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*Understanding and Preventing Construction Conflict, Claims and
Disputes: A Critical In-depth Study into their Causes and
Recommendations to Control in the United Arab Emirates*

By

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ABSTRACT

Construction claims are considered by many project participants as one of the most disruptive and unpleasant events of a project (Ho & Liu, 2004). Researchers like Kumaraswamy (1996) argue that claims managers should focus not merely on the significant claims categories but also on the avoidable ones, to minimize the damaging effects on a given project. It becomes apparent that the causes underlying different claims categories have to be identified so that controllability and avoidability may be established.

This research examines the issues by looking at the construction industry in the United Arab Emirates (UAE), the second largest single industry after oil and gas sector, where claims and disputes are a major problem in the country.

51 leading construction participants including clients, consultants and contractors alike in the UAE were sampled for the study. The analytical results of the survey were further examined, compared and validated via the analysis of the data collected from 45 construction projects.

The main findings of the first phase of study lead to the establishment of an index system called Claim Focus Index (CFI) that further establishes the finding of the 16 most significant types of claims and disputes in the UAE. The study continues to examine the underlying causes of the most significant types of claims and disputes and has identified unique sets of the root causes specific to each significant type of claims and disputes. These shall establish the basis to formulate strategies to focus on avoidability and minimization of claims and disputes.

Keywords: Claims and Disputes, Root Causes, Avoidability

DEDICATION

I dedicate this research to my parents, my lovely wife and children for their sacrifices, support and encouragement. Furthermore, I dedicate this research to my grandmother's soul, who raised me and who would be pleased with my achievement.

ACKNOWLEDGMENTS

I am most grateful to my god for granting me the ability and patience to accomplish this study. I would like to express to all the people who have contributed to efforts made in this study and helped me in every respect.

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Finally, I am deeply grateful to my family and friends for their appreciation, support, understanding and patience.

DECLARATION

I hereby declare that this dissertation is my original work. It is the result of my intensive literature review supported by my own long experience in the field of Engineering Design and Construction in the United Arab Emirates.

STATEMENT 1.

I further declare that this dissertation has not been produced or presented at this University or elsewhere.

STATEMENT 2.

The numerous sources referred to in the preparation of this dissertation have been clearly acknowledged in the bibliography.

Signed:

Nadhem Asaad Bin Taher
(Candidate)

Date:

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CHAPTER ONE
INTRODUCTION

1.1 INTRODUCTION

The construction industry is one of the developing industries in the United Arab Emirates (UAE). Infrastructure development at federal and local levels has been phenomenal in view of the relatively short period since the country's establishment in 1971. The government of the UAE is planning to spend US\$ 20 billion over the next five years on the construction of new infrastructure projects, office and residential accommodation (Intersec, 2005). According to published reports, the value of ongoing construction projects in the UAE has been estimated at US\$ 30 billion, a majority of which are in Dubai and Abu Dhabi Emirates, with plans to develop Dubai and Abu Dhabi as the major tourism centres and regional business and manufacturing bases, this growth is set to continue.

Besides the freehold residential and commercial projects, several hotels, a number of large shopping malls and the massive expansion in both Abu Dhabi and Dubai international Airports are being constructed; this drives the demand for construction materials. According to the UAE Contractor's Association, sixteen-thousand contractors are sharing the UAE's construction business, and three-hundred and forty thousand workers are employed in the sector (Zaneldin, 2002). The current boom in the UAE construction industry (19% of the GDP in 2003) is the direct result of the high return on investment as well as the increased revenue of oil price. This in turn allows the government not only to provide quality life style for its citizens with a very high standard of living as part of the welfare strategy, but also to be recognised as an international trade centre. The open policy of the UAE government towards the foreign residents allows the investment and acquisition of real estate that has potential for a high return on investment. In view of this, the construction industry is considered the UAE's second largest single industry after oil and gas sector. Yet, it is also a very complex and fragmented industry, involving multidisciplinary participants and several stakeholders. Today, construction projects are subject to more claims than any other time in history (Zaneldin, 2002).

Construction claims are considered by many project participants to be one of the most disruptive and unpleasant events of a project (Ho & Liu, 2004). The high competition coupled with the sluggish global economy has forced contractors to bid

projects with minimum profits in order to stay in business. In addition to their multiparty nature, projects are becoming more complex and risky. This has placed an added burden on contractors to construct increasingly sophisticated and risky projects with less resources and profits. Under these circumstances, it is not surprising that the number of claims within the construction industry continues to increase (Zaneldin, 2002).

In order to have a thorough understanding of this issue, it is necessary to have an overview on the construction industry. Cherans & Bryant (1984) summarise that construction projects can be described as temporary multi-organisations, made up of a large number of different people from different backgrounds, based on different geographical locations making their contributions at a different time. These people are interdependent but unfortunately, because of their conflicting interests, are often highly insensitive to the needs of others around them. Moreover, construction is not a single, vertically or horizontally organised industry dominated by a small number of national or multinational corporations. It is a large, fragmented, decentralised industry characterised by thousands of small and medium sized companies and material suppliers. In addition to that, thousands of architects, engineers, bankers, insurance brokers, lawyers, accountants, public administrators, government inspectors, and contracting personnel play a major role (Moss, 1991).

Kangari (1995) states that construction activity is a complex process involving many disciplines with differing skills. Therefore, problems are bound to arise in undertaking complex projects, such as a construction project, due to the widely differing values and goals among the project participants. Some of these problems have the potential to escalate to become significant disputes. In addition, construction, like many other industries in a free-enterprise system, has sizeable risk built into its profit structure (Al-bahar & Crandall, 1990). Although all the parties in a construction contract start with the best of intentions to get the work both complete satisfactorily in the agreed time and at the least expense to owner, whilst ensuring that the general contractor and all other specialist contractors and suppliers make a reasonable profit. Somewhere between the beginning and the end, disagreement, disputes, disruption and delay arise which can destroy the best of intentions. Therefore, the construction industry has a poor reputation for coping with risks, failing to meet deadlines and cost

targets; hence, the clients, the contractors, the public and others have suffered as a result.

1.2 STATEMENT OF THE PROBLEMS

In view of the introductory section, it can be concluded that claims and disputes are considered as some of the most disruptive and undesirable occurrences in a construction project, for most of the project participants. The effectiveness of claim mechanisms influences not only the completion of construction projects, but also resource consumption. This can generate conflicts among project participants and result in wasteful spending from the public budget, which in turn has a negative impact on the future public-funded projects. Any reduction in the incidence could result in tangible benefits in project outcomes.

Loosemore (1995) draws a similar conclusion by saying that resolving the disputes, which develop as a consequence of the differences and conflicts of interests that exist within the project team, is something that occupies much of the project manager's time. It is estimated that there has been a 500 % increase in disputes over the last twenty years (Fenn, 1991). Moreover, Yates (2000) states that great concern has been expressed in recent years regarding the dramatic increase in conflicts and disputes in the construction industry of many countries and areas (e.g. Australia, USA, UK, and Hong Kong). In addition to concern regarding the attendant high cost to the industry both in terms of direct costs (lawyers, claims consultants, management time, delays to project completions) and indirect costs (degeneration of working relationships, consequences of mistrust between participants and lack of team work) (Yates, 2000). It is commonly accepted that claims and disputes need to be avoided. Latham (1994) acknowledges this problem in relation to the U.K. and comments that the best solution is to avoid disputes.

Fenn (2002) states that enormous interest exists amongst the professionals, industry and academia in construction disputes. However, the interest is mostly in the techniques used to resolve disputes, rather than any attempt to avoid disputes. It is taken as axiomatic that disputes will arise and yet nothing is done to predict and avoid them. Moreover, Okpala and Aniekwu (1998) argue that although problems of the high costs of construction contracts constitute a stumbling block in the path of the

construction industry, it appears that little has been done to minimise the problem; and consequently, substantial increase are observed in project costs.

One of the main concerns to construction experts is to devise with solutions to prevent or reduce construction claims and disputes. In trying to consider a response to this question, Yates (2003) believes that it is necessary to reflect upon the possible causes of claims and disputes and the extent to which those causes can be addressed. Moreover, analysing the various causes that may contribute to a project's delay is an important stage in attempting to resolve it. Vidogah & Ndekugri (1997) conclude that determining the impact, timing and the contribution effect of each of those causes to overall delay would assist the parties settle delays without litigation.

The literature review (for details, see Chapter Four) reveals that the identification and the classification of claims and disputes are crucial stages in trying to avoid such claims and disputes.

Watts and Scrivener (1992) identifies the types and frequency of occurrence of the sources of disputes in Australian building industry. The study reveals fifty-nine types of disputes and one-hundred and seventeen 'sources' of disputes. Moreover, Carmichael (2002) argues that there is no complete list of types of claims and disputes; however, he states five main areas of claims and disputes as well as nine main areas of possible causes of disputes. Moreover, Zaneldin (2002) presents eight different main categories as well as twenty-nine different causes of construction claims and disputes in his research findings on wide range issues of disputes within the construction industry in Abu Dhabi and Dubai. Furthermore, Al-Khalil and Al-Ghafly (1999) identifies the most important causes of delay claims in public utility projects in Saudi Arabia based on the frequency and severity of these causes. Important qualitative information and indications about the direction of important trends are obtained. In addition to that, a research that is carried by Kumaraswamy (1997) on wide range issues of claims and disputes within the construction industry in Hong Kong reveals that there are two major areas of causes of claims and disputes with twenty-nine sub types, as well as two major areas of types of claims and disputes with forty-five sub types. Other researches and studies are carried in different countries by different researchers such as Al Sabah et al (2002) in Kuwait, Semple et

al. (1994) in Canada, Rhys Jones (1994) in the UK, Heath et al. (1994) in the UK, Diekmann & Nelson (1985) in the USA. All of these researches suggest different types and cause of claims and disputes. (Detailed analyses of the findings of these studies can be found in Chapter Four).

After the thorough assessment of the literature review, the author summarises the findings of previous works by various researchers as follows:

GENERAL OBSERVATIONS:

- Claims and disputes are considered some of the most disruptive and undesirable occurrences in a construction project, for most of the project participants.
- The effectiveness of claim mechanisms appears not only to influence the completion of construction projects, but also resource consuming.
- Claims and disputes can generate conflicts among project participants and result in wasteful spending from the public budget, which in turn has a negative impact on the future public-funded projects.
- Therefore, claims and disputes need to be avoided. Any reduction of claims and disputes can result in tangible benefits in project outcomes.

The above observations are supported by various studies that were carried out by other researchers such as (Loosemore, 1995; Fenn, 1991; Yates, 2000; Okpala and Aniekwu, 1998; etc.) as explained earlier.

Accordingly, several authors such as Fenn (1997), Jeffery M. Hall (2002), David G. Carmichael (2002), etc., have identified the causes of construction disputes contributed by the involved parties in a construction project.

Literature review reveals that other studies on wide range issues of claims and disputes were carried out in various developed countries. These studies were performed by several researchers such as Diekmann & Nelson (1985) in the USA, Watts and Scrivener (1992) in Australia, and Semple et al. (1994) in Canada. Moreover, Rhys Jones (1994) and Heath et al. (1994) carried similar studies in the UK. In addition, Kumaraswamy (1996, 1997) and Yates (2000) performed studies

into construction claims and disputes within the construction industry in Hong Kong.

Furthermore, literature review exhibits that similar studies have been conducted on wide range issues of this subject to identify the types and causes of claims and disputes within the construction industry in the Arabian Gulf Region. Examples of these researches were carried out by Al-Khalil and Al-Ghafly (1999) in Saudi Arabia, Al Sabah et al (2002) in Kuwait and Zaneldin (2002) in the United Arab Emirates.

All of these researches suggest different types and cause of claims and disputes. However, it is found that in spite of the several attempts by various researchers to address the significant types and causes of claims and disputes, and consequently address a variety of measures to avoid or reduce such causes, claims and disputes not only still occur but also continue to rise. Many authors including Yates (2000) and Fenn (1991) support this observation.

DEFICIENCIES OF THE PREVIOUS RESEARCHES AND STUDIES:

It is apparent from the literature review (Chapter 4, Section 4.6) that there is a lack of evidence in any discussion of the underlying causes of each type of construction claims and disputes. The literature review exposes an almost complete absence of examining the interrelationships between types and causes of claims and disputes. Most attempts by various researchers, addressing lists of common types and causes of claims and disputes, lack such investigation. Fenn (2002) detects this issue and clearly says that the literature on *“cause of construction disputes cites many different causes, and it is impossible to find agreement on causal factors. There is almost no discussion of the philosophical aspects of cause and causation; most researchers claim cause and effect without any backup. Some statistical analysis is carried out but again little discussion of statistical links and cause is found”*. Moreover, Kumaraswamy (1997) asserts that there is a need to identify common sources of claims and disputes in order to isolate and control the root causes. He continues his argument and says that an appreciation of such root causes will be useful in resolving any ongoing and unavoidable claims and disputes, as well as avoiding any avoidable ones.

Thus, if we seek to avoid claims and disputes, we must seek to predict them. Fenn (2002) argues that by predicting claims and disputes, we can take the necessary action to avoid them.

A major problem in the prediction, the evaluation and the assessment of the most significant cause(s) that may contribute to give rise to the overall types of claims and disputes is the identification of the cause(s) underlying various types of claims. On the basis that if the causes are identified, their controllability and hence avoidability can be assessed more realistically. Difficulties in such identification arose from types of claims and disputes being generated overlapping causes as well as cumulative cause-effect cycles (Kumaraswamy, 1997).

Therefore, research into the types and causes of conflict (claims and disputes) is essential, particularly if such research leads to the development of preventative measures, or as described by Fenn et al (1997) a *“predictive” model, which would enable the participants in the construction process, especially the client, “to be aware of, and perhaps avoid factors which cause disputes”*.

1.3 AIMS AND OBJECTIVES

Section 1.2 has indicated that claims and disputes are of major concern in construction projects, in terms of delays and extra cost.

This is particularly relevant to Abu Dhabi due to the large capital investment in construction projects.

Deficiencies in previous research were also identified e.g. Kumaraswamy (1997) and Fenn (2002) indicate the causes and root causes of claims and disputes are not fully understood and an appreciation of such root causes will be useful in resolving any ongoing unavoidable claims and disputes as well as avoiding any avoidable ones.

The primary aim of this research is thus to develop a greater understanding of the underlying root causes of claims in construction in the UAE and to identify those that have the greater impact on time delays and cost overruns.

The secondary aim is to investigate whether a knowledge of these root causes can be used to reduce the incidence and impact of claims and disputes in the construction industry in the UAE and in particular Abu Dhabi.

Based on the above stated aims, the specific objectives are set as:

1. To identify the significant types of claims and disputes;
2. To identify the significant common causes of claims and disputes;
3. To identify the significant causes that may lead to a specific type significant of claims and disputes.
4. To conceptualize the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry

Subsidiary research objectives can be summarised as follows:

1. To understand the relationships among conflicts, claims and disputes.
2. To understand the concept of conflict behaviour, and how can it be used to avoid and control claims and disputes.
3. To understand the concept of project risk management, and how can it be used to avoid and control claims and disputes.
4. To propose some suggestions and recommendations that can be useful for the construction industry in the United Arab Emirates.

1.4 SCOPE OF THE STUDY

This study focuses on the exploration and investigation of the contractual claims and disputes raised in traditional (Lump Sum) procurement approach adopted for construction projects for the government of Abu Dhabi, UAE based on Abu Dhabi General Condition of Contracts (AGCC). This investigation is based on the feedback from experiential knowledge of construction professionals (i.e. clients, consultants, contractors, and claim experts), as well as on data collected from various government projects developed by the government of Abu Dhabi. These projects developed

buildings for education (i.e. schools and collages, etc.), religious services (i.e. mosques, etc.), government (i.e. ministry departments, police stations and head quarters, etc.), and commercial housing.

1.5 SIGNIFICANCE & VALIDATION

As claims and disputes can have numerous negative impacts, namely, delays and cost overruns of construction projects; this study is carried out to identify the momentous types of claims and their associated noteworthy causes that contribute to the rise of these claims and disputes. This identification will help the construction participants in assessing these factors and take the necessary proactive measures to reduce their adverse impact by applying the developed and suggested methods and strategies to control the controllable causes as a mean of avoiding any avoidable claims and disputes and mitigating any ongoing and unavoidable ones in the Arabian Gulf region. These recommendations and strategies are mainly improvement of documentation and administrative processes used in the construction industry in order to reduce the number of claims and disputes and their associated costs.

In spite of the scope and limitation of this study, which focuses mainly on government projects in Abu Dhabi, the general causative pattern of these claims and disputes can be taken as guidance for other construction projects, especially that most of the project developers in Abu Dhabi are using the traditional (lump sum) contract strategy. As previously mentioned, around \$50 Billion is invested in construction development during the last 8 years (Intersect, 2003), as well as the overall percentage and the general trend of claims and disputes which equal to 15 % of the value of the building projects reported by other researchers in the UAE (Zaneldin, 2002). In view of this, one can really appreciate the amount of savings that could be made by developers by avoiding and controlling the causes of these claims and disputes.

A major significance of this study is that it is (to the best knowledge of the author) the first detailed study of its kind to address not only the classification of claims and disputes in terms of their types and causes, but also it is the only study that took these different factors into different layers of analysis (i.e. type, causes, causes and each type, etc.). The researcher as the macro and the micro levels of investigation, where most of the previous works by other researchers looked at claims and disputes

from either the macro level or micro level perspectives. The macro level prospective is that when the previous researchers looked at types and causes in general without any discussion of the underlying causes of these types of claims and disputes; alternatively, the micro level is that when they looked at a specific type of claims and disputes (i.e. variations) and investigate the underlying causes of variations. In both ways of analysis, they proposed general method and strategies to avoid claims and disputes in general. This way of analysis has lead to conflicting causes of claims and disputes, and consequently, the proposed strategies to avoid or reduce such causes are conflicted and add additional confusion to the construction industry. However, this study looks at claims and disputes in two different layers, the analysis of the general types of claims and disputes (macro level), as well as the underlying causes of each type of claims and disputes (the micro level). This approach enabled the researcher to understand and assess those type and their underlying causes more realistically; hence, to propose an appropriate strategies and measures to avoid and control these causes of claims and disputes. Other critic scholars such as Fenn and Kumaraswamy as mentioned earlier in this chapter support the conclusion that was drawn by the researcher on this issue.

The significance of this study is supported by the use of different methods of research, namely, methodological triangulation, which helped the researcher to increase the validity and credibility of the results of the significant types of claims and disputes and their associated and significant root causation, in order to achieve the objectives of the research as adequately as possible. This method of research study is acknowledged by various researchers such as Cohen and Manion (1986) who define triangulation as an *“attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint”*. Altrichter et al. (1996) contend that triangulation *“gives a more detailed and balanced picture of the situation”*; as well as, O’Donoghue and Punch (2003) who argue that triangulation is a *“method of cross-checking data from multiple sources to search for regularities in the research data”*.

Another major significance of this study is that, although, the reported surveys used in this study highlight particular types of claims and disputes and their relative root causation patterns in Abu Dhabi, UAE, a review of the international literature

confirms the many parallels with other contractual regimes. It is also noted that the research methodology used in this study, is potentially applicable as a benchmark for studies in other contractual regimes with special considerations to the general conditions of contracts and the associated risks in those specific regimes. The ongoing development of innovative forms of construction procurement adds value to the services provided to construction participants (i.e. clients, consultants, contractors, experts, etc.), as well as to the construction industry in general. This development can be guided by the additional and crucial knowledge generated, specifically, to manage claims and disputes in construction projects by formulating ways and methods to avoid the avoidable claims and disputes and control the unavoidable ones.

1.6 THE RESEARCH STRUCTURE AND CONTENTS

The dissertation is structured into nine chapters and briefly described as follows:

Chapter 1

This chapter presents an introduction to the study. It highlights the statement of the problem background, the purpose of the study and the formulation of the research aims and objectives. It reviews the previous academic research related to the construction claims and disputes. Moreover, it reports the significance of the study and the contribution of the research. Finally, the methodology of conducting this study and a brief summary on the structure of the dissertation is presented.

Chapter 2

This chapter outlines the research design and methodology. The entire research designs are comprehensively described in the research design procedure. Every research design topic starts with a short literature review that continues with a precise systematic design interconnected directly to this research. Questionnaire design and structured interview were elaborated in immense aspect. As well as questionnaire validity and reliability is included and finally data collection techniques and methods of measurements are introduced. By this clarification, it is easier to understand the following chapters.

Chapter 3

The first main Section (3.2) of this chapter, “An Overview of Conflicts, Claims and Disputes”, discloses the definitions of each term generally used among professionals in the construction industry. It also covers the views of various scholars regarding the relationships amongst these terms, as well as the development of claims and disputes.

The following Section (3.3), “An Overview of Conflict, Management and Resolution”, describes conflict (claims and disputes) as the base for understanding organisational conflict behaviour. Furthermore, it presents a literature review of conflict and its characteristics along with some comments and views of different scholars regarding the role of conflict within organisations. Additionally, it covers the different viewpoints of scholars’ arguments on the reasons and source of conflict phenomena, as well as the explanation of the conflict episodes in order to understand the reason for frequent occurrence of conflict. Moreover, it covers different strategies for managing conflict. Finally, it covers the different methods of conflict resolution.

The last main Section (3.4), “An Overview of Project Risk Management, Types of Contracts and Their Procurement Strategies”, highlights the concept of project risk management. Different types of contracts and procurement strategies are addressed in order to examine the scope of their effect on construction claims and disputes.

Chapter 4

Chapter Four highlights the literature review on construction claims and disputes and approaches to minimising them. It includes claims and disputes occurrence. It also covers the views of various scholars regarding the classification of claims and sources of construction claims and disputes. Furthermore, it presents a literature review on the types and causes of claims and disputes with some comments and views of various researchers regarding these issues. Additionally, it presents the general observations from the literature review made by the researcher. Finally, it highlights and explains different methods of disputes resolutions.

Chapter 5

It is necessary to understand the volume of work that takes place in the UAE and especially in both Abu Dhabi and Dubai Emirates, in order to assess the effects of the environment in the construction industry. The review of the country's characteristics was the base for examining the different types of environmental factors and the scope of their effect on construction projects in the UAE.

This chapter highlights the UAE overview, historic background, location, political structure, society, climate and about its economic review. An in depth analysis has been incorporated about UAE construction and real estate development, construction project providers (public and private sector) and environmental factors affecting this industry such as political, financial, legal etc. This chapter also covers Abu Dhabi construction contracts and its public sector management in construction industry.

Chapter 6

From Chapter Five it is evident that the construction industry is one of the largest industry in UAE and that this industry makes a significant contribution towards the UAE's GDP. This industry is prone to disputes which causes delays in delivering projects on time, thereby incurring extra cost. Thus, it is important to know about variation, risks and causes and effects of variations.

This chapter gives an insight into variations, causes and effects of variations. This also deals with information about the general conditions of contracts to assess the risks associated with variations and disputes i.e. it covers most important factors such as time for completion, payment certificate, inspection of site, penalties for delay etc.

Chapter 7

Findings of the survey study, involving the use of a questionnaire and interviews (Phase I & Phase II), are analysed and discussed in the light of the existing literature reviewed throughout the thesis.

Chapter 8

Continuation of the findings of the survey study, involving the use of a questionnaire and interviews (Phase III & Validation), are analysed and discussed in the light of the existing literature reviewed throughout the thesis.

Chapter 9

It discusses the process of the data analysis to achieve the aim and objectives of this study, which included introduction, analysis of data, important index, findings and discussion, and conclusion.

Chapter 10

In this final chapter, the author presents his conclusions drawn from the primary data generated in Chapter Six, and the secondary data provided throughout various chapters of the thesis. Recommendations for further studies are suggested in this chapter as well, suggested solutions for dealing with environmental pollution, and the proposed environmental impact assessment methodology for implantation in the Emirates of Abu Dhabi and Dubai are also provided in this chapter.

The following chart in Figure 1-1 presents the thesis structure. It summarizes the research contents.

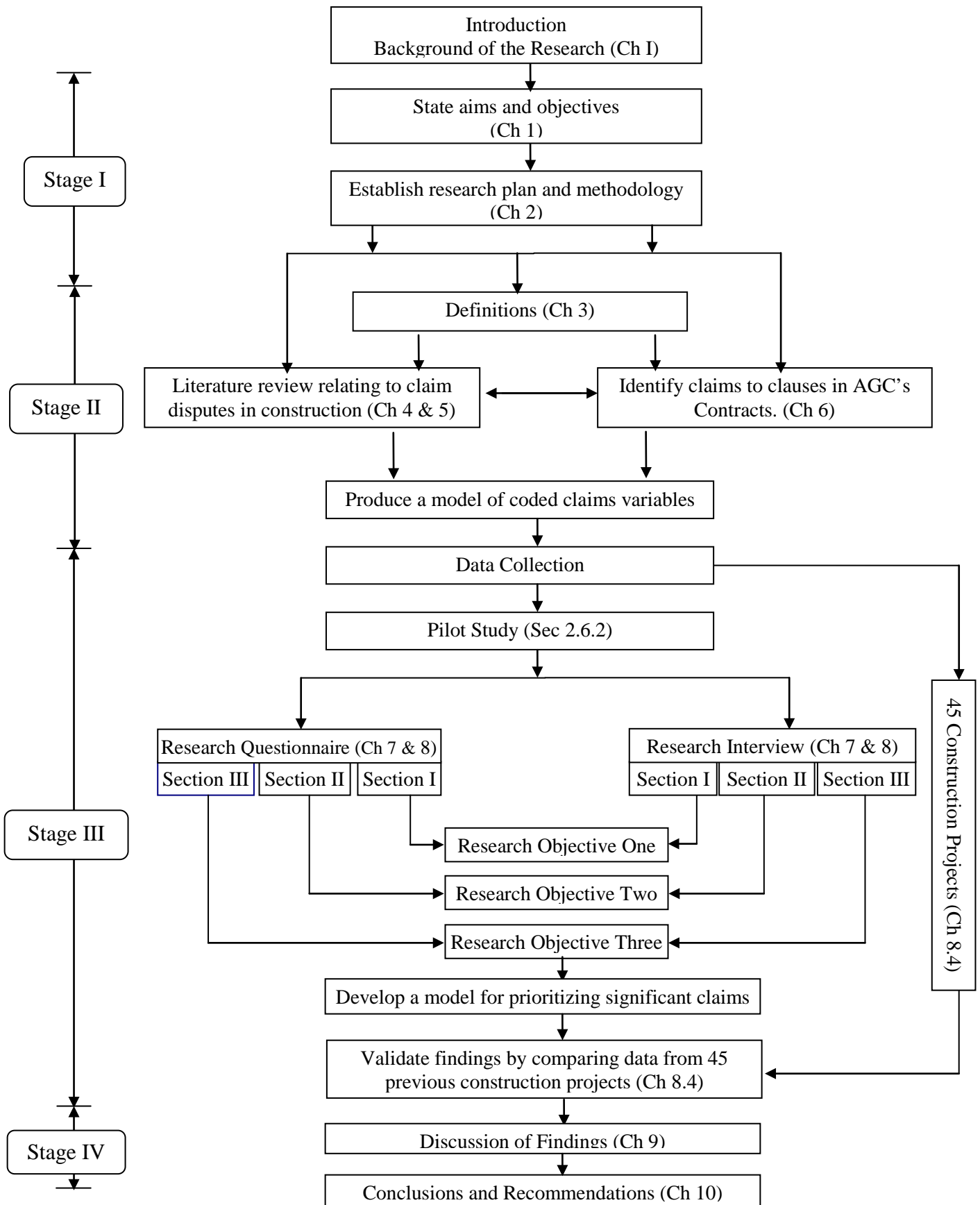


Figure 1-1 Thesis Structure (Flow Chart)

CHAPTER TWO
RESEARCH DESIGN AND METHODOLOGY

2.1 PURPOSE OF THE STUDY

This main purpose of this study is to achieve the aims and objectives relating to the identification, assessment and management of various factors that influence the occurrence and are responsible for the rise of construction conflicts (claims & disputes) in the Arabian Gulf, in general, and Abu Dhabi Emirate, in particular.

2.2 LIMITATION OF STUDY

The research is limited to Abu Dhabi General Condition of Contracts (AGCC) on Government Construction Projects using Traditional (Lump Sum) Contract Strategy.

2.3 RESEARCH DESIGN

According to Stoner and Freeman (1992), the compass of the research design is to generate some new knowledge. Moreover, research design can take one of the following three types.

- *Investigative Research Design* relates to a research where a new problem can be structured and identified.
- *Constructive Research Design* relates to a research where a new solution to a problem can be developed.
- *Pragmatic Research Design* relates to a research where empirical proof on the practicability of an existing solution to a problem can be provided.

This research is in the second of the second type, *Constructive Research Design*, and the following discussion describes the focal arrangement of this research.

Researchers and authors agree that both quantitative (conventional) and qualitative (or unconventional) research methods make important contributions to the development of new knowledge. For example, quantitative research describes quantity and tests relationships between variables at much greater precision than do most qualitative research. On the other hand, qualitative research can provide information regarding individuals' values, beliefs, understandings, and interpretations at much greater detail compared to most quantitative research. Increasingly researchers are

finding that quantitative studies should not stand alone, and that qualitative research can add substance to the field's knowledge base (EECE, 2003).

Today, Government agencies and private sector organizations are becoming increasingly concerned about the effectiveness of their programs and policies. Qualitative studies form the basis for the evaluation of many of these programs or particular components of these programs. Qualitative research is a broad category that includes exploratory or hypothesis-generating (inductive) studies, interpretive research, historical research, and several other forms of knowledge creation distinct from deductive research conducted within the positivist tradition (Mittman, 2001). Qualitative studies use methods including in-depth interviewing, semi-structural observation and focus groups, singly or in combination, depending on the needs of the particular study.

There are several differences between qualitative and quantitative research. One of the strengths of qualitative research methods is that they are exploratory and flexible. The results of a quantitative survey, using closed-ended questions, provide planners and programs with information about characteristics of the population on a set of predetermined questions. Qualitative methods allow the researcher to ask questions of different people in different ways and to modify the questions and data collection methods to explore topics that were not initially deemed important (*Department of International Health, Johns Hopkins University, School of Hygiene and Public Health 2000*).

Moreover, Qualitative research has its strengths, and thus differs with the various forms of qualitative work. For example; Grounded theory is excellent for simultaneously developing and testing new theories about the functioning of social systems; phenomenological research gives us insight into how life is experienced by the people who live it. Such knowledge of other people's subjective experiences is required by anyone hoping to influence their behaviours; hermeneutic research explains the links between one's subjective experience and wider social forces and institutions. Finally, case research can engage theory testing, which is at a philosophy of science perspective similar to a lot of quantitative research, but approaches theory testing from a different angle. Whereas quantitative work looks at many cases but

treats each one in a somewhat cursory fashion (assuming that errors will "wash out" due to larger sample), case research can explore a few cases in detail to determine if a theory really explains what is happening in those real-life situations (Ahuvia, 2003).

Most authors and researchers in the field of social and behavioural sciences view inductive, interpretive and related applications of qualitative methods as those methods' strengths and areas of unique contribution given their "superiority over quantitative methods in developing insights into actors' values, beliefs, understandings and interpretations of events and other phenomena, or in explaining historical occurrences" (Mittman, 2001).

It is fair to conclude that both quantitative and qualitative research play important roles in knowledge creation. "Just as experimental research and survey research are both quantitative, yet are very different from each other; there are many diverse forms of qualitative research, each with its own strengths, weaknesses and assumptions. In some cases quantitative and qualitative research are complementary ways of addressing the same issue." (Ahuvia, 2003)

In quantitative research analysis, it is a systematic scientific investigation to develop and employ mathematical models, theories and hypothesis pertaining to research design. The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships. Quantitative methods are efficient, but qualitative methods may be required where information cannot be obtained effectively by quantitative methods, and are thus complimentary.

In the design of this research, an interaction exists between both qualitative and quantitative approach.

- (a) Quantitative methods are used in a measurement rating scale and a proposed model, as well as the use of historic data from specific contraction projects.
- (b) Qualitative methods are used to study the perception and experiences in relation to claims and disputes as these can be of a subjective nature.

The reason for the above approach in relation to this research is the complexity that is inherent in claims.

When looking at causation the superficial cause may mask an underlying cause, which if identified and addressed may reduce several other superficial causes. To identify the root causes of claims it is necessary to develop knowledge of the contract documentation and how these are interpreted, which may be subjective. Also to assess relative importance of various sources of claims it is necessary to seek the opinions of those with experience of these events, and also to compare these perceptions with actual events. Only then can the complete overview be gained. Hence for this research a combined qualitative and quantitative approach is justified.

2.4 RESEARCH PROCEDURE AND METHODOLOGY

This research is structured into the following four main stages, see Figure 2-1 below, and a detailed explanation is provided in the following sections.

2.4.1 AN OVERVIEW OF RESEARCH PROCEDURE STAGES

This research has been structured into the following stages.

Stage 1. Introductory stage, (Chapters One and Two)

Introduction to the rationale for the research and its aims and objectives, together with a description of the research methodology employed to achieve the stated aims.

Stage 2. Literature Reviews, (Chapters Three, Four, Five and Six)

Examines research and information pertinent to this thesis and provides background information on the geographical location to which the research specifically applies. This information is then used to formulate a model of the sources of claims and disputes that are currently identified.

Stage 3. Primary Data Collection and Analysis, (Chapters Seven and Eight)

Collection of relevant data by questionnaires, structured interviews and case

studies to address each of the three research objectives stated in Chapter One.

Stage 4. Discussion of findings and conclusions, (Chapters Nine and Ten)

Critically evaluates the attainment of each of the research objectives, assesses the success in attaining the aims of the research and provide a statement of the findings.

2.4.2 SOURCES OF DATA COLLECTION

The results of this study are based on data collected from three primary data sources. The first source is the questionnaire survey distributed to 51-construction professionals such as clients, consultants and contractors. The second source is interviews with 10 experts who are directly involved in claims and disputes management. The third source comprises data from 45 construction projects.

The 51 construction professionals were selected to provide information on claims and disputes that have arisen in their working experience, and provide experience from the contracting, consultant and client perspectives.

The structured interviews with the 10 experts provide specialist expertise in the areas of claims and disputes and can be used to verify if the results from the questionnaire survey contain any anomalies or discrepancies. Thus providing some confidence in the questionnaire survey or triggering the need to repeat elements of the survey.

The case studies from the 45 construction projects then provides data to verify if the results and findings of the analysis of the above data are a realistic interpretation of what actually occurs in practice.

The above provides the basis of methodological triangulation (See Figure 2-2 Below) thus providing increased confidence in the validity of the findings through cross referencing between the three major data sources of literature review, questionnaire together with interviews of experts, and case studies.

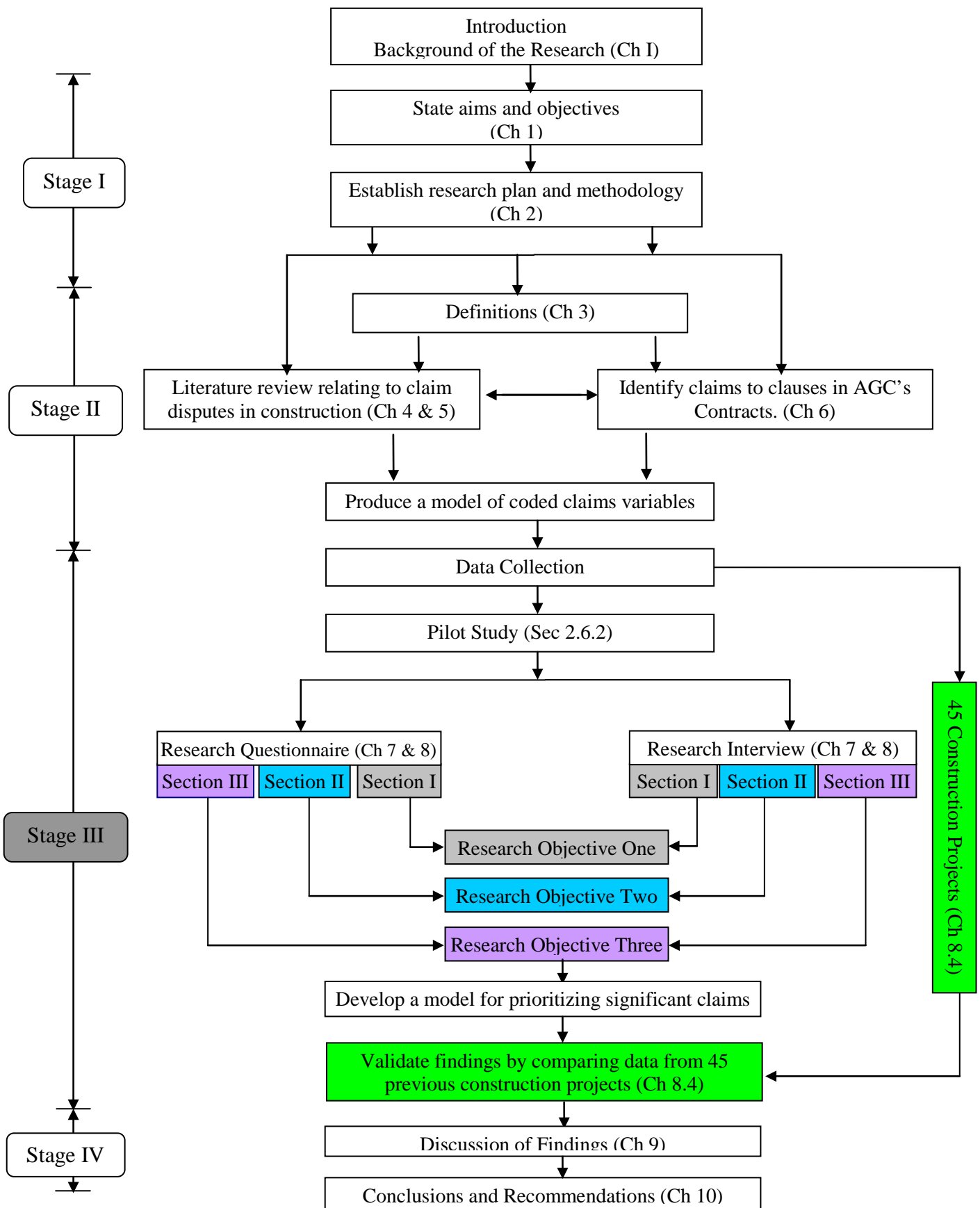


Figure 2-1: Research Structure & Methodology

Detailed information regarding the sampling sources can be found in Chapter Seven, Section 7.2.3. Moreover, other information regarding the sample size, return rate, etc. can be found in Chapter Seven, Section 7.3.1.

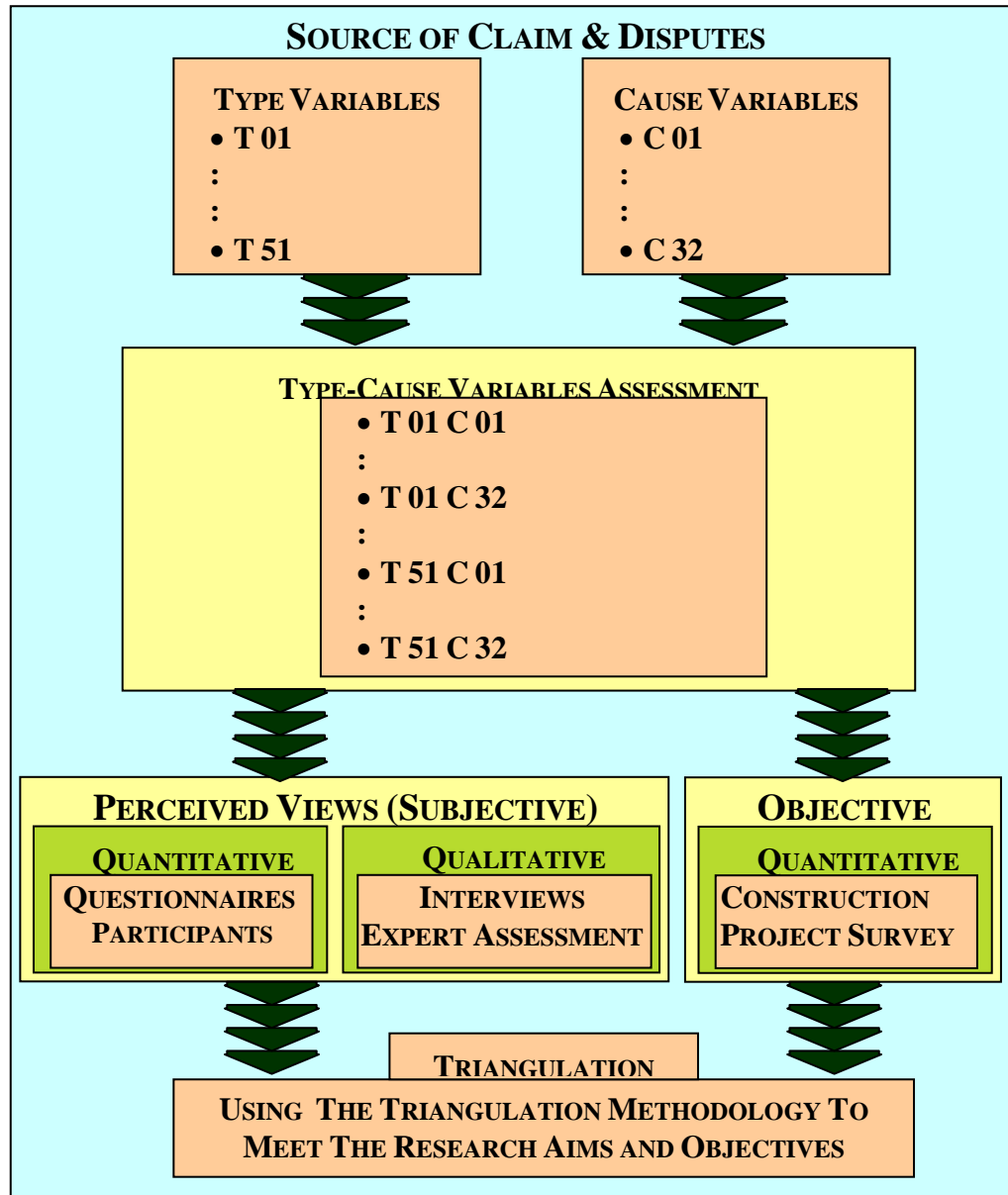


Figure 2-2: Triangulation Methodology

2.5 DATA COLLECTION METHODS

Of the four data collection methods commonly use in research, namely, historical, survey, experimental and case study methods, the survey and case study methods are used in this study as they best match the objectives of this research, (see Section 2.3 above). The survey provides qualitative information and the case studies

provide quantitative information.

For the survey this involves designing a questionnaire, and piloting it to assess its reliability and validity, and conducting interviews with claims and disputes experts. The survey was either sent to the selected sample or handed over in person, and the data generated by the sample were subsequently analysed. The questionnaire is used to find answers to questions such as how many, how, where, when, etc. The researcher employs a qualitative method, namely, interviews. Interviewees were carefully selected and interviewed. According to Mason (1996), interviews are generally characterised by:

- I. A relatively informal style, e.g., the appearance of a conversation or discussion, rather than a formal question and answer format;
- II. A thematic, topic centred, biographical or narrative approach, where researchers do not have a structured list of questions, but usually have many topics, themes or issues which they wish to cover; and
- III. The assumption that data are generated through the interaction itself, because either the interviewer, or the interaction itself, is the data sources

For this research the second of the above classes apply.

As stated in Chapter One (Sections 1.4 and 1.5), questionnaire, interview, and document study techniques were used for the purposes of this research to generate the required data as together they better suit the purposes and approaches of the present study.

2.5.1 QUESTIONNAIRE TECHNIQUE

2.5.1.1 INTRODUCTION

A questionnaire can be defined simply as “*a list or grouping of written questions which a respondent answers*” (Adams and Schvaneveldt, 1985). Chisnall (1997) provides a more useful definition of the questionnaire, referring to it as a “*method of obtaining specific information about a defined problem so that the data, after analysis and interpretation, result in a better appreciation of the problem*”. Chisnall’s definition is most relevant to the purposes of this study.

The questionnaire is one of the most important elements of total research design; its preparation and administration demand extensive professional expertise (Chisnall, 1997). Some of the advantages of the questionnaire are as follows:

Questionnaire is less expensive than any other methods; produces quick results; can be completed at the respondent's convenience and offers greater assurance of anonymity and less opportunity for bias or errors caused by the presence or attitudes of the interviewer. It offers a considered and objective view on the issue, since respondents can consult their files and many subjects prefer to write rather than talk about certain issues; provides wide coverage, is a stable, consistent and uniform measure, without variation; and is not affected by problems (Sarantakos, 1998).

Since a questionnaire is a self-administered interview, it requires self-explanatory instructions and effective question design because there is often no interviewer to help explain what might appear ambiguous to respondents (Smith, 1981). Questionnaires differ from interviews mainly in the way they are administered. Self-administered questions are referred to as questionnaires, whereas questions delivered face-to-face are referred to as interviews. Questionnaires can be relatively easily administered to a large number of participants (when compared to interviews).

However, unlike interviews, they give no opportunity for further questioning by the researcher if an unanticipated avenue for questioning is generated by an answer. Roberts (1999) argues that the questionnaire is the most widely employed technique for the collection of data in surveys and is a very efficient way of creating the matrix of data required for analysis.

2.5.1.2 QUESTIONNAIRE SURVEY DESIGN

Questionnaires are the simplest method to collect data from a large number of respondents. A well designed questionnaire will save the researcher time both in term of data collection and in the analysis of data (Welford and Gouldson, 1993). Moreover, it is important to remember that a questionnaire should be viewed as a multistage process beginning with definition of the aspects to be examined and ending with interpretation of the results. Every step needs to be designed carefully because the results are only as good as the weakest link in the questionnaire process (Ibrahim,

2006).

In questionnaires, respondents are asked to self administer the questionnaire; thus the research questionnaire used in this research was intended to be as simple as possible but with massive information gathering. In this respect, the questions were designed in a manner to help respondents complete them in a systematic fashion, with the minimum amount of time and effort. Moreover, for a questionnaire to yield reliable data, it is necessary to consider respondents' cultural background when designing the questions and their layout. In this respect, closed ended questions were used, because they best generate information and facilitate analysis. However, at the end of the questionnaire respondents will be invited to highlight "any other" issue(s) that may have been omitted in the questionnaire. In addition, Moser and Kalton (1997) state that the questionnaire layout or framework should be such that editing and coding of data will proceed smoothly. Taking this into consideration, code numbers were set and typed clearly on the left side of the questionnaire at design time, so data could be fed into the computer more easily and smoothly.

The questionnaire was structured to obtain responses based on the respondents' perception of claims and disputes in the UAE's construction industry. The questions focused on the following issues:

- To Identify and confirm the types of claims and disputes.
- To estimate the relative frequency, magnitude, and avoidability of different types of claims and disputes
- To Identify and confirm the common causes of claims and disputes.
- To estimate the relative significance (importance) of common causes of claims and disputes
- To identify and confirm the significant (important) cause/s that could lead to a significant (important) type of claims and disputes.
- To estimate the relative significance (importance), and avoidability of cause/s that could lead to a type of claims and disputes.

The questionnaire survey was divided into three parts; the first part focused on the respondent's personal details assessment, and the second part focused on the technical assessment. The technical assessment part was divided into three sections,

each corresponding to one of the research's objectives. The third part was focused on the overall coverage of the questionnaire's sections and variables under each section. As well as, to add any other comments regarding the variables sections and any other related issues. The questionnaire was set out on double-sided A4 paper in booklet form. In order to increase the response rate, the questionnaire booklet contained a personal note to respondents assuring them of the confidentiality of the information obtained and thanking them for their time and effort. The following describes each part of the questionnaire. Note that a copy of the questionnaire survey form can be found in Appendix (C).

Part I (Respondents' Assessment):

This section focused on respondents' personal details and information, including their place of work, occupation, experience, etc. This part was included to verify that the sample investigated was representative of the population covering all target sectors (i.e. Client, Consultant, Contractors). Other personal details, such as name, age, etc. were not included in the questionnaire, because: (1) these details were unnecessary; (2) not important in this kind of questionnaire, (3) to ensure free and honest answers; and (4) to minimise the number of questions, and increase the response rate. Respondents were asked to provide

Part II (Technical Assessment):

Section I: This section focused on the common types of claims and disputes variables. In this section, respondents were asked to provide their perceived views on the tabulated/ suggested common types of claims and disputes. Moreover, they were asked to rate the frequency, magnitude and Avoidability of types of claims and disputes variables.

Section II: Similarly, This section focused on the common causes of claims and disputes variables. In this section, respondents were asked to provide their views on the tabulated/ suggested common causes of claims and disputes variables. In addition, respondents were asked to rate the significance (importance), and the avoidability/controlability of causes of claims and disputes variables.

Section III: This section dealt with the type-cause relationships. It focused on the significant (important) cause/s that could lead to a specific type of claims and disputes, where respondents were asked to rate the significance (importance) of a specific cause under a specific type of claims and disputes.

Part III (Overall Participants' Assessment):

In this section, respondents were asked to rate the overall coverage of the questionnaire's sections and variables under each section. As well as, to add any other comments regarding the variables sections and any other related issues.

Note that each of the used variables in the questionnaire survey was coded based on a unique coding system that was developed in Chapter Four A complete coding system, which was used in this study, can be found in Appendix B.

2.5.2 INTERVIEW RESEARCH DESIGN

2.5.2.1 INTRODUCTION

Interviewing is a common significant method to obtain comprehensive information from a single respondent or groups of respondent. It is very valuable to achieve expert opinions on the subject or talk to someone knowledgeable about a topic.

According to Arsham (2002), there are several different types of interviews based on the technology available for interaction; these types are as follows

➤ *Face to Face*

Face to face, interviews are to sit down and talk with someone. They are beneficial because the adaptation of questions to the answer of the person being interview. Recording equipment may be required for the interview.

➤ *Phone*

Phone interview can be used when to interview someone who is geographically far away, who is too busy to meet and to talk with, or who does not

want to use internet technology. A special recording device may be required to be use with most phone systems.

➤ *Email*

Email interviews are less personal than face- to- face or phone interviews, but highly convenient for most individuals. Not much information can be obtained from someone in an email interview because it is not feasible to ask follow up questions or play off the interviewee's responses. However, email interviews are useful because they are already in a digital format.

➤ *Chat Messaging*

It is also possible to interview someone via an instant messaging service such as MSN Messenger, ICQ or AOL Instant Messenger. These interviews allow a person to talk to people at great distances and give the benefit of adapting the questioning based on the responses receive. Where researcher and/or respondent are not fluent at typing, however the information obtain may not get as lengthy responses from this option (Arsham, 2002).

2.5.2.2 INTERVIEW SURVEY DESIGN

Based on the above guidelines, the interview design was similar to the format of the main questionnaire survey design presented in the previous Section 2.5.1.2 '*QUESTIONNAIRE SURVEY DESIGN*'. A copy of the semi-structured interview form can be found in Appendix (D).

Interviews with ten experts were performed in order to validate the suggested/ identified types and causes of claims and disputes. These ten experts have greater familiarity, and are more involved in claims and disputes management.

The semi-structured interview was structured to obtain responses based on the experts' perception of claims and disputes in the UAE's construction industry. The questions focused on the following issues:

- To compare and validate the identified types of claims and disputes;

- To compare and validate the identified common causes of claims and disputes;
- To identify the significant (important) cause/s that could lead to a significant (important) type of claims and disputes;
- To identify the suggested strategies to avoid/control causes of claims and disputes;

The semi-structured interview was divided into three parts; the first part focused on the Experts' personal details assessment, and the second part focused on the technical assessment. The technical assessment part was divided into three sections, each corresponding to first three research objectives. The third part was a descriptor focused on the overall coverage of the interview's sections and variables under each section. As well as to provide the opportunity to add any other comments regarding the variables sections and any other related issues. The semi-structured interview was set out on double-sided A4 paper in booklet form. In order to increase the response rate, the interview booklet contained a personal note to respondents assuring them of the confidentiality of the information obtained and thanking them for their time and effort.

2.6 PHASES OF DATA ANALYSIS

2.6.1 INTRODUCTION

As a result of the literature surveys of Stage Two of this research (see Figure 2.1), it was possible to develop a model listing those types of claims and dispute variables commonly found in the construction industry and relate these to clauses in both the Abu Dhabi General Condition of Contract (AGCC), and Abu Dhabi Contract General Specification (ACGS). This was the basis for developing a type of claims and disputes model (list) based on Abu Dhabi General Condition of Contract (AGCC).

These variables were then codified and entered into a survey questionnaire. A pilot study was first conducted (see 2.6.2 below) and on completion the revised questionnaires were issued and collected, together with the data from the structured interviews.

The subsequent analysis of the above data was conducted in three Phases, addressing Research Objectives 1, 2 and 3, (see Sections 2.6.3 to 2.6.6 below).

2.6.2 PILOT STUDY

The purpose of the pilot survey study is to test whether the concepts and language used in the questionnaire were comprehensible to the people participating in the research study (Al-Abed, 1996). Piloting aims to see how the survey works and whether or not changes are necessary before the full-scale study starts. This pre-test also provides a means of identifying and solving previously unforeseen problems in the administration of the questionnaire, such as phrasing and sequence of question, or length, and may indicate the need for additional questions or the elimination of others (Kidder, 1981). It is also an important step in order to discover any problems in the questionnaire, such as ambiguous or extraneous questions (Bailey, 1982).

In this respect, the purpose of the pilot survey study, which was carried out between June and July of 2005, was to test and assess whether the concepts and language used in the draft questionnaire were comprehensible to the professionals participating in the research study. Furthermore, to revise any questions before designing the final form of the questionnaire and conducting the main survey.

A total of nine responses (i.e. 10% of the sample size of 80 professionals and 10 experts in claims and disputes) were contacted to provide the researcher with their comments and views. These individuals were chosen from different backgrounds in the construction field and from different positions (i.e. two from clients' position, two from consultants' position, one from contractor's position, and one from experts' position). The analysis of six responses revealed certain areas of the questionnaire and interview, which could affect the reliability of the data collected. These areas were concerned with:

- Length of the questions: long questions and complicated tables were found to be undesirable.
- Language: Similar words in the questions and in the measurement scales sometimes confused interviewees.
- Order of the questions: some questions were found to be better answered when asked towards the end of the interview, as by this time a level of understanding for the whole subjects is established (i.e. suggestions to avoid/control claims and disputes).

Comments and suggestions were taken into account when redrafting the final form of the questionnaire.

2.6.3 PHASE ONE

This phase addresses Research Objective One, “*identifying the significant types of claims and disputes*”. This phase was accomplished by analysing the collected data from experienced-based observations of fifty-one construction professionals, namely, clients, consultants, and contractors (Questionnaire Section I); semi-structured interviews; as well as objective quantitative data from forty five construction projects in separate surveys.

A questionnaire (based on 5 Scale Likert) incorporating the types variables, which were obtained from Stage Two, was designed and directed to 51 professionals to obtain their responses and views on the Frequency, Impact, and Avoidability of the types variables. In order to strengthen the findings of the quantitative questionnaire, interviews with 10 Experts with greater familiarity who are more involved in claims and disputes management were performed; to validate these results, a separate survey was performed to collect quantitative data from 45 construction projects. A complete list of the type variables used can be found at the end of this thesis in Appendix (A), a sample of the questionnaire form can be found in Appendix (C), a sample of the structured interview form with expert can be found in Appendix (D) and a sample of the second survey can be found in Appendix (E). A complete coding system can be found in Appendix (B) as well. The summary of research methodology phase one is shown in the following Figure 2-3.

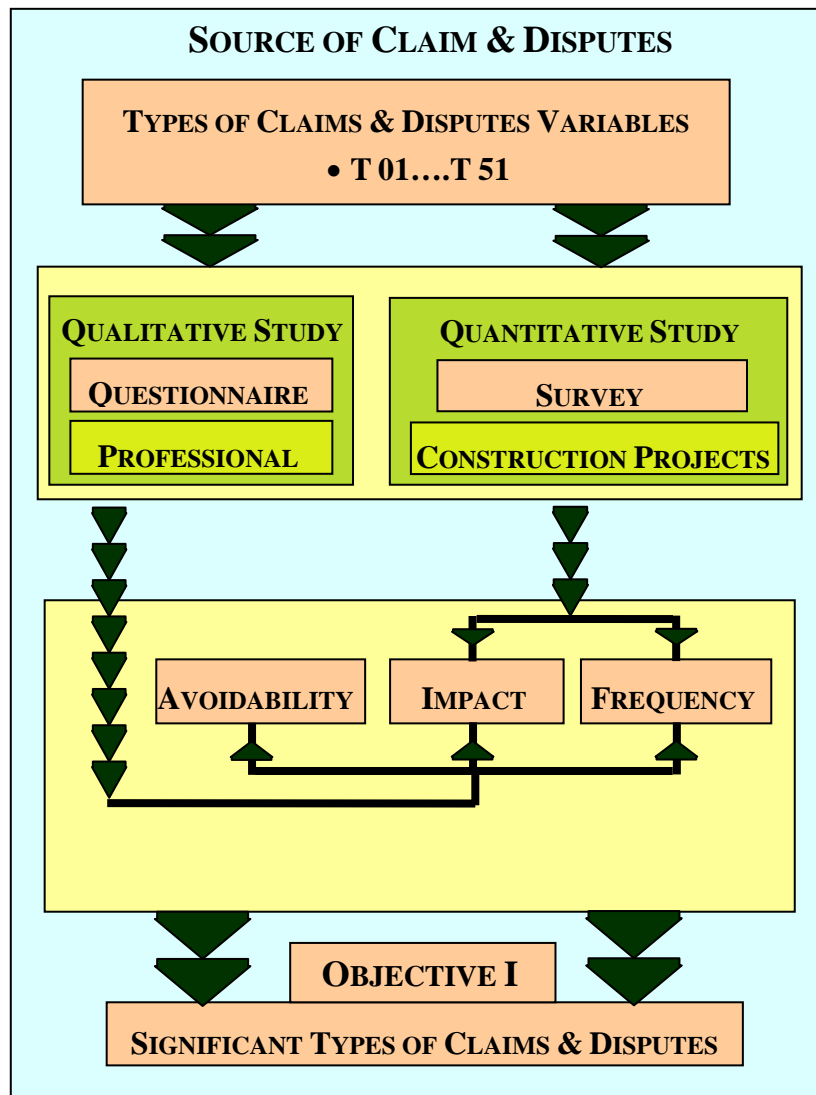


Figure 2-3: Research Methodology Phase One

2.6.4 PHASE TWO

This phase addresses \research Objective Two; namely, “*identifying the significant common causes of claims and disputes*”. This phase was accomplished by analysing the collected data from experienced-based observations of fifty-one construction professionals, namely, clients, consultants, and contractors as well as semi-structured interviews.

A questionnaire (based on 5 Scale Likert) incorporating the causes variables, which were obtained from Stage Two, was designed and directed to 51 professionals to obtain their responses and views on the significance (importance) and avoidability /controllability of the common causes variables. In order to strengthen and to validate

the findings of the quantitative questionnaire, interviews with 10 Experts with greater familiarity who are more involved in claims and disputes management were performed. A complete list of the causes variables used can be found at the end of this thesis in Appendix (A); a sample of the questionnaire can be found in Appendix (C); a sample of the structured interview with expert can be found in Appendix (D); as well as the complete coding system can be found in Appendix (B). The summary of research methodology phase two is shown in the following Figure 2-4

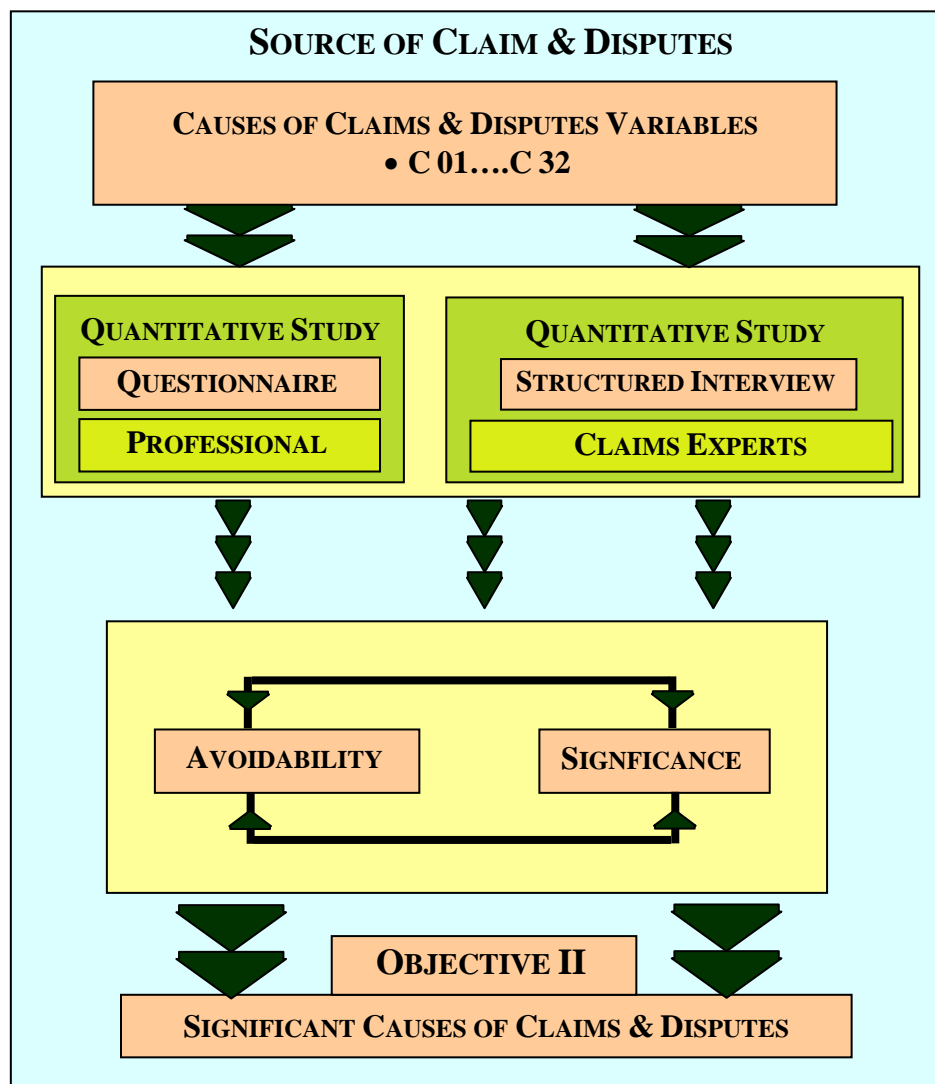


Figure 2-4: Research Methodology Phase Two

2.6.5 PHASE THREE

Having confirmed and identified the types and causes of claims and disputes in the first and second phases, it is now possible to achieve Research Objective Three,

namely, “*to identify the significant causes that may lead to a specific type significant of claims and disputes*”. This phase was accomplished by analysing the collected data from experienced-based observations of fifty-one construction professionals, namely, clients, consultants, and contractors; semi-structured interviews.

A questionnaire survey (based on five Scale Likert) incorporating the potential causes/s that could lead to a specific type of claims and disputes is employed to collect data from the same fifty-one construction professionals. This exercise was performed to obtain their response and views on the “Avoidability”, and the relative importance (significance) of these causes to the specified type of claims and disputes. The generated pattern of the significant and avoidable causes that could lead to the significant types of claims and disputes is investigated further in order to strengthen the findings of the questionnaire using semi-structured interviews with 10 Experts with greater familiarity who are more involved in claims and disputes management. A complete list of the causes that could lead to types of claims and disputes variables used can be found at the end of this thesis in Appendix (A), a sample of the questionnaire can be found in Appendix (C) and a sample of the structured interview with expert can be found in Appendix (D). A sample of the third survey can be found in Appendix (E) as well as the complete coding system can be found in Appendix (B).

The summary of research methodology phase three is shown in the following Figure 2-5

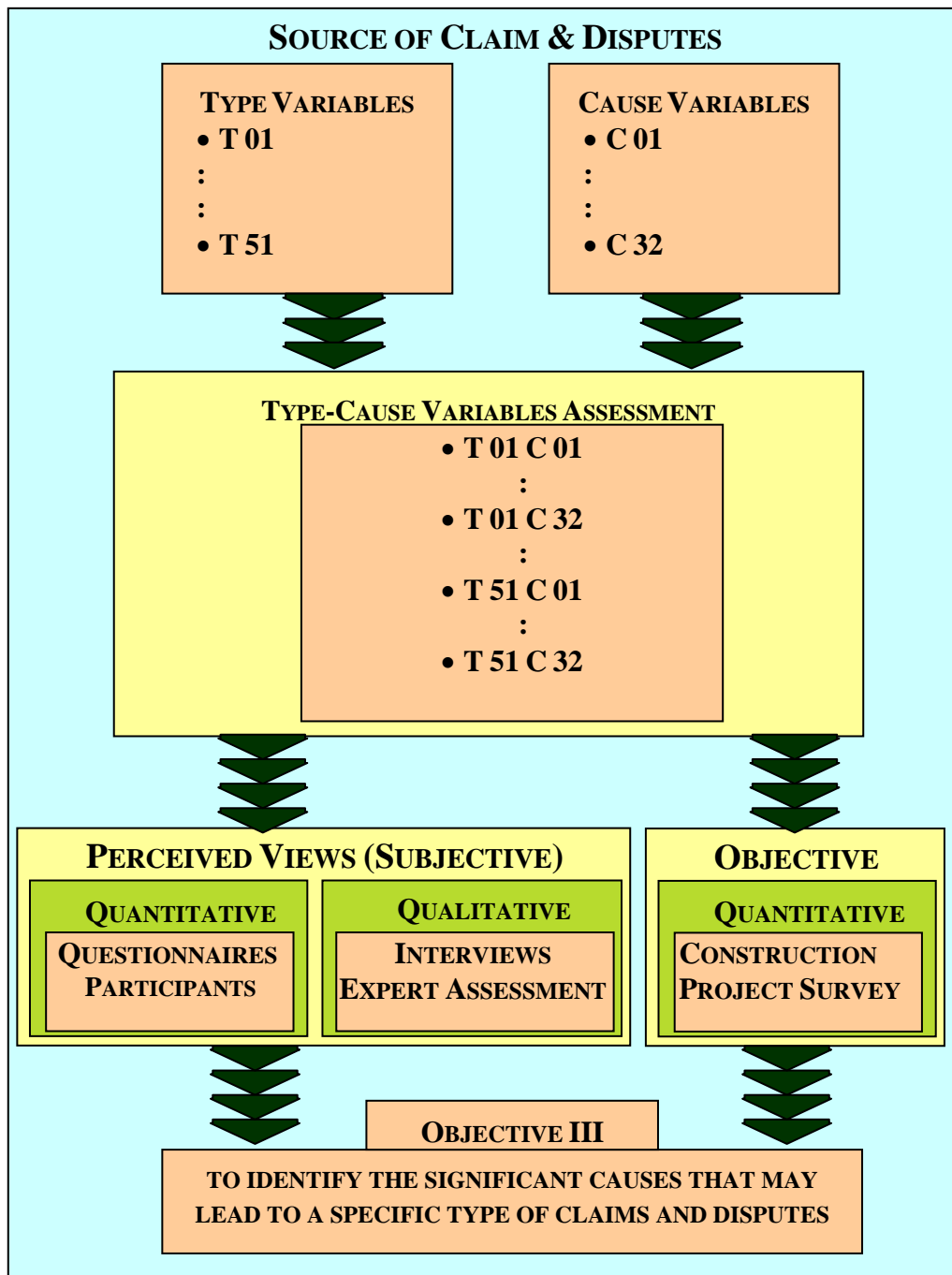


Figure 2-5: Research Methodology Phase Three

Finally, the proposed *strategies and methods to avoid any avoidable claims and disputes, and control the unavoidable ones in the Arabian Gulf, in general, and Abu Dhabi Emirate, in particular* are formulated and unveiled consequently.

Based on the previous stages and phases of the research design procedures, Conclusions and recommendations to the construction industry are presented, at the end of this research study, on how to deal and manage claims and disputes of

construction projects.

2.7 METHOD OF MEASUREMENT OF THE RESEARCH VARIABLES

Three scaling methods are used in social sciences, namely the Thurstone, Likert and Guttman scales (Oppenheim, 1992). As most data required in the analysis of the schemes under study is ordinal, the most appropriate scale to use is the Likert scale, which is widely used in professional literature. This has been consistently followed in this research. For example, to rate the frequency of the types of claims and disputes in the first section of the questionnaire, the following scale was used: very low frequency (or none), low frequency, average frequency, high frequency, very high frequency. In this five point continuum, weights of one, 2, 3, 4, 5 are assigned, whereby 1 is assigned for very low frequency (or none), and 5 for very high frequency.

In the current research, it will be considered that respondents' perceived view on the frequency of type of claims and disputes is frequent if the mean score is greater than three.

The Likert scale is not restricted to five points. Many studies use a three point scale (for example, H. Sulaiman and Y. Nurizan, 1987) depending on how detailed the required data are. The five-item scale is however, the most widely used in research work. In the present study, three and five point scales were tested in the pilot survey to determine the most appropriate. The five-point scale was found to be more discriminating and achieved the best results, the three-point scale being insufficiently sensitive and hence too general. The five-point scale was used for the questions in this research.

Table 2-1 below shows the variables used in the research and the methods used for their measurement.

Table 2-1: Variables Used in the Research and their Measurement Methods

VARIABLES USED IN THE RESEARCH	MEASUREMENT METHODS		
	(QUALITATIVE) MEASUREMENT	(QUANTITATIVE) MEASUREMENT	
<p><u>Types of Claims Variables</u></p> <ul style="list-style-type: none"> • <u>Agreement:</u> T 01 01T 51 01 • <u>Frequency:</u> T 01 02T 51 02 • <u>Magnitude:</u> T 01 03T 51 03 • <u>Avoidability:</u> T 01 04T 51 04 	<p>Administrated Interviews with Experts in Claims & Disputes</p>	<p>Questionnaires Survey</p> <p>➤ 51 Construction Participants</p> <ul style="list-style-type: none"> • Clients • Consultants • Contractors 	
<p><u>Cause of Claims Variables (Over All)</u></p> <ul style="list-style-type: none"> • <u>Agreement:</u> C 01 01C 32 01 • <u>Significance:</u> C 01 03C 32 03 • <u>Avoidability:</u> C 01 07C 32 07 			<p>Quantitative Survey</p> <p>➤ 45 Construction Projects</p>
<p><u>Potential Cause That Could Lead To A Specific Type of Claims Variables</u></p> <ul style="list-style-type: none"> • <u>Significance:</u> T 01 C 01..... T 01 C 32 T 51 C 01.....T 51 C 32 			

A complete list of the variables and their coding system used in the present research can be found in Appendix (A and B, respectively)

2.8 SAMPLING

The first stage of sampling was through cluster sampling. A list of contract numbers for clients, designers, contractors and experts was compiled through the following sources:

- Public Works Department,
- Abu Dhabi Municipality,
- Abu Dhabi Chamber of commerce,
- UAE Contractors Association, and

➤ UAE Engineers Society

However, in order to achieve the best results from the questionnaire survey. Furthermore, the selection process that was performed to choose the respondents includes certain criteria such as the classification of consultants and contractors in the approved list, the number of working experience and the volume of work. Based on these lists, random sampling method was used. (Note: a table of the approved list can be found in the Appendix F).

Questionnaire Validity and reliability

The use of *validity* and *reliability* testing is needed to assess how each question does its job. Zeller and Carmines (1978) define validity as: “*The degree to which a variable corresponds to the concept that it is designed to measure.*” Kidder et al. (1981) commented that content validity is usually evaluated and assessed by a group of judges or experts.

The researcher is an expert in the claims and disputes issues and gained a lot of experience from his work as the Head of Quantity Surveying section in Public Works Department. This experience and work position has facilitated him to consult with his colleagues in different departments who has experience in this filed, as well as allowed him to consult and discuss the issues of claims and disputes with various consultants; contractors; and claims and disputes expert firms such as Hill International, Hyder Consulting , and Bureau Veritas. Moreover, some academic as well as professionals in this field such as Dr. Abdul Rahim Sabouni,(Design Expert at public Works Department); Dr. Ahmed Al Mazrouie (Assistant Under Secretary for Abu Dhabi Municipality) were also had a great contribution in this work. As mentioned earlier in the pilot study (Section 2.6.2) the final list of type variables, cause variables were discussed with professionals and colleagues to assess and the extent of the coverage of these variables list as well as the questioned asked in the questionnaire.

Based on their feedback and comments, a number of modifications and changes were made to the content and framework of the questionnaire. The experts all agreed that the questionnaire had significant content validity.

After establishing instrument *validity*, it is necessary to confirm its reliability. *Reliability* was assessed using the test - retest correlation method (Kidder et al, 1981). This method is based on the following: By using an instrument twice on the same persons or groups, the correlation between the test and retest results is used to measure how stable the responses are. In this case, the *correlation coefficient* is a measure of reliability. The final version of the questionnaire was piloted to several respondents in the three categories before conducting the final survey, and distributed in two different occasions in order to investigate the reliability correlation coefficient. The correlation coefficient between the two sets of score of the two questionnaires was computed to be (0.72, 0.82, and 0.78) for clients, consultants and contractors, respectively. These correlation values indicate good reliability response since a good *correlation coefficient* value is when scores equal 0.7 or more, thus the test-retest scores provided sufficient evidence to conclude that the questionnaire was reliable. After this, the questionnaire was ready for fieldwork application.

2.9 DATA ANALYSIS TECHNIQUES

The collected data from the questionnaires were analysed in three methods. These are Frequency Analysis and Relative Index Analysis, and Rank agreement Factor (RAF). Frequency analysis is used as preliminary analysis. This method will show the frequency and the percentage. The frequencies are represented in the form of tables, pie charts and bar chart. In order to generate the result, the researcher used Microsoft Excel.

2.10.1 1ST METHOD: FREQUENCY ANALYSIS

Frequency analysis is a method to decompose a function, wave, or signal into its frequency components so that it is possible to have a frequency spectrum (Aminudin, 2006). The frequency analysis is used to represent results of data analysis of the number of frequency of response that the respondents give to different variables in the questionnaire survey and structural interview. The result has been tabulated in the form of frequency number and percentage according to total respondents. For graphic result presentation, bar chart and tables have been used as the summary.

2.10.2 2ND METHOD: RELATIVE INDEX ANALYSIS

In Relative Index Analysis, the results are further summarised to attain the level of importance in evaluating the effects of variations. The respondents were requested to judge and weigh up different variables according to their experience and perceived views. The evaluations were based on five-point scale starting with one for least effected to five for very highly effected.

The data collected were tabulated based on the number of responses for each question of a specific variable. Based on the frequency analysis the relative index was then calculated to determine the ranking of each effects of variations being considered.

The relative index (Importance Index) analysis for variable is calculated by using the formula below (Azhan, 2004);

$$\mathbf{RI} = (5n_5 + 4n_4 + 3n_3 + 2n_2 + n) / [5 (n_5 + n_4 + n_3 + n_2 + n)]$$

Where;

RI = Importance Relative Index

N5, n4, n3 ... = number of responding indices

The computation of the Relative Index using this formula will yield the value of RI ranging from 0.2 to 1.0. The values 0.2 represent the lowest strength and the value 1.0 representing the maximum strength.

2.9.3 3RD METHOD: RANKING AGREEMENT FACTOR

In general, the severity indices for the different groups (i.e. clients, consultants, contractors) were not the same and therefore could not be compared directly. Instead, it was used to rank the variables in each group. These ranking made it possible to cross compare the relative importance of these variables as seen by different groups.

In order to measure the agreement in ranking between the groups, a rank

agreement factor in equation 5 below was used for any two groups. This represents the average absolute difference in rank of the item (variable). (Okpala, 1986)

For any two groups, let the rank of the i^{th} item in group 1 be R_{i1} & in group 2 R_{i2} , then;

The absolute difference D_i between any ranking of the i^{th} item by the groups would be:

$$D_i = |R_{i1} - R_{i2}| \quad \dots 1$$

Where,

$$i = 1, 2, 3, \dots, N \quad \dots 2$$

In addition, there are N items.

$$D_{Max} = \sum_{i=1}^N |R_{i1} - R_{j2}| \quad \dots 3$$

Where,

$$j = N - i + 1 \quad \dots 4$$

The Maximum absolute difference between the rankings of all N items by the two groups is when the two groups are in complete disagreement (i.e. if they ranked the items in opposite orders).

For example, for five items ($N = 5$), when

$$i = 1, \quad j = 5 - 1 + 1 = 5$$

$$i = 3, \quad j = 5 - 3 + 1 = 3$$

Rank agreement factor defined as:

$$RA = \frac{\left(\sum_{i=1}^N |R_{i1} - R_{i2}| \right)}{N} \quad \dots 5$$

With the Maximum RA , (RA_{max}):

$$RA_{Max} = \frac{\left(\sum_{i=1}^N |R_{i1} - R_{j2}| \right)}{N} \quad \dots 6$$

In which, RA_{max} increases when the number of the items increase.

The percentage disagreement is defined as:

$$HD = 100 \times \frac{\left(\sum_{i=1}^N |R_{i1} - R_{i2}| \right)}{\left(\sum_{i=1}^N |R_{i1} - R_{j2}| \right)} \dots\dots\dots 7$$

In addition Percentage Agreement Factor (PA) is:

$$PA = 100 - PD_D \dots\dots\dots 8$$

The following is an example to illustrate the use of the rank agreement factor:

Table 2-2: Example of the Type Frequency Responses

CODE #	Type Description	Clients			Consultants			Contractors			Over All		
		Avg. Mean	Import Index	R	Avg. Mean	Import Index	R	Avg. Mean	Import Index	R	Avg. Mean	Import Index	R
T01	Ambiguity in Documents	3.474	69.47%	2	3.667	73.33%	2	3.059	61.18%	4	3.392	67.84%	2
T02	Delays: Incomplete Design by Client	3.421	68.42%	3	3.286	65.71%	4	3.313	66.25%	2	3.347	66.94%	3
T03	Design/ Change/ Omission by Clients	3.882	77.65%	1	4.071	81.43%	1	3.563	71.25%	1	3.83	76.60%	1
T04	Instruction by the Client to Resolve Discrepancy	2.222	44.44%	5	1.867	37.33%	5	2.294	45.88%	5	2.14	42.80%	5
T05	Defective Design: Rectification of Works	3.167	63.33%	4	3.5	70.00%	3	3.063	61.25%	3	3.229	64.58%	4

For five items (N = 5), and three groups: i.e. Clients, Consultants, and Contractors, then:

$$i = 1, 2, 3 \dots N$$

$$j = N - i + 1$$

$$i = 1, \quad j = 5 - 1 + 1 = 5$$

$$i = 2, \quad j = 5 - 2 + 1 = 4$$

$$i = 3, \quad j = 5 - 3 + 1 = 3$$

$$i = 4, \quad j = 5 - 4 + 1 = 2$$

$$i = 5, \quad j = 5 - 5 + 1 = 1$$

$$D_{(Max)} = \sum_i^N |R_{i1} - R_{j2}|$$

Table 2-3: The Maximum Absolutes Difference between Any Two Groups

Item	Ranking by Group 1	Ranking by Group 2	Difference In Rank	Maximum Absolute Difference In Rank, D_{Max}
T01	1	5	- 4	4
T02	2	4	- 2	2
T03	3	3	0	0
T04	4	2	2	2
T05	5	1	4	4

$$D_{(Max)} = 4 + 2 + 0 + 2 + 4 = \underline{12}$$

$$RA_{(Max)} = D_{(Max)} / N:$$

$$\underline{RA_{(Max)}} = 12 / 5 = \underline{2.4}$$

$$PD = 100 \times (RA / RA_{(Max)})$$

$$PA = 100 - PD$$

Continue with the above-mentioned example reveals the following:

$D_{(i, j)}$: $D_{(Client, Consultants)}$ and $RA_{(i, j)}$: $RA_{(Client, Consultants)}$, *then*

$D_{(Client, Consultants)}$, $RA_{(Client, Consultants)}$, $PD_{(Client, Consultants)}$ and $PA_{(Client, Consultants)}$ for the Ranking Agreement Relation between the two groups (i.e. Clients and Consultants) will be as follows:

Table 2-4: The Maximum Absolutes Difference between Clients & Consultants

Item	Clients	Consultants	Difference In Rank	Rank Absolute Difference $D_{(Client, Consultants)}$
T01	2	2	0	0
T02	3	4	-1	1
T03	1	1	0	0
T04	5	5	0	0
T05	4	3	1	1

$$D_{(Client, Consultants)} = 0 + 1 + 0 + 0 + 1 = \underline{2}$$

$$RA_{(Client, Consultants)} = D_{(Client, Consultants)} / N$$

$$RA_{(Client, Consultants)} = 2 / 5 = \underline{0.4}$$

$$PD = 100 \times (RA / RA_{(Max)}); RA_{(Max)} = \underline{2.4}; \text{Then}$$

$$PD = 100 \times (0.4 / 2.4) = \underline{16.67 \%}; \text{And}$$

$$PA = 100 - PD, \quad PA = 100 - 16.67 \% = \underline{83.33 \%}.$$

IN THE SAME WAY;

$D_{(i, j)}$: $D_{(Clients, Contractors)}$ and $RA_{(i, j)}$: $RA_{(Clients, Contractors)}$, then

$D_{(Clients, Contractors)}$, $RA_{(Clients, Contractors)}$, $PD_{(Clients, Contractors)}$ and $PA_{(Clients, Contractors)}$, for the Ranking Agreement Relation between the two groups (i.e. Clients and Contractors) will be as follows:

Table 2-5: The Maximum Absolutes Difference between Clients & Contractors

Item	Clients	Contractors	Difference In Rank	Rank Absolute Difference $D_{(Clients, Contractors)}$
T01	2	4	-2	2
T02	3	2	1	1
T03	1	1	0	0
T04	5	5	0	0
T05	4	3	1	1

$$D_{(Client, Contractors)} = 2 + 1 + 0 + 0 + 1 = \underline{4}$$

$$RA_{(Client, Contractors)} = D_{(Client, Contractors)} / N$$

$$RA_{(Client, Contractors)} = 4 / 5 = \underline{0.8}$$

$$PD = 100 \times (RA / RA_{(Max)}); RA_{(Max)} = \underline{2.4}; \text{ Then}$$

$$PD = 100 \times (0.8 / 2.4) = \underline{33.33 \%}; \text{ And}$$

$$PA = 100 - PD, \quad PA = 100 - 33.33 \% = \underline{67.33 \%}.$$

SIMILARLY; $D_{(i, j)}$: $D_{(Consultants, Contractors)}$ and $RA_{(i, j)}$: $RA_{(Consultants, Contractors)}$, ***then***

$D_{(Consultants, Contractors)}$, $RA_{(Consultants, Contractors)}$, $PD_{(Consultants, Contractors)}$ and $PA_{(Consultants, Contractors)}$ for the Ranking Agreement Relation between the two groups (i.e. Consultants and Contractors) will be as follows:

Table 2-6: The Maximum Absolutes Difference between Clients & Consultants

Item	Consultants	Contractors	Difference In Rank	Rank Absolute Difference $D_{(Consultants, Contractors)}$
T01	2	4	-2	2
T02	4	2	2	2
T03	1	1	0	0
T04	5	5	0	0
T05	3	3	0	0

$$D_{(Consultants, Contractors)} = 2 + 2 + 0 + 0 + 0 = \underline{4}$$

$$RA_{(Consultants, Contractors)} = D_{(Consultants, Contractors)} / N$$

$$RA_{(Consultants, Contractors)} = 4 / 5 = \underline{0.8}$$

$$PD = 100 \times (RA / RA_{(Max)}); RA_{(Max)} = \underline{2.4}; \text{ Then}$$

$$PD = 100 \times (0.8 / 2.4) = \underline{33.33 \%}; \text{ And}$$

$$PA = 100 - PD, \quad PA = 100 - 33.33 \% = \underline{66.67 \%}.$$

The following, table 2-8, summarizes the results for the Rank Agreement Factor (*RAF*), the Disagreement Percentage (*PD*) and the Agreement Percentage (*PA*) amongst Different Groups (i.e. Clients, Consultants & contractors).

Table 2-7: Agreement amongst Different Groups

Groups	RAF	PD	PA
Clients & Consultants	0.4	16.67%	83.33%
Clients & Contractors	0.8	33.33%	66.67%
Consultants & Contractors	0.8	33.33%	66.67%

2.10 SUMMARY

This research is structured into four main stages, (see Figure 2-1). The data analysis of Stage Three is also conducted in three main phases, each addressing the stated Research Objectives stated in Stage One of this thesis.

The primary data collection is by the use of a comprehensive questionnaire (51 respondents) and structured interviews (10 respondents), also case studies using data from 45 projects were used to validate the findings.

The data analysis methods employed are Frequency Analysis, Relative Index Analysis, and the Rank Agreement Factor.

In Stage Four, the stated aims of the research one addressed, based on the findings of Stage Three.

CHAPTER THREE
CONFLICT, CLAIMS AND DISPUTES IN CONSTRUCTION CONTRACTS
(LITERATURE REVIEW)

The first main Section (3.2) of this chapter, “An Overview of Conflicts, Claims and Disputes”, discloses the definitions of each term generally used among professionals in the construction industry. It also covers the views of different scholars regarding the relationships amongst these terms, as well as the development of claims and disputes.

The following Section (3.3), “An Overview of Conflict, Management and Resolution”, describes conflict (claims and disputes) as the base for understanding organisational conflict behaviour within the same organisation as one party of the contract (e.g. conflict between a manager of an organisation and his subordinates such as different goals and objectives or lack of communications). As well as conflict behaviour between different parties of contract, (e.g. role conflict among contract parties such as Change in role expectation and/or standards of performance and behaviour).

Furthermore, it presents a literature review of conflict and its characteristics along with some comments and views of different scholars regarding the role of conflict within organisations. It includes a brief description on conflict and conflict behaviour as a mean of further understanding of conflict behaviour. Additionally, it covers the different viewpoints of scholars’ arguments on the reasons and source of conflict phenomena, as well as the explanation of the conflict episodes in order to understand the reason for frequent occurrence of conflict. Moreover, it covers different strategies for managing conflict. Finally, it covers the different methods of conflict resolution.

The last main Section (3.4), “An Overview of Project Risk Management, Types of Contracts and Their Procurement Strategies”, highlights the concept of project risk management. Different types of contracts and procurement strategies will then be addressed in order to examine the scope of their effect on construction claims and disputes.

3.1 INTRODUCTION

Construction is not a single, vertically or horizontally organised industry dominated by a small number of national or multinational corporations. It is a fragmented, decentralised industry characterised by thousands of small and medium sized construction companies and material suppliers. There are over 150000 workers, many hundreds of specialist sub-contractors, hundreds of general contractors, dozens of major corporations and small entrepreneurs in the United Kingdom construction industry. Architects, engineers, bankers, insurance brokers, lawyers, accountants, public administrators, government inspectors and contracting personnel also play a major role (Kamran, 1996)

The industry is increasingly becoming adversarial, with the clients versus the contractors, the contractors versus the sub-contractors, and often combination of these three against the architect and the engineer. For instance, projects, as a rule, do not finish on time. Each party usually ends up blaming the other, often not without just cause. The architect or the engineer can cause delays on a project due to poor plans or specifications that cause many requests for information and resultant changes, failing to accept controlled work in a timely fashion, failing to promptly analyse shop drawings, and making changes during construction. Delays can be caused by client's interference with the contractor, delays in decision-making, failure to assure access, payments delays, failure to settle changes, requested changes (by the client), and failure to pay for extra work. Projects can also be delayed by the contractors themselves by brokering sub-contractors (failing to provide adequate management and withholding justly due payments), refusing to proceed with changes pending settlement, having to perform rework because of poor quality control, delaying work, unreasonable unit prices, and incompetence (Richter & Mitchell, 1979).

Carmichael (2002) argues that the nature of major projects is such that there will always be disputes between contracting parties. The sources of these disputes might be personalities, different opinions, values, desires, needs and habits, and so on. The parties might be regarded as being in competition. In addition, the English language is not precise, and this provides different interpretations of the contract. He

also adds that because of the uniqueness of projects and because project personnel are only human, and when both egos and money are at stake, it is perhaps surprising that disputes are not more prevalent than they are. Disputes have the potential to convert an otherwise successful project into an unsuccessful one.

In addition, Kangari (1995) states that construction activity is a complex process involving many disciplines with differing skills. Therefore, problems are bound to arise in an undertaking complex projects, such as a construction project, due to the widely differing values and goals among the project participants. Some of these problems will have the potential to escalate to become significant disputes. Today, construction projects are the subject of more disputes than in any other time of history.

Great concerns have been expressed in recent years regarding the dramatic increase in conflicts and disputes in the construction industry of many countries and areas (including Australia, USA, UK and Hong Kong). As well as the attendant high cost to the industry both in terms of direct costs (lawyers, claims consultants, management time, delays to project completions) and indirect costs (degeneration of working relationships, consequences of mistrust between participants and lack of team work) (Yates, 2000).

The construction industry is subject to a great deal of different types of risk: economical, technological, environmental, political and so on. Since it is also subject to long gestation periods, high set up costs and a long life span, it faces a great deal of uncertainties. It is the combination of these factors and diverse construction needs that makes it difficult to bring industrial experience and knowledge together, which then can be used by both practitioners and academics in pursuance of suitable dispute resolution methods.

Hence, as Goodkind (1988) argues, it is not surprising to find widespread evidence of frustration and disappointment that is being experienced in trying to resolve disputes in construction within the conventional procedures of litigation and arbitration. These procedures are often too costly, too late or too harmful to the effective completion of complex projects.

Many experts are involved in trying to resolve this issue. Kumaraswamy (1997) considers that the proliferation of conflicts, claims and disputes in construction projects has spawned specialists (whether self-professed or otherwise) in claims management and disputes resolution. However, different approaches and differentials in terminology used in contracts documentation suggest the need to clarify the related concepts, and to study the critical impacts on projects and the implications for the industry itself.

One of the main concerns to the construction experts is to come up with an answer to whether construction claims and dispute can be prevented or reduced. In trying to consider a response to this question, Yates (2003) believes that it is necessary to reflect upon the possible causes of claims and dispute and the extent to which those causes can be addressed.

Moreover, analysing the various causes that may contribute to a project's delay is an important task to resolve it. Vidogah & Ndekugri (1997) conclude that determining the impact, timing and the contribution effect of each of those causes to overall delay shall assist in helping the parties settle the delay without litigation.

Both the literature and the author's interviews with construction industry participants in the UAE, reveal a general confusion and misuse of the terms (conflicts, claims, and disputes). Yates (2003) supports this observation by saying that "*... a review of the literature reveals confused usage of basic terms*", he adds that "*...the terms 'conflicts' 'claims' and 'disputes' are used separately or in pairs and frequently without clear indication of the precise meaning of each use*".

Rahim (1986) commentates on this theme, and argues that because scholars in different disciplines who are interested in studying conflict, have created no single and precise meaning to conflict, much of the confusion.

Hence, before proceeding any further, the author believes that it is important that the terms "Conflict", "Claim" and "Dispute" be defined. The following Sections 3.2.1 and 3.2.2 disclose the definitions of each term as well as the relationships among them, respectively.

3.2 AN OVERVIEW OF CONFLICTS, CLAIMS AND DISPUTES

Yates (2003) states that: “... a review of the literature reveals confused usage of basic terms”, he adds that “...the terms ‘conflicts’ ‘claims’ and ‘disputes’ are used separately or in pairs and frequently without clear indication of the precise meaning of each use”. Moreover, Rahim (1986) commentates on this theme and argues that because scholars in different disciplines who are interested in studying conflict, however, have created no single and precise meaning to conflict.

As previously mentioned, literature review as well as author’s interviews with construction industry participants in the UAE, reveal confusion and misuse of the terms (conflicts, claims, and disputes) among quite big sector.

This section addresses the definition of Conflicts, Claims and Disputes generally used among professionals in the construction industry. It also covers the views of different scholars regarding the relationships amongst these terms, as well as the development of claims and disputes.

3.2.1 DEFINITION OF CONFLICTS, CLAIMS AND DISPUTES

‘*CONFLICT*’ is defined according to the Oxford Dictionary as ‘struggle; fight; serious disagreement; argument; controversy; opposition; difference; clash; and to be incompatible’.

According to Gardiner & Simons (1992), ‘conflict’ is any divergence of interest, objectives or priorities between individuals, groups or organisations. Similarly, Hodge & Anthony (2002) describe the occurrence of a conflict by saying that a conflict occurs when two or more individuals or groups that have opposing goals, ideas, philosophy or orientations confront each other in some way. They may oppose each other by vying for resources, support or attention to ensure their position prevails. Conflict almost inevitably leads to some form of frustration or confrontation within organisation. Often this occurs on an interpersonal level or it may also be the sort of conflict brought on by an organisational system that does not allow enough freedom or by a clash of values caused by job requirements. In the same way, Fenn et

al. (1997) suggested that 'Conflict' exists where there is an incompatibility of interest.

Moreover, Collins (1995) defines conflict as "*a serious disagreement and argument about something important*" as well as "*a serious difference between two or more beliefs, ideas or interests*".

Finally, Armstrong (1997) defines conflict as symptoms of differences in understanding about intention, of differing values systems, of differing cultures, from confusions between the aims of an action and the objects of the actors. He added that conflicts could also arise from laziness, lack of precision, fear, greed, incompetence, doubt, stakes and arrogance.

As such, it is important to distinguish the different meanings attributed to conflicts since these meanings determine the ways in which conflicting parties, in any organisation or society, will respond to their situation.

A '**Claim**' is defined according to the Oxford Dictionary as 'maintain; assert; say; state; declare; argue; allege and aver'.

According to Powell-Smith & Stephenson (1989), 'Claim' is defined as "*an assertion of a right of money, property or a remedy*".

In addition, Semple *et al.* (1994) defines a 'claim' as "*a request for compensation for damages incurred by any party to a contract*". He also, cited the definition of the Canadian Law Dictionary where it defined a 'claim' as an assertion of the right of money, property or a remedy.

Furthermore, Kumaraswamy (1997) thought that the construction claims themselves can arise as an assertion for extra money or time where those "*... claims can be based on the contract itself, a breach of contract, a breach of some other common law duty, a quasi-contractual assertion for reasonable (quantum merit) competition or an ex-gratia settlement request*".

Finally, Yates (2003) simply explained claims as those problems, which are resolved between the parties and do not become disputes.

A '*Dispute*' is defined according to the Oxford Dictionary as 'argument; disagreement; quarrel; difference of opinion; heated discussion; clash and row'.

Once again, dispute has different meanings and there is no single definition, which makes people confused. Hence, it is important to distinguish the different meanings attributed to dispute since these meanings determine the ways in which conflicting parties, in any organisation or society, will respond to their situation.

According to Brown & Marriot (1993), 'Dispute' is a class or kind of conflict that manifest itself in distinct, he added that dispute involves disagreement over issues capable of resolution by negotiation, mediation or third party adjudication. Additionally, they cited other scholars' definition of dispute such as Fosket, D., one party, which is in dispute, asserts where he argued that 'Actual Dispute' would not exist until a claim by other.

Moreover, Kumaraswamy (1997) argued that the definition of dispute itself is 'in dispute' in different construction related documents. He cited clause 66 (2) of the sixth addition of the ICE Condition of Contracts (ICE 1991): "*...which holds that a dispute is deemed to arise 'when one party serves on the engineer a notice in writing stating the nature of the dispute'. Whereas, rule 1 of the ICE Arbitration Procedure states that a dispute or a difference shall be deemed to arise 'when a claim or assertion made by one party is rejected by the other party and that rejection is not accepted'*". He also added that disputes are taken to imply prolonged disagreements on unsettled claims and protracted unresolved destructive conflict. Moreover, these disputes may arise from different perceptions as to the legitimacy and quantum of the claim.

In addition, Yates (2003) simply explained 'disputes' as those claims which are not resolved between the parties and escalate into disputes. He also, cited the suggestion of Fenn et al (1997) for the definition of dispute as "*... when a conflict becomes irreconcilable and the mechanisms for avoiding it are exhausted or inadequate, techniques for resolving the dispute are required'*".

3.2.2 RELATIONSHIPS AND DEVELOPMENT OF CLAIMS AND DISPUTES

As explained in the previous Section 3.2.1, the different definitions for the terms “Conflicts”, “Claims” and “Disputes”, are important to distinguish the different meanings attributed in construction since these meanings determine the ways in which conflicting parties, in any organisation or society, will respond to their situation. Moreover, this distinction is crucial to understand the relationships amongst these different terms. This section explains these relationships as well as the development of claims and disputes.

The author believes that it is useful to cite the same comment and example made by Fulton (1989), and cited by Carmichael (2002), in order to unveil these issues.

“... Is ‘conflict’ synonymous with ‘dispute’? Although in ordinary parlance the two words are used interchangeably, they are not synonymous. Conflict is in fact the precursor to a dispute. Conflict means an inter-reaction between people who are pursuing incompatible or competing claims. ...

When does a conflict develop into a dispute? ... A dispute starts with conflict, with competing interests – it represents a crisis in the parties’ relationships. Conflict in the commercial context is usually preceded by a transaction. A transaction occurs when two or more parties get together and deal – they bargain, they sell, they lease, and they buy. For a dispute to arise, the deal has to be perceived to have failed by one party to the transaction. ...

...there is a subjective element to a dispute development. Before dispute can arise, the injured parties must first perceive that they have been injured...and secondly they must know that the injury can be remedied. ...

In a study on the process by which a conflict (or in their terms a ‘grievance’) becomes a dispute, Felstiner, Abel and Sarat called the process ‘transformation’. The first step which they identified in a transformation, namely that of ‘saying to oneself that a particular experience has been injurious’, they call ‘naming’. The second step,

that of ‘attribuit[ing] an injury to the fault of another individual or social entity’, they call ‘blaming’. The third step, that of voicing the grievance to the person or entity believed to be responsible and asking for a remedy, they call ‘claiming’. In this transformation process a claim is only finally formed into a dispute when the party to whom it is directed rejects the claim.” (Carmichael, 2002, p. 2-3).

Furthermore, Yates (2003) combined the definitions of the different terms mentioned above and came up with a very interesting conclusion where he called the different stages of construction conflicts, claims and disputes as ‘The Spectrum of Conflict’. The range of this spectrum starts with the notification of a claim at one end, to the resolution of a dispute at the other end, as shown in the following **Figure 3-1**.

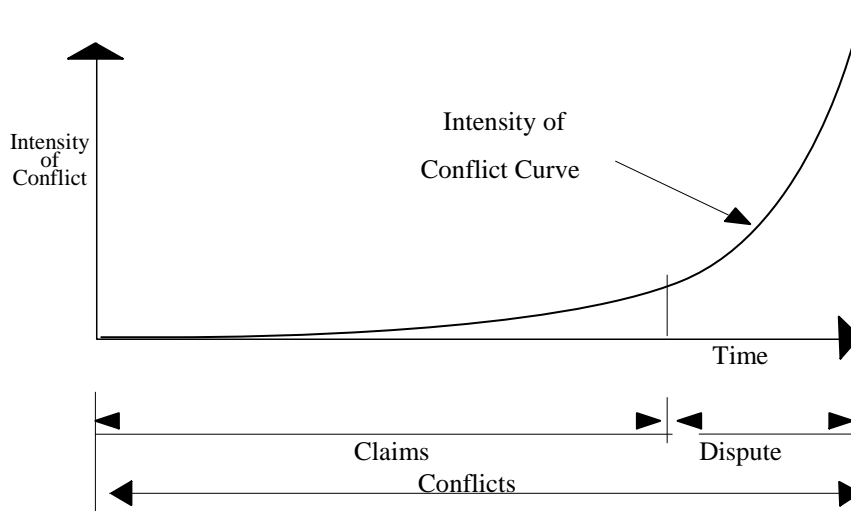


Figure 3-1 The Spectrum of Conflict*
(Source: Yates (2003))*

- Where the Intensity of Conflict Curve: illustrates the increasing strength and intensity of feeling between the parties as the conflict progress throughout the various dispute resolution stages until it is ultimately resolved .
- Also, a model depicting the Increasing Cost of Conflict Curve through the same stages would be more or les identical to the “Intensity of Conflict Curve”.

From the above examples, it can be said that there are different stages of conflict development between different parties. It starts from a claim, and if unresolved, to a potential dispute.

In construction, claims may be settled amicably, however, the prior presence of unnecessary and unhealthy conflict attitude between contracting parties can trigger deterioration of a claim into unnecessary disputes.

Kumaraswamy (1997) explains this scenario of unhealthy conflict attitude by saying that this can generate unnecessary and unreasonable claims that further escalate to unhealthy disputes.

The following **Figure 3-2** presents the relationships among conflicts, claims and disputes and their development.

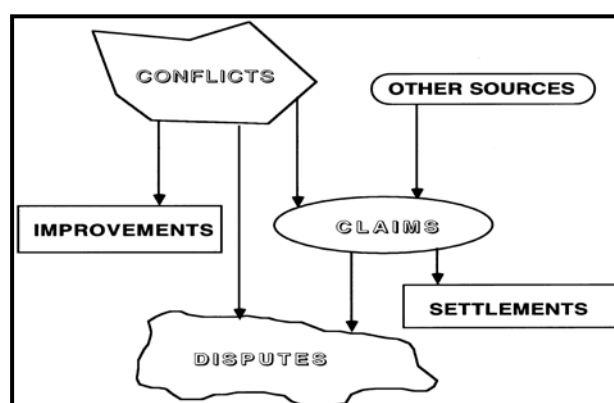


Figure 3-2 Relationships among Conflicts, Claims and Disputes*
(Source: Kumaraswamy (1997))*

While conflict is predictable in groups and organisations due to the complexity and interdependence of organisational life, different theorists have established different views on conflict behaviour whether it is harmful or beneficial to organisations. Sometimes a certain level of conflict is not inevitable but desirable, for conflict is both a cause and effect of change (Mc Givering, 1983). It can stir emotions and creativity alike. By definition 'conflict' creates tension and frustration that augur for action of a different type than the usual approaches to organisational problem solving (Rahim, 1986). Moreover, Gardiner & Simmons (1995) add that despite the potentially unpleasant implications and consequences of conflict, some beneficial and

useful aspects have been recognized. They state that conflict management has been a major part of construction project management Gardiner & Simmons (1995).

As such, conflict, if not carried to extremes, can also have other beneficial effects to the organisation. Therefore, the modern view is not to oppose conflict, but to provide for it, as we can see from other researchers' viewpoints in the following sub paragraphs. The aim becomes not to eliminate fire, or have a wildfire, but to have a "controlled burn". Managers, like foresters, must know when conditions are right for "burning" and when there has been enough. Seen from this perspective, conflict can be considered healthy, not inhibiting, in the organisations striving for effectiveness (Rahim, 1986).

Discussion of the different theories of conflict development, as well as their related reasons and conflict management concept will be discussed in details in Section 3.3. Meanwhile, based on the previous discussion regarding the definitions of the terms "Conflict", "Claim" and "Dispute"; as well as the discussion on the development and relationships among these different terms; The author suggests the following definitions.

'Construction Claim' can be defined as a declaration of one party of the construction contract for a compensation of time or money for the damages incurred by the other part of the contract.

'Construction Dispute' can be defined as the disagreement between the contracting parties over a liability or rejection of a construction claim, and this can be verbal or written.

'Construction Conflict' can be defined as the symptoms of the different understanding of different aims, objectives, believes, ideas and interests. It can happen within the same organization party of a contract or between the contract parties. Moreover, it can happen at any stage of a contract period and if managed unwisely, will trigger a construction claim, which in consequence will escalate to a construction dispute.

No matter what the cause or details or relationship and development of the

disputes are, the first reaction of any defendant, however, is to reject all claims and allegations. Next, they will generally agree to discussions, which lead to negotiations, which generally lead to an amicable settlement of the dispute. Nevertheless, if a settlement is not achieved during the negotiations, the claimant will generally require the dispute to be referred to some independent person, usually an arbitrator or judge, who will make a decision and impose it on both parties.

The construction industry is subject to a great deal of different types of risk: economical, technological, environmental, political and so on. Since it is also subject to long gestation periods, high set up costs and a long life span, it faces a great deal of uncertainties. It is the combination of these factors and diverse construction needs that makes it difficult to bring industrial experience and knowledge together, which then can be used by both practitioners and academics in pursuance of suitable dispute resolution methods.

Therefore, it is not surprising to find widespread evidence of frustration and disappointment that is being experienced in trying to resolve disputes in the construction within the conventional procedures of litigation and arbitration. These procedures are often too costly, too late or too harmful to the effective completion of complex projects. Goodkind (1988).

Many experts are involved in trying to resolve this issue. Kumaraswamy (1997) thinks that the proliferation of conflicts, claims and disputes in construction projects has spawned specialists (whether self-professed or otherwise) in claims management and disputes resolution. However, different approaches and differentials in terminology used in contracts documentation suggest the need to clarify the related concepts, and to study the critical impacts on projects and the implications for the industry itself.

It is important to mention that the term construction claims and disputes, which will be used throughout the thesis, refer to the conflict spectrum explained earlier in p. 58.

Section 3.3 below explains the 'organisational conflict' as this is the base for

understanding the real reasons of conflict within the same organisation as one party of the contract as well as between different parties of contract.

3.3 AN OVERVIEW OF CONFLICT, MANAGEMENT AND RESOLUTION

Definition of the terms “Conflict”, “Claim” and “Dispute” were revised in Section 3.2. Moreover, the relationships amongst these three different terms were explained in order to distinguish the different meanings attributed to them, since these meanings determine the ways in which conflicting parties, in any organisation or society, will respond to it.

However, one can ask the following questions:

What are the real reasons for conflict?

What are the types of conflicts?

How are conflicts developed?

What is the conflict episode?

What are the strategies to manage the conflict? And

What are the methods to resolve the conflicts?

In order to answer these questions, the author believes that the key is to have a good understanding of organisational conflict behaviour.

This section describes conflict as the base for understanding organisational conflict behaviour within the same organisation as one party of the contract (e.g. conflict between a manager of an organisation and his subordinates such as different goals and objectives or lack of communications). As well as conflict behaviour between different parties of contract, (e.g. role conflict among contract parties such as Change in role expectation and/or standards of performance and behaviour).

Furthermore, it presents a historical review of conflict and its characteristics

along with some comments and views of different scholars regarding the role of conflict within organisations. It includes a brief description on conflict and conflict behaviour as a mean of further understanding of conflict behaviour. Additionally, it covers the different viewpoints of scholars' arguments on the reasons and source of conflict phenomena, as well as the explanation of the conflict episodes in order to understand the reason for frequent occurrence of conflict. Moreover, it covers different strategies for managing conflict. Finally, it covers the different methods of conflict resolution.

Few organisations can escape conflict. At some points, almost everyone who is involved in the construction industry, whether as a contractor, designer, consultant or client, will experience it in some form and will eventually be involved in a claim, which results in a dispute. This involvement may arise because they think that they are entitled to some money from someone else. Alternatively, they have been accused of doing something that has caused problems for someone else, or even for no apparent reason at all, except that they are involved in a project, that has problems and they are blamed for mistakes made by other people (Totterdill, 1991).

Conflict is predictable in groups and organisations due to the complexity and interdependence of organisational life; however, different theorists have established different views on conflict behaviour whether it is harmful or beneficial to organisations.

Brett (1984) cited the suggestion given by, an early organisational conflict theorist, Brown (1983) *Managing Conflict at Organisational interfaces*: "conflict is detrimental to organisational functioning and focused much of their attention on the causes and resolution of conflict". However, research projects such as Tjoosvold (1991) have concluded that conflict is beneficial under some circumstances. Furthermore, Pondy (1967) argues that an organisation's success hinges largely on its ability to set up and operate appropriate mechanisms for dealing with a variety of conflict phenomena such as latent conflict, perceived conflict, felt conflict, etc.

It is believed that conflict is the harmful side of differences, which exist within or between social entities. Moreover, Pondy (1967) concludes that conflict is not

necessarily good or bad, but must be evaluated in terms of its individual and organisational functions and dysfunctions. In general, conflict generates pressure to reduce conflict, but chronic conflict persists under certain conditions, and consciously created and managed by the politically astute administrator.

Conflict serves as a mechanism for fine-tuning the organisation's goal hierarchy. In other situations, a conflict episode in an organisation, after its resolution, can clarify the proper power and authority relationships among different organisational members or sub-unit (Moghaddam, 1996). Furthermore, Schelling (1960) states that conflict can only be of positive nature, however, if it is potential value can be realised. This depends on how it is managed and resolved. In his view, this requires the careful appraisal of potential conflict areas. It would also depend on one's perspective regarding the nature of organisational life.

As such, conflict, if not carried to extreme, can also have other beneficial effects to the organisation. Therefore, the modern view is not to oppose conflict, but to provide for it, as we can see from other researchers' viewpoints in the following sub paragraphs. The aim becomes not to eliminate fire, or have a wildfire, but to have a "controlled burn". Managers, like foresters, must know when conditions are right for "burning" and when there has been enough. Seen from this perspective, conflict can be considered healthy, not inhibiting, in the organisations striving for effectiveness (Rahim, 1986).

As previously mentioned, sometimes a certain level of conflict is not inevitable but desirable, for conflict is both cause and effect of change (Mc Givering, 1983). This conclusion was reinforced by other researchers such as Tjoosvold (1991) & Rahim (1986) where they argued that conflict could stir emotions and creativity alike because, by definition, conflict creates tension and frustration that augur for action of a different type than the "usual peaceful" approaches to organisational problem solving.

In addition, Kumaraswamy (1997) cited the comments made by Gardiner & Simmons (1995) in their paper "Case Explorations in Construction Conflict Management" Despite the potentially unpleasant connotations and consequences of

conflict, beneficial aspects of conflict have also been recognized, and conflict management has been said to be a major component in construction project management”. Moreover, he gave an example of that by saying that a conscious shift of conflict occurrences from the construction to the conceptual design stage is seen to contribute to more creative and constructive inputs, in comparison to what may have transpired in the absence of such conflicting views. The cross-fertilisation of ideas and the consideration of more alternatives, through such constructive conflicts at the design stage, would usually lead to “better” designs as well.

Therefore, the notion of “constructive conflict” has been increasingly used in the managerial literature. Conflict is welcomed, and indeed encouraged, if it is likely to make minor incremental adjustments to the existing organisational order and arrangements. Conflict is seen as aiding the decision making process and claimed that one of the requirements of an effective organisation is that conflict is identified and managed in such a way that the destructive win/lose stance with its accompanying polarisation of views is minimised.

Thus, conflict management becomes one of the most difficult, yet important, jobs for any manager and regardless of the organisation type, conflict is recognised as a fact, and so the issue is not whether to have it, but how to manage it. Moreover, to manage conflict, effectively, understanding of conflict behaviours that are most likely to lead to constructive or destructive outcomes is of utmost importance. Therefore, the identification of the variables, which influence the occurrence of those behaviours, can help to develop productive intervention strategies and tactics.

Thomas (1976) just reinforced this idea by saying that the shift in emphasis from the elimination of conflict management requires a more discriminating understanding of conflict phenomena. In order to manage conflict, understanding of sort of conflict behaviour that is most likely to lead to constructive outcomes and the behaviours that tend to be either unproductive or destructive is of utmost importance.

3.3.1 SOURCES / CAUSES OF ORGANISATIONAL CONFLICT

Salaman (1978) has argued that organisations tend to be presented as:

- Harmonious, co-operative structures;
- Where no systematic conflict of interest exists;
- Where conflicts which do arise are seen as exceptional; and
- Where conflicts are seen to arise from misunderstanding and confusions, personality factors, from extra-organisational factors over which the company has no control, and from the expectations of stubborn and inflexible employees.

The important point, however, is not so much whether conflict is seen as inevitable consequences of organisational structure, but how conflict, when found to exist, is to be handled and managed. Conflict, as previously discussed, can take many different forms and can exist at different levels within the organisation. Thus, there are many sources of organisational conflict including the main ones summarised below.

ROLE CONFLICT

People are often thrown into a conflict situation when their roles are changed or when different expectations are applied to established roles. New behaviour patterns can cause conflict when they require significant change on the part of the individual. At the same time, the intrapersonal conflict occurs in these cases and it is probable that interpersonal conflict occurs between an individual and another imposing the change.

CHANGE IN DELEGATION

Changes in delegation can cause conflict. For example, when the authority of a manager is reduced, there can be intrapersonal conflict. The manager can perceive himself or herself to be less important to the organisation and this perception can cause severe emotional disturbance. He or she can view this reduction of authority as

an undermining of the ability to act independently. When a new delegation requires a new contact point for execution, the manager might experience or cause conflict in this different situation with different sub-ordinates who are not accustomed to his or her style or expectations.

CHANGE IN STATUS

Change in status (also known as differences in perception) especially when they disturb a given accepted hierarchy, can bring conflict in virtually every form possible. As every person sees things in different ways and has his or her own, unique picture or image of what the 'real' world is like. Differences in perception result in different people attaching different meanings to the same stimuli. For example, such simple things as changes in title can be a significant cause of conflict. The incumbents in these positions might infer some difference from their titles and feel conflict toward each other or whoever decided which titles to confer. As perceptions become a person's reality, value judgements can be a potential major source of conflict.

CHANGE IN GOALS

A change of goals also brings conflict to an organisation's members. Indeed, major changes in an organisation's mission or goals are common causes for conflict, particularly within large organisations facing a volatile environment.

ORGANISATION OVERLAP

When two or more people are assigned to carry out the same task, organisation overlap occurs. Overlap causes interpersonal strain or conflict almost by definition. Overlap must be avoided because it has tremendous potential for undesirable conflict. However, organisation overlap should not be confused with group membership overlap in organisations, even though similar behavioural consequences may result.

RESOURCE COMPETITION

Most organisational resources are limited and scarce. Resource competition is therefore, concerned with the situations where two or more groups who are competing

for the same resources or rewards are thrown into conflict as a result. Their energy and attention are diverted from pursuing their basic purpose to gaining a larger share of resources or rewards. This type of conflict can be seen almost in any organisation where different departments or faculties are interested in improving their own existing resources and have to fight for their share, for example, at the time of the allocation of next year's budget or when cutbacks have to be made. The greater the limitations of resources will consequent greater potential for conflict. In an organisation with reducing profits or revenues, the potential for conflict is likely to be intensified.

INEQUITABLE TREATMENT

A person's perception of unjust treatment such as in the operation of personnel policies and practices or in reward and punishment systems, can lead to tension and conflict (Mullins 1993). For example, according to the equity theory of motivation the perception of inequity will motivate a person to take action to restore equity, including changes to inputs or outputs, or through acting on others.

CULTURAL CONFLICT

Culture is defined as “.... *The mix of values, beliefs, assumptions, meanings, and expectations that members of a particular organisation, group, or subgroup hold in common and that they use as behaviour and problem solving guides*” (Hodge & Anthony, 2002). Closed examination of this definition shows that culture can easily be the spur to a conflict situation. Heterogeneous cultures bring values and attitudes into conflict quite easily.

This type of conflict can almost be seen daily. For instance, there are those who feel strong moral obligation to withhold their employment from companies that make munitions or that make or distribute alcohol. There is also development of subordinate cultures within any group of size. Martin & Siehl (1983) describe three types of subcultures, one of which is likely to produce conflict. They describe two of these subcultures as follows:

“An enhancing subculture would exist in an organisation enclave in which adherence to the core values of the dominant culture would be more fervent than in

the rest of the organisation. In an orthogonal subculture, the members would simultaneously accept the core values of the dominant culture and a separate, un-conflicting set of values to themselves”.

The third type of subculture is termed “counterculture” according to Martin & Siehl (1983) and it represents values *that “... Should present a direct challenge to the core values of dominant culture”*. Counterculture groups, by definition, conflict with the dominant culture. The level of such conflict seems to be a function of the relative strengths of the two cultures, coupled with their respective inclination to engage in conflict behaviour.

➤ ***STRATEGY – CULTURE CONFLICT***

The cultural orientation of a group within an organisation can also cause conflict with the organisation’s proposed strategy or main directions. Thus, cultural conflict can be viewed as a restriction on the adoption of strategy, a condition to be resolved if an effective, acceptable course of action is to be put in place. Resolution of this type of conflict can be difficult, however, because as it has been pointed out by some researches, “.... the managers have had no method for thinking through the relationship between culture and the critical success factors on which strategy is contingent” (Schwartz & Davis 1981). Hence, management must perhaps intuitively assess how culture relates to strategy and whether a conflict is likely. If so, they have then the following options: manage around culture; attempt to change the culture; or change the strategy. Whatever action management undertakes, cognisance of culture-strategy conflict is imperative.

➤ ***PHYSICAL SETTINGS AND CONFLICT***

Physical proximity or its absence has a definite effect on communications and co-ordination. Competition for preferred space occurs within and between organisations. Thus, adequate space is high on the agenda of any individual or group.

Power is manifest in physical settings. Aspiring executives long to abandon offices in the field for those in the headquarters building. A simple move can change the balance of power is seen as power, so the absence of that access can cause conflict

(Hodge & Anthony, 2002).

Seating arrangement can also invite conflict. A circular arrangement of chairs with no table invites more co-operation than a rectangular one with one “side” facing an “opposing” group at the onset of a meeting. Who sits next to the president, who sits opposite, and who is unable to gain a seat at the main table are all related to power, status, and conflict potential.

Therefore, from this brief look, the affect of the physical setting and trappings at the level of conflict in an organisation can be seen. Hence, this physical settings dimension of conflict must not be overlooked when studying organisational theory.

In summary, as it has been shown above, conflict can take many different forms and can exist at different levels within the organisation. These causes are summarised in the following **Table 3-1**.

Table 3-1: Causes of Conflict

Base	Meaning	Example
Role Conflict	Change in role expectation and/or standards of performance and behaviour.	Changing the method for evaluating sales performance
Change in delegation	Reducing or increasing a person’s authority.	Reducing the scope of a manager’s authority to make budget decisions without obtaining prior approval
Change in Status	Increasing or decreasing a person’s status.	Change in job title from general manager to office manager.
Change in Goals	Goals redefined or given a different priority	Movement from a research to a teaching emphasis in a university
Organisational Overlap	Two or more people assign to carry out the same task.	Stewards and waiters assigned to task of keeping tables clean.
Resource Competition	Two or more people or groups in an organisation competing for scare resources.	Different academic departments in a university competing for faculty budget
Inequitable Treatment	Unjust treatment of individuals or groups within an organisation	Operational of personnel policies such as reward and punishment systems
Cultural Conflict	Individuals or groups within an organisation clashing because of different values, norms, and behaviour patterns	British workers clashing with Japanese managers in Japanese owned British plant.

These bases of conflict mentioned above, point out the reasons or sources of conflict in an attempt to a better understanding of these sources and an eventual improved controlling methods of the conflict. Bryans and Cronin (1983), for instance, have also summarised the possible sources of conflict to be as follows:

- Differences between corporate and individual goals;
- Conflicts between different departments or groups within the organisation;
- Conflict between the formal and informal organisation;
- Conflict between manager and manage;
- Conflict between individual and job;
- Conflict between individuals

3.3.2 THE CONFLICT EPISODE

Hodge and Anthony (2002) argue that because of the frequency of its occurrence, it is important to examine the conflict episode in some details. Scholars such as Pondy (1967) and Rahim (1986) view conflict episode as a series of events, or stages and in their view conflict is a sequential process. Deutsch (1969), on the other hand, views the conflict episode from a holistic point of view, arguing that the simultaneous interplay of a variety of factors determines the course of a conflict and its resolution by third – party intervention.

PONDY'S STAGES OF CONFLICT:

Pondy's stages of conflict help place the issue into the type of perspective that generally prevails today. His model of conflict episode, shown in **Figure 3-3** below, is comprised of five stages: latent conflict, perceived conflict, manifest conflict and conflict aftermath. As briefly mentioned Pondy (1967) argues that an organisation's success hinges largely on its ability to set up and operate appropriate mechanisms for dealing with a variety of conflict phenomena listed in his model.

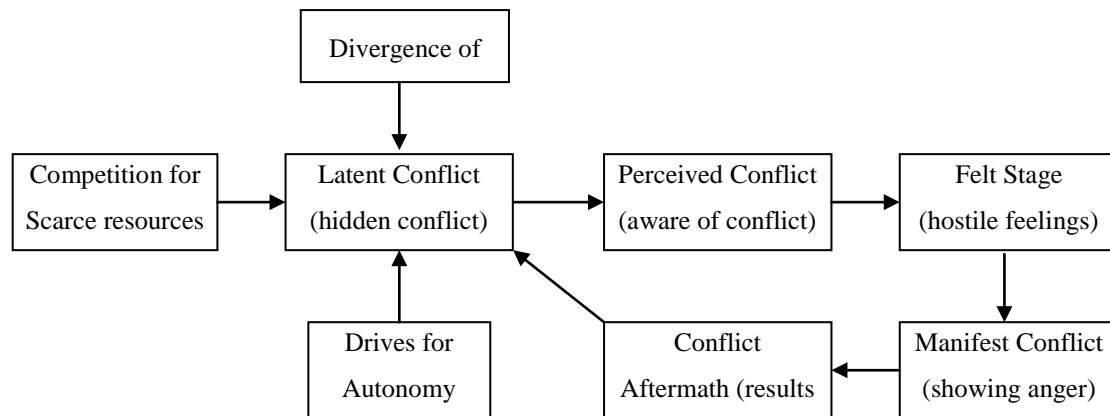


Figure 3-3 Pondy’s Stages of Conflict Model*
(Source: Kamran (1996))*

- **LATENT CONFLICT:** Refers to the source of conflict, such as role conflict or competition over scarce resources. The assumption is that due to certain antecedent conditions conflict “should” occur.
- **PERCEIVED CONFLICT:** The realisation that there is a conflict, but neither party is upset about it, may accompany latent conflict or be present when there is no latent conflict
- **FELT CONFLICT:** Perceived conflict, which grieves the parties involved, but which neither would normally do anything about. Stress and tension are usual outcomes of felt conflict.
- **MANIFEST CONFLICT:** The next level of conflict. The difference between felt and manifest conflict is that manifest involves openly aggressive behaviours ranging from mild, passive resistance through sabotage to actual physical conflict.
- **CONFLICT AFTERMATH:** Is the outcome of conflict that may involve change. If the conflict has actually been resolved, this can lead to greater satisfaction among the participants. If, on the other hand, a conflict has not been resolved then what appears to be a satisfactory resolution may only be one of the prior levels of conflict.

RAHIM’S STAGES OF CONFLICT:

Rahim (1986) as Pondy, also developed a five stage model of the conflict episode by synthesising the works of various scholars in this field. His model of conflict episode, shown in **Figure 3-4** below, is comprised of antecedent conditions,

behavioural changes, structure formation, decision process and conflict aftermath. Rahim's stages of conflict are a dynamic and useful description of just what leads to and happens in a conflict. The solid lines show how the stages are sequentially related (from top to bottom in the figure), while the dashed lines shown how the stages are connected to explain future conflict episodes.

- **ANTECEDENT CONDITIONS:** This is the first of conflict development. These conditions exist within the individual (s) or group (s) just prior to conflict occurring. These conditions are behavioural, structural and demographic in nature.
- **BEHAVIOURAL CHANGES:** It is the second stage in the conflict chain of events. These occur after the conflict is initiated, and they refer to aggressive behaviour accompanied by a reinforcing attitude. Attention of the group is diverted from goal accomplishment to "winning". At this stage, the conflicting parties begin to think of each other as enemies, and describe each other in terms of negative stereotypes.
- **STRUCTURE FORMATION:** As the parties to the conflict become more rigid in their interaction, the third stage occurs, that is, the parties rely on rules and written communications for their interactions. Hence, the conflict becomes institutionalised and as formal as possible.
- **DECISION PROCESS:** In this stage, the parties devise a substitute process or structure of decision making to take the place of the usual methods. For example, arbitration instead of friendly discussion, or issuance of directive by a superior calling for resolution of the conflict, etc.

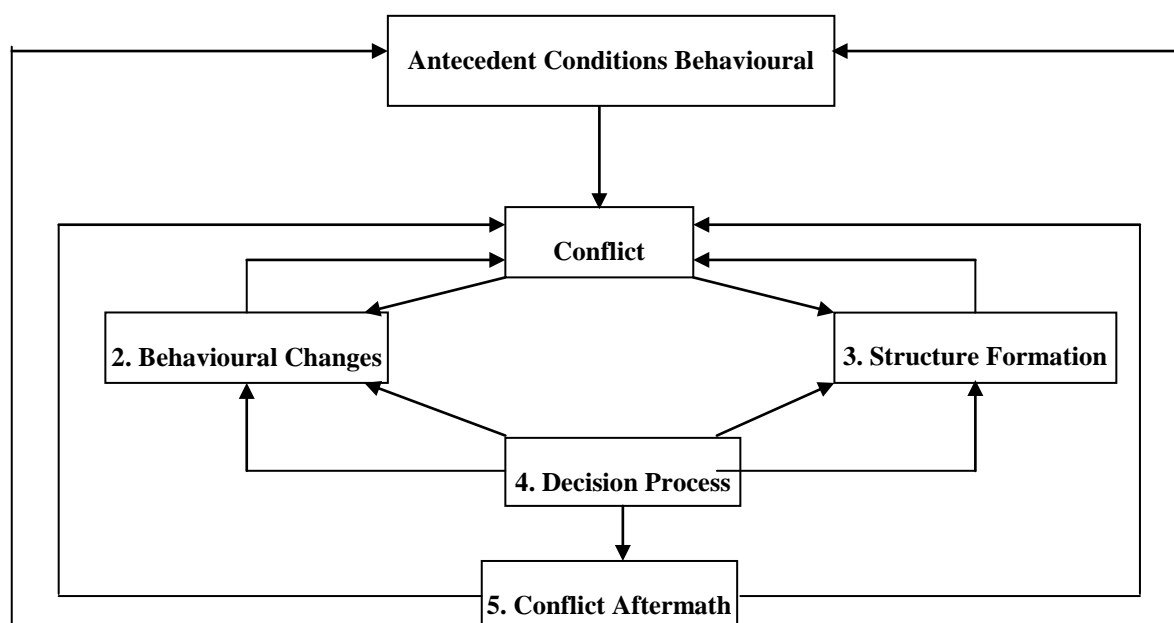


Figure 3-4 Rahim's Stages of Conflict *
(Source: Kamran (1996)*

- **CONFLICT AFTERMATH:** This is the final stage of Rahim's model, and occurs after the conflict is resolved. There can be bitterness and resentment if one party perceives that it is a loser. These feelings can easily carry over into future interactions and cause latent conflict to be a factor of some significance. On the other hand, where a conflict is resolved from a consensus point of view, both parties can approach future encounters on a more positive and cooperative manner, committed to the agreed-on resolution.

DEUTSCH'S FACTORS OF CONFLICT

Deutsch (1969) argued that there are six factors determine the actual course of a conflict episode. His model of conflict episode, shown in **Figure 3-5** below, includes factors such as the process, prior relationship between parties, nature of conflict, characteristics of the parties, estimate of outcomes, and the third party.

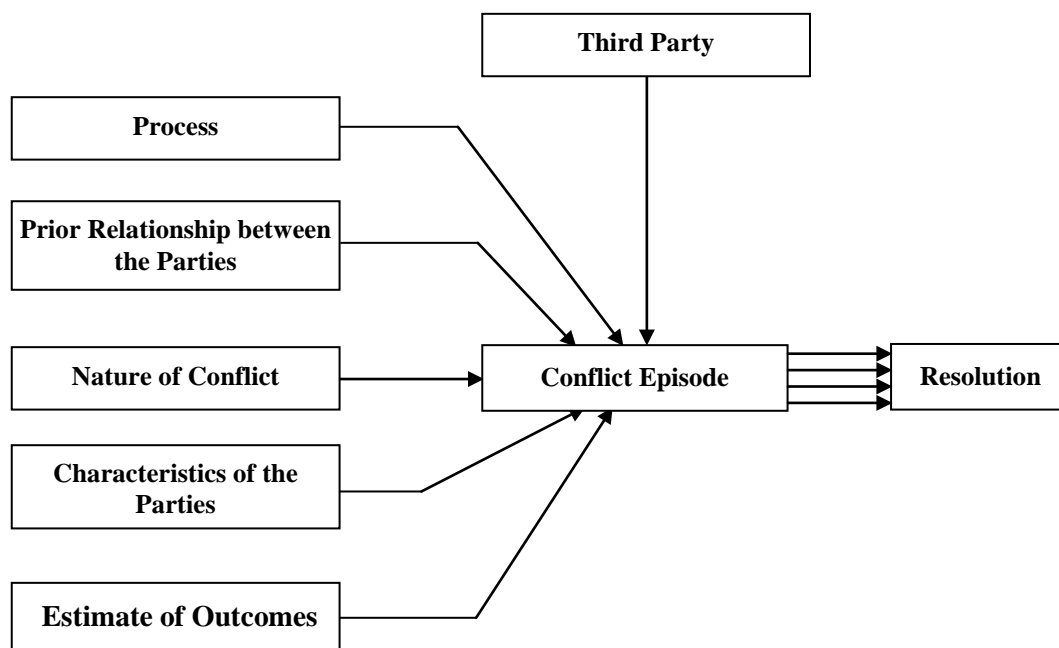


Figure 3-5 Deutsch Six Factors*
(Source: Kamran (1996)*)

3.3.3 MODELS OF MANAGING CONFLICT

As discussed in Section 3.3.1, the consensus among conflict researchers is that conflict need not necessarily be reduced or avoided, but managed. This is mainly due to the positive effects of conflict such as increased innovation and creativity and so on. However, it is important to bear in mind that too little or too much conflict can create stagnation or chaos respectively.

This section presents a body of theory, which will be helpful in managing organisational conflict. That theory is then put into a coherent and understandable form in order to enhance the understanding of conflict.

To manage conflict, effectively, understanding of conflict behaviours that are most likely to lead to constructive or destructive outcomes is of utmost importance. Thus, identification of variables, which influence occurrence of those behaviours, can help development of productive intervention strategies and tactics. Two types of conflict models, namely process and structural models, will be discussed. Process model focuses on occurrence of sequence of events once a conflict episode is underway. Structural model, on the other hand, is concerned with analysing the

context in which conflict in the first place and those, which are pre-existing.

THE PROCESS MODEL OF CONFLICT

The process model of conflict focuses on the sequence of events that occur once a 'conflict episode' is underway. That is, it analyses conflict as a continuing process in which actions are taken that lead to subsequent actions and so on until an outcome is reached. This approach, however, is not particularly concerned with the contextual conditions that set up the possibility of a conflict episode arising, rather it addresses the issue of how it is that such an episode proceeds (Dunford, 1992).

Another scholar, Thomas (1976) has described 'process model' as one form of research that attempts to understand conflict phenomena by studying the internal dynamics of conflict episodes by identifying the events within an episode. Such as the frustration of one party; his conceptualisation of the situation; his behaviour; the reaction of the other party and the final agreement or lack of agreement. The model is then concerned with the influence of each event upon the following events (see **Figure 3-6**). He then concludes that from this perspective, conflict is very much an ongoing process.

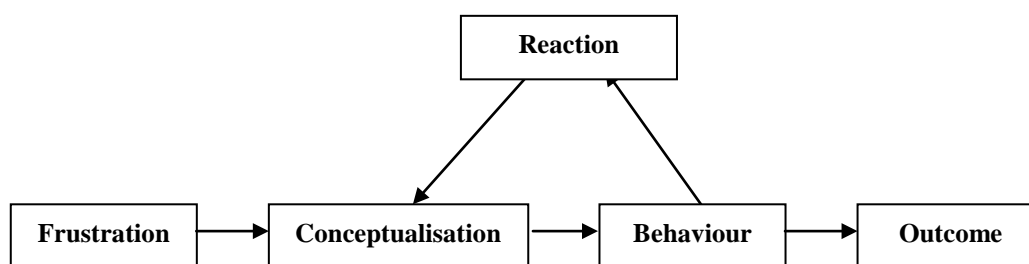


Figure 3-6 Process Model of Conflict Episode *
(Source: Kamran (1996)*)

THE STRUCTURAL MODEL OF CONFLICT

According to Dunford (1992), the structural model of conflict, on the other hand, is concerned with analysing the context in which conflict is produced. That is, it focuses on identifying those factors which set up the possibility of conflict in the first place, i.e. casual factors, such as organisation design, the employment relationship, etc. and those which are pre-existing influences on how the conflict will be handled,

i.e. shaping factors, such as behavioural disposition, social pressure, etc.

Thomas (1976) also describes 'structural model' as another form of research that attempts to understand conflict phenomena by studying how underlying conditions shape events. He argues that the structural model is concerned with identifying the pressures and constraints, which bear upon the parties' behaviour, such as social pressures, personal predisposition's, incentives and so on. He continues that, furthermore, the structural model attempts to specify the effects of these conditions upon behaviour, for instance, in what way do peer pressures influence behaviour, how does frequency of interaction influence conflict behaviour, and how do various personal motives shape one's conflict behaviour?

Thomas then concludes that the understanding of structural influences would tend to be helpful in altering variables to produce long-run changes in conflict – handling behaviour in a situation, such as changing incentive schemes, implementing new procedures, etc.

THE NEED FOR BOTH MODELS

According to Thomas (1976), there is an existing interrelationship between the process and the structural models of conflict. First, the two models complement each other. The structural model tends to be useful for suggesting systemic changes, while the process model tends to be helpful in managing an ongoing system. The structural model suggests long-run improvements in relationships, while the process model helps one to cope with crisis, and so on. Both models, and tactics which they suggest, are necessary for effective conflict management. Secondly, even though the two models are presented separately for convenience and because they seem to reflect somewhat different research literature, in reality, of course, they fit together into one larger view of conflict structure and process. The structural variables constrain and shape the process dynamics, while knowledge of the process dynamics helps one predict the effects of structural variables.

3.3.4 STRATEGIES FOR MANAGING CONFLICT

Although a certain amount of organisational conflict may be seen as inevitable, there are a number of ways in which management can attempt to avoid the harmful effects of conflict. The strategies adopted will vary according to the nature and sources of conflict outlined previously.

- **Clarification of Goals and Objectives:** The clarification and continual refinement of goals and objectives, role definitions and performance standards will help to avoid misunderstandings and conflict. Focusing attention on subordinate goals, which are shared by the parties in conflict, may help to defuse hostility and lead to more co-operative behaviour.
- **Resource Distribution:** Although it may not always be possible for managers to increase their allocated share of resources, they may be able to use imagination and initiative to help overcome conflict situations.
- **Personnel Policies and Procedures:** Careful and detailed attention to just and equitable personnel policies and procedures may help to reduce areas of conflict. Examples are job analysis, recruitment and selection, job evaluation; systems and reward and punishment; appeals, grievance and disciplinary procedures; arbitration and mediation; etc.
- **Development of Inter-personal/Group Process Skills:** this may help to encourage a better understanding of one's own behaviour, the other person's point of view, communication processes and problem solving. It may also encourage people to work through conflict situations in a constructive manner.
- **Group Activities:** Attention to the composition of groups and to factors that affect group cohesiveness may reduce dysfunctional conflict. Overlapping group membership with a 'linking-pin' process, and the careful selection of project teams or task forces for problems affecting more than one group, may also be beneficial.
- **Leadership and Management:** A more participative and supportive style of leadership and management behaviour is likely to assist in conflict management; for example, showing an attitude of respect and trust; encouraging personnel self – development; creating a work environment in which staff can work co-operatively

together. A participative approach to leadership and management may also help to create greater employee commitment.

- **Organisational Processes:** Conflict situations may be reduced by attention to such features as; the nature of the authority structure; work organisation; patterns of communication and sharing of information; democratic functioning of the organisation; unnecessary adherence to bureaucratic procedures, and official rules and regulations.
- **Socio-technical Approach:** Viewing the organisation, as a socio-technical system, in which psychological and social factors are developed in keeping with structural and technical requirements, will help in reducing dysfunctional conflict.

3.3.5 THE METHODS OF CONFLICT RESOLUTION

Conflict is often considered neither good nor bad, but rather a natural condition in the organisation. Managers today are well advised to accept this situation and to devise some strategy for coping with conflict.

- **Use of Power and/or Authority:** One position that can be adopted is to use power and/or authority to put down conflict (suppression). Management simply orders the parties to cease their conflict, or one party can order the other party to cease the conflict. Obviously, this technique has different effectiveness in different organisations. Management might not have enough power and authority to suppress the conflict in one organisation, in which case conflict not only continues, but also management loses relative power and status to the conflicting parties.
- **Smoothing:** Another technique for dealing with conflict is smoothing. Managers who use this technique attempt to defuse the conflict by consoling the conflicting parties. They use supportive, affective language in restoring peaceful relations amongst the parties. Therefore, this technique is an attempt to restore normal or peaceful relations with consultation.
- **Avoidance:** This is another means of dealing with conflict. Here, one or more parties attempts to divert attention from the conflict or simply ignores it. In a heated debate, for example, the chairperson can change the subject to a less

controversial one. In a situation in which conflict seems inevitable, one party can physically leave (as in the case of an impending fight) by walking away. Another example might be seen when a subordinate observes superior taking money from the company's petty cash fund without official authorisation. In order to avoid conflict with the superior, the subordinate may simply "look the other way". This technique is an attempt to deal with conflict by skirting or ignoring the issue.

- **Compromise:** There is also a technique of Compromise. It is argued that managers should develop skills for this type of technique because it can be an effective means for dealing with conflict. The manager (or anyone else for that matter) seeks to establish a middle ground, yielding somewhat from an original position that is part of the conflict. If both parties can move to a middle position, conflict can be controlled. The compromise approach to conflict management is one of bargaining. It establishes values to be given and accepted by both parties. Thus, the approach has promise for effective conflict resolution.
- **Third – party intervention:** This also an effective means for dealing with conflict. Here, one or more people who are not a party to the conflict are brought in to find a means to resolve the conflict issue. For example, in construction industry arbitrators are often brought in to solve construction disputes. However since third parties frequently bring about a compromise in the situation, their involvement is one means of negotiating a compromise solution.
- **Co-optation:** When one group takes over subsumes another group, the condition is termed co-optation and it can be useful in resolving conflict that might have existed among the group. Corporate merges provide an excellent example of this technique. Often these merges are brought about only after bitter and sometimes drawn-out proxy fights among the stockholders of the organisation involved. Once the merger has taken place, the means for peaceful resolution can exist.
- **Democratic Process:** This process can be used to resolve conflict. Opposing group gather together in meetings, which are forums for airing debate, and opposing views. After the views have been discussed, the group frequently will vote on the issues, with the majority vote prevailing; thus conflict can be dealt with simply by voting.
- **Job Rotation:** Conflict can sometimes be managed by the simple method of job rotation. When members work together with other groups, they can come to

appreciate other’s tasks, attitudes and orientations, possibly removing some conditions that cause unhealthy conflict.

- **Larger Goal:** When competing groups can see a larger goal than their individual group’s objective, they can begin to co-operate rather than compete. Organisations faced with a matter of survival can be seen as examples where this can occur.
- **Confrontation:** Conflict can also be dealt with this technique. This is the objective recognition that conflict does in fact exist and that an attempt to deal with it should be based on facts rather than on emotions. It is a mature approach to conflict because it is founded on realism. Its use requires that the parties face the fact that conflict exists and that a straightforward approach to its management should be taken. Confrontation does not suggest that emotions should be ignored; it suggests that objectivity and facts should be emphasised rather than emotions. Because conflict, by its very nature, involves feelings and emotions, the approach cannot be entirely emotion free. Confrontation simply attempts to minimise the role of emotions and stress the importance of facts and objectivity.

The above has investigated the organisational phenomenon known as conflict, highlighted the different viewpoints of scholars’ arguments on the reasons and source of conflict, and finally described various methods of conflict resolution.

A summary of the different thoughts between the two schools is presented in **Table 3-2** below.

Table 3-2: Comparison of Old and New Points of View

Old View	New View
Conflict is avoidable.	Conflict inevitable and is linked to change.
“Troublemakers” cause conflict.	Conflict is determined by structural factors, e.g. Class system, design of career structure.
Conflict is detrimental to task achievement.	A small level of conflict is useful particularly if it is used constructively.

It is important to bear in mind that because conflict is central to organisational

life, managers must devise some means of monitoring and controlling it. Some organisations have gone so far as to differentiate separate organisational units for this purpose. Third – party intervention is an attempt to monitor and control conflict. Other organisations have designed “cooling – off” periods and procedures of decision review to ensure that objectivity and power distribution are as optimal as is practicable. Whatever technique used, conflict, because of its inevitability and potential harm, must be managed properly. The following techniques are can be used to secure the benefits of conflict it is necessary to:

- i) Have agreement on a common goal or objective;
- ii) Have an information system available to the participants, so that they can evaluate progress towards a goal and compare alternative strategies;
- iii) Ensure that the co-ordination mechanisms are appropriate to the degree of differentiation between the participants;
- iv) Ensure that the participating groups have the opportunity to communicate with each other and attain the degree of trust necessary to establish a collaborative relationship.

Above all, the concept of personal commitment, however, must not be overlooked. When parties feel strongly about an issue, they are committed to a successful resolution that will preserve their feelings about or positions on the issue. Once a public commitment is made, individuals become more ego-involved with the outcome of a conflict and so make its resolution more difficult. The message is therefore clear, which is, that one must be careful when forcing others to make a public commitment on an issue, because this makes it more difficult to resolve conflict (Moghaddam, 1996).

To this end, the issue of conflict management was dealt with. The variety of methods that organisations can utilise to better control conflict situations that exists within their organisations was also discussed. These included use of power/authority (suppression), confrontation/co-operation, the democratic process, smoothing, compromise, co-optation, avoidance/withdrawal, job rotation, the establishment of larger goal to bring the conflicting parties together, and third-party intervention.

Finally, from these brief descriptions, it can be seen that parties can use one or a combination of means for dealing with conflict. These techniques provide a variety of approaches and can be effective methods for conflict management. However, through each method of conflict resolution runs the persuasive abilities of the parties. By whatever means, one party attempts to persuade the other of the correctness of its view. Skilful persuaders hold the upper hand when attempting to resolve conflict, regardless of the means they use.

The next section gives a description about types of contracts and identifies different risks in the projects. In addition, various procurement strategies are also mentioned.

3.4 AN OVERVIEW OF PROJECT RISK MANAGEMENT, TYPES OF CONTRACTS AND THEIR PROCUREMENT STRATEGIES

Construction activity is a complex process involving many disciplines with differing skills. Wherever a number of diverse elements are drawn together, grey areas open to alternative interpretation arise. The evolution and translation of a client's requirements into an on-site physical presence carries with it a risk of unpredictable uncertainty leading to differences of opinion. The result of which is described as conflict or dispute (Bishop, 1992).

In addition to this complexity within construction industry, modern societies have experienced a liability explosion, albeit in different degrees. As a result, a construction manager must spend a significant amount of time and effort on settling construction disputes. It would therefore be desirable to identify the causes of disputes and develop methods for managing them so that in this age of scarce resources, more effort may be focused on construction rather than dispute resolution.

Choice of the correct type of contract and procurement method in a construction project can go a long way in improving the relationship between the parties involved. Latham's final (1994) report entitled "Constructing the Teams" represents a comprehensive review of the construction industry's procurement and contractual arrangements. It comments on the inefficiencies inherent in the existing

contractual framework and adversarial nature under which many contracts are managed.

It must be borne in mind that, much has changed since the conventional arrangements came into being, not least of which is the erosion of power base of the engineer or the architect. Finance committees, accountants and auditors have much greater influence today in major contractual matters, whilst selective tendering procedures have still to focus in the 'value for money' concept. Design, Build, Finance and Operate (DBFO); Build, Own, Operate and Transfer (BOOT); and Build, Operated and Transfer (BOT) type contracts are all changing the procurement process and a thrust towards common ownership is being fostered through the greater use of New Engineering Contract. The Construction Design and Management (CDM) Regulations (1994) represent the legislative framework directed at safety, which fundamentally links all the interested parties through the 'constructability' envelope based on risk assessment. In addition, innovative funding arrangements are being encouraged by the 'Private Finance Initiative' (PFI). This is, therefore, a period of great change within the industry with 'Total Quality Management' influencing 'Quality Assurance' and 'Risk Management' approaches to many aspects of procedural matters.

In previous Section 3.3, conflict within organisational environments was discussed and a number of conflict management and resolution strategies were presented. Section 3.4.1 highlights the concept of project risk management. Different types of contracts and procurement strategies will then be addressed (in Sections 3.4.2 and 3.4.3, respectively) in order to examine the scope of their effect on construction claims and disputes.

3.4.1 PROJECT RISK MANAGEMENT

Project risk management is the science of identifying, evaluating and seeking to avert or contain those events or circumstances the occurrence of which would result in increased costs and/or delays to the project's completion. Possible risks are evaluated in terms of their potential costs and likelihood of occurrence. These factors are then weighed against the cost and effectiveness of avoidance measures. The

objective is to promote the timely and economical completion of the project works by avoiding the occurrence of identified risks, or by minimizing their impact on the project. A client can manage project risks either by risk control or by loss control. (Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects, 2002)

According to the Construction Works Procurement Guidance (2002), risk management is a planned and systematic process consisting of identification, assessment and monitoring and control. The aim of risk management is to ensure that risks are identified at project inception, their potential impacts allowed for and, where possible, the risks or their impacts minimised. There are three stages for risk management, these three stages are:

- **Risk identification:** Successful risk management depends on accurate risk identification. Both management practice and engineering techniques should be applied to determine how things might go wrong. When identifying potential risks, it is important to distinguish between the origin of a risk and its impact.
- **Risk assessment:** The purpose of risk assessment is to understand and quantify the likelihood of occurrence and the potential impacts on the project outturn. Various analytical techniques are available, but the key features are:
 - Qualitative assessment: the purpose of qualitative assessment is to describe and understand each risk and gain an early indication of the more significant risks; and
 - Quantitative assessment: the purpose of qualitative assessment is to quantify the probability of each risk occurring and its potential impact in terms of cost, time and performance.
- **Monitoring and Control:** The purpose of risk assessment is to identify options for dealing with risks or their impacts and monitor implementation of the preferred options.

In the same way, Murdoch and Hughes (1993) described the process of

dealing with construction risks. They fall into one of the three stages (Yogeswaran, 1996).

- **Identify the risk:** The risks associated with a specific project should be identified. The identification of the risk is linked to the client's priorities for a project, so that for example: if the timing of a project is critical, the severity of time-related risks is automatically increased.
- **Analyse the risk:** Each of the risks is analysed in terms of their likely frequency of occurrence, their likely severity when they do occur and the range of possible values in terms of minima, maxima and medians for these aspects. Most of the risks, which are lower in priority, are analysed subjectively except the critical risks, which are subject to quantitative analysis.
- **Respond to the risk:** The client's priorities and major risks involved in the project becomes clear from the above steps and the client should decide at to how best he can respond to the risks.

The client seeks to control whatever risks he can through the contract documents. The contractor faces a multitude of risks. It is inevitable that the client, who initiates the formulation of the contract documents either through his internal resources or agents such as engineering consultants (architects and quantity surveyors in the case of building contracts), sets the policy as to how best he should deal with the condition risk (Yogeswaran, 1996).

The guidance on risk assessment, etc., is also crucial for the clients. It determines contract strategy. Latham (1994), in his report on procurement and contractual arrangements in the United Kingdom construction industry, recommended that the Government (Client) should assess the risk internally so that a contract strategy is devised. He quoted the risk classification as follows: (Yogeswaran, 1996).

- **Fundamental Risks:** War damage, nuclear pollution, supersonic bangs
- **Pure Risks:** Fire damage, storm
- **Particular Risks:** Collapse, subsidence, vibration, removal of support
- **Speculative Risks:** Ground conditions, inflation, weather, shortages and

taxes

According to Hughes and Murdoch (1993), the following construction risks are identified:

- ***Physical works:*** Such as physical conditions of the ground; artificial conditions causing obstruction; defective materials or workmanship; costs of tests and samples; weather; site preparation; inadequacy of staff, labour, plant, materials, time or finance.
- ***Delay and disputes:*** Such as possession of site; lateness in the supply of information; inefficient execution of work; delay outside both parties' control; layout disputes
- ***Direction and supervision:*** Such as cupidity (i.e. greed); incompetence; inefficiency; unreasonableness; partiality; lack of communication; mistakes in the documentation; defective designs; ensuring compliance with requirements; lack of clarity in specifying requirements; inappropriate choice of consultants or contractors; changes in requirements.
- ***Damage and injury to persons and property:*** Such as negligence or breach of warranty; uninsurable matters outside the parties' control; accidents; uninsurable risks such as war, usurped power; consequential losses arising from the above; exclusions, gaps and time limits in insurance cover.
- ***External factors:*** Such as Government policy on taxes; labour, safety or other laws such as environmental protection; delay or refusal of planning approval; financial constraints; energy and pay restraints; cost of war or civil commotion; malicious damage; intimidation; labour demands and unrest; strikes; lockouts; pickets.
- ***Payment:*** Devaluation; delay in settling claims and certifying; delay in paying certificates; legal limits in recovery of interest; insolvency of contractor or sub-contractor or client; funding constraints; shortcomings in the measure and value process; exchange rate fluctuations; inflation; anything not covered by a fluctuation clause; replacement cost of plant and equipment.

- **Law and arbitration:** Such as delay in solving disputes; injustice; uncertainty due to lack of records or ambiguity of contract; cost of obtaining decision; enforcing decisions; changes in statutes; new interpretations of common law.

The third stage of risk management involves risk response, thus the following discussion highlights the different ways of responses.

The possible responses (Murdoch and Hughes, 1993) to the contractual risks are:

- **Risk Transfer:** The client transfers the risk to another party or parties, e.g. design risk is transferred to consulting engineers. Similarly, the contractor may transfer his risk to the sub-contractor. The transfer of risk should involve a premium. When many unpredictable or excessively unbalanced risks or undefined responsibilities are involved, the contractors will find it difficult to set a premium for accepting the risk.
- **Risk Retention:** the client carries Risks that are highly unpredictable and poorly defined. Examples of such risks are those associated with war, earthquakes, invasions which would be impossible to quantify or predict.
- **Risk Avoidance:** When some risks are unacceptable, the client may decide to redefine the project scope.
- **Risk Insuring:** This could be considered as a transfer of risk to insurers. The client may specify (into the contract) that the contractor should purchase insurance for indemnifying the client against third party liability - a common provision in standard forms. Consulting engineers insure (professional indemnity insurance) to protect against the liabilities in tort of negligence in respect of their design. Contractors could transfer a considerable risk to insurer, as there are new insurance products available;
- **Doing nothing:** This happens when certain events are not envisaged by the contracts; sometimes, consultants decide that the risks already lie with those parties who can best control them, and choose to do nothing;
- **Risk sharing:** A common risk sharing strategy involves the use of joint ventures to reduce the contractor insolvency. Weather related risks are often

shared between the client and the contractor.

Having identified the possible ways to deal with the construction risks, apportionment of risks is necessary to achieve the desired result. In a traditional lump Sum contract, the parties that take the risk are clients, contractors, consultants, insurers and sub-contractors.

As mentioned earlier, the objective of Project risk management is to promote the timely and economical completion of the project works by avoiding the occurrence of identified risks, or by minimizing their impact on the project. A client can manage project risks either by risk control or by loss control. Risk control seeks to limit exposure to risks by avoidance measures or by risk apportionment. Through the Contract, the Client can transfer contractual responsibility for a given risk to the Contractor, who then has the option of including contingencies for such risk in his bid or of assuming the risk. Alternatively, the Client may determine that it is in the best position to most economically prevent or limit the impact of certain risks and may choose to retain contractual responsibility for them. Project risks may also be managed by loss control. Loss control involves financial provisions such as the retention of Contractor payments, budgetary allowances, and provision of bank guarantees or commercial insurance. Provisions such as these give the Client a financial offset to losses or delays to the project. While the objective of project risk management remains constant, i.e. avoiding or minimizing risks, the strategy adopted for its achievement will vary depending upon the nature of the project and the special risks it presents. For example, the strategy adopted in connection with the construction or widening of a road through a highly developed area containing extensive existing utility services must address risks such as delays or damages resulting from the removal and replacement of discovered services installations. On the other hand, the strategy for the construction of a new road through an undeveloped area will not need to address such risks but will need to take into account the possibility of other kinds of risks, such as unexpected sub-soil conditions (Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects, 2002).

O'Reilly (1995) recommended the following general code of practice for risk

allocation:

- Allocation of risks should be clear, complete and unambiguous.
- The more significant the risk is, the greater the need for clarity. Uncertainty about the meaning or ambit of a term can itself be a major source of risk.
- Allocation should be motivational. The party who accepts the risk should be able to influence its magnitude; control the effects of the risk once it has occurred and should have an incentive for minimizing and controlling the risk.
- The party who is in a better position to control the risk should be allocated with the risk. Significant risks carried by one party also represent risks to other (e.g. if a risk may jeopardise the solvency of the contractor, then the contractor's failure leave the client with an abandoned job. This is a risk to the client also and hence the risk should not be placed outside the control of the client).

General Conditions of Contract clauses principally identify how the risks inherent in construction are apportioned between two parties to the contract namely the Client (sometimes referred to as Principal, Owner, and Client etc) and the Contractor (universally in all forms of contract referred to as Contractor). Risk is an essential consideration in choosing contract strategies and in drafting contract documents (O'Reilly, 1995).

Having dealt with the basic project risk management, the different types of contracts and procurement methods will be addressed in order to examine the scope of their effect on construction disputes.

3.4.2 STANDARD FORMS OF CONTRACTS

Construction contract can be defined as a document that regulates the relationship between principal and contractor throughout the project, stipulating their liabilities, that is, risk allocation, and their obligations, that is, expected conduct (Cahill, 1990). Construction contracts often contain provisions designed to control contract time, cost, conflicts and products quality.

According to Harvey & Ashworth (1993), there are over 30 different forms of contract in use within the construction industry. These include the varieties of forms from the JCT, the General Conditions of Government Contracts, ICE forms, forms for international usage (FIDIC), a range of forms for different sorts of sub-contractors (nominated and direct sub-contractors) and many other forms which have been developed by industrial or property companies which have extensive construction programmes. Some of this can be partially accounted for by the disparate types of project, which require constructing, and the practical impossibility of writing a new set of conditions for every individual contract. The New Engineering Contract (NEC) holds out some hope for rationalisation since it can be used on both building and civil engineering contracts.

Although the general content of many of the forms of contract are similar, there are wide differences in detail and interpretation of the individual clauses and conditions. The contract documents also differ under the different forms of contract (Ashworth, 1991).

Contracts include at least a form of agreement and drawings and Specifications or Bills of Materials. They should encompass at least: (a) a description of the work to be performed, (b) a description of the quality of work required, (c) the cost of the finished work, (d) the construction programme and (e) the contractual conditions. In Abu Dhabi, a contract consists of four parts:

1. Tender and Contract Documents;
2. General and Special Conditions of Contract;
3. General and Special Specifications;
4. Drawing and Designs and Exchanged Correspondence.

A detailed study of Abu Dhabi Construction Contract is presented in Chapter Five (Section 5.8).

Harvey and Ashworth (1993) assert that the choice of a particular form will depend upon a number of circumstances, such as:

- Type of client; private or public;

- Method of procurement to be used;
- Type of work to be undertaken;
- Status of the designer, e.g. consultant or contractor;
- Size of project; and
- Type of contractual documentation to be used.

There are a number of forms of building and civil engineering contracts in standard use. According to Elliot (1988), the JCT Contract in its six current versions is in the centre of the range of the standard forms, each of which are designed for use with the standard form of sub-contract in, these include:

- The JCT Standard Form of Building Contract 1980 Edition;
- JCT conditions of Contract 5th and 6th Editions; and
- JCT agreement for Minor Works.

3.4.3 PROCUREMENT STRATEGIES

From a study carried out by Nahapiet and Nahapiet (1985), it was found that there were three factors related to contract selection: the characteristics of clients, particularly their experience and expertise in construction; the level of performance required by client; and the construction complexity of projects.

Over many years, the construction industry's practitioners have been aware of the difficulties to the placing and management of contracts. In an attempt to overcome these difficulties, modifications to the established procedures have been introduced from time to time since the 'Banwell Report' (1964) identified where limitations in procurements existed.

The objective of all the parties concerned in a construction project, therefore, is similar in many respect to that set by Banwell (1964), in promoting 'efficiency and economy', by increasing the measure of integration between design and construction. To this end, Banwell (1964) saw the need to improve the quality of information between design and construction and the need for adequate time allowances to provide for the processing of that information.

Information and documentation are fundamental to the whole process of planning and managing contracts. If design work is incomplete at tender stage then not all the necessary information can be made available and tender documents will be inadequate for the purpose intended. However, this inadequacy may not be obvious to the contractor at the time of preparing the tender. The contractor bases his estimate on the accuracy and sufficiency of the information provided by the drawings and the Specification or the Schedule of works. If this information does not reflect the total amount of work to be carried out, then the risk borne by the contractor will be increased significantly. This could then escalate into all kinds of conflict and dispute.

Thus, the choice of contract procurement strategies should be based on consideration of the responsibilities for the risks of design, construction, and services, their interfaces, the division of works packages, the number and type of contracts, and method of selecting the contractor. However, the selection of appropriate contractual arrangements for any but the simplest type of project is difficult owing to the diverse range of options and professional advice, which is available. According to Harvey and Ashworth (1993), much of this advice is also in conflict and lacking a sound research basis for evaluation. For example, a design and build contractor is unlikely to recommend the use of an independent designer and vice versa, the provisions that provide only a design service generally take the opposite viewpoint. Harvey and Ashworth (1993) claim that, individual experiences, prejudices, vested interests, familiarity, the need and desire for improvements are factors which have helped to reshape procurement in the construction industry. The proliferations of differing procurement arrangement have resulted in an increasing demand for systematic methods of selecting the most appropriate arrangement for a particular project (Skitmore and Marsden, 1988). The reality of the situation is that a particular project with defined objectives (Harvey & Ashworth, 1993). Factors that should be considered when choosing the procurement path include:

- Size: Small projects are not suited to complex arrangements;
- Design: Aesthetics, function, maintenance, build ability, contractor integration, design before build, etc.;
- Cost: Price competition or negotiation, fixed price arrangements, price certainty,

- payments and cash flows, cost penalties, variations, etc.;
- Time: Inception to hand – over, Start and completion dates, early start on site, contract period, fast tracks, delays, extension of time, etc.;
 - Quality: Quality control, defined standards, maintenance, design and detailing, build ability, contractors' reputation, etc.;
 - Accountability: Contractor selection, 'ad hoc' arrangements, contractual procedures, auditing, simplicity, value for money, etc.;
 - Organisation: Complexity of arrangements, responsibility, subcontracting, lines of management, standard procedures, etc.;
 - Risk: Evaluation, sharing, control, etc.;
 - Market: Workloads, effects of procurement advise, etc.; and
 - Finance: Collateral, payment systems, remedies for default and funding charges.

There are several different contractual types representing different contractual arrangements, which currently predominate in the industry. They include the following:

Lump Sum Contracts: These types of contracts are generally regarded as being the traditional form of contract on construction projects. Here, the client appoints independent consultants to act on his behalf to produce the design and supervise construction. The lump sum contract views project delivery essentially as a sequential process, with design being largely completed before the appointment of the contractor to who detailed plans and specifications must be given. Typically, it places the main responsibility for co-ordinating the various organisations with the architect/engineer and the contractor undertakes to perform work for a fixed price. There are three main benefits associated with lump sum contracts:

1. It is simple and familiar and therefore relatively well understood, hence an obvious first option considered by many clients;
2. It establishes a well-defined set of relationships and responsibilities at each stage of the project and therefore some believe that this leads to greater clarity than several of the other contractual arrangements; and
3. It offers greater price certainty to the client because contractors bid fixed prices based on detailed plans.

Nahapiet and Nahapiet (1985) emphasized that this type involves the client in less financial risk. However, several major limitations were pointed out, and among those frequently cited were:

1. The length of time taken to deliver projects because of the need to complete all design work before letting the construction contracts and although this provides cost security in times of inflation this time extension may result in higher bid prices and thus higher overall project costs;
2. The loss of savings potentially available through earlier involvement of the contractor;
3. The higher probability of adverse relationships being established between the various parties, especially in projects which undergo a large number of changes; and
4. The generally lower level of flexibility involved, especially by comparison with the other forms of contract.

Construction Management: This type of a contract aims to achieve a higher level of integration by separating managerial from technical (i.e. designing and building) responsibilities through the appointment of a specialist construction manager. Instead of organising the contribution of different specialists on a sequential basis, construction management treats projects planning, design and construction as mutually interdependent tasks.

It is frequently described as a team approach to building since it generally involves the creation of a project group involving the client, construction manager, architect and other consultants and subcontractors as required. This team is involved throughout the project and led by the construction manager. According to Nahapiet and Nahapiet (1985), the benefits offered by this type are:

1. Clients have greater degree of control over the project as they are given more information by their agent (i.e. construction manager) on which they base their decisions and are thus able to make more conscious trade-offs between cost, time and quality. This appears especially valuable for the inexperienced client. Although it often places more demands on the client by client by involving

him extensively in project decision making, some clients see construction management reducing the need for the client to take on extra staff for monitoring and control;

2. It offers a higher probability of achieving project performance within tight time and cost constraints; and
3. It often establishes a cohesive team a group of adversaries and, as a result, it is generally easier to overcome problems with out undue delay and bargaining.

However, the disadvantages of this type are:

1. It can make a complicated situation still more complex by adding yet another organisation and another interface to be co-ordinated;
2. It adds a future fee, although some argue that this is offset by a reduction in the management costs of the works contractors; and
3. It involves more uncertainty and hence more risk because it guarantees nothing on price.

Management Contracting: Under this form of contract, the owner appoints a management contractor, who may be a general contractor, to work alongside the other professional consultants. The aim is to ensure that construction expertise is incorporated into the design at an early stage in the project. The management contractor does not carry out any of the construction but in addition to advising the design team, is generally responsible for setting up the site establishment, providing general back-up services, advising on the use of specialist sub-contractors and organising construction.

There are many similarities between construction management and management contracting, for example, it facilitates (a) phased construction, allowing for greater speed of project delivery; (b) maximum competition for each of the contracts and sub-contracts that can result in savings; and (c) the creation of good, harmonious relationship between the various parties involved.

Design & Build: In these types of contracts, the client makes an agreement with one single administrative entity, the prime contractor, who is given responsibility

for the whole project. Unlike the other forms of contract, it involves the contracting organisation becoming the overall co-ordinator and manager for the project team.

According to Nahapiet and Nahapiet (1985), the advantages of these types of contracts are as follows:

1. It provides single point responsibility between client and the design-builder;
2. It eases communication channels between the various specialist groups who are all part of a single organisation, and;
3. It also provides a high degree of flexibility and response to changes at all stages of the project. This, together with the facility for phasing design and construction, results in an early completion time with all its attendant benefits.

However, they identified limitations to these kinds of contracts such as:

1. Maintaining the high quality of design and construction, this is due to the limited number of in-built checks and balances. There may also be a lack of stimulus for design innovation;
2. It is more difficult in this form of contract to evaluate value for money because of the different systems and services offered by different organisations and the limited amount of information available when the contract is awarded; and
3. There is a potential risk of preparing plans, letting sub-contractors, etc.

The following **Table 3-3** summarizes the different procurement strategies along with their advantages and disadvantages.

Table 3-3: Summary of Advantages and Disadvantages of Contract Strategies*

Parameter	Project Objectives	T	CM	MCD	& B
Timing	Early completion	N	Y	Y	Y
Cost	Price certainty before construction start	Y	N	N	Y
Quality	Prestige level in design and construction	Y	Y	Y	N
Variations	Avoid prohibitive costs of Change	Y	Y	Y	N
Complexity	Technically advanced or highly complex building	N	Y	Y	N
Responsibility	Single contractual link for project execution	N	N	N	Y
Professional responsibility	Need for design team to report sponsor	Y	Y	Y	N
Risk avoidance	Desire to transfer complete risk	N	N	N	Y
Damage recovery	Ability to recover costs direct from the contractor	Y	N	Y	Y
Build ability	Contractor input to economic construction	N	Y	Y	N

(Source: Adopted from Yogeswaran, 1996)

Note: Y - appropriate; N – not appropriate
 T – Traditional; CM – Construction management; MC – Management contracting;
 D & M – Design and Manage; D & B – Design and Build

Moreover, the client’s risk assessment of a certain project is essential in selecting the contract strategy. Latham (1994) summarized the procurement and contractual routes emerging in United Kingdom to meet the client’s demands as follows:

- **Standard Construction:** The client on the advice from its consultants may decide that the product can be achieved through a pre-determined construction route, probably involving a limited range of standardized processes and components. A design and build contract with single point responsibility is suggested to be more suitable.
- **Traditional Construction:** In general, all civil engineering projects differ; each requiring specific design solutions while common elements, such as drainage, exist. These projects involve well-used and normal techniques of design and construction, but reflect specific wishes of the Client.
- **Innovative Construction:** Construction management may be an appropriate route to procure a project where the client commissions a project, which involves a high degree of innovative, and many new design details. The client wants hands-on involvement and seeks strong management. It requires a firm leadership and teamwork.

The above has highlighted the concept of project risk management. In addition, it has investigated the different types of contracts and procurement strategies in order to examine the scope of their effect on construction claims and disputes.

It can be concluded that different contractual arrangements establish different patterns of responsibilities and relationships between clients and the various parties involved in construction project. In so doing, they are regarded as offering clients differing combinations of expertise, risk flexibility and costs. Hence, when choosing a procurement strategy for the construction of a proposed project, the client, should first understand the various components of a contracting strategy, the characteristics of the proposed project, and its own ability. Some strategies are more appropriate for some projects than others are, and the client should not choose a strategy simply because it is convenient or recommended by the contractor (Gordon, 1994). The use of various types of risk analysis and management techniques, etc. should guide the client to choose the most appropriate method.

Hence, when choosing a procurement strategy for the construction of a proposed project, the client, should first understand the various components of a contracting strategy, the characteristics of the proposed project, and its own ability. Some strategies are more appropriate for some projects than others are, and the client should not choose a strategy simply because it is convenient or recommended by the contractor (Gordon, 1994). Use of various types of risk analysis and management techniques, etc. should guide the client to choosing the most appropriate method. In so doing, they are regarded as offering clients differing combinations of expertise, risk flexibility and costs. It should always be considered that different contractual arrangements establish different patterns of responsibilities and relationships between clients and the various parties involved in construction project.

3.5 CHAPTER SUMMARY

Most construction disputes start from an event on the construction site. Either the event itself causes an additional cost or delay to an item of work, or it exposes an earlier problem. Also it could be the cause of a problem, that arises later. Following this event, the party who has suffered additional costs submits a claim. This claim is followed by further claims and counterclaims and a “dispute or difference” is borne. This sequence will occur frequently on virtually every construction site.

It is generally agreed that in the construction industry the success of a project derives from co-operation rather than confrontation between the parties involved and that the internal cohesion within the relatively self-contained and/or isolated construction activities will be impaired if adversarial proceedings are employed to settle disputes. A firm credence is held that disputes ought to be resolved, within the industry itself, by processes of dialogue.

This chapter has addressed the definitions of each term “Conflict”, “Claim” and “Dispute” which are generally used among professionals in the construction industry. This was done in order to distinguish the different meanings attributed to these terms since these meanings determine the ways in which conflicting parties will respond to it. It has also investigated the views of different scholars regarding the relationships amongst these terms, as well as the development of claims and disputes.

Moreover, it has investigated the organisational phenomenon known as conflict. It presents a historical review of conflict and its characteristics along with some comments and views of different scholars regarding the role of conflict within organisations. Moreover, the discussion in Section 3.3.1 highlights the different viewpoints of scholars’ arguments on the reasons and source of conflict. The Classical School thought of conflict as an undesirable event, which must be stifled at almost any cost.

Conflict can be regarded as a symptom of a much wider issue. What is really at stake here is the extent to which we regard existing social and organisational arrangements as legitimate. Those who hold unitary and pluralist perspectives tend to

regard inequalities of power and wealth in society and organisations as natural and overall uncontroversial. Those who hold a radical Marxist perspective see these inequalities as the result of inhuman exploitation, which can only be overcome through the destruction of capitalism. The behaviour of the parties in a conflict may be expected to reflect their respective stances on this wider issue of legitimacy (Buchanan & Huczynski 1985).

It must also be acknowledged that, today, some level of conflict is inevitable in organisations, regardless of their size and nature. Therefore, a theory of how organisations form and operate must include a treatment of this important variable.

Causes of conflict were identified to include role conflict, changes in delegation, and changes in status, changes in goals, organisation overlap, resource competition and culture conflict. It was shown that culture conflict could be studied by focusing on how subgroup cultures frequently conflict with the dominant culture's values. Two subcultures, enhancing and orthogonal, do not cause conflict, though a third, counter-conflict, almost by definition, does. Cultural values can conflict with the development and implementation of an organisation's strategy. The physical setting in organisations, as a reflection of culture, can either inhibit or advance conflict situations.

The consensus of recent researchers in this field is that the conflict can be either constructive or destructive to the functioning of a person, group or organisation. To reinforce the point concluded in this section, it is imperative to avoid destructive conflict. Therefore, it is important to identify the situations in which conflict is destructive and those in which it is helpful and the factors that contribute to these positive or negative effects on groups and organisations. In the case of a disruptive, or potentially disruptive, conflict control and regulation is often the best short-term solution. In the case of a disruptive, or potentially disruptive, conflict control and regulation is often the best short-term solution. However, regulation in this sense recognises and legitimises the conflict and therefore may perpetuate it. Furthermore, this chapter the different strategies for managing conflict, as well as the different methods of conflict resolution.

Finally, Section 3.4 of this chapter, “An Overview of Project Risk Management, Types of Contracts and Their Procurement Strategies”, highlights the concept of project risk management. Different types of contracts and procurement strategies will then be addressed in order to examine the scope of their effect on construction claims and disputes.

Generally, clients use construction contracts as a tool to accomplish their objectives, although it is possible to carry out a construction project based on a simple exchange of letters between client and contractor, there are a great many matters that might not be included (Chappell, 1991). These could be important contractual arrangements and therefore a number of standard forms have been produced to suit varying procurement situations and to cover any events that may arise. It is important to bear in mind, however, that no two construction projects are the same. Standard forms are prepared for specific circumstances. It is inviting trouble to use the same form for every project no matter how well acquainted the architect is with that particular form. Many disputes occur because of the wrong choice of contract.

Cahill (1990) argues that, the problem with standard contracts is that they cannot cater for all different fact situations. The more they attempt to do so, the more unwieldy and unsuitable they become. However, it is worth mentioning that the standard contracts are useful both as a framework and as a starting point, as they have been produced by representatives of the different interest groups as well as being tested to some extent by the courts. As a result, their effect may be legally more predictable than a “one off” contract. He claims that the parties are usually more aware of the legal implications of a standard form of contract so that any alterations shifting the imposition of liabilities and obligations will generally be positively considered. This is in contrast to creating an entirely new contract where there may be more potential for liabilities and obligations to be imposed without adequate consideration.

After all a construction contract regulates the relationship between the client and the contractor throughout the work, stipulating their liabilities and obligations. The decision on the type of the contract, therefore, will to some extent determine the contract risk and contract responsibility and how the contractor is to be reimbursed for

the construction of the works. It is therefore, essential that the client is made aware of the risks being carried by the above various parties under the different forms of contract and inherent in the works. It is generally accepted, however, that the party best able to deal with it should accept the risk within a contract.

The choice of correct form of the contract requires the engineer or architect to be aware of the forms available, their respective terms and to be able to compare them. It should be remembered that when the most suitable of the available standard forms has been chosen, it may still be deficient in some respect and it may require modest amendments.

In modern construction, General Conditions of Contract, which allocate the risk between parties, are not alone sufficient to form a contract. Chapter Five presents the documents forming the construction contract in Abu Dhabi, as well as an investigation into some risk areas identified in the contract and the way to deal with them.

CHAPTER FOUR
CONSTRUCTION CLAIMS AND DISPUTES AND THEIR MINIMISATION
(LITERATURE REVIEW)

4.1 INTRODUCTION

Construction contracts entered into by government agencies and authorities are frequently attended by significant risk of exposure to change order requests and claims. This research project was initiated to study the underlying reasons for construction contract claims and disputes in the UAE construction industry. These reasons are in terms of the types of claims and disputes and their underlying causes. Moreover, another objective of this research is to identify methods used for claims and disputes avoidance and resolution. The dissertation focuses on the avoidance and resolution of claims and disputes and examines ways of settling disputes at their inception, before they become formal dispute or lawsuits.

These claims and disputes involve numerous issues, such as contract ambiguities, changes and additions to the contract, differing site conditions, schedule delays, stop work orders, errors and omissions in the contract plans and specifications, acceleration of the contract by the government agency, defective work by the contractor seeking indemnification from third parties, warranty/guaranty clauses, incentive/disincentive clauses, recovery of liquidated damages, and contractor interface. In addition, there are issues related to external entities, such as regulatory agencies.

The complexities that arise significantly increase the exposure of government agencies to large construction change order requests and claims. Effective cost controls and claims management require a sophisticated, anticipatory approach to avoid, resolve, or defend against such claims. Processing these claims consumes considerable management time and frequently requires the retention of additional consultants as well as legal firms. As the volume of unresolved disputes grows, relationships with the contracting community can deteriorate. This may lead to higher bid costs and the actual withdrawal from the bidding of some otherwise capable contractors. The early recognition, identification and resolution of disputes can lessen management costs and administrative efforts. As well as it can lower the overall program costs, benefiting the public, the agency and the contractor. The public will be the prime beneficiary of effective claims and dispute resolution.

This chapter examines the types of claims and disputes and their underlying causes in construction, and the practices used to identify and resolve them before they become formal dispute. It also considers the experiences of the construction industry with the use of alternative dispute resolution techniques. It does not address the experiences of the industry with regard to lawsuits involving unresolved claims and disputes and claims.

4.2 CLAIMS AND DISPUTES OCCURRENCE

According to Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects (2002), Claims generally arise where there is a dispute between the employer and the contractor due to the following two reasons:

1. As to their respective rights and obligations under the Contract; or
2. As to the facts about some event or circumstance.

A dispute arises where the parties have exchanged their opinions or positions and find they disagree on whether and/or how much time and/or money the contractor (or sometimes the client) is due. The mere fact that the contractor seeks additional time or money does not create a dispute or claim. If the client disagrees, then a dispute may exist and the contractor may determine a claim is his only course of action.

In the course of construction projects, and particularly large, complex projects, such disputes are inevitable. However, the occurrence of claims can be minimized by the diligent practice of an active claims avoidance policy.

While claims can result from many different causes, even unforeseeable causes, the origins of many claims can often be traced to the contract. Any contradiction, discrepancy, or ambiguity among the various documents that form the contract is likely to result in the client and contractor forming different expectations as to their rights and obligations. Claims are born due to differing expectations and perception. Some of the most important components of effective claims avoidance relate to the contract, its preparation, and the user's knowledge and application of its provisions during the various phases of the project life cycle.

Of course, claims also result from a broad spectrum of events and circumstances arising during the various stages of the project life cycle. Claims commonly follow from disputes over the cost or time impact of variations or other factors occurring during construction. Therefore, project management is closely linked to successful claims avoidance because it will either lessen or increase the potential for claims during the project.

Claims based on disputed facts are most difficult to avoid. Often witnesses to the same occurrence give very different accounts of what they have seen, depending upon their perspective. Similarly, parties to a contract often interpret events or requirements differently.

Such opinion-based differences frequently remain unresolved. In some cases, a claim based on a factual dispute may be avoided if there is objective evidence that can clarify the situation. Otherwise, this type of claim may not be avoidable. Effective claims management, however, can minimize the impact upon the project.

It must be noted that some contractors assert unfounded claims, attempting to manufacture entitlement to additional time and/or compensation. Merit less claims may be created to act as a “smokescreen” or cover for the contractor’s own delay, inefficiencies, or errors as a means of avoiding exposure to delay penalties. In some cases, merit less claims may be asserted purely as a means of increasing profit.

Although merit less claims are rooted in the intentions of the Contractor and not in any legitimate contractual cause or factual event, the client’s diligent practice of claims avoidance methods still will act to deter such claims. An insincere contractor will find it much more difficult to advance such a claim against a client that has, actively and attentively, followed claims avoidance procedures from the outset. By implementing these procedures, the client will have maintained up-to-date information on the history of the project, will be aware of potential genuine claims situations, and therefore, will be in a better position to refute merit less claims.

4.3 CLASSIFICATION OF CLAIMS

Wallace (1986) classified the construction claims by contractors against clients in the USA, the United Kingdom and the Commonwealth and concluded that the main legal bases for financial claims are as follows (Yogeswaran, 1996).

- (a) Damages for breaches of contract by the employer. These may be conveniently subdivided into:
 1. Breaches affecting the performance of the contract, which nevertheless proceeds to completion;
 2. Breaches resulting in termination or rescission of the contract before completion;
 3. Breaches of the employer's payment obligations; and
- (b) Additional payment due under one or other of the contract provisions. These may be usefully subdivided into:
 1. Sums due for variations (or changes in US parlance);
 2. Sums due on measurement in unit-price contracts;
 3. Sums due under miscellaneous provisions in the contract, such as under changed physical conditions, variation of price, or other compensatory clauses in the contract

Moreover, most researchers and other textbooks on claims such as (Wood, 1978 and Hughes, 1985) as follow (Yogeswaran, 1996) have classified construction claims:

- *contractual claims* arising from specific clauses in the contract,
- *extra-contractual claims* arising from common law entitlement but without any specific basis in the contract, and
- *Ex-gratia claims* initiated by the contractors where no entitlement *exist under both contract and common law provisions*

Yogeswaran (1996) concluded that the possible scenarios for construction

claims are invariably 'written into' and reflected in the contract documents. The parties to the contract, long before men have often signed the conditions for claims and disputes and machines reach the job site (Rubin et. al., 1992). This background raises questions as to the participants and the agreed conditions that can give rise to such a virtual flood of claims as is being experienced in most construction industries (Semple et. al., 1994).

4.4 SOURCES OF CONSTRUCTION CLAIMS & DISPUTES

Totterdill (1991), in his paper "*Does the Construction Industry Need Alternative Dispute Resolution? The Opinion of an Engineer*" declares that almost everyone who is involved in the construction industry, as contractor, designer, consultant or employer, will eventually be involved in a claim which results in a dispute. This involvement may arise because they think that they are entitled to some money from someone else, they have been accused of doing something that has caused problems for someone else, or even for no apparent reason at all. Except their involvement, in a project, that has problems and they are being blamed for mistakes made by other people. No matter what the cause or details of the dispute are, the first reaction of any defendant, however, is to reject all claims and allegations. Next, they will generally agree to discussions, which lead to negotiations. This generally leads to an amicable settlement of the dispute. Nevertheless, if a settlement is not achieved during the negotiation, the claimant will generally require the dispute to be referred to some independent parties, usually arbitrators or judges, who will make a decision and impose it on both parties. Construction, like many other industries in a free-enterprise system, has sizeable risk built into its profit structure (Al-bahar & Crandall, 1990). Although all the parties to a construction contract will start off with the best of intentions to get the work both complete satisfactorily in the agreed time and at the least expense to owner, whilst ensuring that the general contractor and all the other specialist works contractors and suppliers make a reasonable profit. Somewhere between the beginning and the end, disagreement, disputes, disruption and delay arise which can destroy the best of intentions. Therefore, construction industry has a poor reputation for coping with risk, projects failing to meet deadlines and cost targets, hence, clients, contractors, the public and others have suffered as a result.

(Moghaddam, 1996).

4.5 TYPES AND CAUSES OF CLAIMS AND DISPUTES:

There are a number of studies, which have attempted to investigate the various types and causes of construction claims and disputes. These types and causes were observed by many researchers such as McDermott et al (1984), Hibberd (1986), Okpala & Aniekwu (1988), Jahren and Dammeier (1990), Scrivener (1992), Revay (1992), Semple et al (1994), Barret (1995), Kamran (1996), Yogeswaran (1996), Kumaraswamy (1997), Doran (1997), Fenn (1997), Carmichael (2002), Zaneldin (2002), Al Sabah et al (2002), etc.

One of these studies carried by Watts and Scrivener (1992) in Australia identified the types and frequency of occurrence of the sources of disputes in Australian building industry. The study revealed 59 types of disputes and 119 'sources' of disputes. They collected data from 22 Victorian and 46 New South Wales judgments of the State Supreme Courts, plus one Victorian and three New South Wales judgments of the court of Appeal of Australia. The study was primarily descriptive and dealt with identifying the frequent occurrence of claims and disputes within construction industry.

Another study that was carried by Jahren and Dammeier (1990) conducted a wide-encompassing research on the issue of disputes within the construction in Washington in order to assess professional opinion regarding the course of construction disputes. Data collected using structured personal interviews because of the flexibility offered by this method in pursuing detailed responses to questions to fit the unique situation of each respondent. Interviews were held with ten contractors, ten design professional and ten attorneys. Although the small sample size and interview technique did not allow for precise statistical analysis, important qualitative information and indications about the direction of important trends were obtained.

A cross section of the relevant literature Al Sabah et al (2002) identifies seven major types and five main causes of claims and disputes in Kuwait; the seven major types are:

- Delays,
- Variations,
- Defective information,
- Indirect damages,
- Quantity variations,
- Site conditions,
- Site access.

Moreover, the five main causes of claims and disputes in Kuwait are as follows:

- Contract documents,
- Engineer heavy-handedness,
- The process for valuing variations,
- Delay in contract procedure,
- Lack for coordination

Furthermore, Hohns (1979) surveyed more than 300 construction disputes in the USA, which led to the conclusion that their causes could be largely traced to five sources:

1. Underestimation of the cost by the client, contractor or both;
2. Errors, omissions or defects in contract documents;
3. Changes in conditions, (e.g. unforeseen ground conditions);
4. People involved in the construction process.
5. Claims from end-users (legal rights of owners and tenants);

In another research, which was done by Kamran (1996) in Wales revealed that there are five major sources of construction disputes and fifty-five types; these areas are as follows:

- Quality: Nine types including defective work, defective design, insufficient information, negligence, etc
- Cost: Twenty types including cost of repairs by contractor, recovery of

financing costs, unpaid sums, validity of a claim, Variations, etc.

- Time: Twelve types including late payment by client, delay in completion, failure to serve notice in writing, etc.
- Works: Seven types including variations, differing site conditions, failure to complete works, etc
- Point of law: Seven types including validity of engineer's instructions, misrepresentation, breach of contract, etc.

Moreover, a research that was carried by Kumaraswamy (1997) on a wide range issues of disputes within the construction industry in Hong Kong, he collected data from sixty one different projects as well as 46 professional entities such as clients, consultants and contractors in order to assess professional opinion regarding the trend of construction disputes. Data collected using structured personal interviews. Interviews were held with twenty-one clients, seventeen consultants and eight contractors. Important qualitative information and indications about the direction of important trends were obtained. The research revealed that there are two major areas of construction claims disputes and forty-five sub types; these areas are as follows:

- Cost: Twenty-eight types including ambiguity in documents, acceleration of works, suspension of works engineer's instruction to change variations, etc.
- Time: Seventeen types including inclement weather, instruction to resolve discrepancy, delays by utility undertaker, disruption to progress due to unforeseeable obstruction, etc.

He also summarised his observations by ranking the top ten significant types of claims and listed in descending order as follows:

- Variations due to site conditions,
- Variations due to client changes,
- Variations due to design errors,
- Unforeseen ground conditions,
- Ambiguities in contract documents,
- Variations due to external events,

- Interference with utility lines,
- Inclement weather,
- Delayed possession of site,
- Delayed design information.

Moreover, the research revealed that there are two major areas of cause construction disputes and twenty-nine sub types; these areas are as follows:

- Root Causation: Eleven causes including Unclear risk allocation; Client's lack of information or decisiveness; Unrealistic time targets; inappropriate contract type; etc.
- Proximate Causation: Eighteen causes including Inaccurate design information; Poor communications; incomplete tender information; inadequate contract administration; slow client response; etc.

He also summarised his observations by ranking the top ten significant causes of claims and listed in descending order as follows:

- Inaccurate design information,
- Inadequate design information / statement of client's requirements,
- Inadequate site investigation,
- Slow client response/decision making,
- Poor communications (e.g. client / consultant, consultant / contractor),
- Unrealistic time targets,
- Inadequate contract administration,
- Uncontrollable external events (e.g. unforeseen ground conditions),
- Incomplete tender information,
- Unclear risk allocation

Semple et al (1994) investigated the causes of claims, delays and cost overruns on 24 projects in Western Canada and found that the following were the common causes of claims:

- Acceleration: representing situations that involved attempts to mitigate delay

by accelerating the schedule with the use of extra workers, overtime, and/or extended workweeks;

- Restricted access: referring to situations where a particular work area or the entire site was not ready or available for work to progress.
- Weather/cold: referring to conditions where extreme weather or cold conditions affected the ability to do work.
- Increase in scope: including design changes, extra work, and errors.

The increase in scope of works was noted to be the main cause of disputes. Categories of claims that were stated to give rise to the largest number of claims were site overhead, loss of productivity, loss of revenue and financing costs.

In addition, in his contribution to the book “Construction Disputes Avoidance and resolution” and edited by Campbell (1997), Doran (1997) states that the types of disputes are many and various but they may be broadly categorised into three subjects; organisational, contractual and technical. He affirms that the organisational type would depend on the type of forms of construction contracts such as project management, design and build, management contracting, etc. Moreover, he lists twenty-two potential contractual types such as:

- Extension of time;
- Liquidated damages;
- Design faults;
- Variation to contract;
- Payment (or non-payment);
- Action by employers;
- Site boundary disputes;
- Custom difficulties;
- Quality and safety;
- Possession of sites; etc.

He continues and says that the above list of potential types is not exhaustive but gives a flavour of these types.

Additionally, chapter four of the same book “Construction Disputes Avoidance and resolution” and edited by Campbell (1997), Burkett (1997) lists various reasons for claims and disputes as well. It categorizes them into six main categories as follows:

I. General:

- a) Adversarial nature of contracts
- b) Poor communication between the parties:
 - i) Communication on site;
 - ii) Understanding terms of contract and expectations of the parties;
- c) Proliferation of subsidiary contracts and warranties including those with consultants;
- d) Fragmented nature of the industry;
- e) Contractual documentation;
- f) Tender systems and government policy on tendering encouraging low tenders followed by claims;
- g) Inability or reluctance to pay;
- h) Erosion of contract administrator’s role as quasi-arbitrator in contracts; and
- i) Knock-on effect of third party interests.

II. Consultants

- a) Design errors;
- b) Design inadequacies;
- c) Lack of appropriate competence;
- d) Failure to define brief;
- e) Failure to define conditions of engagement and fees;
- f) Delay in settling claims;
- g) Late information;
- h) Incomplete information;
- i) Ambiguous specifications;
- j) Variations and late confirmation of variations;

- k) Lack of coordination of information from different sources;
- l) Under-certifying;
- m) Statutory Authority requirements;
- n) Briefing client on implications of contract and building process;
- o) Checking contractor's programme and method statement;
- p) Unclear delegation of responsibilities; and
- q) Inexperience.

III. Client

- a) Poor briefing;
- b) Expectations at variance with contract documentation;
- c) Changes of mind during construction;
- d) Changes to standard contract conditions and additional non-standard conditions;
- e) Poor financial arrangements leading to late payments;
- f) Rigid budgets;
- g) Reluctance of public bodies to reach decisions which might be criticized;
- h) Interference by administrators outside the contract process; and
- i) Interference by client in contractual duties of the contract administrator.

IV. Contractor

- a) Inadequate site management;
- b) Poor programming;
- c) Poor workmanship;
- d) Disputes with subcontractors/suppliers;
- e) Late payment of subcontractors/suppliers;
- f) Deliberate manufacture of claims premeditated or at conclusion of contract;
- g) Coordination of sub contractors; and
- h) Unforeseen items.

V. Subcontractors

- a) Terms of subcontract and/or miss-match with main contract;
- b) Coordination of design input in non-design main contracts;
- c) Failure to follow conditions of contract; and
- d) Inability to substantiate costs at the appropriate time.

VI. Manufacturers and suppliers:

- a) Failure to define performance or purpose; and
- b) Failure of performance.

In the same way, Carmichael (2002) asserts that there is no complete list of types of claims and disputes; however, he states five main areas of claims and disputes. These areas are as follows:

I. Documentation: this type include three categories as follows:

- a. Drawings such as late issue of drawings. Lack of information. Re-issue of drawings. Poor design;
- b. Documents: such as Poorly written documents including insufficient detail and technical requirement. Lack of information. Inadequate documentation. Interpretation of the specification. Lack of a written contract. Precedence of documents. Lack of coordination. Late supply of documents. Errors, omissions, inconsistency, ambiguities; and
- c. Errors in survey/set out information, data provided, etc.;

II. On site: this type include six categories as follows:

- a. Possession issues such as late or in adequate possession of the site, restricted access;
- b. Latent conditions Issues such as differing site condition different from the anticipated one due to owner's optimistic program. Lack of owner supplied facilities;
- c. Neighbours issues such as disputes with neighbours that lead to injunction or

disruption of the work;

- d. Workmanship and Material issues such as poor workmanship or materials. Delay in supply of materials. Defects of work done or materials. Rectification of works;
- e. Subcontractor's issues such as nominated sub contractors. Late nomination. Default. Alleged poor workmanship or materials; and
- f. Inefficiencies Issues such as delays, uncertainties, cost overruns, poor quality, etc.,

III. **Contract scope:** this type include three categories as follows:

- a. Variations Issues such as large scale variations;
- b. Quantities Issues such as measurement of quantities. Substantial quantity changes. Adjustments to rates and quantities; and
- c. Rise and fall such as interpretation.

IV. **General administration:** this type include seven categories as follows:

- a. Communication issues: such as communication may not be clear or written. Late claims. Poorly documented and supported claims. Response to claims.
- b. Record keeping: such as when claims arise records could be found to have not been systematically filed.
- c. Payment: such as late payment.
- d. Progress issues: such as suspension of works. Disruption of the works. Completion. Methods changes. Delays. Accelerations. Loss of productivity. Inadequate or poor management ability to maintain control of the works. Different opinion of the liquidated damages. Program changes due to variations or changes;
- e. Instructions issues: such as delays in providing instructions, or failure to provide instructions. Late approval;
- f. Inspection issues: such as failure to make test. Opening for inspection and testing of work done; and
- g. General issues: such as unreasonable administration of the contract. Late or inconsistent decisions. Inference and interference problems. Adversarial

relationships. Formation of the contract. Roles and responsibilities.

V. **External influences** (possibly non contractual) such as

- a. Changes in statutory requirements;
- b. Late approval by outside entities and authorities;
- c. Injunction proceedings such as proceedings by others;
- d. Financial problems including bankruptcy;
- e. Delays due to inclement weather;
- f. Delays due to strikes; and
- g. An exaggerated claim based on no real substance to make up for losses.

In addition, Carmichael, (2002) states that “*there will always be misunderstanding and conflicts of interest*” among parties involved in a construction project in trying to determine why disputes occur. He identifies nine areas of possible causes of claims disputes such as:

- Project versus product contracts (contract);
- Team thinking;
- Relationships among parties involved;
- Costing;
- Profit and adversarial attitude;
- History of construction dispute and attitude of participants;
- Size of parties involved and their behaviour;
- Uncertainty ;
- Prevention versus cure (Behaviour of administrating contracts)

In his Canadian investigation, Revay (1992) is in favour of the view that the most frequent causes of claims, which can be traced back to clients’ “misguided” desire to save money at the wrong “end” of the project, are:

1. Inadequate site and/or soil investigation prior to starting the design;
2. Starting design efforts too late and/or unduly limiting the cost of engineering /designs;

3. Calling for bids with an incomplete set of drawings;
4. Endeavouring to complete the design through shop drawing review;
5. Introducing untimely design revisions without allowing commensurate time extension for the completion of the project or without recognizing the contractor's right to impact costs;
6. Interfering both with the sequence and the timing of construction (e.g. to compensate for the delay in the delivery of owner-supplied equipment/materials);
7. Continuing to introduce changes under the disguise of correcting deficiencies

Jergeas and Hartman (1994) maintained that claims could not be avoided entirely. Avoiding disputes requires understanding the causes of claims, understanding contractual terms and obligations, and early and continued non-adversarial communication. Some well-known reasons giving rise to claims were cited, such as:

- Increase in scope of work (changes, extras and errors);
- Inadequate bid information
- Faulty and/or late owner-supplied equipment and material
- Inferior quality of drawings and/or specifications, giving rise to ambiguities in contract requirements
- Insufficient time for bid preparation
- Stop-and-go operations because of lack of coordination, design information, equipment, or material
- Work in congested areas and overcrowding
- Acceleration to regain schedule
- Inadequate investigation before bidding
- Unbalanced bidding and under-estimation

The above reasons have to be linked to the appropriate categories of the claims that give rise to an entitlement under the contract.

Another research that was carried by Zanelidin (2002) on a wide range issues of claims and disputes within the construction industry in Abu Dhabi and Dubai, he

collected data from 129 different projects as well as 56 leading firms such as design offices and consultants as well as contractors. In order to assess professional opinion regarding the trend of construction disputes. A questionnaire survey was first designed considering input from a number of consultants and contractors in Dubai and Abu Dhabi Emirates in UAE. The survey was mailed to 56 leading firms (22 contractors and 34 design offices and consultants) who have participated in a wide variety of small to large-size projects. Important qualitative information and indications about the direction of important trends were obtained.

Eight different categories as well as twenty-nine different types of construction claims and disputes were observed. The researcher ranked the significant types of claims in descending order as follows:

Types of Claims	Rank
• Changes Claims	1
• Extra-Work Claims	2
• Delay Claims	3
• Non-Performance Claims	4
• Different Site Conditions Claims	5
• Acceleration Claims	6
• Damage Claims	7
• Contract Ambiguity Claims	8

The researcher ranked the significant causes of claims in descending order as follows:

Causes of Claims	Rank
• Change orders or Variations	1
• Delay caused by owner	2
• Oral change orders by owner	3
• Delay in payments by owner	4
• Low price of contract due to high competition	4

• Changes in material & labour costs	6
• Owner personality	7
• Variations in quantities	7
• Subcontracting problems	9
• Delay caused by contractor	9
• Contractor is not well organized	9
• Contractor financial problems	12
• Bad quality of contractor's work	13
• Government regulations	14
• Estimating errors	15
• Scheduling errors	15
• Design errors or omissions	17
• Execution errors	18
• Bad communication between parties	19
• Subsurface problems	20
• Specifications & drawings inconsistencies	21
• Termination of work	22
• Poorly written contracts	23
• Suspension of work	23
• Accidents	25
• Planning errors	26

Although he used the term causes rather than types, his findings were quite similar to other researchers. Thus, the researcher has some reservations on the terms used. It is not a criticism of his work rather than clarification to the reader/s in order to avoid confusion.

Moreover, research carried out by Al-Khalil and Al-Ghafly (1999) determined the most important causes of delay claims in public utility projects in Saudi Arabia based on the frequency and severity of these causes. A survey of randomly selected samples of constructors, consultants and owners was carried out to assess the frequency of occurrence and the severity of impact of sixty potential delay causes. A

frequency index and a severity index were determined for each cause. An importance index for each cause was then computed as the product of the frequency and severity indices. Important qualitative information and indications about the direction of important trends were obtained. Although they used the term severity instead of impact or magnitude, their findings were quite similar to other researchers. Thus, the researcher has some reservations on the terms used. It is not a criticism of their work rather than clarification to the reader/s in order not to get confused.

A cross section of the relevant literature Guidelines for Claims Avoidance and Management for construction projects (2002) reveals a number of types of claims and disputes in Abu Dhabi; these types are:

- Variation or modification to the works;
- Ambiguous Contract Documents;
- Error / Omission in the Contract Documents;
- Delayed Interim Payments;
- Differing Site Condition;
- Suspension of the Works;
- Delayed or Interrupted Site Access;
- Quantities Fluctuation;
- Late Approval of Contractor Submittals by Department or Engineer

This guidelines state six major areas of project risk categories of claims and disputes in Abu Dhabi; these risk areas are:

I. Force Majeure Risks such as:

- Delays due to exceptionally adverse weather, floods, storms, earthquakes, etc
- Damages to the works due to exceptionally adverse weather, floods, storms, earthquakes, etc

II. Political Risks such as:

- Labour strikes, civil unrest, etc.
- New taxes / customs tariffs

- Expropriation of Contractor's equipment / machinery
- Embargoes on project imported items.

III. Economical Risks such as:

- Delayed payments to Contractor
- Inflation/price escalation
- Unproductive/idle plants or labour
- Finance charges for loss of profit, extended performance bond, insurance, retention, etc.
- Default of subcontractors or suppliers
- Currency fluctuation

IV. Design Risks such as:

- Change of design, quantity/quality
- Design omissions/errors by Consultant/Department
- Rectification works/specification change due to defective design
- Incomplete design

V. Physical Risks such as:

- Restricted access or possession
- Additional work
- Change of project profile and site
- Unanticipated soil conditions
- Loss of/damage to materials on site or during transport
- Damage to other property during transport of materials

VI. Construction Risks such as:

- Suspension of works
- Extension of Time for Completion
- Prolongation of suspension
- Re-measurement of Contract items

- Different Site Conditions
- Availability/suitability of project materials
- Time and schedule delays

Groton, (1991) suggests that the ten most common specific causes of construction claims and disputes are:

1. Contract provisions that, unrealistically, shift project risks to parties who are unprepared to cover those risks.
2. Ambiguous contract documents;
3. Unrealistic expectations of the parties, particularly employers who have insufficient financing to accomplish their objectives;
4. Contractors who bid too low;
5. Inadequate contractor management, supervision and coordination;
6. Failure of participants to deal promptly with changes and unexpected conditions;
7. Poor communications among project participants;
8. A lack of team spirit or collegiality among participants;
9. A litigious mind-set on the part of some or all project participants;
10. Contract administrators who prefer to kick a dispute to a higher level or to lawyers rather than take responsibility for resolving the problem at the source.

Rhys Jones (1994) also finds ten major causes that could lead to construction claims and disputes, these ten areas are:

- Management;
- Law;
- Culture;
- Communications;
- Design;
- Economics;
- Tendering pressure;
- Unrealistic expectations;
- Contracts;

- Workmanship;

In a Canadian study, Bristow and Vassilopoulos (1995) identifies five primary causes of claims in construction (become disputes if party rejects claims). These causes are:

- Unrealistic expectation;
- Contract documents;
- Communications;
- Lack of team spirit;
- Changes

Moreover, a study that was carried by Mitropolous and Howell (2001) in the USA reveals that a classification of problem situations produces a model based on:

- Project uncertainty;
- Contracts;
- Working relations;
- Problem solving effectiveness

4.6 CAUSES OF DISPUTES IN THE CONSTRUCTION INDUSTRY

“Undoubtedly many construction disputes have their origin in the seeds sown by or in, the client’s error” (Hellard, 1987). Under normal circumstances disputes should not occur if there is no common relationship between two parties, there must be a common relationship between the two then a misunderstanding to be fulfilled and the other parties fails to fulfil it then it becomes a dispute.

The study on construction disputes by Hellard (1987) has come up with the following as major factors that causes disputes in the industry.

4.6.1 DESIGN DEFICIENCY

The design deficiency leads to a major dispute that generally is beyond an error of omission. The design error usually can be change in the means, methods,

environment, duration or the conditions of the construction process. The most common place in which design errors are made are in the foundations, in the construction of the frame and the enclosure, in the utilisation of spaces such as method and materials and the required end result are specified, in project duration, and in connection with related performance by others on which the project in question must at some point rely. Some of the problems are as follows:

➤ *THE UNDER OR SUBSURFACE PROBLEMS*

The cause of under problems can be traced to the handling, display and interpretation of subsurface investigations. The location, depth, number, and types of borings or subsurface investigations are established by the engineer who needs the information in the building's foundation and its construction. The owner obviously wants to get the most out of the borings and subsurface investigations and may limit the expenditure and thus limit the amount of ground investigation. These investigations are first used for the design of the foundation; then they are typically offered to the contractor for its use in bidding and constructing the job, and it is in this latter use that the disputes begin. It is well known in the industry that variations in the earth's composition constantly occur. It is also well known that each bidding contractor cannot adequately investigate the site to define the soil characteristics in the time period available for bidding. The owner thus has a problem, progressing to the project construction stage without adequate site investigation puts at risk the excavation and methods of foundation construction selected by the contractor.

➤ *DEFECTIVE PLANS*

“A major source of disputes in the design deficiencies is that categorized as defective plans” (Hellard, 1997). Most people involved with plans have a working idea of the definition of this phrase, but in reality no standard exists locally or nationally that precisely describes how to check the plans for defects.

The majority who have worked with plans know that no set of drawings is complete or without error. Not only are these types of errors common, but all who work with plans know that drawings can always be improved and upgraded.

Major disputes can arise from defective plans. Experience has shown that major costs can be lost by one party to a contract because of a drafting error. Although this type of error can be very expensive it is not on common. In this case, the question is not the extent of damage but the degree of professionalism used or lacking. Engineers and architects are cautioned not to judge themselves in disputes over plans they have prepared which appear defective. The experienced designer will acknowledge the existence of an error and do their utmost to mitigate the resultant costs of correction.

➤ *METHODS OR MEANS AND SPECIFICATION PERFORMANCE*

The last category of deficient design is that of the case in which the designer has specified both method or means of construction and the result required and then refuses to accept one of these two requirements. An example of this problem that often occurs is when the designer specifies that a certain waterproof coating be applied in two coats on some exterior surface under stringent conditions. The contractor applies the specified coating exactly the way it should, careful inspection is made by the designer as work proceeds and then to the dismay of all the waterproof coating leaks contrary to the specifications. Almost without exception, the work is rejected and the contractor told to do it over. The means to accomplish the end result has been specified and followed but the end result does not meet the specification.

Very often, the architect or engineer, in their roll as interpreter of the contract, will find themselves in the position of imposing a penalty on a contractor for an error which the designer is as at fault and may ultimately be found responsible in a dispute.

Some recent libel statistics have found that failure to act, while fully aware of the consequences, even in a contract relationship is really a tort action and punitive damages are assessable.

➤ *RISK*

A construction risk can be defined as any exposure to possible loss. Because every construction project is unique, each offers a multitude of different risks. To

ensure the success of its undertaking, a company/corporate owner embarking on a construction project must be able to *recognise* and *assess* these risks. Risk is inherent by nature.

The contractor should consider and exhibit its risks to its advantage in any project it prices. The present practice of the typical contractor is sadly deficient in risk defence in comparison to the owners and designers. Risks occur from the following elements:

- A failure in recognising the shortcomings in existing methods;
- Unfamiliarity and misunderstanding of the concept of risk sharing;
- Lack of trust (Hesitation to extend trust) in a contractual relationship;
- Additional costs, time and resources required for implementing changes.

Risks can, broadly, be categorised as following:

1. Force majeure risks
2. Political risks
3. Economical risks
4. Design risks
5. Physical risks
6. Construction risks

Thus the root causes of disputes in design deficiency are:

1. The under or subsurface problems;
2. Defective plans;
3. Methods or means and specification performance;
4. Risks.

4.6.2 THE CONTRACT CONDITIONS

The documents referenced as part of the contract typically include a set of the general conditions or rules which are to be followed and the roles of those who will be governed by the rules. (Hellard 1987). Contract documents are one of the major

origin of disputes. The following are the main reasons for these disputes:

➤ *THE LACK OF PERFECTION IN THE CONTRACT DOCUMENTS*

“Owners, contractors, designers, and every one involved in construction readily recognise and are quick to admit publicly the very obvious fact that a perfect set of contract documents simply does not exist.” (Hohns, 1979). Most drawings in the contract documents have mechanical errors or lack a needed dimension or detail. Contract changes always occur as projects undergo the design and construction process. Also when something unforeseen occurs, the documents and work scopes must be adjusted. The more complex the project, the more amendments and modifications a change has. The shorter the period allowed for design, the more modifications that are required, and the more the opportunity for errors. This can be related with poor English, antiquated provisions, all types of ambiguity and confusion. No one man may know or remember every place a certain detail was shown.

“The larger the project, the more the people, the drawings, the thoughts, and the ideas consequently, the larger the project the more errors there are” (Hall, 2002).

Document errors become a defect attributable to the owner as they may result in the contractor un-bidding and recovering money through claims. Document errors become the fault of the designer when the judgment of its peers and the custom of the industry these errors are considered gross and inexcusable. Document errors develop into liabilities when someone who has a right to rely on the professional is disadvantaged financially. Punitive damages are staring to be considered as collectible against a professional when the person’s judging the facts finds that the professional’s refusal to come to grips with its duties are contrary to any reasonable standards of behaviour.

➤ *THE PSYCHOLOGY OF PEOPLE IN CONSTRUCTION*

“It was noted earlier that construction is not a science, it is an art. Construction is really people, and the successful contract administrator, or disputant to a contract interpretation or unfortunate occurrence on a project, is well served to

know a little about people involved.” (Hohns, 1979)

When traced to its source, a construction dispute often has just two people involved. They may be very visible to each other and all concerned, or they may not be known to each other and insulated from the dispute by the management structure.

Camicheal (2002), argues that construction confrontations and disputes arise because the people involved have needs. From the contractor's side the needs are usually money or profit related. The designer has the ideas, his building or design, that might be his monument to himself, reputation, artistic temperament, money, insurance premium, and similar needs. The owners have needs as well, political careers, corporate careers and the need to have the space for a certain day. When something unanticipated or not properly recognized interferes with the fulfillment process, goals and security are jeopardized, communications become strained, and strains seem always to be followed by demands, refusals, other more intense strains, hard, then harder positions, and money losses.

➤ *FAILURE TO COUNT THE COST*

“Dispute continually arises because someone failed to count the cost at the beginning when the cost should have been defined” (Jessup et al., 1963).

According to Essex (1996) *“Disputes arise when the job does not come out well, and too often the reason for this is the failure initially to figure the cost accurately”*. This failure to count the initial cost is not confined to just the contractor. It applies to the owner who set out unrealistically to build a project, as well as the designer who sets out the design it for less than it will really cost either for design or construction. In construction, major cost and work scopes are calculated and committed in short periods of time. It is common that someone fails to account for items resulting in a price that is too low. Thus, for the contractor with cash flow problems there is no capacity to absorb cost overruns.

The failure of a contractor to understand or correctly bid or price the work is also a major reason for disputes, as this result in a proliferation of claims as an attempt

to recover costs.

Thus the causes of claims and disputes through contract documents are:

1. The lack of perfection in the contract documents
2. The psychology of people in construction
3. Failure to count the cost

4.6.3 CONSTRUCTION PROCESS

Construction process disputes are currently being pursued under both contract and tort concepts of law. If a designer, who does not have a contract with the contractor, does not do its work in the time and manner set forth in the owner-contractor contract or in the time and manner on which the contractor has a right to rely, i.e., duties well established by custom and the standard of care, the designer incurs a very real risk of being sued by the contractor in a tort action. Tort actions bring the added threat of punitive damages. This exposure to the design professional has never really been pursued until recently (Ibrahim,2007).

According to (Motsa, 2007), much focus is put on contract time; the contract documents usually set forth a definite number of calendar days or fixed final date for completion. There is at times more than one date in the documents when jobs are to be built in phases or specific milestone portions of completion are necessary. *“The construction process dispute and almost all disputes involving large amounts of money are time related”* (Hellard, 1997).

Furthermore, various studies have identified the causes of construction disputes that contributed by the various party in construction projects. Such as Fenn (1997), Hall (2000),Carmicheal (2002) and Ibrahim (2007)

In this study the authors have decided to classify the events of construction disputes into three categories which are clients, designers and contractors. The causes of construction disputes listed below have been identified by range of party representatives and professionals working in the construction industry.

The following factors are identified as causes of construction disputes caused by clients:

- Failure to appoint a project manager
- Discrepancies / ambiguities in contract documents.
- The absence of team spirit among the participants.
- Inadequate tracing mechanisms for request of information
- Deficient management, supervision and coordination efforts on the part of the project
- Poor communications amongst members of the team
- Failure to respond in timely manner
- Lowest price mentality in engagement of contractors and designers.
- Reluctant to check for constructability, clarity and completeness.

Moreover, Hall (2000) identified the following causes of construction disputes caused by consultants:

- Incompleteness of drawing and specifications
- Over design and underestimating the costs involved
- Design and specification oversights and errors or omissions resulting from uncoordinated civil, structural, architectural, mechanical and electrical designs.
- Late information delivery and cumbersome approach to request for information's
- Failure to understand its responsibilities under the design team contract

Furthermore, Carmicheal (2002) identified the following causes of construction disputes that are caused by contractors :

- Inadequate CPM scheduling and update requirements
- Lack of understanding and agreement in contract procurement
- Inadequate contractors management, supervision and coordination
- Failure to plan and execute the changes of works
- Delay/ suspension of works
- Failure to understand and correctly bid or price the works
- Reluctance to seek clarification

The following fish bone diagram (Figure 4-1) showing the root causes of construction claims & disputes:

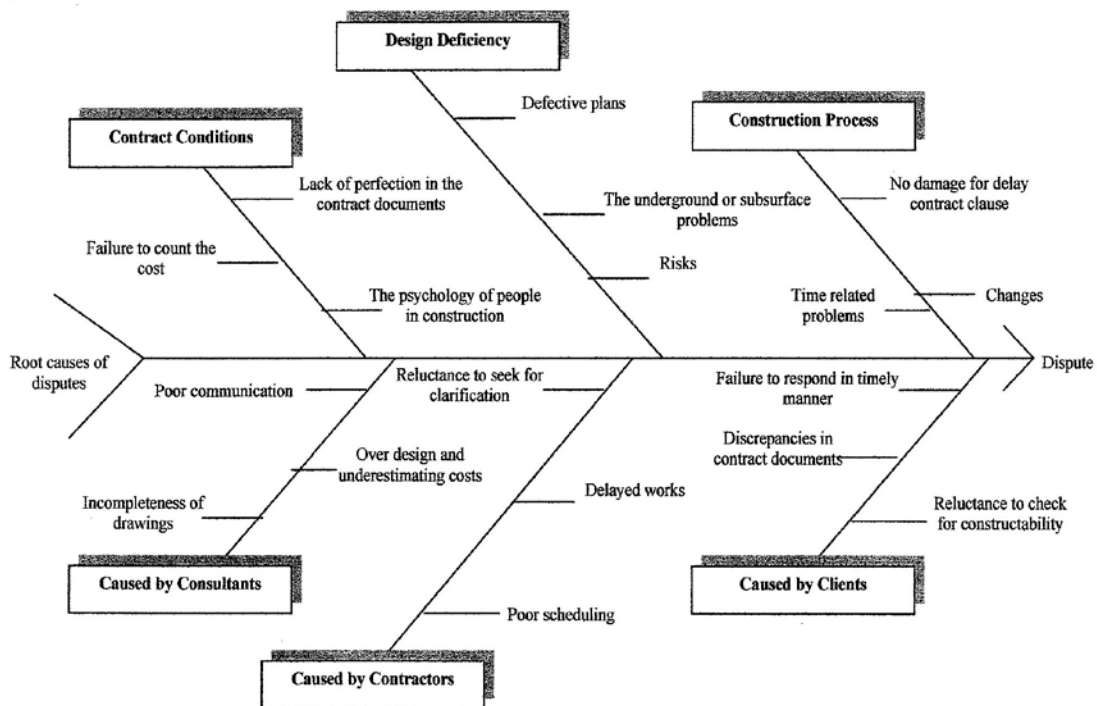


Figure 4-1 Fish bone diagram showing the root causes of construction claims & disputes *

(Source: Mosta (2006)) *

Moreover, Kumaraswamy (1997) summarizes the commonly accepted causes in the following Figure 4-2:

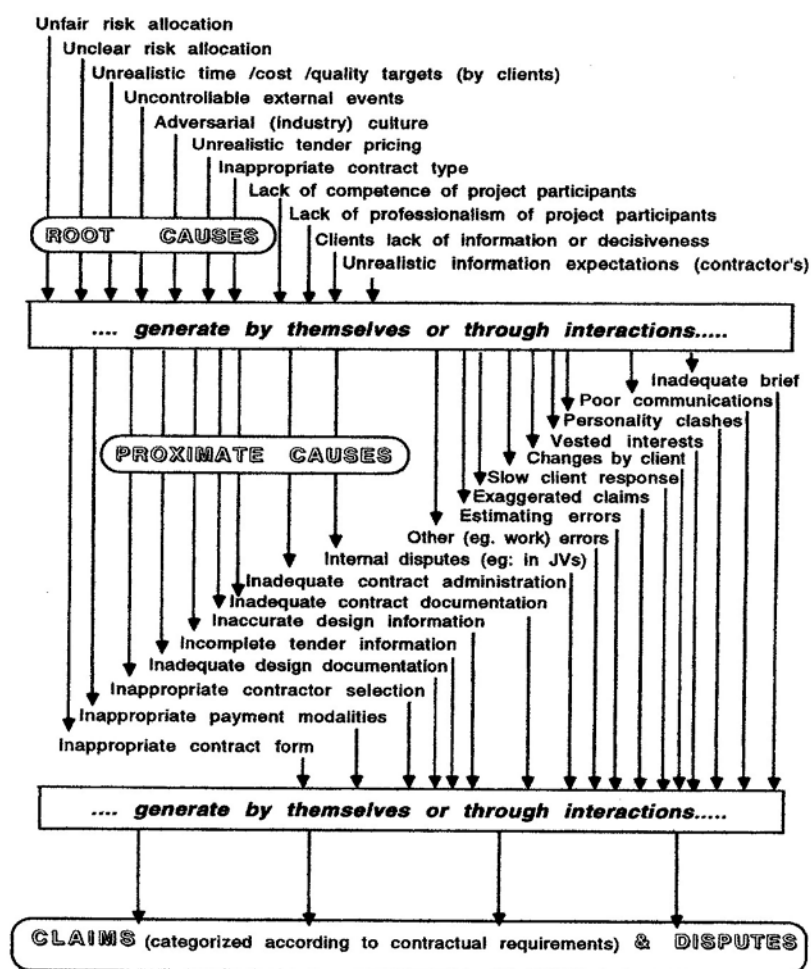


Figure 4-2 Common causes of construction claims & disputes *

(Source: Kumaraswamy (1997))*

The above Figure 4-1 and Figure 4-2 represent the commonly accepted causes of disputes attributable to the various parties in construction based on literature surveys.

These causes are the ones incorporated in formulation of a questionnaire used to evaluate root causes of claims (see Chapter 4, Section 4.8 below for details).

4.7 GENERAL OBSERVATIONS FROM THE LITERATURE SURVEY

Many studies were carried out by the authors such as Kumaraswamy (1997), Fenn (1997), Hall (2002), Carmichael (2002), Zaneldin (2002), etc have identified the types and causes of construction claims and disputes that contributed to by the various

party in construction project. However, researchers classified the types and causes of claims and disputes based on different perspectives. The following main and general observations from the previous literature survey can be summarised as follows:

- Different researchers classified the types and causes of claims and disputes based on different perspectives.
- Misuse of different terms such as severity instead of impact or magnitude can be noticed.
- The terms Types and Cause of claims and disputes appear to have been used without distinction.
- Some Types and Causes appeared common in many regions whereas others appeared more specific to particular contractual regimes.
- Most of the causes, which were mentioned in these studies, have to be linked to the appropriate categories of the claims that give rise to an entitlement under the contract.
- Common patterns of Types and Causes of disputes began to emerge.

Fenn (2002) recognizes this and states that:

“The literature on construction disputes might be summarised as naive and chaotic. Three things may explain the chaotic manner in which the subject of construction disputes is discussed in the literature:

- *the clash between scientific logic and legal logic;*
- *the lack of a taxonomy to define the problem;*
- *the relatively small research base*

The clash between scientific and legal logic is suggested by the presence of lawyers involved in the subject. Legal logic has developed separately from other research disciplines and science, and might be described as logic of rhetoric. Scientific logic on the other hand is empirical. The lack of a taxonomy means that there is no agreement on terms. The absence of a substantial research base means that methodologies are new and still developing“(Fenn, 2002).

Moreover, Kumaraswamy (1997) adds, “A *classification of the ‘common’ categories of construction claims encountered in a particular country can be influenced by the claim category heads that are permissible and ‘popular’ under the prevalent conditions of contract. ‘Popularity’ of usage of particular claim category heads, while supposedly based on justifiable causes, is also enhanced by the perceived potential of ‘success’ in obtaining compensation.*”

Thus, the need to conceptualise and structure the relationship between the types and causes of claims is recognised in developing the questionnaires used in this study.

The major references from the literature review can be summarized in the following Table 4-1:

Table 4-1 List of References for Types of Claims and Disputes Literature

Research	Research/Paper/Article
AI Sabah <i>et al</i> (2002)	Construction Claims: Results from Major Tribunal Findings in Kuwait
Alkass <i>et al</i> , (1996)	Construction delay analysis techniques
Bristow & Vasilopoulous (1995)	'The New CCDC2: Facilitating Dispute Resolution of Construction Projects
Clegg (1992)	'Contracts Cause Conflict'
Conlin <i>et al</i> (1996)	The Relationship between Construction Procurement Strategies and Construction Contract Disputes
Diekmann & Nelson (1985)	Construction Claims: Frequency and Severity
Diekmann <i>et al</i> (1994)	Disputes Potential Index: A Study into the Predictability of Contract Disputes
Fenn <i>et al</i> (1997)	Conflict and Dispute in Construction.
Heath <i>et al</i> (1994)	The Origin of Conflict Within the Construction Process
Heath <i>et al</i> (1994)	The nature and origin of conflict within the construction process
Hewit (1991)	Winning Construction Disputes - Strategic Planning For Major Litigation
Mitropolous & Howell (2001)	Model For Understanding, Preventing and Resolving Project Disputes
Molenaar <i>et al</i> (2000)	Structural Equation Model of Construction Dispute Potential
Rhys Jones (1994)	How Constructive Is Construction Law
Semple <i>et al</i> (1994)	Construction Claims and Disputes: Causes and Cost/Time Overruns
Sykes (1996)	Claims and Disputes in Construction
Transportation Research Board (1995)	Resolution of Disputes to Avoid Construction Claims
Watts & Scrivener (1992)	Review of Australian Building Disputes Settled by Litigation
Watts & Scrivener (1995)	Building Disputes Settled By Litigation - A Comparison of Australia and UK Practice

The findings from the literature review can be summarized in the following Table 4-2:

Table 4-2 List of Findings from Literature Review on Types of Claims and Disputes Literature

Research	Country	Context	Comments
Al Sabah <i>et al</i> (2002)	Kuwait	Empirical	Value of claims due to: delays, variation orders, defective information, indirect damages, quantity variations, site conditions, site access. Causes of claims: contract documents, engineer heavy-handedness, the process for valuing variation orders, delay in contract procedures, lack of coordination.
Alkass <i>et al</i> , (1996)	Canada	Empirical	Delays are the most common problem.
Bristow & Vasilopoulous (1995)	Canada	Empirical	Five primary causes of claims: unrealistic expectations by the parties; ambiguous contract documents; poor communications between project participants; lack of team spirit among participants; and a failure of participants to deal promptly with changes and unexpected conditions.
Clegg (1992)	UK	Empirical	Contracts are the main cause conflicts.
Conlin <i>et al</i> (1996)	UK	Empirical	Six areas: payment, performance, delay, negligence, quality and administration.
Conlin <i>et al</i> (1996)	UK	Empirical/ 483 dispute events on 21 projects	Six broad groups of causes of conflict: payment and budget; performance; delay and time; negligence; quality: and administration.
Diekmann & Nelson (1985)	USA	Empirical	Two most common causes of claims: Design errors (46%) and discretionary and mandatory changes (26%).
Diekmann & Nelson (1985)	USA	Empirical/ 427 claims on 22	Two most common causes of contract claims (46%) were 'design errors' and another 26% were 'discretionary or mandatory changes'. Other specific claims types (entitlement issues) included:

		(federally administered) projects	differing site conditions; weather; strikes; and value engineering.
Diekmann <i>et al</i> (1994)	USA	Empirical	Three major areas: People, Process and Product
Fenn (1999)	UK	Empirical	By development of a taxonomy independent variables were identified and then reduced by regression to three variables which predict well: level of variations, success of previous projects, tender period.
Fenn et al (1997)	UK	Empirical	Reporting on literature and testing the proposal that contract conditions cause dispute, therefore some contracts cause more dispute than others.
Heath <i>et al</i> (1994)	UK	Empirical/ Survey of 28 quantity surveyors, and five case studies	Five main categories (types) of claims: extension of time; variations in quantities; variations in specifications; drawing changes; others. Seven main types of disputes: contract terms; payments; variations; extensions of time; nomination; re-nomination; and availability of information.
Hewit (1991)	General	General/ Theoretical	Six main types (categories) of claims: change of scope; changed conditions; delay; disruption; acceleration; and termination.
Kumaraswamy (1996)	Hong Kong	Empirical	Two areas: root causes and proximate causes.
Mitropolous & Howell (2001)	USA	Empirical	A classification of problem situations produces a model based on: project uncertainty, contract, working relations and problem solving effectiveness.
Molenaar <i>et al</i> (2000)	USA	Empirical	Many predictors of project success eg. Scope definition, budget definition, project complexity.

Rhys Jones (1994)	UK	Empirical/ Survey of construction industry and lawyers	Ten factors in the development of disputes: poor management; adversarial culture; poor communications; inadequate design; economic environment; unrealistic tendering; influence of lawyers; unrealistic client expectations; inadequate contract drafting; and poor workmanship.
Semple <i>et al</i> (1994)	Canada	Empirical/ 24 projects	Six contract clauses commonly cited in claims. Six common categories of disputed claims: premium time; equipment costs; financing costs; loss of revenue; loss of productivity; and site overhead. Four common causes of claims: acceleration; restricted access; weather/cold; and increase in scope.
Sykes (1996)	General	General/ Theoretical	Two major groups of claims and disputes: claim reasons arising from misunderstandings - with eight specific reasons/examples; and claim reasons arising from unpredictability - with 17 specific reasons/examples.
Transportation Research Board (1995)	USA	Empirical	Three areas: design deficiencies, utility conflicts and unknown site conditions.
Watts & Scrivener (1992)	Australia	Empirical/ 72 judgments from 56 construction litigation cases	59 categories of disputes and 117 'sources' of disputes; Most frequent sources include, for example, claims arising from: variations; negligence in tort; and delays including damages.
Watts & Scrivener (1995)	UK/ Australia	Empirical	Comparison of 60 litigated construction disputes in UK and Australia; 290 sources of dispute classified into five sub-groups.

Note that the table is compiled from different sources such as Fenn (1997, 2002), Kumaraswamy (1998) and the researcher's addition

4.8 CLASSIFYING CLAIMS AND THEIR CAUSES

As there is some disagreement between different researcher' to the relative importance of these different types and causes of claims and disputes (variables), this research will asses the common types of claims and disputes, as well as measure their relative frequency and impact on a construction project.

This was done, after considering the impact of cultural and contractual factors imposed, applying project risk management assessments and altering the mentioned variables to be compatible with the conditions of contract of Abu Dhabi Emirate

Thus, based on the above-mentioned observations from the literature review, the author's experience, and interviews with construction participants and experts, classifying claims and disputes will be based on the following four conditions:

1. Category head that is permissible under Abu Dhabi General Conditions of Contract conditions of contract.
2. Risks associated to those types or causes that are not addressed under Abu Dhabi General Conditions of Contract conditions of contract.
3. Risks associated with procurement strategy used in Abu Dhabi, in this case and for the purpose of study, Traditional Lump Sum Contracts.
4. Most common Types (categories) that appear in other regions and fulfil the above-mentioned conditions.

- ***Types of claims and disputes:***

In this case, the Types (categories) of claims and disputes are defined as those areas from which the claims and disputes originate under the UAE conditions of the contract.

In accordance with the conditions and rule, the researcher suggests the following types (categories) of claim and disputes. Table 4-3 below lists all the identified/ suggested types of claims and disputes.

Table 4-3 List of Identified/Suggested Types of Claims and Disputes

NO	Types of Disputes & Claims
1	Ambiguity in Documents
2	Delays Due to Incomplete Design/ Insufficient Information by Client/Consultant
3	Change of Design/ Design Omission / Errors by the Client (Engineer)
4	Instruction Issued by the Client/Consultant to Resolve Discrepancy
5	Rectification of Works/ Specification Change Due to Defective Design
6	Substantial Increase in Quantity of any item not resulting from a Variation
7	Substantial Change in Quality of any item not resulting from a Variation
8	Error in Setting out Due to Incorrect Data Shown on Drawings
9	Change of Project Profile and Site
10	Delayed Site Possession/ Restricted Access
11	Differing Site Condition
12	Unanticipated Soil Condition
13	Unforeseen Ground Condition/ Unforeseeable Obstruction
14	Investigation of Suspected Defects
15	Uncovering of Works For Testing (Examination)
16	Additional Tests to Verify Compliance with the Specification (in excess to those mentioned in tender documents)
17	Suspension of Work
18	Acceleration of Works
19	Variations
20	Additional Work (to other parts of the works) arising from repairs or defects
21	Client/ Engineer's Instruction to Change (not resulting from Variation)
22	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)
23	Loss of / Damage to Materials on Site or During Transport
24	Rectification of Damages To Other Property During Transport of Materials
25	Delays Due to the Unavailability / Unsuitability of Project Materials
26	Delay/ Disruption to Regular Progress Due To Variation
27	Delay/ Disruption to Regular Progress Due To Late Instruction by the Client/Consultant Engineer
28	Delay/ Disruption to Regular Progress Due To Late Issue of Consent (Approval)
29	Delay/ Disruption to Regular Progress Due To Delays Caused by any Person/ Organization Employed by the Employer such as (Nominated Subcontractor, Suppliers or Others)

Continued' Table 4-3 List of Identified/Suggested Types of Claims and Disputes

NO	Types of Disputes & Claims
30	Delay/ Disruption to Regular Progress Due To Late Delivery of Materials by the Employer
31	Delay Disruption to Regular Progress Caused by Utility Services Organization
32	Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen building regulations/ procedures
33	Client's Breach of Contract
34	Late Issuance of final certificate
35	Extension of Time For Completion
36	Un Paid Sums (Late Payment)
37	Interest on Un Paid Sums (Late Payment)
38	Overdue retention money
39	Inflation / Price Escalation
40	Currency Fluctuation
41	Finance Charges For Loss Of Profit, Extended Performance Bond, Insurance, Retention, Etc.
42	Liquidated and ascertained damages
43	Default of Subcontractor, Nominated Subcontractor Or Suppliers
44	Unproductive / Idle Plants, Equipment or Labour
45	Labour Strikes, Civil Unrest, Etc.
46	Custom Tariffs, New Taxes
47	Embargoes on Project Imported Items
48	Expropriation of Contractor's Equipment or Machinery
49	Delays Due to Exceptional Inclement Weather, Flood, Storms, Etc.
50	Damages To the Works Due to Exceptionally Adverse Weather, Flood, Storms, Earthquakes, Etc.
51	Rectification of Damage Caused by Un Excepted Risk

These fifty one headings of claims and disputes are included in section one of the questionnaire (See Chapter 7, Section 7.4)

- ***Causes of claims and disputes:***

Similarly, Causes of claims are defined as those ones that trigger the related types of claims and disputes.

In accordance with the above-mentioned conditions and rules, Table 4-4 below lists all the identified/ suggested causes of claims and disputes.

Table 4-4 List of Identified/Suggested Causes of Claims and Disputes

<u>No</u>	<u>List of Causes</u>
1	Inadequate/ Inaccurate Design Information
2	Inadequate Design Documentation
3	Inadequate Brief
4	Unclear & Inadequate Specifications
5	Inappropriate Contract Type (Strategy)
6	Inappropriate Contract Form
7	Inadequate Contract administration
8	Inadequate contract documentation
9	Incomplete Tender Information
10	Inappropriate Contractor Selection
11	Unrealistic Tender Pricing
12	Unclear Risk Allocation
13	Inappropriate Payment Method
14	Inappropriate Document Control
15	Inappropriate/ Unexpected Time Control (Target)
16	Inappropriate/ Unexpected Cost Control (Target)
17	Inappropriate/ Unexpected Quality Control (Target)
18	Poor Communications Among Project Participants
19	Lack of Information for Decision Making;(Decisiveness)
20	Slow Client Response
21	Changes by Client
22	Lack of Competence of Project Participants
23	Poor Workmanship
24	Inadequate Site Investigation
25	Unrealistic Client Expectations
26	Unrealistic Information Expectations (By the Contractor)
27	Lack of Team Spirit Among Participants
28	Personality Clashes Among Project Participants
29	Poor Management By One or More Project Participants
30	Adversarial (industry) Culture Among Project Participants

Continued Table 4-4 List of Identified/Suggested Causes of Claims and Disputes

<i>No</i>	<i>List of Causes</i>
31	Uncontrollable External Events
32	Exaggerated Claims

This list of the underlying ‘Causes’ for claims are included in section two of the questionnaire (See Chapter 7, Section 7.5).

The types and causes of construction claims and disputes listed above been identified based on the following:

- Review of the common types and causes used in other contractual regimes;
- A detailed study of Abu Dhabi General Conditions of Contract (AGCC)
- A range of party representatives and professionals working in the UAE construction industry such as client, consultants, contractors, quantity surveyors and claims expert; and
- The researcher’s own working experience in claims and disputes

This is explained in details in the Research Produce and Methodology of Chapter Two, Section Four.

4.9 SIGNIFICANCE & AVOIDABILITY:

Significance and avoidability are two key issues that have addressed of real sic strategy for reducing claims is to be formulated.

We have seen from the articles reviewed in Section 4-2 to 4-7 that the identified ‘major’ on ‘primary’ claims and definitions can vary between authors.

This may be due to types of projects considered on the construction environment of these projects.

As this study relates specially to the UAE, then respondents to the questionnaire (See Chapter Seven are given the opportunity to make their own

judgment on the frequency, impact and avoidability so as to identify the most important of the fifty one claims types identified from the literature survey of this chapter, see Table 4-3)

Similarly for the causes of claims identified, it is necessary to determine this significance and avoidability.

Again these causes are included the questionnaire for respondents to enter, according to their judgment, the significance and avoidability of the Thirty two underlying causes of claims (see Table 4-4) identified in this literature review.

The finding of the research will thus target specific building projects operating under lumpsum contracts for the operational environment found in the UAE.

4.10 CHAPTER SUMMARY

The complexities that arise significantly increase the exposure of the UAE government agencies to large construction change order requests and claims. Effective cost controls and claims management require a sophisticated, anticipatory approach to avoid, resolve, or defend against such claims. Processing these claims consumes considerable management time and frequently requires the retention of additional consultants as well as legal firms. As the volume of unresolved disputes grows, relationships with the contracting community can deteriorate. This may lead to higher bid costs and the actual withdrawal from the bidding of some otherwise capable contractors. The early recognition, identification, and resolution of disputes can lessen management costs, administrative efforts, and lower overall program costs, benefiting the public, the agency, and the contractor. The public will be the prime beneficiary of effective claims and dispute resolution.

These claims and disputes involve numerous issues such as contract ambiguities; changes and additions to the contract; differing site conditions; schedule delays; stop work orders; errors and omissions in the contract plans and specifications. Moreover, it involves acceleration of the contract by the government agency; defective work by the contractor seeking indemnification from third parties;

warranty/guaranty clauses; incentive/disincentive clauses, recovery of liquidated damages, and contractor interface. In addition, there are issues related to external entities, such as regulatory agencies.

There exists enormous interest in construction disputes amongst the professions, industry and academia. However, this interest is mostly with the techniques used to resolve disputes, rather than any attempt to avoid disputes. It is taken as axiomatic that disputes will arise and yet nothing is done to predict and avoid them Fenn (2002).

Although construction claims and disputes are considered one of the most disruptive and undesirable occurrences in a project, for most project participants, it is commonly accepted that claims and disputes need to be avoided. Latham (1994) acknowledges this problem and comments that the best solution is to avoid disputes. However, there have been a few studies to dictate the structured prediction and avoidance of these claims and disputes.

Thus, if we seek to avoid claims and disputes, we must seek to predict them. Fenn (2002) argues that by predicting claims and disputes, we can take the necessary action to avoid them.

In trying to explain the prediction concept, Fenn (2002) gives an example of Medicine where predictive techniques have developed a concept of preventive medicine using the aetiological approach (the study of causes). He argues that an aetiological approach may throw new light on construction. Continuing the analogy with medicine, Fenn (2002) describes construction claims and disputes as the

“Dysfunctional of the conflict, and therefore the disease on the body of construction. Aetiological approach has thrown new light on many problems of medical diseases. Providing important clues to the understanding of the nature of the disorder and promoting advances in diagnosis, treatment and prevention”.

Moreover, diagnosis is defined as the act of identifying a disease from its symptoms or signs. In this context, Fenn (2002) argues that construction claims and disputes (disease) is identified, however, the symptoms (causes) of claims and

disputes are currently not considered.

Kumaraswamy (1997) agrees on this issue, and claims that there is a need to identify common sources of claims and disputes in order to isolate and control the root causes. He continues his argument and says that an appreciation of such root causes will be useful in resolving any ongoing and unavoidable claims and disputes, as well as avoiding any avoidable ones.

A major problem in the prediction, the evaluation, and the assessment of the most significant cause/s that may contribute to give rise to the overall types of claims and disputes is the identification of the cause/s underlying different types of claims. On the basis that if the cause are identified, their controllability and hence Avoidability can be assessed more realistically. Difficulties in such identification arose from types of claims & disputes being generated overlapping causes as well as cumulative cause-effect cycles (Kumaraswamy, 1997).

Therefore, research into the types and causes of conflict (claims and disputes) is essential, particularly if such research leads to the development of preventative measures, or as described by Fenn et al (1997) a *“predictive” model that would enable the participants in the construction process, especially the client, “to be aware of, and perhaps avoid factors which cause disputes”*.

The current research analyses addresses such objectives by means of an appropriate classification of various types of construction claims & disputes and their relevant root causes; an estimation of their relative significance (importance) in terms of their magnitude, and probability of occurrence (frequency); an assessment of the root cause’s controllability.

This research project aims to study the construction claims and disputes avoidability in the UAE construction industry. Hence, to develop a new strategy that will guide construction managers to minimize the damaging effect of claims and disputes on a construction project in the Arabian Gulf Region by focusing on the following two issues identified key issues in relations to construction claims and disputes.

1. Types of claims and disputes

This addressed by including the fifty-one identified types of claims and disputes from the literature survey (See Table 4-3) into section one of the questionnaire sent to respondents

2. Causes of claims and disputes

This is addressed by including the thirty-two causes of claims and disputes identified from the literature survey (See Table 4-4) into section two of the questionnaire sent to respondents

3. Significance and Avoidability

This is addressed by requiring respondents to assess the frequency, impact and avoidability for the types of claims and disputes

These key objectives form the basis for the development of this questionnaire survey (See Chapter 7).

CHAPTER FIVE
AN OVERVIEW OF CONSTRUCTION INDUSTRY AND ENVIRONMENT IN
THE UAE
(LITERATURE REVIEW)

5.1 INTRODUCTION

The first part of this chapter highlights the UAE overview, historic background, location, political structure, society, climate and about its economic review. An in depth analysis has been incorporated about UAE construction and real estate development, construction project providers (public and private sector) and environmental factors affecting this industry such as political, financial, legal etc. This chapter also covers Abu Dhabi construction contracts and its public sector management in construction industry.

The following section explains the areas that resulted in making UAE an immense investment market as well as a major growth area, even in the global recession of 2009.

5.2 OVERVIEW

The United Arab Emirates (UAE) is located on the cusp of the Arabian Peninsula bordered by the Arabian Gulf to the north, Oman and the Gulf of Oman to the east, and Saudi Arabia to the south. This strategic position is of great benefit to the UAE, making the country a crucial centre for trade. Since gaining independence in 1971 from the United Kingdom, the United Arab Emirates has developed a dynamic economy, with one of the highest per capita incomes in the world. Figure 5-1 below presents the location of the UAE. The following section presents a brief background about UAE history.



Figure 5-1 UAE Map, (Source: INTERSEC, 2005)

5.2.1 HISTORIC BACKGROUND

The United Arab Emirates (UAE) was formed from the group of tribally organised Arabian Peninsula sheikhdoms along the Southern coast of the Persian Gulf and the Northwestern coast of the Gulf of Oman. From the seventeenth to the nineteenth century, the British mounted expeditions against these places. Britain was in fact motivated by the desire to establish its supremacy in the region against the claims of other European powers.

The United Kingdom announced in 1968 and reaffirmed in 1971 that it would end its treaty relationships with the seven Trucial Coast states, which had been under British protection since 1892. Following the termination of all existing treaties with Britain, on December 2, 1971, six of the seven sheikhdoms formed the United Arab Emirates (UAE). The seventh sheikhdom, Ras al Khaimah, joined the UAE in 1972.

5.2.2 POLITICAL STRUCTURE

The UAE is a federation of seven self-governing emirates: Abu Dhabi, Ajman, Al Fujayrah, Dubai, Ras al Khaimah, Sharjah and Umm al Qaywayn. Abu Dhabi remains today, the politically predominant emirate because of its size, population, hydrocarbon wealth, portfolio of overseas assets and large budget exceeding that of the UAE Government (Library of Congress, 2006). The emirate of Dubai holds a secondary position by virtue of being the hub of private-sector activity.

5.2.3 SOCIETY

UAE citizens constitute less than 20 % of the population whereas the rest of them are migrants, foreign workers, from South and Southeast Asia. The vast majority of UAE's citizens are Muslims but there are diversified religions and languages as well. English is widely spoken language there (Library of Congress, 2006).

5.2.4 CLIMATE

The climate of the UAE is generally hot and humid. The summer months are the hottest and the winter months are with average temperature. The impact of this

severe climate on both the type of construction as well as the material used will be discussed later in this chapter.

5.3 ECONOMIC REVIEW

The UAE economy enjoys a competitive combination of cost, market and environmental advantages that create an ideal and attractive investment climate for local and expatriate businesses. The UAE has successfully implemented an economic diversification plan, boosting its industrial and service sectors in order to reduce its dependence on oil resources.

The advantages of the UAE's strategic location as a time zone bridge between the Far East and Europe on the East-West axis and the North America and Africa on the North-South axis. Moreover, the UAE economy enjoys a competitive combination of cost, market and environmental advantages that create an ideal and attractive investment climate for local and expatriate businesses alike. In fact, these advantages not only rank UAE and especially Dubai, for example, as the Arabian Gulf's leading multi-purpose business centre and regional hub country, but they place it at the forefront of the globe's, dynamic and emerging market economies. Finally, Dubai, with its ancient commercial and seafaring traditions, has been recognised as the Middle East region's leading trading hub. Thus, it has become known as its key re-export centre and a gateway to a market that can be characterised as:

- **LARGE:** Well-established trading links exist with the greater than 1.5 billion people in the neighbouring region covering the Gulf, Middle East/Eastern Mediterranean, Central Asia, Africa and the Asian sub-continent.
- **GROWING:** Dubai's total international trade has grown on average by over 11% per year since 1988 and regional economic growth and liberalisation should boost demand further.
- **PROSPEROUS:** A buoyant local economy strategically located in the midst of one of the world's richest regions and well endowed with ample supplies of cheap energy and primary aluminium; also adjacent to major regional suppliers of vital agro-export commodities.
- **DIVERSIFIED:** Varied and significant import requirements generate

opportunities for product suppliers and re-exporters.

- **ACCESSIBLE:** Served by over one hundred and twenty shipping lines and linked via eighty-five airlines to over one hundred and thirty global destinations.

The next section presents some of the important facts on UAE’s economy.

5.3.1 FACTS ABOUT THE UAE’S ECONOMY

The UAE has one of the highest per capita incomes in the Arab world. It claims to be the world's third largest proven oil deposits and fourth largest gas reserve. The major heavy industries in the UAE are related to hydrocarbons such as Liquefied petroleum gas, distillate fuel oils, jet fuels. There has been other industries that produce white cement, construction materials, ceramics and metal projects like aluminium etc. In addition, construction is an important industry in the UAE, as infrastructure and various building projects, industrial, commercial and residential, continue apace. According to the UAE government, the real estate and business services sector are recording a sizeable growth on income. Efforts are also made to promote tourism and trade, these reflected increase on the hotel and restaurant sector. The following Table 5-1 table presents some facts on the UAE’s Economy.

Table 5-1 Facts about the United Arab Emirates and it’s Economy

Capital	Abu Dhabi
Constitution	Federation of seven member states (emirates)
Geographical area	83,600 km ²
Population	3.75 Millions (2002) and 4.3 Millions (2004)
GDP	USD 71.0 billion (2002)
GDP per head	USD 18,930 (2002)
Inflation rate	2.9% (2002)
Exports	USD 45.7 billion (2002 estimated)
Imports	USD 35.9 billion (2002 estimated)
Main supplier countries	Germany, Japan, USA, GB, France, People’s Republic of China, Republic of Korea
Main imports	Machinery, electro-technical equipment, textiles, foodstuffs, means of transportation

Source: Dubai Economic Department (DED) (2005), UAE Interact (2004); Library of Congress (2006)

In addition to all this, UAE is also proving its success in banking sector by attracting larger institutions and foreign countries. UAE Central Bank has launched three new financial markets. Government has drawn up plans to establish the country's first credit rating agency and hopes to attract some of the \$600 billion. In September 2005, Dubai International Financial Centre (DIFC) established the Dubai International Financial Exchange, which provides markets for equities, bonds, funds, sharia-compliant products and derivatives and is full open to foreign investment. The following Table 5-2 presents the UAE's GDP growth rate.

Table 5-2 Gross Domestic Product (GDP) of the United Arab Emirates

Gross Domestic Product (GDP) of the United Arab Emirates		
2003	87.6 Billion US \$	
2004	103 Billion US\$	7.4 % on previous year GDP
2005	118 Billion US \$	6.7 % on previous year GDP
2006	164 Billion US \$	23%

Source: Dubai Economic Department (DED) (2005), UAE Interact (2004).

In UAE, the construction plays a major role in its development and it is analysed that it has 14% contribution to the GDP (Intersect, 2003). The following section provides more details about the construction industry of UAE.

5.3.2 FACTS ABOUT THE UAE'S CONSTRUCTION INDUSTRY

The United Arab Emirates (UAE) construction industry has reached an unparalleled position in the last decade. The real boom started in the mid-1990s with the shift from an oil-dependent country to a more industrial, commercial and tourism hub. The growth is initiated by the public sector but the private sector is as active. The Emirate of Dubai is now being credited with the highest per square kilometre of construction activity in the world.

The following Table 5-3 presents some facts about the UAE's construction industry.

Table 5-3 Facts About the UAE Construction Industry

Facts About the UAE Construction Industry	
Gross domestic product (GDP)	Dhs 293 billions in 2003
Construction industry's contribution to GDP	13.8%
Total no. of contractors	16,000
Total no. of employees in construction industry	340,000 (16.5% of the total work force)
Value of ongoing construction projects	\$30 billion
Landmark ongoing projects	World's tallest tower, world's biggest mall and world's biggest man made island

Source: Compiled from Gulf News (2005), ITP Construction (2004), Dubai Economic Department (DED) (2005), UAE Interact (2004).

Driven by active demand and official support for construction, the cement and building materials market has continued to develop and henceforth paved way to establish manufacturing industries for producing white cement, construction materials, and ceramics.

During the last two decades, UAE witnessed remarkable growth in its economic and social development pattern, which has created an active real estate market. The prominent factor, which has also stimulated the real estate market, is the growing foreign trade activities. The increasing trend in the population growth has necessitated the construction of large residential projects. The expansion in the construction of Real Estate has also created stable rates for rents, which boosts the economy.

The UAE offers modern infrastructure and excellent facilities. Transport within the UAE is almost entirely road-based and the quality of the roads is good, particularly in Abu Dhabi and Dubai. Apart from this, the UAE currently is building and improving on rail network system. It has thirty-five airports, twenty-two of which have paved runways, as well as two heliports.

The current boom in the construction industry is the direct result of a high return on investment and due to the decision of the Dubai government to allow foreign residents to acquire real estate. The government of the UAE is planning to

spend USD 20 billion over the next five years on the construction of new infrastructure projects, office and residential accommodation. The construction industry is one of the up coming industries in the UAE with several large projects in the works. The following Table 5-4 lists the major construction projects development in the UAE

Table 5-4 Major Construction Projects Development in the UAE

Emirate	Project Name	Cost
Dubai	The World of Islands	US\$ 4 billion
	Two Palm Island	US\$ 3 billion
	Dubai Pearl	US\$ 820 million
	China Town	US\$ 650 million
	Hydropolis Hotel	US\$ 500 million
	Gardens Shopping Mall	US\$ 200 million
	Dubai Lost City Project	US\$ 165 million
	Wellness and hydrotherapy centre	US\$ 120 million
Abu Dhabi	Pearl of the Emirates	US\$ 2.5 billion
	Najmat Abu Dhabi (The Star of Abu Dhabi)	US\$ 8 billion
	Shams Abu Dhabi (The Sun of Abu Dhabi)	US\$ 6.9 billion
	Addax Port	AED 6.5 billion

Sources from Construction Market in the UAE

The next section presents a detailed explanation about construction and real estate sector development of UAE

5.4 CONSTRUCTION AND REAL ESTATE SECTOR DEVELOPMENT

5.4.1 OVERVIEW

During the last two decades, Dubai has witnessed remarkable growth in its economic and social development pattern. These positive developments have played a significant role in placing Dubai as one of the leading commercial and industrial centres in the region. The major economic changes have had a positive impact on the social development and in elevating the living standard of Dubai citizens. Both the government and private sector including housing projects, hospitals, schools and educational institutions and other utilities established major social development projects. The fast growth in these areas has attracted more rapid investment in the

construction activities covering commercial centres, housing colonies and other related servicing projects.

These economic and social developments have created an active real estate market. The following are the major factors, which have resulted in the appreciation of the real estate value:

The growing need to accommodate the fast growing population of Dubai which have increased from fifty-nine thousands inhabitants in 1968 to one-hundred and eighty three thousand in 1975 and rose sharply in 1980 to two-hundred and seventy six thousand and four hundred and nineteen thousand in 1985. It is expected that Dubai's population will double by the year 2000. The population growth of Dubai is considered one of the highest in the world. The increasing trend in the population growth has necessitated the construction of large residential projects in various parts of Dubai by both the government and private investors. These initiatives have played a significant role in solving the accommodation problems witnessed by the emirate during the economic boom period in the 1960's and mid 1970's. The expansion in the construction of Real East has also created stable rates for rents, which boosts the economy.

The prominent factor, which has also stimulated the real estate market, is the growing foreign trade activities. Dubai's total trade has increased from nine billion Dirham in 1974 to twenty billion (Dh.) during the year 1978, and rose sharply during the year 1980 to reach thirty-seven billion (Dh.) and thirty two billion (Dh.) in 1987. With the view to meet the requirements of business establishments for office space, the private investors implemented showrooms, warehouses and employees' accommodations, major commercial centres and residential projects.

Beside the fast growing trade activities, the manufacturing sector growth during the 80's have also stimulated the real estate market for industrial plots as well as commercial and residential needs of over two-hundred and sixty five industrial establishments operating in Dubai.

The tremendous positive changes in Dubai economic and social structures have raised the people's standard of living. All these factors have added more to the

value of real estate in Dubai, which can be classified into four distinct categories:

- I. Commercial Estates;
- II. Industrial Estates;
- III. Agricultural Estates; and
- IV. Residential estates

5.4.2 MAIN CONSTRUCTION PROJECT PROVIDER

5.4.2.1 PUBLIC SECTOR

The federal government as well as the local government for each of the seven emirates are engaged in a vast range of construction projects from irrigation projects to desalination plants, and from sports stadiums to power generations to stations and sewerage treatment facilities. Mosques, schools, villas, government administration buildings, hospitals, airports, roads, bridges and tunnels, as well as every kind of infrastructure projects which are constructed under the auspices of the government.

Projects are executed under the supervision and direction of the Ministry of Works at the federal level, as well as the public works department or municipality of each local government.

5.4.2.2 PRIVATE SECTOR

The private sector has played a moderate role in the seventies and eighties. However, in the mid 90's and thereafter companies such as contractors and developers started to merge in order to compete with the new semiprivate corporation specialising in real estate development, such as Emaar, Al Dar Sorouh and Tameer. These giant developers are public liability corporations with part of the shares belonging to the different local governments. In recent years, these giant corporations have played a great role in developing the UAE's real estate and construction industry in general, as we will see in the following sections of this chapter.

5.5 REAL ESTATE DEVELOPMENT IN THE UAE

5.5.1 DUBAI REAL ESTATE DEVELOPMENT

The Palm Islands, also referred to, as The Palm Dubai and The Palms, are the three largest man-made islands in the world, which are being built on the coast of the emirate of Dubai, in the United Arab Emirates (UAE). Its concept was announced in May 2002 and the three resort islands are expected to maintain Dubai's position as a premium tourist destination. The Palm Islands is also the self-declared 'Eighth Wonder of the World'.

Each of the islands (*Palm Jumeirah*, *Palm Jebel Ali*, and *Palm Deira*) are being built in the shape of a date palm tree and consist of a trunk, a crown with fronds, and are surrounded by a crescent island that acts as a breakwater. The islands will support luxury hotels, freehold residential villas, unique water homes, shoreline apartments, marinas, water theme parks, restaurants, shopping malls, sports facilities, health spas, cinemas and various diving sites.



Figure 5-2 The Palm Islands: Dubai, UAE

(Source: http://reaestate.theemiratesnetwork.com/development\dubi\palm_islands.php)

The Palm Deira is the largest of the three Palm Islands (*Palm Jumeirah*, *Palm Jebel Ali* and *Palm Deira*), located on the Deirah coastal area. It will consist of residential property, marinas, shopping malls, sports facilities and clubs. The residential area will be located on the fronds and will contain eight-thousand two-storey town houses in three distinct styles - Premier Villas, Grand Villas and Vista Town Homes.

The Palm Jebel Ali is the middle-sized island of the three *Palm Islands* (*Palm Jumeirah*, *Palm Jebel Ali* and *Palm Deira*), located on the Jebel Ali coastal area. It is more of an entertainment destination for both adults and children, which caters to both

residents and tourists. The island will also be 50% larger than the Palm Jumeirah, and will include six marinas, a 'Sea Village', a water theme park and water homes built on stilts between the fronds and the crescent. Construction began on the Palm Jebel Ali in October 2002.

The Palm Jumeirah is the smallest of the three Palm Islands (Palm Jumeirah, Palm Jebel Ali and Palm Deira), located on the Jumeirah coastal area. It will contain over twenty-five of the top international hotel brands including Movenpick Resort Oceana Palm Jumeirah, Antara, Radisson SAS, Hilton, One and Only Royal Mirage, Starwood, Marriott, Oberoi, Kempinski, Taj etc. Construction began on the Palm Jumeirah Island in June 2001.

The Palm Golden Mile will be situated along the trunk of the Palm Jumeirah as an exclusive residential and retail boulevard. The Golden Mile Retail will be a unique shopping experience, with over 200 of the world's most upscale stores and restaurants from designer boutiques to formal dining and outdoor cafes. The Gold Mile Residences will contain 10 waterfront buildings with approximately seven-hundred and eighty freehold apartments from one bedroom to penthouses and town homes. It is a joint venture between Al Nakheel and IFA Hotels & Resorts.



Figure 5-3 The Palm Golden Mile; Dubai, UAE

(Source: http://reaestate.theemiratesnetwork.com/development/dubi/palm_islands.php)

The Palm Trump International Hotel and Tower, also referred to as Trump Tower Dubai, will be the luxury centrepiece building of the Palm Golden Mile. The tower will be in the shape of a split-linked tower with an innovative open core design. It consists of a forty-eight-storey with a mixed-use condo-hotel and residence with a three-hundred-room five-star hotel and three-hundred and sixty freehold residential apartments. This AED 2.2 billion (US\$ 600 million) development will include

exclusive access to a private beach and yacht club with tennis courts, gymnasium and fitness centre, stylized pools and gardens. It is expected to be completed by 2009.



Figure 5-4 The Palm Trump International Hotel; Dubai, UAE

(Source: http://reaestate.theemiratesnetwork.com/development\dubi\palm_islands.php)

➤ ***Dubai Marina***

Dubai Marina, formerly named Westside Marina, referred to as the world's largest man-made marina and is amongst the world's largest planned waterfront development. It is located in Dubai's new growth corridor and is designed to create an awe-inspiring city-within-a-city. It will accommodate over one-hundred and twenty thousand people in their luxury apartment towers and villas, with a unique waterfront view. The development will be constructed in two phases. The first phase will include ***Dubai Marina Towers*** project and the second phase will include the construction of the five Al Majara Towers that offer 1 to 3 bedroom units, along with the development of the Al Sahab twin tower that is also offering one-three bedroom units.

➤ ***Dubai Marina Towers***

Dubai Marina Towers are six freehold waterfront apartment towers located on the right corner of the southern shore of the Dubai Marina. IT includes sixty-four luxury villas connected by a spectacular network of rooftop gardens. Underground parking for two-thousand cars, six swimming pools, 2,800 square meters of sports facilities, 2,000 square meters of themed restaurants, 4,000 square meters of retail space and a 200 square meter prayer hall that surround the apartment towers and villas.



Figure 5-5 Dubai Marina Towers; Dubai, UAE

(Source: http://reaestate.theemiratesnetwork.com/development/dubi/palm_islands.php)

Dubai Mall

Downtown Dubai's major retail outlet will also be the world's largest shopping mall, which will cover 9 million square feet (836 thousand square meters). Burj Dubai Mall will have areas for leisure pursuits, including an excellent aquarium, fashion show arena, gold souk and an ice rink, as it intends to revolutionize the modern shopping experience. This mall was opened in November 2008.

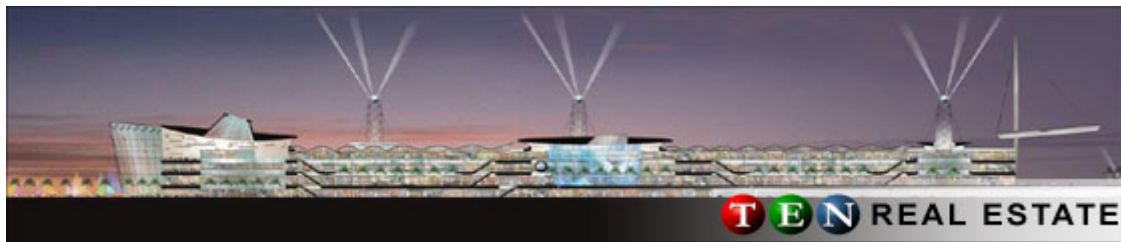


Figure 5-6 Dubai Mall; Dubai, UAE

(Source: http://reaestate.theemiratesnetwork.com/development/dubi/palm_islands.php)

5.5.2 ABU DHABI REAL ESTATE DEVELOPMENT

With the Bayt Al Khidma as lead house, three project developers will develop Al Reem Island into a further district of Abu Dhabi.

Various centres with residential and office buildings for some three-hundred thousand inhabitants will be built on an 864-hectare site northeast of the UAE's capital of Abu Dhabi. Drees & Sommer Gulf has been commissioned to undertake the entire program and project management for development of the island's external and internal infrastructure. All infrastructures were to be completed by the end of 2007. The island site means that it is a great challenge to integrate suitable public transport systems into a general infrastructure master plan connecting Al Reem to neighbouring islands at various places.

Al Reem Island, previously referred to as 'Abu Al Shuoom', 'The Pearl' and 'Emirates Pearl Island', is a residential, commercial and business project to be built on the natural island of Al Reem Isle, located off the north-eastern coast of Abu Dhabi city. The development will be connected to the Abu Dhabi City Island by two or three bridges and be located twenty minutes from the Abu Dhabi International Airport.

Al Reem Island will cover an area of six-hundred and thirty three hectares (68 million square feet) and is being built by three developers - Tamouh Investments owns 60%, Sorouh owns 20% and Al Reem Investments owns the remaining 20%. An independent third-party facilities management company known as Bayt Al Khidma, who will ensure all three Reem Island developers meet the high standards of construction, will oversee the development. The island is estimated to accommodate two-hundred and eighty thousand residents and will include important amenities like schools, medical clinics, shopping malls, restaurants, a 27-hole golf course, hotels, resorts, spas, gardens, and beaches. Property available on Al Reem Island will be on an extendable 99-year leasehold basis.

➤ *Al Reem Island Major Divisions and Investments*

Pearl of the Emirates: developed by Tamouh Investments which owns 60% of Al Reem Island, it includes Marina Square that covers 15 towers and a 5-star hotel.

As well as addax port project.

Shams Abu Dhabi (The Sun of Abu Dhabi): Residential development by Sorouh to be completed by 2011.

Najmat Abu Dhabi (The Star of Abu Dhabi): Urban waterside community development by Al Reem Investments covering 20 million square feet (1.86 million square meters) to accommodate eighty-thousand thousand to be completed by 2012.

➤ ***Pearl of the Emirates Developments***

Marina Square: Covers 13.2 million square feet (1.2 million square meters) Pearl of the Emirates, with 70% residential and 30% commercial districts expected to be complete by 2009. It will contain a collection of fourteen high-rise waterfront towers including Marina Heights 1 and 2 by Profile Group Properties, forty-nine-floored Tala Tower by Sorouh Real Estate, and forty-three-storeyed Ocean Terrace Residence by First Gulf Bank (FGB).

Addax Port: This will include 5 towers (Office Tower, Park Tower, Marina Tower, Executive Tower, and Light Tower), four of which are residential and one will be commercial.



Figure 5-7 Pearl of the Emirates Developments; Abu Dhabi, UAE

(Source: http://reastate.theemiratesnetwork.com/development/dubi/palm_islands.php)

➤ *Shams Abu Dhabi (The Sun of Abu Dhabi) Developments:*

Shams Abu Dhabi, which can be translated into English as 'The Sun of Abu Dhabi' or 'Abu Dhabi's Sun', is one of the three project developments being built on *Al Reem Island*. The project will occupy approximately 25% of the island, occupying 14.2 million square feet and is to house around one-hundred thousand residents.

Shams Abu Dhabi will have residential living areas that occupy 90% of the project, while the remaining 10% will be used for commercial and recreational areas. It will contain around one-hundred skyscrapers, twenty-two thousand residential units and a million square meter (10.8 million square foot) park. The Gate District, an eight-building development, while other developments in the project include the 83-storey the sky tower, the five million square foot Abu Dhabi towers, and the upper village, will mark the entrance of the development. Sorouh Real Estate is the developer and the project expected completion date is 2011.



Figure 5-8 Shams Abu Dhabi (The Sun of Abu Dhabi) Developments; Abu Dhabi, UAE

(Source: http://reaestate.theemiratesnetwork.com/development\dubi\palm_islands.php)

5.6 TYPES OF ENVIRONMENTAL FACTORS

“The systems of building projects are a response to the environmental factors and the interaction of projects with their environments are reciprocal. The environment should be defined in a more structural way, and that the criteria should be examined to ensure any observable environmental phenomena may be classified into generic groups of environmental forces.” W.P. Hughes (1989).

5.6.1 CULTURAL FACTORS

This describes society's acceptance or tolerance of certain modes of behaviour. It covers such phenomena as 'peer group pressure'. It can have a great effect upon the industrial relations scene within a project, and on the 'informal systems' which are often acknowledged to exist within formal organisations.

Culture defines the aesthetics of design and project that in itself affects factors such as quality. The United Arab Emirates is an Islamic / Arab country. During the seventies and the eighties, most of the building designs reflect the Islamic and Arabic culture with minor western designs. However, the rapid growth of the UAE's economy in general as well as the importance of the geographic location as a regional trade centre has caused great employment opportunities as well as numerous businesses opening in the country. Hence, people came from all over the world. Most of the employment seekers especially for the middle and lower class jobs came from the sub-continent (India and Pakistan), which provide cheap labour that is used in the construction industry. Moreover, American and European people found great opportunities for investments as well as business and work opportunities. This rapid increase of population from all over the world has affected the building designs in order to tolerate their needs. The following sub factors explain the change of buildings' aesthetics

➤ CONSULTANT FIRMS/ENGINEERS

Consultant Firms/ Engineers are from all over the world. The local consultant offices have started in the mid/late 1970's. The majority of the Engineers in-charge of design is expatriates (British, Arabs, and Indians). This has led to a variety of aesthetics reflecting the culture of the designers. Foreigners' designs did not consider the culture of the area in the beginning and numerous designs were reflections/copies of buildings used in the European environment. Examples of these are:

- I. Villas with pitched roofs/clay tiles in an area where rain is confined to 10-14 days a year;
- II. Buildings with glass cladding on most elevations extending the full height of the project; This is for a climatic environment where the sun shines for 350

days a year and temperature is 40 degrees centigrade on average in the summer and does not go below 20 degrees centigrade in winter (daytime). In addition to the above, the climate has very high humidity content and dust surrounds the area. The above gives us an idea of the problem relating to electricity consumption to air conditioning and cleaning the curtain wall (glass). This clearly indicates how a designer's own culture can have a great impact on their designs. Hence, affect the output of the designers.

➤ ***THE EXPATRIATES WORKING IN THE CONSTRUCTION INDUSTRY***

The expatriates working in the construction industry had further added to the cultural effect of the area. The requirements of different cultures/ people are accommodated by the freedom allowed in the UAE. The achievement, however, is that the people of the UAE have remarkably managed to maintain their culture and way of life. There are boundaries, which can be clearly identified between the culture and the conservative way of life of the people of the UAE as one side and the expatriates' culture and way of life on the other side. Requirements of culture are numerous and it is an obligation that the designer should differentiate between design where the end user is an expatriate, and designs where the end user is a native. The increase in the number of consulting firms owned and run by local architects/consultants is helping in differentiating this issue, which is crucial to the local environment.

5.6.2 ECONOMIC

This includes the level of general economic activity, as well as the question of deployment of resources or in other words the economic resources available to carry out the work, including the economic competition, which exists to varying degrees around the appointment of all of the parties to the building project. Examples of these economic resources are labour, material and oil prices.

The import of all labour for construction projects is a major factor affecting the construction industry. As mentioned earlier most of these labour came from the sub-continent (India and Pakistan), which provide cheap labour that is used in the construction industry.

The import of most items for the finishes is a further burden. The industry, however, commenced in late 70's and early 80's to establish factories for processing items connected to the industry, (paints/all related concrete products (blocks etc.) /aluminium extrusion plants/cement factories). However, all steel reinforcement and section in addition to all timber/plywood is imported (Russia/Romania for wood-Malaysia for plywood – Reinforcement from Qatar / Turkey – Burma for teak wood). Any factor affecting the import causes serious disruption to the industry.

Oil Prices: The fluctuation of oil prices has a major effect on the local economy. Because oil is the major export income for the UAE, it affects the trend and policy of the federal as well as the local government for each emirate. The number of projects being tendered is very dependent on this fluctuation. Several projects do go on hold for a period of time (i.e. in the eighties when the oil price was very low). Contrary, both the federal and the local government try to invest on infrastructure when there is high revenue from oil (i.e. the last ten years).

The government of the UAE is planning to spend US\$ 20 billion over the next five years on the construction of new infrastructure projects, office and residential accommodation (Intersec, 2005). According to published reports, the value of ongoing construction projects in the UAE has been estimated at US\$ 30 billion a majority of which are in Dubai and Abu Dhabi Emirates, with plans to develop Dubai and Abu Dhabi as the major tourism centres and regional business and manufacturing bases, this growth is set to continue.

5.6.3 POLITICAL

This is concerned with government policies and the effect of political decisions upon the project. It also covers the sometimes-large influence that politically powerful individuals can have over a project.

As mentioned earlier in Section 5.3, the UAE Government has established both Abu Dhabi and Dubai as a finance and trade centre and has succeeded in this with its open policy to all trade. The oil revenue helped the local Government in achieving this aim. The wise use of these resources has led to the establishment of major infrastructure projects and free zones. It is an evidence of the success of the

government policies.

5.6.4 SOCIAL

This term describes the social environment within which the project is operating. There may be a specific social need for a project, or conversely, a building may be having adverse social consequences. The need to build to accommodate is the major trend. They are though heading towards the total trade market does not have the construction industry following suite in pre-planning / marketing study. The industry has up to now followed suite and not predicted the requirement. However, it must be noted that the extent of construction is still slower in pace than neighbouring Abu Dhabi. The boom taking place in Dubai seems gradual and not sudden. Investors and property developers go about establishing a location that follows the requirements. This has led to a more stable construction industry than any other neighbouring countries

5.6.5 PHYSICAL

This relates to the physical conditions on the site. There may be difficulties associated with the site, or the climate may be bad; thus, inclement weather is included in this category. Each contributor to the project will also have its own physical environment.

The physical conditions are a major environmental factor on the construction in Dubai. The physical condition, the desert, and the lack of natural greenery, in addition to the soft soil conditions (dune sand or reclaimed land) are all factors which contributes to the difficulties experienced by construction companies.

The climate is hot and humid, the high temperature during the whole year (with the exception of the mild weather in January (February) where temperature average at 38 degrees is a further problem when works continuous all day/six days a week. The population uses air conditioning everywhere, offices/accommodation and market places. The production rates of labour in summer drops automatically and it is all due to climate conditions.

5.6.6 AESTHETIC

There will be some sort of aesthetic influence around a project; whether it is through ‘fashion’ in building design, or whether it arises through the conscious choice by a client of a particular designer.

As noted in cultural factors (Section 5.6.1 earlier), foreign consultants carry their views of designers from their country of origin and imply that this is what should be constructed in the UAE. The design has left its mark on the aesthetics of projects in the area (please refer to Figure 5-4 to Figure 5-8). Local Investors seem to get used to such designs and accordingly, suffer the problems of implementing such designs, which clearly burden the maintenance budgets allowed.

5.6.7 FINANCIAL

Financial limits always seem to exist on building projects. They are often clearly specified, but they may be based on inadequate information. Financial environmental forces are distinguished from economic ones on the basis that economics is to do with the deployment of resources, whereas, financial limitations are strictly to do with money.

Most projects constructed run over budget. The lack of an effective brief by client and the speed in which clients desire to get these projects, started (i.e. time from decision to commence drawings – to build – and time allocated to prepare documents by consultants is short. (some – survey carried out with “Consultants”) are the main factors contributing to the problem of financial burden on clients, basically due to their own fault in not allowing sufficient time for preparation. The use of Fidic in which the price escalation / special risk are deleted (clause 70 and 65 of Fidic).

5.6.8 LEGAL

Legislation affects the client’s activities directly, through factors such as safety, planning law, building regulations, etc. It also influences the contractual relationships within a project.

No Company can operate in the UAE, unless, it had either a local partner or

sponsor. This policy was adopted to ensure the welfare of the local people. The increase in number of the UAE engineers / architects has contributed to the increase in number of 100 % locally owned firms. Foreign firms try joint ventures with well-established firms to gain from the contract/reputation of local firms or personal as this carries weight in obtaining tender lists/competition/tenders and securing projects.

The contracts used in the Emirate of Abu Dhabi are principally (Fidic). These are amended extensively (contracts on average result in a 15 % increase of initial project cost (Zaneldin, 2002). These change the bases of Fidic International, so much that it becomes a very different form. Each consultant changes/adds and/or omits as he sees fit, where he sees fit. Contractors do object at the tender stage; however, if they are successful and the consultant inserts acceptance of tender documents as, a condition to awarding the contract, then most, if not all, contractors accept these conditions.

5.6.9 INSTITUTIONAL

This covers the influence that professional institutions can have over the conduct of the professional consultants. It affects conditions of engagement, fee scales, etc.

➤ PROFESSIONAL INSTITUTIONS:

The following Professional Institutions are available in the Emirates of Abu Dhabi are:

- I. Society of Engineers (where all expatriate engineers are associate members);
- II. Contractors Association/ member of the world Organisation of Building Offices (WOBO); and
- III. Other societies, which organises professionals by nationality/university graduates, etc

The Society of Engineers is the most active of the above. The Society has been trying to push certain legislation in regard to organising the professional offices. Setting criteria and assessing the minimum professional requirement in each office

has been another target of the society's aim, all of which contributes to organising the construction industry.

➤ ***ABU DHABI MUNICIPALITY***

Abu Dhabi Municipality is the main local government legal institution that regulates/defines requirements and scope of work of any professional office working or intending to work in the Emirate of Abu Dhabi. Each office (Consultant / Contractor) has to obtain a licence from Abu Dhabi Municipality prior to commencing work in the area. This is done by meeting defined requirements set by the Municipality, which studies the same and issues a licence (recently membership to the Chamber of Commerce has become a rule-but this is, basically, a registration procedure only).

➤ ***CATEGORIES OF CONTRACTORS***

The Abu Dhabi Municipality has different categories for contractors working in the area under its jurisdiction and this is judged by the past performance/number of professionals and amount of equipment available with the company requesting registration. The categories are:

- I. Unlimited (allowed constructing any size of building).
- II. Unlimited (all contracts) – any size and any nature;
- III. (Ground floor and seven storeys);
- IV. (Ground floor and four storeys);
- V. (Ground floor and one storey);
- VI. Maintenance;
- VII. Interiors

5.6.10 TECHNOLOGICAL

This aspect relates to the technology, which is available to do the work, both in terms of the design work and the construction work.

All technology in the building industry is imported from Europe. The extent of use differs from one organisation to another. The increase in the number of major

overseas contractors defines the use and extent to which these are utilised. This in fact was one of the main benefits of the overseas companies in the 70's and early 80's. However, the use of robots in the industry is non-existent and contractors in the area do not carry out development. This is either the reason why all technology is imported directly by the contractor or is done through agents / representatives in the area.

5.6.11 POLICY

The client will undertake the translation of these environment influences and when a decision to provide a building is taken, the assessment of the environment will be translated into the policy of the project. This decision will be based upon consideration of the environment and influences on the client's organisation, and there may be some consideration of the project's effect upon the environment. These decisions form the immediate boundary to the building project as a system.

5.7 ORGANISATION OF PUBLIC PROJECT MANAGEMENT IN ABU DHABI

As the focus and the scope of this study is for governmental projects, the researcher feels that it is important to introduce the following

In order to understand the hierarchy and the procedures that are used in constructing a building project in Abu Dhabi, it is essential to know how Public Project Management is structured. Thus, this section introduces the organisation of public project management and its procedures to deal with constructing government projects, as well as to explain how the public sector deals with such claims and disputes.

5.7.1 OVERVIEW

The Government of Abu Dhabi is engaged in a vast range of construction projects from irrigation projects to desalination plants, from sports stadiums to power generation stations and sewage treatment facilities. Mosques, schools, villas, government administration buildings, hospitals, airports, bridges, ports, roads, and every kind of infrastructure projects are constructed under the auspices of the Government.

These projects are executed under the supervision and direction of the various Departments. Before reviewing the principles of claims avoidance it will be helpful to consider the organisational structure of project management in Abu Dhabi and how it relates to the project life cycle phases.

Authority over the Government's construction projects rests with the Executive Council. The Executive Council exercises its authority through the General Projects Committee, the Planning Department, the Finance Department and the various executing Departments. Project works are executed under the authority of the appropriate Department, with the Finance Department retaining control of project payments.

The principle Departments involved in the execution of construction projects include:

- Public Works Department;
- Abu Dhabi Municipality and Town Planning Department;
- AI Ain Municipality and Town Planning Department;
- Department of Social Services and Commercial Buildings

Each Department is responsible for the administration of contracts for works related to its particular field. Private Contractors accomplish the project works typically under the direction of independent consultants (generally the project Engineer). The appropriate Department oversees both the Consultant and the Contractor.

The following Chart illustrates the hierarchy of project management in Abu Dhabi.

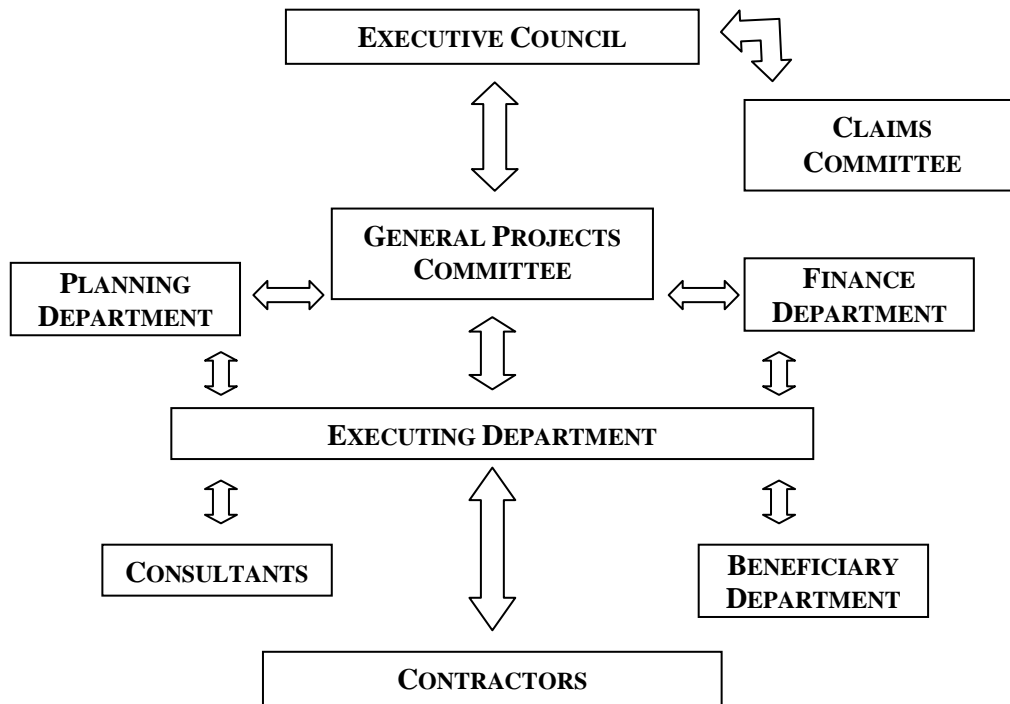


Figure 5-9 PROJECT MANAGEMENT ORGANIZATION

(Source: Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects, 2002)

5.7.2 PROCEDURE

Each level of this hierarchy is engaged, to varying degrees, in the entire project life cycle. New projects are proposed by the Beneficiary Department and are reviewed by the Planning Department and the General Projects Committee. The General Projects Committee then submits selected projects for Executive Council approval and inclusion in the annual development program.

Engineers for approved projects are selected through a process that involves the relevant executing Department, the Planning Department, the General Projects Committee and the Executive Council. Engineers eligible for the project according to the Consultant Registration System are pre-qualified by the Department, reviewed by the General Projects Committee and Planning Department, and are subject to the approval of the Executive Council. The Department then prepares an invitation to bid for the project consultant. The invitation to bid is reviewed by the Planning Department prior to issuance by the Department. The General Projects Committee and Planning Department receive the bids. Thereafter the bids are evaluated by the Department, which then makes a recommendation to the General Projects Committee.

The General Projects Committee, in consultation with the Planning Department, then makes a recommendation to the Executive Council, which has ultimate responsibility for approving the project Engineer.

Contractors are selected through an open-invitation process according to the established classification system (see Section 5.6.9). Tender documents are prepared by the Engineer under the direction and authority of the Department and subject to the review of the Planning Department and the Finance Department. Invitations to bid are issued by the concerned Department. Bids are received by the General Projects Committee and are opened by the Tenders Opening Committee, which consists of representatives of the General Projects Committee, the Planning Department, the concerned Department and the Engineer.

The Engineer evaluates the bids under the direction and authority of the Department. Based on that evaluation, the Department makes a recommendation for award to the General Projects Committee, which, in consultation with the Planning Department, reviews the recommendation and submits it to the Executive Council. The Executive Council produce contract awards.

The Contractor executes the Project works under the supervision and administration of the Engineer, who in turn operates under the supervision and authority of the Department. Time extensions and variations require approval of the General Projects Committee and those time extensions or variations that include amendments to the Contract Sum require Executive Council approval.

On completion of the project works and after inspection by the Department and the Engineer, the Department issues the Preliminary Acceptance Certificate and the works are handed to the End-user Department. This establishes the end date of the project and the start date of the maintenance guarantee period. At the expiry of the maintenance guarantee period, the Department accepts final hand over of the project and issues the Final Acceptance Certificate.

5.8 AN OVERVIEW OF ABU DHABI CONSTRUCTION CONTRACT

5.8.1 INTRODUCTION

The preceding discussion highlights the importance and significance of Variations as it was found by many researchers and studies the most common and significant types of claims and disputes. It is very important to assess the risks associated with any construction project for claims and disputes avoidance. Thus, this section highlights the main elements of Abu Dhabi construction contracts as well as discusses some important issues in Abu Dhabi General Conditions of Contract. Consistent application of the Contract's provisions is perhaps the single most critical aspect of claims avoidance thorough knowledge and understanding of the Contract.

In a dispute over the meaning of a contract provision, a key determinant will be the conduct of the parties, i.e. how they applied the disputed provision in the course of the project works. It is therefore vital that the construction parties appreciate and understand how their duties and activities are affected by the Contract so that they can apply its provisions consistently.

In Abu Dhabi, the Contract consists of four parts:

- a) Tender and Contract Documents;
- b) General and Special Conditions of Contract;
- c) General and Special Specifications;
- d) Drawing and Designs and Exchanged Correspondence.

5.8.2 ELEMENTS OF CONTRACTS

➤ **Tender and Contract Documents:**

The Tender Documents consist of the Invitation for Tenders, Instructions for Tenderers and Tender Forms. These documents include the plans and specifications, drawings; the Bills of Quantities, addenda and the Conditions of Contract.

On award of the works, the parties enter into a contractual agreement for the execution of the works (“Agreement”). The Agreement and the Tender Document, along with any clarifications thereto made prior to the execution of the Agreement,

then become the Contract Documents. The Agreement recites the consideration given by the Contractor (in terms of work, materials, equipment, etc. to be furnished) to the Department in exchange for the Department's agreement to pay a stipulated sum to the Contractor for his timely performance. The number of days in which to complete the Contract work is also provided in the Agreement

➤ **General and Special Conditions of Contract**

The General Conditions of Contract are the core of the contractual relationship between the Department and the Contractor. In Abu Dhabi, law mandates the terms of the General Conditions and they include a number of topics, which address the rights and duties of the parties, and so, are of special concern to claims avoidance. Interpretation and application of the provisions of the General Conditions are discussed in detail in Section 5.8.3 below.

The Special Conditions of Contract include the specific project requirements and may add to or clarify items in the General Conditions. The Special Conditions will vary from Department to Department and may vary from project to project, depending upon the Department policies. The discussion in Section 5.8.3 below highlights Special Conditions provisions that may be used to clarify provisions of the General Conditions, which are especially likely to be the subject of claims.

➤ **General and Special Specifications**

The General and Special Specifications set out in detail the project's technical requirements and performance criteria. The Specifications complement the drawings, explaining requirements that are best expressed in words, such as the quality of materials and equipment, installation methods and techniques, and performance requirements, and therefore, can be particularly important in avoiding or resolving disputes.

➤ **Drawing and Designs and Exchanged Correspondence**

This category includes all contract drawings, plans, diagrams and sketches, and, essentially, comprises the design of the works. The drawings define the physical relationship of the materials to be used in the construction of the works. They show

what is involved, where it is located and what the physical dimensions are. The drawings provide information concerning sizes, locations, quantities and configurations.

Claims commonly arise from discrepancies, omissions or ambiguities in the design drawings.

Exchanged correspondence refers to pre-Agreement correspondence only and does not apply to correspondence following the execution of the Agreement.

5.8.3 CONDITIONS OF CONTRACT

It can be noted from above that the Conditions of Contract are contained in the General and Special Conditions. The terms of the General Conditions are mandated by Executive Council Resolution No. 23, Session 20/81, 7 June 1981, and are the only part of the Contract, which is the same for all Departments. The General Conditions address numerous issues that are of paramount importance to claims avoidance, including the allocation of major risks (as shown in Table 5-5 in the following Section 5.8.4). The General Conditions are divided into twelve chapters:

1. Scope of Contract
2. Contract Completion Period
3. Financial Reimbursement for Contract Works
4. Amendment of Contract
5. Bonds and Guarantees
6. Progress of Work During Execution
7. Sub-Contractors and Sub-Suppliers
8. Assignment of the Contract
9. Penalties
10. Termination of the Contract
11. Settlement of Disputes
12. General Provisions

Note that these headings are provided for ease of reference and do not affect the interpretation of the conditions. The provisions of the Conditions are contained in

53 articles.

The following with the contract reviews the most important provisions of the General Conditions with respect to claims avoidance. The intention is to provide the User with an understanding of these provisions so that he can apply them in a consistent manner.

The Special Conditions of Contract supplement or clarify the General Conditions, taking into account the particular legal, physical, climatic or oilier conditions of the subject project. The Special Conditions can play an important role in claims avoidance as they can be used to clarify any ambiguities in or provisions of the General Conditions, which in view of the particular project are likely to give rise to Contractor claims.

It is, therefore, important that due consideration be given to the issues addressed and to the language used in the Special Conditions so that they can supplement the General Conditions in a way that minimises the likelihood of claims. As correct and consistent interpretation of the Contract is a most critical element of claims avoidance, it is equally important that the User study the Special Conditions for his project. The User must understand the relationship of the Special Conditions to the General Conditions so that he will be able to consistently apply the terms and conditions of the Contract to situations that arise in the course of construction.

Special Conditions should typically refer to and follow the format of the General Conditions. Such a standardized cross-reference is beneficial to the User as it clearly identifies the provisions of the General Conditions to which the Special Conditions relate. However, the User may encounter instances where his Department has used an alternative form of Special Conditions in view of the requirements of the Department or of the project at hand. Regardless, the important factor for claims avoidance purposes is to know how the Special Conditions clarify the General Conditions

The paragraphs below include comments on Special Conditions terms, which may be used to affect the General Conditions, in terms of claims avoidance. The objective of this section is to familiarise the user with the ways in which the Special

Conditions can be used to complement or clarify the General Conditions, again in terms of claims avoidance.

➤ **Definitions**

The Definitions Article of the Contract is intended to communicate to the parties the meaning of terms and phrases that appear throughout the General Conditions. Definitions are used to define the parties, their position in the Contract and bring to the Contractor's attention key elements of the work.

Note that the Definitions Article of the General Conditions defines only a limited number of terms as follows:

Department, Approved, Engineer, Drawings & Design, Contractor, Site Works, Temporary works, Contract and Construction/Mobilization Plant.

The Special Conditions may be used to provide a more comprehensive list of defined terms. Included in the Special Conditions are definitions for the important terms would ensure that all parties have a clear concept of what such terms mean and would provide a reference for the settlement of disputes.

For example, the General Conditions definitions do not include terms such as “preliminary handing-over” or “final handing-over” and the definitions for those terms must be inferred from their use in the General Conditions. Both of these terms are extremely important, as they are the trigger for a number of other important contractual events, such as the commencement of the maintenance period in the case of the preliminary handing-over or the release of retention funds in the case of the final handing-over. A lack of certainty among the parties as to contractual meaning of terms such as these will inevitably lead to disputes and claims. The Special Conditions can be used to, effectively, avoid such claims.

5.8.4 CATEGORIES OF RISKS AND RISK APPORTIONMENT IN ABU DHABI GENERAL CONDITIONS OF CONTRACT

While each project will present unique risks, general categories of risks are common to the construction industry as a whole and their consideration should be a

part of every risk management strategy. The user who has knowledge of these general categories of risk can consider them in the context of his specific project and will be better able to identify and avoid potential claims situations (Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects, 2002).

General Conditions of Contract clauses principally identify how the risks inherent in construction are apportioned between two parties to the contract namely the Employer (sometimes referred to as Principal, Owner, and Client etc) and the Contractor (universally in all forms of contract referred to as Contractor). Risk is an essential consideration in choosing contract strategies and in drafting contract documents (O'Reilly, 1995).

According to Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects, 2002, there are six main categories of construction project risks; these risks are as follows:

Force Majeure	Political Risks	Economic Risks
Design Risks	Physical Risks	Construction Risks

In addition, these guidelines state one of the methods of risk reduction available to an employer. This method is the contractual transfer of risk responsibility to the Contractor. Moreover, the guidelines indicate that the risk elements not addressed in the General Conditions may be dealt with in the particular project's Form of Agreement, Special Conditions or other parts of the Contract. Thus, the user should review carefully his project's entire Contract, in particular the Special Conditions, to determine which other risks have been addressed contractually and whether responsibility for them has been allocated to the Department or to the Contractor

The following, Table 5-5, indicates the relevant articles of the Abu Dhabi General Conditions of Contract for Civil Engineering Works that address the general '*Force Majeure*', '*Political*', '*Economic*', '*Design*', '*Physical*' and '*Construction*' risk categories, respectively. (Note that this table is adopted from Abu Dhabi Guidelines for Claim Avoidance and Management for Construction Projects, 2002).

Table 5-5 Project Risk Category and Allocation of Risks Under A.G.C.C

Category	Example Of Specific Risks	Treatment Under A.G.C.C.
Force Majeure	<ul style="list-style-type: none"> a. Delays due to exceptionally adverse weather, floods, storms, earthquakes, etc b. Damages to the works due to exceptionally adverse weather, floods, storms, earthquakes, etc 	<ul style="list-style-type: none"> a. Contractor may be entitled to Extension of Time (Article 3). b. Contractor responsible for insuring/Contractor's Risk (Article 12, Article 25)
Political Risks	<ul style="list-style-type: none"> a. Labour strikes, civil unrest, etc. b. New taxes / customs tariffs c. Expropriation of Contractor's equipment / machinery d. Embargoes on project imported items. 	<ul style="list-style-type: none"> a. Contractor may be entitled to Extension of Time (Article 3) b. Not addressed c. Not addressed d. Contractor responsible for compliance with Israel Boycott (Article 47)
Economic Risks	<ul style="list-style-type: none"> a. Delayed payments to Contractor b. Inflation/price escalation c. Unproductive/idle plants or labour d. Finance charges for loss of profit, extended performance bond, insurance, retention, etc. e. Default of subcontractors or suppliers f. Currency fluctuation 	<ul style="list-style-type: none"> a. Not addressed b. Not addressed c. Not addressed d. Not addressed e. Contractor may be entitled to Extension of Time (Article 3) f. Not addressed (but note denomination of Contract in Dirham effectively places risk on Contractor).
Design Risks	<ul style="list-style-type: none"> a. Change of design, quantity/quality b. Design omissions/errors by Consultant/Department c. Rectification works/specification change due to defective design d. Incomplete design 	<ul style="list-style-type: none"> a. Contractor may be entitled to Extension of Time (Articles 3, 9, 10, 18) b. Contractor may be entitled to Extension of Time (Articles 3, 9, 10, 18) c. Contractor may be entitled to Extension of Time (Articles 3, 9, 10, 18) d. Contractor may be entitled to Extension of Time (Articles 3, 9, 10, 18)

Continued' Table 5-5 Project Risk Category and Allocation of Risks Under A.G.C.C

Category	Example Of Specific Risks	Treatment Under A.G.C.C.
Physical Risks	<ul style="list-style-type: none"> a. Restricted access or possession b. Additional work c. Change of project profile and site d. Unanticipated soil conditions e. Loss of/damage to materials on site or during transport f. Damage to other property during transport of materials 	<ul style="list-style-type: none"> a. Contractor may be entitled to Extension of Time (Articles 3, 18) b. Contractor may be entitled to Extension of Time / additional compensation (Articles 3, 7, 8, 9, 10, 18) c. Contractor may be entitled to Extension of Time / additional compensation (Articles 3, 7, 8, 9, 10, 18) d. Contractor's risk (Article 24) e. Contractor responsible for damage to materials on site (Article 25) f. Contractor responsible for damage to roads / bridges / waterways (Article 34)
Construction Risks	<ul style="list-style-type: none"> a. Suspension of works b. Extension of Time for Completion c. Prolongation of suspension d. Re-measurement of Contract items e. Different Site Conditions f. Availability/suitability of project materials g. Time and schedule delays 	<ul style="list-style-type: none"> a. Contractor liable for Suspensions for Default (Art 4) b. Contractor or Department's risk depending upon cause (Articles 3, 9, 10) c. Contractor's risk where Suspension for Default (Art 4) d. Lump Sum Contract: Contractor's risk generally, possible entitlement if due to Contract Modification (Article 7) Quantities/ Unit Rates Contracts: Department's risk (Article 8) e. Contractor's risk (Article 24) f. Availability: Contractor may be entitled to Extension of Time (Article 3) but not to additional costs for use of alternative materials (Article 21) Suitability: Contractor's risk (Article 21) g. Contractor may be entitled to Extension of Time (Articles 3, 9, 10, 18)

(Source: AD Guidelines for Claim Avoidance and Management for Construction Projects, 2002)

5.9 CHAPTER SUMMARY

An overview of UAE's history, climate, society and its political structure has been covered in this chapter. Factual information about country's economy was also presented along with the analysis of the different economic sectors such as energy, banking and finance, industry and manufacturing and real estate. Furthermore, the various market characteristics were discussed including the strategic advantages of the country's location that not only rank the country as the Arabian Gulf's leading multi-purpose business centre and regional hub country, but also the position at the forefront of the globe's, dynamic and emerging market economies. In addition to that, the different environment and investment factors, that have made the UAE a great investment market as well as a major selling point, were also identified.

It was shown that United Arab Emirates is becoming less dependent on natural resources as a source of revenue but petroleum and natural gas exports still play an important role in the economy especially in Abu Dhabi. The United Arab Emirates has a rapidly growing economy with a high GDP per capita and energy consumption per capita. A massive construction boom, an expanding manufacturing industries and thriving services sector are helping the UAE diversify its economy.

From the above, the importance of UAE as a trade centre is established, and the government policy of attracting new ventures in firms of new industries/ factories and assembly plant is a further supplement to the boom, which is evident at the present stage. In addition, this boom contributes to the increase demand for new space expected from the construction industry; thus, have created the environmental factors affecting it. It is necessary to understand the volume of work that takes place in the UAE and especially in both Abu Dhabi and Dubai Emirates, in order to assess the effects of the environment in the construction industry.

“The systems of building projects are a response to the environmental factors and the interaction of projects with their environments are reciprocal. The environment should be defined in a structural way, and that the criteria should be examined to ensure any observable environmental phenomena may be classified into generic groups of environmental forces. “W.P. Hughes (1989).

The review of the country's characteristics was the base for examining the different types of environmental factors and the scope of their effect on construction

projects in the UAE.

Consequently if savings in the large investment in construction can be made, through the reduction of costs and time delays resulting from claims then this will result in benefits to the UAE.

The following chapter will focus on variations as it was observed as the most significant type of claims and disputes from the literature review. Moreover, it presents a detailed study of Abu Dhabi General Conditions of Contracts (AGCC) in order to assess the risks associated with different types and causes of claims and disputes using Lump Sum contract strategy.

CHAPTER SIX

**VARIATIONS AND RISK ASSESSMENT OF VARIOUS TYPES AND CAUSES OF
CLAIMS AND DISPUTES IN THE UAE**

6.1 INTRODUCTION

From Chapter Five it is evident that the construction industry is one of the largest industry in the UAE and that this industry makes a significant contribution towards the UAE's GDP. This industry is prone to disputes which causes delays in delivering projects on time, thereby incurring extra cost. Thus, it is important to know about variation, risks and causes and effects of variations.

This chapter gives an insight into variations, causes and effects of variations. This also deals with information about the general conditions of contracts to assess the risks associated with variations and disputes i.e. it covers most important factors such as time for completion, payment certificate, inspection of site, penalties for delay etc.

6.2 OVERVIEW

Barret (1995) reported that variations present the most common causes of construction claims and disputes. Moreover, Ibrahim (2007) claims that variations are among the most significant sources of cost growth and disruptions to field productivity on construction projects. He argues that two sources of variations exist on construction projects. These two sources are Owner-generated variations, and Field-generated variations orders. The first source occurs when an amendment to the project scope, design, or detailing is requested by the owner, and a change to the original contract agreement is required. The second source arises when problems and conflicts are detected in the field that requires a redesign or reconfiguration of the design. In both cases, variations can have numerous negative effects to projects cost and schedule. These negative effects are augmented depending on the timing of the variations; with risky effects increasing the further the project progresses. Often called "unforeseen," field generated variations are often highly disruptive to labour productivity, as one or more trades are strained to disrupt planned work sequences, and at times, complete rework. While owner generated variations are often predictable, field-generated variations orders often arise from design errors or a lack or coordination in contract documents, and are usually preventable (Ibrahim, 2007).

In practice, the Contractor interprets as a variation as any items, not priced in

the tender. On the other hand, the Engineer tends to argue that all that is necessary to construct the works is deemed implicitly included in the tender. It is useful to look at the definition of variations.

6.3 DEFINITION OF VARIATIONS

Each standard form of construction contract has its own definition of variation; there is no single definition of what a variation is. However in a common sense, interpretation, a variation refers to any alteration to the basis upon which the contract was let. This means the term embraces not only changes to the work or matters appertaining to the work in accordance with the provisions of contract, but also changes to the contract conditions themselves. (Ibrahim, 2007)

Darter (1991) describes the various cases (litigation) that set out the definition of variations (in U.K.). In case of Lump Sum contracts, where the variations involve performance of additional work the word “extras” is used to denote such work.

According to Ibrahim (2007), a variation can be taken to be any, a combination of any or all of the following:

1. Variation in building projects may mean ‘the alteration or modification of the design, quality or quantity of the works, as shown upon the contract drawings and described by or referred to in the contract bills. Moreover, it includes the addition, omission or substitution of any work. In addition, variation includes the alteration of the kind or standard of any of the materials as goods to be used in the works. The removal from the site of any work materials or goods executed or brought thereon by the contractor for the purposes of the works other than work, material or goods, which are not in accordance with the contract.
2. Variations in building projects together with instructions regarding the expenditure of provisional sums, prime cost sums and instructions concerning the nature of the work that are not specifically termed a variation in the contract documents.
3. Variation of contract in law, i.e. if both parties alter a contract document by

agreement after execution of the original contract this is a variation of the contract terms or conditions.

4. Variation of price clause that enables the contract sum to be adjusted for rises and falls in the cost of labour or materials.

Ibrahim (2007) concludes that variations are directly attributed to matters not being as stated or as required in the contract documents. This happens either because circumstances actually change or because circumstances upon which the contract documents were based were misconstrued.

The former is a matter that can easily appreciate and comprehend; however, it still has two distinct aspects. Firstly, circumstances may change in such a way, over which can have no control, that the documentation can now be seen to be defective. On the other hand, circumstances may require that the client determine a choice of action, with the resulting choice creating a variation.

6.4 AN OVERVIEW OF THE RELATION BETWEEN VARIATIONS AND SITE INSTRUCTIONS

Building and civil engineering contracts generally have within them express provisions enabling the supervising officer to issue instructions. It is accepted that building and civil engineering contracts have an implied term that the supervising officer shall issue instructions to the contractor whenever such instructions are required. This is an obligation upon the supervising officer and not a right. Clearly, the supervising officer must supply all drawings and information necessary for the execution of the works, but it is submitted that such drawings and information cannot change the obligations undertaken by the contractor, unless express provision is made within the contract or the contractor gives his consent. If this submission is correct then no implied term can give the supervising officer a general right to issue instructions (Ibrahim, 2006).

However, a term will be implied which compels the supervising officer to issue instructions whenever they are necessary for the proper performance and execution of the works. Failure of the supervising officer to give timely instructions

may well give rise to a breach of an implied term. A distinction between a right and an obligation is necessary as it is of contractual significance. A term to the effect that the supervising officer will issue necessary instructions for the due performance will be implied in the absence of an express provision.

It is necessary to consider what constitutes an instruction and to distinguish between the types of instructions from a supervising officer because whether an instruction exists is contractually significant, as is the type and form of the instruction. The contractor requires to receive the information in due time, and as long as he does he is not adversely affected by its issue. Thus, the supervising officer is required to fulfil his obligation of providing sufficient details to enable the contractor to comply with his obligations.

Instructions are often confused with variations or variations. An instruction may constitute a variation, and express authority to issue instructions requiring a variation is contained in all the Abu Dhabi contracts under consideration. However, not all instructions will be variations. Many instructions are patently not variations yet contractors generally view a supervising officer's instruction as a variation with the potential that offers for additional remuneration and/or extension of time.

Hibberd (1986) classifies the events into three cases. In the first case, the supervising officer *shall* issue instruction. In the second case, the supervising officer is *deemed* to have given instructions. Finally, the supervising officer *may* issue instruction. These three cases are mentioned below.

The first case where the Supervising Officer *shall issue* instruction in the following events:

- Where the expenditure of provisional sums included either in the main contract or in subcontract is required;
- Notification by the contractor of a default by the original nominated subcontractor;
- Nomination of nominated supplier;
- Where the subcontractor validly determines his own employment;

- Notification by the contractor of a discrepancy in or divergence between or within documents, including instructions (except where the instruction constitute a variation) any drawings or documents issued;
- Where there is a divergence between the Statutory Requirement and other related documents and/or instruction requiring a variation;
- Notification by the contractor of the existence of antiquities;
- Failure of proposed nomination to proceed to contract; and
- Determination of subcontractors' employment because of their own default

Moreover, Hibberd (1986) points out the event where the Supervising Officer is *deemed* to have given instructions, these events are as follows:

- Where an error or omission in description or quantity exists;
- Compliance with emergency conditions; and
- Where the removal and disposal of debris or damaged work and other specified items occurring as a result of war damage has taken place

Finally, the third case where the Supervising Officer *may* issue instructions; these events are as follows:

- Where documents necessary for the purposes of compiling the final account are to be sent to the quantity surveyor;
- Error in setting out where cost is not to be borne by contractor;
- Removal and disposal of debris occasioned by an insurable peril;
- Removal and disposal of debris or damage, protective work, as a consequence of the works sustaining war damage;
- Postponement of any work;
- Exclusion of persons employed on the site;
- Making good of defects, shrinkage or other faults which appear within the defects liability period;
- Removal of work, materials or goods not in accordance with the contract; and
- Opening up for inspection or for arranging tests

6.5 AN OVERVIEW OF THE CAUSES AND EFFECTS OF VARIATIONS

Causes and Effects of Variations were studied and observed by many researchers such as McDermott et al (1984), Hibberd (1986), Okpala & Aniekwu (1988), Darter (1991), Clough and Sears (1994), Barret (1995), Chan and Young, 1995, Thomas and Napolitan (1995), Fisk (1997), Yogeswaran (1996), Ibrahim (2007), etc.

Yogeswaran (1996) cited in his research into “Sources and Causes of Claims in Honk Kong” three detailed studies by various researchers. The first study was carried by Hibberd (1986) ‘Building Contract: Variations’ in the U.K. and presented the following profiles as derived from the construction industry:

Table 6-1 Actual Causes of variations (Hibberd, 1980)*

	Causes of Variation	Percentage
1	Designer	19
2.	Employer – forced	1
3.	Employer - choice	10
4.	Contractor	3
5.	Management:	
	defects in design	9
	inadequate consideration of design	25
	incorrect assessment of brief	6
	defect in documentation	16
	unnecessary	5
6.	Unforeseen	6

• *This Table adopted from Yogeswaran (1996)*

Table 6-2 Sources of claims from Contractors (Hibberd, 1980),*

Source/ Reason	Response From		
	All	Architects (%)	Quantity Surveyors
Delay Caused by design team	10	--	18
Variation	38	41	37
Nomination	7	11	4
Errors in documentation	10	15	--
Unforeseen events	25	29	22
Commercial process	8	4	15
Other reasons	2	--	4

** This Table adopted from Yogeswaran (1996)*

Table 6-3 Greatest problem in Contract management (Hibberd, 1980)*

Source/Reason	Response from		
	All (%)	Architects (%)	Quantity Surveyors (%)
Variation	27	25	28
Claim	19	22	15
Delay	22	25	19
Nomination	13	13	14
Personalities	16	15	18
Other reasons	3	-	6

** This Table adopted from Yogeswaran (1996)*

Yogeswaran (1996), comments that the most common source of claims usually arises from the contract documents. It is surprising to note from the above tables that the adversarial relationship that had been a source of difficulty as far as back in 1980 persists to this day.

Moreover, Yogeswaran (1996) cited the results of a study that was carried by McDermott et al (1984) where they studied 16 building projects in order to identify the sources, causes and effects of variations on building projects. In their study, the avoidability and significance of variations were analysed from 1600 variations arose

in the 16 projects. Potential sources of variations were classified into three categories with the first two sub-divided into associated sources - the percentage of variations initiated by the respective sources are shown in Table 6-4 below. Moreover, the causes of variations were classified as shown in the next Table 6-5.

Table 6-4 Potential Sources of Variations (McDermott, 1984)*

Sources	Percentage (Variations in 16 Projects)
A. Internal	(71)
Client Representative	3
Architect	38
Structural Engineer	30 *
Mechanical Engineer	* included
Electrical Engineer	* included
Quantity Surveyor	* included
Nominated sub-contractor	-
Domestic sub-contractor	-
B. External	(25)
Client Body	16
Building Control	-
Fire Control	+ included
Local/Planning Authority	4+
Contractor	5
Domestic sub-contractor	-
Domestic supplier	-
Statutory Authority (Water/Gas/ etc)	+ included
C. Unallocatable	(4)

* *This Table adopted from Yogeswaran (1996)*

Table 6-5 Classification of Causes of Variations (McDermott, 1984)*

Causes	Percentage of Variations
A. Environmental Change	(15) *
Budget	* included
Technology	* included
Time	* included
Site	* included
Legal	* included
Social	* included
B. Communication of information in the design process (inadequate/error)	(85)
Stage I: Briefing	4
Stage 2: Sketch Plan	9
Stage 3: Working Drawings	57
Stage 4: Site Operations / feedback	15

Avoidability was defined as one where cause was within the control of the design team and the significance was based on the cut-off value of variation at £400.

Table 6-6 Avoidable Causes of Variations *

Causes	Significant Effect (%)	Insignificant Effect (%)
Avoidable	18	59
Unavoidable	8	15

* This Table adopted from Yogeswaran (1996)

The principal observations by Yogeswaran (1996) from McDermott's research (1984) were:

- Both significant and insignificant variations originated from the design team.
- Variations attributable to external bodies, such as building and fire control, accounted for a low proportion of the total.
- Variations due to external economic, technical and client pressures accounted for about one-third of the more significant variations.
- The vast majority of variations were caused by faults in the communication of design decisions, from early in the briefing stages, culminating in the critical

working drawing stage.

- The extent of variations in the projects studied suggested that the extent of design completion at the stage (i.e. prior to tender) was not as great as that required by the contractual documents.

The third study that was cited by Yogeswaran (1996) is a study that was carried by Chan and Yeong (1995). This study considered that reducing variations is one of the pre-requisites for keeping the cost of the projects within budget. Practitioners in the construction industry in Australia and Malaysia were interviewed to identify and rank the prevailing strategies in order of usefulness to reduce the variations. The results for this study were as follows:

Table 6-7 Comparison of the ranking strategies for the reduction of variations between Australia and Malaysia (Chan and Yeong, 1995)*

	Strategy	Rank from Australian responses	Rank from Malaysian responses
1.	Clear and thorough project brief	1	1
2.	Quality contract documentation	2	6
3.	Use of independent cost manager	3	9
4.	Right attitude to control	4	7
5.	Good communication	5	2
6.	Detailed design	6	5
7.	Select the right contractor	7	3
8.	Detailed site investigation	8	4
9.	Alternative procurement	9	9
10.	Avoiding the use of nominated subcontractors	10	10

** This Table adopted from Yogeswaran (1996)*

Another study by Ibrahim (2006), this study is similar to the first study by Hibberd (1980) in terms of the variable used for the study. This study investigated the causes and effects of variations on building projects based on data from 18 building projects as well as data collected from twenty-four various construction participants including clients, consultants, quantity surveyors and contractors. A summary of the results are shown below:

Table 6-8 Actual Causes of variations *

Cause of Variation	Response Percentage	
	Projects	Questionnaires
Designer	14	21
Employer – forced	6	4
Employer – choice	13	8
Contractor	8	4
Defects in design	13	8
Inadequate consideration of design	15	25
Incorrect assessment of brief	5	4
Defect in documentation	14	17
Unnecessary	5	4
Unforeseen	7	4
	100	100

* This Table adopted from Ibrahim (2007)

Table 6-9 Reasons of claims by Contractors*

Reason for Claims	Response By (%)		
	Quantity Surveyors	Others	All
Delay Caused by design team	19	12.5	17
Variation	25	37.5	29
Nomination	6	0	4
Errors in documentation	0	12.5	4
Unforeseen events	25	25	25
Commercial process	19	12.5	17
Other reasons	6	0	4
	100	100	100

Table 6-10 Greatest problem in Contract management *

Reasons	Response By (%)		
	Quantity Surveyors	Others	All
Variation	31.25	25	29
Claim	12.5	25	17
Delay	18.75	25	2
Nomination	12.5	12.5	2
Personalities	18.75	12.5	17
Other reasons	6.25	0	4
	100	100	100

** This Table adopted from Ibrahim (2007)*

Table 6-11 below summarises the findings of effects of variations and their degree of important.

Table 6-11 Effects of Variations *

Effects Description	Response	
	Importance Index	Rank
Increase in project cost	0.967	1
Delay in payment	0.908	2
Procurement delay	0.850	3
Logistics delays	0.817	4
Completion schedule delay	0.792	5
Rework and demolition	0.758	6
Additional payments for contractor	0.758	7
Disputes among professionals	0.683	8
Increase in overhead expenses	0.658	9
Damage to firm's reputation	0.650	10
Poor professional relations	0.608	11
Hiring new professionals	0.566	12
Productivity degradation	0.433	13
Quality degradation	0.417	14
Progress is affected but without any delay	0.408	15
Poor safety conditions	0.367	16

** This Table adopted from Ibrahim (2007)*

The collective observations from the previous studies for the causes, effects and strategies to reduce variations can be summarised as follows:

The design team considers the client's objectives and a continuous process of design takes place until no further modifications can be incorporated, even when considered, because constraints of time and cost finally draw the line. The point at which this happens is extremely variable, being partly dependent upon the make up and nature of the design team and partly upon their relationship with the client body.

The fundamental issue is not, however whether the design is conclude before or after commencement of the works, but whether the contractual arrangement chosen is compatible with the extent and timing of such design. In other words, some contracts accommodate degrees of change more readily than others do because they accept that change is part of the design process, which continues after the contract is made. It is therefore essential that the professional advisers select the appropriate level of design and adopt the contractual arrangement to suit.

The appropriate level of pre contract design is dependent upon the priorities that the client establishes (e.g. time, cost, and aesthetics), and the design team should always discuss these priorities fully with the client. Even where the design team concludes their design, it can be argued that the design process itself is still not complete because the contractor (not a member of the design team in traditional procedures) is responsible for the last level of design in many, if not all, instances. The level of design by the contractor may be a conscious decision.

It may also be involuntary and determined by the expertise of the operatives employed, with the product not necessarily achieving an absolute standard but failing within an acceptable tolerance.

This element of design is generally limited but is still significant, due to the contractor often suggests that if the supervising officer requires the work to be carried out in a way different from his assumption then this constitutes an instruction which causes a variation to the basis upon which the contract is let, therefore financial adjustment in favour of the contractor is required on the basis that the contractor's

assumption will always be the least expensive

It is evident that many changes to the works occur even though the clients' brief remains the same; however, the client must be able to amend his brief as necessary. The amendment to the design brief will frequently result in a change to the work, and many practitioners believe this latter point is why a variation clause exists.

Matters of design in the widest sense are the major cause of variations but there are in addition matters, which appertain to the works but do not affect its design. Examples of these matters are the area of site and its access, the sequence of operations, restrictions on working time and the like. These are issues, which may require a variation because circumstances are not as they were when the contract documents were prepared. Other causes of these variations could be when circumstances were not fully appreciated at that time and were thus inaccurately recorded.

It is possible for the client to avoid the consequences of some of these changes but they cannot where it warrants a particular situation, (e.g. compliance with design standards), or the law requires such a situation. In these circumstances, the client will be considered in default and must have a means of overcoming the problem of his default and express provisions, permitting variations of this nature exist within the standard forms of contract.

Variations arise for a variety of reasons. Some of these reasons are foreseeable but others are not. Some result from a genuine change of circumstances and others from the design team's own inadequacies. Figure 6-1 below shows the origin of variations. It is regrettable that what evidence there is seems to suggest that the design teams are the main cause of the involuntary variation.

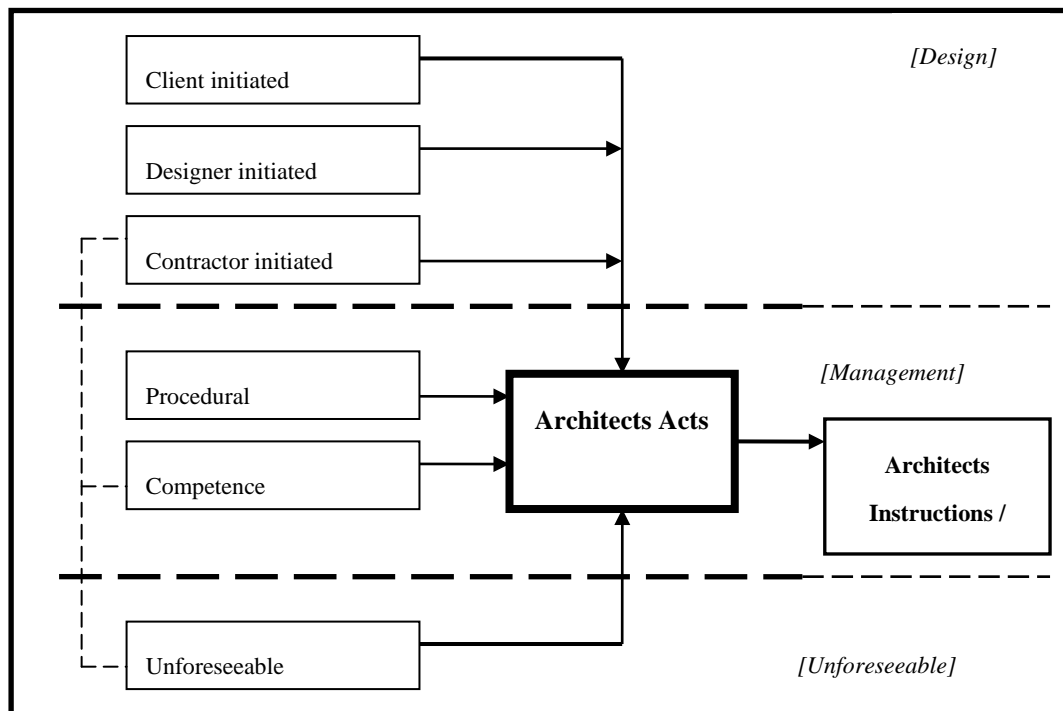


Figure 6-1 Origin of Variation*

*(Source: This Figure adopted from Peter R. Hibberd, 1986)

The collective summary from the previous studies for the causes, effects and strategies to reduce variations are as follows:

➤ **Causes of Variations:**

- Designer
- Employer – forced
- Employer - choice
- Contractor
- Defects in design
- Inadequate consideration of design
- Incorrect assessment of brief
- Defect in documentation
- Unnecessary
- Unforeseen

➤ ***Effects of Variations:***

- Progress is affected but without any delay;
- Increase in project cost;
- Hiring new professionals;
- Increase in overhead expenses;
- Delay in payment;
- Quality degradation;
- Productivity degradation
- Procurement delay;
- Rework and demolition;
- Logistics delays;
- Damage to firm's reputation;
- Poor safety conditions;
- Poor professional relations;
- Additional payments for contractor;
- Disputes among professionals;
- Completion schedule delay

➤ ***Strategies for Reducing Variations:***

- Clear and thorough project brief
- Quality contract documentation
- Use of independent cost manager
- Right attitude to control
- Good communication
- Detailed design
- Select the right contractor
- Detailed site investigation
- Alternative procurement
- Avoiding the use of nominated subcontractors

6.6 AN OVERVIEW OF EVALUATION OF VARIATIONS

According to Yogeswaran (1996), there are certain rules for valuing the variations issued under General Condition of Contracts. These rules are as follows:

1. Any item of work omitted shall be valued at the rate set out in the contract for such work;
2. Any work carried out which is the same as or similar in character to and executed under the same or similar conditions and circumstances to any item of work priced in the Contract shall be valued at the rate set out in the Contract for such item of work;
3. Any work carried out which is not the same as or similar in character to or is not executed under the same or similar conditions or circumstances to any item of work priced in the Contract shall be valued at a rate based on the rates in the Contract so far as may be reasonable, failing which, at a rate agreed between the Engineer and the Contractor.

Yogeswaran continues his argument, and says that contractors usually argue that all varied works are dissimilar in nature while the Engineers view them as similar in nature. Depending on the attitude and professionalism of the Engineer and Contractor, agreements on the valuation are obtained, failing which the Contractor usually notifies a claim for additional payment. Moreover, it is common practice to value the claims arising under different clauses other than the variations clause and advise a “variation order” for the convenience of accounting purposes. This appears to be misleading and claims arising under different clauses are accounted as if arising under variation (Yogeswaran, 1996).

In the same way, Ibrahim (2007) argues that most standard forms of contract include a clause under which the client or his representative is able to issue an instruction to the contractor to vary the works, which are described in the contract. A change in shape of the scheme, the introduction of different materials, revised timing and sequence are all usually provided for by the variations clause. It will also usually include a mechanism for evaluating the financial effect of the variation and there is normally provision for adjusting the completion date. In the absence of such a clause

the employer could be in a difficulty should a variation to the works be required. The contractor could either refuse to carry out the work or undertake the work or insist upon payment on a quantum merit or fair valuation basis. Calculation of the price for the extra work applying this method could involve payment well in excess of the contract rates. Even where a contract includes the usual variations clause there may be circumstances, which could lead to additions or changes introduced by the client, which falls outside the variations clause. Contractors who find themselves with unattractive contract prices would find it to their advantage to be able to argue that a change introduced by the client fell outside the variations clause thus leaving the way open to argue that payment for the change should be on a quantum merit or fair valuation basis (Ibrahim, 2007).

6.7 IMPORTANT ARTICLES IN ABU DHABI GENERAL CONDITIONS OF CONTRACTS TO ASSESS THE RISKS ASSOCIATED WITH VARIATIONS AND OTHER CLAIMS AND DISPUTES

“Variations” or “instructions to change” are described in various clauses of Abu Dhabi General Conditions of Contract. Chapter IV of Abu Dhabi General Condition of Contract (ADGCC), Amendment of Contract, contains four articles. These four articles, article 7 to article 10, which collectively provide for changes and variations to the contract as may be required by the Department. . There are two types of changes to the Contract, which are addressed by this chapter:

1. Amendment of Quantities;
2. Amendment of the Time for Completion.

Another two main articles that should be looked at are article 3 and article 18 of Abu Dhabi General Condition of Contract (ADGCC). These two articles are Extension of time for completion and Engineer’s Instruction, respectively.

A detailed study of Abu Dhabi General Condition of Contract (ADGCC) is presented in the next following sections to highlight some important articles and clauses of the (ADGCC) in order to assess the risks associated with variations, engineer’s instruction and other important risks areas that should be assessed for

construction project in Abu Dhabi. However, the author believes that it was appropriate to introduce the organization of Public Project Management in Abu Dhabi in order to understand the hierarchy and the procedures that are used in constructing a building project in Abu Dhabi. This has been dealt with in Section 5.7 “**ORGANISATION OF PUBLIC PROJECT MANAGEMENT IN ABU DHABI**”.

6.7.1 **ARTICLE ONE: SCOPE OF WORKS**

Article 1 identifies the four elements which form the Contract. All four elements are taken together as a unit to form the contract. According to Article 1, the four elements are:

- *Tender and Contract Documents*
- *General and Special Conditions of Contract*
- *General and Special Specifications*
- *Drawings, designs, and exchanged correspondence*

Note that the term “exchanged correspondence”, is intended to include only the correspondence between the Department and the prospective contractor prior to the formal signing or execution of the Agreement. This correspondence may clarify the intent of the parties during the negotiation period prior to contract signing. No correspondence following the contract signing will be considered part of the Contract. The Special Conditions may be used to clarify this point, although contractual law on this issue is firmly established throughout the industry.

The provisions of this Article are very important, as they will be referred to in any dispute over whether particular additional or extra work is properly characterized as a variation to the Works or as work outside the scope of the Works. This determination can have serious consequences as payment for additional work characterized, as a variation would be governed by the terms and conditions of the Contract. An example of that such as the agreed unit rates, whereas work deemed outside the scope of the Contract would not.

Any clarification of the scope of the Works made in the Special Conditions should be carefully worded so that it is neither overly broad nor too narrow.

Since Article 1 of the General Conditions defines the four parts of the Tender Documents that form the Contract, the corresponding Special Conditions article could be used to clarify the priority of those parts. This can be accomplished by establishing an order of precedence or by stating that an order of precedence should be established in the Agreement, as is common industry practice.

6.7.2 *ARTICLE TWO: TIME FOR COMPLETION*

This article identifies the method by which the date upon which all of the Works shall be completed is to be calculated. According to this article, Part 1 of the Contract (the Tender and Contract Documents) will identify the period for the execution of the Works.

The completion date for the Contract will be the duration or period (as specified in Part 1), in calendar days, from the date of site handover to the Contractor. The site handover date shall be considered as the contract commencement date. If the Contractor or his representative fails to appear on site on the contract commencement date, the Department should provide notice to the Contractor.

6.7.3 *ARTICLE THREE: EXTENSION OF TIME FOR COMPLETION*

Article 3 provides for the extension of time for completion of the Works, at the discretion of the Department, identified factors. The factors under which the Department may grant an extension of time for completion are:

- a. Force Majeure;
- b. Abnormal and severe weather;
- c. Loss or damage by fire, which is not caused by the Contractor;
- d. Civil commotion or labour disputes affecting construction;
- e. Changes or variations ordered by the Engineer in accordance with Article 18;
- f. Failure of the Department to provide information which the Contractor has requested in writing;
- g. Delays in the delivery of goods and materials required from the Department or from subcontractors or suppliers, if the Contractor has taken all precautions to

the satisfaction of the Engineer to minimize or avoid the occurrence of the delays.

Note that the Contractor's entitlement to an extension of time is not automatic. Rather, Article 3 sets out the causes of delay for which an extension of time maybe granted. The Contractor must "make every possible effort to avoid such delay", and, although this requirement must be reasonably and fairly applied, his failure to take action to avoid or mitigate delay may deprive him of entitlement to a time extension.

Also, note that the Contractor may be entitled under paragraph 1, sub-paragraph g, to an extension of time for delays on the part of his Sub-Contractors or Suppliers. However, this provision conditions entitlement on the Contractor is having "taken all possible precautions for avoidance of such occurrences or minimization thereof". The reasonable and fair application of this language will depend upon the circumstances at hand.

Paragraph 2 of Article 3 provides:

"In all cases the Contractor shall promptly inform the Engineer of the cause of delay, nevertheless the Contractor shall make every possible effort to avoid such delay."

Paragraph 2 therefore imposes a notice requirement on the Contractor, failing which he may lose entitlement to an extension of time. Note that this language does not establish a specific period for notice to be given, requiring only that notification is made "promptly". What constitutes prompt notification will depend upon the circumstances. However, under General Projects Committee Circular No. 10/87, 30 July 1987, the Contractor is required to notify the Department of any intention to file a claim within seven (7) days of the incident underlying the claim, and within thirty days must submit details of the claim including any proposed adjustments to the Contract Value or Time for Completion.

In general, the policy for notice is to give the Department and/or the Engineer an opportunity to take action to mitigate the delay. If the Contractor fails to give timely notice of the delay so that the Department's ability to take such action is compromised, then he has violated the spirit of the notice requirement and entitlement may be denied.

Note also that Paragraph 2 does not specify the form which notification must take. Notice of the delay in site meetings or the Department's actual knowledge of the delay often will be deemed "constructive notice" and will satisfy the policy reasons for notification. Evidence of constructive notice will often exist in recorded meeting minutes, field notes, daily jobsite reports, etc. Oral communication between the parties has also been used to establish constructive notice.

The Special Conditions may be used to provide a more exact explanation of the nature of the required notice of delay from the Contractor and of the time requirement for the supply of any further particulars of the delay and its impact upon the Works schedule or costs.

The Special Conditions might also be used to indicate which grounds for an extension of time may entitle the Contractor to additional compensation and which grounds would only give entitlement to additional time.

Note that the General Conditions provide that an extension of time may be granted for delays resulting from force majeure or for "abnormal and severe weather conditions" but do not define these terms. The Special Conditions may supplement the General Conditions by including a definition of these terms.

6.7.4 ***ARTICLE FOUR: SUSPENSION OF WORKS***

Article 4 provides for the event that the Contractor fails to satisfy any provision of the Contract or Specifications or otherwise fails to advance progress on the Works, the Engineer may suspend all or part of the Works. Any such suspension will remain in effect until the Contractor has provided a remedy for such identified deficiencies. It is important to note that the Contractor will have no right to claim for a time extension for any delays caused by suspensions in accordance with this Article.

Suspensions of work are taken very seriously and the discretion given the Department in Article 4 must be exercised judiciously. The language of Article 4 authorizes the suspension of the work whenever "the Contractor contravenes any of the provisions of the Contract or specifications or neglects the construction thereof". In practice, the Contractor's breach would need to be material to warrant a suspension of the work.

A decision to suspend the work should be taken bearing in mind the whole of the circumstances and only where there is a clear case of default for which the Contractor is responsible.

6.7.5 *ARTICLE SIX: PAYMENT CERTIFICATE*

Article 6 sets out the Contract's mechanism for payment to the Contractor for work performed. The Contractor is required to submit monthly statements to the Engineer, who then verifies the Contractor's statement and issues a payment certificate. Payment is made based on 90% of the value of executed works and 75% of the value of materials on site, provided they comply with the specifications. Payment is to be made within 45 days of the submission of the payment certificate by the Engineer. Note that UAE national contractors are exempted from any retention of funds if they provide a bank guarantee in lieu thereof.

Adherence to the requirements of this article will reduce the incidents of claims by the Contractor for late payment. This issue is a common claim issue and exposes the Department to liability for interest on delayed payments.

Particular difficulties often arise with delays in processing Advance Payments and/or the first payment certificate due to the objections raised by the Finance Department concerning non-compliance of Contract Documents with Finance Department Circular No. 2/88 dated 15 March 1988. This general circular, to all heads of Government Departments, relates to provisions in Tender Documents for services and supplies for the Engineer and/or the Department. The circular refers to Executive Council Decision No. 38 at Session 38/81, which decided not to allow any amounts in the construction contracts for provision of certain facilities for Engineers and that the cost of these facilities should be included in the Engineer's fees for site supervision staff. The circular states further that no costs should be included in the construction contracts for provision of services, equipment and facilities to the Department. These costs are to be borne by the executing Department's own funds. It is important to ensure that the Tender/Contract Documents comply with the Finance Department circular in order to avoid delays in processing payment certificates whilst any discrepancy is resolved.

Paragraph 5 of Article 6 briefly sets out the procedure for the Final Payment to the Contractor. No specific time frame is identified for processing the Final Payment; however, it should normally be completed within a reasonable period.

6.7.6 CONTRACT AMENDMENTS AND MODIFICATIONS PROVISIONS

Variations or instructions to change are described in various clauses of Abu Dhabi General Conditions of Contract. Chapter IV of Abu Dhabi General Condition of Contract (ADGCC), Amendment of Contract, contains four articles. These four articles, article 7 to article 10, which collectively provide for changes and variations to the contract as may be required by the Department. There are two types of changes to the Contract; these types are:

1. Amendment of Quantities
2. Amendment of the Time for Completion

Another two main articles that should be looked at are article 3 and article 18 of Abu Dhabi General Condition of Contract (ADGCC). These two articles are Extension of time for completion and Engineer's Instruction, respectively. Dealing with article 3, (Extension of time for completion) is presented earlier in Section 6.7.3. In addition, article 18 (Engineer's Instruction) will be presented in the next Section 6.7.7. This section deals with articles 7 – 10.

Articles 7 and 8 relate to amendments of quantities. Articles 9 and 10 relate to amendments of the time for completion. Changes to, or variations in, the contract price or time for completion are affected by whether the Contract is made on a lump sum basis or on the basis of quantities and unit rates.

➤ ***Article 7, Amendment of Quantities in the Case of Contracts Made on a Lump Sum Basis:***

Article 7 provides that the Lump Sum price in the Contractor's tender shall be inclusive of all materials, goods, labour costs, administrative and overhead costs and profit. However, under Article 7 the Department reserves the right to amend the contract by increases or decreases up to the limit of 20% of the contract value without changing the contract rates or time of performance. Such increases or decreases expressly include changes with respect to the type, quantities, weight, and dimensions

of the work specified in the Contract Documents.

Based on Article 7, if the cumulative changes to the work specified in the Contract Documents are either increased or decreased by 20% –10% for Dredging and Reclamation Works in Waterways - or less, the Contractor will not be entitled to a change in the contract rates as shown in the Contractor's tender. The Contractor will be required to execute all amendments incorporating increases or decreases as if such amendments were included in the original contract. At the same time, the Department does not have a right to reduce the contract rates even if the quantities are increased or reduced by 20% or less in value than specified in the Contract Documents.

Note that where amendments to the Contract result in an increase in contract price in excess of 20 %, the parties are to agree on new rates for such additional work. If they cannot agree, then the new rates are to be determined under the provisions of Article 46, Settlement of Disputes. In such event, the Contractor must continue making progress on the Works, without stopping, while the matter is being resolved.

➤ ***Article 8, Amendment of Quantities in the Case of Contracts Based on Quantities and Unit Rates***

Article 8 governs changes to the contract price for contracts, which are based on quantities and unit rates. According to Article 8, the total contract price will be adjusted for variations in estimated quantities based on the unit rates, which the Contractor provided in the Bill of Quantities.

However, the unit rates, which the Contractor provided in his Bill of Quantities, will be binding upon the Contractor during the construction of the Works and will not be subject to reconsideration for any reason.

Note that this Article does not address changes, which involve added categories of work for which the Bill of Quantities does not provide for unit rates. In such situations, the Contractor and the Department would have to agree on an appropriate unit rate for the added category of work. In the event that the Contractor and the Department fail to agree on a unit rate for such work, the Contractor may submit a claim against the Department.

It is important to recognise that Article 8 (as well as Article 7) is likely to generate claims for additional costs based on quantity amendments. Such claims will

focus on the issue of whether individual or cumulative changes have exceeded the threshold required for an increase in the contract price. The resolution of claims will depend on an agreement between the Department and the Contractor as to how the cost for each change will be determined individually, and considered cumulatively, in evaluating the 20% threshold for changes in the contract price.

➤ ***Article 9, Amendment of the Time for Completion in the Case of Contracts Based on Quantities and Unit Rates***

For contracts based on quantities and unit rates, changes in the Time for Completion will be governed by Article 9. Article nine sets out several conditions that must be satisfied in order for the Contract time for completion to be adjusted. The required conditions are:

1. changes in quantities are made as a result of a Variations issued by the Department; and
2. the amendment of quantities must exceed 20% of the contract value; and
3. the amendments must have resulted from an “incorrectness” in the contract; and
4. The request must be made within fourteen days of the notice of amendment.

It is important to note that there are many situations not addressed by Article 9 in which the Contractor may believe that he is entitled to an extension of time. For example, the Department may issue changes to the work which result in amendments to the quantities by more than 20%, but which are not the result of any “incorrectness” in the Contract. Such changes may result from changed requirements of the Department following contract award. In those circumstances, the Contractor may claim for an extension of time. Note that any such claim would be governed not by Article 9 but by Article 3, paragraph 1 (e), which allows extensions of time for delays resulting from the execution of Engineer's Instructions, including modifications in the quantity of the Works.

➤ ***Article 10, Amendment of the Time for Completion in the Case of Contracts Based on Lump Sum Amounts***

For contracts based on lump sum amounts, Article 10 of the General Conditions governs changes in the Time for Completion. Article 10 refers the reader

to paragraph 4 of Article 9. Paragraph 4 of Article 9 provides that the Contractor may request an extension of time in accordance with paragraph 1, if changes in the quantities are made because of a Variations issued by the Department.

Note that since paragraph 4 of Article 9 incorporates by reference paragraph 1 of Article 9, the conditions for an extension of time contained in that paragraph 1 also apply to time extensions for lump sum contracts. (See conditions for article 9 above).

As previously mentioned, another two main articles that should be looked at in assessing variation and amendments are article 3 and article 18 of Abu Dhabi General Condition of Contract (ADGCC). The following, Section 6.7.7, presents an overview of article 18 (Engineer's Instruction), while article 3 (Extension of Time for Completion) is presented earlier in Section 6.7.3 above.

6.7.7 *ARTICLE EIGHTEEN : ENGINEER'S INSTRUCTIONS*

Article 18 describes the authority of the Engineer to issue instructions affecting the Works. In accordance with Article 18, the Engineer is authorised, among other things, to:

- a. Make modifications with respect to the type or quantities of the works;
- b. Resolve discrepancies between the drawings and specifications;
- c. Order the removal of materials from the site and the supply of substitute materials for approval;
- d. Order the reconstruction of any works which do not conform to the project requirements or are not otherwise approved by the Engineer;
- e. Delay the construction of any item of work required by the Contract;
- f. Order the deportation of any worker which the Engineer determines is not determines to be on the site;
- g. Order the repair of defective works;
- h. Order the uncovering of any work so as to allow for inspection;
- i. Issue requests for the testing of the works or materials for compliance with contract specifications.

Paragraph 3 of Article 18 provides the mechanism by which the Engineer's

verbal instructions may be ratified. First, the Engineer should confirm in writing any oral instructions or clarifications that modify the Works. Otherwise, the Contractor should request the Engineer's confirmation within 7 days of the instruction. If the Engineer does not then revoke the instruction in writing within 7 days, the oral instructions shall be deemed confirmed, as if issued in writing.

Note that Paragraph 3 does not specify the form of the Contractor's request for confirmation and that such request made in a meeting or otherwise may be sufficient to support the Contractor in claiming that the instruction was confirmed.

Also, note that in the absence of written instructions from the Engineer, the oral instruction may become a claim issue as to the scope, intent, cost and potential delay with respect to the oral instruction. In such a situation, the Department will be at a distinct disadvantage in responding to such a claim.

Article 18 is related to Article 3 in that delays to the Works occurring further to Engineer's Instructions made according to. Article 18 may entitle the Contractor to an extension of time under Article 3.

Note that depending upon the Contract value the Works may involve a Senior Resident Engineer and Assistant Engineer(s) in addition to the Engineer. In such cases, the Special Conditions should indicate the relative authority and responsibilities delegated to each, especially in terms of issuing instructions to the Contractor and the effect (or limitations) of such instructions upon the contractual rights and obligations of the parties.

6.7.8 *ARTICLE TWENTY ONE: MATERIALS, GOODS AND WORKMANSHIP*

Article 21 describes the Contractor's responsibility for the execution of the Works according to the specifications.

Article 21, Paragraph 3, sets out the responsibilities of the parties with respect to the testing of materials to ensure compliance with the specifications. In the first instance, the Contractor must bear the costs of any tests required by the Engineer.

The Contractor may, with the Department's approval, carry out a second test, again at the Contractor's expense. The Department then may carry out a third test and

the results of that third test shall prevail. If the results of the third test are consistent with the first test, then the Contractor must bear the costs of the third test, otherwise, the Department will bear the costs.

Note that instructions from the Engineer to conduct tests comprise one of the categories of Engineer's Instructions provided for by Article 18, and as such, may entitle the Contractor to an extension of time under Article 3.

Article 21, paragraph four, sets-out the provisions for "the use of alternative materials in lieu of those specified in the Contract". Such alternative materials must conform to the General and Special Specifications and their use requires the Engineer's approval.

Paragraph four states that the use of alternative materials shall not entitle the Contractor to additional costs but may entitle the Department to decrease the Contract value.

The Special Conditions can provide important additional information with respect to this article. Delays related to the content, production, review, and return of submittals, samples, and shop drawings are a common cause of Contractor's claims.

6.7.9 *ARTICLE TWENTY FOUR: INSPECTION OF SITE*

Article 24, Inspection of Site, requires the Contractor to declare in writing that he has:

1. Inspected the site;
2. Determined that the soil is suitable for foundations in accordance with the drawings; and
3. Checked the drawings for the foundation requirements

This article places the risk of unforeseen conditions solely on the Contractor, notwithstanding the fact that the Department may be in a better position to determine the nature and adequacy of the site conditions during the design phase of the project. The consequence of placing this risk on the Contractor is that he has the option either of including a contingency in his tender for this event or of assuming the risk. If the risk is not encountered, any contingency will be a benefit to the Contractor and an

unnecessary cost to the Department. Despite the language of this article, it is not uncommon for a Contractor to assert a claim for unforeseen or “differing” site conditions.

The Special Conditions may be used to reduce the incidents of such claims by expounding upon the intention of General Conditions Article 24. This can be done by expressly stating that any geotechnical data included in the Tender Documents was provided for information purposes only and does not operate to relieve the Contractor of his duty to make his own determination of site conditions.

6.7.10 *ARTICLE THIRTY SIX: PRELIMINARY HANDING OVER OF WORKS AND CLEARANCE OF SITE*

Article 36 defines the terms and conditions for the preliminary handing-over of the Works. Essentially, preliminary acceptance takes place upon the substantial completion of the Works, as determined by the Department’s inspection. Note that some Special Conditions may include beneficial use or occupancy as a requirement for the preliminary handing over.

Under Article 36, the date of the completion of the Works and the commencement of the maintenance period shall be the date of the Contractor’s notice to the Department that the Works are ready for preliminary hand-over, so long as the inspection of the Works confirms that they have been satisfactorily completed, minor, nonessential work items excepted. Otherwise, the preliminary handing over is to be postponed until the Works have been completed properly. In such case, the maintenance period will commence from the date of the last inspection.

As the preliminary handing-over triggers the maintenance period, it is important that the Department carefully document the inspection and acceptance or rejection of the Works. Such documentation may be necessary to address disputes that may arise regarding the commencement of the maintenance period.

Article 36 also provides for the preliminary handing-over to proceed where the incomplete works are of such a minor nature as to “*not obstruct utilization of the Works*”. In this event, the value of the incomplete work is to be deducted from the Contractor’s dues provided such incomplete work is completed within two months.

Otherwise, the Department shall proceed with the completion of the Works and shall deduct the costs thereof from the Contractor's dues.

Note that Article 36 further provides that the Department shall retain the Performance Bond until the completion of the maintenance period and the final acceptance of the Works.

Although Article 14 of the General Conditions, Maintenance Guarantee, provides for the maintenance period with respect to any part of the Works handed over separately to commence at the time of such hand-over, Article 36 provides only for the preliminary handing over of the whole of the Works.

Where appropriate, the Special Conditions might provide a mechanism for the preliminary handing-over of any part of the Works and the effect of such partial handing-over on the retention fund or delay penalties, if any.

6.7.11 ARTICLE FORTY ONE: PENALTIES FOR DELAY

Article 41 provides a remedy for the Department to use in situations where the Contractor has failed to complete the Works within the time prescribed in the Contract or as such, time may have been modified by any extension orders issued by the Department. The amount of the penalties for delay are determined on a project basis and provided for accordingly. However, the total amount of the penalty may not exceed 10% of the total Contract Value. The Abu Dhabi Courts may assess the penalties against the Contractor without notice, or require explanation or action. Moreover, the Department does not need to demonstrate or prove that it has been damaged or harmed because of the Contractor's failure to complete the Works in the time required.

In addition to the above Penalties for Delay, the Contractor may be further assessed the costs for the site supervision incurred by the Department. These costs will be assessed if the delays were solely attributable to the Contractor.

Law No. 2 of 1994 amending certain provisions of Law No. 3 of 1977 (Tenders, Auctions and Stores Act) provides that in all cases, the total deduction in respect of Contractor caused delay in completion shall not exceed 10 % of the total Contract Value. This maximum percentage includes the above delay penalties as well

as and the above site supervision fees, if there are any, which should not exceed two percent (2 %) of the total Contract Value. The Special Conditions of Contract and Contract Agreement should clearly identify these maximum limits.

6.7.12 ARTICLE FORTY SIX: SETTLEMENT OF DISPUTES

General Conditions Article 46, “Settlement of-Disputes”, provides reference to the administrative procedures for resolving disputes between the Contractor and the Department with respect to the Contract. Paragraph 1 requires the Contractor and the Department to, amicably, resolve any differences that may develop under the Contract. Such attempts at amicable resolution shall be in accordance with the administrative procedures of the respective Department for which the construction work is being performed.

6.8 CHAPTER SUMMARY

The Construction Industry is a collaborative effort among professionals of different streams such as architecture, electrical, mechanical etc. So it is probable that building projects will be subjected to variations. The identification of project variations at the earliest stage will minimise the disputes. Henceforth, this chapter gives insight into variations, causes and effects of variations. This chapter sets out the variations and risk assessment of various types of causes of claims and disputes, moreover discussing elaborately the sources of the variations. It defines the variations and intercommunicate the relation between the variations and site instructions. The conclusions on causes of variations are accomplished by comparing with some of the views of well-known authors in variation construction contracts. Their after the evaluation of the variations by setting up certain values involved in general conditions are plowed. Eventually construe the articles of general conditions of contracts to assess the risks associated with variations and other claims and disputes from Abu Dhabi. The chapter also assist with importance of identifying and assessing the risks. It has given in depth explanation about general conditions of contracts to assess the risk associated with variation and disputes. Discussion pertaining to factors such as time for completion, inspection of site, penalties for delay, suspension of works, engineer instructions, contract amendments , settlement if disputes are also presented

in this section.

A thorough understanding of this study will ensure to reduce the disputes and helps in settlement of the problems before transforming as a dispute.

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CHAPTER SEVEN

RESEARCH DISCUSSION AND ANALYSIS: PART I

7.1 INTRODUCTION

This Chapter relates to research objectives One and Two of Stage III of the research methodology, see

Figure 7-1 below which is reproduced from Figure 2.1 of the research methodology.

Having derived a list of widely recognised Types and Causes of Claims and Disputes from the literature survey of Chapters Four and Five, it is necessary to assess their validity in the context of the construction industry in the UAE and in particular Abu Dhabi.

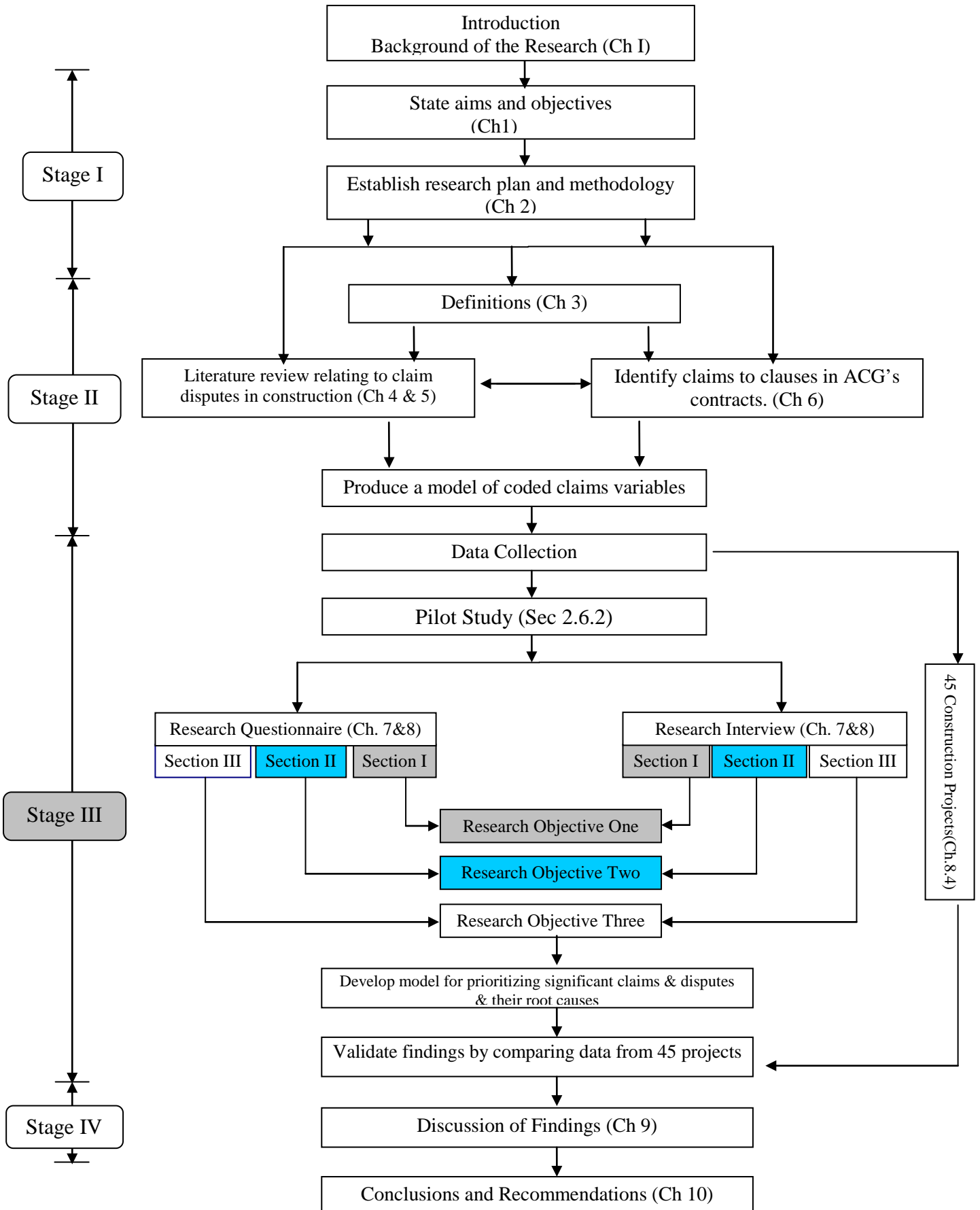


Figure 7-1 Phase One & Phase Two

Chapter Seven address research objectives One and Two, namely:

1. To identify the significant types of claims and disputes;
2. To identify the significant common causes of claims and disputes;

In this Chapter the data collection processes used in this research is discussed and this leads to establishing.

The concept of the ‘Claims Focus Indicator’ is then developed in order to identify those Claims which can be most effectively managed.

7.2 LITERATURE SEARCH

The main objectives of this chapter is to identify the significant types and causes of claims and disputes in terms of their occurrence and impact, and to identify the significant causes that trigger these types of claims and disputes. Furthermore, the research focuses on the ways and techniques that could be used to avoid or mitigate and control the likelihood and impact of these causes.

In line with these research objectives, the research project was conducted in two major phases. The first included the collection or gathering of information that provided the basic background on the study of construction claims and disputes. It also provides the basis for the questionnaire. The second phase included the collection of data from relevant parties involved in the construction industry, for use in addressing the research objectives stated above in Section 7.1.

7.2.1 PRIMARY AND SECONDARY DATA

Data used in this study were from both primary and secondary sources. The primary source of data were obtained from questionnaire survey (Questionnaire: Part I & II) directed to key participants in the construction industry (i.e. clients, consultants, contractors and experts). Moreover, data collected from 45 construction projects for the verification and validation process.(Please refer to figure 2.1 in Chapter Two for more details).

Besides the primary data, secondary information was obtained from other sources, including reports, articles, working papers, and information from various government agencies.

7.2.2 QUESTIONNAIRE DEVELOPMENT

The questionnaire was structured to obtain responses based on the respondents' perception of claims and disputes in the UAE's construction industry. The questions focused on the following issues:

- To identify and confirm the types of claims and disputes;
- To estimate the relative frequency, magnitude, and avoidability of different types of claims and disputes
- To identify and confirm the common causes of claims and disputes;
- To estimate the relative significance of common causes of claims and disputes;
- To identify the significant causes that could lead to a significant type of claims and disputes; and
- To estimate the relative significance, and avoidability of causes that could lead to a type of claims and disputes.

The questionnaire survey was divided into three parts:

- The first part focused on the respondent's personal details assessment;
- The second part focused on the technical assessment which was divided into three sections, each corresponding to one of the research's objectives; and
- The third part focused on the overall coverage of the questionnaire's sections and variables under each section, as well as any additional comments regarding the variables and any other related issues.

In order to increase the response rate, the questionnaire booklet contained a personal note to respondents assuring them of the confidentiality of the information obtained and thanking them for their time and effort. The following describes each part of the questionnaire.

Part I (Respondents' Assessment):

This section focused on respondents' personal details and information, including place of work, occupation, experience, etc. This part was included to verify that the sample investigated was representative of the population covering all target sectors (i.e. Client, Consultant, Contractors). Other personal details, such as name, age, etc. were excluded .

Part II (Technical Assessment) includes Three Sections:

These target data required to answer the stated research objectives;

- ***Section I:*** The target data in this section required to answer the First stated research objectives. It focused on the types of claims and disputes variables, where respondents were asked to provide their perceived views and rate the frequency, magnitude and avoidability of the tabulated / suggested types of claims and disputes variables.
- ***Section II:*** In the same way, the target data in this section required to answer the Second stated research objectives. It focused on common causes of claims and disputes variables, where respondents were asked to provide their perceived views and rate the significance and the avoidability / controllability of the tabulated / suggested causes of claims and disputes variables.
- ***Section III:*** Finally, the target data in this section required to answer the Third stated research objectives. It dealt with the type-cause relationships. It focused on the significant causes that could lead to a specific type of claims and disputes, where respondents were asked to rate the significance of a specific cause under a specific type of claims and disputes.

Part III (Overall Participants' Assessment):

The purpose of this section was to explore the respondents' opinion on the overall coverage of the questionnaire's sections and variables under each section. As

well as, to add any other comments regarding the variables sections and any other related issues.

This part of the questionnaire is provided for the respondents to add any additional relevant information.

Note that each of the variables used in the questionnaire survey was coded based on a coding system that was developed specifically for this research. Both the discussion and analysis chapters present the coding system for the specified factors. A complete coding system, which was used in this study, can be found in Appendix B.(For more details on Questionnaire Design and Development, please refer to Section 2.5.1.2)

7.2.3 SAMPLING SOURCES

The first stage of sampling was through cluster sampling. A list of contract numbers for clients, designers, contractors and experts was compiled through the following source; as they are likely to have the knowledge to address the issues raised in this research.

- Public Works Department,
- Abu Dhabi Municipality,
- Abu Dhabi Chamber of commerce,
- UAE Contractors Association, and
- UAE Engineers Society

In order to achieve the best results from the questionnaire survey, careful selection process was performed to choose the respondents. The selection process includes certain criteria such as the classification of consultants and contractors in the approved list, the number of working experience, the volume of work, etc. Based on these lists, the next step of sampling was adopting the random sampling with accordance to the distribution of questionnaire as will be shown in Section 7.3. (Note: a table of the approved list can be found in the Appendix F). (For more details; please see Chapter Two, Section 2.8)

7.2.4 RESPONSES TO QUESTIONNAIRE SURVEYS

A method of analysis was performed based on the role of the respondents (i.e. clients, consultants and contractors). In order to achieve the study objectives, the data collected from questionnaire survey was categorized into four sections as below:

- Client's perception: (19 responses were received from the survey),
- Designer's perception: (17 responses were received from the survey),
- Contractor's perception: (15 responses were received from the survey), and
- The Overall's perspective: (51 responses were received from the survey).

7.3 PARTICIPANT CHARACTERISTICS

Information regarding the respondents was collected in the first part of the questionnaire survey. Respondents were asked to choose one of the provided options for each question. This information helped in analysing the overall responses. This section of the survey helped in collecting information for the following questions:

- Participant's characteristics:
 - I. PC 1: Name of the organization/ firm
 - II. PC 2: Role of the respondents
 - III. PC 3: Managerial level
 - IV. PC 4: Personal experience
 - V. PC 5: Organization/ firm's experiences)
 - VI. PC 6: Organization/ firm's annual number of projects
 - VII. PC 7: Organization/ firm's number of employees

7.3.1 RESPONDENT'S ROLE/TYPE (PC 2)

There were eighty questionnaires distributed and only fifty-one responded. The return rate, which equals to 63.75 %, was considered very good. It is known that the average response rate is about 30 % of questionnaire distributed (Gilbert, 2001, p.61). Thus, the sample size was sufficient to carry out a reliable analysis of responses, as the minimum sample size according to Dixon et al. (1987) and Reseal (1975), is for student research. (see Chapter Two for more details). These questionnaires were grouped according to respondents' role in the construction

industry, i.e. clients, consultants and contractors. Out of the fifty-one respondents, nineteen were clients (37.3 %), seventeen were consultants (33.3 %) and fifteen were contractors (29.4 %). The following **Figure 7-2** shows this breakdown:

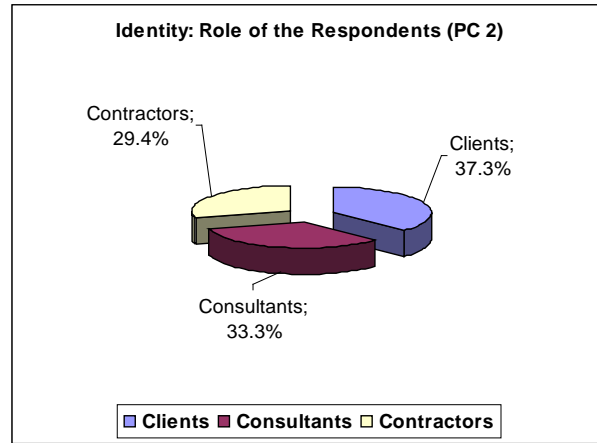


Figure 7-2 Respondents' Role/Type (PC 2)

7.3.2 RESPONDENT'S MANAGERIAL LEVEL (PC 3)

The distribution of the respondents' managerial level shows that 31.58 % of the clients were at senior managerial level. 41.18 % and 40 % of the consultants and contractors were in this category, respectively. **Figure 7-3** shows that 'middle level management' category represents the main stream of the responses.

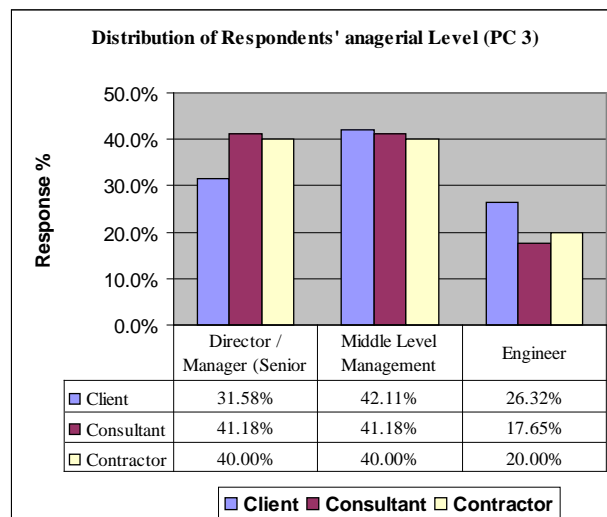


Figure 7-3 Respondents' Managerial Level (PC 3)

7.3.3 NUMBER OF WORKING YEARS (EXPERIENCE)(PC 4)

The analysis of the responses reveals that most of the respondents had fifteen to twenty years working experience. The second category was over twenty years of working experience. **Figure 7-4** presents this distribution.

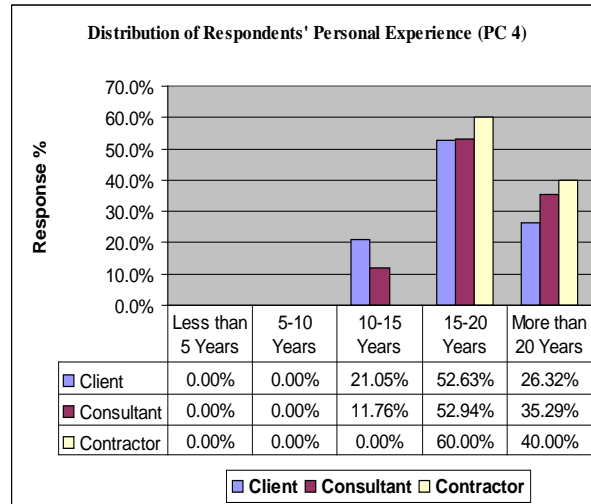


Figure 7-4 Respondents' Working Experience (PC 4)

7.3.4 ORGANISATION/ FIRM OVER ALL EXPERIENCE (PC 5)

Questions five thru eight in the first part of the questionnaire, were aimed at collecting information regarding the overall experience of the respondent's / organisations. These questions were asked in order to support the respondents' response; hence, sound responses were expected. In general, knowledge and experience is a transferable issue. A person can gain greater knowledge and experience from an organisation that has certain characteristics. Some of these characteristics are:

- Well-established and longer experience (a longer history in developing specific projects;
- Larger number of projects; and
- Larger number of professionals

The analysis of the collected data reveals that most of these selected firms have great experience in building projects. It is analysed that all respondents are

working with organisations that have twenty years or above. The distribution of total firm’s experience is presented in **Figure 7-5** below.

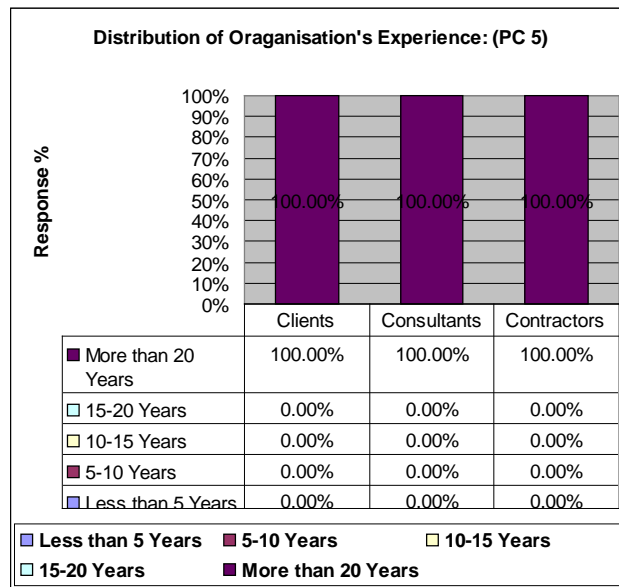


Figure 7-5 Organisation/ Firm Experience (PC 5)

Furthermore, the distribution of responses for the organisation’s (firm) annual number of projects, as well as their number of professional staff is presented in **Figure 7-6** and **Figure 7-7**, respectively. The distribution of the responses regarding the organisation’s (firm) annual number of projects shows that 88.89 % of the clients’ organisations are developing more than 40 projects each year. 35.29 % and 60 % of the consultants and contractors were in this category, respectively.

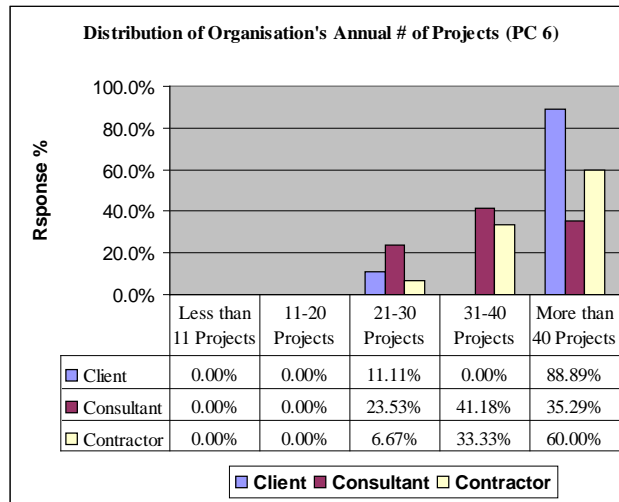


Figure 7-6 Organisation/ Firm Annual Number of Projects (PC 6)

Moreover, **Figure 7-7** shows that 57.89 % of the clients’ organisations have less than one hundred professionals. 10.53 % of the clients responded that their organisations have more than 500 staff. In addition, 41.18 % of the consultants responded that they are working in organisations/firms that employ between two to three hundred. Finally, the analysis reveals that 33.33 % of the contracting firms are employing one to two hundred professional staff, while 26.67 % are employing more than three hundred. It is worth noting that clients present the highest response to the ‘less than 100’ category. This can be explained as most of the clients out-source their projects.

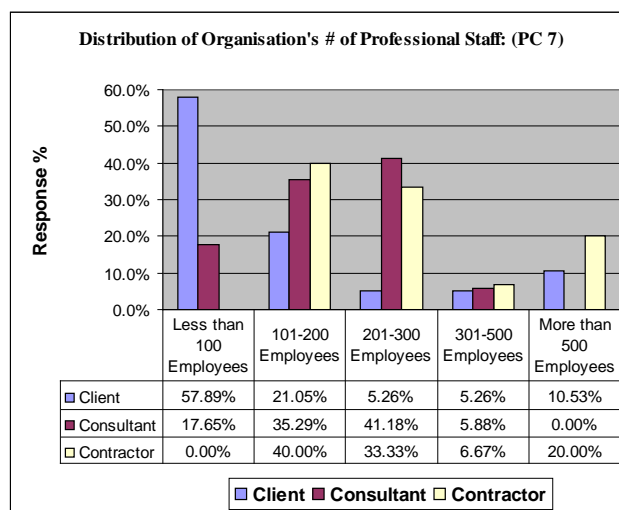


Figure 7-7 Organisation/ Firm Number of Professional Staff (PC 7)

7.4 TYPES OF CLAIMS AND DISPUTES

The second section of the questionnaire survey focused on the types of construction claims and disputes in the UAE. A table was provided with fifty-one possible types of claims and disputes as derived in Chapters Four, Five and Six . This section was expected to provide answers to the following questions:

- ✓ Do the construction professionals agree that these suggested types contribute to the generation of construction claims and disputes? and if so, to what extent in terms of their frequency and severity?
- ✓ Can the frequency and/or severity of these types be avoided or at least controlled under the UAE general conditions of contract?

Therefore, this section aimed at exploring the respondents' perception on these suggested types of construction claims and disputes in the UAE. The section focused on the following four aspects:

- ✓ Identifying and confirming the common and potential types of construction claims and disputes;
- ✓ Estimating the relative frequency of each type of claims and disputes;
- ✓ Estimating the relative magnitude (severity/ impact) of each type of claims and disputes;
- ✓ Estimating the avoidability/ controllability of each type of claims and disputes

Respondents were first asked if the suggested and tabulated types were to be considered potential types, and three assessment indicators were used to further the research. These assessment indicators were frequency, severity and avoidability. For each of these assessments, respondents gave there responses based on the scale that were given. However not all respondents gave a response for all assessments. No weight was given when no response was provided. Hence, this was classified as negative response. Through out this section of this dissertation, frequent, severe and avoidable types are those with an average score that is greater than three, and an important index of more than 60%. The response scale for each assessment is explained in details in the sub-sections below.

The following **Table 7-1** lists the suggested types of construction claims and disputes, which were used in the first section of the second part (technical assessment) of the questionnaire survey. In addition, **Table 7-2** provides a description and the coding system used to code these types and their sub variables.

Table 7-1 Description and Codes for Types of Claims and Disputes

Code	Types of Claims and Disputes
T 01	Ambiguity in documents
T 02	Delays: Incomplete design/ insufficient information by client/ consultant
T 03	Design/ change/ omission / errors by the client or (engineer)
T 04	Instruction by the client/ consultant to resolve discrepancy
T 05	Rectification of works/ specification change due to defective design
T 06	Substantial increase in quantity of any item (not resulting from a variation)
T 07	Substantial change in quality of any item (not resulting from a variation)
T 08	Error in setting out due to incorrect data shown on drawings
T 09	Change of project profile and site
T 10	Delayed site possession/ works/ restricted access
T 11	Differing site condition
T 12	Unanticipated soil condition
T 13	D. D. R. P.: Due to unforeseen ground condition/unforeseeable obstruction
T 14	Investigation of suspected defects
T 15	Uncovering of works for testing (examination)
T 16	Additional tests to verify compliance with the
T 17	Suspension of work
T 18	Acceleration of Works
T 19	Variations
T 20	Additional work to other parts arising from repairs or defects
T 21	Client's instruction to change (not resulting from variation)
T 22	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)
T 23	Loss of / damage to materials on site or during transport
T 24	Repair damages to other property during transport of materials
T 25	Delays: Unavailability / unsuitability of project materials
T 26	D. D. R. P.: Due to variation
T 27	D. D. R. P.: Due to late instruction by client/ consultant engineer
T 28	D. D. R. P.: Due to late issue of consent (approval)
T 29	D. D. R. P.: Due to delay caused by any person/ organization employed by client such as (nominated subcontractor, suppliers or others)
T 30	D. D. R. P.: Due to late delivery of materials by the client
T 31	D. D. R. P.: Due to delay caused by utility services organization
T 32	D. D. R. P.: Due to additional/ unforeseen building regulations/procedures
T 33	Client's breach of contract
T 34	Late issuance of final certificate
T 35	Extension of time for completion
T 36	Late payment
T 37	Interest on late payment

Continued' Table 7-1 Description and Codes for Types of Claims and Disputes

Code	Types of Claims and Disputes
T 38	Overdue retention money
T 39	Inflation / price escalation
T 40	Currency fluctuation
T 41	Finance charges: Loss of profit, insurance, retention, etc.
T 42	Liquidated and ascertained damages
T 43	Default of subcontractor, nominated subcontractor or suppliers
T 44	Unproductive / idle plants, equipment or labour
T 45	Labour strikes, civil unrest, etc.
T 46	Custom tariffs, new taxes
T 47	Embargoes on project imported items
T 48	Expropriation of contractor's equipment or machinery, etc.
T 49	D. D. R. P.: Due to inclement weather, flood, storms, etc.
T 50	Damages to work due to exceptionally inclement/ adverse weather
T 51	Rectification of damage due to unexpected risk

Where, D. D. R. P.: Delays/ disruption to regular progress

➤ **The Coding system used in this study:**

• **Types of claims & disputes sub variables:**

The types of claims and disputes sub variables are represented as (T 00 0 0) where,

T: Types of claims & disputes

00: Fifty one (51) different types (First two zeros) (1-51)

0: Duplication of the same type (Controlling question) (3rd Digit)
(Need for a sub coding)

0: (Four different questions asked for each Type) (1-4) (4th Digit)
(Need for a second sub coding)

Table 7-2 Description and Coding System for Types of Claims and Disputes Sub Variables

Variable	Label	Description
<i>Types of Construction Claims and Disputes</i> (T000)	T000 1	Is this a potential type? Specific type of claim potentiality
	T000 2	Frequency Probability of occurrence of a specific type of claim in a construction project
	T000 3	Impact (Magnitude) An average magnitude of a specific type of claim expressed as a percentage of original contract value, or original contract period
	T000 4	Avoidability Possibility of avoiding a specific <i>type</i> by avoiding the underlying cause/s that can contribute to the generation of a specific <i>type</i> of construction claims and disputes

7.4.1 PERCEIVED AGREEMENT ASSESSMENT

In this section, respondents were asked to assess the type variables that are used in this study. Respondents were asked whether they agree that any of the types of claims and disputes, listed in the second part of the questionnaire, was to be considered as a potential type of claims and disputes or not. A three-point response scale was given to the respondents, with a weight of 1 for “yes”, 2 for “no”, 3 for “not sure”. No weight was given when no response was provided. A comparison table is presented later in this section to compare the agreement assessment of the various groups (i.e. clients, consultants and contractors) for the various types of construction claims and disputes.

General note:

Table 7-3, **Table 7-4** and **Table 7-5** present the responses for the agreement assessment from the three responding groups. These three tables are found in Sections 7.4.1.1, 7.4.1.2 and 7.4.1.3, respectively. (Note that the presented types of claims and disputes in these tables that indicates the different levels of agreement are extracted from **Table 7-7**). **Table 7-7**, which can be found in the following Section 7.4.1.5 and Appendix Y.1.1.1., is used to compare the agreement assessment, for the fifty-one types of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). Finally, these responses are presented in a bar chart, which can be found in Appendix Y.1.1.2.

7.4.1.1 CLIENTS' PERCEPTION

Clients confirmed that most of the suggested types are potentially likely to lead to the generation of construction claims and disputes; however, their agreement percentage regarding those suggested types was not the same for those suggested types.

All clients confirmed that 41 out of 51 types are potentially the likely factors except those listed in **Table 7-3** that indicate the different levels of agreement.

Table 7-3 Types of Claims & Disputes Agreement Assessment (Clients' Perception)

Code #	Clients' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
T4201	0	18	1	0	94.74%	5.26%	0.00%
T4801	0	18	1	0	94.74%	5.26%	0.00%
T0501	0	14	1	4	73.68%	5.26%	21.05%
T4101	2	12	3	2	70.59%	17.65%	11.76%
T4501	0	13	3	3	68.42%	15.79%	15.79%
T4701	0	13	2	4	68.42%	10.53%	21.05%
T0401	2	11	3	3	64.71%	17.65%	17.65%
T4601	2	11	2	4	64.71%	11.76%	23.53%
T3201	0	11	4	4	57.89%	21.05%	21.05%
T3701	1	10	5	3	55.56%	27.78%	16.67%

7.4.1.2 CONSULTANTS' PERCEPTION

In the same way, consultants confirmed that most of the suggested types are potentially likely to lead to the generation of construction claims and disputes; however, their agreement percentage regarding those types was not the same for those suggested types. All consultants agreed that 41 out of 51 types are potentially the likely factors except those listed in the following **Table 7-4**, which presents the different levels of agreement, as perceived by consultants.

Table 7-4 Types of Claims & Disputes Agreement Assessment (Consultants' Perception)

Code #	Consultants' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
T4801	0	16	1	0	94.12%	5.88%	0.00%
T3401	0	14	0	3	82.35%	0.00%	17.65%
T0501	0	12	3	2	70.59%	17.65%	11.76%
T4501	1	11	3	2	68.75%	18.75%	12.50%
T4701	1	11	4	1	68.75%	25.00%	6.25%
T4101	0	11	3	3	64.71%	17.65%	17.65%
T4601	0	11	4	2	64.71%	23.53%	11.76%
T3701	1	10	4	2	62.50%	25.00%	12.50%
T3201	0	10	4	3	58.82%	23.53%	17.65%
T0401	1	9	4	3	56.25%	25.00%	18.75%

7.4.1.3 CONTRACTORS' PERCEPTION

Similarly, contractors confirmed that most of the tabulated types are potential and can generate construction claims and disputes. However, their agreement percentage regarding those types was not the same for those suggested types. All contractors agreed that 40 out of 51 types are potentially the likely factors except

those listed in the following **Table 7-5** that presents the different levels of agreement as perceived by them.

Table 7-5 Types of Claims & Disputes Agreement Assessment (Consultants' Perception)

Code #	Contractors' Agreement				Agreement Percentage (%)		
	Neg.Res	Yes	No	Not Sure	Yes	No	Not Sure
T0601	0	14	1	0	93.33%	6.67%	0.00%
T2001	0	14	1	0	93.33%	6.67%	0.00%
T2401	0	14	1	0	93.33%	6.67%	0.00%
T4601	0	12	1	2	80.00%	6.67%	13.33%
T4701	1	11	1	2	78.57%	7.14%	14.29%
T3201	0	11	0	4	73.33%	0.00%	26.67%
T3701	0	11	0	4	73.33%	0.00%	26.67%
T4501	0	11	0	4	73.33%	0.00%	26.67%
T0401	1	10	0	4	71.43%	0.00%	28.57%
T4101	2	9	0	4	69.23%	0.00%	30.77%
T0501	0	10	0	5	66.67%	0.00%	33.33%

7.4.1.4 OVERALL PERCEIVED AGREEMENT ASSESSMENT

Finally, the collective assessment of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, reveals that all of the suggested types are likely to lead to the generation of construction claims and disputes with different agreement percentages. All respondents (i.e. clients, consultants and contractors) believe that 37 out of 51 types are potentially the likely factors except those listed in the following **Table 7-6** below, which presents the different levels of agreement, as perceived by them.

Table 7-6 Types of Claims & Disputes Agreement Assessment (Overall' Perception)

Code #	Overall Respondents' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
T0601	0	50	1	0	98.04%	1.96%	0.00%
T2001	0	50	1	0	98.04%	1.96%	0.00%
T4201	0	50	1	0	98.04%	1.96%	0.00%
T2401	2	48	1	0	97.96%	2.04%	0.00%
T4801	0	49	2	0	96.08%	3.92%	0.00%
T3401	0	48	0	3	94.12%	0.00%	5.88%
T4701	2	35	7	7	71.43%	14.29%	14.29%
T0501	0	36	4	11	70.59%	7.84%	21.57%
T4501	1	35	6	9	70.00%	12.00%	18.00%
T4601	2	34	7	8	69.39%	14.29%	16.33%
T4101	4	32	6	9	68.09%	12.77%	19.15%
T0401	4	30	7	10	63.83%	14.89%	21.28%
T3701	2	31	9	9	63.27%	18.37%	18.37%
T3201	0	32	8	11	62.75%	15.69%	21.57%

7.4.1.5 FINDINGS RELATED TO PERCEIVED AGREEMENT ASSESSMENT

In this section, respondents were asked whether they agree that any of the listed types in the second part of the questionnaire is a potential type of claims and disputes or not by selecting one of the three given options; yes, no, and not sure. An analysis of the agreement assessment reveals that clients believe that all of the suggested types are potentially likely to lead to the generation of construction claims and disputes except for two of them, namely, *Delay due to additional building regulations / procedures (T3201)* and *Interest on late payment (T3701)*, where they scored 57.89 % and 55.56 %, respectively. In the same way, consultants agree that all of the mentioned types of claims and disputes are potential except for two of them, namely, *Delay due to additional building regulations / procedures (T3201)* and *Instruction by the client to resolve discrepancy (T0401)*, where they scored 58.82% and 56.25 %, respectively. However, contractors think that all of the 51 types are potential types of claims and disputes. It can be shown that these results are logical especially when it shows that both clients and consultants try to defend their positions by saying that any *Delays due to additional building regulations / procedures (T3201)* is not a potential type of claims and disputes. However, they disagree on the second one where the clients believe that any *Interest on late payment (T3701)* is not a potential type of claims and disputes and consultants believe that instruction by the client to resolve discrepancy (**T0401**) is not a potential type of claims and disputes. On the other hand, contractors believe that all of these types are potential types of

claims and disputes. The results reveal that the respondents were biased in some way depending on their experience and background. However, this bias is not surprising; in fact, it had been reported by other researchers such as Kumaraswamy (1996) and Yogeswaran (1996).

Moreover, the collective assessment of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, reveals that the 51 types are potential types of claims and disputes with different agreement percentages. All respondents believed that 37 out of 51 types are potentially the likely factors except those listed in the following table that include different levels of agreement.

Table 7-7 below is used to compare the agreement assessment of the various groups (i.e. clients, consultants and contractors) for the fifty-one types of claims and disputes that are used in this research.

Table 7-7 Types of Claims & Disputes Agreement Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT					
Type Description	Code	Clients	Consultants	Contractors	Over All
Ambiguity in Documents - Is this a potential type?	T0101	100.00%	100.00%	100.00%	100.00%
Delays: Incomplete Design/ Insufficient Information by Client - Is this a po	T0201	100.00%	100.00%	100.00%	100.00%
Design/ Change/ Omission / Errors by the Client - Is this a potential type?	T0301	100.00%	100.00%	100.00%	100.00%
Change in Quality (not resulting from a Variation) - Is this a potential type?	T0701	100.00%	100.00%	100.00%	100.00%
Error in Setting out Due to Incorrect Data Shown on Drawings - Is this a po	T0801	100.00%	100.00%	100.00%	100.00%
Change of Project Profile and Site - Is this a potential type?	T0901	100.00%	100.00%	100.00%	100.00%
Delayed Site Possession/ Restricted Access - Is this a potential type?	T1001	100.00%	100.00%	100.00%	100.00%
Differing Site Condition - Is this a potential type?	T1101	100.00%	100.00%	100.00%	100.00%
Unanticipated Soil Condition - Is this a potential type?	T1201	100.00%	100.00%	100.00%	100.00%
Unforeseen Ground Condition/ Unforeseeable Obstruction - Is this a potent	T1301	100.00%	100.00%	100.00%	100.00%
Investigation of Suspected Defects - Is this a potential type?	T1401	100.00%	100.00%	100.00%	100.00%
Uncovering of Works For Testing - Is this a potential type?	T1501	100.00%	100.00%	100.00%	100.00%
Additional Tests to Verify Compliance with the - Is this a potential type?	T1601	100.00%	100.00%	100.00%	100.00%
Suspension of Work - Is this a potential type?	T1701	100.00%	100.00%	100.00%	100.00%
Acceleration of Works - Is this a potential type?	T1801	100.00%	100.00%	100.00%	100.00%
Variations - Is this a potential type?	T1901	100.00%	100.00%	100.00%	100.00%
Client's Instruction to Change (not resulting from Variation) - Is this a pote	T2101	100.00%	100.00%	100.00%	100.00%
Facilities provided to others by the contractor - Is this a potential type?	T2201	100.00%	100.00%	100.00%	100.00%
Loss of / Damage to Materials on Site or During Transport - Is this a poten	T2301	100.00%	100.00%	100.00%	100.00%
Delays: Unavailability / Unsuitability of Project Materials - Is this a potenti	T2501	100.00%	100.00%	100.00%	100.00%
Delay: Due To Variation - Is this a potential type?	T2601	100.00%	100.00%	100.00%	100.00%
Delay: Due To Late Instruction by Client - Is this a potential type?	T2701	100.00%	100.00%	100.00%	100.00%
Delay: Due To Late Approval - Is this a potential type?	T2801	100.00%	100.00%	100.00%	100.00%
Delay: caused by client or employed by Client - Is this a potential type?	T2901	100.00%	100.00%	100.00%	100.00%
Delay: Late Delivery of Materials by Client - Is this a potential type?	T3001	100.00%	100.00%	100.00%	100.00%
Delay: Caused by Utility Services Organization - Is this a potential type?	T3101	100.00%	100.00%	100.00%	100.00%
Client's Breach of Contract - Is this a potential type?	T3301	100.00%	100.00%	100.00%	100.00%
Extension of Time For Completion - Is this a potential type?	T3501	100.00%	100.00%	100.00%	100.00%
Late Payment - Is this a potential type?	T3601	100.00%	100.00%	100.00%	100.00%
Overdue retention money - Is this a potential type?	T3801	100.00%	100.00%	100.00%	100.00%
Inflation / Price Escalation - Is this a potential type?	T3901	100.00%	100.00%	100.00%	100.00%
Currency Fluctuation - Is this a potential type?	T4001	100.00%	100.00%	100.00%	100.00%
Default of Subcontractor, Nominated Subcontractor - Is this a potential type	T4301	100.00%	100.00%	100.00%	100.00%
Unproductive / Idle Plants, Equipment or Labour - Is this a potential type?	T4401	100.00%	100.00%	100.00%	100.00%
Delays: Inclement Weather, Flood, Storms, , Etc. - Is this a potential type?	T4901	100.00%	100.00%	100.00%	100.00%
Damages to Work due to Inclement Weather, - Is this a potential type?	T5001	100.00%	100.00%	100.00%	100.00%
Rectification of Damage due to Un Excepted Risk - Is this a potential type?	T5101	100.00%	100.00%	100.00%	100.00%
Quantity Increase (not resulting from a Variation) - Is this a potential type?	T0601	100.00%	100.00%	93.33%	98.04%
Additional Work to other Parts arising from repairs or defects - Is this a po	T2001	100.00%	100.00%	93.33%	98.04%
Liquidated and ascertained damages - Is this a potential type?	T4201	94.74%	100.00%	100.00%	98.04%
Repair damages to other Property during Transport of Materials - Is this a p	T2401	100.00%	100.00%	93.33%	97.96%
Expropriation of Contractor's Equipment etc. - Is this a potential type?	T4801	94.74%	94.12%	100.00%	96.08%
Late Issuance of final certificate - Is this a potential type?	T3401	100.00%	82.35%	100.00%	94.12%
Embargoes on Project Imported Items - Is this a potential type?	T4701	68.42%	68.75%	78.57%	71.43%
Defective Design: Rectification of Works/ Specification Change - Is this a	T0501	73.68%	70.59%	66.67%	70.59%
Labour Strikes, Civil Unrest, Etc. - Is this a potential type?	T4501	68.42%	68.75%	73.33%	70.00%
Custom Tariffs, New Taxes - Is this a potential type?	T4601	64.71%	64.71%	80.00%	69.39%
Finance Charges: Loss of Profit, Insurance, Retention, Etc. - Is this a potent	T4101	70.59%	64.71%	69.23%	68.09%
Instruction by the Client to Resolve Discrepancy - Is this a potential type?	T0401	64.71%	56.25%	71.43%	63.83%
Interest on Late Payment - Is this a potential type?	T3701	55.56%	62.50%	73.33%	63.27%
Delay: Additional building regulations/ procedures - Is this a potential type?	T3201	57.89%	58.82%	73.33%	62.75%

7.4.2 PERCEIVED FREQUENCY ASSESSMENT

In this section, respondents were asked to choose one of the following five options to rate the frequency of each type of claims and disputes in construction projects. These options are never, rare (low frequency), average, high frequency and very high frequency. A weight in a scale from 1 to 5 was given for each of the five frequencies with a weight of 1 for “never”, 2 for “rare”, 3 for “average”, 4 for “high frequency” and 5 for “very high frequency”. No weight was given when no response was provided. The analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any type of claims with an average score greater than three (3), or important index of more than 60 % is said to be frequent. On the contrary, If the mean score of a type less than three, then this type is said to be not frequent.

General note:

The following **Table 7-8**, **Table 7-9** and **Table 7-10** present the responses for the agreement assessment from the three responding groups. These three tables are found in Sections 7.4.2.1, 7.4.2.2 and 7.4.2.3, respectively. Note that the presented top ten frequent types of claims and disputes in these tables are extracted from a complete list of type’s frequency assessment, which can be found in Section 7.4.2.5 and Appendix Y.1.2.1. Furthermore, these responses are presented in a bar chart format, which can be found in Appendix Y.1.2.2).

7.4.2.1 CLIENTS’ PERCEPTION

In this section, clients were asked to rate how frequent each of these types of claims and disputes are in construction projects. **Table 7-8** below shows the results for the top ten frequent types of claims and disputes.

Sixteen types are perceived by the clients as frequent ones, their average mean values are greater than 3 and their importance index values are greater than 60 %. The remaining thirty-five types are perceived as less frequent.

Table 7-8 Types of Claims & Disputes Frequency Assessment (Clients' Perception)

Code #	Type Frequency						Type Frequency Index		
	Neg.Res	N	LF	Av	HF	VHF	Mean	Index	Rank
T1902	2	0	0	4	7	6	4.12	82.35%	1
T0302	2	0	0	4	11	2	3.88	77.65%	2
T1202	1	0	0	7	7	4	3.83	76.67%	3
T1102	0	0	2	4	9	4	3.79	75.79%	4
T2602	0	0	1	8	5	5	3.74	74.74%	5
T1302	1	0	0	8	8	2	3.67	73.33%	6
T0902	1	0	3	5	6	4	3.61	72.22%	7
T3502	1	0	0	9	7	2	3.61	72.22%	7
T3102	2	0	1	6	10	0	3.53	70.59%	9
T0102	0	0	2	8	7	2	3.47	69.47%	10

The most frequent types of claims and disputes as perceived by clients are as follows:

- T1902 Variations;
- T0302 Design/ change/ omission / errors by the client;
- T1202 Unanticipated soil condition;
- T1102 Differing site condition;
- T2602 Delay: Due to variation;
- T1302 Unforeseen ground condition/ unforeseeable obstruction;
- T0902 Change of project profile and site;
- T3502 Extension of time for completion;
- T3102 Delay: Caused by utility services organization;
- T0102 Ambiguity in documents;
- T2802 Delay: Due to late approval;
- T0202 Delays: Incomplete design/ insufficient information by client;
- T2702 Delay: Due to late instruction by client;
- T1002 Delayed site possession/ restricted access;
- T4302 Default of subcontractor, nominated subcontractor;
- T0502 Defective design: Rectification of works/ specification change

It can be noted that **T1902**, “**Variation**” is rated as the highest frequency type of claims and disputes with an average score of 4.2 and important index of 82.35 %. However, **T4602**, “**Custom tariffs, new taxes, etc.**” claims and disputes is ranked the

lowest as it has an average score of 1.4 and important index of 27.06%, where eleven clients answered that it is not frequent.

7.4.2.2 CONSULTANTS' PERCEPTION

In the same way, consultants were asked to rate the frequency of these types in construction projects. **Table 7-9** below shows their response.

Table 7-9 Types of Claims & Disputes Frequency Assessment (Consultants' Perception)

Code #	Type Frequency						Type Frequency Index		
	Neg. Resp	N	LF	Av	HF	VHF	Mean	Index	Rank
T1902	0	0	0	4	10	3	3.94	78.82%	1
T2802	2	0	0	6	5	4	3.87	77.33%	2
T2602	0	0	0	8	7	2	3.65	72.94%	3
T0302	1	0	1	8	4	3	3.56	71.25%	4
T3502	2	0	0	10	3	1	3.36	67.14%	5
T1202	1	0	2	8	5	1	3.31	66.25%	6
T1302	1	0	0	11	5	0	3.31	66.25%	6
T3102	1	0	0	11	5	0	3.31	66.25%	6
T1002	1	0	1	10	4	1	3.31	66.25%	6
T4302	1	0	1	11	2	2	3.31	66.25%	6
T0202	1	0	0	12	3	1	3.31	66.25%	6
T4202	0	0	2	11	3	1	3.18	63.53%	12

Based on the consultants' responses, twenty types are perceived as frequent by the consultants. The remaining thirty-one types are perceived as less frequent. The most frequent types of claims and disputes as perceived by consultants are listed below:

- T1902 Variations;
- T2802 Delay: Due to late approval;
- T2602 Delay: Due to variation;
- T0302 Design/ change/ omission / errors by the client;
- T3502 Extension of time for completion;
- T0202 Delays: Incomplete design/ insufficient information by client;
- T1002 Delayed site possession/ restricted access;
- T1202 Unanticipated soil condition;
- T1302 Unforeseen ground condition/ unforeseeable obstruction;
- T3102 Delay: Caused by utility services organization;
- T4302 Default of subcontractor, nominated subcontractor;
- T4202 Liquidated and ascertained damages;

- T0902 Change of project profile and site;
- T1102 Differing site condition;
- T0502 Defective design: rectification of works/ specification change;
- T2702 Delay: Due to late instruction by client;
- T3402 Late issuance of final certificate;
- T0102 Ambiguity in documents;
- T2502 Delays: Unavailability / unsuitability of project materials;
- T4402 Unproductive / idle plants, equipment or labour

It can be noted that **T1902, “Variation”** is rated as the highest frequency type of claims and disputes with an average score of 3.9, and important index of 78.82 %. All consultants responded that this type is frequent. On the contrary, **T3202, “Delay: additional building regulations/ procedures”** claims and disputes is ranked the lowest as it has an average score of 1.31 and important index of 26.25 %, where sixteen consultants answered that it is not frequent.

7.4.2.3 CONTRACTORS’ PERCEPTION

The results of rating the frequency of the types of claims and disputes in construction projects from contractors’ perceptions are shown in **Table 7-10** below.

Table 7-10 Types of Claims & Disputes Frequency Assessment (Contractors’ Perception)

Code #	Type Frequency						Type Frequency Index		
	Neg.Res	N	LF	Av	HF	VHF	Mean	Index	Rank
T1902	0	0	0	3	6	6	4.20	84.00%	1
T2602	0	0	0	4	5	6	4.13	82.67%	2
T0302	1	0	0	4	5	5	4.07	81.43%	3
T1102	0	0	0	5	5	5	4.00	80.00%	4
T0902	1	0	1	3	5	5	4.00	80.00%	4
T1302	1	0	0	3	11	0	3.79	75.71%	6
T1202	0	0	1	2	12	0	3.73	74.67%	7
T0102	0	0	0	7	6	2	3.67	73.33%	8
T3102	1	0	0	5	9	0	3.64	72.86%	9
T2802	0	0	0	8	5	2	3.60	72.00%	10

For this group of respondents, seventeen types are perceived as frequent by the contractors. The remaining thirty-four types are perceived as less frequent. The most frequent types of claims and disputes as perceived by contractors are listed below:

- T1902 Variations;
- T2602 Delay: Due to variation;
- T0302 Design/ change/ omission / errors by the client;
- T0902 Change of project profile and site;
- T1102 Differing site condition;
- T1302 Unforeseen ground condition/ unforeseeable obstruction;
- T1202 Unanticipated soil condition;
- T0102 Ambiguity in documents;
- T3102 Delay: Caused by utility services organization;
- T2802 Delay: Due to late approval;
- T4302 Default of subcontractor, nominated subcontractor;
- T3502 Extension of time for completion;
- T1002 Delayed site possession/ restricted access;
- T0502 Defective design: Rectification of works/ specification change;
- T2702 Delay: Due to late instruction by client;
- T0202 Delays: Incomplete design/ insufficient information by client;
- T2902 Delay: Caused by client or employed by Client

It can be noted that *T1902, "Variation"* is rated as the highest frequency type of claims and disputes with an average score of 4.2, and important index of 84.0 %. All contractors responded that this type is frequent. On the contrary, *T5102, "Rectification of damage due to unexpected risk"* claims and disputes is ranked the lowest as it has an average score of 1.43 and important index of 28.57 %, where fourteen contractors answered that it is not frequent.

7.4.2.4 OVERALL PERCEIVED FREQUENCY ASSESSMENT

Finally, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 7-11** below. In addition, the comparison **Table 7-12** in the following Section 7.4.2.5 is used to compare the frequency assessment, for the fifty-one types of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). In general, the most frequent types of claims and disputes are sixteen

types as perceived by all respondents. However, thirty-five types are perceived as less frequent.

Table 7-11 Types of Claims & Disputes Frequency Assessment (Overall Perception)

Code #	Type Frequency						Type Frequency Index		
	Neg.Re	N	LF	Av	HF	VHF	Avg. Mean	Index	Rank
T1902	2	0	0	11	23	15	4.08	81.63%	1
T0302	4	0	1	16	20	10	3.83	76.60%	2
T2602	0	0	1	20	17	13	3.82	76.47%	3
T1202	2	0	3	17	24	5	3.63	72.65%	4
T1102	0	0	5	18	19	9	3.63	72.55%	5
T2802	3	0	0	25	16	7	3.63	72.50%	6
T1302	3	0	0	22	24	2	3.58	71.67%	7
T0902	2	0	7	18	14	10	3.55	71.02%	8
T3502	5	0	0	27	13	5	3.51	70.22%	9
T3102	4	0	1	22	24	0	3.49	69.79%	10

The most frequent types of claims and disputes based on the combination of all the respondents' response as perceived by them are as follows:

- T1902 Variations;
- T0302 Design/ change/ omission / errors by the client;
- T2602 Delay: Due to variation;
- T1202 Unanticipated soil condition;
- T1102 Differing site condition;
- T2802 Delay: Due to late approval;
- T1302 Unforeseen ground condition/ unforeseeable obstruction;
- T0902 Change of project profile and site;
- T3502 Extension of time for completion;
- T3102 Delay: Caused by utility services organization;
- T0102 Ambiguity in documents;
- T1002 Delayed site possession/ restricted access;
- T4302 Default of subcontractor, nominated subcontractor;
- T0202 Delays: Incomplete design/ insufficient information by client;
- T2702 Delay: Due to late instruction by client;
- T0502 Defective Design: Rectification of works/ specification change

It can be noted that **T1902**, "**Variation**" is rated as the highest frequency type of claims and disputes with an average score of 4.08, and important index of 81.63 %.

Forty-nine respondents responded that this type is frequent, and two of these respondents did not answer this question. On the contrary, **T4702, “Embargoes on project imported items”** claims and disputes is ranked the lowest as it has an average score of 1.47 and important index of 29.39 %, where forty-nine answered that it is not frequent. Note that Appendix Y.1.2.2 shows the graphs of the responses from the respondents for the frequencies of all types of claims that have been considered for this assessment.

7.4.2.5 FINDINGS RELATED TO PERCEIVED FREQUENCY ASSESSMENT

Table 7-12 below, can be used to compare the types of claims and disputes based on the perceived frequency assessment of the various groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes. The analysis of the responses shows that **T1902, “Variation”** has the highest frequency in the table below because; it is ranked as the highest by the three groups of respondents. In addition, **T0302 “Design/ change/ omission / errors by the client”** is ranked as the second highest over all, although it is ranked as third by contractors and fourth by consultants. **T2602 “Delay: due to variation”** is ranked third over all; however, it is ranked fifth by clients meaning that there are four more frequent types of claims and disputes. In contrast, **T4702, “Embargoes on project imported items”** claims and disputes is ranked the lowest as it has an average score of 1.47 and important index less than 30.0 %.

Table 7-12 Types of Claims & Disputes Frequency Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	
		Avg. Mean	Imp. Index	Ranking	Avg. Mean	Imp. Index	Ranking	Avg. Mean	Imp. Index	Ranking	Avg. Mean	Imp. Index	Ranking
		Clients			Consultants			Contractors			Over All		
Variations - Frequency	T1902	4.118	82.35%	1	3.941	78.82%	1	4.200	84.00%	1	4.082	81.63%	1
Design/ Change/ Omission / Errors by	T0302	3.882	77.65%	2	3.563	71.25%	4	4.071	81.43%	3	3.830	76.60%	2
Delay: Due To Variation - Frequency	T2602	3.737	74.74%	5	3.647	72.94%	3	4.133	82.67%	2	3.824	76.47%	3
Unanticipated Soil Condition - Frequ	T1202	3.833	76.67%	3	3.313	66.25%	6	3.733	74.67%	7	3.633	72.65%	4
Differing Site Condition - Frequency	T1102	3.789	75.79%	4	3.118	62.35%	13	4.000	80.00%	4	3.627	72.55%	5
Delay: Due To Late Approval - Frequ	T2802	3.444	68.89%	11	3.867	77.33%	2	3.600	72.00%	10	3.625	72.50%	6
Unforeseen Ground Condition/ Unfo	T1302	3.667	73.33%	6	3.313	66.25%	6	3.786	75.71%	6	3.583	71.67%	7
Change of Project Profile and Site - F	T0902	3.611	72.22%	7	3.118	62.35%	13	4.000	80.00%	4	3.551	71.02%	8
Extension of Time For Completion -	T3502	3.611	72.22%	7	3.357	67.14%	5	3.538	70.77%	12	3.511	70.22%	9
Delay: Caused by Utility Services Or	T3102	3.529	70.59%	9	3.313	66.25%	6	3.643	72.86%	9	3.489	69.79%	10
Ambiguity in Documents - Frequency	T0102	3.474	69.47%	10	3.059	61.18%	18	3.667	73.33%	8	3.392	67.84%	11
Delayed Site Possession/ Restricted A	T1002	3.316	66.32%	14	3.313	66.25%	6	3.533	70.67%	13	3.380	67.60%	12
Default of Subcontractor, Nominated	T4302	3.278	65.56%	15	3.313	66.25%	6	3.571	71.43%	11	3.375	67.50%	13
Delays: Incomplete Design/ Insuffici	T0202	3.421	68.42%	12	3.313	66.25%	6	3.286	65.71%	16	3.347	66.94%	14
Delay: Due To Late Instruction by Cl	T2702	3.333	66.67%	13	3.063	61.25%	15	3.357	67.14%	15	3.250	65.00%	15
Defective Design: Rectification of W	T0502	3.167	63.33%	16	3.063	61.25%	15	3.500	70.00%	14	3.229	64.58%	16
Client's Breach of Contract - Freque	T3302	2.944	58.89%	17	2.875	57.50%	23	2.929	58.57%	18	2.917	58.33%	17
Liquidated and ascertained damages	T4202	2.632	52.63%	23	3.176	63.53%	12	2.867	57.33%	21	2.882	57.65%	18
Acceleration of Works - Frequency	T1802	2.778	55.56%	19	2.941	58.82%	21	2.923	58.46%	20	2.875	57.50%	19
Unproductive / Idle Plants, Equipmen	T4402	2.789	55.79%	18	3.059	61.18%	18	2.733	54.67%	25	2.863	57.25%	20
Delay: caused by client or employed	T2902	2.778	55.56%	19	2.824	56.47%	24	3.000	60.00%	17	2.854	57.08%	21
Quantity Increase (not resulting from	T0602	2.737	54.74%	22	2.938	58.75%	22	2.857	57.14%	22	2.837	56.73%	22
Late Issuance of final certificate - Fr	T3402	2.500	50.00%	29	3.063	61.25%	15	2.769	55.38%	24	2.766	55.32%	23
Suspension of Work - Frequency	T1702	2.778	55.56%	19	2.625	52.50%	28	2.857	57.14%	22	2.750	55.00%	24
Delays: Unavailability / Unsuitability	T2502	2.474	49.47%	32	3.059	61.18%	18	2.667	53.33%	30	2.725	54.51%	25
Investigation of Suspected Defects -	T1402	2.556	51.11%	27	2.647	52.94%	27	2.600	52.00%	31	2.600	52.00%	27
Late Payment - Frequency	T3602	2.556	51.11%	24	2.563	51.25%	30	2.667	53.33%	27	2.592	51.84%	26
Uncovering of Works For Testing - F	T1502	2.579	51.58%	25	2.400	48.00%	33	2.714	54.29%	27	2.563	51.25%	28
Delays: Inclement Weather, Flood, St	T4902	2.389	47.78%	36	2.313	46.25%	36	2.929	58.57%	18	2.521	50.42%	29
Client's Instruction to Change (not re	T2102	2.389	47.78%	34	2.400	48.00%	33	2.733	54.67%	25	2.500	50.00%	30
Delay: Late Delivery of Materials by	T3002	2.526	50.53%	28	2.353	47.06%	35	2.600	52.00%	31	2.490	49.80%	31
Finance Charges: Loss of Profit, Insu	T4102	2.278	45.56%	38	2.813	56.25%	25	2.400	48.00%	34	2.490	49.80%	32
Error in Setting out Due to Incorrect	T0802	2.579	51.58%	25	2.188	43.75%	39	2.692	53.85%	29	2.479	49.58%	33
Inflation / Price Escalation - Frequen	T3902	2.500	50.00%	30	2.688	53.75%	26	2.214	44.29%	38	2.479	49.58%	33
Currency Fluctuation - Frequency	T4002	2.278	45.56%	36	2.588	51.76%	29	2.357	47.14%	36	2.408	48.16%	35
Additional Work to other Parts arisin	T2002	2.474	49.47%	30	2.529	50.59%	31	2.067	41.33%	40	2.373	47.45%	36
Change in Quality (not resulting from	T0702	2.444	48.89%	32	2.125	42.50%	40	2.400	48.00%	34	2.327	46.53%	37
Interest on Late Payment - Frequency	T3702	2.444	48.89%	34	2.438	48.75%	32	2.000	40.00%	41	2.319	46.38%	38
Facilities provided to others by the cd	T2202	2.263	45.26%	38	2.235	44.71%	38	2.267	45.33%	37	2.255	45.10%	39
Additional Tests to Verify Complianc	T1602	2.211	44.21%	41	1.813	36.25%	42	2.429	48.57%	33	2.143	42.86%	40
Instruction by the Client to Resolve I	T0402	2.222	44.44%	40	2.294	45.88%	37	1.867	37.33%	43	2.140	42.80%	41
Labour Strikes, Civil Unrest, Etc. - F	T4502	1.944	38.89%	42	2.125	42.50%	40	1.786	35.71%	45	1.958	39.17%	42
Overdue retention money - Frequency	T3802	1.737	34.74%	43	1.765	35.29%	43	1.933	38.67%	42	1.804	36.08%	43
Delay: Additional building regulation	T3202	1.706	34.12%	44	1.313	26.25%	51	2.214	44.29%	38	1.723	34.47%	44
Repair damages to other Property dur	T2402	1.684	33.68%	47	1.588	31.76%	47	1.867	37.33%	43	1.706	34.12%	45
Damages to Work due to Inclement V	T5002	1.667	33.33%	47	1.750	35.00%	45	1.643	32.86%	46	1.688	33.75%	46
Loss of / Damage to Materials on Site	T2302	1.684	33.68%	45	1.765	35.29%	43	1.533	30.67%	49	1.667	33.33%	47
Rectification of Damage due to Un E	T5102	1.706	34.12%	45	1.706	34.12%	46	1.429	28.57%	51	1.625	32.50%	48
Expropriation of Contractor's Equipm	T4802	1.526	30.53%	49	1.529	30.59%	50	1.615	32.31%	48	1.551	31.02%	49

Furthermore, the following Table 7-13 presents the agreement of the responses between the respondents groups using the Rank Agreement Factor. The methodology used in computing the RAFs PDs and PAs is based on that described by Okpala & Aniekwu (1988). The agreement between clients and consultants is 82.38 %. In addition, this agreement equals to 86.54 % and 77.85 % for clients and

contractors, as well as consultants and contractors, respectively. It can be clearly seen that the agreement between the clients and contractors is the highest amongst all the groups. It indicates that the both clients and contractors are aware of the frequency of these types since they are the ones who initiate such types. However, this does not mean that they agree on the legitimacy of these types because if they agree on that, then there will not be claims and counter claims from both groups as to the legitimacy of these claims and disputes. These findings are recognised by other researchers such as Yogeswaran (1996), Kumaraswamy (1997, 1998), Poh (2005) and others.

Kumaraswamy (1997) states that "...whilst there is a very good agreement amongst the various groups in the construction industry regarding the frequency of the types of claims and disputes, the general collective disagreement is not surprising. These differences are due to the different vantage points if not the vested interests of the different groups (i.e. clients, consultants and contractors). If there is no such disagreement, disputes will undoubtedly be fewer" (Kumaraswamy, 1997).

Table 7-13 Types of Claims & Disputes (Frequency Rank Agreement Factor Comparison)*

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.49	17.62%	82.38%
Clients & Contractors	3.43	13.46%	86.54%
Consultants & Contractors	5.65	22.15%	77.85%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.24	8.77%	91.23%
Consultants & Over All	3.75	14.69%	85.31%
Contractors & Over All	2.57	10.08%	89.92%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

The second part of this table, 'agreement of each group with over all groups' confirms that the 'the combined over all responses' can be used to assess the frequency of the types of claims and disputes. It can be clearly shown that there is a very high agreement percentage between the rank of these types by each group and the combined overall rank. Since the overall assessment reflects the overall perceived frequency (by all groups), the combined responses can be used to identify the most frequent types of claims and disputes.

7.4.3 PERCEIVED MAGNITUDE (IMPACT/ SEVERITY) ASSESSMENT

In this section, respondents were asked to rate the impact or magnitude of each types of claims on their projects in terms of projects' cost. Respondents were asked to choose one of the following five options to rate the frequency of each type of claims and disputes in construction projects. These options are never, rare (low impact), average, high impact and very high impact. A weight in a scale from 1 to 5 was given for each of the five frequencies with a weight of 1 for "never", 2 for "rare", 3 for "average", 4 for "high impact" and 5 for "very high impact". No weight was given when no response was provided. The analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be severe. On the contrary, If the mean score of a type less than three, then this type is said to be not severe.

General note:

The following **Table 7-14**, **Table 7-15** and **Table 7-16** present the responses for the magnitude/ impact assessment from the three responding groups. These three tables are found in Sections 7.4.3.1, 7.4.3.2 and 7.4.3.3, respectively. Note that the presented top ten severe types of claims and disputes in these tables are extracted from a complete list of type's magnitude/ impact assessment, which can be found in Section 7.4.3.5 and Appendix Y.1.3.1. Furthermore, these responses are presented in a bar chart format, which can be found in Appendix Y.1.3.2).

7.4.3.1 CLIENTS' PERCEPTION

In this section, clients were asked to rate the impact (magnitude) of each type of claims and disputes on a construction project. **Table 7-14** below presents the result of this assessment from clients' perspective.

The table presents the top ten and most severe types of construction claims and disputes that have a great impact on construction projects. Twenty-eight types are perceived by the clients as severe ones, their average mean values are greater than 3,

and their importance index values are greater than 60 %. The remaining twenty-three types are perceived as less severe.

Table 7-14 Types of Claims & Disputes Magnitude Assessment (Clients' Perception)

Code #	Type Impact						Type Impact Index		
	Neg.Res	N	LI	Av	HI	VHI	Avg. Mean	Index	Rank
T1903	0	0	0	1	7	11	4.53	90.53%	1
T0303	0	0	0	2	11	6	4.21	84.21%	2
T2603	0	0	0	4	7	8	4.21	84.21%	3
T1103	2	0	1	2	8	6	4.12	82.35%	4
T1203	1	0	0	5	8	5	4.00	80.00%	5
T1303	2	0	1	4	7	5	3.94	78.82%	6
T0103	0	0	1	7	6	5	3.79	75.79%	7
T3103	0	0	0	6	11	2	3.79	75.79%	7
T2803	1	0	0	8	6	4	3.78	75.56%	9
T1003	0	0	0	9	6	4	3.74	74.74%	10
T3503	0	0	0	8	8	3	3.74	74.74%	10
T0203	0	0	0	8	8	3	3.74	74.74%	10

The most severe types of claims and disputes as perceived by clients are as follows:

- T1903 Variations;
- T0303 Design/ change/ omission / errors by the client or (engineer);
- T2603 D. D. R. P.: Due to variation;
- T1103 Differing site condition;
- T1203 Unanticipated soil condition;
- T1303 D. D. R. P.: Due to unforeseen ground condition/ unforeseeable obstruction;
- T0103 Ambiguity in documents;
- T3103 D. D. R. P.: Due to delay caused by utility services organization;
- T2803 D. D. R. P.: Due to late issue of consent (approval);
- T0203 Delays: Incomplete design/ insufficient information by client/ consultant;
- T1003 Delayed site possession/ works/ restricted access;
- T3503 Extension of time for completion;
- T0903 Change of project profile and site;
- T2703 D. D. R. P.: Due to late instruction by client/ consultant engineer;
- T0503 Rectification of works/ specification change due to defective design;
- T1803 Acceleration of works;
- T4303 Default of subcontractor, nominated subcontractor or suppliers;
- T4403 Unproductive / idle plants, equipment or labour;

- T2903 D. D. R. P: Due to delay caused by any person/ organization employed by client such as (nominated subcontractor, suppliers or others);
- T3603 Late payment;
- T3303 Client’s breach of contract;
- T2103 Client’s instruction to change;
- T3003 D. D. R. P.: Due to late delivery of materials by the client;
- T4903 D. D. R. P.: Inclement weather, flood, storms, etc.;
- T1703 Suspension of work;
- T0603 Substantial increase in quantity of any item;
- T4203 Liquidated and ascertained damages;
- T1403 Investigation of suspected defects;

It can be noted that **T1903, “Variation”** is rated as the most severe type of claims and disputes with an average score of 4.53 and important index of 90.53 %. Out of 19 clients, 18 responded that this type has a high impact effect on construction projects. However, **T4703, “Embargoes on project imported items”** claims and disputes is ranked the lowest as it has an average score of 1.53 and important index of 30.59 %, where seventeen clients answered that it is not severe.

7.4.3.2 CONSULTANTS’ PERCEPTION

Similarly, consultants were asked to rate the impact (magnitude) of each type of claims and disputes on a construction project. The following **Table 7-15** shows the responses of consultants for the Impact assessment.

Table 7-15 Types of Claims & Disputes Magnitude Assessment (Consultants’ Perception)

Code #	Type Impact						Type Impact Index		
	Neg.Re	N	LI	Av	HI	VHI	Mean	Index	Rank
T2603	1	0	0	1	9	6	4.31	86.25%	1
T1903	0	0	0	1	10	6	4.29	85.88%	2
T2803	1	0	0	3	9	4	4.06	81.25%	3
T1203	1	0	0	3	10	3	4.00	80.00%	4
T0303	0	0	0	5	9	3	3.88	77.65%	5
T1303	2	0	0	4	9	2	3.87	77.33%	6
T3503	0	0	0	6	7	3	3.81	76.25%	7
T1003	0	0	0	6	10	1	3.71	74.12%	8
T3103	1	0	0	8	6	2	3.63	72.50%	9
T0903	1	0	0	8	7	1	3.56	71.25%	10

From **Table 7-15** above, it can be clearly noted that **T2603, “Delays or disruption to the regular progress due to variation”** is perceived as the most severe type of claims and disputes by the consultants. This type has an average score of 4.31 and important index of 86.25 %. Moreover, **T1903, “Variation”** is ranked the second highest with an average score of 4.3 and important index of 85.88 %. On the other hand, **T4703, “Embargoes on project imported items”** claims and disputes is ranked the lowest as it has an average score of 1.47 and important index of 29.41 %. Finally, twenty-seven types are perceived as severe ones by the consultants. The remaining twenty-four types are perceived as less severe. These severe types of claims and disputes as perceived by consultants are listed below:

- T2603 D. D. R. P.: Due to variation;
- T1903 Variations
- T2803 D. D. R. P.: Due to late issue of consent (approval)
- T1203 Unanticipated soil condition
- T0303 Design/ change/ omission / errors by the client or (engineer)
- T1303 D. D. R. P.: Due to unforeseen ground condition/ unforeseeable obstruction
- T3503 Extension of time for completion
- T1003 Delayed site possession/ works/ restricted access
- T3103 D. D. R. P.: Due to delay caused by utility services organization
- T0903 Change of project profile and site
- T2703 D. D. R. P.: Due to late instruction by client/ consultant engineer
- T4303 Default of subcontractor, nominated subcontractor or suppliers
- T1103 Differing site condition
- T0103 Ambiguity in documents
- T1803 Acceleration of works
- T2903 D. D. R. P: Due to delay caused by any person/ organization employed by client such as (nominated subcontractor, suppliers or others)
- T0203 Delays: Incomplete design/ insufficient information by client/ consultant
- T0503 Rectification of works/ specification change due to defective design
- T4403 Unproductive / idle plants, equipment or labour
- T3303 Client’s breach of contract
- T1703 Suspension of work
- T1403 Investigation of suspected defects

- T4203 Liquidated and ascertained damages
- T3603 Late payment
- T0603 Substantial increase in quantity of any item
- T2503 Delays: Unavailability / unsuitability of project materials
- T3903 Inflation / price escalation

7.4.3.3 CONTRACTORS' PERCEPTION

In the same way, contractors were asked to rate the impact (magnitude) of each type of claims and disputes on a construction project. **Table 7-16** below presents the result of this assessment from contractors' perspective.

Table 7-16 Types of Claims & Disputes Magnitude Assessment (Contractors' Perception)

Code #	Type Impact						Type Impact Index		
	Neg.Resp.	N	LI	Av	HI	VHI	Mean	Index	Rank
T1903	0	0	0	0	5	10	4.67	93.33%	1
T2603	2	0	0	1	4	8	4.54	90.77%	2
T0303	0	0	0	2	3	10	4.53	90.67%	3
T1103	1	0	0	1	9	4	4.21	84.29%	4
T0903	2	0	0	3	6	4	4.08	81.54%	5
T1303	1	0	0	3	7	4	4.07	81.43%	6
T1203	0	0	0	4	7	4	4.00	80.00%	7
T0103	0	0	1	2	8	4	4.00	80.00%	7
T0503	0	0	0	3	10	2	3.93	78.67%	9
T1003	0	0	0	6	5	4	3.87	77.33%	10

T1903, **T2603** and **T0303** are the top three types from a contractor's perspective and they have important index of over 90% with the highest being 93.33 % for **T1903**, "**Variations**", and with an average score of 4.67, 4.54 and 4.53, respectively. Moreover, twenty-eight types are perceived as severe ones by the contractors. The remaining twenty-three types are perceived as less severe. These severe types of claims and disputes as perceived by consultants are listed below:

- T1903 Variations
- T2603 D. D. R. P.: Due to variation
- T0303 Design/ change/ omission / errors by the client or (engineer)
- T1103 Differing site condition
- T0903 Change of project profile and site
- T1303 D. D. R. P.: Due to unforeseen ground condition/ unforeseeable obstruction
- T0103 Ambiguity in documents

- T1203 Unanticipated soil condition
- T0503 Rectification of works/ specification change due to defective design
- T1003 Delayed site possession/ works/ restricted access
- T2803 D. D. R. P.: Due to late issue of consent (approval)
- T0203 Delays: Incomplete design/ insufficient information by client/ consultant
- T3103 D. D. R. P.: Due to delay caused by utility services organization
- T3503 Extension of time for completion
- T2703 D. D. R. P.: Due to late instruction by client/ consultant engineer
- T1803 Acceleration of works
- T4303 Default of subcontractor, nominated subcontractor or suppliers
- T1703 Suspension of work
- T3603 Late payment
- T4203 Liquidated and ascertained damages
- T2903 D. D. R. P: Due to delay caused by any person/ organization employed by client such as (nominated subcontractor, suppliers or others)
- T3303 Client's breach of contract
- T4903 D. D. R. P.: Inclement weather, flood, storms, etc.
- T2103 Client's instruction to change (not resulting from variation)
- T3003 D. D. R. P.: Due to late delivery of materials by the client
- T4403 Unproductive / idle plants, equipment or labour
- T1503 Uncovering of works for testing (examination)
- T2503 Delays: Unavailability / unsuitability of project materials

7.4.3.4 OVERALL PERCEIVED IMPACT / MAGNITUDE ASSESSMENT

Finally, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 7-17** below. In general, the most severe types of claims and disputes are twenty-six types as perceived by all respondents. However, twenty-five types are perceived as less severe.

Table 7-17 Types of Claims & Disputes Magnitude Assessment (Overall Perception)

Code #	Type Impact						Type Impact Index		
	Neg.Resp.	N	LI	Av	HI	VHI	Mean	Index	Rank
T1903	0	0	0	2	22	27	4.49	89.80%	1
T2603	3	0	0	6	20	22	4.33	86.67%	2
T0303	0	0	0	9	23	19	4.20	83.92%	3
T1203	2	0	0	12	25	12	4.00	80.00%	4
T1303	5	0	1	11	23	11	3.96	79.13%	5
T1103	5	0	2	11	21	12	3.93	78.70%	6
T2803	3	0	0	17	20	11	3.88	77.50%	7
T0903	4	0	1	16	23	7	3.77	75.32%	8
T1003	0	0	0	21	21	9	3.76	75.29%	9
T3503	0	0	0	22	19	9	3.74	74.80%	10

The most severe types of claims and disputes based on the combination of all the respondents' response as perceived by them are as follows:

- T1903 Variations
- T2603 D. D. R. P.: Due to variation
- T0303 Design/ change/ omission / errors by the client or (engineer)
- T1203 Unanticipated soil condition
- T1303 D. D. R. P.: Due to unforeseen ground condition/ unforeseeable obstruction
- T1103 Differing site condition
- T2803 D. D. R. P.: Due to late issue of consent (approval)
- T0903 Change of project profile and site
- T1003 Delayed site possession/ works/ restricted access
- T3503 Extension of time for completion
- T0103 Ambiguity in documents
- T3103 D. D. R. P.: Due to delay caused by utility services organization
- T2703 D. D. R. P.: Due to late instruction by client/ consultant engineer
- T0503 Rectification of works/ specification change due to defective design
- T0203 Delays: Incomplete design/ insufficient information by client/ consultant
- T1803 Acceleration of works
- T4303 Default of subcontractor, nominated subcontractor or suppliers
- T2903 D. D. R. P: Due to delay caused by any person/ organization employed by client such as (nominated subcontractor, suppliers or others)
- T4403 Unproductive / idle plants, equipment or labour
- T1703 Suspension of work

- T3603 Late payment
- T3303 Client's breach of contract
- T4203 Liquidated and ascertained damages
- T2103 Client's instruction to change (not resulting from variation)
- T1403 Investigation of suspected defects
- T0603 Substantial increase in quantity of any item
- T1503 Uncovering of works for testing (examination)

From **Table 7-17** above, it can be clearly noted that **T1903, "Variation"** is perceived as the most severe type of claims and disputes by all respondents. This type has an average score of 4.49 and important index of 89.80 %. Moreover, **T2603, "Delays or disruption to the regular progress due to variation"** is ranked the second highest with an average score of 4.33 and important index of 86.67 %. On the other hand, **T4703, "Embargoes on project imported items"** claims and disputes is ranked the lowest as it has an average score of 1.56 and important index of 31.11 %.

Appendix Y.1.3.2 shows the graphs of the responses from the respondents for the magnitude/impact of all types of claims that have been considered for this assessment.

7.4.3.5 FINDINGS RELATED TO PERCEIVED IMPACT ASSESSMENT

Table 7-18 below is used to compare the types of claims and disputes based on the perceived impact (severity) assessment of the various groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes.

Table 7-18 Types of Claims & Disputes Magnitude Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking
		Clients			Consultants			Contractors			Over All		
Variations - Impact(Magnitude)	T1903	4.526	90.53%	1	4.294	85.88%	2	4.667	93.33%	1	4.490	89.80%	1
Delay: Due To Variation - Impa	T2603	4.211	84.21%	3	4.313	86.25%	1	4.538	90.77%	2	4.333	86.67%	2
Design/ Change/ Omission / Err	T0303	4.211	84.21%	2	3.882	77.65%	5	4.533	90.67%	3	4.196	83.92%	3
Unanticipated Soil Condition - I	T1203	4.000	80.00%	5	4.000	80.00%	4	4.000	80.00%	7	4.000	80.00%	4
Unforeseen Ground Condition/ U	T1303	3.941	78.82%	6	3.867	77.33%	6	4.071	81.43%	6	3.957	79.13%	5
Differing Site Condition - Impac	T1103	4.118	82.35%	4	3.467	69.33%	13	4.214	84.29%	4	3.935	78.70%	6
Delay: Due To Late Approval - I	T2803	3.778	75.56%	9	4.063	81.25%	3	3.786	75.71%	11	3.875	77.50%	7
Change of Project Profile and Si	T0903	3.722	74.44%	13	3.563	71.25%	10	4.077	81.54%	5	3.766	75.32%	8
Delayed Site Possession/ Restr	T1003	3.737	74.74%	10	3.706	74.12%	8	3.867	77.33%	10	3.765	75.29%	9
Extension of Time For Complet	T3503	3.737	74.74%	10	3.813	76.25%	7	3.667	73.33%	14	3.740	74.80%	10
Ambiguity in Documents - Impa	T0103	3.789	75.79%	7	3.412	68.24%	14	4.000	80.00%	7	3.725	74.51%	11
Delay: Caused by Utility Service	T3103	3.789	75.79%	7	3.625	72.50%	9	3.714	74.29%	13	3.714	74.29%	12
Delay: Due To Late Instruction b	T2703	3.722	74.44%	13	3.500	70.00%	11	3.643	72.86%	15	3.625	72.50%	13
Defective Design: Rectification	T0503	3.632	72.63%	15	3.294	65.88%	17	3.933	78.67%	9	3.608	72.16%	14
Delays: Incomplete Design/ Insu	T0203	3.737	74.74%	10	3.294	65.88%	17	3.733	74.67%	12	3.588	71.76%	15
Acceleration of Works - Impact	T1803	3.500	70.00%	16	3.375	67.50%	15	3.571	71.43%	16	3.479	69.58%	16
Default of Subcontractor, Nomin	T4303	3.421	68.42%	17	3.471	69.41%	12	3.467	69.33%	17	3.451	69.02%	17
Delay: caused by client or emplo	T2903	3.316	66.32%	19	3.313	66.25%	16	3.286	65.71%	21	3.306	66.12%	18
Unproductive / Idle Plants, Equip	T4403	3.412	68.24%	18	3.250	65.00%	19	3.071	61.43%	25	3.255	65.11%	19
Suspension of Work - Impact(M	T1703	3.056	61.11%	25	3.200	64.00%	21	3.429	68.57%	18	3.213	64.26%	20
Late Payment - Impact(Magnitud	T3603	3.222	64.44%	20	3.125	62.50%	24	3.286	65.71%	19	3.208	64.17%	21
Client's Breach of Contract - Im	T3303	3.158	63.16%	21	3.235	64.71%	20	3.200	64.00%	22	3.196	63.92%	22
Liquidated and ascertained dama	T4203	3.053	61.05%	26	3.188	63.75%	22	3.308	66.15%	20	3.167	63.33%	23
Client's Instruction to Change (n	T2103	3.111	62.22%	22	2.933	58.67%	31	3.083	61.67%	24	3.044	60.89%	24
Investigation of Suspected Defec	T1403	3.000	60.00%	28	3.188	63.75%	22	2.923	58.46%	29	3.043	60.85%	25
Quantity Increase (not resulting	T0603	3.053	61.05%	26	3.118	62.35%	25	2.867	57.33%	30	3.020	60.39%	26
Uncovering of Works For Testin	T1503	2.947	58.95%	29	2.941	58.82%	28	3.067	61.33%	27	2.980	59.61%	27
Delays: Inclement Weather, Floc	T4903	3.105	62.11%	23	2.706	54.12%	34	3.143	62.86%	23	2.980	59.60%	28
Delay: Late Delivery of Material	T3003	3.105	62.11%	23	2.750	55.00%	32	3.071	61.43%	25	2.980	59.59%	29
Delays: Unavailability / Unsuita	T2503	2.889	57.78%	30	3.063	61.25%	26	3.000	60.00%	28	2.979	59.58%	30
Inflation / Price Escalation - Imp	T3903	2.611	52.22%	34	3.059	61.18%	27	2.667	53.33%	33	2.780	55.60%	31
Additional Work to other Parts	T2003	2.737	54.74%	31	2.941	58.82%	28	2.600	52.00%	36	2.765	55.29%	32
Late Issuance of final certificate	T3403	2.526	50.53%	37	2.941	58.82%	28	2.667	53.33%	33	2.706	54.12%	33
Error in Setting out Due to Incon	T0803	2.611	52.22%	34	2.400	48.00%	39	2.714	54.29%	32	2.574	51.49%	34
Additional Tests to Verify Comp	T1603	2.684	53.68%	33	2.294	45.88%	40	2.733	54.67%	31	2.569	51.37%	35
Currency Fluctuation - Impact(M	T4003	2.389	47.78%	40	2.750	55.00%	32	2.533	50.67%	37	2.551	51.02%	36
Facilities provided to others by th	T2203	2.722	54.44%	32	2.250	45.00%	42	2.643	52.86%	35	2.542	50.83%	37
Change in Quality (not resulting	T0703	2.588	51.76%	36	2.563	51.25%	35	2.333	46.67%	40	2.500	50.00%	38
Interest on Late Payment - Impac	T3703	2.421	48.42%	39	2.438	48.75%	38	2.429	48.57%	38	2.429	48.57%	39
Instruction by the Client to Reso	T0403	2.474	49.47%	38	2.294	45.88%	40	2.400	48.00%	39	2.392	47.84%	40
Finance Charges: Loss of Profit,	T4103	2.263	45.26%	41	2.533	50.67%	36	2.214	44.29%	42	2.333	46.67%	41
Labour Strikes, Civil Unrest, Etc	T4503	2.222	44.44%	42	2.471	49.41%	37	1.929	38.57%	45	2.224	44.49%	42
Overdue retention money - Impa	T3803	1.947	38.95%	44	2.176	43.53%	43	2.308	46.15%	41	2.122	42.45%	43
Damages to Work due to Inclm	T5003	2.000	40.00%	43	2.059	41.18%	45	2.067	41.33%	44	2.039	40.78%	44
Loss of / Damage to Materials or	T2303	1.895	37.89%	45	2.176	43.53%	43	1.867	37.33%	46	1.980	39.61%	45
Rectification of Damage due to	T5103	1.895	37.89%	45	1.941	38.82%	46	1.643	32.86%	50	1.840	36.80%	46
Custom Tariffs, New Taxes - Im	T4603	1.842	36.84%	47	1.667	33.33%	48	1.800	36.00%	48	1.776	35.51%	47
Repair damages to other Property	T2403	1.778	35.56%	49	1.647	32.94%	49	1.857	37.14%	47	1.755	35.10%	48
Delay: Additional building regul	T3203	1.789	35.79%	48	1.471	29.41%	51	2.077	41.54%	43	1.755	35.10%	48

T1903, “*Variation*” has the highest severity in the table above; it is ranked as the highest by the clients and contractors, and ranked as the second highest by the consultants. In addition, *T2603* “*Delay: due to variation*” is ranked as the second highest over all; however, it is ranked second by contractors and first by consultants. This type is ranked third by clients; this means that there are two more severe types of claims and disputes as perceived by clients. *T0303* “*Design/ change/ omission / errors by the client*” is ranked as the third highest over all, although it is ranked as

third by contractors and second by clients. In contrast, *T4703*, “*Embargoes on project imported items*” claims and disputes is ranked the lowest as it has an average score of 1.56 and important index less than 31.11 %. *T4703* is ranked 51 by clients and contractors, and 50 by consultants. Overall, 26 types appears to be significant; however, from clients perception, 28 types are severe, 27 for consultants and 28 for contractors.

The following **Table 7-19** summarises the results for the ‘Magnitude/Impact Assessment’ using the Rank Agreement Factor. They present the agreement of the responses between the respondents groups. The agreement between clients’ responses and contractors’ responses is 90.92 %. However, the agreement between clients’ responses and consultants’ responses is 85.38%, while the responses agreement between consultants and contractors is 82.77 %. The agreement between the clients and contractors is the highest amongst all the groups.

Table 7-19 Types of Claims & Disputes (Magnitude Rank Agreement Factor Comparison)*

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.73	14.62%	85.38%
Clients & Contractors	2.31	9.08%	90.92%
Consultants & Contractors	4.39	17.23%	82.77%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.67	6.54%	93.46%
Consultants & Over All	2.61	10.23%	89.77%
Contractors & Over All	2.06	8.08%	91.92%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

Looking at the agreement between each group of respondents and overall, there is a 93.46 % agreement between clients response and overall response. That is, the ranking of the types from a clients’ perspective is very close to that of the overall. The agreement between consultants and Overall is 89.77 %, while the agreement between contractors and overall is 91.92 %.

Despite the fact that there is a very good agreement, regarding the severity of the types of claims and disputes amongst the various groups in the construction industry, the general collective disagreement is not surprising. These differences are

due to the different assessment by the different groups. If there is no such disagreement amongst the different groups regarding the severity (magnitude), disputes will definitely be fewer.

7.4.4 PERCEIVED AVOIDABILITY ASSESSMENT

In this section, respondents were asked to rate the degree of avoidability of each type of construction claims and disputes. In another expression, respondents were requested to identify as to how easy or difficult it would be to avoid the claims and disputes from various types by avoiding/ controlling the root causes that lead to such types. Respondents were asked to choose one of the following five options to rate the frequency of each type of claims and disputes in construction projects. These options are never (cannot be avoided), rare (low avoidability), average, high avoidability and very high avoidability. A weight in a scale from 1 to 5 was given for each of the five frequencies with a weight of 1 for “never”, 2 for “rare”, 3 for “average”, 4 for “high avoidability” and 5 for “very high avoidability”. No weight was given when no response was provided. The analysis of the results for this assessment is based on the average score, which equals to three (3.0). This average score is the same as an Important Index of 60%. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be avoidable/ controllable. On the contrary, If the mean score of a type less than three, then this type is said to be unavoidable/ not controllable. Finally, if the score is exactly three, then the type of claim that is under consideration may or may not be avoided; it depends on the underlying cause/s.

General note:

Table 7-20, Table 7-21 and Table 7-22 below illustrate the responses for the avoidability/controllability assessment by the various responding groups. These three tables are found in Sections 7.4.4.1, 7.4.4.2 and 7.4.4.3, respectively. Note that the presented top ten avoidable types of claims and disputes in these tables are extracted from a complete list of type’s avoidability/controllability assessment, which can be found in Section 7.4.4.5 and Appendix Y.1.4.1. Furthermore, these responses are presented in a bar chart format, which can be found in Appendix Y.1.4.2). In addition, the comparison **Table 7-24** in the following Section 7.4.4.5 is used to compare the

avoidability/controllability assessment, for the fifty-one types of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors).

7.4.4.1 CLIENTS' PERCEPTION

This section shows the responses of the avoidability/controllability assessment as perceived by clients. **Table 7-20** below presents their result for the top ten avoidable types of claims and disputes perceived by the clients. .

Table 7-20 Types of Claims & Disputes Avoidability Assessment (Clients' Perception)

Code #	Type Avoidability						Type Avoidability Index		
	Neg.Resp.	N	LA	Av	HA	VHA	Mean	Index	Rank
T0104	0	0	0	1	7	11	4.53	90.53%	1
T0404	0	0	0	4	7	8	4.21	84.21%	2
T0504	0	0	0	2	11	6	4.21	84.21%	2
T0204	0	0	0	4	9	6	4.11	82.11%	4
T0304	0	0	0	4	10	5	4.05	81.05%	5
T0704	0	0	1	4	9	5	3.95	78.95%	6
T0604	0	0	0	8	6	5	3.84	76.84%	7
T1004	0	0	1	7	6	5	3.79	75.79%	8
T1304	0	0	0	6	11	2	3.79	75.79%	8
T0904	0	0	0	9	6	4	3.74	74.74%	10
T1204	0	0	0	7	10	2	3.74	74.74%	10
T1104	0	0	0	8	8	3	3.74	74.74%	10
T2704	0	0	0	8	8	3	3.74	74.74%	10

For this assessment, **T0104** “*Ambiguity in documents*” is ranked as the most avoidable type as it has an average score of 4.53 and important index of 90.53 %. It means that clients think that this type can be avoided by controlling the root causes that could lead to the generation of this type of claims and disputes. There are 39 types with an important index of over 60 %. The top ten most avoidable/ controllable types of claims and disputes based on the clients' response as perceived by them are as follows:

- T0104 Ambiguity in documents
- T0404 Instruction by the client/ consultant to resolve discrepancy
- T0504 Rectification of works/ specification change due to defective design
- T0204 Delays: Incomplete design/ insufficient information by client/ consultant
- T0304 Design/ change/ omission / errors by the client or (engineer)
- T0704 Substantial change in quality of any item (not resulting from a variation)

- T0604 Substantial increase in quantity of any item (not resulting from a variation)
- T1004 Delayed site possession/ works/ restricted access
- T1304 D. D. R. P.: Due to unforeseen ground condition/unforeseeable obstruction
- T0904 Change of project profile and site
- T1104 Differing site condition
- T1204 Unanticipated soil condition
- T2704 D. D. R. P.: Due to late instruction by client/ consultant engineer

It is worth noting that **T0404** and **T0504** are both ranked as number 2 with an average score of 4.21 and important index of 84.21 %; however, the scale responses of the clients for these two types are different. Similarly, **T0904**, **T1104**, **T1204** and **T2704** are ranked as number 10 with an average score of 3.74 and important index of 74.74 %. On the other hand, **T4704**, “*Embargoes on project imported items*” claims and disputes is the least avoidable/ controllable from clients’ prospective, as it has an average score of 2.42 and important index of 48.42 %.

7.4.4.2 CONSULTANTS’ PERCEPTION

Table 7-21 below shows the responses of consultants for this assessment. It presents the results for the top ten avoidable types of claims and disputes perceived by the consultants.

Table 7-21 Types of Claims & Disputes Avoidability Assessment (Consultants’ Perception)

Code #	Type Avoidability						Type Avoidability Index		
	Neg.Resp	N	LA	Av	HA	VHA	Mean	Index	Rank
T0104	0	0	0	1	9	7	4.35	87.06%	1
T0404	0	0	0	2	9	6	4.24	84.71%	2
T0304	0	0	0	3	11	3	4.00	80.00%	3
T0604	0	0	0	4	9	4	4.00	80.00%	3
T0504	0	0	0	5	9	3	3.88	77.65%	5
T0704	0	0	0	4	11	2	3.88	77.65%	5
T1204	0	0	0	6	8	3	3.82	76.47%	7
T0904	0	0	0	6	10	1	3.71	74.12%	8
T1904	0	0	0	7	9	1	3.65	72.94%	9
T1304	0	0	0	8	7	2	3.65	72.94%	9
T0204	1	0	1	8	5	2	3.50	70.00%	11

Forty-two types are perceived as avoidable by the consultants. The remaining nine types are perceived as less avoidable. The top ten most avoidable types of claims and disputes as perceived by consultants are listed below:

- T0104 Ambiguity in documents
- T0404 Instruction by the client/ consultant to resolve discrepancy
- T0304 Design/ change/ omission / errors by the client or (engineer)
- T0604 Substantial increase in quantity of any item
- T0504 Rectification of works/ specification change due to defective design
- T0704 Substantial change in quality of any item (not resulting from a variation)
- T1204 Unanticipated soil condition
- T0904 Change of project profile and site
- T1304 D. D. R. P.: Due to unforeseen ground condition/unforeseeable obstruction
- T1904 Variations
- T0204 Delays: Incomplete design/ insufficient information by client/ consultant

The analysis of the responses shows that there are four types with an important index of over 80 %. These are **T0104**, **T0404**, **T0304** and **T0604**. Moreover, **T1504**, **T4304**, **T3304**, **T3604** and **T3704** all have an average score of 3.18 and important index of 63.53 % and therefore ranked at number 27.

7.4.4.3 CONTRACTORS' PERCEPTION

Similarly, this section analyse the avoidability of each type of construction claims and disputes from a contractors' perspective. **Table 7-22** below shows their response for the top ten avoidable types.

Table 7-22 Types of Claims & Disputes Avoidability Assessment (Contractors' Perception)

Code #	Type Avoidability						Type Avoidability Index		
	Neg.Re	N	LA	Av	HA	VHA	Mean	Index	Rank
T0104	0	0	0	0	6	9	4.60	92.00%	1
T0504	0	0	0	2	3	10	4.53	90.67%	2
T0404	0	0	0	2	4	9	4.47	89.33%	3
T0204	0	0	0	1	10	4	4.20	84.00%	4
T0704	1	0	0	3	6	5	4.14	82.86%	5
T1904	0	0	0	3	7	5	4.13	82.67%	6
T0304	0	0	0	4	7	4	4.00	80.00%	7
T1004	0	0	1	2	8	4	4.00	80.00%	7
T2604	0	0	0	3	10	2	3.93	78.67%	9
T0904	0	0	0	5	7	3	3.87	77.33%	10

For this group of respondents, forty-two types are perceived as avoidable types by the contractors. The remaining nine types are perceived as less avoidable. The top

ten most avoidable types of claims and disputes as perceived by contractors are listed below:

- T0104 Ambiguity in documents
- T0504 Rectification of works/ specification change due to defective design
- T0404 Instruction by the client/ consultant to resolve discrepancy
- T0204 Delays: Incomplete design/ insufficient information by client/ consultant
- T0704 Substantial change in quality of any item (not resulting from a variation)
- T1904 Variations
- T0304 Design/ change/ omission / errors by the client or (engineer)
- T1004 Delayed site possession/ works/ restricted access
- T2604 D. D. R. P.: Due to variation
- T0904 Change of project profile and site

It can be noted that *T0104, “Ambiguity in documents”* is rated as the most avoidable type of claims and disputes with an average score of 4.6, and important index of 92.0 %. All contractors responded that this type is avoidable. In addition, *T0504 “Rectification of works/ specification change due to defective design”* is ranked as number 2 with an average score of 4.53 and Index of 90.67 %. On the contrary, *T4904, “D. D. R. P.: Due to Inclement weather, flood, storms, etc”* claims and disputes is ranked the lowest as it has an average score of 2.4 and important index of 48.0 %, where nine contractors answered that this is a low avoidable type. As mentioned earlier, there are 42 more types with an important index of over 60 %.

7.4.4.4 OVERALL PERCEIVED AVOIDABILITY ASSESSMENT

Finally, the responses of all the respondents regarding the avoidability of types of claims and disputes are analysed in this section, based on the combined responses of the different groups (i.e. clients, consultants and contractors). **Table 7-23** below presents their response for the top ten avoidable types.

Table 7-23 Types of Claims & Disputes Avoidability Assessment (Overall Perception)

Code #	Type Avoidability						Type Avoidability Index		
	Neg.Resp	N	LA	Av	HA	VHA	Mean	Index	Rank
T0104	0	0	0	2	22	27	4.49	89.80%	1
T0404	0	0	0	8	20	23	4.29	85.88%	2
T0504	0	0	0	9	23	19	4.20	83.92%	3
T0304	0	0	0	11	28	12	4.02	80.39%	4
T0704	1	0	1	11	26	12	3.98	79.60%	5
T0204	1	0	1	13	24	12	3.94	78.80%	6
T0604	0	0	0	18	21	12	3.88	77.65%	7
T1904	0	0	1	16	26	8	3.80	76.08%	8
T0904	0	0	0	20	23	8	3.76	75.29%	9
T1004	0	0	4	16	21	10	3.73	74.51%	10

In general, the most avoidable types of claims and disputes are forty-two types as perceived by all respondents. However, nine types are perceived as less avoidable. The top ten most avoidable types of claims and disputes as perceived by contractors are listed below:

- T0104 Ambiguity in documents
- T0404 Instruction by the client/ consultant to resolve discrepancy
- T0504 Rectification of works/ specification change due to defective design
- T0304 Design/ change/ omission / errors by the client or (engineer)
- T0704 Substantial Change in quality of any item (not resulting from a variation)
- T0204 Delays: Incomplete design/ insufficient information by client/ consultant
- T0604 substantial increase in quantity of any item (not resulting from a variation)
- T1904 Variations
- T0904 Change of project profile and site
- T1004 Delayed site possession/ works/ restricted access

It can be noted that **T0104**, “*Ambiguity in documents*” is rated as the most avoidable type of claims and disputes with an average score of 4.49, and important index of 89.9 %. Forty-nine respondents responded that this type is avoidable, and the remaining two respondents responded that it has an average avoidability. Moreover, **T0404** “*Instruction by the client/ consultant to resolve discrepancy*” is ranked as number 2 with an average score of 4.29 and Index of 85.88 %. In addition, **T0504** “*Rectification of works/ specification change due to defective design*” is ranked as number 3 with an average score of 4.2 and index of 83.92 %. On the contrary, **T4904**, “*D. D. R. P.: Due to inclement weather, flood, storms, etc*” claims and disputes is ranked the lowest as it has an average score of 2.51 and important index of 50.2 %,

where twenty-five of the total respondents answered that this is a low avoidable type. As mentioned earlier, there are 42 more types with an important index of over 60 %.

Additionally, Appendix Y.1.4.2 shows the graphs of the responses from the respondents for the avoidability/controllability of all types of claims that have been considered for this assessment.

7.4.4.5 FINDINGS RELATED TO PERCEIVED AVOIDABILITY ASSESSMENT

Section 7.4.4 of this dissertation presents the responses of various groups regarding the avoidability/ controllability of various suggested potential types of construction claims and disputes. Respondents were asked to rate the degree of avoidability of the suggested types of construction claims and disputes. In another expression, respondents were requested to identify as to how easy or difficult it would be to avoid the claims and disputes from various types by avoiding/ controlling the root causes that lead to such types. **Table 7-24** The table below can be used to compare the types of claims and disputes based on the perceived avoidability/controllability assessment of the various groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes. **T0104, “Ambiguity in documents”** is ranked as the most avoidable type of claims and disputes with an average score of 4.49, and important index of 89.9 %. Moreover, **T0404 “Instruction by the client/ consultant to resolve discrepancy”** is ranked as number 2 with an average score of 4.29 and Index of 85.88 %. **T0404** is ranked as number 2 by both clients and consultants and as number 3 by the contractors. In addition, **T0504 “Rectification of works/ specification change due to defective design”** is ranked as number 3 with an average score of 4.2 and Index of 83.92 %. Although **T0504** ranked as number 2 by the clients and contractors, it is ranked as number 5 by the consultants, which therefore made it to be ranked at number 3 in the overall ranking. In contrast, **T4904, “D. D. R. P.: Due to inclement weather, flood, storms, etc”** claims and disputes is ranked the lowest by all groups. It has an overall average score of 2.51 and important index of 50.2 %.

Table 7-24 Types of Claims & Disputes Avoidability Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT														
Type Description	Code	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	
		Clients			Consultants			Contractors			Over All			
Ambiguity in Documents-Avoidability	T0104	4.526	90.53%	1	4.353	87.06%	1	4.600	92.00%	1	4.490	89.80%	1	
Instruction Issued by the Client/Cons	T0404	4.211	84.21%	2	4.235	84.71%	2	4.467	89.33%	3	4.294	85.88%	2	
Rectification of Works/ Specification	T0504	4.211	84.21%	2	3.882	77.65%	5	4.533	90.67%	2	4.196	83.92%	3	
Change of Design/ Design Omission	T0304	4.053	81.05%	5	4.000	80.00%	3	4.000	80.00%	7	4.020	80.39%	4	
Substantial Change in Quality of any	T0704	3.947	78.95%	6	3.882	77.65%	5	4.143	82.86%	5	3.980	79.60%	5	
Delays Due to Incomplete Design/ In	T0204	4.105	82.11%	4	3.500	70.00%	11	4.200	84.00%	4	3.940	78.80%	6	
Substantial Increase in Quantity of an	T0604	3.842	76.84%	7	4.000	80.00%	3	3.800	76.00%	11	3.882	77.65%	7	
Variations -Avoidability	T1904	3.684	73.68%	14	3.647	72.94%	9	4.133	82.67%	6	3.804	76.08%	8	
Change of Project Profile and Site-Av	T0904	3.737	74.74%	10	3.706	74.12%	8	3.867	77.33%	10	3.765	75.29%	9	
Delayed Site Possession/ Restricted A	T1004	3.789	75.79%	8	3.412	68.24%	13	4.000	80.00%	7	3.725	74.51%	10	
Unforeseen Ground Condition/ Unfor	T1304	3.789	75.79%	8	3.647	72.94%	9	3.667	73.33%	14	3.706	74.12%	11	
Unanticipated Soil Condition-Avoida	T1204	3.737	74.74%	10	3.824	76.47%	7	3.467	69.33%	17	3.686	73.73%	12	
Differing Site Condition -Avoidabilit	T1104	3.737	74.74%	10	3.471	69.41%	12	3.800	76.00%	11	3.667	73.33%	13	
Delay/ Disruption to Regular Progres	T2604	3.667	73.33%	15	3.294	65.88%	15	3.933	78.67%	9	3.620	72.40%	14	
Delay/ Disruption to Regular Progres	T2704	3.737	74.74%	10	3.294	65.88%	15	3.733	74.67%	13	3.588	71.76%	15	
Delay/ Disruption to Regular Progres	T2804	3.526	70.53%	16	3.313	66.25%	14	3.667	73.33%	14	3.560	70.00%	16	
Error in Setting out Due to Incorrect	T0804	3.316	66.32%	20	3.250	65.00%	21	3.533	70.67%	16	3.360	67.20%	17	
Acceleration of Works-Avoidability	T1804	3.474	69.47%	17	3.294	65.88%	15	3.267	65.33%	28	3.353	67.06%	18	
Client/ Engineer's Instruction to Char	T2104	3.444	68.89%	18	3.294	65.88%	15	3.267	65.33%	28	3.340	66.80%	19	
Delay/ Disruption to Regular Progres	T2904	3.421	68.42%	19	3.118	62.35%	32	3.333	66.67%	22	3.294	65.88%	20	
Suspension of Work -Avoidability	T1704	3.263	65.26%	21	3.235	64.71%	22	3.333	66.67%	22	3.275	65.49%	21	
Delays Due to the Unavailability/ Ur	T2504	3.105	62.11%	31	3.294	65.88%	15	3.400	68.00%	18	3.255	65.10%	22	
Inflation / Price Escalation-Avoidabil	T3904	3.263	65.26%	21	3.118	62.35%	32	3.400	68.00%	18	3.255	65.10%	22	
Currency Fluctuation-Avoidability	T4004	3.211	64.21%	23	3.235	64.71%	22	3.333	66.67%	22	3.255	65.10%	22	
Extension of Time For Completion-A	T3504	3.105	62.11%	31	3.294	65.88%	15	3.333	66.67%	22	3.235	64.71%	25	
Uncovering of Works For Testing (E	T1504	3.105	62.11%	31	3.176	63.53%	26	3.400	68.00%	18	3.216	64.31%	26	
Liquidated and ascertained damages -	T4204	3.053	61.05%	37	3.235	64.71%	22	3.400	68.00%	18	3.216	64.31%	26	
Additional Tests to Verify Complianc	T1604	3.158	63.16%	24	3.235	64.71%	22	3.200	64.00%	32	3.196	63.92%	28	
Default of Subcontractor, Nominated	T4304	3.158	63.16%	24	3.176	63.53%	26	3.267	65.33%	28	3.196	63.92%	28	
Additional Work (to other parts of the	T2004	3.158	63.16%	24	3.059	61.18%	35	3.333	66.67%	22	3.176	63.53%	30	
Investigation of Suspected Defects-A	T1404	3.105	62.11%	31	3.059	61.18%	35	3.267	65.33%	28	3.137	62.75%	31	
Delay/ Disruption to Regular Progres	T3004	3.158	63.16%	24	2.941	58.82%	42	3.333	66.67%	22	3.137	62.75%	31	
Client's Breach of Contract -Avoidab	T3304	3.105	62.11%	31	3.176	63.53%	26	3.067	61.33%	36	3.118	62.35%	33	
Delay/ Disruption to Regular Progres	T3204	3.158	63.16%	24	3.059	61.18%	35	3.067	61.33%	36	3.098	61.96%	34	
Un Paid Sums (Late Payment)-Avoid	T3694	2.947	58.95%	39	3.176	63.53%	26	3.200	64.00%	32	3.098	61.96%	34	
Rectification of Damages To Other P	T2404	3.158	63.16%	24	2.941	58.82%	42	3.133	62.67%	34	3.078	61.57%	36	
Delay Disruption to Regular Progress	T3104	3.158	63.16%	24	3.059	61.18%	35	3.000	60.00%	42	3.078	61.57%	36	
Un Paid Sums (Late Payment)-Avoid	T3604	3.000	60.00%	38	3.176	63.53%	26	3.067	61.33%	36	3.078	61.57%	36	
Interest on Un Paid Sums (Late Paym	T3704	2.947	58.95%	39	3.176	63.53%	26	3.133	62.67%	34	3.078	61.57%	36	
Facilities provided to others by the co	T2204	3.105	62.11%	31	3.118	62.35%	32	2.933	58.67%	43	3.059	61.18%	40	
Overdue retention money-Avoidabilit	T3804	2.895	57.89%	42	3.059	61.18%	35	3.067	61.33%	36	3.000	60.00%	41	
Custom Tariffs, New Taxes-Avoidab	T4604	2.895	57.89%	42	3.059	61.18%	35	3.067	61.33%	36	3.000	60.00%	41	
Loss of / Damage to Materials on Site	T2304	2.947	58.95%	39	2.941	58.82%	42	3.067	61.33%	36	2.980	59.61%	43	
Finance Charges For Loss Of Profit,	T4104	2.684	53.68%	47	3.059	61.18%	35	2.867	57.33%	45	2.863	57.25%	44	
Late Issuance of final certificate -Avo	T3404	2.833	56.67%	44	2.941	58.82%	42	2.667	53.33%	50	2.820	56.40%	45	
Expropriation of Contractor's Equipm	T4804	2.556	51.11%	49	2.941	58.82%	42	2.867	57.33%	45	2.780	55.60%	46	
Labour Strikes, Civil Unrest, Etc.-Av	T4504	2.684	53.68%	47	2.353	47.06%	49	2.933	58.67%	43	2.647	52.94%	47	
Embargoes on Project Imported Items	T4704	2.421	48.42%	51	2.824	56.47%	47	2.733	54.67%	47	2.647	52.94%	47	
Damages To the Works Due to Except	T5004	2.737	54.74%	45	2.294	45.88%	50	2.733	54.67%	47	2.588	51.76%	49	

The following Table 7-25 present the agreement of the responses between the respondents groups by using the Rank Agreement Factor. From the table below, the agreement of the responses between clients and consultants, clients and contractors, as well as consultants and contractors are 76.69%, 80.08% and 77.54% respectively.

This set of percentage is the lowest out of all the assessment indicators. The agreement between the clients and contractors is the highest amongst all the groups.

Table 7-25 Types of Claims & Disputes (Avoidability Rank Agreement Factor Comparison)*

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	5.94	23.31%	76.69%
Clients & Contractors	5.08	19.92%	80.08%
Consultants & Contractors	5.73	22.46%	77.54%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.31	13.00%	87.00%
Consultants & Over All	3.88	15.23%	84.77%
Contractors & Over All	3.18	12.46%	87.54%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

However, the agreement between contractors' responses and overall's responses is higher than the agreement between other groups of respondents and overall as there is 87.54 % agreement between contractors and overall responses.

A very strong agreement amongst the various groups in the construction industry regarding the avoidability of the types of claims and disputes can be noticed. However, the different views amongst these groups regarding the underlying causes that can generate/trigger these types of claims and disputes may justify the collective disagreement. Section 7.5 discusses the common and potential causes that may lead to the types of claims and disputes. Additionally, Section 8.2 presents the discussion of underlying causes that can generate the different types of claims and disputes. Based on these discussions, the interactions amongst these variables are finally, unveiled.

7.4.5 CLAIMS FOCUS INDICATOR (CFI) INVESTIGATION

The respondents were requested to rate the frequency, impact and avoidability of the types of construction claims and disputes. Accordingly, the most frequent, severe and avoidable/controllable types were identified and ranked as described in sub-Sections 7.4.2, 7.4.3 and 7.4.4, respectively. The purpose of this information is to identify the types of claims that should/ could be minimised in construction projects. However, the results may not directly point out the types of claims and disputes that

should be addressed with a view to minimise them. Hence, A “*Claims focus indicator*” (*CFI*) was formulated to compare the perceived significance of each of these types, through an integration of the scores against the above three ‘dimensions’. This new variable would allow the identification of the types that merit particular attention. The methodology used in computing the *CFI* is based on that described by Yogeswaran (1996) and Kumaraswamy (1998).

The recommended managerial attention on minimising construction claims and disputes arising from specific types is taken to depend on the following factors:

- Relative frequency of types of claims and disputes, in another word; how often these types of claims occur. For example, if a specific type of claims occurs in every project, then higher priority is given to minimise that type.
- Relative impact (magnitude) of types of claims and disputes, in another word; the magnitude expressed as a percentage of original contract value. For example, if a specific type of claims appears to be severe or with a higher magnitude, then higher priority is given to minimise that type.
- Relative avoidability of types of claims and disputes is that a specific type is avoidable by avoiding/ controlling the root cause/s that can contribute to the generation of such type. In another word, how easy it is to avoid these types of claims and disputes. For example, if a specific type of claims can be avoided very easily, then priority is given to find ways to minimise such type.

Each value associated with these variables (frequency, magnitude and avoidability) was given a different weighting so that the weighted sum of the responses of these three variables would result in a new combined variable termed “*Claims focus indicator*” (*CFI*). The following weighting factors were assigned (as a proportion of a new variable indicator):

Frequency K_f

Magnitude K_m

Avoidability K_a

$$K_f + K_m + K_a = 1$$

These weighting factors K_f , K_m and K_a were introduced, before integrating the scores, to permit weighting of the relative importance (in a given scenario) of the magnitude, frequency and avoidability of potential types of claims and disputes on a given project.

The 'CFI' for each type of claims and disputes is then computed as:

$$CFI = K_f R_f + K_m R_m + K_a R_a$$

Where, R_f , R_m and K_a are derived from the survey data, and K_f , K_m and K_a are chosen by management depending on the desired relative weightings (e.g. to focus on controlling potentially more frequent/ larger value/ more avoidable claims).

Different sets of values (7 sets) for the weighting factors K_f , K_m and K_a were used in calculating the *CFI*. These sets were used in order to compare the sensitivities to such variations. Despite the assumption of different values for the weighting factors, the results showed a similar trend. This can be shown in the following subSections. **Table 7-26** below presents the different sets for the 'weighting factors values' used in calculating the 'CFI'. Furthermore, the average score values of the 'frequency', 'magnitude' and 'avoidability', which were discussed in previous sections, are used with these seven sets of weighting factors to calculate the *CFI* values. Hence, the *CFI* value for a type of claims and disputes can range from 1 to 5 (Importance Index range from 20 % to 100 %).

Table 7-26 Different sets for the 'Weighting Factors Values' used in calculating the 'CFI'

SET No.	Kf	Km	Ka	TOTAL
1	0.35	0.15	0.5	1
2	0.5	0.15	0.35	1
3	0.35	0.5	0.15	1
4	0.15	0.5	0.35	1
5	0.5	0.35	0.15	1
6	0.15	0.35	0.5	1
7	0.333	0.333	0.333	0.999

The *CFI* Indicator will have a higher value for those claims that ‘should’/ can easily be minimised and a lower value for those types of claims and disputes that ‘need not’/ could not/ are difficult to be minimised. These factors are tabulated to represent the above proposal as in the following **Table 7-27**.

Table 7-27 Claims & Disputes Focus Indicator (CFI): Variables & Their Weighting Factor *

Scale used in Survey	Frequency (K_f)		Magnitude (K_m)		Avoidability (K_a)	
	5	Very high Frequency	$5 * K_f$	Very high Magnitude	$5 * K_m$	Very easy to avoid/minimise
4	High Frequency	$4 * K_f$	High Magnitude	$4 * K_m$	Easy to avoid	$4 * K_a$
3	Average	$3 * K_f$	Average	$3 * K_m$	Average	$3 * K_a$
2	Low Frequency	$2 * K_f$	Low Magnitude	$2 * K_m$	Difficult to avoid	$2 * K_a$
1	Very Low Frequency	$1 * K_f$	Very Low Magnitude	$1 * K_m$	Very difficult to avoid	$1 * K_a$

(* Note: **Table 7-27** is adapted from Yogeswaran, 1996)

These indicators were obtained from the responses for each responding group (i.e. clients, consultants and contractors) and for over all responses. It is worth noting that the types of claims with CFI average values above three (important index above 60 %) are chosen as ‘types of claims that are *significant*’. However, these significant types of claims and disputes can be prioritised. The *first priority* will be for those types that are frequent, severe and avoidable (their frequency, magnitude and avoidability mean values >3). In addition, the *second priority* will be for those types with one or more of their indicators have value less than three (i.e. R_f , R_m or $R_a <3$). Contrary, the types of claims with CFI average values below three (important index below 60 %) are chosen as ‘types of claims that are *insignificant*’, even if one or more of their indicators have value more than three (i.e. R_f , R_m or $R_a <3$). Hence, these types of claims and disputes can be prioritised as follows:

- Significant types, which require first priority, are those with CFI value more than three and their R_f , R_m or R_a values are more than three.
- Significant types, which require second priority, are those with CFI value more than three, and their R_f , R_m or R_a values are less than three.
- Insignificant types are those ones with CFI value less than three.

For example; two types can have CFI values > 3 ; however, the priority will be given for the type that is frequent, severe and avoidable. The following example illustrates these cases:

Table 7-28 An example illustrating the priority of the significant types and their CFI values based on the frequency, magnitude, avoidability values for these types of claims and disputes.

CODE	F	M	A	* CFI MEDIAN	RESULT
T19	3.94	4.29	3.65	3.96	SIG-1st Priority
T42	3.18	3.19	3.06	3.14	SIG-1st Priority
T06	2.94	3.12	4.00	3.35	SIG-2nd Priority
T17	2.63	3.20	3.24	3.02	SIG-2nd Priority
T34	3.06	2.94	2.94	2.98	NOT SIG
T04	2.29	2.29	4.24	2.97	NOT SIG
T14	2.65	3.19	3.06	2.96	NOT SIG

* (Note that these CFI median values are based on the seven sets of values for K_f , K_m or K_a as shown in the following sections).

It can be seen from the **Table 7-28** above that **T19** and **T42** have CFI value more than three; R_f , R_m and R_a values are more than three as well. Hence, **T19** and **T42** are considered significant types of claims and disputes with *first priority* to be avoided/ minimised. However, **T06** and **T17** have CFI value more than three; R_m and R_a values are more than three, but R_f values are less than three. Thus, **T06** and **T17** are considered significant types of claims and disputes with *second priority* to be avoided/ minimised. Note that **T06** has a CFI value of 3.14, which is greater than **T42** (3.14); however, it is considered *second priority* since its R_f value is less than three (2.94). Contrary, **T34**, **T04** and **T14** have CFI value less than three even one or more

of their indicator's values (i.e. R_f , R_m and R_a) are more than three. Hence, **T34**, **T04** and **T14** are considered '*insignificant*' types of claims and disputes.

Furthermore, the analysis shows that twenty-two of the fifty-one postulated types of claims and disputes emerged as relatively more significant (i.e. $CFI > 3$) than the other twenty-nine; however, only sixteen of them need first priority attention. These findings will be explained and discussed in details in the following sections.

Thus, the focus of the discussion and analysis in the next stage will be on those types that are *significant* and need *first priority* attention by construction managers to avoid. These types are frequent, severe and should'/ can easily be minimised.

7.4.5.1 CLIENTS' PERCEPTION:

Table 7-29 below displays the calculated CFI values in a descending order from clients' perception. These CFI values are based on the values for the frequency, magnitude and avoidability of these types of claims and disputes. In addition, it presents the seven sets of weighting factors that are used to calculate the CFI values for each type of claims and disputes and to show the trend of these types. They are ranked based on their calculated median for the 'seven set' CFI values, as well as their priority of importance to avoid/minimise.

From this table, it can be seen that sixteen types are found significant ($CFI > 3$) with first priority to avoid and the remaining thirty-five are not. These significant types are more frequent, severe and 'need/can' be avoided/ minimised. **T19** "*Variations*", is found to be the most significant type of claims with a CFI value of 4.11. The second and third most significant ones are **T03** and **T01** with CFI score of 4.04 and 3.93, respectively. Furthermore, six types are found to be significant with *second priority* to avoid/minimise. They are classified as such since they are not frequent; these types are **T18**, **T06**, **T29**, **T44**, **T33** and **T17**. On the other hand, twenty-nine types are found insignificant with **T47** and **T48** having the lowest median score of 1.91 and 1.78, respectively. These values are presented in **Figure 7-8** below to show the trend of these types based on the seven set weighting factors.

Table 7-29 Types of Claims & Disputes CFI Assessment (Clients' Perception)

SET Number	Kf	Km	Ka	TOTAL	
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK (
2	0.50	0.15	0.35	1.00	Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),
3	0.35	0.50	0.15	1.00	
4	0.15	0.50	0.35	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES: 22
5	0.50	0.35	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority 16
6	0.15	0.35	0.50	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority 6
7	0.33	0.33	0.33	1.00	TOTAL NUMBER OF INSIGNIFICANT TYPES: 29

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	4.12	4.53	3.68	3.96	4.03	4.26	4.17	4.20	4.04	4.11	3.96	4.26	4.11	YES	SIG-1st Priority	1
T03	3.88	4.21	4.05	4.02	3.99	4.07	4.11	4.02	4.08	4.04	3.99	4.11	4.04	YES	SIG-1st Priority	2
T01	3.47	3.79	4.53	4.05	3.89	3.79	4.00	3.74	4.11	3.93	3.74	4.11	3.93	YES	SIG-1st Priority	3
T11	3.79	4.12	3.74	3.81	3.82	3.95	3.94	3.90	3.88	3.88	3.81	3.95	3.88	YES	SIG-1st Priority	4
T26	3.74	4.21	3.67	3.77	3.78	3.96	3.95	3.89	3.87	3.87	3.77	3.96	3.87	YES	SIG-1st Priority	5
T12	3.83	4.00	3.74	3.81	3.82	3.90	3.88	3.88	3.84	3.85	3.81	3.90	3.85	YES	SIG-1st Priority	6
T13	3.67	3.94	3.79	3.77	3.75	3.82	3.85	3.78	3.82	3.80	3.75	3.85	3.80	YES	SIG-1st Priority	7
T02	3.42	3.74	4.11	3.81	3.71	3.68	3.82	3.63	3.87	3.75	3.63	3.87	3.75	YES	SIG-1st Priority	8
T09	3.61	3.72	3.74	3.69	3.67	3.69	3.71	3.67	3.71	3.69	3.67	3.71	3.69	YES	SIG-1st Priority	9
T05	3.17	3.63	4.21	3.76	3.60	3.56	3.76	3.49	3.85	3.67	3.49	3.85	3.67	YES	SIG-1st Priority	10
T10	3.32	3.74	3.79	3.62	3.54	3.60	3.69	3.53	3.70	3.61	3.53	3.70	3.61	YES	SIG-1st Priority	11
T27	3.33	3.72	3.74	3.59	3.53	3.59	3.67	3.53	3.67	3.59	3.53	3.67	3.59	YES	SIG-1st Priority	12
T28	3.44	3.78	3.53	3.54	3.52	3.62	3.64	3.57	3.60	3.58	3.52	3.64	3.58	YES	SIG-1st Priority	13
T31	3.53	3.79	3.16	3.38	3.44	3.60	3.53	3.56	3.43	3.49	3.38	3.60	3.49	YES	SIG-1st Priority	14
T35	3.61	3.74	3.11	3.38	3.45	3.60	3.50	3.58	3.40	3.48	3.38	3.60	3.48	YES	SIG-1st Priority	15
T43	3.28	3.42	3.05	3.19	3.22	3.32	3.27	3.29	3.22	3.25	3.19	3.32	3.25	YES	SIG-1st Priority	16
T18	2.78	3.50	3.47	3.23	3.13	3.24	3.38	3.13	3.38	3.25	3.13	3.38	3.24	NO	SIG-2nd Priority	17
T06	2.74	3.05	3.84	3.34	3.17	3.06	3.28	3.01	3.40	3.21	3.01	3.40	3.21	NO	SIG-2nd Priority	18
T29	2.78	3.32	3.42	3.18	3.08	3.14	3.27	3.06	3.29	3.17	3.06	3.29	3.17	NO	SIG-2nd Priority	19
T44	2.79	3.41	3.16	3.07	3.01	3.16	3.23	3.06	3.19	3.12	3.01	3.23	3.12	NO	SIG-2nd Priority	20
T33	2.94	3.16	3.11	3.06	3.03	3.08	3.11	3.04	3.10	3.07	3.03	3.11	3.07	NO	SIG-2nd Priority	21
T17	2.78	3.06	3.26	3.06	2.99	2.99	3.09	2.95	3.12	3.03	2.95	3.12	3.03	NO	SIG-2nd Priority	22
T07	2.44	2.59	3.95	3.22	2.99	2.74	3.04	2.72	3.25	2.99	2.72	3.25	2.99	NO	NOT SIG	23
T21	2.39	3.11	3.44	3.03	2.87	2.91	3.12	2.80	3.17	2.98	2.80	3.17	2.98	NO	NOT SIG	24
T04	2.22	2.47	4.21	3.25	2.96	2.65	3.04	2.61	3.30	2.97	2.61	3.30	2.97	NO	NOT SIG	25
T30	2.53	3.11	3.16	2.93	2.83	2.91	3.04	2.82	3.04	2.93	2.82	3.04	2.93	NO	NOT SIG	26
T36	2.56	3.22	3.00	2.88	2.81	2.96	3.04	2.86	3.01	2.92	2.81	3.04	2.92	NO	NOT SIG	27
T14	2.56	3.00	3.11	2.90	2.81	2.86	2.97	2.79	2.99	2.88	2.79	2.99	2.88	NO	NOT SIG	28
T15	2.58	2.95	3.11	2.90	2.82	2.84	2.95	2.79	2.97	2.87	2.79	2.97	2.87	NO	NOT SIG	29
T08	2.58	2.61	3.32	2.95	2.84	2.71	2.85	2.70	2.96	2.83	2.70	2.96	2.84	NO	NOT SIG	30
T25	2.47	2.89	3.11	2.85	2.76	2.78	2.90	2.71	2.93	2.82	2.71	2.93	2.82	NO	NOT SIG	31
T42	2.63	3.05	2.68	2.72	2.71	2.85	2.86	2.79	2.81	2.79	2.71	2.86	2.79	NO	NOT SIG	32
T20	2.47	2.74	3.16	2.86	2.75	2.71	2.84	2.67	2.91	2.79	2.67	2.91	2.79	NO	NOT SIG	33
T22	2.26	2.72	3.11	2.75	2.63	2.62	2.79	2.55	2.84	2.69	2.55	2.84	2.69	NO	NOT SIG	34
T16	2.21	2.68	3.16	2.76	2.61	2.59	2.78	2.52	2.85	2.68	2.52	2.85	2.68	NO	NOT SIG	35
T49	2.39	3.11	2.53	2.57	2.54	2.77	2.80	2.66	2.71	2.67	2.54	2.80	2.67	NO	NOT SIG	36
T39	2.50	2.61	2.89	2.71	2.65	2.61	2.69	2.60	2.74	2.67	2.60	2.74	2.67	NO	NOT SIG	37
T40	2.28	2.39	3.26	2.79	2.64	2.48	2.68	2.46	2.81	2.64	2.46	2.81	2.64	NO	NOT SIG	38
T34	2.50	2.53	2.83	2.67	2.62	2.56	2.63	2.56	2.68	2.62	2.56	2.68	2.62	NO	NOT SIG	39
T37	2.44	2.42	2.95	2.69	2.62	2.51	2.61	2.51	2.69	2.60	2.51	2.69	2.61	NO	NOT SIG	40
T41	2.28	2.26	3.21	2.74	2.60	2.41	2.60	2.41	2.74	2.58	2.41	2.74	2.60	NO	NOT SIG	41
T45	1.94	2.22	2.68	2.36	2.25	2.19	2.34	2.15	2.41	2.28	2.15	2.41	2.28	NO	NOT SIG	42
T32	1.71	1.79	3.16	2.44	2.23	1.97	2.26	1.95	2.46	2.22	1.95	2.46	2.23	NO	NOT SIG	43
T24	1.68	1.78	3.16	2.44	2.21	1.95	2.25	1.94	2.45	2.20	1.94	2.45	2.21	NO	NOT SIG	44
T38	1.74	1.95	2.95	2.37	2.19	2.02	2.27	1.99	2.42	2.21	1.99	2.42	2.21	NO	NOT SIG	45
T23	1.68	1.89	2.95	2.35	2.16	1.98	2.23	1.95	2.39	2.17	1.95	2.39	2.17	NO	NOT SIG	46
T50	1.67	2.00	2.74	2.25	2.09	1.99	2.21	1.94	2.32	2.13	1.94	2.32	2.13	NO	NOT SIG	47
T51	1.71	1.89	2.74	2.25	2.10	1.95	2.16	1.93	2.29	2.11	1.93	2.29	2.11	NO	NOT SIG	48
T46	1.35	1.84	2.89	2.20	1.97	1.83	2.14	1.76	2.30	2.03	1.76	2.30	2.03	NO	NOT SIG	49
T48	1.53	1.67	2.56	2.06	1.91	1.75	1.96	1.73	2.09	1.91	1.73	2.09	1.91	NO	NOT SIG	50
T47	1.39	1.53	2.42	1.93	1.77	1.61	1.82	1.59	1.95	1.78	1.59	1.95	1.78	NO	NOT SIG	51

In addition, Figure 7-9 below presents the seven sets of the significant types of claims and disputes with first priority to avoid/minimise. These types have average score greater than three. They are frequent, severe and can/need to be avoided. T19 and T03 are the top two and the only ones with an average score value greater than 4.

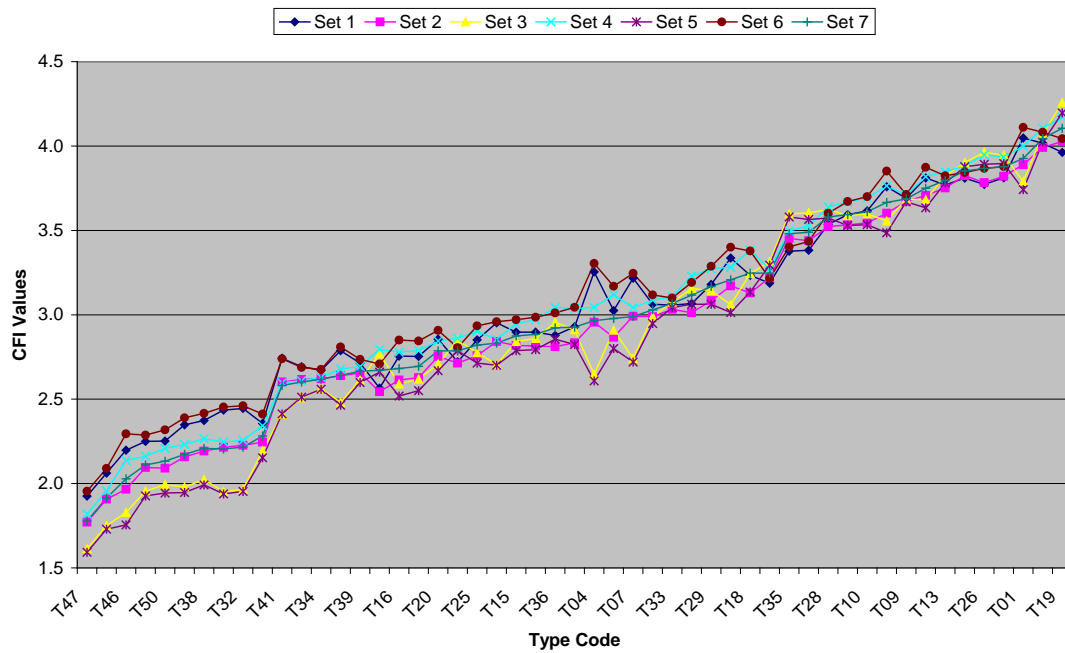


Figure 7-8 Types of Claims & Disputes (CFI) Assessment: All Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Clients’ Perception’.

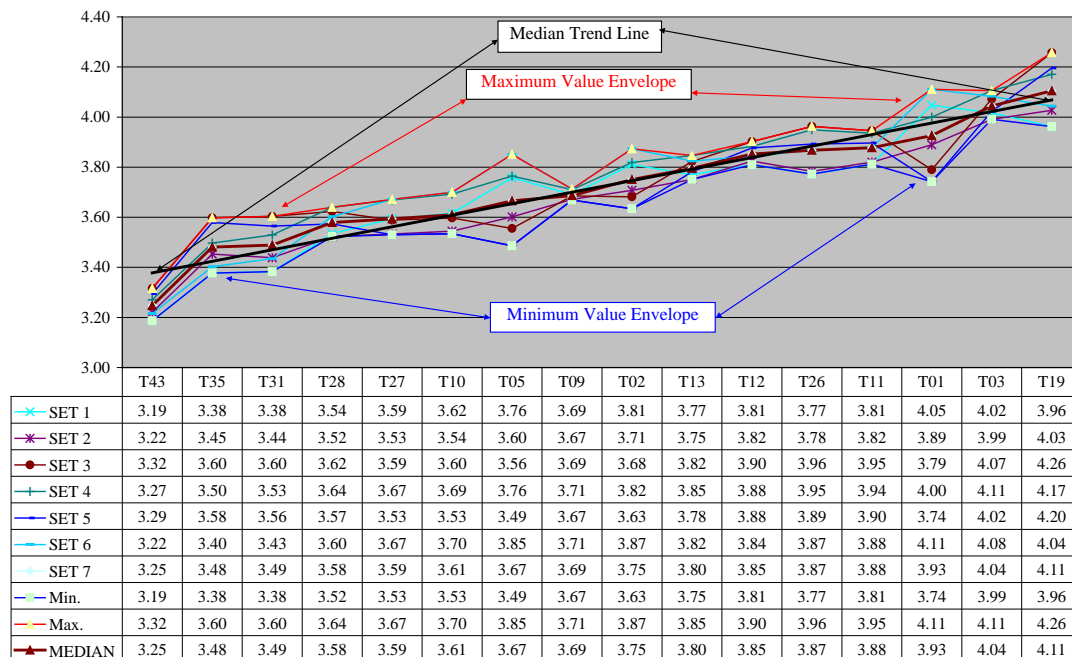


Figure 7-9 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Clients’ Perception’.

7.4.5.2 CONSULTANT’S PERCEPTION

Similarly, the following Table 7-30 presents the calculated CFI values in a descending order based on perceived frequency, magnitude and avoidability of these types of claims and disputes from a consultants’ perception.

Table 7-30 Types of Claims & Disputes CFI Assessment (Consultants’ Perception)

SET Number	Kf	Km	Ka	TOTAL		
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK (Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),	
2	0.50	0.15	0.35	1.00		
3	0.35	0.50	0.15	1.00		
4	0.15	0.50	0.35	1.00		
5	0.50	0.35	0.15	1.00		
6	0.15	0.35	0.50	1.00		
7	0.33	0.33	0.33	1.00		
					TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:	24
					TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority	19
					TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority	5
					TOTAL NUMBER OF INSIGNIFICANT TYPES:	27

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	3.94	4.29	3.65	3.85	3.89	4.07	4.01	4.02	3.92	3.96	3.85	4.07	3.96	YES	SIG-1st Priority	1
T03	3.56	3.88	4.00	3.83	3.76	3.79	3.88	3.74	3.89	3.81	3.74	3.89	3.81	YES	SIG-1st Priority	2
T26	3.65	4.31	3.29	3.57	3.62	3.93	3.86	3.83	3.70	3.75	3.57	3.93	3.75	YES	SIG-1st Priority	3
T28	3.87	4.06	3.31	3.62	3.70	3.88	3.77	3.85	3.66	3.74	3.62	3.88	3.74	YES	SIG-1st Priority	4
T12	3.31	4.00	3.82	3.67	3.59	3.73	3.84	3.63	3.81	3.71	3.59	3.84	3.71	YES	SIG-1st Priority	5
T13	3.31	3.87	3.65	3.56	3.51	3.64	3.71	3.56	3.67	3.61	3.51	3.71	3.61	YES	SIG-1st Priority	6
T01	3.06	3.41	4.35	3.76	3.56	3.43	3.69	3.38	3.83	3.60	3.38	3.83	3.60	YES	SIG-1st Priority	7
T35	3.36	3.81	3.29	3.39	3.40	3.58	3.56	3.51	3.49	3.48	3.39	3.58	3.49	YES	SIG-1st Priority	8
T10	3.31	3.71	3.41	3.42	3.41	3.52	3.54	3.47	3.50	3.47	3.41	3.54	3.47	YES	SIG-1st Priority	9
T09	3.12	3.56	3.71	3.48	3.39	3.43	3.55	3.36	3.57	3.46	3.36	3.57	3.46	YES	SIG-1st Priority	10
T05	3.06	3.29	3.88	3.51	3.38	3.30	3.47	3.27	3.55	3.41	3.27	3.55	3.41	YES	SIG-1st Priority	11
T02	3.31	3.29	3.50	3.40	3.38	3.33	3.37	3.33	3.40	3.37	3.33	3.40	3.37	YES	SIG-1st Priority	12
T11	3.12	3.47	3.47	3.35	3.29	3.35	3.42	3.29	3.42	3.35	3.29	3.42	3.35	YES	SIG-1st Priority	13
T43	3.31	3.47	3.24	3.30	3.31	3.38	3.36	3.36	3.33	3.34	3.30	3.38	3.34	YES	SIG-1st Priority	14
T31	3.31	3.63	3.06	3.23	3.27	3.43	3.38	3.38	3.30	3.33	3.23	3.43	3.33	YES	SIG-1st Priority	15
T27	3.06	3.50	3.29	3.24	3.21	3.32	3.36	3.25	3.33	3.28	3.21	3.36	3.28	YES	SIG-1st Priority	16
T44	3.06	3.25	3.18	3.15	3.13	3.17	3.20	3.14	3.18	3.16	3.13	3.20	3.16	YES	SIG-1st Priority	17
T25	3.06	3.06	3.29	3.18	3.14	3.10	3.14	3.10	3.18	3.14	3.10	3.18	3.14	YES	SIG-1st Priority	18
T42	3.18	3.19	3.06	3.12	3.14	3.16	3.14	3.16	3.12	3.14	3.12	3.16	3.14	YES	SIG-1st Priority	19
T06	2.94	3.12	4.00	3.50	3.34	3.19	3.40	3.16	3.53	3.35	3.16	3.53	3.35	NO	SIG-2nd Priority	20
T18	2.94	3.38	3.29	3.18	3.13	3.21	3.28	3.15	3.27	3.20	3.13	3.28	3.20	NO	SIG-2nd Priority	21
T33	2.88	3.24	3.18	3.08	3.03	3.10	3.16	3.05	3.15	3.09	3.03	3.16	3.09	NO	SIG-2nd Priority	22
T29	2.82	3.31	3.12	3.04	3.00	3.11	3.17	3.04	3.14	3.08	3.00	3.17	3.08	NO	SIG-2nd Priority	23
T17	2.63	3.20	3.24	3.02	2.92	3.00	3.13	2.92	3.13	3.02	2.92	3.13	3.02	NO	SIG-2nd Priority	24
T34	3.06	2.94	2.94	2.98	3.00	2.98	2.96	3.00	2.96	2.98	2.96	3.00	2.98	NO	NOT SIG	25
T04	2.29	2.29	4.24	3.26	2.97	2.59	2.97	2.59	3.26	2.94	2.59	3.26	2.97	NO	NOT SIG	26
T14	2.65	3.19	3.06	2.93	2.87	2.98	3.06	2.90	3.04	2.96	2.87	3.06	2.96	NO	NOT SIG	27
T36	2.56	3.13	3.18	2.95	2.86	2.94	3.06	2.85	3.07	2.95	2.85	3.07	2.95	NO	NOT SIG	28
T39	2.69	3.06	3.06	2.93	2.87	2.93	3.00	2.87	3.00	2.93	2.87	3.00	2.93	NO	NOT SIG	29
T21	2.40	2.93	3.29	2.93	2.79	2.80	2.98	2.72	3.03	2.87	2.72	3.03	2.87	NO	NOT SIG	30
T41	2.81	2.53	3.24	2.98	2.92	2.74	2.82	2.78	2.93	2.86	2.74	2.98	2.86	NO	NOT SIG	31
T07	2.13	2.56	3.88	3.07	2.81	2.61	2.96	2.54	3.16	2.85	2.54	3.16	2.85	NO	NOT SIG	32
T20	2.53	2.94	3.06	2.86	2.78	2.81	2.92	2.75	2.94	2.84	2.75	2.94	2.84	NO	NOT SIG	33
T15	2.40	2.94	3.18	2.87	2.75	2.79	2.94	2.71	2.98	2.84	2.71	2.98	2.84	NO	NOT SIG	34
T40	2.59	2.75	3.12	2.88	2.80	2.75	2.85	2.72	2.91	2.82	2.72	2.91	2.82	NO	NOT SIG	35
T37	2.44	2.44	3.18	2.81	2.70	2.55	2.70	2.55	2.81	2.68	2.55	2.81	2.70	NO	NOT SIG	36
T30	2.35	2.75	2.94	2.71	2.62	2.64	2.76	2.58	2.79	2.68	2.58	2.79	2.68	NO	NOT SIG	37
T08	2.19	2.40	3.25	2.75	2.59	2.45	2.67	2.42	2.79	2.61	2.42	2.79	2.61	NO	NOT SIG	38
T22	2.24	2.25	3.12	2.68	2.55	2.38	2.55	2.37	2.68	2.53	2.37	2.68	2.55	NO	NOT SIG	39
T49	2.31	2.71	2.59	2.51	2.47	2.55	2.61	2.49	2.59	2.53	2.47	2.61	2.53	NO	NOT SIG	40
T16	1.81	2.29	3.24	2.60	2.38	2.27	2.55	2.19	2.69	2.44	2.19	2.69	2.44	NO	NOT SIG	41
T38	1.76	2.18	3.18	2.53	2.32	2.18	2.46	2.12	2.61	2.37	2.12	2.61	2.37	NO	NOT SIG	42
T45	2.13	2.47	2.35	2.29	2.26	2.33	2.38	2.28	2.36	2.31	2.26	2.38	2.31	NO	NOT SIG	43
T23	1.76	2.18	2.94	2.41	2.24	2.15	2.38	2.09	2.50	2.29	2.09	2.50	2.29	NO	NOT SIG	44
T46	1.56	1.67	3.06	2.33	2.10	1.84	2.14	1.82	2.35	2.09	1.82	2.35	2.10	NO	NOT SIG	45
T24	1.59	1.65	2.94	2.27	2.07	1.82	2.09	1.81	2.29	2.06	1.81	2.29	2.07	NO	NOT SIG	46
T48	1.53	1.69	2.94	2.26	2.05	1.82	2.10	1.80	2.29	2.05	1.80	2.29	2.05	NO	NOT SIG	47
T50	1.75	2.06	2.29	2.07	1.99	1.99	2.09	1.94	2.13	2.03	1.94	2.13	2.03	NO	NOT SIG	48
T47	1.56	1.53	2.82	2.19	2.00	1.74	1.99	1.74	2.18	1.97	1.74	2.18	1.97	NO	NOT SIG	49
T51	1.71	1.94	2.29	2.04	1.95	1.91	2.03	1.88	2.08	1.98	1.88	2.08	1.98	NO	NOT SIG	50
T32	1.31	1.47	3.06	2.21	1.95	1.65	2.00	1.63	2.24	1.95	1.63	2.24	1.95	NO	NOT SIG	51

It can be seen that twenty-four out of the fifty-one postulated types are significant with different priorities. Nineteen of these significant types need *first priority attention* by construction managers. *T19 “Variation”* has the highest CFI value of 3.96. In addition five types are considered significant with second priority to

avoid/minimise; these types are **T06**, **T18**, **T33**, **T29** and **T17** and their CFI values are 3.35, 3.2, 3.09, 3.08 and 3.02, respectively. Contrary, twenty-seven of the suggested types are insignificant from their perception with the lowest median score of 1.95 for **T32** “*D. D. R. P: Due to additional/unforeseen building regulations*”. The trend of the CFI values for these types based on the seven sets of weighting factors for each type are illustrated in the following **Figure 7-10**. Furthermore, **Figure 7-11** presents these CFI values for the significant types with first priority focus. **T19** “*Variation*”, has the highest value of 3.96.

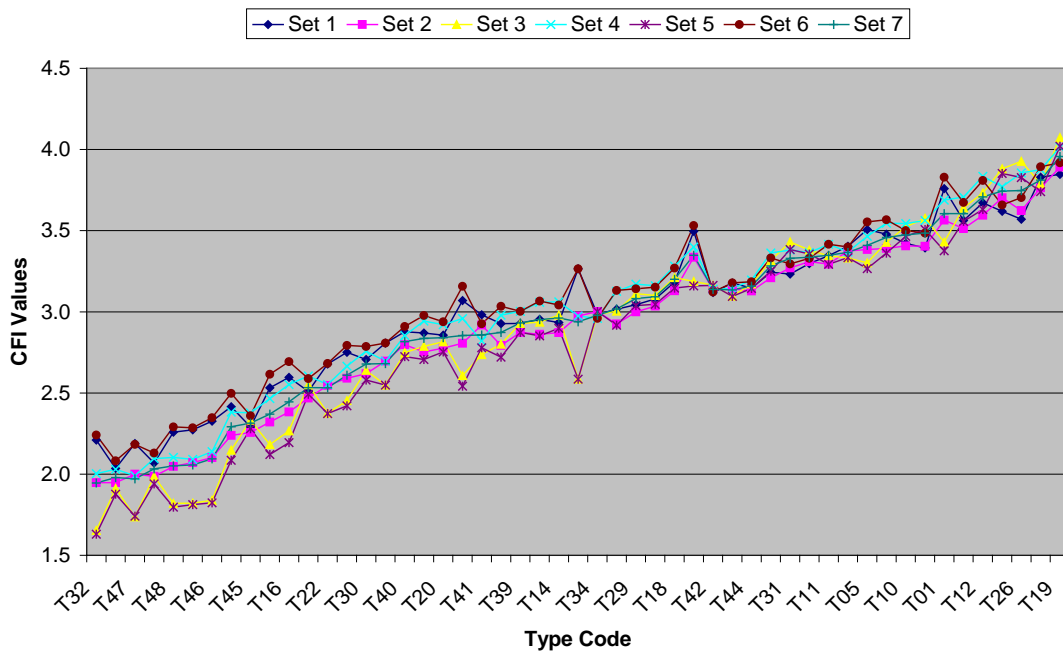


Figure 7-10 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Consultants’ Perception’.

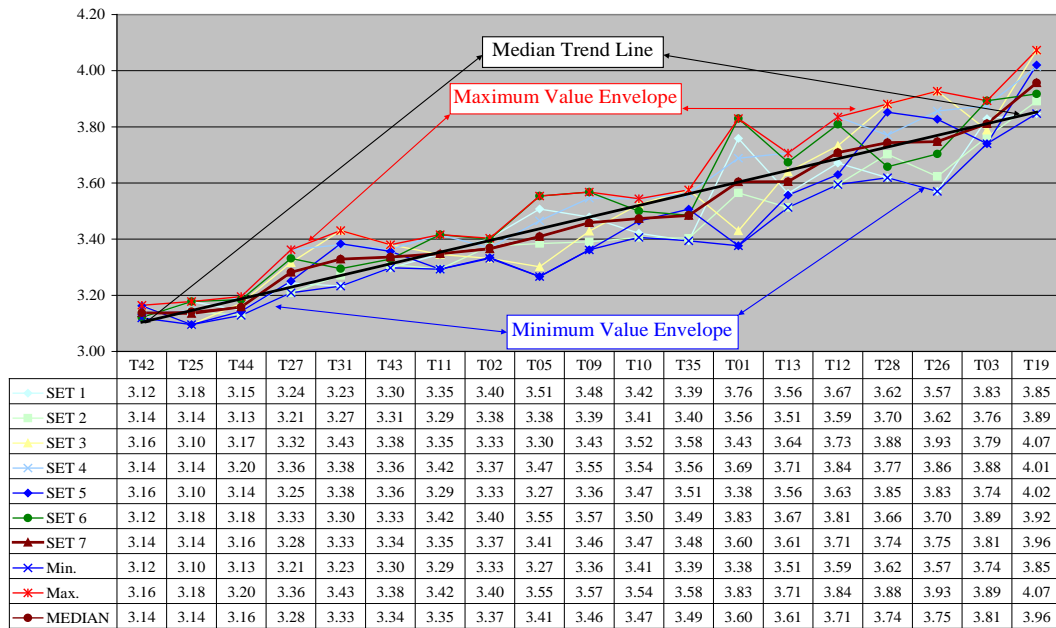


Figure 7-11 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Consultants’ Perception’.

7.4.5.3 CONTRACTOR’S PERCEPTION

In the same way, **Table 7-31** below presents the calculated CFI values in a descending order from the contractors’ perception.

Table 7-31 Types of Claims & Disputes CFI Assessment (Contractors' Perception)

SET Number	Kf	Km	Ka	TOTAL	
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK () Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),
2	0.50	0.15	0.35	1.00	
3	0.35	0.50	0.15	1.00	
4	0.15	0.50	0.35	1.00	
5	0.50	0.35	0.15	1.00	
6	0.15	0.35	0.50	1.00	
7	0.33	0.33	0.33	1.00	
				TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:	27
				TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority	17
				TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority	10
				TOTAL NUMBER OF INSIGNIFICANT TYPES:	24

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	4.20	4.67	4.13	4.24	4.25	4.42	4.41	4.35	4.33	4.33	4.24	4.42	4.33	YES	SIG-1st Priority	1
T26	4.13	4.54	3.93	4.09	4.12	4.31	4.27	4.25	4.18	4.20	4.09	4.31	4.20	YES	SIG-1st Priority	2
T03	4.07	4.53	4.00	4.11	4.12	4.29	4.28	4.22	4.20	4.20	4.11	4.29	4.20	YES	SIG-1st Priority	3
T01	3.67	4.00	4.60	4.18	4.04	3.97	4.16	3.92	4.25	4.08	3.92	4.25	4.08	YES	SIG-1st Priority	4
T11	4.00	4.21	3.80	3.93	3.96	4.08	4.04	4.05	3.98	4.00	3.93	4.08	4.00	YES	SIG-1st Priority	5
T05	3.50	3.93	4.53	4.08	3.93	3.87	4.08	3.81	4.17	3.98	3.81	4.17	3.98	YES	SIG-1st Priority	6
T09	4.00	4.08	3.87	3.94	3.96	4.02	3.99	4.01	3.96	3.98	3.94	4.02	3.98	YES	SIG-1st Priority	7
T13	3.79	4.07	3.67	3.77	3.79	3.91	3.89	3.87	3.83	3.84	3.77	3.91	3.84	YES	SIG-1st Priority	8
T10	3.53	3.87	4.00	3.82	3.75	3.77	3.86	3.72	3.88	3.80	3.72	3.88	3.80	YES	SIG-1st Priority	9
T02	3.29	3.73	4.20	3.81	3.67	3.65	3.83	3.58	3.90	3.74	3.58	3.90	3.74	YES	SIG-1st Priority	10
T12	3.73	4.00	3.47	3.64	3.68	3.83	3.77	3.79	3.69	3.73	3.64	3.83	3.73	YES	SIG-1st Priority	11
T28	3.60	3.79	3.67	3.66	3.65	3.70	3.72	3.68	3.70	3.68	3.65	3.72	3.68	YES	SIG-1st Priority	12
T27	3.36	3.64	3.73	3.59	3.53	3.56	3.63	3.51	3.65	3.57	3.51	3.65	3.57	YES	SIG-1st Priority	13
T35	3.54	3.67	3.33	3.46	3.49	3.57	3.53	3.55	3.48	3.51	3.46	3.57	3.51	YES	SIG-1st Priority	14
T43	3.57	3.47	3.40	3.47	3.50	3.49	3.46	3.51	3.45	3.48	3.45	3.51	3.48	YES	SIG-1st Priority	15
T31	3.64	3.71	3.00	3.33	3.43	3.58	3.45	3.57	3.35	3.45	3.33	3.58	3.45	YES	SIG-1st Priority	16
T29	3.00	3.29	3.33	3.21	3.16	3.19	3.26	3.15	3.27	3.20	3.15	3.27	3.20	YES	SIG-1st Priority	17
T18	2.92	3.57	3.27	3.19	3.14	3.30	3.37	3.20	3.32	3.25	3.14	3.37	3.25	NO	SIG-2nd Priority	18
T17	2.86	3.43	3.33	3.18	3.11	3.21	3.31	3.13	3.30	3.20	3.11	3.31	3.20	NO	SIG-2nd Priority	19
T06	2.86	2.87	3.80	3.33	3.19	3.00	3.19	3.00	3.33	3.17	3.00	3.33	3.19	NO	SIG-2nd Priority	20
T33	2.93	3.20	3.07	3.04	3.02	3.09	3.11	3.04	3.09	3.06	3.02	3.11	3.06	NO	SIG-2nd Priority	21
T15	2.71	3.07	3.40	3.11	3.01	2.99	3.13	2.94	3.18	3.06	2.94	3.18	3.06	NO	SIG-2nd Priority	22
T21	2.73	3.08	3.27	3.05	2.97	2.99	3.10	2.94	3.12	3.02	2.94	3.12	3.02	NO	SIG-2nd Priority	23
T42	2.87	3.31	2.87	2.93	2.93	3.09	3.09	3.02	3.02	3.01	2.93	3.09	3.02	NO	SIG-2nd Priority	24
T44	2.73	3.07	3.27	3.05	2.97	2.98	3.09	2.93	3.12	3.02	2.93	3.12	3.02	NO	SIG-2nd Priority	25
T25	2.67	3.00	3.40	3.08	2.97	2.94	3.09	2.89	3.15	3.02	2.89	3.15	3.02	NO	SIG-2nd Priority	26
T36	2.67	3.29	3.07	2.96	2.90	3.04	3.12	2.94	3.08	3.00	2.90	3.12	3.00	NO	SIG-2nd Priority	27
T30	2.60	3.07	3.33	3.04	2.93	2.95	3.09	2.88	3.13	3.00	2.88	3.13	3.00	NO	NOT SIG	28
T08	2.69	2.71	3.53	3.12	2.99	2.83	3.00	2.83	3.12	2.98	2.83	3.12	2.99	NO	NOT SIG	29
T07	2.40	2.33	4.14	3.26	3.00	2.63	2.98	2.64	3.25	2.96	2.63	3.26	2.98	NO	NOT SIG	30
T14	2.60	2.92	3.27	2.98	2.88	2.86	2.99	2.81	3.05	2.93	2.81	3.05	2.93	NO	NOT SIG	31
T04	1.87	2.40	4.47	3.25	2.86	2.52	3.04	2.44	3.35	2.91	2.44	3.35	2.91	NO	NOT SIG	32
T49	2.93	3.14	2.40	2.70	2.78	2.96	2.85	2.92	2.74	2.82	2.70	2.96	2.82	NO	NOT SIG	33
T16	2.43	2.73	3.20	2.86	2.74	2.70	2.85	2.65	2.92	2.78	2.65	2.92	2.78	NO	NOT SIG	34
T40	2.36	2.53	3.40	2.91	2.75	2.60	2.81	2.58	2.94	2.76	2.58	2.94	2.76	NO	NOT SIG	35
T34	2.77	2.67	2.67	2.70	2.72	2.70	2.68	2.72	2.68	2.70	2.68	2.72	2.70	NO	NOT SIG	36
T20	2.07	2.60	3.33	2.78	2.59	2.52	2.78	2.44	2.89	2.66	2.44	2.89	2.66	NO	NOT SIG	37
T39	2.21	2.67	3.07	2.71	2.58	2.57	2.74	2.50	2.80	2.65	2.50	2.80	2.65	NO	NOT SIG	38
T41	2.40	2.21	3.33	2.84	2.70	2.45	2.63	2.48	2.80	2.65	2.45	2.84	2.65	NO	NOT SIG	38
T22	2.27	2.64	2.93	2.66	2.56	2.55	2.69	2.50	2.73	2.61	2.50	2.73	2.61	NO	NOT SIG	40
T37	2.00	2.43	3.20	2.66	2.48	2.39	2.63	2.33	2.75	2.54	2.33	2.75	2.54	NO	NOT SIG	41
T38	1.93	2.31	3.13	2.59	2.41	2.30	2.54	2.24	2.66	2.46	2.24	2.66	2.46	NO	NOT SIG	42
T32	2.21	2.08	3.07	2.62	2.49	2.27	2.44	2.29	2.59	2.45	2.27	2.62	2.45	NO	NOT SIG	43
T24	1.87	1.86	3.13	2.50	2.31	2.05	2.31	2.05	2.50	2.28	2.05	2.50	2.31	NO	NOT SIG	44
T45	1.79	1.93	2.93	2.38	2.21	2.03	2.26	2.01	2.41	2.21	2.01	2.41	2.21	NO	NOT SIG	45
T46	1.64	1.80	3.07	2.38	2.16	1.94	2.22	1.91	2.41	2.17	1.91	2.41	2.17	NO	NOT SIG	46
T23	1.53	1.87	3.07	2.35	2.12	1.93	2.24	1.88	2.42	2.15	1.88	2.42	2.15	NO	NOT SIG	47
T50	1.64	2.07	2.73	2.25	2.09	2.02	2.24	1.95	2.34	2.15	1.95	2.34	2.15	NO	NOT SIG	48
T48	1.62	1.71	2.87	2.26	2.07	1.85	2.10	1.84	2.28	2.06	1.84	2.28	2.07	NO	NOT SIG	49
T47	1.47	1.62	2.73	2.12	1.93	1.73	1.98	1.71	2.15	1.94	1.71	2.15	1.94	NO	NOT SIG	50
T51	1.43	1.64	2.73	2.11	1.92	1.73	1.99	1.70	2.16	1.93	1.70	2.16	1.93	NO	NOT SIG	51

Based on these calculations, twenty-seven are found significant with only seventeen of them need first priority focus to avoid/minimise. These significant types are more frequent, severe and 'need/can' be avoided/ minimised. **T19** and **T26** are found to be the most significant types of claims with CFI value of 4.33 and 4.2, respectively. In addition, **T29** is ranked seventeenth with a CFI value of 3.2. The remaining ten significant types need second priority attention. On the other hand, twenty-four types are insignificant with the lowest median scores of 1.93 and 1.94 for **T47** and **T51**, respectively. **Figure 7-12** below shows the seven sets of weighting

factors for each type. The lowest is **T51** and has a median score of 1.93, and the highest is **T19 “Variation”** with a median value equals to 4.33.

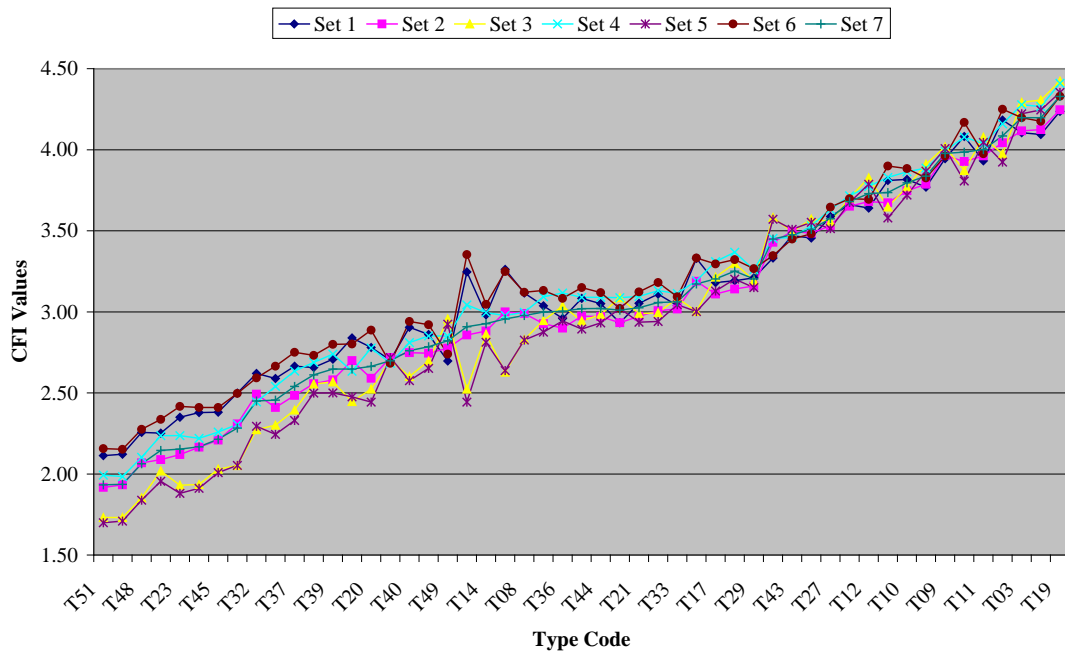


Figure 7-12 Types of Claims & Disputes (CFI) Assessment: All Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Contractors' Perception'.

Furthermore, **Figure 7-13** shows the significant types ranked according to the median of the seven sets weighting factor with median score of over three. The top five of these significant types has a median value that is greater than 4 and these are **T19, T26, T03, T01** and **T11**, there medians are as follows; 4.33, 4.198, 4.197, 4.09 and 4.0, respectively.

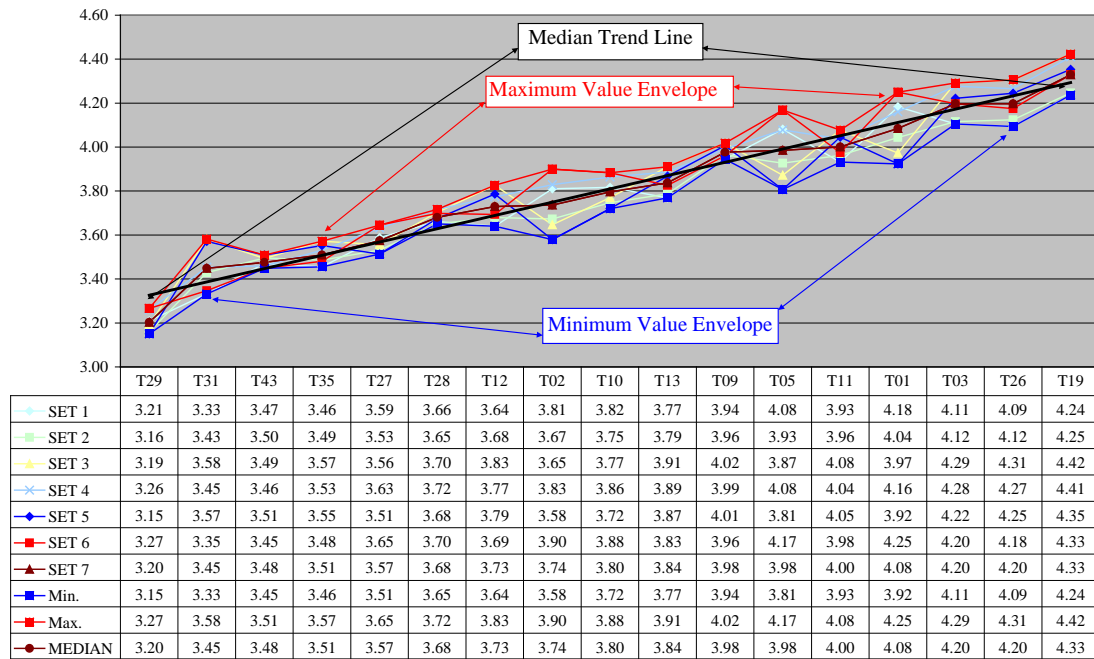


Figure 7-13 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Contractors' Perception'.

7.4.5.4 OVERALL CLAIM FOCUS INDICATOR (CFI)

Table 7-32 shows the CFI values that have been calculated for the types of claims and disputes based on the overall frequency, magnitude and avoidability response values. These CFI values are ranked in a descending order. Moreover, this table presents the seven sets of weighting factors for each type.

Based on these calculations, sixteen types are found significant with *first priority* focus to avoid/minimise (CFI>3) and the remaining thirty-five are not. These significant types are more frequent, severe and ‘need/can’ be avoided/ minimised. **T19 “Variations”** is found to be the most significant types of claims with a CFI value of 4.12. In addition, **T43 “Default of subcontractor/nominated sub contractor”** is ranked sixteenth with a CFI value of 3.34. Contrary, twenty-nine types are insignificant with **T47** having the lowest median score and the only one with a median score that is less than two. Finally, six types have CFI value more than three; however, they are not considered significant with *first priority* focus since they are not frequent (frequency values < 3). These six types are **T06, T18, T29, T44, T17 and T33**.

Table 7-32 Types of Claims & Disputes CFI Assessment (Overall Perception)

SET Number	Kf	Km	Ka	TOTAL	
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK
2	0.50	0.15	0.35	1.00	Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),
3	0.35	0.50	0.15	1.00	
4	0.15	0.50	0.35	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES: 22
5	0.50	0.35	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority 16
6	0.15	0.35	0.50	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority 6
7	0.33	0.33	0.33	1.00	TOTAL NUMBER OF INSIGNIFICANT TYPES: 29

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	4.08	4.49	3.80	4.00	4.05	4.24	4.19	4.18	4.09	4.12	4.00	4.24	4.12	YES	SIG-1st Priority	1
T03	3.83	4.20	4.02	3.98	3.95	4.04	4.08	3.99	4.05	4.01	3.95	4.08	4.01	YES	SIG-1st Priority	2
T26	3.82	4.33	3.62	3.80	3.83	4.05	4.01	3.97	3.90	3.92	3.80	4.05	3.92	YES	SIG-1st Priority	3
T01	3.39	3.73	4.49	3.99	3.83	3.72	3.94	3.67	4.06	3.87	3.67	4.06	3.87	YES	SIG-1st Priority	4
T12	3.63	4.00	3.69	3.71	3.71	3.82	3.84	3.77	3.79	3.77	3.71	3.84	3.77	YES	SIG-1st Priority	5
T13	3.58	3.96	3.71	3.70	3.68	3.79	3.81	3.73	3.78	3.74	3.68	3.81	3.74	YES	SIG-1st Priority	6
T11	3.63	3.93	3.67	3.69	3.69	3.79	3.79	3.74	3.75	3.74	3.69	3.79	3.74	YES	SIG-1st Priority	7
T09	3.55	3.77	3.76	3.69	3.66	3.69	3.73	3.66	3.73	3.69	3.66	3.73	3.69	YES	SIG-1st Priority	8
T05	3.23	3.61	4.20	3.77	3.62	3.56	3.76	3.51	3.85	3.67	3.51	3.85	3.67	YES	SIG-1st Priority	9
T28	3.63	3.88	3.50	3.60	3.62	3.73	3.71	3.69	3.65	3.66	3.60	3.73	3.66	YES	SIG-1st Priority	10
T02	3.35	3.59	3.94	3.68	3.59	3.56	3.68	3.52	3.73	3.62	3.52	3.73	3.62	YES	SIG-1st Priority	11
T10	3.38	3.76	3.73	3.61	3.56	3.62	3.69	3.57	3.69	3.62	3.56	3.69	3.62	YES	SIG-1st Priority	12
T35	3.51	3.74	3.24	3.41	3.45	3.58	3.53	3.55	3.45	3.49	3.41	3.58	3.49	YES	SIG-1st Priority	13
T27	3.25	3.63	3.59	3.48	3.42	3.49	3.56	3.43	3.55	3.48	3.42	3.56	3.48	YES	SIG-1st Priority	14
T31	3.49	3.71	3.08	3.32	3.38	3.54	3.46	3.51	3.36	3.42	3.32	3.54	3.42	YES	SIG-1st Priority	15
T43	3.38	3.45	3.22	3.31	3.33	3.39	3.36	3.38	3.32	3.34	3.31	3.39	3.34	YES	SIG-1st Priority	16
T06	2.84	3.02	3.88	3.39	3.23	3.09	3.29	3.06	3.42	3.24	3.06	3.42	3.24	NO	SIG-2nd Priority	17
T18	2.88	3.48	3.35	3.20	3.13	3.25	3.34	3.16	3.33	3.23	3.13	3.34	3.23	NO	SIG-2nd Priority	18
T29	2.85	3.31	3.29	3.14	3.08	3.15	3.23	3.08	3.23	3.15	3.08	3.23	3.15	NO	SIG-2nd Priority	19
T44	2.86	3.26	3.20	3.09	3.04	3.11	3.18	3.05	3.17	3.10	3.04	3.18	3.10	NO	SIG-2nd Priority	20
T17	2.75	3.21	3.27	3.08	3.00	3.06	3.16	2.99	3.17	3.08	2.99	3.17	3.08	NO	SIG-2nd Priority	21
T33	2.92	3.20	3.12	3.06	3.03	3.09	3.13	3.04	3.11	3.07	3.03	3.13	3.07	NO	SIG-2nd Priority	22
T25	2.73	2.98	3.25	3.03	2.95	2.93	3.04	2.89	3.08	2.98	2.89	3.08	2.98	NO	NOT SIG	23
T42	2.88	3.17	2.86	2.92	2.92	3.02	3.02	2.98	2.97	2.97	2.92	3.02	2.97	NO	NOT SIG	24
T21	2.50	3.04	3.34	3.00	2.88	2.90	3.07	2.82	3.11	2.96	2.82	3.11	2.96	NO	NOT SIG	25
T36	2.59	3.21	3.08	2.93	2.85	2.97	3.07	2.88	3.05	2.96	2.85	3.07	2.96	NO	NOT SIG	26
T04	2.14	2.39	4.29	3.25	2.93	2.59	3.02	2.55	3.31	2.94	2.55	3.31	2.94	NO	NOT SIG	27
T07	2.33	2.50	3.98	3.18	2.93	2.66	2.99	2.64	3.21	2.93	2.64	3.21	2.93	NO	NOT SIG	28
T14	2.60	3.04	3.14	2.94	2.85	2.90	3.01	2.84	3.02	2.92	2.84	3.02	2.92	NO	NOT SIG	29
T15	2.56	2.98	3.22	2.95	2.85	2.87	3.00	2.81	3.04	2.92	2.81	3.04	2.92	NO	NOT SIG	30
T30	2.49	2.98	3.14	2.89	2.79	2.83	2.96	2.76	2.99	2.87	2.76	2.99	2.87	NO	NOT SIG	31
T08	2.48	2.57	3.36	2.93	2.80	2.66	2.84	2.64	2.95	2.80	2.64	2.95	2.80	NO	NOT SIG	32
T20	2.37	2.76	3.18	2.83	2.71	2.69	2.85	2.63	2.91	2.77	2.63	2.91	2.77	NO	NOT SIG	33
T34	2.77	2.71	2.82	2.78	2.78	2.74	2.75	2.75	2.77	2.76	2.74	2.78	2.76	NO	NOT SIG	34
T39	2.48	2.78	3.00	2.78	2.71	2.71	2.81	2.66	2.84	2.75	2.66	2.84	2.75	NO	NOT SIG	35
T40	2.41	2.55	3.25	2.85	2.73	2.61	2.78	2.59	2.88	2.74	2.59	2.88	2.74	NO	NOT SIG	36
T41	2.49	2.33	3.25	2.85	2.73	2.53	2.68	2.55	2.82	2.69	2.53	2.85	2.69	NO	NOT SIG	37
T49	2.52	2.98	2.51	2.58	2.59	2.75	2.75	2.68	2.68	2.67	2.58	2.75	2.68	NO	NOT SIG	38
T16	2.14	2.57	3.20	2.73	2.58	2.51	2.72	2.45	2.82	2.63	2.45	2.82	2.63	NO	NOT SIG	39
T22	2.25	2.54	3.06	2.70	2.58	2.52	2.68	2.48	2.76	2.62	2.48	2.76	2.62	NO	NOT SIG	40
T37	2.32	2.43	3.10	2.73	2.61	2.49	2.65	2.47	2.75	2.61	2.47	2.75	2.61	NO	NOT SIG	41
T38	1.80	2.12	3.08	2.49	2.30	2.15	2.41	2.11	2.55	2.33	2.11	2.55	2.33	NO	NOT SIG	42
T45	1.96	2.22	2.65	2.34	2.24	2.19	2.33	2.15	2.40	2.27	2.15	2.40	2.27	NO	NOT SIG	43
T32	1.72	1.76	3.10	2.42	2.21	1.95	2.22	1.94	2.42	2.19	1.94	2.42	2.21	NO	NOT SIG	44
T23	1.67	1.98	2.98	2.37	2.17	2.02	2.28	1.97	2.43	2.21	1.97	2.43	2.21	NO	NOT SIG	45
T24	1.71	1.76	3.08	2.40	2.19	1.94	2.21	1.93	2.41	2.18	1.93	2.41	2.19	NO	NOT SIG	46
T50	1.69	2.04	2.59	2.19	2.06	2.00	2.18	1.95	2.26	2.10	1.95	2.26	2.10	NO	NOT SIG	47
T46	1.51	1.78	3.00	2.30	2.07	1.87	2.16	1.83	2.35	2.09	1.83	2.35	2.09	NO	NOT SIG	48
T51	1.63	1.84	2.59	2.14	1.99	1.88	2.07	1.84	2.18	2.02	1.84	2.18	2.02	NO	NOT SIG	49
T48	1.55	1.69	2.78	2.19	2.00	1.80	2.05	1.78	2.21	2.00	1.78	2.21	2.00	NO	NOT SIG	50
T47	1.47	1.56	2.65	2.07	1.89	1.69	1.92	1.68	2.09	1.89	1.68	2.09	1.89	NO	NOT SIG	51

CFI calculations for the type of claims and disputes based on the seven sets of weighting factors are illustrated in **Figure 7-14** below. The lowest is **T47** “*Embargoes on project imported items*”, and has a median score of 1.89. The highest is **T19** “*Variation*” with median equal to 4.12.

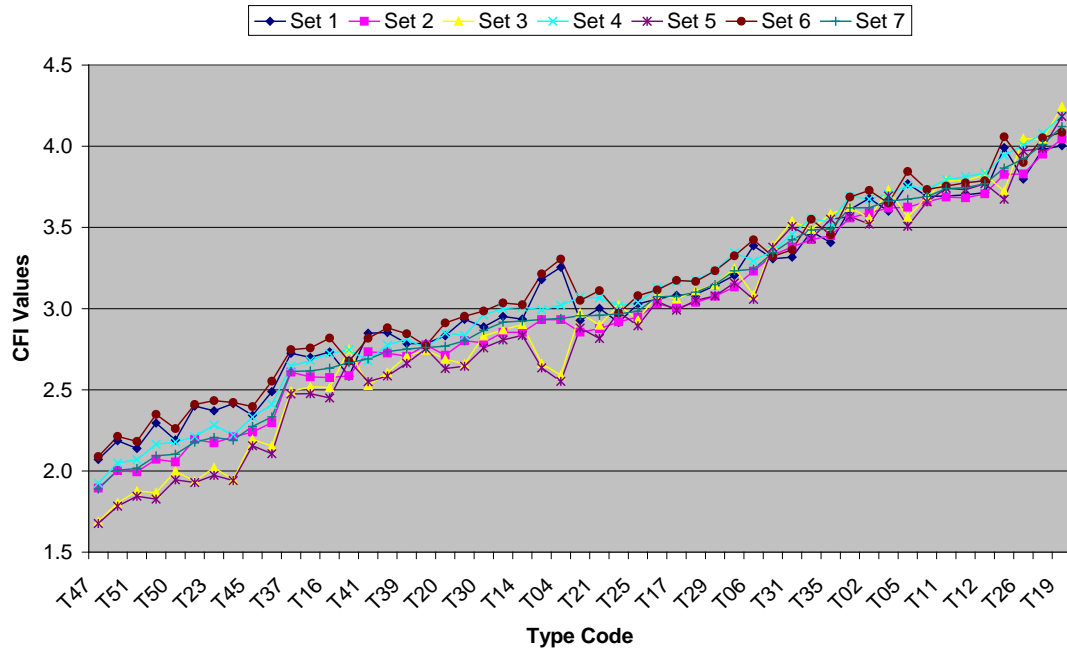


Figure 7-14 Types of Claims & Disputes (CFI) Assessment: All Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Overall Perception'.

Additionally, Figure 7-15 illustrate the significant types ranked according to the median of the seven sets weighting factor. T19 and T03 are the only two significant types that have a median score greater than four. Their median values are equal to 4.12 and 4.01, respectively.

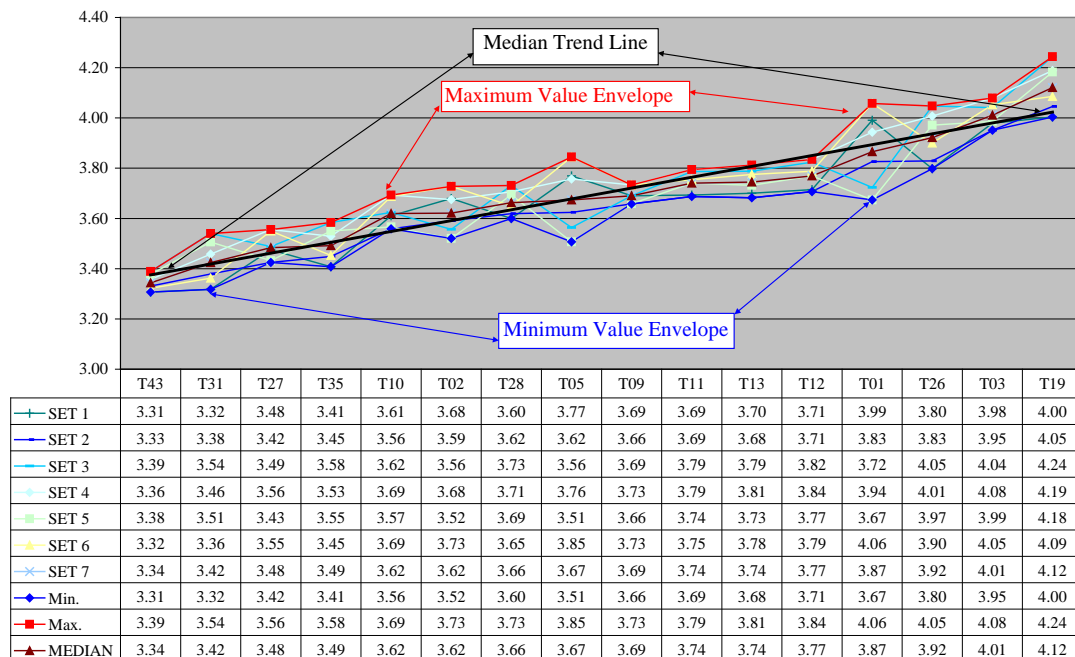


Figure 7-15 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Overall Perception'.

7.4.5.5 FINDINGS RELATED TO CLAIM FOCUS INDICATOR (CFI) ASSESSMENT

The following **Table 7-33** compares the calculated CFI values and Important Index for all types of claims and disputes based on the responses from the three responding groups. It can be seen that **T19** is ranked first by all groups. Additionally, **T03** is ranked second based on clients and consultants' response and third based on contractors' ones. Sixteen types are found to be significant with *first priority* to avoid/minimise. *These are T19, T03, T26, T01, T12, T13, T11, T09, T05, T28, T02, T10, T35, T27, T31 and T43.* Note the full agreement of all responding groups regarding the significance and the priority of these sixteen types to be avoided/minimised. This implies that the focus should be on these types. Contrary, in spite of their values (>3), **T06, T18, T29, T44, T17, and T33** are not considered significant with first priority to avoid/minimise. These six types of claims and disputes are not frequent as explained earlier in Section 7.4.5.1, 7.4.5.2, 7.4.5.3 and 7.4.5.4. In addition, twelve types out of these significant types have CFI values of more than 3.5 and an Important Index of over 70 %.

Furthermore, **Table 7-34** presents the RAF and agreement percentage of the responses from the different responding groups. According to this table, the agreement between clients and consultants is 83.69 %, clients and contractors is 90.38 % and consultants and contractors is 84.38 %. Therefore, there is a better agreement between clients and contractors as it has the highest percentage out of all the comparison.

Additionally, the following **Table 7-35** compares not only the calculated CFI values and Important Index, for all types of claims and disputes based on the responses from the three responding groups, but also the types' significance priority.

Table 7-33 Types of Claims & Disputes Claim Management Focus (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	CMF Avg- Mean	CMF Imp- Index	CMF Ranking	CMF Avg- Mean	CMF Imp- Index	CMF Ranking	CMF Avg- Mean	CMF Imp- Index	CMF Ranking	CMF Avg- Mean	CMF Imp- Index	CMF Ranking
		Clients			Consultants			Contractors			Over All		
Variations	T19	4.11	82.11	1	4.11	82.11	1	4.11	82.11	1	4.12	82.42	1
Change of Design/ Design Omission	T03	4.04	80.89	2	4.04	80.89	2	4.04	80.89	3	4.01	80.22	2
Delay/ Disruption to Regular Progr	T26	3.87	77.35	5	3.87	77.35	3	3.87	77.35	2	3.92	78.43	3
Ambiguity in Documents	T01	3.93	78.52	3	3.93	78.52	7	3.93	78.52	4	3.87	77.31	4
Unanticipated Soil Condition	T12	3.85	77.06	6	3.85	77.06	5	3.85	77.06	11	3.77	75.39	5
Unforeseen Ground Condition/ Un	T13	3.80	75.91	7	3.80	75.91	6	3.80	75.91	8	3.74	74.90	6
Differing Site Condition	T11	3.88	77.56	4	3.88	77.56	13	3.88	77.56	5	3.74	74.82	7
Change of Project Profile and Site	T09	3.69	73.73	9	3.69	73.73	10	3.69	73.73	7	3.69	73.80	8
Rectification of Works/ Specificati	T05	3.67	73.32	10	3.67	73.32	11	3.67	73.32	6	3.67	73.48	9
Delay/ Disruption to Regular Progr	T28	3.58	71.59	13	3.58	71.59	4	3.58	71.59	12	3.66	73.26	10
Delays Due to Incomplete Design/	T02	3.75	75.01	8	3.75	75.01	12	3.75	75.01	10	3.62	72.43	11
Delayed Site Possession/ Restricted	T10	3.61	72.21	11	3.61	72.21	9	3.61	72.21	9	3.62	72.40	12
Extension of Time For Completion	T35	3.48	69.62	15	3.48	69.62	8	3.48	69.62	14	3.49	69.84	13
Delay/ Disruption to Regular Progr	T27	3.59	71.87	12	3.59	71.87	16	3.59	71.87	13	3.48	69.69	14
Delay Disruption to Regular Progr	T31	3.49	69.78	14	3.49	69.78	15	3.49	69.78	16	3.42	68.48	15
Default of Subcontractor, Nominat	T43	3.25	64.94	16	3.25	64.94	14	3.25	64.94	15	3.34	66.88	16
Substantial Increase in Quantity of	T06	3.21	64.15	18	3.21	64.15	20	3.21	64.15	20	3.24	64.86	17
Acceleration of Works	T18	3.24	64.87	17	3.24	64.87	21	3.24	64.87	18	3.23	64.65	18
Delay/ Disruption to Regular Progr	T29	3.17	63.37	19	3.17	63.37	23	3.17	63.37	17	3.15	62.92	19
Unproductive / Idle Plants, Equipm	T44	3.12	62.33	20	3.12	62.33	17	3.12	62.33	25	3.10	62.03	20
Suspension of Work	T17	3.03	60.58	22	3.03	60.58	24	3.03	60.58	19	3.08	61.52	21
Client's Breach of Contract	T33	3.07	61.32	21	3.07	61.32	22	3.07	61.32	21	3.07	61.47	22
Delays Due to the Unavailability /	T25	2.82	56.40	31	2.82	56.40	18	2.82	56.40	26	2.98	59.67	23
Liquidated and ascertained damage	T42	2.79	55.74	32	2.79	55.74	19	2.79	55.74	24	2.97	59.44	24
Client/ Engineer's Instruction to Ch	T21	2.98	59.57	24	2.98	59.57	30	2.98	59.57	23	2.96	59.17	25
Un Paid Sums (Late Payment)	T36	2.92	58.46	27	2.92	58.46	28	2.92	58.46	27	2.96	59.13	26
Instruction Issued by the Client/Co	T04	2.97	59.32	25	2.97	59.32	26	2.97	59.32	32	2.94	58.78	27
Substantial Change in Quality of ar	T07	2.99	59.84	23	2.99	59.84	32	2.99	59.84	30	2.93	58.65	28
Investigation of Suspected Defects	T14	2.88	57.68	28	2.88	57.68	27	2.88	57.68	31	2.92	58.47	29
Uncovering of Works For Testing (T15	2.87	57.49	29	2.87	57.49	34	2.87	57.49	22	2.92	58.33	30
Delay/ Disruption to Regular Progr	T30	2.93	58.54	26	2.93	58.54	37	2.93	58.54	28	2.87	57.32	31
Error in Setting out Due to Incorre	T08	2.84	56.83	30	2.84	56.83	38	2.84	56.83	29	2.80	56.04	32
Additional Work (to other parts of t	T20	2.79	55.73	33	2.79	55.73	33	2.79	55.73	37	2.77	55.37	33
Late Issuance of final certificate	T34	2.62	52.41	39	2.62	52.41	25	2.62	52.41	36	2.76	55.22	34
Inflation / Price Escalation	T39	2.67	53.32	37	2.67	53.32	29	2.67	53.32	38	2.75	55.01	35
Currency Fluctuation	T40	2.64	52.81	38	2.64	52.81	35	2.64	52.81	35	2.74	54.71	36
Finance Charges For Loss Of Profi	T41	2.60	51.94	41	2.60	51.94	31	2.60	51.94	38	2.69	53.80	37
Delays Due to Exceptional Inclme	T49	2.67	53.42	36	2.67	53.42	40	2.67	53.42	33	2.68	53.52	38
Additional Tests to Verify Complia	T16	2.68	53.63	35	2.68	53.63	41	2.68	53.63	34	2.63	52.66	39
Facilities provided to others by the	T22	2.69	53.88	34	2.69	53.88	39	2.69	53.88	40	2.62	52.32	40
Interest on Un Paid Sums (Late Pay	T37	2.61	52.18	40	2.61	52.18	36	2.61	52.18	41	2.61	52.25	41
Overdue retention money	T38	2.21	44.17	45	2.21	44.17	42	2.21	44.17	42	2.33	46.65	42
Labour Strikes, Civil Unrest, Etc.	T45	2.28	45.63	42	2.28	45.63	43	2.28	45.63	45	2.27	45.49	43
Delay/ Disruption to Regular Progr	T32	2.23	44.53	43	2.23	44.53	51	2.23	44.53	43	2.21	44.19	44
Loss of / Damage to Materials on S	T23	2.17	43.47	46	2.17	43.47	44	2.17	43.47	47	2.21	44.14	45
Rectification of Damages To Other	T24	2.21	44.28	44	2.21	44.28	46	2.21	44.28	44	2.19	43.87	46
Damages To the Works Due to Exc	T50	2.13	42.65	47	2.13	42.65	48	2.13	42.65	48	2.10	42.06	47
Custom Tariffs, New Taxes	T46	2.03	40.56	49	2.03	40.56	45	2.03	40.56	46	2.09	41.87	48
Rectification of Damage Caused by	T51	2.11	42.21	48	2.11	42.21	50	2.11	42.21	51	2.02	40.31	49

Table 7-34 Types of Claims & Disputes CFI Assessment: (Rank Agreement Factor Comparison)

Agreement Amongst Groups			
Groups	RAF	PD	PA
Clients & Consultants	4.157	16.31%	83.69%
Clients & Contractors	2.451	9.62%	90.38%
Consultants & Contractors	3.980	15.62%	84.38%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

7.5 CAUSES OF CLAIMS AND DISPUTES

In the previous section, the focus is on the types of claims and disputes. The most important types of claims and disputes in terms of the perceived frequency, magnitude and avoidability were listed under the overall section of each assessment.

This section presents the discussion and analysis of the collected data from the third section of the questionnaire survey. The third section of the questionnaire survey focused on the common and potential causes that lead to the types of claims and disputes, which were discussed in the previous section. A table was provided with thirty-two possible causes of claims and disputes as derived in Chapters Four, Five and Six. This section aims to provide answers to the following questions:

- ✓ Do the construction professionals agree that these suggested causes contribute to the generation of the types of construction claims and disputes? and, if so, to what extent?;
- ✓ Can these causes be avoided or at least controlled under the UAE general conditions of contract?

Therefore, this section aimed at exploring the respondents' perception on these suggested causes that lead to the types of claims and disputes in the UAE. The section focused on the following three aspects:

- ✓ Identifying and confirming the common and potential cause/s that contributes to the generation of types of construction claims and disputes.
- ✓ Estimating the relative significance of each cause of claims and disputes;
- ✓ Estimating the avoidability/ controllability of each cause of claims and disputes

Respondents were first asked if the suggested and tabulated causes were to be considered potential causes, and two assessment indicators were used to further the research. These assessment indicators were significance and avoidability. For each of these assessments, respondents gave their responses based on the scale that were given. However not all respondents gave a response for all assessments. No weight was given when no response was provided. Hence, this was classified as Negative response. Through out this section of this dissertation, significant and avoidable

causes are those with an average score that is greater than three and an important index of more than 60%. The response scale for each assessment is explained in details in the sub-sections below.

The following **Table 7-36** lists the suggested causes of construction claims and disputes, which were used in the second section of the second part (Technical Assessment) of the questionnaire survey. In addition, **Table 7-37** provides a description and the coding system used to code these causes and their sub variables.

Table 7-36 Description and Codes for Causes of Claims and Disputes

Code	Causes of claims and disputes
C01	Inadequate/ inaccurate design information
C02	Inadequate design documentation
C03	Inadequate brief
C04	Unclear & inadequate specifications
C05	Inappropriate contract type (strategy)
C06	Inappropriate contract form
C07	Inadequate contract administration
C08	Inadequate contract documentation
C09	Incomplete tender information
C10	Inappropriate contractor selection
C11	Unrealistic tender pricing
C12	Unrealistic client expectations
C13	Inappropriate payment method
C14	Inappropriate document control
C15	Inappropriate/ unexpected time control (target)
C16	Inappropriate/ unexpected cost control (target)
C17	Inappropriate/ unexpected quality control (target)
C18	Poor communications among project participants
C19	Lack of information for decision making; (decisiveness)
C20	Slow client response
C21	Changes by client
C22	Lack of competence of project participants
C23	Poor workmanship
C24	Inadequate site investigation
C25	Unrealistic client expectations
C26	Unrealistic information expectations (by the contractor)
C27	Lack of team spirit among participants
C28	Personality clashes among project participants
C29	Poor management by one or more project participants
C30	Adversarial (industry) culture among project participants
C31	Uncontrollable external events
C32	Exaggerated claims

➤ **The Coding system used in this study:**

• **Causes of claims & disputes sub variables: (C 00 0 0)**

C: Cause of claims & disputes

00: Thirty two (32) different causes (first two zeros) (1-32)

0: Duplication of the same cause (controlling question) (3rd zero)
(Need for a sub coding)

0: (Four different questions asked for each cause) (1, 3....) (4th zero)
(Need for a second sub coding)

Table 7-37 Description and Coding System for Causes of Claims and Disputes Sub Variables

Variable		Label	Description
Causes of Construction Claims and Disputes, (C 000)	C000 1	Is this a potential cause?	Specific cause of claim potentiality that would lead to type of claims
	C000 3	Significance	Significance of a specific cause of claims can be expressed as a function of the impact (I) on a construction project, and the probability of occurrence (P). Where, (I): is the collective magnitude of a specific cause that would lead to the generation of types of claims in a construction project; expressed as a percentage of original contract value, or original contract period. And, (P): Probability of occurrence of a specific cause that would that would lead to the generation of types of claims in a construction project
	C000 7	Cause avoidability / controllability	Possibility of avoiding/ controlling a specific <u>cause</u> that that would contribute to the generation of <u>types</u> of construction claims and disputes

7.5.1 PERCEIVED AGREEMENT ASSESSMENT

In this section, respondents were asked to assess the cause variables that are used in this study. Respondents were asked whether they agree that any of the causes of claims and disputes, which were listed in the third part of the questionnaire, was to be considered a potential cause of claims and disputes or not. A three-point response scale was given to the respondents, with a weight of 1 for “yes”, 2 for “no”, 3 for “not sure”. No weight was given when no response was provided. A comparison table is presented later in this section to compare the agreement assessment of the various groups (i.e. clients, consultants and contractors) for the various causes of construction claims and disputes.

General note:

The following **Table 7-38**, **Table 7-39** and **Table 7-40** present the responses for the agreement assessment from the three responding groups. These three tables are found in Sections 7.5.1.1, 7.5.1.2 and 7.5.1.3 respectively. Note that the presented different levels of agreement of these causes of types of claims and disputes in these tables are extracted from a complete list of cause’s agreement assessment, which can be found in Section 7.5.1.5 and Appendix Y.2.1.1. Furthermore, these responses are presented in a bar chart format, which can be found in Appendix Y.2.1.2). Additionally, the comparison **Table 7-42** in the following Section 7.5.1.5 is used to compare the cause’s agreement assessment by the various responding groups (i.e. clients, consultants and contractors). The suggested thirty-two causes, which can contribute to the generation of types of construction claims and disputes, are used in this research.

7.5.1.1 CLIENT’S PERCEPTION

Clients confirmed that most of the suggested causes are potentially likely to lead to the generation of types of construction claims and disputes. All clients agreed that 26 out of 32 causes are potentially the likely factors that trigger such types of construction claims and disputes except those listed in the following below **Table 7-38**, which presents the different levels of agreement as perceived by clients.

Table 7-38 Causes of Claims & Disputes Agreement Assessment (Clients' Perception)

Code #	Clients' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
C2801	1	17	1	0	94.44%	5.56%	0.00%
C2601	1	13	2	3	72.22%	11.11%	16.67%
C1301	0	12	2	5	63.16%	10.53%	26.32%
C1401	0	12	3	4	63.16%	15.79%	21.05%
C2501	0	12	3	4	63.16%	15.79%	21.05%
C1501	1	11	2	5	61.11%	11.11%	27.78%

Where, 94.44 % and 72.22 % of the clients think that C28 and C28, respectively, are potential causes that can trigger the types of claims and disputes. Furthermore, C13, C14, C15 and C25 are considered potential causes. These causes can contribute to the generation of types of construction claims and disputes with an agreement percentage of 63.16 %. Finally, C15 is considered the least potential cause that could trigger such types of claims and disputes with an agreement percentage of 61.11 %

7.5.1.2 CONSULTANT'S PERCEPTION

On the other hand, all consultants felt that 23 out of 32 causes are potentially the likely factors that contribute to the generation of types of construction claims and disputes except those listed in the following below **Table 7-39**, which presents the different levels of agreement from consultant perspective.

Table 7-39 Causes of Claims & Disputes Agreement Assessment (Consultants' Perception)

Code #	Consultants' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
C1801	0	15	1	1	88.24%	5.88%	5.88%
C1701	1	14	1	1	87.50%	6.25%	6.25%
C1901	0	14	1	2	82.35%	5.88%	11.76%
C1501	0	12	3	2	70.59%	17.65%	11.76%
C1401	1	11	3	2	68.75%	18.75%	12.50%
C2801	1	11	5	0	68.75%	31.25%	0.00%
C1301	0	11	4	2	64.71%	23.53%	11.76%
C2501	0	11	3	3	64.71%	17.65%	17.65%
C2601	0	10	4	3	58.82%	23.53%	17.65%

Where, 88.24 % and 87.5 % of the consultants think that C18 and C17, respectively, are potential causes that can trigger the types of claims and disputes. In addition, C19 and C15 are considered by the consultants to be potential causes with agreement percentage of 82.35 % and 70.59 %, respectively. Moreover, 68.75 % of the consultants think that C14 and C28 are potential causes of claims and disputes. Furthermore, C13 and C25 are considered potential causes of claims and disputes with

agreement percentage of 64.71 %. Finally, 58.82 % of the consultants think that C26 is a potential cause and may contribute to the generation of types of construction claims and disputes.

7.5.1.3 CONTRACTOR'S PERCEPTION

In the same way, all contractors think that 23 out of 32 causes are potentially the likely factors that contribute to the generation of types of construction claims and disputes except those listed in the following below **Table 7-40**, which shows the different levels of agreement from contractors perspective.

Table 7-40 Causes of Claims & Disputes Agreement Assessment (Contractors' Perception)

Code #	Contractors' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
C1301	0	13	1	1	86.67%	6.67%	6.67%
C1801	0	13	1	1	86.67%	6.67%	6.67%
C1501	1	12	1	1	85.71%	7.14%	7.14%
C1401	0	12	0	3	80.00%	0.00%	20.00%
C1701	0	12	2	1	80.00%	13.33%	6.67%
C1901	0	12	1	2	80.00%	6.67%	13.33%
C2801	0	11	4	0	73.33%	26.67%	0.00%
C2501	1	10	1	3	71.43%	7.14%	21.43%
C2601	0	10	2	3	66.67%	13.33%	20.00%

Where, C13 and C18 are considered potential causes. These causes can contribute to the generation of types of construction claims and disputes with an agreement percentage of 86.67 %. In addition, 85.71 % of the contractors think that C15 is a potential cause of claims and disputes. Furthermore, C14, C17 and C19 are considered by the contractors to be potential causes of claims and disputes with an agreement percentage of 80.0 %. Finally, 73.33 %, 71.43 % and 66.67 % of the contractors think that C28, C25 and C26, respectively, are potential causes and may contribute to the generation of types of construction claims and disputes.

7.5.1.4 OVERALL PERCEIVED AGREEMENT

Finally, the collective assessment of the overall responses is revealed in this section. This collective assessment is based on the combination of the relative responses of all responding groups. The analysis of the responses reveals that all of the thirty-two suggested causes are potential. All the respondents believed that 23 out of 32 causes could contribute to the generation of types of construction claims and

disputes except those listed in the following below **Table 7-41**, which shows the different levels of agreement from all the responding groups (clients, consultants, contractors).

Table 7-41 Causes of Claims & Disputes Agreement Assessment (Overall Perception)

Code #	Overall Respondents' Agreement				Agreement Percentage (%)		
	Neg.Resp.	Yes	No	Not Sure	Yes	No	Not Sure
C1801	0	47	2	2	92.16%	3.92%	3.92%
C1701	2	44	3	2	89.80%	6.12%	4.08%
C1901	1	44	2	4	88.00%	4.00%	8.00%
C2801	2	39	10	0	79.59%	20.41%	0.00%
C1501	2	35	6	8	71.43%	12.24%	16.33%
C1301	0	36	7	8	70.59%	13.73%	15.69%
C1401	1	35	6	9	70.00%	12.00%	18.00%
C2501	1	33	7	10	66.00%	14.00%	20.00%
C2601	1	33	8	9	66.00%	16.00%	18.00%

Where, 92.16 % and 89.8 % of all respondents think that C18 and C17, respectively, are potential causes of claims and disputes. In addition, C19 and C28 are considered by all respondents to be potential causes with agreement percentage of 88.0 % and 79.59 %, respectively. Moreover, 71.43 % of all respondents think that C15 is a potential cause of claims and disputes. Furthermore, C13 and C14 are considered potential causes of claims and disputes with agreement percentage of 70.59 % and 70.0 %, respectively. Finally, C25 and C26 are considered the least potential causes that can trigger or contribute to the generation of types of construction claims and disputes with an agreement of 66.0 % for both causes.

7.5.1.5 FINDINGS RELATED TO OVERALL PERCEIVED AGREEMENT

All responding groups confirmed that most of the suggested causes are potentially likely to lead to the generation of types of construction claims and disputes. All groups agreed that 23 out of 32 causes are potentially the likely factors that trigger such types of construction claims and disputes except those listed in the previous **Table 7-41**, which presents the different levels of agreement as perceived by all groups. **Table 7-42** below, is used to compare the cause's agreement assessment by the various responding groups (i.e. clients, consultants and contractors). These suggested thirty-two causes can contribute to the generation of types of construction claims and disputes. In addition, the results reveal that the respondents were biased in some way depending on their experience and background. However, this bias is not

surprising; in fact, it was reported by other researchers such as Kumaraswamy (1996) and Yogeswaran (1996).

Table 7-42 Causes of Claims & Disputes Agreement Assessment (Comparison Table)

CAUSE OF CLAIMS & DISPUTES ASSESSMENT					
Cause Description	Code	Clients	Consultants	Contractors	Over All
Inadequate/ Inaccurate Design Information - Is this a potential Cause?	C0101	100.00%	100.00%	100.00%	100.00%
Inadequate Design Documentation - Is this a potential Cause?	C0201	100.00%	100.00%	100.00%	100.00%
Inadequate Brief - Is this a potential Cause?	C0301	100.00%	100.00%	100.00%	100.00%
Unclear & Inadequate Specifications - Is this a potential Cause?	C0401	100.00%	100.00%	100.00%	100.00%
Inappropriate Contract Type (Strategy) - Is this a potential Cause?	C0501	100.00%	100.00%	100.00%	100.00%
Inappropriate Contract Form - Is this a potential Cause?	C0601	100.00%	100.00%	100.00%	100.00%
Inadequate Contract Administration - Is this a potential Cause?	C0701	100.00%	100.00%	100.00%	100.00%
Inadequate Contract Documentation - Is this a potential Cause?	C0801	100.00%	100.00%	100.00%	100.00%
Incomplete Tender Information - Is this a potential Cause?	C0901	100.00%	100.00%	100.00%	100.00%
Inappropriate Contractor Selection - Is this a potential Cause?	C1001	100.00%	100.00%	100.00%	100.00%
Unrealistic Tender Pricing - Is this a potential Cause?	C1101	100.00%	100.00%	100.00%	100.00%
Unclear Risk Allocation - Is this a potential Cause?	C1201	100.00%	100.00%	100.00%	100.00%
Inappropriate Payment Method - Is this a potential Cause?	C1301	63.16%	64.71%	86.67%	70.59%
Inappropriate Document Control - Is this a potential Cause?	C1401	63.16%	68.75%	80.00%	70.00%
Inappropriate/ Unexpected Time Control (Target) - Is this a potential Cause?	C1501	61.11%	70.59%	85.71%	71.43%
Inappropriate/ Unexpected Cost Control (Target) - Is this a potential Cause?	C1601	100.00%	100.00%	100.00%	100.00%
Inappropriate/ Unexpected Quality Control (Target) - Is this a potential Cause?	C1701	100.00%	87.50%	80.00%	89.80%
Poor Communications Among Project Participants - Is this a potential Cause?	C1801	100.00%	88.24%	86.67%	92.16%
Lack of Information for Decision Making - Is this a potential Cause?	C1901	100.00%	82.35%	80.00%	88.00%
Slow Client Response - Is this a potential Cause?	C2001	100.00%	100.00%	100.00%	100.00%
Changes by Client - Is this a potential Cause?	C2101	100.00%	100.00%	100.00%	100.00%
Lack of Competence of Project Participants - Is this a potential Cause?	C2201	100.00%	100.00%	100.00%	100.00%
Poor Workmanship - Is this a potential Cause?	C2301	100.00%	100.00%	100.00%	100.00%
Inadequate Site Investigation - Is this a potential Cause?	C2401	100.00%	100.00%	100.00%	100.00%
Unrealistic Client Expectations - Is this a potential Cause?	C2501	63.16%	64.71%	71.43%	66.00%
Unrealistic Expected Information by Contractor - Is this a potential Cause?	C2601	72.22%	58.82%	66.67%	66.00%
Lack of Team Spirit Among Participants - Is this a potential Cause?	C2701	100.00%	100.00%	100.00%	100.00%
Personality Clashes Among Project Participants - Is this a potential Cause?	C2801	94.44%	68.75%	73.33%	79.59%
Poor Management - Is this a potential Cause?	C2901	100.00%	100.00%	100.00%	100.00%
Adversarial (industry) Culture - Is this a potential Cause?	C3001	100.00%	100.00%	100.00%	100.00%
Uncontrollable External Events - Is this a potential Cause?	C3101	100.00%	100.00%	100.00%	100.00%
Exaggerated Claims - Is this a potential Cause?	C3201	100.00%	100.00%	100.00%	100.00%

7.5.2 PERCEIVED SIGNIFICANCE ASSESSMENT

In this section, respondents were asked to choose one of the following five options to rate the level of significance (importance) of each cause of claims and disputes in construction projects. These options are never, rare (low importance), average, high importance and very high importance. A weight in a scale from 1 to 5 was given for each of the five frequencies with a weight of 1 for “never”, 2 for “low importance”, 3 for “average”, 4 for “high importance” and 5 for “very high importance”. No weight was given when no response was provided.

The analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be significant. On the contrary, If the mean score of a type less than three, then this type is said to be insignificant.

General note:

The following **Table 7-43**, **Table 7-44** and **Table 7-45** present the responses for the cause's significance assessment from the clients, consultants and contractors. These three tables are found in Sections 7.5.2.1, 7.5.2.3 and 7.5.2.3 respectively. Note that the presented top ten significant causes of claims and disputes in these tables are extracted from a complete list of cause's significance assessment in **Table 7-47**, which can be found in Section 7.5.2.5 and Appendix Y.2.2.1. Furthermore, these responses are presented in a bar chart format, which can be found in Appendix Y.2.1.2).

7.5.2.1 CLIENT'S PERCEPTION

The **Table 7-43** below shows the responses for the significance of these causes from clients' perception.

Table 7-43 Causes of Claims & Disputes Significance Assessment (Clients' Perception)

Code #	Cause Impact / Magnitude						Cause Impact Index		
	Neg.Res	N	LI	Av	HI	VHI	Mean	Index	Rank
C0203	0	0	0	4	7	8	4.21	84.21%	1
C0103	1	0	0	4	9	5	4.06	81.11%	2
C1503	0	0	0	7	6	6	3.95	78.95%	3
C1603	1	0	0	8	5	5	3.83	76.67%	4
C2103	1	0	0	8	5	5	3.83	76.67%	4
C1903	0	0	0	9	8	2	3.63	72.63%	6
C2003	0	0	1	9	6	3	3.58	71.58%	7
C1803	0	0	1	9	7	2	3.53	70.53%	8
C0303	0	0	1	10	6	2	3.47	69.47%	9
C2903	0	0	0	12	5	2	3.47	69.47%	9
C2403	0	0	1	10	7	1	3.42	68.42%	11

As can be seen from this table, there are only two causes with an index over 80%. These causes are **C0203** and **C0103**; they have average scores of 4.21 and 4.06, respectively. They contribute significantly to the generation of types of claims and disputes. Additionally, there are 23 significant causes as perceived by clients. These significant causes are **C0203**, **C0103**, **C1503**, **C1603**, **C2103**, **C1903**, **C2003**, **C1803**, **C0303**, **C2903**, **C2403**, **C0403**, **C3003**, **C1203**, **C0803**, **C1103**, **C1003**, **C0903**, **C0503**, **C2203**, **C2503**, **C0603** and **C2303**.

7.5.2.2 CONSULTANT'S PERCEPTION

Similarly, **Table 7-44** present the result of this assessment from consultants' perception.

Table 7-44 Causes of Claims & Disputes Significance Assessment (Consultants' Perception)

Code #	Cause Impact / Magnitude						Cause Impact Index		
	Neg.Res	N	LI	Av	HI	VHI	Mean	Index	Rank
C0103	0	0	0	5	4	8	4.18	83.53%	1
C0203	1	0	0	4	6	6	4.13	82.50%	2
C1903	1	0	0	3	9	4	4.06	81.25%	3
C1603	1	0	0	4	8	4	4.00	80.00%	4
C1503	0	0	0	5	8	4	3.94	78.82%	5
C2103	0	0	0	6	8	3	3.82	76.47%	6
C1803	0	0	0	7	7	3	3.76	75.29%	7
C2403	0	0	0	7	8	2	3.71	74.12%	8
C2003	0	0	1	5	10	1	3.65	72.94%	9
C0303	0	0	0	9	6	2	3.59	71.76%	10
C0403	0	0	0	10	4	3	3.59	71.76%	10

There are four causes have an index over 80%. These causes are **C0103**, **C0203**, **C1903** and **C1603** with index values of 83.53%, 82.50%, 81.25% and 80.00%, respectively. In addition, there are another 17 significant causes from a Consultants' point of view. These causes are **C1503**, **C2103**, **C1803**, **C2403**, **C2003**, **C0303**, **C0403**, **C2903**, **C1203**, **C0803**, **C3003**, **C1003**, **C3103**, **C1103**, **C0903**, **C0503** and **C2203**.

7.5.2.3 CONTRACTOR'S PERCEPTION

In the sae way, contractors' responses are shown in **Table 7-45**.

Table 7-45 Causes of Claims & Disputes Significance Assessment (Contractors' Perception)

Code #	Cause Impact / Magnitude						Cause Impact Index		
	Neg.Res	N	LI	Av	HI	VHI	Mean	Index	Rank
C0203	0	0	0	4	6	5	4.07	81.33%	1
C0103	0	0	0	4	7	4	4.00	80.00%	2
C1503	0	0	0	3	11	1	3.87	77.33%	3
C1603	0	0	0	4	10	1	3.80	76.00%	4
C1903	0	0	0	6	6	3	3.80	76.00%	4
C1803	0	0	0	5	8	2	3.80	76.00%	4
C2003	1	0	0	5	8	1	3.71	74.29%	7
C2403	0	0	0	5	10	0	3.67	73.33%	8
C2103	0	0	0	7	7	1	3.60	72.00%	9
C0803	1	0	0	7	6	1	3.57	71.43%	10
C2903	0	0	0	7	8	0	3.53	70.67%	11

C0203 is seen as the cause with the highest importance with an average score of 4.07, and an index value of 81.33%. In addition, **C0103** follows with an average score of 4 and an index of 80.00%. However, **C1603**, **C1903** and **C1803** have the same index of 76.00%. These three causes are ranked at number 4. In general, twenty-three significant causes can contribute to the generation of types of claims and disputes, from contractors' perception. These causes are **C0203**, **C0103**, **C1503**, **C1603**, **C1903**, **C1803**, **C2003**, **C2403**, **C2103**, **C0803**, **C2903**, **C1203**, **C0303**, **C1003**, **C0403**, **C3003**, **C1103**, **C0903**, **C2803**, **C0703**, **C0503**, **C2603** and **C2203**.

7.5.2.4 OVERALL PERCEIVED SIGNIFICANCE (IMPORTANCE)

Table 7-46 illustrate the responses for the cause's significance assessment from an overall respondents' perspective, which is the total response from all the respondents for the first ten types of claims and disputes. The comparison **Table 7-47**, in the following Section 7.5.2.5, is used to compare the cause's significance assessment, for the thirty-two causes of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors).

Table 7-46 Causes of Claims & Disputes Significance Assessment (Overall Perception)

Code #	Cause Impact / Magnitude						Cause Impact Index		
	Neg.Res	N	LI	Av	HI	VHI	Mean	Index	Rank
C0203	1	0	0	12	19	19	4.14	82.80%	1
C0103	1	0	0	13	20	17	4.08	81.60%	2
C1503	0	0	0	15	25	11	3.92	78.43%	3
C1603	2	0	0	16	23	10	3.88	77.55%	4
C1903	1	0	0	18	23	9	3.82	76.40%	5
C2103	1	0	0	21	20	9	3.76	75.20%	6
C1803	0	0	1	21	22	7	3.69	73.73%	7
C2003	1	0	2	19	24	5	3.64	72.80%	8
C2403	0	0	1	22	25	3	3.59	71.76%	9
C0303	0	0	1	27	19	4	3.51	70.20%	10
C2903	0	0	1	26	21	3	3.51	70.20%	10

There are 21 significant causes altogether as perceived by all groups. **C0203** and **C0103** are the top two with an average score of 4.14 and 4.08, and an important index value of 82.80% and 81.60% respectively. The top eleven of these significant causes have an index value of over 70%. For this assessment, the cause with the lowest importance is **C1303** as it has an index of 45.71%. Twenty-five people responded that this cause has a low significance, and 19 responded that it only has an average significance.

7.5.2.5 FINDINGS RELATED TO OVERALL PERCEIVED SIGNIFICANCE

In order to compare the response of each responding group based on their average score or important index, **Table 7-47** is used for this purpose.

As was mentioned earlier there are 21 significant causes from an overall perception. However, there are 23 significant causes from clients' perception, 21 significant causes from consultants' perception and 23 from contractors' perception. This simply means that some causes are seen as significant from a group's perception and are seen as insignificant by another group. For instance, clients and contractors responded that **C3103** is insignificant, and this same cause appears to be significant from consultants' perception. The most significant causes are **C0203, C0103, C1503, C1603, C1903, C2103, C1803, C2003, C2403, C0303, C2903, C0403, C1203, C0803, C3003, C1003, C1103, C0903, C0503, C3103** and **C2203**.

Table 7-47 Causes of Claims & Disputes Significance Assessment (Comparison Table)

CAUSES OF CLAIMS & DISPUTES ASSESSMENT													
Cause Description	Code	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking
		Clients			Consultants			Contractors			Over All		
Inadequate Design Documentation - I	C0203	4.211	84.21%	1	4.125	82.50%	2	4.067	81.33%	1	4.140	82.80%	1
Inadequate/ Inaccurate Design Inform	C0103	4.056	81.11%	2	4.176	83.53%	1	4.000	80.00%	2	4.080	81.60%	2
Inappropriate/ Unexpected Time Cont	C1503	3.947	78.95%	3	3.941	78.82%	5	3.867	77.33%	3	3.922	78.43%	3
Inappropriate/ Unexpected Cost Cont	C1603	3.833	76.67%	4	4.000	80.00%	4	3.800	76.00%	4	3.878	77.55%	4
Lack of Information for Decision Mal	C1903	3.632	72.63%	6	4.063	81.25%	3	3.800	76.00%	4	3.820	76.40%	5
Changes by Client - Impact(Magnitud	C2103	3.833	76.67%	4	3.824	76.47%	6	3.600	72.00%	9	3.760	75.20%	6
Poor Communications Among Project	C1803	3.526	70.53%	8	3.765	75.29%	7	3.800	76.00%	4	3.686	73.73%	7
Slow Client Response - Impact(Magn	C2003	3.579	71.58%	7	3.647	72.94%	9	3.714	74.29%	7	3.640	72.80%	8
Inadequate Site Investigation - Impact	C2403	3.421	68.42%	11	3.706	74.12%	8	3.667	73.33%	8	3.588	71.76%	9
Inadequate Brief - Impact(Magnitude	C0303	3.474	69.47%	9	3.588	71.76%	10	3.467	69.33%	13	3.510	70.20%	10
Poor Management - Impact(Magnitud	C2903	3.474	69.47%	9	3.529	70.59%	12	3.533	70.67%	11	3.510	70.20%	10
Unclear & Inadequate Specifications	C0403	3.421	68.42%	11	3.588	71.76%	10	3.333	66.67%	15	3.451	69.02%	12
Unclear Risk Allocation - Impact(Ma	C1203	3.263	65.26%	14	3.438	68.75%	13	3.533	70.67%	11	3.400	68.00%	13
Inadequate Contract Documentation -	C0803	3.211	64.21%	15	3.353	67.06%	14	3.571	71.43%	10	3.360	67.20%	14
Adversarial (industry) Culture - Impa	C3003	3.368	67.37%	13	3.353	67.06%	14	3.286	65.71%	16	3.340	66.80%	15
Inappropriate Contractor Selection - I	C1003	3.105	62.11%	17	3.353	67.06%	14	3.400	68.00%	14	3.275	65.49%	16
Unrealistic Tender Pricing - Impact(N	C1103	3.111	62.22%	16	3.176	63.53%	18	3.200	64.00%	17	3.160	63.20%	17
Incomplete Tender Information - Imp	C0903	3.105	62.11%	17	3.000	60.00%	19	3.200	64.00%	17	3.102	62.04%	18
Inappropriate Contract Type (Strategy	C0503	3.053	61.05%	19	3.000	60.00%	19	3.067	61.33%	21	3.041	60.82%	19
Uncontrollable External Events - Imp	C3103	2.941	58.82%	24	3.235	64.71%	17	2.867	57.33%	25	3.020	60.41%	20
Lack of Competence of Project Partic	C2203	3.000	60.00%	20	3.000	60.00%	19	3.000	60.00%	23	3.000	60.00%	21
Unrealistic Client Expectations - Imp	C2503	3.000	60.00%	20	2.941	58.82%	24	2.929	58.57%	24	2.960	59.20%	22
Inappropriate Contract Form - Impact	C0603	3.000	60.00%	20	2.941	58.82%	22	2.867	57.33%	25	2.940	58.80%	23
Inadequate Contract Administration -	C0703	2.895	57.89%	25	2.882	57.65%	25	3.071	61.43%	20	2.940	58.80%	23
Poor Workmanship - Impact(Magnitu	C2303	3.000	60.00%	20	2.941	58.82%	22	2.800	56.00%	27	2.922	58.43%	25
Personality Clashes Among Project Pa	C2803	2.842	56.84%	26	2.765	55.29%	27	3.133	62.67%	19	2.902	58.04%	26
Unrealistic Expected Information by	C2603	2.833	56.67%	27	2.813	56.25%	26	3.067	61.33%	21	2.898	57.96%	27
Lack of Team Spirit Among Participa	C2703	2.526	50.53%	30	2.733	54.67%	29	2.786	55.71%	29	2.667	53.33%	28
Inappropriate Document Control - Im	C1403	2.684	53.68%	28	2.765	55.29%	27	2.467	49.33%	31	2.647	52.94%	29
Exaggerated Claims - Impact(Magniti	C3203	2.632	52.63%	29	2.353	47.06%	31	2.600	52.00%	30	2.529	50.59%	30

Furthermore, Table 7-48 presents the cause significance assessment’s RAF and agreement percentage of the responses from the different responding groups. According to this table, the percentages of agreement amongst these groups are between 80% and 90%. Clients and consultants have the highest agreement of 89.84%, while clients and contractors have the lowest of 82.81%. Therefore, there is a better agreement between clients and consultants as it has the highest percentage out of all the comparison. Furthermore, the second part of the table shows that responses between ‘Clients’ and ‘Overall’, as well as ‘Consultants’ and ‘Overall’ are very similar as they both have an agreement of approximately 93%.

Table 7-48 Causes of Claims & Disputes (Significance Rank Agreement Factor Comparison)**Agreement Amongst Groups**

Groups	<i>RAF</i>	<i>PD</i>	<i>PA</i>
Clients & Consultants	1.63	10.16%	89.84%
Clients & Contractors	2.75	17.19%	82.81%
Consultants & Contractors	2.69	16.80%	83.20%

Agreement of Each Group With Over All Groups

Groups	<i>RAF</i>	<i>PD</i>	<i>PA</i>
Clients & Over All	1.19	7.42%	92.58%
Consultants & Over All	1.13	7.03%	92.97%
Contractors & Over All	2.00	12.50%	87.50%

* *RAF*: Rank Agreement Factor, *PD*: Percentage of Disagreement and *PA*: Percentage of Agreement

7.5.3 PERCEIVED CONTROLLABILITY/AVOIDABILITY ASSESSMENT

This section looks at the Avoidability assessment whereby respondents were asked to identify how avoidable the causes of the claims are for their projects. A five-point response scale will be used for this assessment and these are ‘Never’ or ‘No Avoidability’ (N) = 1, ‘Low Avoidability’ (LA) = 2, ‘Average’ (Av) = 3, ‘High Avoidability’ (HA) = 4, ‘Very High Avoidability’ (VHA) = 5. The analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be Avoidable (very easy to avoid). On the contrary, If the mean score of a type less than three, then this type is said to be Unavoidable (very difficult to avoid).

General note:

Table 7-49, **Table 7-50** and **Table 7-51** present the responses for the avoidability/controllability assessment by the various responding groups. These three tables are found in Sections 7.5.3.1, 7.5.3.2 and 7.5.3.3, respectively. Note that the presented top ten avoidable causes of claims and disputes in these tables are extracted from a complete list of cause’s avoidability/controllability assessment in **Table 7-52**, which can be found in Section 7.5.3.5 and Appendix Y.2.3.1. Furthermore, these responses are presented in a bar chart format, which can be found in Appendix Y.2.3.2). In addition, the comparison **Table 7-53** in the following Section 7.5.3.5 is used to compare the avoidability/controllability assessment, for the thirty-two causes

of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors).

7.5.3.1 CLIENT'S PERCEPTION

This section summarises the Clients' responses for the avoidability assessment. **Table 7-49** below shows their responses.

Table 7-49 Causes of Claims & Disputes Avoidability Assessment (Clients' Perception)

Code #	Cause Avoidability						Cause Avoidability Index		
	Neg.Res	N	LA	Av	HA	VHA	Mean	Index	Rank
C0507	0	0	0	2	11	6	4.21	84.21%	1
C0907	0	0	0	3	10	6	4.16	83.16%	2
C0307	0	0	0	3	11	5	4.11	82.11%	3
C0107	0	0	0	2	14	3	4.05	81.05%	4
C0607	0	0	0	5	8	6	4.05	81.05%	4
C0207	0	0	0	3	13	3	4.00	80.00%	6
C0407	0	0	0	5	9	5	4.00	80.00%	6
C1307	0	0	0	6	11	2	3.79	75.79%	8
C0707	0	0	0	9	10	0	3.53	70.53%	9
C1007	0	0	0	9	10	0	3.53	70.53%	9
C2407	0	0	0	10	8	1	3.53	70.53%	9
C1407	0	0	1	10	7	1	3.42	68.42%	12

The analysis of the responses reveals that *C0507* is the most avoidable cause. It has an importance index percentage of 84.21%, and an average score of 4.21. In addition, there are another six significant causes with importance values over 80%. These causes are *C0507*, *C0907*, *C0307*, *C0107*, *C0607*, *C0207* and *C0407*. Furthermore, *C0107* and *C0607* are ranked fourth with an index value of 81.05%. *C0207* and *C0407* are ranked sixth with the same index value of 80.0% as well. In general, there are twenty-eight avoidable causes altogether. These avoidable causes are *C0507*, *C0907*, *C0307*, *C0107*, *C0607*, *C0207*, *C0407*, *C1307*, *C0707*, *C1007*, *C2407*, *C1407*, *C1207*, *C0807*, *C1707*, *C1807*, *C2507*, *C2207*, *C2607*, *C2907*, *C1107*, *C1907*, *C2707*, *C3207*, *C1607*, *C2307*, *C2807* and *C1507*. The remaining four causes are unavoidable. The top ten avoidable causes from clients' point of view are as follows:

- C0507 Inappropriate contract type (strategy)
- C0907 Incomplete tender information
- C0307 Inadequate brief
- C0607 Inappropriate contract form
- C0107 Inadequate / inaccurate design information

- C0407 Unclear & inadequate specifications
- C0207 Inadequate design documentation
- C1307 Inappropriate payment method
- C0707 Inadequate contract administration
- C2407 Inadequate site investigation

7.5.3.2 CONSULTANT'S PERCEPTION

The consultants' responses are shown in **Table 7-50** below:

Table 7-50 Causes of Claims & Disputes Avoidability Assessment (Consultants' Perception)

Code #	CONSULTANTS						Cause Avoidability Index		
	Cause Avoidability						Mean	Index	Rank
	Neg.Resp	N	LA	Av	HA	VHA			
C0307	0	0	0	4	7	6	4.12	82.35%	1
C0407	0	0	0	4	8	5	4.06	81.18%	2
C0607	0	0	0	5	6	6	4.06	81.18%	2
C0107	0	0	0	4	9	4	4.00	80.00%	4
C0507	0	0	0	6	5	6	4.00	80.00%	4
C0907	0	0	0	6	6	5	3.94	78.82%	6
C0207	0	0	0	6	9	2	3.76	75.29%	7
C1307	0	0	0	7	7	3	3.76	75.29%	7
C1407	0	0	0	7	9	1	3.65	72.94%	9

In general, twenty-two causes are perceived as avoidable by the consultants. The remaining ten causes are perceived as less avoidable. The top ten most avoidable causes of claims and disputes as perceived by consultants are listed below:

- C0307 Inadequate brief
- C0607 Inappropriate contract form
- C0407 Unclear & inadequate specifications
- C0507 Inappropriate contract type (strategy)
- C0107 Inadequate / inaccurate design information
- C0907 Incomplete tender information
- C0207 Inadequate design documentation
- C1307 Inappropriate payment method
- C1407 Inappropriate document control
- C0707 Inadequate contract administration

The most avoidable cause for this assessment is **C0307** with an average score of 4.12 and index value of 82.35%. However, two causes are ranked as number two

with an average score of 4.06 and index of 81.18 %. These causes are **C0407** and **C0607**, respectively. In addition, another two causes are ranked as number four with an average score of 4.0 and Index of 80.0%. These are **C0107** and **C0507**. The avoidable causes have the following codes **C0307**, **C0407**, **C0607**, **C0107**, **C0507**, **C0907**, **C0207**, **C1307**, **C1407**, **C0707**, **C1007**, **C2407**, **C0807**, **C1207**, **C1107**, **C1707**, **C2207**, **C2707**, **C1907**, **C2607**, **C2807** and **C1807**.

7.5.3.3 CONTRACTOR'S PERCEPTION

Similarly, this section analyse the avoidability of each cause of construction claims and disputes from a contractors' perspective. **Table 7-51** below presents their response for the top ten avoidable types.

Table 7-51 Causes of Claims & Disputes Avoidability Assessment (Contractors' Perception)

Code #	CONTRACTORS						Cause Avoidability Index		
	Cause Avoidability						Mean	Index	Rank
	Neg.Resp	N	LA	Av	HA	VHA			
C0407	0	0	0	2	5	8	4.40	88.00%	1
C0507	0	0	0	3	4	8	4.33	86.67%	2
C0307	0	0	0	4	3	8	4.27	85.33%	3
C0607	0	0	0	3	5	7	4.27	85.33%	3
C0907	0	0	0	4	3	8	4.27	85.33%	3
C0107	0	0	0	3	7	5	4.13	82.67%	6
C0207	0	0	0	3	9	3	4.00	80.00%	7
C1307	0	0	1	6	5	3	3.67	73.33%	8
C0707	0	0	0	6	9	0	3.60	72.00%	9
C2407	0	0	0	6	9	0	3.60	72.00%	9
C0807	0	0	0	7	8	0	3.53	70.67%	11

The most avoidable cause, which can contribute to the generation of types of claims and disputes, is **C0407** with an average score of 4.4 and an index value of 88.0%, from contractors' point of view. However, there are seven causes with an index value over 80%. The top ten most avoidable causes of claims and disputes as perceived by contractors are listed below:

- C0407 Unclear & inadequate specifications
- C0507 Inappropriate contract type (strategy)
- C0307 Inadequate brief
- C0607 Inappropriate contract form
- C0907 Incomplete tender information
- C0107 Inadequate / inaccurate design information
- C0207 Inadequate design documentation
- C1307 Inappropriate payment method

- C0707 Inadequate contract administration
- C2407 Inadequate site investigation

From Contractor's perception, there are twenty-four avoidable causes. These avoidable causes are *C0407, C0507, C0307, C0607, C0907, C0107, C0207, C1307, C0707, C2407, C0807, C0507, C0307, C0607, C0907, C0107, C0207, C1307, C0707, C2407, C0807, C1007, C1207, C1407, C1907, C1807, C2807, C1707, C2207, C2607, C1107, C2707, C1507 and C2507*. Contrary, there are eight unavoidable ones. The lowest of these causes is *C3107* with an importance index value of 44.0 %.

7.5.3.4 OVERALL PERCEIVED CONTROLLABILITY/AVOIDABILITY

Responses from the various groups, regarding the avoidability of causes that can contribute to/'trigger' the types of claims and disputes, are analysed. However, this section reveals the analysis of the overall response data. The overall response data are based on the combined responses of the three different groups (i.e. clients, consultants and contractors). **Table 7-52** below presents their response for the top ten avoidable causes of claims and disputes.

Table 7-52 Causes of Claims & Disputes Avoidability Assessment (Overall Perception)

Code #	Cause Avoidability						Cause Avoidability Index		
	Neg.Resp	N	LA	Av	HA	VHA	Mean	Index	Rank
C0507	0	0	0	11	20	20	4.18	83.53%	1
C0307	0	0	0	11	21	19	4.16	83.14%	2
C0407	0	0	0	11	22	18	4.14	82.75%	3
C0607	0	0	0	13	19	19	4.12	82.35%	4
C0907	0	0	0	13	19	19	4.12	82.35%	4
C0107	0	0	0	9	30	12	4.06	81.18%	6
C0207	0	0	0	12	31	8	3.92	78.43%	7
C1307	0	0	1	19	23	8	3.75	74.90%	8
C0707	0	0	0	23	28	0	3.55	70.98%	9
C2407	0	0	0	24	26	1	3.55	70.98%	9
C1007	0	0	0	24	27	0	3.53	70.59%	11
C1407	0	0	1	26	21	3	3.51	70.20%	12

In general, there are twenty-four avoidable causes as perceived by all respondents. However, eight causes are perceived as less avoidable. The top ten most avoidable types of claims and disputes as perceived by contractors are listed below:

- C0507 Inappropriate contract type (strategy)
- C0307 Inadequate brief
- C0407 Unclear & inadequate specifications
- C0607 Inappropriate contract form

- C0907 Incomplete tender information
- C0107 Inadequate / inaccurate design information
- C0207 Inadequate design documentation
- C1307 Inappropriate payment method
- C0707 Inadequate contract administration
- C2407 Inadequate site investigation

C0507 “Inappropriate contract type strategy” is rated as the most avoidable cause of claims and disputes with an average score of 4.168, and important index of 83.53%. Forty respondents responded that this type is avoidable, and, the remaining eleven responded that it has an average avoidability. *C0307* and *C0407* are ranked second and third, respectively. These two causes have an index value of 83.14 % and 82.75%, as well as an average score of 4.16 and 4.14, respectively. The cause with the lowest avoidability is *C3107* and has an index of 41.96%.

7.5.3.5 FINDINGS RELATED TO PERCEIVED AVOIDABILITY ASSESSMENT

Table 7-53 below is used to compare the response of each responding group based on their average score or important index.

For this assessment, all the group respondents responded that *C0507* is the most avoidable cause and it has an overall important index of 83.53%. *C0307* is ranked number two as it was ranked number one by consultants and number three by both consultants and clients. This cause has an overall average score of 4.16 and Index of 83.14%. Overall, the top significant causes are *C0507*, *C0307*, *C0407*, *C0607*, *C0907*, *C0107*, *C0207*, *C1307*, *C0707*, *C2407*, *C1007*, *C1407*, *C1207*, *C0807*, *C1707*, *C1907*, *C1807*, *C2207*, *C2607*, *C2807*, *C1107*, *C2707*, *C2507* and *C1507*.

It can be seen that most of these suggested causes are avoidable and controllable. The least avoidable and controllable cause is *C3107* with an importance index value of 41.96 %. It was ranked last by all groups. This finding is inline with Kumaraswamy (1997)’s one. He says: ..”An appraisal of the root causes, for example, reveals the apparent controllability of all except one - related to ‘uncontrollable external events’.”

Table 7-53 Causes of Claims & Disputes Avoidability Assessment (Comparison Table)

CAUSES OF CLAIMS & DISPUTES AVOIDABILITY ASSESSMENT													
NOTE THAT THE RED COLOUR INDICATES THE AVOIDABLE CAUSES; HOWEVER THE GREEN COLOUR INDICATES THE UNAVOIDABLE CAUSE OF CLAIMS & DISPUTES													
Cause Description	Code	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking
		Clients			Consultants			Contractors			Over All		
Inappropriate Contract Type (Strategy) - Cause Avoidability	C0507	4.21	84.21%	1	4.00	80.00%	4	4.33	86.67%	2	4.18	83.53%	1
Inadequate Brief - Cause Avoidability	C0307	4.11	82.11%	3	4.12	82.35%	1	4.27	85.33%	3	4.16	83.14%	2
Unclear & Inadequate Specifications - Cause Avoidability	C0407	4.00	80.00%	6	4.06	81.18%	2	4.40	88.00%	1	4.14	82.75%	3
Inappropriate Contract Form - Cause Avoidability	C0607	4.05	81.05%	4	4.06	81.18%	2	4.27	85.33%	3	4.12	82.35%	4
Incomplete Tender Information - Cause Avoidability	C0907	4.16	83.16%	2	3.94	78.82%	6	4.27	85.33%	3	4.12	82.35%	4
Inadequate/ Inaccurate Design Information - Cause Avoidability	C0107	4.05	81.05%	4	4.00	80.00%	4	4.13	82.67%	6	4.06	81.18%	6
Inadequate Design Documentation - Cause Avoidability	C0207	4.00	80.00%	6	3.76	75.29%	7	4.00	80.00%	7	3.92	78.43%	7
Inappropriate Payment Method - Cause Avoidability	C1307	3.79	75.79%	8	3.76	75.29%	7	3.67	73.33%	8	3.75	74.90%	8
Inadequate Contract Administration - Cause Avoidability	C0707	3.53	70.53%	9	3.53	70.59%	10	3.60	72.00%	9	3.55	70.98%	9
Inadequate Site Investigation - Cause Avoidability	C2407	3.53	70.53%	9	3.53	70.59%	10	3.60	72.00%	9	3.55	70.98%	9
Inappropriate Contractor Selection - Cause Avoidability	C1007	3.53	70.53%	9	3.53	70.59%	10	3.53	70.67%	11	3.53	70.59%	11
Inappropriate Document Control - Cause Avoidability	C1407	3.42	68.42%	12	3.65	72.94%	9	3.47	69.33%	14	3.51	70.20%	12
Unclear Risk Allocation - Cause Avoidability	C1207	3.37	67.37%	13	3.47	69.41%	13	3.53	70.67%	11	3.45	69.02%	13
Inadequate Contract Documentation - Cause Avoidability	C0807	3.35	67.06%	14	3.47	69.41%	13	3.53	70.67%	11	3.45	68.98%	14
Inappropriate/ Unexpected Quality Control (Target)	C1707	3.32	66.32%	15	3.12	62.35%	15	3.27	65.33%	18	3.24	64.71%	15
Lack of Information for Decision Making - Cause Avoidability	C1907	3.11	62.11%	22	3.06	61.18%	19	3.47	69.33%	14	3.20	63.92%	16
Poor Communications Among Project Participants	C1807	3.22	64.44%	16	3.00	60.00%	22	3.33	66.67%	16	3.18	63.60%	17
Lack of Competence of Project Participants - Cause Avoidability	C2207	3.16	63.16%	18	3.12	62.35%	15	3.27	65.33%	18	3.18	63.53%	18
Unrealistic Client Expectations - Cause Avoidability	C2607	3.16	63.16%	18	3.06	61.18%	19	3.27	65.33%	18	3.16	63.14%	19
Personality Clashes Among Project Participants	C2807	3.05	61.05%	25	3.06	61.18%	19	3.33	66.67%	16	3.14	62.75%	20
Unrealistic Tender Pricing - Cause Avoidability	C1107	3.11	62.22%	21	3.12	62.35%	15	3.13	62.67%	21	3.12	62.40%	21
Lack of Team Spirit Among Participants - Cause Avoidability	C2707	3.11	62.11%	22	3.12	62.35%	15	3.13	62.67%	21	3.12	62.35%	22
Unrealistic Expected Information by Contractors	C2507	3.21	64.21%	17	2.88	57.65%	25	3.00	60.00%	24	3.04	60.78%	23
Inappropriate/ Unexpected Time Control (Target)	C1507	3.00	60.00%	28	2.94	58.82%	23	3.07	61.33%	23	3.00	60.00%	24
Poor Management - Cause Avoidability	C2907	3.16	63.16%	18	2.82	56.47%	26	2.73	54.67%	29	2.92	58.43%	25
Poor Workmanship - Cause Avoidability	C2307	3.05	61.05%	25	2.82	56.47%	26	2.80	56.00%	27	2.90	58.04%	26
Adversarial (industry) Culture - Cause Avoidability	C3007	2.84	56.84%	29	2.94	58.82%	23	2.87	57.33%	25	2.88	57.65%	27
Inappropriate/ Unexpected Cost Control (Target)	C1607	3.05	61.05%	25	2.71	54.12%	28	2.80	56.00%	27	2.86	57.25%	28
Exaggerated Claims - Cause Avoidability	C3207	3.11	62.11%	22	2.65	52.94%	30	2.73	54.67%	29	2.84	56.86%	29
Changes by Client - Cause Avoidability	C2107	2.79	55.79%	30	2.71	54.12%	28	2.87	57.33%	25	2.78	55.69%	30
Slow Client Response - Cause Avoidability	C2007	2.79	55.79%	30	2.47	49.41%	31	2.67	53.33%	31	2.65	52.94%	31
Uncontrollable External Events - Cause Avoidability	C3107	2.00	40.00%	32	2.12	42.35%	32	2.20	44.00%	32	2.10	41.96%	32

In addition, the following **Table 7-54** presents the percentage agreement of responses amongst the various groups. It can be seen that agreement between consultants and contractors is the highest amongst all groups, although the percentage agreement between clients and contractors, and consultants and contractors are similar. The bottom part of the table shows that the percentage agreement between clients and overall is the same as the agreement between consultants as they both have a percentage agreement of 89.26%.

Table 7-54 Causes of Claims & Disputes (Avoidability Rank Agreement Factor Comparison)*

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.06	19.14%	80.86%
Clients & Contractors	2.66	16.60%	83.40%
Consultants & Contractors	2.16	13.48%	86.52%
Agreement of Each Group With Over All Groups			
Groups	RAF	PD	PA
Clients & Over All	1.72	10.74%	89.26%
Consultants & Over All	1.72	10.74%	89.26%
Contractors & Over All	1.25	7.81%	92.19%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

7.6 SUMMARY

This chapter discusses the types and causes of claims and disputes (the macro level). The four assessment indicators that were used are agreement (if the respondents agrees that the types or causes are potential), frequency (how frequent are these types and causes), impact (the level of impact these types and causes have on respondents projects) and avoidability (the level of avoidability for the types and causes). The respondents were requested to rate the frequency, impact and avoidability of the types of construction claims and disputes. Accordingly, the most frequent, severe and avoidable/controllable types were identified and ranked as described in sub-Sections 7.4.2, 7.4.3 and 7.4.4, respectively. The purpose of this information is to identify the types of claims that should/ could be minimised in construction projects. However, the results may not directly point out the types of claims and disputes that should be addressed with a view to minimise them. Hence, A “*Claims Focus Index*” (CFI) was formulated to compare the perceived significance of each of these types, through an integration of the scores against the above three ‘dimensions’. This new variable would allow the identification of the types that merit particular attention. The methodology used in computing the CFI is based on that described by Yogeswaran (1996) and Kumaraswamy (1998).

Sixteen significant types of claims and disputes that require managerial attention and focus are identified. These top sixteen types are frequent, severe and/or can be avoided. (See **Table 7-55** below; note that this Table is extracted from **Table 7-35** of Chapter 7).

Table 7-55 Comparison of the calculated CFI values for each Type of Claims & Disputes among the different responding groups, based on their perceptions for the frequency, magnitude and avoidability of each Type of Claims & Disputes; (Ranked according to Types’ significance).

RANK ACCORDING TO MEDIAN WITH PRIORITY

Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK Q2
 Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),
 TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:
 TOTAL NUMBER OF SIGNIFICANT TYPES: **First Priority**
 TOTAL NUMBER OF SIGNIFICANT TYPES: **Second Priority**
 TOTAL NUMBER OF INSIGNIFICANT TYPES:

Types of Claims & Disputes Significance Results			
CL	CONS	CONT	Over All
22	24	27	22
16	19	17	16
6	5	10	6
29	27	24	29

R.M.N.:RANK ACCORDING TO MEDIAN VALUES (WITH OUT PRIORITY)
R.M.P.: RANK ACCORDING TO MEDIAN VALUES (WITH PRIORITY)
MED: AVERAGE MEAN MEDIAN VALUES

CL: CLIENTS AND CONS: CONSULTANTS
 CONT: CONTRACTORS AND OA: OVERALL
 M. I. L. %:MEDIAN VALUE AS A PERCENTAGE

CODE	CLIENTS				CONSULTANTS				CONTRACTORS				OVERALL			
	MED	MI%	M.N.M.P	RESULT	MED	MI%	M.N.M.P	RESULT	MED	MI%	M.N.M.P	RESULT	MED	MI%	M.N.M.P	RESULT
T19	4.11	82.11	1 1	SIG-1st Priority	4.11	82.11	1 1	SIG-1st Priority	4.11	82.11	1 1	SIG-1st Priority	4.12	82.42	1 1	SIG-1st Priority
T03	4.04	80.89	2 2	SIG-1st Priority	4.04	80.89	2 2	SIG-1st Priority	4.04	80.89	3 3	SIG-1st Priority	4.01	80.22	2 2	SIG-1st Priority
T26	3.87	77.35	5 5	SIG-1st Priority	3.87	77.35	3 3	SIG-1st Priority	3.87	77.35	2 2	SIG-1st Priority	3.92	78.43	3 3	SIG-1st Priority
T01	3.93	78.52	3 3	SIG-1st Priority	3.93	78.52	7 7	SIG-1st Priority	3.93	78.52	4 4	SIG-1st Priority	3.87	77.31	4 4	SIG-1st Priority
T12	3.85	77.06	6 6	SIG-1st Priority	3.85	77.06	5 5	SIG-1st Priority	3.85	77.06	11 11	SIG-1st Priority	3.77	75.39	5 5	SIG-1st Priority
T13	3.80	75.91	7 7	SIG-1st Priority	3.80	75.91	6 6	SIG-1st Priority	3.80	75.91	8 8	SIG-1st Priority	3.74	74.90	6 6	SIG-1st Priority
T11	3.88	77.56	4 4	SIG-1st Priority	3.88	77.56	14 13	SIG-1st Priority	3.88	77.56	5 5	SIG-1st Priority	3.74	74.82	7 7	SIG-1st Priority
T09	3.69	73.73	9 9	SIG-1st Priority	3.69	73.73	10 10	SIG-1st Priority	3.69	73.73	7 7	SIG-1st Priority	3.69	73.80	8 8	SIG-1st Priority
T05	3.67	73.32	10 10	SIG-1st Priority	3.67	73.32	11 11	SIG-1st Priority	3.67	73.32	6 6	SIG-1st Priority	3.67	73.48	9 9	SIG-1st Priority
T28	3.58	71.59	13 13	SIG-1st Priority	3.58	71.59	4 4	SIG-1st Priority	3.58	71.59	12 12	SIG-1st Priority	3.66	73.26	10 10	SIG-1st Priority
T02	3.75	75.01	8 8	SIG-1st Priority	3.75	75.01	12 12	SIG-1st Priority	3.75	75.01	10 10	SIG-1st Priority	3.62	72.43	11 11	SIG-1st Priority
T10	3.61	72.21	11 11	SIG-1st Priority	3.61	72.21	9 9	SIG-1st Priority	3.61	72.21	9 9	SIG-1st Priority	3.62	72.40	12 12	SIG-1st Priority
T35	3.48	69.62	15 15	SIG-1st Priority	3.48	69.62	8 8	SIG-1st Priority	3.48	69.62	14 14	SIG-1st Priority	3.49	69.84	13 13	SIG-1st Priority
T27	3.59	71.87	12 12	SIG-1st Priority	3.59	71.87	17 16	SIG-1st Priority	3.59	71.87	13 13	SIG-1st Priority	3.48	69.69	14 14	SIG-1st Priority
T31	3.49	69.78	14 14	SIG-1st Priority	3.49	69.78	16 15	SIG-1st Priority	3.49	69.78	16 16	SIG-1st Priority	3.42	68.48	15 15	SIG-1st Priority
T43	3.25	64.94	16 16	SIG-1st Priority	3.25	64.94	15 14	SIG-1st Priority	3.25	64.94	15 15	SIG-1st Priority	3.34	66.88	16 16	SIG-1st Priority

Furthermore, Section 7.5 discusses the common and potential causes that may lead to the types of claims and disputes.

The next stage of analysis is to investigate the significant causes that could lead to such significant types of claims and disputes (micro level). Thus, Section 8.2 presents the discussion of underlying causes that can generate the different types of claims and disputes. Based on these discussions, the interactions amongst these variables are finally, unveiled. In this section, a detailed analysis and discussion is presented for the top five significant types (T19, T03, T26, T01 and T12) and their related significant root causes, the same analysis was employed for all sixteen of the significant types

CHAPTER EIGHT

RESEARCH DISCUSSION AND ANALYSIS: PART II

8.1 INTRODUCTION

This chapter has two sections (A) and (B); the first part investigates the significant causes under types of claims and disputes (see **Figure 8-1** below which is reproduced from Figure 2.1 of the research methodology Section 2.4 in Chapter 2). The second part of this chapter presents the results and findings of the quantitative study based on data collected from forty-five construction project, and attempts to verify whether the identified significant causes of claims and disputes actually occur in practice. Thus providing independent verification, “Triangulation” methodology, as explained earlier in (Section 2.4.2).

➤ **PART A: SIGNIFICANT CAUSES UNDER TYPES OF CLAIMS AND DISPUTES**

➤ **PART B: QUANTITATIVE STUDY**

The previous chapter discusses the types and causes of claims and disputes (the macro level). The four assessment indicators that were used are agreement (if the respondents agrees that the types or causes are potential), frequency (how frequent are these types and causes), impact (the level of impact these types and causes have on respondents projects) and avoidability (the level of avoidability for the types and causes). A CFI index was developed for the significant types of claims and disputes that require managerial attention and focus. These top sixteen types are frequent, severe and/or can be avoided. (See **Table 8-1** below; note that this Table is extracted from **Table 7-35** of Chapter 7).

The next stage of analysis is to investigate the significant causes that could lead to such significant types of claims and disputes (micro level). In this section, a detailed analysis and discussion is presented for the top five significant types (**T19, T03, T26, T01 and T12**) and their related significant root causes, the same analysis was employed for all sixteen of the significant types. (Details of the Analysis of all are given in Appendix Y.3 for Tables and Bar Charts), but have been omitted from this section for clarity.

Table 8-1 Comparison of the calculated CFI values for each Type of Claims & Disputes among the different responding groups, based on their perceptions for the frequency, magnitude and avoidability of each Type of Claims & Disputes; (Ranked according to Types’ significance).

RANK ACCORDING TO MEDIAN WITH PRIORITY

Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK Q2
 Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),
 TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:
 TOTAL NUMBER OF SIGNIFICANT TYPES: **First Priority**
 TOTAL NUMBER OF SIGNIFICANT TYPES: **Second Priority**
 TOTAL NUMBER OF INSIGNIFICANT TYPES:

Types of Claims & Disputes Significance Results			
CL	CONS	CONT	Over All
22	24	27	22
16	19	17	16
6	5	10	6
29	27	24	29

R.M.N.:RANK ACCORDING TO MEDIAN VALUES (WITH OUT PRIORITY)
 R.M.P.: RANK ACCORDING TO MEDIAN VALUES (WITH PRIORITY)
 MED: AVERAGE MEAN MEDIAN VALUES

CL: CLIENTS AND CONS: CONSULTANTS
 CONT: CONTRACTORS AND OA: OVERALL
 M. I. L. %:MEDIAN VALUE AS A PERCENTAGE

CODE	CLIENTS				CONSULTANTS				CONTRACTORS				OVERALL			
	MED	MI%	M,N,P	RESULT	MED	MI%	M,N,P	RESULT	MED	MI%	M,N,P	RESULT	MED	MI%	M,N,P	RESULT
T19	4.11	82.11	1 1	SIG-1st Priority	4.11	82.11	1 1	SIG-1st Priority	4.11	82.11	1 1	SIG-1st Priority	4.12	82.42	1 1	SIG-1st Priority
T03	4.04	80.89	2 2	SIG-1st Priority	4.04	80.89	2 2	SIG-1st Priority	4.04	80.89	3 3	SIG-1st Priority	4.01	80.22	2 2	SIG-1st Priority
T26	3.87	77.35	5 5	SIG-1st Priority	3.87	77.35	3 3	SIG-1st Priority	3.87	77.35	2 2	SIG-1st Priority	3.92	78.43	3 3	SIG-1st Priority
T01	3.93	78.52	3 3	SIG-1st Priority	3.93	78.52	7 7	SIG-1st Priority	3.93	78.52	4 4	SIG-1st Priority	3.87	77.31	4 4	SIG-1st Priority
T12	3.85	77.06	6 6	SIG-1st Priority	3.85	77.06	5 5	SIG-1st Priority	3.85	77.06	11 11	SIG-1st Priority	3.77	75.39	5 5	SIG-1st Priority
T13	3.80	75.91	7 7	SIG-1st Priority	3.80	75.91	6 6	SIG-1st Priority	3.80	75.91	8 8	SIG-1st Priority	3.74	74.90	6 6	SIG-1st Priority
T11	3.88	77.56	4 4	SIG-1st Priority	3.88	77.56	14 13	SIG-1st Priority	3.88	77.56	5 5	SIG-1st Priority	3.74	74.82	7 7	SIG-1st Priority
T09	3.69	73.73	9 9	SIG-1st Priority	3.69	73.73	10 10	SIG-1st Priority	3.69	73.73	7 7	SIG-1st Priority	3.69	73.80	8 8	SIG-1st Priority
T05	3.67	73.32	10 10	SIG-1st Priority	3.67	73.32	11 11	SIG-1st Priority	3.67	73.32	6 6	SIG-1st Priority	3.67	73.48	9 9	SIG-1st Priority
T28	3.58	71.59	13 13	SIG-1st Priority	3.58	71.59	4 4	SIG-1st Priority	3.58	71.59	12 12	SIG-1st Priority	3.66	73.26	10 10	SIG-1st Priority
T02	3.75	75.01	8 8	SIG-1st Priority	3.75	75.01	12 12	SIG-1st Priority	3.75	75.01	10 10	SIG-1st Priority	3.62	72.43	11 11	SIG-1st Priority
T10	3.61	72.21	11 11	SIG-1st Priority	3.61	72.21	9 9	SIG-1st Priority	3.61	72.21	9 9	SIG-1st Priority	3.62	72.40	12 12	SIG-1st Priority
T35	3.48	69.62	15 15	SIG-1st Priority	3.48	69.62	8 8	SIG-1st Priority	3.48	69.62	14 14	SIG-1st Priority	3.49	69.84	13 13	SIG-1st Priority
T27	3.59	71.87	12 12	SIG-1st Priority	3.59	71.87	17 16	SIG-1st Priority	3.59	71.87	13 13	SIG-1st Priority	3.48	69.69	14 14	SIG-1st Priority
T31	3.49	69.78	14 14	SIG-1st Priority	3.49	69.78	16 15	SIG-1st Priority	3.49	69.78	16 16	SIG-1st Priority	3.42	68.48	15 15	SIG-1st Priority
T43	3.25	64.94	16 16	SIG-1st Priority	3.25	64.94	15 14	SIG-1st Priority	3.25	64.94	15 15	SIG-1st Priority	3.34	66.88	16 16	SIG-1st Priority

The complete list and summary of the findings, for the significant root causes that could lead to the sixteen types of claims and disputes that that have been identified in Section 7-4 with Claim Focus Index (CFI) values of equals to 60 % or above, can be found in the next Section 8-2. Reducing these types of claims and disputes provides the potential for avoiding their frequencies and/or magnitudes. And hence, provide positive benefits in managing construction projects in the UAE.

Consequently if these can be established as valid root causes then they can be used as a basis of strategies for the reduction in the effect of claims on such projects.

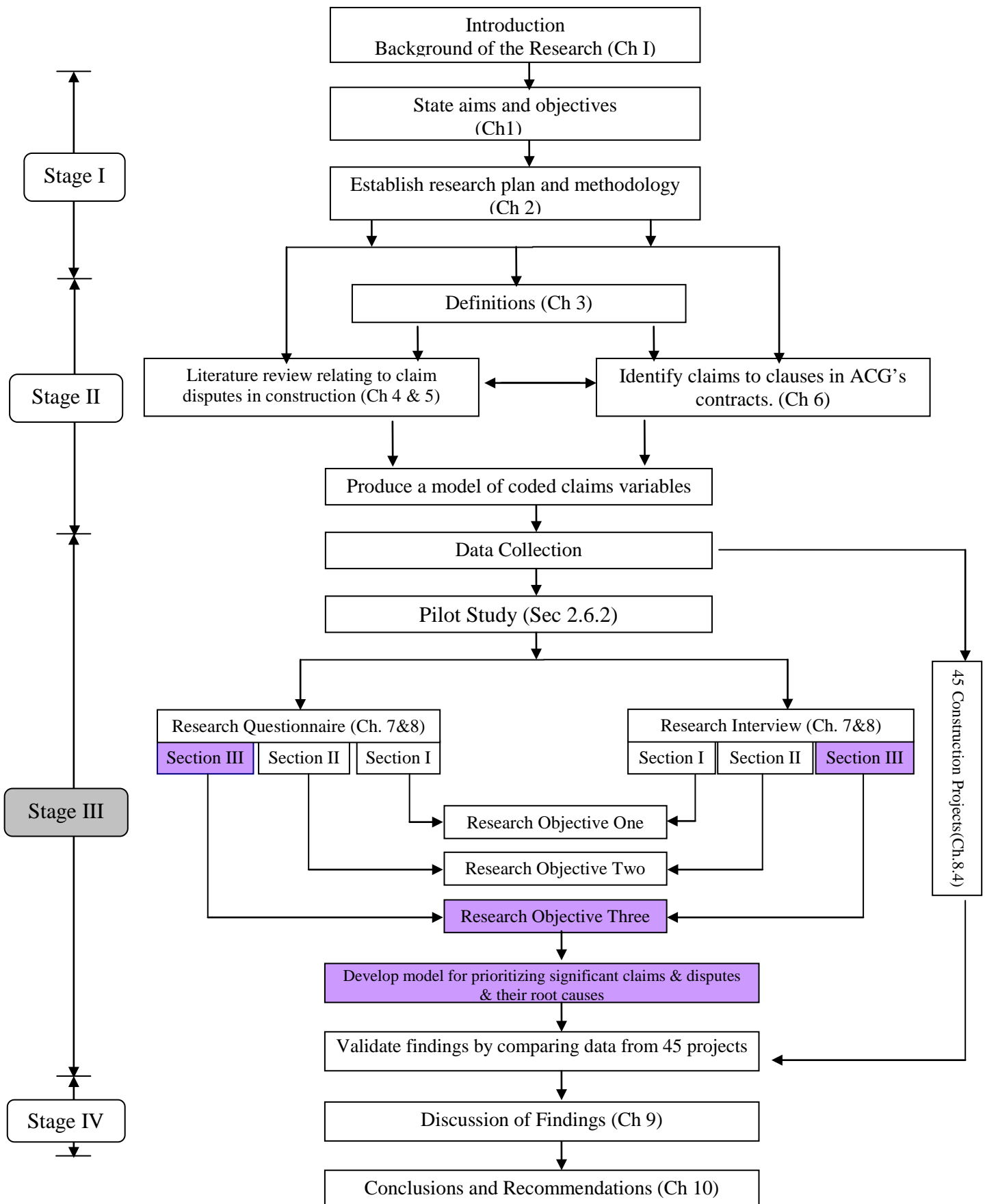


Figure 8-1 Phase Three (Part A of Chapter 8)

8.2 PART A: SIGNIFICANT CAUSES UNDER TYPES OF CLAIMS AND DISPUTES

As previously mentioned, the focal point of this study is to find out the types of claims and disputes that are significant and need minimisation. These types were compared, to verify which one had a relatively higher frequency with a relatively higher magnitude (impact) and can be easily avoided (higher avoidability). This stage of the analysis is called the macro level analysis. Moreover, the study endeavours to explore the root causation of such types of claims and disputes. This exploration enables the proper assessment of both the significance and the avoidability of these underlying root causes. This stage of the analysis is called the micro level analysis.

By combining these two levels of analysis, proper preventive measures can be suggested to reduce the frequency and/or magnitude of those types of claims and disputes. In short, if we can avoid or at least control the significant underlying causes of any type of claims and disputes, then this type can be avoided or at least controlled.

Section 7.4 presents those potentially significant types of claims and disputes that require managerial attention for minimisation. Moreover, Section 7.5 highlights the various causes that could give rise or contribute to such types of claims and disputes. Sections 7.4 and 7.5 present the macro level analysis. A deeper analysis was performed on the root causation of each type of claims and disputes in the next stage to present the result of the micro level analysis.

This section presents the discussion and analysis of the collected data from the third section of the questionnaire survey that focused on the root causation of each type of claims and disputes.

The analysis of the collected data from the third section expected to provide an answer to the following question;

- ✓ Do the construction professionals agree that these suggested causes contribute to the generation of the types of construction claims and disputes? and, if so, to what extent?;

Therefore, this section aimed at exploring the respondents' perception on the suggested causes that could contribute to the rise of each type of claims and disputes in the UAE. The section focused on the following aspects:

- ✓ Confirming the common and potential cause/s that contributes to the generation of each type of construction claims and disputes;
- ✓ Estimating the relative significance of each cause of claims and disputes;

A table was provided with thirty-two possible causes that could lead to each type of claims and disputes. Respondents were asked to rate the level of significance (importance) of each root cause that underlies a specific type of claims and disputes in construction projects. Respondents were asked to choose one of the following five options never, rare (low significance), average, high significance and very high significance. A weight in a scale from 1 to 5 was given for each of the five options with a weight of 1 for “never”, 2 for “low significance”, 3 for “average”, 4 for “high significance” and 5 for “very high significance”. No weight was given when no response was provided. The analysis of the results for this assessment is based on the average score, which equals to three (3.0). This average score is the same as an “Importance Index” of 60 %. If any cause has an average score equal or greater than three (Importance Index equal or more than 60 %), then this cause is said to be significant. On the contrary, if the mean score of a specific cause is less than three, then this cause is said to be not significant. Hence, all causes are ranked from 1 to 32 based on their perceived significance values, where rank number 1 is for the most significant cause and rank number 32 for the least significant type.

The following system used to code the causes that can trigger/ contribute to the types and their sub variables, which were used in the third section of the second part (technical assessment) of the questionnaire survey. In addition, the following table provides a description and the coding system used to code these causes.

➤ **The Coding system used in this study for this assessment is as follows:**

- **Type – cause interrelationships variables:** **(T00 0 C00)**

(Significance of different causes under a specific type of claims & disputes)

Note: The coding for these variables is the combination of both types & cause coding (T00 & C00).

T00: Fifty one (51) different types (first two zeros) after **T** (1-51)

0: Duplication of the same type (controlling question) (3rd Zero)
(Need for a sub coding)

C00: Thirty two (32) different causes (fourth & fifth zeros) after **C** (1-32)

(One question asked for each type-cause relations) (1)
(No need for a second sub coding)

Table 8-2 Description and Coding System for Types of Claims and Disputes Sub Variables

Variable		Label	Description
Type – cause assessment (T000 C00)	T000 C00 1	Significance	Significance of a specific cause that can lead to a specific type of claim

The results of this analysis for the top five significant types of claims and disputes such as (**T19, T03, T26, T01, and T12**) are revealed in this section. A comparison table is presented compare the significance assessment of the various groups (i.e. clients, consultants and contractors). Finally, a Rank agreement factor comparison table is presented to correlate the significance assessment, and to explain the agreement of the responses of the various groups (i.e. clients, consultants and contractors) on the underlying root causation that could significantly contribute to the rise of specific types of claims and disputes.

The complete list and summary of the findings, for the significant root causes that could lead to the sixteen types of claims and disputes that that have been identified in Section 7-4 with Claim Focus Index (CFI) values of equals to 60 % or above, can be found in the next Sections 8-2-1 to 8-2-5 and 8-3. These types of claims and disputes require managerial attention with potential for avoiding their frequencies and/or magnitudes.

8.2.1 VARIATIONS CLAIMS AND DISPUTES (T 19)

8.2.1.1 CLIENT'S PERCEPTION

Table 8-3 below presents the responses for the significant causes that contribute to *T19*, “*Variations*” claims and disputes as perceived by the clients.

Table 8-3 Significant Causes of: [(T 19)-(Clients' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T190C01	1	0	1	3	8	6	4.06	81.11%	1
T190C02	0	0	0	8	9	2	3.68	73.68%	2
T190C03	1	0	1	6	9	2	3.67	73.33%	3
T190C08	1	0	1	6	9	2	3.67	73.33%	3
T190C04	0	0	0	9	9	1	3.58	71.58%	5
T190C07	1	0	1	11	6	0	3.28	65.56%	6
T190C09	1	0	1	11	6	0	3.28	65.56%	6
T190C20	0	0	1	12	6	0	3.26	65.26%	8
T190C22	0	0	1	12	6	0	3.26	65.26%	8
T190C29	0	0	1	15	3	0	3.11	62.11%	10
T190C15	1	0	3	12	3	0	3.00	60.00%	11
T190C26	2	0	1	15	1	0	3.00	60.00%	11

The most significant cause for this type is **T190C01** as it has an Average score of 4.06, and Index of 81.11 %. This is the only cause out of the 32 causes that has an Index of over 80 %. The significant causes for this type are **T190C01**, **T190C02**, **T190C03**, **T190C08**, **T190C04**, **T190C07**, **T190C09**, **T190C20**, **T190C22**, **T190C29**, **T190C15** and **T190C26**.

8.2.1.2 CONSULTANT'S PERCEPTION

The responses from Consultants for the significant causes that contribute to *T19*, “*Variations*” claims and disputes are shown in the following **Table 8-4**.

Table 8-4 Significant Causes of: [(T 19)-(Consultants' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T190C02	0	0	1	3	6	7	4.12	82.35%	1
T190C01	0	0	0	5	6	6	4.06	81.18%	2
T190C08	0	0	1	4	6	6	4.00	80.00%	3
T190C09	0	0	1	4	6	6	4.00	80.00%	3
T190C21	0	0	0	6	8	3	3.82	76.47%	5
T190C03	0	0	1	9	7	0	3.35	67.06%	6
T190C04	0	0	1	9	7	0	3.35	67.06%	6
T190C15	2	0	1	8	6	0	3.33	66.67%	8
T190C16	1	0	1	9	6	0	3.31	66.25%	9
T190C22	0	0	1	10	6	0	3.29	65.88%	10

From Consultants perception, the most significant cause is **T190C02**. The cause **C02** has an average score of 4.12 Index of 82.35 % for type **T19**. Causes **C08** and **C09** are both ranked third for type **T19** with an average score of 4. These two causes have exactly the same response from consultants and have an index of 80.00%. The significant causes for this type are **T190C02, T190C01, T190C08, T190C09, T190C21, T190C03, T190C04, T190C15, T190C16** and **T190C22**.

8.2.1.3 CONTRACTOR'S PERCEPTION

The contractors' responses for the significance cause of type **T19** is shown in **Table 8-5** below.

Table 8-5 Significant Causes of: [(T 19)-(Contractors' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T190C02	0	0	0	3	9	3	4.00	80.00%	1
T190C08	0	0	0	4	8	3	3.93	78.67%	2
T190C09	0	0	0	4	8	3	3.93	78.67%	2
T190C21	0	0	0	4	8	3	3.93	78.67%	2
T190C01	1	0	0	4	8	2	3.86	77.14%	5
T190C03	1	0	0	6	7	1	3.64	72.86%	6
T190C04	0	0	0	7	7	1	3.60	72.00%	7
T190C22	0	0	0	7	7	1	3.60	72.00%	7
T190C29	0	0	0	7	7	1	3.60	72.00%	7
T190C15	0	0	0	10	3	2	3.47	69.33%	10
T190C07	0	0	1	10	4	0	3.20	64.00%	11
T190C16	0	0	1	10	4	0	3.20	64.00%	11
T190C12	0	0	1	13	1	0	3.00	60.00%	13
T190C17	1	0	1	12	1	0	3.00	60.00%	13

There are fourteen significant causes, which contribute to the rise of variations claims and disputes as perceived by contractors. **T190C02** is the most significance cause for this type. It has an average score 4. From contractors' perception, **C02** is the only cause for type **T19** with an Index of 80.00 % all the other causes has an Index that is less than 80.00 %. All the significant causes are **T190C02, T190C08, T190C09, T190C21, T190C01, T190C03, T190C04, T190C22, T190C29, T190C15, T190C07, T190C16, T190C12** and **T190C17**.

8.2.1.4 OVERALL PERCEIVED AGREEMENT

Finally, the collective responses for all the respondents' are shown in **Table 8-6** below.

Table 8-6 Significant Causes of: [(T 19)-(Overall' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T190C01	2	0	1	12	22	14	4.00	80.00%	1
T190C02	0	0	1	14	24	12	3.92	78.43%	2
T190C08	1	0	2	14	23	11	3.86	77.20%	3
T190C09	1	0	2	19	20	9	3.72	74.40%	4
T190C03	2	0	2	21	23	3	3.55	71.02%	5
T190C21	0	0	2	26	17	6	3.53	70.59%	6
T190C04	0	0	1	25	23	2	3.51	70.20%	7
T190C22	0	0	2	29	19	1	3.37	67.45%	8
T190C15	3	0	4	30	12	2	3.25	65.00%	9
T190C29	2	1	3	33	11	1	3.16	63.27%	10
T190C16	1	0	4	35	11	0	3.14	62.80%	11
T190C07	1	0	7	32	11	0	3.08	61.60%	12
T190C20	0	0	9	34	8	0	2.98	59.61%	13
T190C12	0	0	10	38	3	0	2.86	57.25%	14
T190C17	1	0	10	37	3	0	2.86	57.20%	15
T190C19	1	0	10	37	3	0	2.86	57.20%	15
T190C06	1	4	20	24	2	0	2.48	49.60%	17
T190C25	2	9	14	24	2	0	2.39	47.76%	18
T190C10	1	12	11	25	2	0	2.34	46.80%	19
T190C31	2	5	24	19	1	0	2.33	46.53%	20
T190C14	1	14	15	20	1	0	2.16	43.20%	21
T190C18	1	12	19	18	1	0	2.16	43.20%	21
T190C05	0	13	26	11	1	0	2.00	40.00%	23
T190C11	1	16	21	12	1	0	1.96	39.20%	24
T190C26	2	20	13	15	1	0	1.94	38.78%	25
T190C32	0	24	13	13	1	0	1.82	36.47%	26
T190C13	1	23	14	12	1	0	1.82	36.40%	27
T190C23	3	22	17	8	1	0	1.75	35.00%	28
T190C24	2	18	27	4	0	0	1.71	34.29%	29
T190C27	1	27	22	1	0	0	1.48	29.60%	30
T190C28	0	27	24	0	0	0	1.47	29.41%	31
T190C30	2	31	18	0	0	0	1.37	27.35%	32

T190C01 is the most significant type-cause with an index value of 80.00%. Fourteen respondents responded that the cause **C01** has a very high significance for type **T19**, while 22 responded that it has high significance and 14 responded that it has average significance. This makes the cause to have an average score of four. The least significance cause for **T19** is **C30** as it has “Importance Index” of 27.35 %.

8.2.1.5 FINDINGS RELATED TO OVERALL PERCEIVED AGREEMENT

In general, the most significant causes that may trigger this type of claims and disputes are twelve causes as perceived by all respondents. However, the remaining twenty causes are perceived as less significant (not important).

Table 8-7 below shows the average score and important index for all of the suggested causes for **T19 “Variations”**. Furthermore, it can be used to compare these values amongst the different responding groups and the overall values.

Table 8-7 Significant Causes of Variations Claims and Disputes: [(T 19)-(Comparison Table)]

Significant Causes Under Types of Claims & Disputes Assessment													
Cause Description	Code	Clients			Consultants			Contractors			Over All		
		T19 Significance Avg. Mean	T19 Significance Imp. Index	T19 Significance Ranking	T19 Significance Avg. Mean	T19 Significance Imp. Index	T19 Significance Ranking	T19 Significance Avg. Mean	T19 Significance Imp. Index	T19 Significance Ranking	T19 Significance Avg. Mean	T19 Significance Imp. Index	T19 Significance Ranking
Variations - Inadequate/ Inaccurate Design Information	T190C01	4.06	81.11%	1	4.06	81.18%	2	3.86	77.14%	5	4.00	80.00%	1
Variations - Inadequate Design Documentation	T190C02	3.68	73.68%	2	4.12	82.35%	1	4.00	80.00%	1	3.92	78.43%	2
Variations - Inadequate Contract Documentation	T190C08	3.67	73.33%	3	4.00	80.00%	3	3.93	78.67%	2	3.86	77.20%	3
Variations - Incomplete Tender Information	T190C09	3.28	65.56%	6	4.00	80.00%	3	3.93	78.67%	2	3.72	74.40%	4
Variations - Inadequate Brief - [Significant]	T190C03	3.67	73.33%	3	3.35	67.06%	6	3.64	72.86%	6	3.55	71.02%	5
Variations - Changes by Client - [Significant]	T190C21	2.95	58.95%	13	3.82	76.47%	5	3.93	78.67%	2	3.53	70.59%	6
Variations - Unclear & Inadequate Specifications	T190C04	3.58	71.58%	5	3.35	67.06%	6	3.60	72.00%	7	3.51	70.20%	7
Variations - Lack of Competence of Professionals	T190C22	3.26	65.26%	8	3.29	65.88%	10	3.60	72.00%	7	3.37	67.45%	8
Variations - Inappropriate/ Unexpected Changes	T190C15	3.00	60.00%	11	3.33	66.67%	8	3.47	69.33%	10	3.25	65.00%	9
Variations - Poor Management - [Significant]	T190C29	3.11	62.11%	10	2.80	56.00%	12	3.60	72.00%	7	3.16	63.27%	10
Variations - Inappropriate/ Unexpected Changes	T190C16	2.95	58.95%	13	3.31	66.25%	9	3.20	64.00%	11	3.14	62.80%	11
Variations - Inadequate Contract Administration	T190C07	3.28	65.56%	6	2.76	55.29%	13	3.20	64.00%	11	3.08	61.60%	12
Variations - Slow Client Response - [Significant]	T190C20	3.26	65.26%	8	2.71	54.12%	16	2.93	58.67%	15	2.98	59.61%	13
Variations - Unclear Risk Allocation	T190C12	2.89	57.89%	16	2.71	54.12%	16	3.00	60.00%	13	2.86	57.25%	14
Variations - Inappropriate/ Unexpected Changes	T190C17	2.89	57.89%	16	2.71	54.12%	16	3.00	60.00%	13	2.86	57.20%	15
Variations - Lack of Information for Decision Making	T190C19	2.94	58.89%	15	2.71	54.12%	16	2.93	58.67%	15	2.86	57.20%	15
Variations - Inappropriate Contract Formulation	T190C06	2.83	56.67%	20	2.76	55.29%	13	1.73	34.67%	24	2.48	49.60%	17
Variations - Unrealistic Client Expectations	T190C25	1.50	30.00%	29	2.88	57.50%	11	2.93	58.67%	15	2.39	47.76%	18
Variations - Inappropriate Contractor Selection	T190C10	2.89	57.89%	16	2.71	54.12%	16	1.14	22.86%	32	2.34	46.80%	19
Variations - Uncontrollable External Factors	T190C31	1.84	36.84%	23	2.38	47.50%	22	2.93	58.57%	20	2.33	46.53%	20
Variations - Inappropriate Document Preparation	T190C14	2.26	45.26%	22	1.31	26.25%	31	2.93	58.67%	15	2.16	43.20%	21
Variations - Poor Communications Arrangements	T190C18	2.89	57.89%	16	1.63	32.50%	24	1.80	36.00%	23	2.16	43.20%	21
Variations - Inappropriate Contract Terms	T190C05	1.53	30.53%	26	2.76	55.29%	13	1.73	34.67%	24	2.00	40.00%	23
Variations - Unrealistic Tender Pricing	T190C11	1.53	30.53%	26	1.65	32.94%	23	2.93	58.57%	20	1.96	39.20%	24
Variations - Unrealistic Expected Information	T190C26	3.00	60.00%	11	1.47	29.41%	26	1.27	25.33%	28	1.94	38.78%	25
Variations - Exaggerated Claims - [Significant]	T190C32	2.74	54.74%	21	1.29	25.88%	32	1.27	25.33%	28	1.82	36.47%	26
Variations - Inappropriate Payment Methods	T190C13	1.33	26.67%	32	1.35	27.06%	30	2.93	58.67%	15	1.82	36.40%	27
Variations - Poor Workmanship - [Significant]	T190C23	1.39	27.78%	31	2.67	53.33%	21	1.27	25.33%	28	1.75	35.00%	28
Variations - Inadequate Site Investigation	T190C24	1.53	30.53%	26	1.56	31.25%	25	2.14	42.86%	22	1.71	34.29%	29
Variations - Lack of Team Spirit Among Professionals	T190C27	1.56	31.11%	25	1.47	29.41%	26	1.40	28.00%	26	1.48	29.60%	30
Variations - Personality Clashes Among Professionals	T190C28	1.58	31.58%	24	1.47	29.41%	26	1.33	26.67%	27	1.47	29.41%	31
Variations - Adversarial (industry) Culture	T190C30	1.42	28.42%	30	1.44	28.75%	29	1.21	24.29%	31	1.37	27.35%	32

The comparison table reveals that **C01**, “**Inadequate/ inaccurate design information**”, is the most significant cause that contributes to variations claims and disputes. Cause **C01** was ranked as number one by clients, ranked number two by consultants and number five by contractors. Overall, this cause is the most significance cause for type **T19** with an index of 80.00 % and average score of 4. However, cause **C02** was ranked as number 1 by both the consultants and contractors and ranked number 2 by clients. After combining all the respondents’ responses, cause **C02** was ranked number two with an index of 78.43 % and average score of 3.92. Finally, the most significant causes are listed below:

- T190C01 Variations - Inadequate/ inaccurate design information
- T190C02 Variations - Inadequate design documentation
- T190C08 Variations - Inadequate contract documentation

- T190C09 Variations - Incomplete tender information
- T190C03 Variations - Inadequate brief
- T190C21 Variations - Changes by client
- T190C04 Variations - Unclear & inadequate specifications
- T190C22 Variations - Lack of competence of project participants
- T190C15 Variations - Inappropriate/ unexpected time control (target)
- T190C29 Variations - Poor management
- T190C16 Variations - Inappropriate/ unexpected cost control (target)
- T190C07 Variations - Inadequate contract administration

Moreover, the following **Table 8-8** presents the percentage agreement of responses amongst the various groups.

Table 8-8 Significant Causes of: [(T 19)-(Rank Agreement Factor Comparison Table)]

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.56	28.52%	71.48%
Clients & Contractors	5.09	31.84%	68.16%
Consultants & Contractors	4.03	25.20%	74.80%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.31	20.70%	79.30%
Consultants & Over All	2.94	18.36%	81.64%
Contractors & Over All	2.91	18.16%	81.84%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

From the “**Rank agreement factor**” comparison **Table 8-8**, it can be seen that the agreement between consultants and contractors is the highest amongst the groups with a rank agreement factor of 4.03 and percentage agreement of 74.80 %. However, the percentage agreement between clients and contractors is below 70 % with an RAF of 5.09. Finally, the cause significance bar charts of all causes of claims under “*Variations*”, *T19*, claims and disputes can be found in Appendix Y.3.2.19.

8.2.2 DESIGN/CHANGE/OMISSION/ERRORS BY THE CLIENT CLAIMS AND DISPUTES (T 03)

8.2.2.1 CLIENT'S PERCEPTION

Table 8-9 below shows how significant the causes for type T03, "Design/change/omission/errors by the client", are from clients' perception.

Table 8-9 Significant Causes of: [(T 03)-(Clients' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T030C01	0	0	0	5	8	6	4.05	81.05%	1
T030C02	0	0	0	8	9	2	3.68	73.68%	2
T030C04	0	0	0	10	8	1	3.53	70.53%	3
T030C03	0	0	0	12	7	0	3.37	67.37%	4
T030C09	0	0	0	12	7	0	3.37	67.37%	4
T030C21	0	0	0	14	5	0	3.26	65.26%	6
T030C20	0	0	0	16	3	0	3.16	63.16%	7
T030C19	2	1	2	10	4	0	3.00	60.00%	8

From their responses, clients responded that T030C01 is the most significant cause with an average score of 4.05 and an important index of 81.05 %. For this cause, none of the clients responded that cause C01 has a no or low significance for type T03. The significant type-causes are T030C01, T030C02, T030C04, T030C03, T030C09, T030C21, T030C20 and T030C19.

8.2.2.2 CONSULTANT'S PERCEPTION

In the same way, Table 8-10 below presents the significant causes that contribute to T03, "Design/change/omission/errors by the client", as perceived by consultants.

Table 8-10 Significant Causes of: [(T 03)-(Consultants' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T030C01	0	0	0	4	6	7	4.18	83.53%	1
T030C02	0	0	0	5	6	6	4.06	81.18%	2
T030C20	0	0	0	8	6	3	3.71	74.12%	3
T030C21	0	0	0	8	7	2	3.65	72.94%	4
T030C03	0	0	0	10	6	1	3.47	69.41%	5
T030C04	0	0	0	10	7	0	3.41	68.24%	6
T030C09	0	0	0	12	5	0	3.29	65.88%	7

It can be noted that there are seven causes significantly contribute to this type of claims and disputes as perceived by consultants. These causes are **T030C01**, **T030C02**, **T030C20**, **T030C21**, **T030C03**, **T030C04** and **T030C09**. From consultants' perception, the most significant cause is **C01** with an average score of 4.18 and Index of 83.53 %. In addition, none of the consultants responded that these significant causes have no or low significance

8.2.2.3 CONTRACTOR'S PERCEPTION

The contractors' responses for significant causes of this type of claims and disputes are shown in **Table 8-11** below.

Table 8-11 Significant Causes of: [(T 03)-(Contractors' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T030C01	0	0	0	4	8	3	3.93	78.67%	1
T030C02	0	0	0	4	9	2	3.87	77.33%	2
T030C09	0	0	0	5	8	2	3.80	76.00%	3
T030C04	0	0	0	7	7	1	3.60	72.00%	4
T030C03	0	0	0	9	6	0	3.40	68.00%	5
T030C20	0	0	0	10	5	0	3.33	66.67%	6
T030C21	0	0	1	10	4	0	3.20	64.00%	7
T030C08	0	0	0	13	2	0	3.13	62.67%	8
T030C19	0	0	3	8	4	0	3.07	61.33%	9

As it can be seen from the **Table 8-11** above that, the top two causes for **T03** are **C01** and **C02**. These two causes have an average score of 3.93 and 3.87; and index of 78.67 % and 77.33 %, respectively. Most of the contractors responded that these causes have a high significance for type **T03**. There are nine significant causes altogether for **T03** from contractors' perception and these are **T030C01**, **T030C02**, **T030C09**, **T030C04**, **T030C03**, **T030C20**, **T030C21**, **T030C08** and **T030C19**.

8.2.2.4 OVERALL PERCEIVED AGREEMENT

Table 8-12 below shows the combination of all the responses from different groups (i.e. clients, consultants and contractors).

The analysis of all group responses reveals that **C01** is the most significant cause for this type of claims and disputes. **C01** has an average score of 4.06 and

important index of 81.18 %. 13 respondents said that this cause has an average significance, 22 responded that it has a high significance while 16 respondents said that it has a very high significance. The least significance cause for T03 is C13 as it has an average score of 1.35 and “Importance Index” of 27.08 %.

Table 8-12 Significant Causes of: [(T 03)-(Overall' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T030C01	0	0	0	13	22	16	4.06	81.18%	1
T030C02	0	0	0	17	24	10	3.86	77.25%	2
T030C04	0	0	0	27	22	2	3.51	70.20%	3
T030C09	0	0	0	29	20	2	3.47	69.41%	4
T030C03	0	0	0	31	19	1	3.41	68.24%	5
T030C20	0	0	0	34	14	3	3.39	67.84%	6
T030C21	0	0	1	32	16	2	3.37	67.45%	7
T030C08	0	0	6	40	5	0	2.98	59.61%	8
T030C19	2	1	11	28	9	0	2.92	58.37%	9
T030C15	1	2	17	28	3	0	2.64	52.80%	10
T030C05	0	3	19	23	6	0	2.63	52.55%	11
T030C29	0	5	14	29	3	0	2.59	51.76%	12
T030C22	0	6	13	29	3	0	2.57	51.37%	13
T030C18	1	6	16	23	5	0	2.54	50.80%	14
T030C25	1	13	16	10	7	4	2.46	49.20%	15
T030C06	0	5	25	21	0	0	2.31	46.27%	16
T030C14	2	8	21	19	1	0	2.27	45.31%	17
T030C12	0	18	10	21	2	0	2.14	42.75%	18
T030C31	3	10	23	15	0	0	2.10	42.08%	19
T030C16	2	11	26	12	0	0	2.02	40.41%	20
T030C28	1	17	19	12	2	0	1.98	39.60%	21
T030C27	2	15	28	5	1	0	1.84	36.73%	22
T030C17	2	22	18	8	1	0	1.76	35.10%	23
T030C24	3	16	28	4	0	0	1.75	35.00%	24
T030C32	0	25	18	8	0	0	1.67	33.33%	25
T030C07	2	22	22	5	0	0	1.65	33.06%	26
T030C23	4	23	22	2	0	0	1.55	31.06%	27
T030C30	1	27	19	4	0	0	1.54	30.80%	28
T030C11	3	27	19	2	0	0	1.48	29.58%	29
T030C26	2	26	23	0	0	0	1.47	29.39%	30
T030C10	2	29	20	0	0	0	1.41	28.16%	31
T030C13	3	32	15	1	0	0	1.35	27.08%	32

8.2.2.5 FINDINGS RELATED TO OVERALL PERCEIVED AGREEMENT

Table 8-13 below shows the average score and important index of all the causes for T03 “*Design change / design omission / design errors by the client*”. It can be used to compare these values amongst the different responding groups and the overall values.

Table 8-13 Significant Causes of Variations Claims and Disputes: [(T 03)-(Comparison Table)]

Significant Causes Under Types of Claims & Disputes Assessment													
Cause Description	Code	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance	T 03 Significance
		Avg. Mean	Imp. Index	Ranking	Avg. Mean	Imp. Index	Ranking	Avg. Mean	Imp. Index	Ranking	Avg. Mean	Imp. Index	Ranking
		Clients			Consultants			Contractors			Over All		
Design/ Change/ Omission / Errors by	T030C01	4.05	81.05%	1	4.18	83.53%	1	3.93	78.67%	1	4.06	81.18%	1
Design/ Change/ Omission / Errors by	T030C02	3.68	73.68%	2	4.06	81.18%	2	3.87	77.33%	2	3.86	77.25%	2
Design/ Change/ Omission / Errors by	T030C04	3.53	70.53%	3	3.41	68.24%	6	3.60	72.00%	4	3.51	70.20%	3
Design/ Change/ Omission / Errors by	T030C09	3.37	67.37%	4	3.29	65.88%	7	3.80	76.00%	3	3.47	69.41%	4
Design/ Change/ Omission / Errors by	T030C03	3.37	67.37%	4	3.47	69.41%	5	3.40	68.00%	5	3.41	68.24%	5
Design/ Change/ Omission / Errors by	T030C20	3.16	63.16%	7	3.71	74.12%	3	3.33	66.67%	6	3.39	67.84%	6
Design/ Change/ Omission / Errors by	T030C21	3.26	65.26%	6	3.65	72.94%	4	3.20	64.00%	7	3.37	67.45%	7
Design/ Change/ Omission / Errors by	T030C08	2.95	58.95%	9	2.88	57.65%	8	3.13	62.67%	8	2.98	59.61%	8
Design/ Change/ Omission / Errors by	T030C19	3.00	60.00%	8	2.71	54.12%	10	3.07	61.33%	9	2.92	58.37%	9
Design/ Change/ Omission / Errors by	T030C15	2.50	50.00%	15	2.88	57.65%	8	2.53	50.67%	13	2.64	52.80%	10
Design/ Change/ Omission / Errors by	T030C05	2.79	55.79%	13	2.59	51.76%	12	2.47	49.33%	14	2.63	52.55%	11
Design/ Change/ Omission / Errors by	T030C29	2.95	58.95%	9	2.06	41.18%	18	2.73	54.67%	11	2.59	51.76%	12
Design/ Change/ Omission / Errors by	T030C22	2.42	48.42%	16	2.65	52.94%	11	2.67	53.33%	12	2.57	51.37%	13
Design/ Change/ Omission / Errors by	T030C18	2.32	46.32%	18	2.59	51.76%	12	2.79	55.71%	10	2.54	50.80%	14
Design/ Change/ Omission / Errors by	T030C25	2.89	57.78%	12	2.24	44.71%	17	2.20	44.00%	16	2.46	49.20%	15
Design/ Change/ Omission / Errors by	T030C06	2.68	53.68%	14	1.94	38.82%	19	2.27	45.33%	15	2.31	46.27%	16
Design/ Change/ Omission / Errors by	T030C14	2.28	45.56%	19	2.59	51.76%	12	1.86	37.14%	21	2.27	45.31%	17
Design/ Change/ Omission / Errors by	T030C12	2.89	57.89%	11	1.29	25.88%	31	2.13	42.67%	18	2.14	42.75%	18
Design/ Change/ Omission / Errors by	T030C31	2.42	48.42%	16	1.67	33.33%	23	2.14	42.86%	17	2.10	42.08%	19
Design/ Change/ Omission / Errors by	T030C16	1.72	34.44%	24	2.53	50.59%	15	1.79	35.71%	22	2.02	40.41%	20
Design/ Change/ Omission / Errors by	T030C28	2.28	45.56%	19	1.76	35.29%	22	1.87	37.33%	19	1.98	39.60%	21
Design/ Change/ Omission / Errors by	T030C27	1.78	35.56%	23	1.88	37.50%	21	1.87	37.33%	19	1.84	36.73%	22
Design/ Change/ Omission / Errors by	T030C17	1.33	26.67%	31	2.44	48.75%	16	1.53	30.67%	25	1.76	35.10%	23
Design/ Change/ Omission / Errors by	T030C24	1.94	38.89%	22	1.53	30.67%	26	1.73	34.67%	23	1.75	35.00%	24
Design/ Change/ Omission / Errors by	T030C32	2.11	42.11%	21	1.53	30.59%	27	1.27	25.33%	31	1.67	33.33%	25
Design/ Change/ Omission / Errors by	T030C07	1.50	30.00%	28	1.94	38.82%	19	1.50	30.00%	26	1.65	33.06%	26
Design/ Change/ Omission / Errors by	T030C23	1.65	32.94%	25	1.56	31.25%	25	1.43	28.57%	27	1.55	31.06%	27
Design/ Change/ Omission / Errors by	T030C30	1.33	26.67%	31	1.59	31.76%	24	1.73	34.67%	23	1.54	30.80%	28
Design/ Change/ Omission / Errors by	T030C11	1.56	31.11%	27	1.47	29.33%	28	1.40	28.00%	28	1.48	29.58%	29
Design/ Change/ Omission / Errors by	T030C26	1.63	32.63%	26	1.47	29.33%	28	1.27	25.33%	31	1.47	29.39%	30
Design/ Change/ Omission / Errors by	T030C10	1.47	29.47%	29	1.40	28.00%	30	1.33	26.67%	30	1.41	28.16%	31

In general, the most significant causes that may trigger this type of claims and disputes are seven causes as perceived by all groups. However, the remaining twenty-five causes are perceived as less significant (not important). The most significant causes are as follows:

- T030C01 Design/ change/ omission / errors by the client - inadequate/ inaccurate design information
- T030C02 Design/ change/ omission / errors by the client - inadequate design documentation
- T030C04 Design/ change/ omission / errors by the client - unclear & inadequate specifications
- T030C09 Design/ change/ omission / errors by the client - incomplete tender information
- T030C03 Design/ change/ omission / errors by the client - inadequate brief

- T030C20 Design/ change/ omission / errors by the client - slow client response
- T030C21 Design/ change/ omission / errors by the client - changes by client

In addition, **Table 8-13** above shows that the top two causes **C01** and **C02** are ranked the same by all the respondents. They are ranked first and second in the overall with an overall important index of 81.18 % and 77.25 %, respectively. In addition, none of the overall top significant causes is ranked as non-significant by any of the group respondents; or in another word, none of these causes has an important index that is less than 60 % in any of the respondents' perception.

Furthermore, **Table 8-14** below presents the percentage of agreement between the responses given by each group respondents.

Table 8-14 Significant Causes of: [(T 03)-(Rank Agreement Factor Comparison Table)]

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.57	16.02%	83.98%
Clients & Contractors	4.66	29.10%	70.90%
Consultants & Contractors	3.34	20.90%	79.10%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.75	17.19%	82.81%
Consultants & Over All	2.41	15.04%	84.96%
Contractors & Over All	1.53	9.57%	90.43%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

Clients and consultants have the lowest rank agreement factor (2.56), that is, their responses are very similar more than any other group and their percentage agreement is 83.98 %. The lowest percentage agreement amongst the various groups is between clients and contractors (70.9 %). This is expected since there are always claims and counterclaims between clients and contractors as to the perceived cause.

Note that the cause significance bar charts of all causes of claims under “*Design change / design omission / design errors by the client*”, *T 03*, claims and disputes can be found in Appendix Y.3.2.3.

8.2.3 DELAY: DUE TO VARIATION CLAIMS AND DISPUTES (T 26)

8.2.3.1 CLIENT'S PERCEPTION

Table 8-15 below summarizes the clients' responses for the significance assessment of the suggested root causes that may trigger "*Delay: due to variation*" claims and dispute.

Table 8-15 Significant Causes of: [(T 26)-(Clients' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T260C01	2	1	0	4	7	5	3.88	77.65%	1
T260C02	1	0	0	7	9	2	3.72	74.44%	2
T260C03	0	1	0	7	8	3	3.63	72.63%	3
T260C04	0	1	0	7	9	2	3.58	71.58%	4
T260C08	0	1	0	7	9	2	3.58	71.58%	4
T260C21	0	1	0	8	9	1	3.47	69.47%	6
T260C09	1	1	0	11	6	0	3.22	64.44%	7
T260C07	0	1	0	12	6	0	3.21	64.21%	8
T260C22	0	1	0	12	6	0	3.21	64.21%	8
T260C29	1	1	0	12	5	0	3.17	63.33%	10
T260C15	1	1	0	14	3	0	3.06	61.11%	11
T260C26	1	0	1	15	2	0	3.06	61.11%	11
T260C16	0	0	1	16	2	0	3.05	61.05%	13
T260C17	0	0	3	13	3	0	3.00	60.00%	14

From their responses, the clients responded that **C01**, **C02**, **C03**, **C04** and **C08** are the top four significant causes for **T26** with an index of 77.65 %, 74.44 %, 72.63 % and 71.58 % for **C04** and **C08**. None of the significant causes has an index that is greater than 80.00 %. In addition, another eleven causes are perceived as significant to produce such type of claims and disputes. These causes are **T260C01**, **T260C02**, **T260C03**, **T260C04**, **T260C08**, **T260C21**, **T260C09**, **T260C07**, **T260C22**, **T260C29**, **T260C15**, **T260C26**, **T260C16**, **T260C17**, **T260C19** and **T260C20**.

8.2.3.2 CONSULTANT'S PERCEPTION

Similarly, Table 8-16 below presents the consultants' perception for the significance of the suggested root causes that may trigger "*Delay: due to variation*" claims and dispute.

It can be noted that **C02** is seen as the cause with the highest level of significance from consultants' perception with an average score of 4.13. 6 consultants responded that it has a very high significance, 5 responded that it has a high significance and 4 responded that it has an average significance. There are fourteen

significant causes altogether, with the last three significant causes having the same important index therefore having the same rank. These significant causes are **T260C02, T260C21, T260C08, T260C09, T260C01, T260C03, T260C04, T260C15, T260C16, T260C22, T260C20, T260C05, T260C06** and **T260C29**.

Table 8-16 Significant Causes of: [(T 26)-(Consultants' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T260C02	2	0	0	4	5	6	4.13	82.67%	1
T260C21	1	1	0	2	6	7	4.13	82.50%	2
T260C08	0	1	0	3	6	7	4.06	81.18%	3
T260C09	2	1	0	4	5	5	3.87	77.33%	4
T260C01	0	1	0	4	8	4	3.82	76.47%	5
T260C03	1	1	0	4	7	4	3.81	76.25%	6
T260C04	0	1	0	9	7	0	3.29	65.88%	7
T260C15	2	1	0	8	6	0	3.27	65.33%	8
T260C16	2	1	0	8	6	0	3.27	65.33%	8
T260C22	1	1	0	9	6	0	3.25	65.00%	10
T260C20	1	0	1	11	4	0	3.19	63.75%	11
T260C05	0	0	1	15	1	0	3.00	60.00%	12
T260C06	1	0	1	14	1	0	3.00	60.00%	12
T260C29	0	1	2	10	4	0	3.00	60.00%	12

8.2.3.3 CONTRACTOR'S PERCEPTION

In the same way, **Table 8-17** below summarizes the contractors' responses for the significance of the suggested root causes that may trigger "*Delay: due to variation*" claims and dispute

Table 8-17 Significant Causes of: [(T 26)-(Contractors' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T260C21	1	0	0	2	9	3	4.07	81.43%	1
T260C08	0	0	0	3	9	3	4.00	80.00%	2
T260C09	0	0	0	4	9	2	3.87	77.33%	3
T260C01	1	0	0	4	8	2	3.86	77.14%	4
T260C02	1	0	0	4	8	2	3.86	77.14%	4
T260C03	2	0	0	4	7	2	3.85	76.92%	6
T260C22	2	0	0	6	6	1	3.62	72.31%	7
T260C04	0	0	0	7	7	1	3.60	72.00%	8
T260C29	0	0	0	7	7	1	3.60	72.00%	8
T260C15	1	0	0	7	6	1	3.57	71.43%	10
T260C16	0	0	0	10	5	0	3.33	66.67%	11
T260C07	0	0	1	10	4	0	3.20	64.00%	12
T260C25	0	0	1	10	4	0	3.20	64.00%	12
T260C17	3	0	1	8	3	0	3.17	63.33%	14
T260C20	2	0	0	11	2	0	3.15	63.08%	15
T260C13	1	0	1	12	1	0	3.00	60.00%	16
T260C14	1	0	1	12	1	0	3.00	60.00%	16
T260C19	0	0	2	11	2	0	3.00	60.00%	16

The top two causes for type **T26** from contractors' perception has an index of 80 % and above with **T260C21** having an average score of 4.07 and an index of 81.43 %; and **T260C08** having an average score of 4 and index of 80.00 %. Moreover, both causes **T260C01** and **T260C02** have exactly the same response from the contractors with an average score of 3.86 and an important index of 77.14 %. These two causes are ranked fourth. Finally, the significant causes for this type as perceived by contractors are **T260C21**, **T260C08**, **T260C09**, **T260C01**, **T260C02**, **T260C03**, **T260C22**, **T260C04**, **T260C29**, **T260C15**, **T260C16**, **T260C07**, **T260C25**, **T260C17**, **T260C20**, **T260C13**, **T260C14** and **T260C19**.

8.2.3.4 OVERALL PERCEIVED AGREEMENT

The overall responses of all the respondents are shown in **Table 8-18** below.

Table 8-18 Significant Causes of: [(T 26)-(Overall' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T260C02	4	0	0	15	22	10	3.89	77.87%	1
T260C08	0	2	0	13	24	12	3.86	77.25%	2
T260C21	2	2	0	12	24	11	3.86	77.14%	3
T260C01	3	2	0	12	23	11	3.85	77.08%	4
T260C03	3	2	0	15	22	9	3.75	75.00%	5
T260C09	3	2	0	19	20	7	3.63	72.50%	6
T260C04	0	2	0	23	23	3	3.49	69.80%	7
T260C22	3	2	0	27	18	1	3.33	66.67%	8
T260C15	4	2	0	29	15	1	3.28	65.53%	9
T260C29	1	2	2	29	16	1	3.24	64.80%	10
T260C16	2	1	1	34	13	0	3.20	64.08%	11
T260C07	1	2	1	36	11	0	3.12	62.40%	12
T260C20	4	0	3	36	8	0	3.11	62.13%	13
T260C17	3	0	10	31	7	0	2.94	58.75%	14
T260C19	4	1	8	33	5	0	2.89	57.87%	15
T260C12	0	2	7	39	3	0	2.84	56.86%	16
T260C06	1	4	15	29	2	0	2.58	51.60%	17
T260C25	1	9	16	19	6	0	2.44	48.80%	18
T260C26	3	10	11	24	3	0	2.42	48.33%	19
T260C31	1	7	23	19	1	0	2.28	45.60%	20
T260C18	3	7	23	17	1	0	2.25	45.00%	21
T260C05	1	10	24	15	1	0	2.14	42.80%	22
T260C14	2	16	13	19	1	0	2.10	42.04%	23
T260C11	1	12	26	12	0	0	2.00	40.00%	24
T260C10	0	19	15	16	1	0	1.98	39.61%	25
T260C32	5	21	11	13	1	0	1.87	37.39%	26
T260C23	3	19	19	9	1	0	1.83	36.67%	27
T260C13	3	23	12	12	1	0	1.81	36.25%	28
T260C24	2	16	27	6	0	0	1.80	35.92%	29
T260C28	1	16	33	1	0	0	1.70	34.00%	30
T260C27	4	15	32	0	0	0	1.68	33.62%	31
T260C30	2	29	20	0	0	0	1.41	28.16%	32

Looking at the **Table 8-18** above, most of the respondents responded that thirteen of these suggested causes are significant and can trigger this type of claims and disputes, namely, “*Delay: due to variation*”. The important index of the top four causes is very close to each other. **T260C02** has an index of 77.87 %, **T260C08** has an index of 77.25 %, **T260C21** has an index of 77.14 % and **T260C01** has an index of 77.08 %. The average score of the top four causes are 3.89, 3.86, 3.86 and 3.85. Finally, nineteen causes are considered not significant to this type of claims and disputes. **T260C30** has the lowest score with an average of 1.41 and important index of 28.16 %.

8.2.3.5 FINDINGS RELATED TO OVERALL PERCEIVED AGREEMENT

The following **Table 8-19** presents the average score and “Importance Index” of all the causes for “*Delay: due to variation*”, (**T26**). It can be used to compare these values amongst the different responding groups and the overall values.

In addition, **Table 8-19** above reveals that there are 13 significant causes for type **T26** altogether. The top three causes **C02**, **C08** and **C21** have an important index of 77.87 %, 77.25 % and 77.14 %, respectively. For this type, none of the significant causes has an index that is greater than 80 %. In general, the significant causes for “*Delay: due to variation*” claims and disputes are as follows:

- T260C02 Delay: due to variation - inadequate design documentation
- T260C08 Delay: due to variation - inadequate contract documentation
- T260C21 Delay: due to variation - changes by client
- T260C01 Delay: due to variation - inadequate/ inaccurate design information
- T260C03 Delay: due to variation - inadequate brief
- T260C09 Delay: due to variation - incomplete tender information
- T260C04 Delay: due to variation - unclear & inadequate specifications
- T260C22 Delay: due to variation - lack of competence of project participants
- T260C15 Delay: due to variation - inappropriate/ unexpected time control (target)
- T260C29 Delay: due to variation - poor management
- T260C16 Delay: due to variation - inappropriate/ unexpected cost control (target)
- T260C07 Delay: due to variation - inadequate contract administration
- T260C20 Delay: due to variation - slow client response

Table 8-19 Significant Causes of Delays due to Variations Claims and Disputes: [(T 26)- (Comparison Table)]

Significant Causes Under Types of Claims & Disputes Assessment													
Cause Description	Code	T26 Significance Avg. Mean	T26 Significance Imp. Index	T26 Significance Ranking	T26 Significance Avg. Mean	T26 Significance Imp. Index	T26 Significance Ranking	T26 Significance Avg. Mean	T26 Significance Imp. Index	T26 Significance Ranking	T26 Significance Avg. Mean	T26 Significance Imp. Index	T26 Significance Ranking
		Clients			Consultants			Contractors			Over All		
Delay: Due To Variation - Inadequate	T260C02	3.72	74.44%	2	4.13	82.67%	1	3.86	77.14%	4	3.89	77.87%	1
Delay: Due To Variation - Inadequate	T260C08	3.58	71.58%	4	4.06	81.18%	3	4.00	80.00%	2	3.86	77.25%	2
Delay: Due To Variation - Changes b	T260C21	3.47	69.47%	6	4.13	82.50%	2	4.07	81.43%	1	3.86	77.14%	3
Delay: Due To Variation - Inadequate	T260C01	3.88	77.65%	1	3.82	76.47%	5	3.86	77.14%	4	3.85	77.08%	4
Delay: Due To Variation - Inadequate	T260C03	3.63	72.63%	3	3.81	76.25%	6	3.85	76.92%	6	3.75	75.00%	5
Delay: Due To Variation - Incomplete	T260C09	3.22	64.44%	7	3.87	77.33%	4	3.87	77.33%	3	3.63	72.50%	6
Delay: Due To Variation - Unclear &	T260C04	3.58	71.58%	4	3.29	65.88%	7	3.60	72.00%	8	3.49	69.80%	7
Delay: Due To Variation - Lack of Co	T260C22	3.21	64.21%	8	3.25	65.00%	10	3.62	72.31%	7	3.33	66.67%	8
Delay: Due To Variation - Inappropri	T260C15	3.06	61.11%	11	3.27	65.33%	8	3.57	71.43%	10	3.28	65.53%	9
Delay: Due To Variation - Poor Mana	T260C29	3.17	63.33%	10	3.00	60.00%	12	3.60	72.00%	8	3.24	64.80%	10
Delay: Due To Variation - Inappropri	T260C16	3.05	61.05%	13	3.27	65.33%	8	3.33	66.67%	11	3.20	64.08%	11
Delay: Due To Variation - Inadequate	T260C07	3.21	64.21%	8	2.94	58.75%	15	3.20	64.00%	12	3.12	62.40%	12
Delay: Due To Variation - Slow Clie	T260C20	3.00	60.00%	14	3.19	63.75%	11	3.15	63.08%	15	3.11	62.13%	13
Delay: Due To Variation - Inappropri	T260C17	3.00	60.00%	14	2.71	54.12%	17	3.17	63.33%	14	2.94	58.75%	14
Delay: Due To Variation - Lack of Inf	T260C19	3.00	60.00%	14	2.67	53.33%	19	3.00	60.00%	16	2.89	57.87%	15
Delay: Due To Variation - Unclear Ri	T260C12	2.89	57.89%	17	2.71	54.12%	17	2.93	58.67%	19	2.84	56.86%	16
Delay: Due To Variation - Inappropri	T260C06	2.84	56.84%	20	3.00	60.00%	12	1.80	36.00%	24	2.58	51.60%	17
Delay: Due To Variation - Unrealistic	T260C25	1.53	30.53%	29	2.81	56.25%	16	3.20	64.00%	12	2.44	48.80%	18
Delay: Due To Variation - Unrealistic	T260C26	3.06	61.11%	11	2.63	52.50%	20	1.36	27.14%	29	2.42	48.33%	19
Delay: Due To Variation - Uncontroll	T260C31	1.84	36.84%	23	2.24	44.71%	22	2.93	58.57%	20	2.28	45.60%	20
Delay: Due To Variation - Poor Comr	T260C18	2.89	57.89%	17	1.75	35.00%	24	1.92	38.46%	23	2.25	45.00%	21
Delay: Due To Variation - Inappropri	T260C05	1.61	32.22%	27	3.00	60.00%	12	1.80	36.00%	24	2.14	42.80%	22
Delay: Due To Variation - Inappropri	T260C14	2.17	43.33%	22	1.29	25.88%	31	3.00	60.00%	16	2.10	42.04%	23
Delay: Due To Variation - Unrealistic	T260C11	1.58	31.58%	28	1.76	35.29%	23	2.86	57.14%	21	2.00	40.00%	24
Delay: Due To Variation - Inappropri	T260C10	2.89	57.89%	17	1.59	31.76%	26	1.27	25.33%	31	1.98	39.61%	25
Delay: Due To Variation - Exaggerate	T260C32	2.82	56.47%	21	1.29	25.71%	32	1.33	26.67%	30	1.87	37.39%	26
Delay: Due To Variation - Poor Work	T260C23	1.28	25.56%	31	2.63	52.50%	20	1.64	32.86%	28	1.83	36.67%	27
Delay: Due To Variation - Inappropri	T260C13	1.26	25.26%	32	1.40	28.00%	30	3.00	60.00%	16	1.81	36.25%	28
Delay: Due To Variation - Inadequate	T260C24	1.68	33.68%	26	1.60	32.00%	25	2.13	42.67%	22	1.80	35.92%	29
Delay: Due To Variation - Personality	T260C28	1.83	36.67%	24	1.53	30.59%	28	1.73	34.67%	27	1.70	34.00%	30
Delay: Due To Variation - Lack of Te	T260C27	1.72	34.44%	25	1.56	31.25%	27	1.77	35.38%	26	1.68	33.62%	31
Delay: Due To Variation - Adversaria	T260C30	1.44	28.89%	30	1.50	30.00%	29	1.27	25.33%	31	1.41	28.16%	32

Furthermore, **Table 8-20** below presents the percentage of agreement between the responses given by each group respondents.

Table 8-20 Significant Causes of: [(T 26)-(Rank Agreement Factor Comparison Table)]

Agreement Amongst Groups			
Groups	RAF	PD	PA
Clients & Consultants	4.00	25.00%	75.00%
Clients & Contractors	4.78	29.88%	70.12%
Consultants & Contractors	4.91	30.66%	69.34%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

Despite some differences in viewpoints held by each group, there is a good agreement amongst the various groups as to the significant causes that can initiate such type of claims and disputes. It can be noted that there is a better agreement

between the responses of clients and consultants than there is for consultant and contractors. In addition, the agreement between clients and consultants is the greatest having a RAF of 4 and agreement percentage of 75 %. However, the lowest agreement is between consultants and contractors having a RAF of 4.91 and agreement percentage of 69.34 %.

The cause significance bar charts of all causes of claims under “*Delay: due to variation*”, (T 26), claims and disputes can be found in Appendix Y.3.2.26.

8.2.4 AMBIGUITY IN DOCUMENTS CLAIMS AND DISPUTES (T 01)

8.2.4.1 CLIENT’S PERCEPTION

Table 8-21 below presents the clients’ responses for the significant causes contributing to T01, “*Ambiguity in documents*” claims and disputes.

Table 8-21 Significant Causes of: [(T 01)-(Clients’ Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T010C01	0	0	0	4	9	6	4.11	82.11%	1
T010C04	0	0	0	9	7	3	3.68	73.68%	2
T010C02	0	0	0	8	11	0	3.58	71.58%	3
T010C09	0	0	0	11	6	2	3.53	70.53%	4
T010C03	0	1	0	8	9	1	3.47	69.47%	5
T010C20	0	0	0	15	4	0	3.21	64.21%	6
T010C19	0	0	0	16	3	0	3.16	63.16%	7
T010C05	0	0	1	15	3	0	3.11	62.11%	8
T010C08	0	0	1	15	3	0	3.11	62.11%	8
T010C18	0	0	1	15	3	0	3.11	62.11%	8
T010C06	0	0	2	15	2	0	3.00	60.00%	11
T010C12	0	0	2	15	2	0	3.00	60.00%	11
T010C22	0	0	2	15	2	0	3.00	60.00%	11

As can be seen from the Table 8-21 above that C01 is the most significant cause of type T01 as it has an average score of 4.11 and an important index of 82.11 %, this is the only cause with an index that is greater than 80.00% out of all the 32 causes. However, there are 13 significant causes altogether with the bottom three significant causes having exactly the same response and important index of 60.00 %. Finally, the significant causes from clients’ perception are T010C01, T010C04, T010C02, T010C09, T010C03, T010C20, T010C19, T010C05, T010C08, T010C18, T010C06, T010C12 and T010C22.

8.2.4.2 CONSULTANT'S PERCEPTION

The responses from consultants for the significant causes that contribute to *T01, "Ambiguity in documents"* claims and disputes are shown in the next **Table 8-22** below.

Table 8-22 Significant Causes of: [(T 01)-(Consultants' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T010C01	0	0	0	3	7	7	4.24	84.71%	1
T010C02	0	0	0	4	8	5	4.06	81.18%	2
T010C04	0	0	0	8	5	4	3.76	75.29%	3
T010C09	0	0	0	8	6	3	3.71	74.12%	4
T010C20	1	1	0	5	8	2	3.63	72.50%	5
T010C03	0	0	0	10	6	1	3.47	69.41%	6
T010C08	0	0	0	12	5	0	3.29	65.88%	7
T010C18	0	0	1	12	4	0	3.18	63.53%	8
T010C21	0	0	3	9	5	0	3.12	62.35%	9
T010C19	0	0	3	10	4	0	3.06	61.18%	10
T010C22	0	0	0	16	1	0	3.06	61.18%	10
T010C05	0	0	1	15	1	0	3.00	60.00%	12
T010C06	0	0	1	15	1	0	3.00	60.00%	12

Consultants responded that **C01** has the highest level of significance in initiating this type of claims and disputes. 7 of them responded that it has a very high significance; another 7 responded that it has high significance and 3 responded that it has an average significance. It has an average score of 4.24 and an important index of 84.71 %. The second most significant cause for this type of claims and disputes is C02. This cause has an index of 81.18 % with an average score of 4.06. In general, this type of has thirteen significant root causes. These causes are **T010C01, T010C02, T010C04, T010C09, T010C20, T010C03, T010C08, T010C18, T010C21, T010C19, T010C22, T010C05** and **T010C06**.

8.2.4.3 CONTRACTOR'S PERCEPTION

Similarly, **Table 8-23** presents the contractors' responses regarding the root causes of this type of claims and disputes.

Table 8-23 Significant Causes of: [(T 01)-(Contractors' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T010C01	0	0	0	4	8	3	3.93	78.67%	1
T010C09	0	0	0	4	8	3	3.93	78.67%	1
T010C04	0	0	0	4	9	2	3.87	77.33%	3
T010C02	0	0	0	5	8	2	3.80	76.00%	4
T010C03	0	0	0	7	7	1	3.60	72.00%	5
T010C20	0	0	0	9	6	0	3.40	68.00%	6
T010C08	0	0	0	10	5	0	3.33	66.67%	7
T010C19	0	0	1	10	4	0	3.20	64.00%	8
T010C21	0	0	0	12	3	0	3.20	64.00%	8
T010C29	0	0	1	10	4	0	3.20	64.00%	8
T010C18	0	0	1	11	3	0	3.13	62.67%	11
T010C25	0	0	0	13	2	0	3.13	62.67%	11
T010C24	0	0	3	8	4	0	3.07	61.33%	13

C01 and **C09** are seen as the most significant causes from contractors' perception with an Index of 78.67% and an average score of 3.933, both these causes are ranked as number one as they have exactly the same response from contractors. There are 13 significant type-causes from contractors' perspective and these are **T010C01**, **T010C09**, **T010C04**, **T010C02**, **T010C03**, **T010C20**, **T010C08**, **T010C19**, **T010C21**, **T010C29**, **T010C18**, **T010C25** and **T010C24**.

8.2.4.4 OVERALL PERCEIVED AGREEMENT

This section presents the results of the significant causes of type **T01**, "*Ambiguity in Documents*" as perceived by all groups (i.e. clients, consultants and contractors). The combination of all the respondents is shown in the following **Table 8-24**.

In general, **C01** is the most significant cause for type **T01** with an average score of 4.1 and index of 81.96 %. Most of the respondents responded that this cause is of high significance. There are nine significant causes altogether with the bottom two significant causes having the same average score of 3.14, "Importance Index" of 62.75 % and ranked as number eight. These two significant causes are **C18** and **C19**.

Table 8-24 Significant Causes of: [(T 01)-(Overall' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T010C01	0	0	0	11	24	16	4.10	81.96%	1
T010C02	0	0	0	17	27	7	3.80	76.08%	2
T010C04	0	0	0	21	21	9	3.76	75.29%	3
T010C09	0	0	0	23	20	8	3.71	74.12%	4
T010C03	0	1	0	25	22	3	3.51	70.20%	5
T010C20	1	1	0	29	18	2	3.40	68.00%	6
T010C08	0	0	1	37	13	0	3.24	64.71%	7
T010C18	0	0	3	38	10	0	3.14	62.75%	8
T010C19	0	0	4	36	11	0	3.14	62.75%	8
T010C05	0	2	6	35	8	0	2.96	59.22%	10
T010C22	0	1	4	42	4	0	2.96	59.22%	10
T010C06	1	4	10	33	3	0	2.70	54.00%	12
T010C29	0	6	14	23	8	0	2.65	52.94%	13
T010C21	0	10	11	22	8	0	2.55	50.98%	14
T010C24	3	10	14	17	7	0	2.44	48.75%	15
T010C25	2	10	20	17	2	0	2.22	44.49%	16
T010C12	3	12	16	18	2	0	2.21	44.17%	17
T010C07	0	12	24	12	3	0	2.12	42.35%	18
T010C11	0	13	24	11	3	0	2.08	41.57%	19
T010C23	0	18	30	3	0	0	1.71	34.12%	20
T010C27	2	26	23	0	0	0	1.47	29.39%	21
T010C28	2	26	23	0	0	0	1.47	29.39%	21
T010C14	1	28	21	1	0	0	1.46	29.20%	23
T010C30	2	28	20	1	0	0	1.45	28.98%	24
T010C15	4	26	21	0	0	0	1.45	28.94%	25
T010C32	2	28	21	0	0	0	1.43	28.57%	26
T010C16	0	30	21	0	0	0	1.41	28.24%	27
T010C17	2	30	19	0	0	0	1.39	27.76%	28
T010C26	3	30	18	0	0	0	1.38	27.50%	29
T010C13	3	34	14	0	0	0	1.29	25.83%	30
T010C31	2	36	13	0	0	0	1.27	25.31%	31
T010C10	2	37	12	0	0	0	1.24	24.90%	32

8.2.4.5 FINDINGS RELATED TO OVERALL PERCEIVED AGREEMENT

The comparison **Table 8-25** below presents the average score and important index for all of the suggested causes for *T01 "Ambiguity in documents"*. These values are based on the responses of the different responding groups (i.e. clients, consultants and contractors).

In general, nine significant causes may trigger ambiguity in documents claims and disputes as perceived by all respondents. However, the remaining twenty-three causes are perceived as less significant (not important). The most significant causes are as follows:

- T010C01 Ambiguity in documents - inadequate/ inaccurate design information
- T010C02 Ambiguity in documents - inadequate design documentation
- T010C04 Ambiguity in documents - unclear & inadequate specifications

- T010C09 Ambiguity in documents - incomplete tender information
- T010C03 Ambiguity in documents - inadequate brief
- T010C20 Ambiguity in documents - slow client response
- T010C08 Ambiguity in documents - inadequate contract documentation
- T010C18 Ambiguity in documents - poor communications among project participants
- T010C19 Ambiguity in documents - lack of information for decision making

Table 8-25 Significant Causes of Ambiguity in documents Claims and Disputes: [(T 01)- (Comparison Table)]

Significant Causes Under Types of Claims & Disputes Assessment													
Cause Description	Code	Clients			Consultants			Contractors			Over All		
		T01 Significance Avg. Mean	T01 Significance Imp. Index	T01 Significance Ranking	T01 Significance Avg. Mean	T01 Significance Imp. Index	T01 Significance Ranking	T01 Significance Avg. Mean	T01 Significance Imp. Index	T01 Significance Ranking	T01 Significance Avg. Mean	T01 Significance Imp. Index	T01 Significance Ranking
Ambiguity in Documents - Inadequate	T010C01	4.11	82.11%	1	4.24	84.71%	1	3.93	78.67%	1	4.10	81.96%	1
Ambiguity in Documents - Inadequate	T010C02	3.58	71.58%	3	4.06	81.18%	2	3.80	76.00%	4	3.80	76.08%	2
Ambiguity in Documents - Unclear &	T010C04	3.68	73.68%	2	3.76	75.29%	3	3.87	77.33%	3	3.76	75.29%	3
Ambiguity in Documents - Incomplete	T010C09	3.53	70.53%	4	3.71	74.12%	4	3.93	78.67%	1	3.71	74.12%	4
Ambiguity in Documents - Inadequate	T010C03	3.47	69.47%	5	3.47	69.41%	6	3.60	72.00%	5	3.51	70.20%	5
Ambiguity in Documents - Slow Clie	T010C20	3.21	64.21%	6	3.63	72.50%	5	3.40	68.00%	6	3.40	68.00%	6
Ambiguity in Documents - Inadequate	T010C08	3.11	62.11%	8	3.29	65.88%	7	3.33	66.67%	7	3.24	64.71%	7
Ambiguity in Documents - Poor Comm	T010C18	3.11	62.11%	8	3.18	63.53%	8	3.13	62.67%	11	3.14	62.75%	8
Ambiguity in Documents - Lack of Inf	T010C19	3.16	63.16%	7	3.06	61.18%	10	3.20	64.00%	8	3.14	62.75%	8
Ambiguity in Documents - Inappropri	T010C05	3.11	62.11%	8	3.00	60.00%	12	2.73	54.67%	15	2.96	59.22%	10
Ambiguity in Documents - Lack of Co	T010C22	3.00	60.00%	11	3.06	61.18%	10	2.80	56.00%	14	2.96	59.22%	10
Ambiguity in Documents - Inappropri	T010C06	3.00	60.00%	11	3.00	60.00%	12	1.93	38.57%	16	2.70	54.00%	12
Ambiguity in Documents - Poor Mana	T010C29	2.05	41.05%	16	2.82	56.47%	14	3.20	64.00%	8	2.65	52.94%	13
Ambiguity in Documents - Changes by	T010C21	1.53	30.53%	21	3.12	62.35%	9	3.20	64.00%	8	2.55	50.98%	14
Ambiguity in Documents - Inadequate	T010C24	1.44	28.75%	26	2.82	56.47%	14	3.07	61.33%	13	2.44	48.75%	15
Ambiguity in Documents - Unrealistic	T010C25	1.59	31.76%	18	2.06	41.18%	16	3.13	62.67%	11	2.22	44.49%	16
Ambiguity in Documents - Unclear Ris	T010C12	3.00	60.00%	11	1.60	32.00%	18	1.79	35.71%	17	2.21	44.17%	17
Ambiguity in Documents - Inadequate	T010C07	2.68	53.68%	15	1.82	36.47%	17	1.73	34.67%	18	2.12	42.35%	18
Ambiguity in Documents - Unrealistic	T010C11	2.89	57.89%	14	1.47	29.41%	21	1.73	34.67%	18	2.08	41.57%	19
Ambiguity in Documents - Poor Work	T010C23	1.79	35.79%	17	1.59	31.76%	19	1.73	34.67%	18	1.71	34.12%	20
Ambiguity in Documents - Lack of Tea	T010C27	1.59	31.76%	18	1.47	29.41%	21	1.33	26.67%	27	1.47	29.39%	21
Ambiguity in Documents - Personality	T010C28	1.53	30.59%	20	1.47	29.41%	21	1.40	28.00%	26	1.47	29.39%	21
Ambiguity in Documents - Inappropri	T010C14	1.39	27.78%	28	1.47	29.41%	21	1.53	30.67%	21	1.46	29.20%	23
Ambiguity in Documents - Adversaria	T010C30	1.44	28.89%	25	1.47	29.41%	21	1.43	28.57%	25	1.45	28.98%	24
Ambiguity in Documents - Inappropri	T010C15	1.38	27.50%	29	1.44	28.75%	26	1.53	30.67%	21	1.45	28.94%	25
Ambiguity in Documents - Exaggerate	T010C32	1.47	29.41%	24	1.53	30.59%	20	1.27	25.33%	29	1.43	28.57%	26
Ambiguity in Documents - Inappropri	T010C16	1.32	26.32%	30	1.41	28.24%	27	1.53	30.67%	21	1.41	28.24%	27
Ambiguity in Documents - Inappropri	T010C17	1.32	26.32%	30	1.40	28.00%	28	1.47	29.33%	24	1.39	27.76%	28
Ambiguity in Documents - Unrealistic	T010C26	1.50	30.00%	22	1.33	26.67%	29	1.27	25.33%	29	1.38	27.50%	29
Ambiguity in Documents - Inappropri	T010C13	1.41	28.24%	27	1.13	22.50%	32	1.33	26.67%	27	1.29	25.83%	30
Ambiguity in Documents - Uncontroll	T010C31	1.28	25.56%	32	1.31	26.25%	30	1.20	24.00%	31	1.27	25.31%	31
Ambiguity in Documents - Inappropri	T010C10	1.47	29.47%	23	1.13	22.50%	31	1.07	21.43%	32	1.24	24.90%	32

Furthermore, the entire responding groups rated **C01** as the highest significant cause. Accordingly, it was ranked first by all groups, and was therefore ranked as the most significant cause for this type of claims and disputes. In addition, each of the responding groups responded that there are 13 significant causes ($\geq 60\%$) for **T01**.

However, the analysis of the collective responses of all groups reveals that there are only 9 significant causes as agreed by all responding groups.

The following **Table 8-26** presents the percentage agreement of amongst the various responding groups.

Table 8-26 Significant Causes of Ambiguity in documents Claims and Disputes: [(T 01)- (Comparison Table)]

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.38	21.09%	78.91%
Clients & Contractors	4.59	28.71%	71.29%
Consultants & Contractors	2.72	16.99%	83.01%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

The highest percentage agreement is between consultants and contractors, which is 83.0 %, and with a RAF of 2.72. However, there is only a 71.29 % agreement between clients and contractors, which has a RAF of 4.59. What is interesting is the high level of agreement between consultants and contractors as to the significant causes to this type of claims and disputes.

The cause significance charts of all causes of claims under “*Ambiguity in documents*”, (T 01), claims and disputes can be found in Appendix Y.3.2.1.

8.2.5 UNANTICIPATED SOIL CONDITION CLAIMS AND DISPUTES (T 12)

This section explains the significant causes for this type of claims and disputes. Responses from the various responding groups are summarised and analysed in the following sub sections.

8.2.5.1 CLIENT’S PERCEPTION

Table 8-27 below summarizes the clients’ responses for the significance assessment of the suggested root causes that may trigger “*Unanticipated soil condition*” claims and disputes, (T 12).

From clients’ point of view, there are only 7 significant causes for T12. C24 is ranked first, having an average score of 3.68 and index of 73.68 %. In addition, C01,

C08 and **C09** have different responses from clients; however, they have the same average score of 3.47 and “Importance Index” of 69.47 %. These three causes are ranked fourth. The significant causes with an index that equals to 60.00 % or above are **T120C24**, **T120C02**, **T120C26**, **T120C01**, **T120C08**, **T120C09** and **T120C04**.

Table 8-27 Significant Causes of: [(T 12)-(Clients’ Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T120C24	0	0	0	8	9	2	3.68	73.68%	1
T120C02	0	0	0	9	9	1	3.58	71.58%	2
T120C26	0	0	1	8	9	1	3.53	70.53%	3
T120C01	0	0	1	10	6	2	3.47	69.47%	4
T120C08	0	1	0	8	9	1	3.47	69.47%	4
T120C09	0	0	0	10	9	0	3.47	69.47%	4
T120C04	0	0	0	16	3	0	3.16	63.16%	7

From clients’ point of view, there are only 7 significant causes for **T12**, with **C24** ranked first, having an average score of 3.68 and index of 73.68 %. **C01**, **C08** and **C09** have different responses from clients, but the same average score of 3.47 and important index of 69.47 %. These three causes are ranked fourth. The significant causes with an index that equals to 60.00 % or above are **T120C24**, **T120C02**, **T120C26**, **T120C01**, **T120C08**, **T120C09** and **T120C04**.

8.2.5.2 CONSULTANT’S PERCEPTION

Similarly, **Table 8-28** below presents the consultants’ perception for the significance of the suggested root causes that may trigger this type of claims and dispute.

Table 8-28 Significant Causes of: [(T 12)-(Consultants’ Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T120C24	0	0	0	5	6	6	4.06	81.18%	1
T120C01	0	0	1	5	5	6	3.94	78.82%	2
T120C02	0	0	0	5	9	3	3.88	77.65%	3
T120C09	0	0	0	6	8	3	3.82	76.47%	4
T120C08	0	0	1	5	8	3	3.76	75.29%	5
T120C26	0	1	0	5	8	3	3.71	74.12%	6
T120C03	0	0	0	10	6	1	3.47	69.41%	7

C24 is ranked as number one based on consultants’ responses. Moreover, **C24** is the only cause with an index that is greater than 80.00 %, and it has an average score of 4.06. None of the consultants responded that this cause has a ‘No’ or ‘Low

significance'. There are only eight significant causes, as perceived by consultants, for “*Unanticipated soil condition*” claims and disputes, (T 12). These significant causes are T120C24, T120C01, T120C02, T120C09, T120C08, T120C26 and T120C03.

8.2.5.3 CONTRACTOR’S PERCEPTION

Similarly, the responses from the contractors are shown in **Table 8-29** below.

Table 8-29 Significant Causes of: [(T 12)-(Contractors’ Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T120C01	0	0	0	4	8	3	3.93	78.67%	1
T120C02	0	0	0	4	8	3	3.93	78.67%	1
T120C03	0	0	0	4	8	3	3.93	78.67%	1
T120C09	0	0	0	4	8	3	3.93	78.67%	1
T120C24	0	0	0	6	7	2	3.73	74.67%	5
T120C21	0	0	0	7	8	0	3.53	70.67%	6
T120C20	0	0	0	9	6	0	3.40	68.00%	7
T120C04	0	0	2	9	4	0	3.13	62.67%	8
T120C08	0	0	2	9	4	0	3.13	62.67%	8
T120C29	0	0	2	9	4	0	3.13	62.67%	8
T120C10	2	0	0	12	1	0	3.08	61.54%	11

In general, 11 significant causes can trigger “*Unanticipated soil condition*” claims and disputes, (T 12). C01, C02, C03 and C09 are the most significant causes from contractors’ point of view. These four causes have exactly the same response from this responding group; where 3 contractors responded that these causes have very high significance, 8 responded that these causes have high significance and 4 responded that they have average significance. The average score for each of these causes is 3.93, with an important index of 78.67 %. Amongst these eleven significant causes, C10 is least significant with an average score of 3.07 and “Importance Index” of 61.54 %. These significant causes are T120C01, T120C02, T120C03, T120C09, T120C24, T120C21, T120C20, T120C04, T120C08, T120C29 and T120C10.

8.2.5.4 OVERALL PERCEIVED AGREEMENT

All the respondents’ results are combined together and shown in the next **Table 8-30**.

C24 is ranked first with an overall average score of 3.82 and an “Importance Index” of 76.47 %. There are no causes with an index of 80.00 % or above. There are

10 significant causes altogether for T12 with C20 having an average score of 3 and index of 60.00 % and ranked as number ten.

Table 8-30 Significant Causes of: [(T 12)-(Overall' Perception)]

Code #	Type - Cause Significance						T-C Significance Index		
	Neg.Res	N	LS	Av	HS	VHS	Mean	Index	Rank
T120C24	0	0	0	19	22	10	3.82	76.47%	1
T120C02	0	0	0	18	26	7	3.78	75.69%	2
T120C01	0	0	2	19	19	11	3.76	75.29%	3
T120C09	0	0	0	20	25	6	3.73	74.51%	4
T120C08	0	1	3	22	21	4	3.47	69.41%	5
T120C03	1	0	2	29	15	4	3.42	68.40%	6
T120C26	2	4	11	13	17	4	3.12	62.45%	7
T120C04	0	0	6	37	8	0	3.04	60.78%	8
T120C21	2	0	9	30	10	0	3.02	60.41%	9
T120C20	1	1	6	35	8	0	3.00	60.00%	10
T120C29	0	1	8	36	6	0	2.92	58.43%	11
T120C18	0	0	11	37	3	0	2.84	56.86%	12
T120C19	0	2	9	37	3	0	2.80	56.08%	13
T120C31	0	1	12	35	3	0	2.78	55.69%	14
T120C22	1	4	20	24	2	0	2.48	49.60%	15
T120C10	6	15	16	13	1	0	2.00	40.00%	16
T120C15	0	16	20	14	1	0	2.00	40.00%	16
T120C14	2	19	26	4	0	0	1.69	33.88%	18
T120C25	0	18	32	1	0	0	1.67	33.33%	19
T120C30	1	24	20	6	0	0	1.64	32.80%	20
T120C23	1	20	30	0	0	0	1.60	32.00%	21
T120C05	1	24	23	3	0	0	1.58	31.60%	22
T120C07	3	22	25	1	0	0	1.56	31.25%	23
T120C11	4	27	15	5	0	0	1.53	30.64%	24
T120C16	0	26	23	2	0	0	1.53	30.59%	25
T120C27	0	28	22	1	0	0	1.47	29.41%	26
T120C28	3	27	20	1	0	0	1.46	29.17%	27
T120C06	6	25	20	0	0	0	1.44	28.89%	28
T120C12	1	32	14	4	0	0	1.44	28.80%	29
T120C17	2	33	16	0	0	0	1.33	26.53%	30
T120C13	1	34	16	0	0	0	1.32	26.40%	31
T120C32	5	32	14	0	0	0	1.30	26.09%	32

8.2.5.5 FINDINGS RELATED TO OVERALL PERCEIVED AGREEMENT

The comparison **Table 8-31** below presents the average score and important index for all of the suggested causes for T12 “*Unanticipated soil condition*”. These values are based on the responses of the different responding groups (i.e. clients, consultants and contractors). In addition, it can be used to compare these values amongst the different responding groups and the overall values.

In general, the most significant causes that may trigger this type of claims and disputes are ten causes as perceived by all respondents. However, the remaining twenty-two causes are perceived as less significant (not important). The most significant causes are as follows:

- T120C24 Unanticipated soil condition - inadequate site investigation
- T120C02 Unanticipated soil condition - inadequate design documentation
- T120C01 Unanticipated soil condition - inadequate/ inaccurate design information
- T120C09 Unanticipated soil condition - incomplete tender information
- T120C08 Unanticipated soil condition - inadequate contract documentation
- T120C03 Unanticipated soil condition - inadequate brief
- T120C26 Unanticipated soil condition - unrealistic expected information by contractor
- T120C04 Unanticipated soil condition - unclear & inadequate specifications
- T120C21 Unanticipated soil condition - changes by client
- T120C20 Unanticipated soil condition - slow client response

Table 8-31 Significant Causes of Unanticipated Soil Condition Claims and Disputes: [(T 12)- (Comparison Table)]

Significant Causes Under Types of Claims & Disputes Assessment													
Cause Description	Code	Clients			Consultants			Contractors			Over All		
		T12 Significance Avg. Mean	T12 Significance Imp. Index	T12 Significance Ranking	T12 Significance Avg. Mean	T12 Significance Imp. Index	T12 Significance Ranking	T12 Significance Avg. Mean	T12 Significance Imp. Index	T12 Significance Ranking	T12 Significance Avg. Mean	T12 Significance Imp. Index	T12 Significance Ranking
Unanticipated Soil Condition - Inadeq	T120C24	3.68	73.68%	1	4.06	81.18%	1	3.73	74.67%	5	3.82	76.47%	1
Unanticipated Soil Condition - Inadeq	T120C02	3.58	71.58%	2	3.88	77.65%	3	3.93	78.67%	1	3.78	75.69%	2
Unanticipated Soil Condition - Inadeq	T120C01	3.47	69.47%	4	3.94	78.82%	2	3.93	78.67%	1	3.76	75.29%	3
Unanticipated Soil Condition - Incomp	T120C09	3.47	69.47%	4	3.82	76.47%	4	3.93	78.67%	1	3.73	74.51%	4
Unanticipated Soil Condition - Inadeq	T120C08	3.47	69.47%	4	3.76	75.29%	5	3.13	62.67%	8	3.47	69.41%	5
Unanticipated Soil Condition - Inadeq	T120C03	2.94	58.89%	8	3.47	69.41%	7	3.93	78.67%	1	3.42	68.40%	6
Unanticipated Soil Condition - Unreal	T120C26	3.53	70.53%	3	3.71	74.12%	6	1.77	35.38%	22	3.12	62.45%	7
Unanticipated Soil Condition - Unclea	T120C04	3.16	63.16%	7	2.82	56.47%	8	3.13	62.67%	8	3.04	60.78%	8
Unanticipated Soil Condition - Change	T120C21	2.79	55.79%	13	2.80	56.00%	10	3.53	70.67%	6	3.02	60.41%	9
Unanticipated Soil Condition - Slow C	T120C20	2.84	56.84%	11	2.81	56.25%	9	3.40	68.00%	7	3.00	60.00%	10
Unanticipated Soil Condition - Poor M	T120C29	2.89	57.89%	9	2.76	55.29%	11	3.13	62.67%	8	2.92	58.43%	11
Unanticipated Soil Condition - Poor C	T120C18	2.89	57.89%	9	2.71	54.12%	12	2.93	58.67%	12	2.84	56.86%	12
Unanticipated Soil Condition - Lack of	T120C19	2.84	56.84%	11	2.65	52.94%	14	2.93	58.67%	12	2.80	56.08%	13
Unanticipated Soil Condition - Uncont	T120C31	2.74	54.74%	15	2.71	54.12%	12	2.93	58.67%	12	2.78	55.69%	14
Unanticipated Soil Condition - Lack of	T120C22	2.79	55.79%	13	2.65	52.94%	14	1.86	37.14%	18	2.48	49.60%	15
Unanticipated Soil Condition - Inappr	T120C10	1.53	30.53%	27	1.62	32.31%	16	3.08	61.54%	11	2.00	40.00%	16
Unanticipated Soil Condition - Inappr	T120C15	1.63	32.63%	18	1.59	31.76%	17	2.93	58.67%	12	2.00	40.00%	16
Unanticipated Soil Condition - Inappr	T120C14	1.71	34.12%	16	1.59	31.76%	17	1.80	36.00%	20	1.69	33.88%	18
Unanticipated Soil Condition - Unreal	T120C25	1.63	32.63%	18	1.53	30.59%	19	1.87	37.33%	17	1.67	33.33%	19
Unanticipated Soil Condition - Advers	T120C30	1.63	32.63%	18	1.47	29.41%	22	1.86	37.14%	18	1.64	32.80%	20
Unanticipated Soil Condition - Poor W	T120C23	1.58	31.58%	23	1.53	30.59%	19	1.71	34.29%	23	1.60	32.00%	21
Unanticipated Soil Condition - Inappr	T120C05	1.56	31.11%	26	1.41	28.24%	25	1.80	36.00%	20	1.58	31.60%	22
Unanticipated Soil Condition - Inadeq	T120C07	1.63	32.63%	18	1.38	27.50%	27	1.69	33.85%	24	1.56	31.25%	23
Unanticipated Soil Condition - Unreal	T120C11	1.67	33.33%	17	1.36	27.14%	28	1.53	30.67%	25	1.53	30.64%	24
Unanticipated Soil Condition - Inappr	T120C16	1.26	25.26%	32	1.53	30.59%	19	1.87	37.33%	17	1.53	30.59%	25
Unanticipated Soil Condition - Lack of	T120C27	1.58	31.58%	23	1.47	29.41%	22	1.33	26.67%	27	1.47	29.41%	26
Unanticipated Soil Condition - Person	T120C28	1.56	31.25%	25	1.47	29.41%	22	1.33	26.67%	27	1.46	29.17%	27
Unanticipated Soil Condition - Inappr	T120C06	1.47	29.47%	28	1.40	28.00%	26	1.45	29.09%	26	1.44	28.89%	28
Unanticipated Soil Condition - Unclea	T120C12	1.63	32.63%	18	1.35	27.06%	29	1.29	25.71%	29	1.44	28.80%	29
Unanticipated Soil Condition - Inappr	T120C17	1.37	27.37%	29	1.31	26.25%	31	1.29	25.71%	29	1.33	26.53%	30
Unanticipated Soil Condition - Inappr	T120C13	1.32	26.32%	31	1.35	27.06%	29	1.29	25.71%	29	1.32	26.40%	31
Unanticipated Soil Condition - Exagge	T120C32	1.33	26.67%	30	1.29	25.71%	32	1.29	25.71%	29	1.30	26.09%	32

In addition, **Table 8-31** above reveals that there are ten significant causes for type **T12** altogether. The top three causes **C24**, **C02** and **C01** have an “Importance Index” of 76.47 %, 75.69 % and 75.29 %, respectively. For this type, none of the significant causes has an index that is greater than 80 %. In addition, **C24** is ranked first by both the clients and consultants, and fifth by contractors based on their responses. The second most significant cause for this type is **C02**. It is ranked second, third and first by the clients, the consultants and the contractors, respectively. The least significant cause amongst these ten significant causes is **C20**. It is ranked tenth (over all) with an average score of 3 and “Importance Index” of 60 %.

Furthermore, **Table 8-32** below presents the percentage of agreement between the responses given by each group respondents.

Table 8-32 Significant Causes of: [(T 12)-(Rank Agreement Factor Comparison Table)]

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.28	20.51%	79.49%
Clients & Contractors	4.72	29.49%	70.51%
Consultants & Contractors	3.19	19.92%	80.08%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

The percentage of agreement between clients and consultants is very close to that of consultants and contractors as they have a RAF of 3.28 and 3.19; percentage agreement of 79.49 % and 80.08 % respectively. However, clients and contractors have the lowest percentage of agreement with a RAF of 4.72 and percentage agreement of 70.51 %.

The cause significance charts of all causes of claims under (*T 12*), “*Unanticipated soil condition*” claims and disputes can be found in Appendix Y.3.2.12.

8.3 RELATION BETWEEN CAUSE, SIGNIFICANCE AND AVOIDABILITY

Construction claims are considered by many project participants to be one of the most disruptive and unpleasant events of a project (Ho, & Liu, 2004). Loosemore (1994) adds that resolving the disputes, which develop as a consequence of the differences and conflict of interests that exist within the project team, is something that occupies much of the project manager's time. It is estimated that there has been a 500 % increase in disputes over the last twenty years (Fenn, 1991). Moreover, Yates (2000) states that great concern has been expressed in recent years regarding the dramatic increase in conflicts and disputes in the construction industry of many countries and areas (including Australia, USA, UK, and Hong Kong).

Latham acknowledged this, and commented that: *“The best solution is to avoid disputes”* (Fenn, 2002). However, there exists enormous interest in construction disputes amongst the construction's parties and researchers with the techniques used to resolve disputes, rather than any attempt to avoid claims and disputes. In order to avoid claims and disputes, we need to predict them (Fenn, 2002).

In the same way, Skene and Shaban (2002) conclude that some disputes will require the dispute resolution provisions of the contract including arbitration or litigation. However, this should not deter the participants in a construction project from examining the means and methods to avoid or minimize disputes before or during the course of the project. They add that in order to avoid disputes, it is necessary to have some appreciation for the reasons that disputes may arise on a construction project and to consider the steps that can be taken to minimize the likelihood of such disputes (Skene and Shaban, 2002).

In addition, Kumaraswamy (1998) states that “Demands for a more viable service from the construction industry includes calls for curtailment of the proliferation of avoidable claims and disputes that have debilitated the industry. A more efficient service could be provided to construction clients if the sources and root causes of such claims and disputes could be identified and addressed in advance”, (Kumaraswamy, 1998). He continues by saying that: “The identification of probable causative patterns of avoidable claims and disputes that merit special attention is seen to suggest managerial strategies to reduce such occurrences”, (Kumaraswamy, 1998),

Moreover, claims managers should focus not merely on the significant claims categories but also on the avoidable ones, to minimize the damaging effects on a given project (Kumaraswamy, 1996). In addition, "... it was felt necessary to identify the causes underlying different claims categories, on the premise that if the causes are identified, their controllability and hence avoidability can be assessed more realistically", (Kumaraswamy, 1996). He continues by saying, "Difficulties in such identifications arose from most claims being generated from overlapping causes and/or cumulative cause-effect cycles", (Kumaraswamy, 1996).

Sixteen types of claims and disputes have been identified in Section 6-4 with Claim Focus Index (CFI) values of equals to 60 % or above. These types require managerial attention with potential for avoiding their frequencies and/or magnitudes have been chosen for the next stage of analysis.

In addition, investigation and discussion in the previous section was aimed at unravelling the network of principal cause-effect interactions leading to types of claims and disputes, particularly, these sixteen types of claims and disputes. Pre identified causes for these types of claims and disputes were tabulated to study their perceived significance to these types of claims and disputes. Accordingly, these significant root causes were identified. Moreover, the perceived significant root causes that could trigger the top five types of claims and disputes were analysed and discussed in details in the previous Section 7-2. Furthermore, the perceived avoidability of the causes that may trigger the types of claims and disputes were investigated in the previous chapter (Section 6-5).

Having investigated the significance and the avoidability of those root causes, this section aims at exploring the relations between these two indicators to suggest managerial strategies to reduce such occurrences

8.3.1 SIGNIFICANT AND AVOIDABLE ROOT CAUSES

This section presents the values for the significant and avoidable root causes for the sixteen types of claims and disputes have been identified in Section 6-4 with Claim Focus Index (CFI) values of equals to 60 % or above. **Table 8-33** below presents the values for the responses on the Significant and Avoidable Root Causes.

Table 8-33 Values for the Significant and Avoidable Root Causes

Variations			Change of design/ design omission / errors by the client (engineer)			Delay/ disruption to regular progress due to variation			Ambiguity in documents		
Type code		T19	Type code		T03	Type code		T26	Type code		T01
Type rank		1	Type rank		2	Type rank		3	Type rank		4
Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability
C01	80.00	81.18	C01	81.18	81.18	C01	77.08	81.18	C01	81.96	81.18
C02	78.43	78.43	C02	77.25	78.43	C02	77.87	78.43	C02	76.08	78.43
C03	71.02	83.14	C03	68.24	83.14	C03	75.00	83.14	C03	70.20	83.14
C04	70.20	82.75	C04	70.20	82.75	C04	69.80	82.75	C04	75.29	82.75
C05	40.00	83.53	C05	52.55	83.53	C05	42.80	83.53	C05	59.22	83.53
C06	49.60	82.35	C06	46.27	82.35	C06	51.60	82.35	C06	54.00	82.35
C07	61.60	70.98	C07	33.06	70.98	C07	62.40	70.98	C07	42.35	70.98
C08	77.20	68.98	C08	59.61	68.98	C08	77.25	68.98	C08	64.71	68.98
C09	74.40	82.35	C09	69.41	82.35	C09	72.50	82.35	C09	74.12	82.35
C10	46.80	70.59	C10	28.16	70.59	C10	39.61	70.59	C10	24.90	70.59
C11	39.20	62.40	C11	29.58	62.40	C11	40.00	62.40	C11	41.57	62.40
C12	57.25	69.02	C12	42.75	69.02	C12	56.86	69.02	C12	44.17	69.02
C13	36.40	74.90	C13	27.08	74.90	C13	36.25	74.90	C13	25.83	74.90
C14	43.20	70.20	C14	45.31	70.20	C14	42.04	70.20	C14	29.20	70.20
C15	65.00	60.00	C15	52.80	60.00	C15	65.53	60.00	C15	28.94	60.00
C16	62.80	57.25	C16	40.41	57.25	C16	64.08	57.25	C16	28.24	57.25
C17	57.20	64.71	C17	35.10	64.71	C17	58.75	64.71	C17	27.76	64.71
C18	43.20	63.60	C18	50.80	63.60	C18	45.00	63.60	C18	62.75	63.60
C19	57.20	63.92	C19	58.37	63.92	C19	57.87	63.92	C19	62.75	63.92
C20	59.61	52.94	C20	67.84	52.94	C20	62.13	52.94	C20	68.00	52.94
C21	70.59	55.69	C21	67.45	55.69	C21	77.14	55.69	C21	50.98	55.69
C22	67.45	63.53	C22	51.37	63.53	C22	66.67	63.53	C22	59.22	63.53
C23	35.00	58.04	C23	31.06	58.04	C23	36.67	58.04	C23	34.12	58.04
C24	34.29	70.98	C24	35.00	70.98	C24	35.92	70.98	C24	48.75	70.98
C25	47.76	60.78	C25	49.20	60.78	C25	48.80	60.78	C25	44.49	60.78
C26	38.78	63.14	C26	29.39	63.14	C26	48.33	63.14	C26	27.50	63.14
C27	29.60	62.35	C27	36.73	62.35	C27	33.62	62.35	C27	29.39	62.35
C28	29.41	62.75	C28	39.60	62.75	C28	34.00	62.75	C28	29.39	62.75
C29	63.27	58.43	C29	51.76	58.43	C29	64.80	58.43	C29	52.94	58.43
C30	27.35	57.65	C30	30.80	57.65	C30	28.16	57.65	C30	28.98	57.65
C31	46.53	41.96	C31	42.08	41.96	C31	45.60	41.96	C31	25.31	41.96
C32	36.47	56.86	C32	33.33	56.86	C32	37.39	56.86	C32	28.57	56.86

Table 8-33 Continued: Values for the Significant and Avoidable Root Causes

Unanticipated soil condition			Unforeseen ground condition/ unforeseeable obstruction			Differing site condition			Change of project profile and site		
Type code		T12	Type code		T13	Type code		T11	Type code		T09
Type rank		5	Type rank		6	Type rank		7	Type rank		8
Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability
C01	75.29	81.18	C01	75.29	81.18	C01	75.69	81.18	C01	76.86	81.18
C02	75.69	78.43	C02	76.00	78.43	C02	76.00	78.43	C02	73.73	78.43
C03	68.40	83.14	C03	68.98	83.14	C03	68.40	83.14	C03	74.12	83.14
C04	60.78	82.75	C04	61.20	82.75	C04	60.78	82.75	C04	65.88	82.75
C05	31.60	83.53	C05	31.67	83.53	C05	31.37	83.53	C05	35.00	83.53
C06	28.89	82.35	C06	28.40	82.35	C06	28.63	82.35	C06	30.67	82.35
C07	31.25	70.98	C07	31.49	70.98	C07	31.49	70.98	C07	26.40	70.98
C08	69.41	68.98	C08	69.41	68.98	C08	69.41	68.98	C08	70.59	68.98
C09	74.51	82.35	C09	74.80	82.35	C09	74.51	82.35	C09	74.90	82.35
C10	40.00	70.59	C10	39.57	70.59	C10	40.00	70.59	C10	33.64	70.59
C11	30.64	62.40	C11	31.25	62.40	C11	30.61	62.40	C11	26.53	62.40
C12	28.80	69.02	C12	28.80	69.02	C12	28.63	69.02	C12	26.38	69.02
C13	26.40	74.90	C13	26.38	74.90	C13	26.40	74.90	C13	25.10	74.90
C14	33.88	70.20	C14	34.17	70.20	C14	34.17	70.20	C14	32.77	70.20
C15	40.00	60.00	C15	40.00	60.00	C15	40.00	60.00	C15	60.39	60.00
C16	30.59	57.25	C16	30.42	57.25	C16	31.02	57.25	C16	58.04	57.25
C17	26.53	64.71	C17	26.67	64.71	C17	26.40	64.71	C17	56.80	64.71
C18	56.86	63.60	C18	57.83	63.60	C18	57.20	63.60	C18	61.18	63.60
C19	56.08	63.92	C19	56.40	63.92	C19	56.47	63.92	C19	56.47	63.92
C20	60.00	52.94	C20	60.39	52.94	C20	60.39	52.94	C20	58.82	52.94
C21	60.41	55.69	C21	60.41	55.69	C21	60.40	55.69	C21	66.67	55.69
C22	49.60	63.53	C22	49.60	63.53	C22	49.80	63.53	C22	49.80	63.53
C23	32.00	58.04	C23	31.84	58.04	C23	32.08	58.04	C23	28.80	58.04
C24	76.47	70.98	C24	76.47	70.98	C24	76.47	70.98	C24	76.86	70.98
C25	33.33	60.78	C25	33.06	60.78	C25	33.20	60.78	C25	57.25	60.78
C26	62.45	63.14	C26	61.60	63.14	C26	62.00	63.14	C26	32.34	63.14
C27	29.41	62.35	C27	29.39	62.35	C27	29.79	62.35	C27	28.80	62.35
C28	29.17	62.75	C28	29.13	62.75	C28	29.17	62.75	C28	31.60	62.75
C29	58.43	58.43	C29	58.78	58.43	C29	58.40	58.43	C29	56.00	58.43
C30	32.80	57.65	C30	33.33	57.65	C30	32.92	57.65	C30	44.08	57.65
C31	55.69	41.96	C31	55.69	41.96	C31	56.25	41.96	C31	36.73	41.96
C32	26.09	56.86	C32	26.09	56.86	C32	26.12	56.86	C32	26.09	56.86

Table 8-33 Continued: Values for the Significant and Avoidable Root Causes

Rectification of works/ specification change due to defective design			Delay/ disruption to regular progress due to late issue of consent (approval)			Delays due to incomplete design/ insufficient information by client/consultant			Delayed site possession/ restricted access		
Type code		T05	Type code		T28	Type code		T02	Type code		T10
Type rank		9	Type rank		10	Type rank		11	Type rank		12
Cause Code	Signifi cance	Avoid ability	Cause Code	Signifi cance	Avoid ability	Cause Code	Signifi cance	Avoid ability	Cause Code	Signifi cance	Avoid ability
C01	76.47	81.18	C01	80.41	81.18	C01	81.18	81.18	C01	75.29	81.18
C02	76.08	78.43	C02	79.17	78.43	C02	78.04	78.43	C02	76.00	78.43
C03	69.80	83.14	C03	75.10	83.14	C03	73.33	83.14	C03	74.90	83.14
C04	75.29	82.75	C04	73.20	82.75	C04	69.80	82.75	C04	73.33	82.75
C05	52.80	83.53	C05	61.63	83.53	C05	58.43	83.53	C05	58.00	83.53
C06	39.61	82.35	C06	49.17	82.35	C06	50.98	82.35	C06	47.92	82.35
C07	37.60	70.98	C07	50.20	70.98	C07	47.35	70.98	C07	65.49	70.98
C08	63.92	68.98	C08	52.24	68.98	C08	67.84	68.98	C08	71.37	68.98
C09	64.71	82.35	C09	76.96	82.35	C09	73.33	82.35	C09	74.90	82.35
C10	29.60	70.59	C10	26.94	70.59	C10	27.50	70.59	C10	64.71	70.59
C11	28.00	62.40	C11	30.00	62.40	C11	29.17	62.40	C11	46.27	62.40
C12	28.51	69.02	C12	41.25	69.02	C12	41.22	69.02	C12	39.60	69.02
C13	26.27	74.90	C13	25.96	74.90	C13	26.96	74.90	C13	29.39	74.90
C14	51.43	70.20	C14	51.02	70.20	C14	59.61	70.20	C14	31.82	70.20
C15	66.67	60.00	C15	76.47	60.00	C15	71.76	60.00	C15	63.53	60.00
C16	51.20	57.25	C16	61.63	57.25	C16	58.82	57.25	C16	56.86	57.25
C17	52.80	64.71	C17	62.00	64.71	C17	60.00	64.71	C17	27.35	64.71
C18	53.73	63.60	C18	75.92	63.60	C18	63.67	63.60	C18	60.00	63.60
C19	58.82	63.92	C19	68.57	63.92	C19	61.20	63.92	C19	58.37	63.92
C20	47.20	52.94	C20	76.25	52.94	C20	70.98	52.94	C20	69.02	52.94
C21	59.61	55.69	C21	75.20	55.69	C21	67.45	55.69	C21	69.80	55.69
C22	53.73	63.53	C22	67.84	63.53	C22	60.39	63.53	C22	58.40	63.53
C23	48.80	58.04	C23	37.60	58.04	C23	37.55	58.04	C23	31.06	58.04
C24	35.51	70.98	C24	36.33	70.98	C24	35.83	70.98	C24	66.67	70.98
C25	39.59	60.78	C25	62.92	60.78	C25	60.00	60.78	C25	56.08	60.78
C26	27.92	63.14	C26	27.08	63.14	C26	27.76	63.14	C26	25.71	63.14
C27	39.17	62.35	C27	61.67	62.35	C27	56.08	62.35	C27	27.66	62.35
C28	37.87	62.75	C28	56.47	62.75	C28	47.06	62.75	C28	29.80	62.75
C29	35.60	58.43	C29	58.75	58.43	C29	54.29	58.43	C29	60.00	58.43
C30	30.59	57.65	C30	36.60	57.65	C30	32.27	57.65	C30	42.04	57.65
C31	36.33	41.96	C31	49.36	41.96	C31	39.59	41.96	C31	62.75	41.96
C32	30.80	56.86	C32	28.16	56.86	C32	28.51	56.86	C32	24.68	56.86

Table 8-33 Continued: Values for the Significant and Avoidable Root Causes

Extension of time for completion			Delay/ disruption to regular progress due to late instruction by the client/consultant engineer			Delay disruption to regular progress caused by utility services organization			Default of subcontractor, nominated subcontractor or suppliers.		
Type code		T35	Type code		T27	Type code		T31	Type code		T43
Type rank		13	Type rank		14	Type rank		15	Type rank		16
Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability
C01	80.00	81.18	C01	80.39	81.18	C01	61.70	81.18	C01	66.80	81.18
C02	79.58	78.43	C02	80.00	78.43	C02	60.42	78.43	C02	67.50	78.43
C03	70.80	83.14	C03	75.42	83.14	C03	61.30	83.14	C03	67.08	83.14
C04	70.61	82.75	C04	73.73	82.75	C04	66.09	82.75	C04	68.00	82.75
C05	62.50	83.53	C05	62.55	83.53	C05	38.00	83.53	C05	60.00	83.53
C06	62.50	82.35	C06	50.43	82.35	C06	34.69	82.35	C06	54.89	82.35
C07	79.18	70.98	C07	49.60	70.98	C07	60.00	70.98	C07	64.71	70.98
C08	68.40	68.98	C08	51.67	68.98	C08	61.60	68.98	C08	67.35	68.98
C09	67.39	82.35	C09	76.80	82.35	C09	52.08	82.35	C09	58.72	82.35
C10	76.40	70.59	C10	27.08	70.59	C10	30.64	70.59	C10	27.92	70.59
C11	52.08	62.40	C11	30.00	62.40	C11	26.25	62.40	C11	37.96	62.40
C12	62.45	69.02	C12	42.00	69.02	C12	61.63	69.02	C12	52.50	69.02
C13	38.40	74.90	C13	26.40	74.90	C13	27.08	74.90	C13	28.09	74.90
C14	41.67	70.20	C14	51.43	70.20	C14	27.76	70.20	C14	60.41	70.20
C15	76.60	60.00	C15	76.40	60.00	C15	69.80	60.00	C15	70.40	60.00
C16	31.84	57.25	C16	62.00	57.25	C16	53.88	57.25	C16	68.98	57.25
C17	30.83	64.71	C17	62.40	64.71	C17	33.88	64.71	C17	68.57	64.71
C18	79.61	63.60	C18	75.92	63.60	C18	76.33	63.60	C18	72.24	63.60
C19	75.83	63.92	C19	70.42	63.92	C19	78.04	63.92	C19	78.72	63.92
C20	74.69	52.94	C20	76.60	52.94	C20	76.73	52.94	C20	78.37	52.94
C21	78.00	55.69	C21	75.60	55.69	C21	62.04	55.69	C21	76.80	55.69
C22	70.64	63.53	C22	67.60	63.53	C22	62.08	63.53	C22	68.16	63.53
C23	61.96	58.04	C23	37.08	58.04	C23	27.84	58.04	C23	48.94	58.04
C24	61.60	70.98	C24	36.47	70.98	C24	40.44	70.98	C24	42.50	70.98
C25	62.13	60.78	C25	63.14	60.78	C25	54.58	60.78	C25	64.26	60.78
C26	61.63	63.14	C26	27.60	63.14	C26	44.58	63.14	C26	45.00	63.14
C27	61.22	62.35	C27	61.70	62.35	C27	60.43	62.35	C27	66.00	62.35
C28	61.63	62.75	C28	56.40	62.75	C28	61.60	62.75	C28	60.00	62.75
C29	69.20	58.43	C29	59.60	58.43	C29	61.96	58.43	C29	69.36	58.43
C30	52.17	57.65	C30	36.40	57.65	C30	40.00	57.65	C30	33.60	57.65
C31	76.40	41.96	C31	48.98	41.96	C31	74.04	41.96	C31	44.90	41.96
C32	27.84	56.86	C32	28.33	56.86	C32	24.58	56.86	C32	29.39	56.86

Since there are two indicators (cause significance and cause avoidability), root causes can be categorised as follows (Table 8-34):

Table 8-34 Categorizations of Cause’s Variables

Cause significance	Cause avoidability
Significant causes	Avoidable causes
Insignificant causes	Unavoidable causes

Accordingly, significance and avoidability values for the root causes that may contribute to the sixteen types of claims and disputes that require managerial attention can be plotted in a diagram to produce four groups of values (see Figure 8-3 below). This categorization helps in developing proper actions/strategies to deal with these causes (see Figure 8-2 below). These proposed actions/ strategies are:

- If the root cause is both ‘Significant’ and ‘Avoidable’, then it is crucial to propose ways and techniques to ‘Prevent/ minimise’ such cause.
- If the root cause is both ‘Insignificant’ and ‘Avoidable’, then it is crucial to propose ways and techniques to ‘Minimise’ such cause (depending on their significance).
- If the root cause is both ‘Significant’ and ‘Unavoidable’, then it is crucial to propose ways and techniques to ‘Control/Monitor’ such cause.
- If the root cause is both ‘Insignificant’ and ‘Unavoidable’, then notify construction managers of such cause.

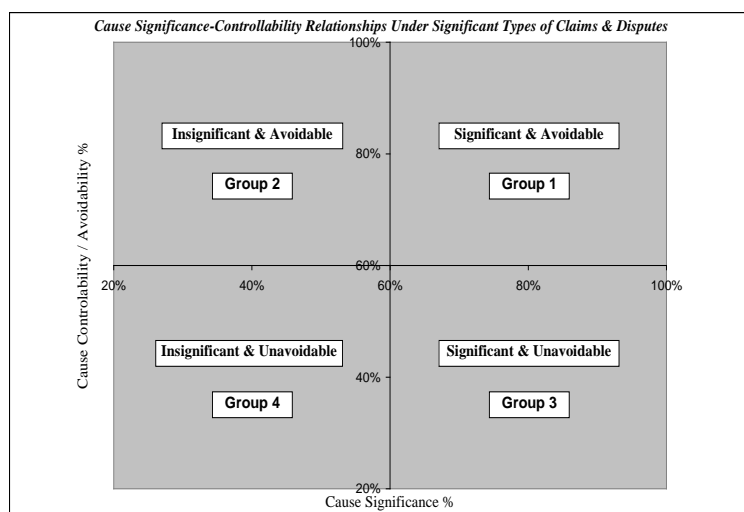


Figure 8-2 Categorization of Cause Significant and Avoidability

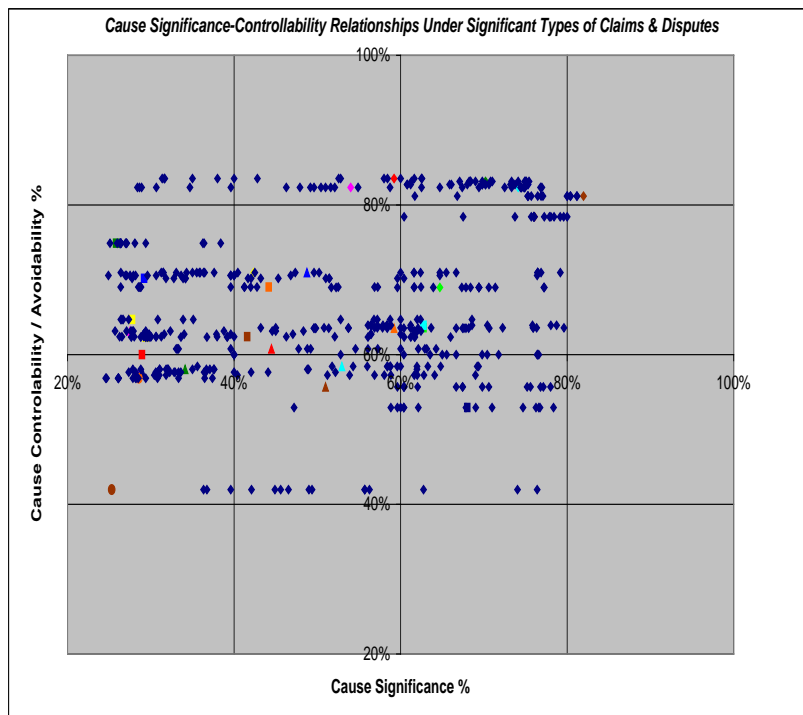


Figure 8-3 Cause Significant and Avoidability Response Values

It is worth noting that the vast majority of these root causes fall under group 1 and 2. Groups 1 and 2 represent the significant and avoidable causes, and insignificant and avoidable ones, respectively. In addition, group 3 has the least number of these root causes. Group 3 represents the significant and unavoidable causes. Finally, group 4 represents the insignificant and unavoidable causes.

Since the focus on the significant causes, group 1 and 3 will be focused on with a view to propose ways to prevent/minimise the avoidable causes and to control/monitor the unavoidable ones in. Moreover, group 1 will require further attention since the responding groups perceived these causes as an avoidable ones and are significant in contributing to the respective types of claims and disputes. This will be discussed in details in Section 8.1.1

Finally, it is worth noting that both groups 2 and 4 require managerial attention. Group 2 represents the insignificant and avoidable causes. In spite of the insignificance of such causes, management should pay attention to these causes. Participants could well reduce the probability of occurrence of these causes since they are avoidable. In addition, the accumulative effect of such insignificant causes could well have a snowball effect, which suggests the possibilities of more claims and

disputes (Yogeswaran, 1998). On the other hand, group 4 represents the insignificant and unavoidable causes. Although the causes under this group are insignificant/ less significant, management should be a ware of these causes and pay attention to such possibilities.

Having investigated these root causes, the following step is aimed presenting these different causes in a matrix format in order to conceptualise the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry.

8.3.2 THE PROPOSED MATRIX

CASUSE OF CLAIMS & DISPUTES ASSESSMENT		Causes of Claims Code										Preventive Techniques Ranking														
		Cause Controllability Importance Index										Ranking														
		Cause Controllability Ranking										Ranking														
		Cause Controllability Description										Ranking														
		Cause Controllability Categorisation; Where, "HS-										Ranking														
		Causes of Claims Rank										Ranking														
TYPE OF CLAIMS & DISPUTES ASSESSMENT														Ranking												
DESCR	CODE	Frequency	Impact	Ranking	Frequency	Impact	Ranking	Cause	Ranking	Frequency	Impact	Ranking	Frequency	Impact	Ranking	Frequency	Impact	Ranking	Frequency	Impact	Ranking	Frequency	Impact	Ranking		
		Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	Avg. Mean	Index	
Variations	T19	4.08	81.63%	1	4.49	89.80%	1	3.80	76.08%	8	4.12	82.50%	1	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	
Change of Design/ Design Omission / Errors b	T03	3.83	76.60%	2	4.20	83.92%	3	4.02	80.39%	4	4.02	80.30%	2	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Delay/ Disruption to Regular Progress Due To	T26	3.82	76.47%	3	4.33	86.67%	2	3.62	72.40%	14	3.93	78.51%	3	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	
Ambiguity in Documents	T01	3.39	67.84%	11	3.73	74.51%	11	4.49	89.80%	1	3.87	77.40%	4	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Unanticipated Soil Condition	T12	3.63	72.65%	4	4.00	80.00%	4	3.69	73.73%	12	3.77	75.46%	5	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Unforeseen Ground Condition/ Unforeseeable	T13	3.58	71.67%	7	3.96	79.13%	5	3.71	74.12%	11	3.75	74.97%	6	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Differing Site Condition	T11	3.63	72.55%	5	3.93	78.70%	6	3.67	73.33%	13	3.74	74.86%	7	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Change of Project Profile and Site	T09	3.55	71.02%	8	3.77	75.32%	8	3.76	75.29%	9	3.69	73.88%	8	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Rectification of Works/ Specification Change	T05	3.23	64.58%	16	3.61	72.16%	14	4.20	83.92%	3	3.68	73.56%	9	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Delay/ Disruption to Regular Progress Due To	T28	3.63	72.50%	6	3.88	77.50%	7	3.50	70.00%	16	3.67	73.33%	10	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Delays Due to Incomplete Design/ Insufficient	T02	3.35	66.94%	14	3.59	71.76%	15	3.94	78.80%	6	3.63	72.51%	11	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Delayed Site Possession/ Restricted Access	T10	3.38	67.60%	12	3.76	75.29%	9	3.73	74.51%	10	3.62	72.47%	12	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Extension of Time For Completion	T35	3.51	70.22%	9	3.74	74.80%	10	3.24	64.71%	25	3.50	69.90%	13	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Delay/ Disruption to Regular Progress Due To	T27	3.25	65.00%	15	3.63	72.50%	13	3.59	71.76%	15	3.49	69.76%	14	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Delay Disruption to Regular Progress Caused b	T31	3.49	69.79%	10	3.71	74.29%	12	3.08	61.57%	36	3.43	68.54%	15	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	
Default of Subcontractor, Nominated Subcontr	T43	3.38	67.50%	13	3.45	69.02%	17	3.22	64.31%	26	3.35	66.94%	16	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	LS-HA	

Figure 8-5 Claims and Disputes Matrix (Group 1 and 2)

CASUSE OF CLAIMS & DISPUTES ASSESSMENT														Causes of Claims Code															
														Cause Controllability Importance Index								Preventive Techniques Ranking							
														Cause Controllability Ranking								C21	C20	C29	C16	C31	C23	C30	C32
														Cause Controllability Description								55.69%	52.94%	58.43%	57.25%	41.96%	58.04%	57.65%	56.86%
														Cause Controllability Categorisation; Where, "HS-								6	7	1	4	8	2	3	5
TYPE OF CLAIMS & DISPUTES ASSESSMENT																													
DESCR	CODE	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Cause Avoid	Cause Avoid Imp. Index	Cause Avoid Mean	CMF Imp. Index	CMF Ranking	Preventive Techniques Ranking																
		Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Cause Avoid	Cause Avoid Imp. Index	Cause Avoid Mean	CMF Imp. Index	CMF Ranking																	
Variations	T19	4.08	81.63%	1	4.49	89.80%	1	3.80	76.08%	8	4.12	82.50%	1	HS-LA	LS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA				
Change of Design/ Design Omission / Errors b	T03	3.83	76.60%	2	4.20	83.92%	3	4.02	80.39%	4	4.02	80.30%	2	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Delay/ Disruption to Regular Progress Due To	T26	3.82	76.47%	3	4.33	86.67%	2	3.62	72.40%	14	3.93	78.51%	3	HS-LA	HS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Ambiguity in Documents	T01	3.39	67.84%	11	3.73	74.51%	11	4.49	89.80%	1	3.87	77.40%	4	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Unanticipated Soil Condition	T12	3.63	72.65%	4	4.00	80.00%	4	3.69	73.73%	12	3.77	75.46%	5	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Unforeseen Ground Condition/ Unforeseeable	T13	3.58	71.67%	7	3.96	79.13%	5	3.71	74.12%	11	3.75	74.97%	6	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Differing Site Condition	T11	3.63	72.55%	5	3.93	78.70%	6	3.67	73.33%	13	3.74	74.86%	7	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Change of Project Profile and Site	T09	3.55	71.02%	8	3.77	75.32%	8	3.76	75.29%	9	3.69	73.88%	8	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Rectification of Works/ Specification Change	T05	3.23	64.58%	16	3.61	72.16%	14	4.20	83.92%	3	3.68	73.56%	9	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Delay/ Disruption to Regular Progress Due To	T28	3.63	72.50%	6	3.88	77.50%	7	3.50	70.00%	16	3.67	73.33%	10	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Delays Due to Incomplete Design/ Insufficient	T02	3.35	66.94%	14	3.59	71.76%	15	3.94	78.80%	6	3.63	72.51%	11	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Delayed Site Possession/ Restricted Access	T10	3.38	67.60%	12	3.76	75.29%	9	3.73	74.51%	10	3.62	72.47%	12	HS-LA	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Extension of Time For Completion	T35	3.51	70.22%	9	3.74	74.80%	10	3.24	64.71%	25	3.50	69.90%	13	HS-LA	HS-LA	HS-LA	LS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Delay/ Disruption to Regular Progress Due To	T27	3.25	65.00%	15	3.63	72.50%	13	3.59	71.76%	15	3.49	69.76%	14	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Delay Disruption to Regular Progress Caused b	T31	3.49	69.79%	10	3.71	74.29%	12	3.08	61.57%	36	3.43	68.54%	15	HS-LA	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			
Default of Subcontractor, Nominated Subcontr	T43	3.38	67.50%	13	3.45	69.02%	17	3.22	64.31%	26	3.35	66.94%	16	HS-LA	HS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA			

Figure 8-6 Claims and Disputes Matrix (Group 2 and 4)

CASUSE OF CLAIMS & DISPUTES ASSESSMENT		Causes of Claims Code											Preventive Techniques Ranking												
		Cause Controllability Importance Index																							
		Cause Controllability Ranking																							
		Cause Controllability Description																							
		Cause Controllability Categorisation; Where, "HS-																							
		Causes of Claims Rank																							
TYPE OF CLAIMS & DISPUTES ASSESSMENT																									
DESCR	CODE	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Cause Avoid	Cause Avoid Imp. Index	Cause Avoid CMF Avg. Mean	Cause Avoid Imp. Index	CMF Ranking	Claims and Disputes												
		Variations	T19	4.08	81.63%	1	4.49	89.80%	1	3.80	76.08%	8		4.12	82.50%	1	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA
Change of Design/ Design Omission / Errors b	T03	3.83	76.60%	2	4.20	83.92%	3	4.02	80.39%	4	4.02	80.30%	2	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-HA	HS-LA	HS-LA	HS-LA
Delay/ Disruption to Regular Progress Due To	T26	3.82	76.47%	3	4.33	86.67%	2	3.62	72.40%	14	3.93	78.51%	3	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA	HS-LA	HS-LA	HS-LA
Ambiguity in Documents	T01	3.39	67.84%	11	3.73	74.51%	11	4.49	89.80%	1	3.87	77.40%	4	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA	LS-HA	LS-LA	HS-LA	HS-LA
Unanticipated Soil Condition	T12	3.63	72.65%	4	4.00	80.00%	4	3.69	73.73%	12	3.77	75.46%	5	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	HS-LA	HS-LA	HS-LA
Unforeseen Ground Condition/ Unforeseeable	T13	3.58	71.67%	7	3.96	79.13%	5	3.71	74.12%	11	3.75	74.97%	6	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	HS-LA	HS-LA	HS-LA
Differing Site Condition	T11	3.63	72.55%	5	3.93	78.70%	6	3.67	73.33%	13	3.74	74.86%	7	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	HS-LA	HS-LA	HS-LA
Change of Project Profile and Site	T09	3.55	71.02%	8	3.77	75.32%	8	3.76	75.29%	9	3.69	73.88%	8	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	HS-LA	LS-LA	HS-LA
Rectification of Works/ Specification Change	T05	3.23	64.58%	16	3.61	72.16%	14	4.20	83.92%	3	3.68	73.56%	9	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	LS-HA	LS-HA	LS-LA	LS-LA	LS-LA
Delay/ Disruption to Regular Progress Due To	T28	3.63	72.50%	6	3.88	77.50%	7	3.50	70.00%	16	3.67	73.33%	10	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-LA	HS-LA	HS-LA
Delays Due to Incomplete Design/ Insufficient	T02	3.35	66.94%	14	3.59	71.76%	15	3.94	78.80%	6	3.63	72.51%	11	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-LA	HS-LA	HS-LA
Delayed Site Possession/ Restricted Access	T10	3.38	67.60%	12	3.76	75.29%	9	3.73	74.51%	10	3.62	72.47%	12	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-LA	HS-LA	HS-LA
Extension of Time For Completion	T35	3.51	70.22%	9	3.74	74.80%	10	3.24	64.71%	25	3.50	69.90%	13	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-LA	HS-LA
Delay/ Disruption to Regular Progress Due To	T27	3.25	65.00%	15	3.63	72.50%	13	3.59	71.76%	15	3.49	69.76%	14	HS-HA	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA	HS-HA	HS-HA	HS-LA	HS-LA	HS-LA
Delay Disruption to Regular Progress Caused b	T31	3.49	69.79%	10	3.71	74.29%	12	3.08	61.57%	36	3.43	68.54%	15	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-LA	HS-LA	HS-LA
Default of Subcontractor, Nominated Subcontr	T43	3.38	67.50%	13	3.45	69.02%	17	3.22	64.31%	26	3.35	66.94%	16	HS-HA	HS-HA	HS-HA	HS-HA	LS-HA	HS-HA	HS-HA	HS-HA	HS-HA	HS-LA	HS-LA	HS-LA

Figure 8-7 Claims and Disputes Matrix (Group 1 and 3)

8.3.3 FINDINGS RELATED TO CAUSE SIGNIFICANCE & AVOIDABILITY

In this section, findings related to the cause significance and cause avoidability is discussed in order to suggest strategies to avoid/ control the types of claims and disputes by avoiding/ controlling their significant underlying root causes.

Based on the previously mentioned suggested strategies which was addressed in Section 8.3.1, significant types the

Identifying the causes that can/shall be minimised: (Group I) [HS-HA]

The causes that were classified under the first group are listed under the respective types of claims and disputes as follows:

Variations (T19)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Lack of competence of project participants (C22)

Change of design/ design omission / errors by the client (engineer) (T03)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Incomplete tender information (C09)

D. D. R. P.: Due to Variation (T26)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Lack of competence of project participants (C22)

Ambiguity in documents (T01)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)

Unanticipated soil condition (T12)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)

Unforeseen ground condition/ unforeseeable obstruction (T13)

- Inadequate/ inaccurate design information (C01)

- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)

Differing site condition (T11)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)

Change of project profile and site (T09)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Poor communications among project participants (C18)
- Inadequate site investigation (C24)

Rectification of works/ specification change due to defective design (T05)

- Inadequate/ inaccurate design information (C01)
- Inadequate Design Documentation (C02)

- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)

D. D. R. P.: Due to late issue of consent (approval) (T28)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inappropriate contract type (strategy) (C05)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Lack of team spirit among participants (C27)

Delays due to incomplete design/insufficient information by client/ consultant (T02)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)

- Unrealistic client expectations (C25)

Delayed site possession/ works/ restricted access (T01)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate contractor selection (C10)
- Inappropriate/ unexpected time control (target) (C15)
- Poor communications among project participants (C18)
- Inadequate site investigation (C24)

Extension of Time for Completion (T35)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate contractor selection (C10)
- Unclear risk allocation (C12)
- Inappropriate/ unexpected time control (target) (C15)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)

- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

D. D. R. P.: Due to late instruction by client/ consultant engineer (T27)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inappropriate contract type (strategy) (C05)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Lack of team spirit among participants (C27)

D. D. R. P.: Due to delay caused by utility services organization (T31)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Unclear risk allocation (C12)
- Inappropriate/ unexpected time control (target) (C15)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Default of subcontractor, nominated subcontractor or suppliers (T43)

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inappropriate contract type (strategy) (C05)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Inappropriate document control (14)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

The above-identified causes under the first group that *can/shall* be minimised by management/construction participants are summarised in the following **Table 8-35**:

Table 8-35 (Group I) [HS-HA]: The significant and avoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C01 Inadequate/ Inaccurate Design Information	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01
C02 Inadequate Design Documentation	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02
C03 Inadequate Brief	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03	C03
C04 Unclear & Inadequate Specifications	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04	C04
C05 Inappropriate Contract Type (Strategy)	-	-	-	-	-	-	-	-	-	C05	-	-	C05	C05	-	C05
C06 Inappropriate Contract Form	-	-	-	-	-	-	-	-	-	-	-	-	C06	-	-	-
C07 Inadequate Contract Administration	C07	-	C07	-	-	-	-	-	-	-	-	C07	C07	-	C07	C07
C08 Inadequate Contract Documentation	C08	-	C08	C08	C08	C08	C08	C08	C08	-	C08	C08	C08	-	C08	C08
C09 Incomplete Tender Information	C09	C09	C09	C09	C09	C09	C09	C09	C09	C09	C09	C09	C09	C09	-	-
C10 Inappropriate Contractor Selection	-	-	-	-	-	-	-	-	-	-	-	C10	C10	-	-	-
C11 Unrealistic Tender Pricing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12 Unclear Risk Allocation	-	-	-	-	-	-	-	-	-	-	-	-	C12	-	C12	-
C13 Inappropriate Payment Method	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 8-35 Continued (Group I) [HS-HA]: The significant and avoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C14 Inappropriate Document Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C14
C15 Inappropriate/ Unexpected Time Control (Target)	C15	-	C15	-	-	-	-	C15	C15	C15	C15	C15	C15	C15	C15	C15
C16 Inappropriate/ Unexpected Cost Control (Target)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17 Inappropriate/ Unexpected Quality Control Target	-	-	-	-	-	-	-	-	-	C17	C17	-	-	C17	-	C17
C18 Poor Communications Among Project Participants	-	-	-	C18	-	-	-	C18	-	C18	C18	C18	C18	C18	C18	C18
C19 Lack of Information for Decision Making;	-	-	-	C19	-	-	-	-	-	C19	C19	-	C19	C19	C19	C19
C20 Slow Client Response	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C21 Changes by Client	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C22 Lack of Competence of Project Participants	C22	-	C22	-	-	-	-	-	-	C22	C22	-	C22	C22	C22	C22
C23 Poor Workmanship	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24 Inadequate Site Investigation	-	-	-	-	C24	C24	C24	C24	-	-	-	C24	C24	-	-	-
C25 Unrealistic Client Expectations	-	-	-	-	-	-	-	-	-	C25	C25	-	C25	C25	-	C25
C26 Unrealistic Information Expectations by contractor	-	-	-	-	C26	C26	C26	-	-	-	-	-	C26	-	-	-
C27 Lack of Team Spirit Among Participants	-	-	-	-	-	-	-	-	-	C27	-	-	C27	C27	C27	C27
C28 Personality Clashes Among Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	C28	-	C28	C28
C29 Poor Management by one of Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C30 Adversarial (industry) Culture Among Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C31 Uncontrollable External Events	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C32 Exaggerated Claims	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- Inadequate/ inaccurate design information (C01)
- Inadequate design documentation (C02)
- Inadequate brief (C03)
- Unclear & inadequate specifications (C04)
- Inadequate contract documentation (C08)
- Incomplete tender information (C09)
- Inappropriate/ unexpected time control (target) (C15)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)

Identifying the causes that can be minimised: (Group II) [LS-HA]

The insignificant and avoidable causes that were classified under the second group are listed under the respective types of claims and disputes as follows:

Variations (T19)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Change of design/ design omission / errors by the client (engineer) (T03)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Inadequate site investigation (C24)

- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the Contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

D. D. R. P.: Due to variation (T26)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Ambiguity in documents (T01)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)

- Lack of competence of project participants (C22)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Unanticipated soil condition (T12)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Unforeseen ground condition/ unforeseeable obstruction (T13)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)

- Inappropriate document control (14)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Differing site condition (T11)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected time control (target) (C15)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Change of project profile and site (T09)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)

- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected quality control (target) (C17)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Rectification of works/ specification change due to defective design (T05)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected quality control (target) (C17)
- Poor communications among project participants (C18)
- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

D. D. R. P.: Due to late issue of consent (approval) (T28)

- Inappropriate contract form (C06)

- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)
- Personality clashes among project participants (C28)

Delays due to incomplete design/insufficient information by client /consultant (T02)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Delayed site possession/ works/ restricted access (T10)

- Inappropriate contract type (strategy) (C05)
- Inappropriate contract form (C06)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate/ unexpected quality control (target) (C17)

- Lack of information for decision making; (decisiveness) (C19)
- Lack of competence of project participants (C22)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)
- Lack of team spirit among participants (C27)
- Personality clashes among project participants (C28)

Extension of time for completion (T35)

- Unrealistic tender pricing (C11)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inappropriate / unexpected quality control (target) (C17)

D. D. R. P.: Due to late instruction by client/ consultant engineer (T27)

- Inappropriate contract form (C06)
- Inadequate contract administration (C07)
- Inadequate contract documentation (C08)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inappropriate document control (14)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)
- Personality clashes among project participants (C28)

D. D. R. P.: Due to delay caused by utility services organization (T31)

- Inappropriate contract form (C06)
- Incomplete tender information (C09)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Inappropriate payment method (C13)

- Inappropriate document control (14)
- Inappropriate/ unexpected quality control (target) (C17)
- Inadequate site investigation (C24)
- Unrealistic client expectations (C25)
- Unrealistic information expectations (by the contractor) (C26)

Default of subcontractor, nominated subcontractor or suppliers (T43)

- Inappropriate contract form (C06)
- Incomplete tender information (C09)
- Inappropriate contractor selection (C10)
- Unrealistic tender pricing (C11)
- Unclear risk allocation (C12)
- Inappropriate payment method (C13)
- Inadequate site investigation (C24)
- Unrealistic information expectations (by the contractor) (C26)

The above-identified causes under the second group that *can* be minimised are summarised in the following **Table 8-36**:

Table 8-36 (Group II) [LS-HA]: The insignificant and avoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C01 Inadequate/ Inaccurate Design Information	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02 Inadequate Design Documentation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03 Inadequate Brief	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04 Unclear & Inadequate Specifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05 Inappropriate Contract Type (Strategy)	C05	C05	C05	C05	C05	C05	C05	C05	C05	-	C05	C05	-	-	C05	-
C06 Inappropriate Contract Form	C06	C06	C06	C06	C06	C06	C06	C06	C06	C06	C06	C06	-	C06	C06	C06
C07 Inadequate Contract Administration	-	C07	-	C07	C07	C07	C07	C07	C07	C07	C07	-	-	C07	-	-
C08 Inadequate Contract Documentation	-	C08	-	-	-	-	-	-	-	C08	-	-	-	C08	-	-
C09 Incomplete Tender Information	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C09	C09
C10 Inappropriate Contractor Selection	C10	C10	C10	C10	C10	C10	C10	C10	C10	C10	C10	-	-	C10	C10	C10
C11 Unrealistic Tender Pricing	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11	C11
C12 Unclear Risk Allocation	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12	C12	-	C12	-	C12
C13 Inappropriate Payment Method	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13	C13
C14 Inappropriate Document Control	C14	C14	C14	C14	C14	C14	C14	C14	C14	C14	C14	C14	C14	C14	C14	-
C15 Inappropriate/ Unexpected Time Control (Target)	-	C15	-	C15	C15	C15	C15	-	-	-	-	-	-	-	-	-
C16 Inappropriate/ Unexpected Cost Control (Target)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C17 Inappropriate/ Unexpected Quality Control Target	C17	C17	C17	C17	C17	C17	C17	C17	C17	-	-	C17	C17	-	C17	-

Table 8-36 Continued (Group II) [LS-HA]: The insignificant and avoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C18 Poor Communications Among Project Participants	C18	C18	C18	-	C18	C18	C18	-	C18	-	-	-	-	-	-	-
C19 Lack of Information for Decision Making;	C19	C19	C19	-	C19	C19	C19	C19	C19	-	-	C19	-	-	-	-
C20 Slow Client Response	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C21 Changes by Client	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C22 Lack of Competence of Project Participants	-	C22	-	C22	C22	C22	C22	C22	C22	-	-	C22	-	-	-	-
C23 Poor Workmanship	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C24 Inadequate Site Investigation	C24	C24	C24	C24	-	-	-	-	C24	C24	C24	-	-	C24	C24	C24
C25 Unrealistic Client Expectations	C25	C25	C25	C25	C25	C25	C25	C25	C25	-	-	C25	-	-	C25	-
C26 Unrealistic Information Expectations by contractor	C26	C26	C26	C26	-	-	-	C26	C26	C26	C26	C26	-	C26	C26	C26
C27 Lack of Team Spirit Among Participants	C27	C27	C27	C27	C27	C27	C27	C27	C27	-	C27	C27	-	-	-	-
C28 Personality Clashes Among Project Participants	C28	C28	C28	C28	C28	C28	C28	C28	C28	C28	C28	C28	-	C28	-	-
C29 Poor Management by one of Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C30 Adversarial (industry) Culture Among Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C31 Uncontrollable External Events	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C32 Exaggerated Claims	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Identifying the causes that should/need to be controlled/ monitored by construction participants: (Group III) [HS-LA]

The causes that were classified under the third group are significant and unavoidable. These causes are listed under the respective types of claims and disputes as follows:

Variations (T19)

- Inappropriate/ unexpected cost control (target) (C16)
- Changes by client (C21)
- Poor management by one or more project participants (C29)

Change of design/ design omission / errors by the client (engineer) (T03)

- Slow client response (C20)
- Changes by client (C21)

D. D. R. P.: Due to variation (T26)

- Inappropriate/ unexpected cost control (target) (C16)
- Slow client response (C20)
- Changes by client (C21)
- Poor management by one or more project participants (C29)

Ambiguity in documents (T01)

- Slow client response (C20)

Unanticipated soil condition (T12)

- Slow client response (C20)
- Changes by client (C21)

Unforeseen ground condition/ unforeseeable obstruction (T13)

- Slow client response (C20)
- Changes by client (C21)

Differing site condition (T11)

- Slow client response (C20)
- Changes by client (C21)

Change of project profile and site (T09)

- Changes by client (C21)

D. D. R. P.: Due to late issue of consent (approval) (T28)

- Inappropriate/ unexpected cost control (target) (C16)
- Slow client response (C20)
- Changes by client (C21)

Delays due to incomplete design/insufficient information by client/ consultant (T02)

- Slow client response (C20)
- Changes by client (C21)

Delayed site possession/ works/ restricted access (T10)

- Slow client response (C20)
- Changes by client (C21)

- Poor management by one or more project participants (C29)
- Uncontrollable external events (C31)

Extension of time for completion (T35)

- Slow client response (C20)
- Changes by client (C21)
- Poor Workmanship (C23)
- Poor management by one or more project participants (C29)
- Uncontrollable external events (C31)

D. D. R. P.: Due to late instruction by client/ consultant engineer (T27)

- Inappropriate/ unexpected cost control (target) (C16)
- Slow client response (C20)
- Changes by client (C21)

D. D. R. P.: Due to delay caused by utility services organization (T31)

- Slow client response (C20)
- Changes by client (C21)
- Poor management by one or more project participants (C29)
- Uncontrollable external events (C31)
- Management by one or more project participants (C29)

Default of subcontractor, nominated subcontractor or suppliers (T43)

- Inappropriate/ unexpected cost control (target) (C16)
- Slow client response (C20)
- Changes by client (C21)
- Poor management by one or more project participants (C29)

The above-identified causes under the third group that *should/need* to be *controlled/ monitored* by management/ construction participants are summarised in the following **Table 8-37**:

Table 8-37 (Group III) [HS-LA]: The significant and unavoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C01 Inadequate/ Inaccurate Design Information	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02 Inadequate Design Documentation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03 Inadequate Brief	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04 Unclear & Inadequate Specifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05 Inappropriate Contract Type (Strategy)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C06 Inappropriate Contract Form	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C07 Inadequate Contract Administration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C08 Inadequate Contract Documentation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C09 Incomplete Tender Information	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10 Inappropriate Contractor Selection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C11 Unrealistic Tender Pricing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12 Unclear Risk Allocation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C13 Inappropriate Payment Method	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14 Inappropriate Document Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15 Inappropriate/ Unexpected Time Control (Target)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16 Inappropriate/ Unexpected Cost Control (Target)	C16	-	C16	-	-	-	-	-	-	C16	-	-	-	C16	-	C16
C17 Inappropriate/ Unexpected Quality Control Target	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18 Poor Communications Among Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19 Lack of Information for Decision Making;	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C20 Slow Client Response	-	C20	C20	C20	C20	C20	C20	-	-	C20	C20	C20	C20	C20	C20	C20
C21 Changes by Client	C21	C21	C21	-	C21	C21	C21	C21	-	C21	C21	C21	C21	C21	C21	C21
C22 Lack of Competence of Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C23 Poor Workmanship	-	-	-	-	-	-	-	-	-	-	-	-	C23	-	-	-
C24 Inadequate Site Investigation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25 Unrealistic Client Expectations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26 Unrealistic Information Expectations by contractor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C27 Lack of Team Spirit Among Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C28 Personality Clashes Among Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C29 Poor Management by one of Project Participants	C29	-	C29	-	-	-	-	-	-	-	-	C29	C29	-	C29	C29
C30 Adversarial (industry) Culture Among Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C31 Uncontrollable External Events	-	-	-	-	-	-	-	-	-	-	-	C31	C31	-	C31	-
C32 Exaggerated Claims	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Identifying the causes that require managerial attention: (Group IV)

[LS-LA]

The insignificant and unavoidable causes that were classified under the fourth group require managerial attention according to the proposed strategy. These causes as listed under the respective types of claims and disputes as follows:

Variations (T19)

- Slow client response (C20)
- Poor workmanship (C23)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Change of design/ design omission / errors by the client (engineer) (T03)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

D. D. R. P.: Due to variation (T26)

- Poor workmanship (C23)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Ambiguity in documents (T01)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Unanticipated soil condition (T12)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Unforeseen ground condition/ unforeseeable obstruction (T13)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Differing site condition (T11)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Change of project profile and site (T09)

- Inappropriate/ unexpected cost control (target) (C16)
- Slow client response (C20)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Rectification of works/ specification change due to defective design (T05)

- Inappropriate/ unexpected cost control (target) (C16)
- Slow client response (C20)
- Changes by client (C21)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)

- Uncontrollable external events (C31)
- Exaggerated claims (C32)

D. D. R. P.: Due to late issue of consent (approval) (T28)

- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Delays due to incomplete design/insufficient information by client/ consultant (T02)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Poor management by one or more project participants (C29)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

Delayed site possession/ works/ restricted access (T10)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Adversarial (industry) culture among project participants (C30)
- Exaggerated claims (C32)

Extension of time for completion (T35)

- Inappropriate/ unexpected cost control (target) (C16)
- Adversarial (industry) culture among project participants (C30)
- Exaggerated claims (C32)

D. D. R. P.: Due to late instruction by client/ consultant engineer (T27)

- Poor workmanship (C23)
- Poor management by one or more project participants (C29)

- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

D. D. R. P.: Due to delay caused by utility services organization (T31)

- Inappropriate/ unexpected cost control (target) (C16)
- Poor workmanship (C23)
- Adversarial (industry) culture among project participants (C30)
- Exaggerated claims (C32)

Default of subcontractor, nominated subcontractor or suppliers (T43)

- Poor workmanship (C23)
- Adversarial (industry) culture among project participants (C30)
- Uncontrollable external events (C31)
- Exaggerated claims (C32)

The above-identified causes under the fourth group that require managerial attention are summarised in the following **Table 8-38**:

Table 8-38 (Group IV) [LS-LA]: The insignificant and unavoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C01 Inadequate/ Inaccurate Design Information	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C02 Inadequate Design Documentation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C03 Inadequate Brief	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C04 Unclear & Inadequate Specifications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C05 Inappropriate Contract Type (Strategy)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C06 Inappropriate Contract Form	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C07 Inadequate Contract Administration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C08 Inadequate Contract Documentation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C09 Incomplete Tender Information	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C10 Inappropriate Contractor Selection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C11 Unrealistic Tender Pricing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C12 Unclear Risk Allocation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C13 Inappropriate Payment Method	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C14 Inappropriate Document Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C15 Inappropriate/ Unexpected Time Control (Target)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C16 Inappropriate/ Unexpected Cost Control (Target)	-	C16	-	C16	C16	C16	C16	C16	C16	-	C16	C16	C16	-	C16	-
C17 Inappropriate/ Unexpected Quality Control Target	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C18 Poor Communications Among Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C19 Lack of Information for Decision Making;	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 8-38 Continued (Group IV) [LS-LA]: The insignificant and unavoidable causes

Causes of Claims and Disputes	Significant Types of Claims and Disputes															
	T19	T03	T26	T01	T12	T13	T11	T09	T05	T28	T02	T10	T35	T27	T31	T43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C20 Slow Client Response	C20	-	-	-	-	-	-	C20	C20	-	-	-	-	-	-	-
C21 Changes by Client	-	-	-	C21	-	-	-	-	C21	-	-	-	-	-	-	-
C22 Lack of Competence of Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C23 Poor Workmanship	C23	C23	C23	C23	C23	C23	C23	C23	C23	C23	C23	C23	-	C23	C23	C23
C24 Inadequate Site Investigation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C25 Unrealistic Client Expectations	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C26 Unrealistic Information Expectations by contractor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C27 Lack of Team Spirit Among Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C28 Personality Clashes Among Project Participants	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C29 Poor Management by one of Project Participants	-	C29	-	C29	C29	C29	C29	C29	C29	C29	C29	-	-	C29	-	-
C30 Adversarial (industry) Culture Among Participants	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30	C30
C31 Uncontrollable External Events	C31	C31	C31	C31	C31	C31	C31	C31	C31	C31	C31	-	-	C31	-	C31
C32 Exaggerated Claims	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32	C32

8.4 PART B: QUANTITATIVE STUDY

This part of Chapter Eight presents the main results of the analysis of quantitative data from a separate survey on 45 construction projects.

8.4.1 INTRODUCTION

The objectives of the following sections are to establish if the sixteen significant types of claims, identified in Chapter 7 (see Sections 7.4.5.4 and 7.4.5.5), commonly occur in construction projects in the UAE.

In this study, flexibility exists between both qualitative and quantitative approaches. This is explained in details in the research design procedure, which can be found in chapter two of this dissertation.

It is the basis of the ‘triangulation’ methodology to verify the model (please see Chapter Two, Section 2.4.2 for more details).

If this can be established then using the associated root causes of these sixteen significant types of claims (Establish in Part A of Chapter 8) leads to the possibility of providing strategies to reduce their occurrence.

8.4.2 THE QUANTITATIVE SURVEY

This subsection highlights the objective of this survey, the source of data and the survey format used in this quantitative study.

The scope of this study is focused on the exploration and investigation of the contractual claims and disputes raised in traditional (lump sum) contract strategy used for building construction projects for the government of Abu Dhabi, UAE according to Abu Dhabi General Condition of Contracts (AGCC). This investigation is based on feedback from experiential knowledge of construction professionals (i.e. clients, consultants, and contractors, claim experts). Moreover, the concluding results of this investigation are based on data collected from forty-five government projects developed by the government of Abu Dhabi. These various projects includes educational projects (i.e. schools and collages, etc.); religious projects (i.e. mosques, etc.); government buildings (i.e. ministries, departments, police stations and head quarters, etc.); and housing projects.

As previously mentioned, the main research outcomes are based on analysis of the data collected from three sources (refer to

Figure 8-8). These sources helped the researcher to increase the validity and credibility of the research results. Significant types of claims and disputes, as well as their associated and significant root causation were analysed, in order to achieve the objectives of the research.

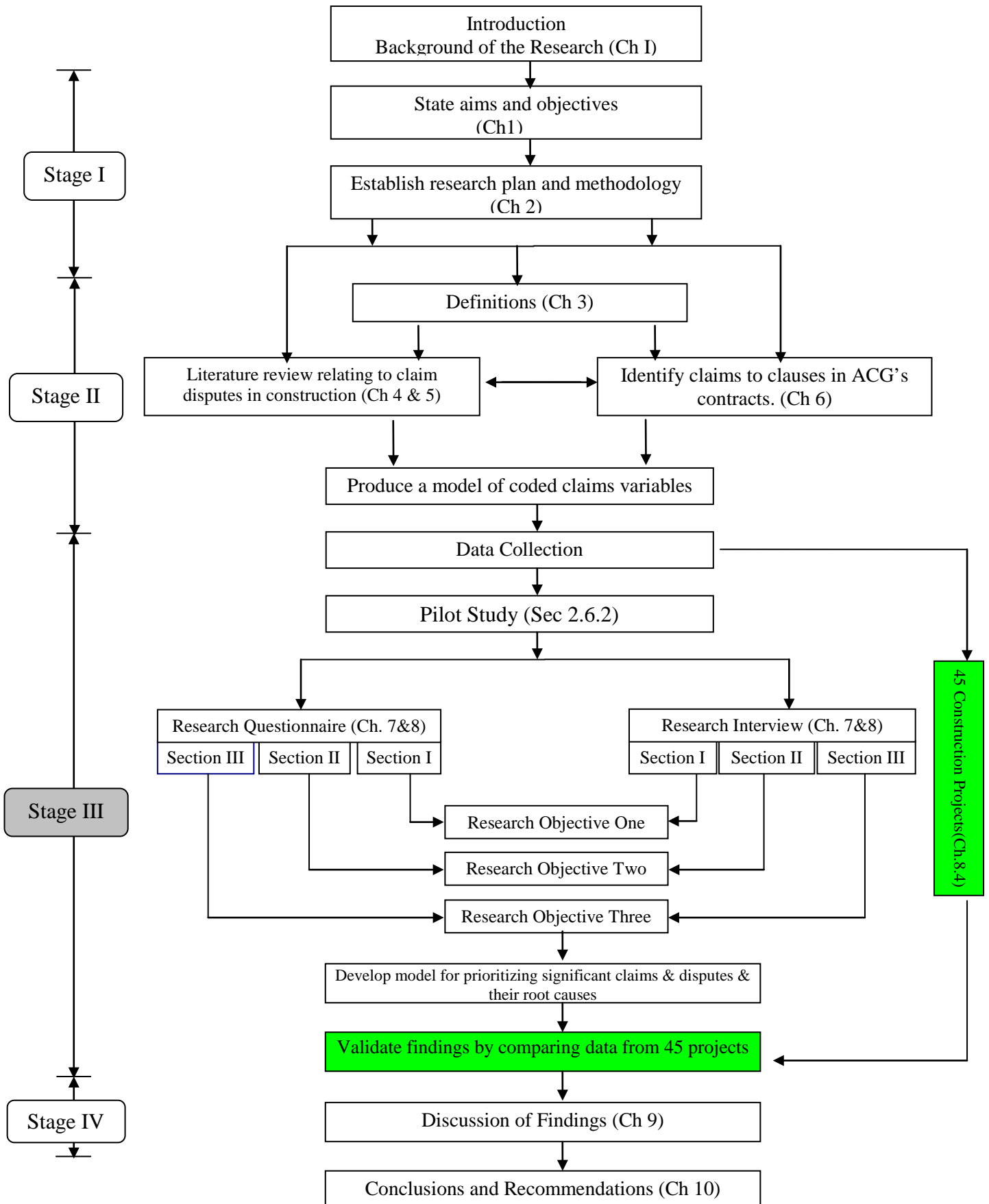


Figure 8-8 Validation (45 Construction Projects) (Chapter 8 – Part B)

Abu Dhabi Municipality, previously named “Works Department”, is the main developer for government projects in Abu Dhabi, United Arab Emirates. As a senior staff, Head of Quality Control/Assurance Section, and as a sponsored researcher by Abu Dhabi Municipality, tremendous services and information were provided by the department.

The survey was conducted with the help and support of the research and development section as well as the follow up unit of Abu Dhabi Municipality, previously named as Works Department. Engineers Raed Nasher, and Ahmed Al Habshi from the execution section and the follow up unit, respectively, participated in collecting the data.

It was decided to collect data from claims on a cross-section of construction projects in Abu Dhabi, in order to compare the significant types of claims and disputes. Based on the projects’ monthly progress report, projects were chosen to reflect the various types of projects and areas using a random sampling technique under each area of work (i.e. West of Abu Dhabi, East of Abu Dhabi, Al Mafraq, etc.). A list of projects can be found in Appendix (G).

A standardized data form was developed and used to collect information from each project in the sample as to the cost of claims and disputes. The classification of claims and disputes reflects the provisions of the Abu Dhabi Government Conditions of Contract and their risk areas. Relative magnitude and frequency of each type claims and disputes were quantified based on the collected data from those forty-five construction projects. A sample form used in the quantitative survey can be found in Appendix (E). The analysis of the collected data based on the frequency and magnitude of each type of claims and disputes is presented in the next section.

8.5 ANALYSIS AND DISCUSSION OF DATA

This subsection presents the analysis of the collected data from the forty-five construction projects based on the frequency and magnitude of each type of claims and disputes.

8.5.1 TYPES OF CONSTRUCTION PROJECTS

This subsection presents the types of construction projects sample used in this study.

As stated in Chapter One (Section Four) and Chapter Two (Section Two), this study is focused on the contractual claims and disputes in traditional (lump sum) contracts according to Abu Dhabi General Condition of Contracts (AGCC). Traditional contract is a common strategy used for building various construction projects, which are developed by the government of Abu Dhabi, UAE.

The types of government projects include the following:

- ✓ Government buildings (i.e. ministries, departments, police stations and head quarters, etc.);
- ✓ Educational projects (i.e., schools, collages, etc.);
- ✓ Religious projects (i.e. mosques, etc.);
- ✓ Housing projects; and
- ✓ Recreational projects (i.e. sports centres, etc.).

(Note: a list of selected projects can be found in [Appendix \(G\)](#).)

The distribution of project categories is summarised in the following **Table 8-39**.

Table 8-39 Claims & Disputes: Distribution of Project Category

Projects Description	Distribution of Project Category			
	Number of Projects		Percentage	
	Total	Claimed	Total	Actual
Government buildings (i.e. ministries, departments, Police stations and head quarters, etc.)	8	8	17.78	23.53
Educational projects (i.e., schools, collages, etc.);	16	8	35.56	23.53
Religious projects (i.e. mosques, etc.);	6	3	13.33	8.82
Housing projects; and	9	9	20.00	26.47
Recreational projects (i.e. sports centres, etc.).	6	6	13.33	17.65
Total Number of Projects	45	34	100.00	100.00

It can be seen that the selected sample for this investigation has thirty-four projects claimed for additional cost, the percentage being as high as 75.55%. The investigated sample includes a range of projects that cover various government construction projects in Abu Dhabi, UAE. Information regarding the projects' original contract values (OCV), actual contract values (ACV), which reflect cost over-runs, and duration can be found in **Appendix G1,G2**.

8.5.2 MAGNITUDE OF CLAIMS AND DISPUTES

As previously mentioned, a standardised data form was developed and used to collect information from each project in the sample as to the cost of claims and disputes. The classification of claims and disputes reflects the provisions of the Abu Dhabi Government Conditions of Contract and their risk areas. Relative magnitude and frequency of each type claims and disputes were quantified based on the collected data from those forty-five construction projects.

This subsection presents the analysis of the collected data based on the magnitude of each type of claims and disputes.

Table 8-40 below contains extracts derived from the database of the relative magnitudes of cost claims and disputes made, based on data obtained from the 45 construction projects. Cost claims and disputes values, in a certain category in a project, reflected as a percentage of original contract value (OCV), in respect of each project. In other wards magnitude of cost claims and disputes under each type were calculated as a ratio of the original contract value (OCV) for both claimed and paid values. Claimed values by the contractors and paid values by the clients/clients' representative. Average means were then calculated for each type of claims and disputes (**T 01 - T 51**) based on the number of projects in which contractors actually claimed under a given category. Such standardization facilitated comparison of the relative magnitudes of grouped claims in a given category, in relation to contract values, rather than in terms of absolute values that may not indicate the relative impacts on the projects. This methodology is explained by Kumaraswamy (1996).

A sample extracted of such indicators, of total claims under each category in respect of each project in the database, is shown in the following table. **Table 8-40** presents the results from this stage of the research analysis.

Table 8-40 Claimed Value Percentage (%): As Percentage of Original Contract Value (OCV)

Project No	Category			T 190	T 030	T 180	T 090	T 120	Total
	OCV	ACV	Cost Claim						
2	50,000	62,550	25.10%	16.86	2.24			1.25	42.90
3	90,000	124,800	38.67%	24.61	2.17		2.61	1.71	58.62
5	9,980	12,600	26.25%	24.25	6.41			1.20	46.94
6	31,195	34,645	11.06%	8.33	1.54	2.76	2.08	1.99	29.89
10	29,251	36,526	24.87%	12.38	3.73		2.26	1.25	36.39
11	28,789	35,399	22.96%	10.25	3.30		2.15	1.67	41.70
12	29,427	35,627	21.07%	10.47	3.64		2.00	1.33	41.72
45	28,970	36,892	27.35%	15.02	6.39		5.01	5.73	52.86

In addition, **Table 8-41** below presents the results of the second stage of the analysis of the cost claims and disputes values (Claimed) for the above extracted data in **Table 8-40**. While,

Table 8-44 summarize, presented later, the results of the “*Claimed*” value for all types of claims and disputes along with a comparison between the claimed values and paid values for each type of construction claims and disputes. The average mean and standard deviations indicate the relative magnitude and the variability of claims and disputes under each type.

Table 8-41 Summary Statistics of Types of claims and disputes data (Claimed by Contractors)

Cost claim description	T 190	T 030	T 180	T 090	T 120	Total
Sub total	304.5	49.3	7.58	26.9	33.44	
Positive response	25	14	10	10	17	34
Negative response	20	31	35	35	28	11
Total number of responses	45	45	45	45	45	45
Number of projects claimed/ Total number of projects	55.56	31.11	22.22	22.22	37.78	75.56
Average (%)	12.18	3.52	0.76	2.69	1.97	23.31
Standard deviation	9.36	1.86	0.76	1.23	1.19	21.20

An example of these calculations (for both stages) is presented here:

The summation of the percentage of **T19** for all claimed projects in the above **Table 8-40** equals to 304.5 in the sub total row of **Table 8-41**. This number is divided

by twenty-five, which can be found in the second row of **Table 8-41**. This row represents the number of projects claimed this specific Type of claims and disputes. The result, which equals to 12.18%, is shown in the sixth row of **Table 8-41**. In addition, the last row represents the standard deviation of this specific type of claims and disputes. These results are shown in

Table 8-44 which summarizes the results for the “*Claimed*” value for all types of claims and disputes along with a comparison between the claimed values and paid values for each type of construction claims and disputes.

A similar procedure was followed in combining and comparing the values of all “*paid*” (settled) cost claims in respect of each category and in each project. This is shown in **Table 8-42**.

Table 8-42 Paid Value Percentage (%): As Percentage of Original Contract Value (OCV)

Project no	Category			T 190	T 030	T 180	T 090	T 120	Total
	OCV	ACV	Cost claim						
2	50,000	62,550	25.10%	11.43	1.70			0.30	25.10
3	90,000	124,800	38.67%	21.97	0.96		1.28	0.51	38.67
5	9,980	12,600	26.25%	13.93	3.46			0.78	26.25
6	31,195	34,645	11.06%	3.56	1.03	0.53	1.07		11.06
10	29,251	36,526	24.87%	7.52	2.94		1.18	0.85	24.87
11	28,789	35,399	22.96%	5.18	1.74		1.11	0.94	22.96
12	29,427	35,627	21.07%	4.40	1.59		1.22	0.95	21.07
45	28,970	36,892	27.35%	10.08	1.97			2.14	27.35

In the same way, **Table 8-43** summarizes the results of the second stage of the analysis of the cost claims and disputes values (Paid). The average mean and standard deviations indicate the relative magnitude and the variability of claims and disputes under each type.

Table 8-43 Summary Statistics of Types of claims and disputes data (Paid by Contractors)

Cost claim description	T 190	T 030	T 180	T 090	T 120	Total
Sub total	198.5	25.13	2.026	7.539	13.5	
Positive response	25	14	5	6	16	34
Negative response	20	31	40	39	29	11
Total number of responses	45	45	45	45	45	45
Number of projects claimed/ Total number of projects	55.56	31.11	11.11	13.33	35.56	75.56
Average (%)	7.94	1.80	0.41	1.26	0.84	12.96
Standard deviation	7.34	0.70	0.20	0.22	0.45	12.41

The following comparison

Table 8-44 summarizes the results of for the “*Claimed*” and “*Paid*” values for all types of claims and disputes. The average mean and standard deviations indicate the relative magnitude and the variability of claims and disputes under each type.

Table 8-44 Types of Claims & Disputes: Objective magnitude Assessment

Magnitude OF TYPES OF CLAIMS & DISPUTES ASSESSMENT									
DESCRIPTION	CODE	Claimed Magnitude %	Claimed Rank	Standard Dev.	Paid Magnitude %	Paid Rank	Standard Dev.	Success % (Claimed/Paid)	Paid Rank
Variations	T19	12.18	1	9.36	7.94	1	7.34	65.18	11
Change of Design/ Design Omission / Errors	T03	3.52	2	1.86	1.80	2	0.70	50.93	24
Differing Site Condition	T11	3.05	3	1.50	1.68	3	1.07	54.89	19
Rectification of Works/ Specification Change	T05	1.90	6	0.85	1.39	4	0.87	73.29	4
Delay/ Disruption to Regular Progress Due To	T26	1.66	8	1.99	1.27	5	1.03	76.59	1
Change of Project Profile and Site	T09	2.69	4	1.23	1.26	6	0.22	46.74	28
Unproductive / Idle Plants, Equipment or Lab	T44	1.88	7	0.96	1.02	7	0.39	54.59	20
Unanticipated Soil Condition	T12	1.97	5	1.19	0.84	8	0.45	42.90	31
Ambiguity in Documents	T01	1.16	14	0.47	0.81	9	0.34	70.04	6
Delays Due to Incomplete Design/ Insufficient	T02	1.28	11	0.61	0.72	10	0.13	55.91	17
Unforeseen Ground Condition/ Unforeseeable	T13	1.36	10	0.96	0.70	11	0.48	51.19	22
Facilities provided to others by the contractor	T22	1.26	12	0.35	0.70	12	0.23	55.36	18
Client/ Engineer's Instruction to Change (not	T21	1.41	9	0.44	0.66	13	0.15	46.79	27
Delayed Site Possession/ Restricted Access	T10	0.98	16	0.53	0.65	14	0.37	66.61	10
Liquidated and ascertained damages	T42	1.21	13	0.32	0.56	15	0.15	46.65	29
Un Paid Sums (Late Payment)	T36	0.85	18	0.61	0.52	16	0.27	61.25	15
Suspension of Work	T17	0.99	15	0.53	0.51	17	0.26	51.15	23
Delay/ Disruption to Regular Progress Due To	T29	0.69	25	0.22	0.50	18	0.15	72.53	5
Default of Subcontractor, Nominated Subcont	T43	0.76	20	0.29	0.47	19	0.21	61.31	14
Delay/ Disruption to Regular Progress Due To	T28	0.76	21	0.49	0.45	20	0.21	58.77	16
Acceleration of Works	T18	0.76	22	0.76	0.41	21	0.20	53.44	21
Delay/ Disruption to Regular Progress Due To	T27	0.72	23	0.51	0.34	22	0.17	47.67	25
Error in Setting out Due to Incorrect Data Sho	T08	0.91	17	0.57	0.33	23	0.12	36.63	32
Investigation of Suspected Defects	T14	0.71	24	0.39	0.32	24	0.12	44.39	30
Delay/ Disruption to Regular Progress Due To	T32	0.47	28	0.17	0.31	25	0.08	67.03	9
Substantial Increase in Quantity of any item n	T06	0.45	29	0.27	0.31	26	0.14	68.45	8
Delays Due to the Unavailability / Unsuitabili	T25	0.81	19	0.48	0.29	27	0.13	35.66	33
Delay/ Disruption to Regular Progress Due To	T30	0.42	30	0.09	0.29	28	0.05	69.45	7
Additional Work (to other parts of the works) a	T20	0.33	31	0.06	0.24	29	0.05	73.41	3
Inflation / Price Escalation	T39	0.48	26	0.16	0.23	30	0.08	46.93	26
Delay Disruption to Regular Progress Caused	T31	0.33	32	0.15	0.20	31	0.10	61.98	13
Interest on Un Paid Sums (Late Payment)	T37	0.24	33	0.08	0.18	32	0.05	76.03	2
Delays Due to Exceptional Inclement Weather	T49	0.47	27		0.16	33		33.33	34
Additional Tests to Verify Compliance with th	T16	0.23	34	0.09	0.14	34	0.03	62.19	12
Extension of Time For Completion	T35	0.00	36		0.00	35		0.00	35
Rectification of Damages To Other Property I	T24	0.20	35	0.07	0.00	35		0.00	35
Instruction Issued by the Client/Consultant to	T04	0.00	36		0.00	35		0.00	35
Client's Breach of Contract	T33	0.00	36		0.00	35		0.00	35
Uncovering of Works For Testing (Examinati	T15	0.00	36		0.00	35		0.00	35
Late Issuance of final certificate	T34	0.00	36		0.00	35		0.00	35
Substantial Change in Quality of any item not	T07	0.00	36		0.00	35		0.00	35
Currency Fluctuation	T40	0.00	36		0.00	35		0.00	35
Finance Charges For Loss Of Profit, Extended	T41	0.00	36		0.00	35		0.00	35
Labour Strikes, Civil Unrest, Etc.	T45	0.00	36		0.00	35		0.00	35
Overdue retention money	T38	0.00	36		0.00	35		0.00	35
Loss of / Damage to Materials on Site or Duri	T23	0.00	36		0.00	35		0.00	35
Rectification of Damage Caused by Un Excep	T51	0.00	36		0.00	35		0.00	35
Damages To the Works Due to Exceptionally	T50	0.00	36		0.00	35		0.00	35
Expropriation of Contractor's Equipment or A	T48	0.00	36		0.00	35		0.00	35
Embargoes on Project Imported Items	T47	0.00	36		0.00	35		0.00	35
Custom Tariffs, New Taxes	T46	0.00	36		0.00	35		0.00	35

It can be shown that **T19** “*Variations claims and disputes*” is ranked number one as both “*claimed*” and “*paid*” types of claims and disputes. While **T03** “*Change of design/ design error*” is ranked second as both “*claimed*” and “*paid*” types of claims and disputes as well. Followed by **T11** “*Differing Site conditions*” as it is ranked third for both claimed and paid type.

8.5.3 FREQUENCY OF CLAIMS AND DISPUTES

The previous section dealt with the magnitude values and percentage of each type of claims and disputes. This subsection presents the analysis of the collected data based on the frequency of each type of claims and disputes.

From both **Table 8-41** and **Table 8-43** it can be shown that the fifth row in **Table 8-41** reflects the frequency of the “*Claimed*” percentage values. Similarly, the fifth row in **Table 8-43** reflects the frequency of the “*Paid*” percentage values.

Table 8-41 Summary Statistics of Types of claims and disputes data (Claimed by Contractors)

	T 190	T 030	T 180	T 090	T 120	Total
SUB TOTAL	304.5	49.3	7.583	26.9	33.44	
POSITIVE RESPONSE	25	14	10	10	17	34
NEGATIVE RESPONSE	20	31	35	35	28	11
TOTAL NUMBER OF RESPONSE	45	45	45	45	45	45
No. of projects claimed/Total no of projects	55.56	31.11	22.22	22.22	37.78	75.56
AVERAGE (%)	12.18	3.52	0.76	2.69	1.97	23.31
STD DEVIATION	9.36	1.86	0.76	1.23	1.19	21.20

Table 8-43 Summary Statistics of Types of claims and disputes data (Paid by Contractors)

	T 190	T 030	T 180	T 090	T 120	Total
SUB TOTAL	198.5	25.13	2.026	7.539	13.5	
POSITIVE RESPONSE	25	14	5	6	16	34
NEGATIVE RESPONSE	20	31	40	39	29	11
TOTAL NUMBER OF RESPONSE	45	45	45	45	45	45
No. of projects claimed/Total no of projects	55.56	31.11	11.11	13.33	35.56	75.56
AVERAGE (%)	7.94	1.80	0.41	1.26	0.84	12.96
STD DEVIATION	7.34	0.70	0.20	0.22	0.45	12.41

From the above example, **T 190 “Variations”** is considered the most frequent claimed type. This is followed by **T 120 “Unanticipated soil conditions”**. The complete discussion of all types is found in the following section. Fourth row (**No. of projects claimed/ total no of projects**) indicates the relative frequency of each type of claims and disputes. The following comparison **Table 8-45** summarizes the results of

the “*Claimed*” and “*Paid*” Frequencies for all types of claims and disputes. In addition, it presents the rank of each type of claims and disputes in both cases the “*Claimed*” and the “*Paid*” ones. Rank number 1 indicates that this type is the most frequent type.

Table 8-45 Types of Claims & Disputes: Objective Frequency Assessment

FREQUENCY OF TYPES OF CLAIMS & DISPUTES ASSESSMENT					
DESCRIPTION	CODE	Claimed Frequency %	C.R	Paid Frequency %	P.R
Variations	T19	55.56	1	55.56	1
Unproductive / Idle Plants, Equipment or Labour	T44	46.67	2	37.78	3
Delay/ Disruption to Regular Progress Due To Variation	T26	42.22	3	31.11	9
Unforeseen Ground Condition/ Unforeseeable Obstruction	T13	40.00	4	31.11	9
Delay/ Disruption to Regular Progress Due To Late Issue of Consent (Appr	T28	40.00	4	40.00	2
Delay/ Disruption to Regular Progress Due To Late Instruction by the Clien	T27	40.00	4	31.11	9
Unanticipated Soil Condition	T12	37.78	7	35.56	5
Un Paid Sums (Late Payment)	T36	37.78	7	37.78	3
Differing Site Condition	T11	35.56	9	28.89	13
Rectification of Works/ Specification Change Due to Defective Design	T05	35.56	9	35.56	5
Ambiguity in Documents	T01	35.56	9	33.33	7
Delayed Site Possession/ Restricted Access	T10	33.33	12	33.33	7
Change of Design/ Design Omission / Errors by the Client (Engineer)	T03	31.11	13	31.11	9
Suspension of Work	T17	28.89	14	28.89	13
Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen buil	T32	28.89	14	22.22	20
Delay Disruption to Regular Progress Caused by Utility Services Organizat	T31	28.89	14	26.67	15
Default of Subcontractor, Nominated Subcontractor Or Suppliers.	T43	26.67	17	26.67	15
Delays Due to Incomplete Design/ Insufficient Information by Client/Const	T02	24.44	18	24.44	17
Liquidated and ascertained damages	T42	24.44	18	24.44	17
Delay/ Disruption to Regular Progress Due To Delays Caused by any Perso	T29	24.44	18	24.44	17
Change of Project Profile and Site	T09	22.22	21	13.33	27
Acceleration of Works	T18	22.22	21	11.11	28
Investigation of Suspected Defects	T14	20.00	23	17.78	22
Additional Work (to other parts of the works) arising from repairs or defects	T20	20.00	23	20.00	21
Facilities provided to others by the contractor (in excess to those mentione	T22	17.78	25	17.78	22
Client/ Engineer's Instruction to Change (not resulting from Variation)	T21	17.78	25	17.78	22
Error in Setting out Due to Incorrect Data Shown on Drawings	T08	17.78	25	17.78	22
Delays Due to the Unavailability / Unsuitability of Project Materials	T25	15.56	28	6.67	31
Inflation / Price Escalation	T39	15.56	28	15.56	26
Substantial Increase in Quantity of any item not resulting from a Variation	T06	13.33	30	8.89	29
Delay/ Disruption to Regular Progress Due To Late Delivery of Materials b	T30	11.11	31	8.89	29
Interest on Un Paid Sums (Late Payment)	T37	6.67	32	4.44	32
Additional Tests to Verify Compliance with the Specification (in excess to	T16	6.67	32	4.44	32
Rectification of Damages To Other Property During Transport of Materials	T24	6.67	32	0.00	35
Delays Due to Exceptional Inclement Weather, Flood, Storms, Earthquakes	T49	2.22	35	2.22	34
Extension of Time For Completion	T35	0.00	36	0.00	35
Instruction Issued by the Client/Consultant to Resolve Discrepancy	T04	0.00	36	0.00	35
Client's Breach of Contract	T33	0.00	36	0.00	35
Uncovering of Works For Testing (Examination)	T15	0.00	36	0.00	35
Late Issuance of final certificate	T34	0.00	36	0.00	35
Substantial Change in Quality of any item not resulting from a Variation	T07	0.00	36	0.00	35
Currency Fluctuation	T40	0.00	36	0.00	35
Finance Charges For Loss Of Profit, Extended Performance Pond, Insuranc	T41	0.00	36	0.00	35
Labour Strikes, Civil Unrest, Etc.	T45	0.00	36	0.00	35
Overdue retention money	T38	0.00	36	0.00	35
Loss of / Damage to Materials on Site or During Transport	T23	0.00	36	0.00	35
Rectification of Damage Caused by Un Excepted Risk	T51	0.00	36	0.00	35
Damages To the Works Due to Exceptionally Adverse Weather, Flood, Sto	T50	0.00	36	0.00	35
Expropriation of Contractor's Equipment or Machinery	T48	0.00	36	0.00	35
Embargoes on Project Imported Items	T47	0.00	36	0.00	35
Custom Tariffs, New Taxes	T46	0.00	36	0.00	35

It can be noted that *T1902*, “*Variation*” is considered the most frequent claimed and paid type as it scored the highest frequency rate (55.56 % and 55.6 %) of the surveyed projects claimed this type of claims and dispute). This means that all contractors were granted compensation; however, this compensation varies. The exact

paid % can be shown in the magnitude assessment. This is followed by **T 440** “*Unproductive Idle Plant and Equipment*”. T 44 is ranked second and third in claimed and paid frequency, respectively. **T260** “*Delay: Due to variation*” was ranked third and ninth in claimed and paid frequency, respectively. This is followed by **T2802** “*Delay: Due to late approval*”, where it ranked fourth and second in in claimed and paid frequency, respectively

8.5.4 FINDING RELATED TO MAGNITUDE AND FREQUENCY OF CLAIMS AND DISPUTES

In this section, a comparison **Table 8-46** below is presented to compare the results for the magnitude of the types of claims and disputes from both surveys; the qualitative and the quantitative study.

The analysis shows that **T1903**, “*Variation*” is considered to be the most severe type of claims and disputes. It can be shown that **T19** “*Variations claims and disputes*” is ranked number one as both “*claimed*” and “*paid*” types of claims and disputes. Comparing that with the subjective views as perceived by construction participants, it is found that this type is perceived the most severe type of claims and disputes. In addition, **T2603** “*Delay: due to variation*” is ranked as the second highest as perceived by participants. It is ranked eighth as “*claimed*” and fifth as “*paid*” types of claims and disputes. Furthermore, **T0303** “*Design/ change/ omission / errors by the client*” is ranked as the third highest over all. It is ranked second as both “*claimed*” and “*paid*” types of claims and disputes as well. In contrast, **T4703**, “*Embargoes on project imported items*” claims and disputes is ranked the lowest as it has an important index less than 31.11 %. **T4703** is ranked 51 by participants. Contractors did not claim or paid under this type of claims and disputes.

Table 8-46 Types of Claims & Disputes: Subjective & Objective Magnitude Comparison

IMPACT (MAGNITUDE) OF TYPES OF CLAIMS & DISPUTES ASSESSMENT									
Type of Assessment		Objective Assessment						Subjective	
DESCRIPTION	CODE	Claimed Average %	Claimed Rank	Paid Average %	Paid Rank	Average % (Claimed/Paid)	Average Rank	Over All Magnitude %	Magnitude Rank
Variations	T19	12.18	1	7.94	1	65.18	11	89.80%	1
Delay/ Disruption to Regular Progress Due To Variation	T26	1.66	8	1.27	5	76.59	1	86.67%	2
Change of Design/ Design Omission / Errors by the Client (Engi	T03	3.52	2	1.80	2	50.93	24	83.92%	3
Unanticipated Soil Condition	T12	1.97	5	0.84	8	42.90	31	80.00%	4
Unforeseen Ground Condition/ Unforeseeable Obstruction	T13	1.36	10	0.70	11	51.19	22	79.13%	5
Differing Site Condition	T11	3.05	3	1.68	3	54.89	19	78.70%	6
Delay/ Disruption to Regular Progress Due To Late Issue of Con	T28	0.76	21	0.45	20	58.77	16	77.50%	7
Change of Project Profile and Site	T09	2.69	4	1.26	6	46.74	28	75.32%	8
Delayed Site Possession/ Restricted Access	T10	0.98	16	0.65	14	66.61	10	75.29%	9
Extension of Time For Completion	T35	0.00	36	0.00	35	0.00	35	74.80%	10
Ambiguity in Documents	T01	1.16	14	0.81	9	70.04	6	74.51%	11
Delay Disruption to Regular Progress Caused by Utility Services	T31	0.33	32	0.20	31	61.98	13	74.29%	12
Delay/ Disruption to Regular Progress Due To Late Instruction b	T27	0.72	23	0.34	22	47.67	25	72.50%	13
Rectification of Works/ Specification Change Due to Defective I	T05	1.90	6	1.39	4	73.29	4	72.16%	14
Delays Due to Incomplete Design/ Insufficient Information by C	T02	1.28	11	0.72	10	55.91	17	71.76%	15
Acceleration of Works	T18	0.76	22	0.41	21	53.44	21	69.58%	16
Default of Subcontractor, Nominated Subcontractor Or Supplier	T43	0.76	20	0.47	19	61.31	14	69.02%	17
Delay/ Disruption to Regular Progress Due To Delays Caused by	T29	0.69	25	0.50	18	72.53	5	66.12%	18
Unproductive / Idle Plants, Equipment or Labour	T44	1.88	7	1.02	7	54.59	20	65.11%	19
Suspension of Work	T17	0.99	15	0.51	17	51.15	23	64.26%	20
Un Paid Sums (Late Payment)	T36	0.85	18	0.52	16	61.25	15	64.17%	21
Client's Breach of Contract	T33	0.00	36	0.00	35	0.00	35	63.92%	22
Liquidated and ascertained damages	T42	1.21	13	0.56	15	46.65	29	63.33%	23
Client/ Engineer's Instruction to Change (not resulting from Var	T21	1.41	9	0.66	13	46.79	27	60.89%	24
Investigation of Suspected Defects	T14	0.71	24	0.32	24	44.39	30	60.85%	25
Substantial Increase in Quantity of any item not resulting from a	T06	0.45	29	0.31	26	68.45	8	60.39%	26
Uncovering of Works For Testing (Examination)	T15	0.00	36	0.00	35	0.00	35	59.61%	27
Delays Due to Exceptional Inclement Weather, Flood, Storms, E	T49	0.47	27	0.16	33	33.33	34	59.60%	28
Delay/ Disruption to Regular Progress Due To Late Delivery of I	T30	0.42	30	0.29	28	69.45	7	59.59%	29
Delays Due to the Unavailability / Unsuitability of Project Mater	T25	0.81	19	0.29	27	35.66	33	59.58%	30
Inflation / Price Escalation	T39	0.48	26	0.23	30	46.93	26	55.60%	31
Additional Work (to other parts of the works) arising from repair	T20	0.33	31	0.24	29	73.41	3	55.29%	32
Late Issuance of final certificate	T34	0.00	36	0.00	35	0.00	35	54.12%	33
Error in Setting out Due to Incorrect Data Shown on Drawings	T08	0.91	17	0.33	23	36.63	32	51.49%	34
Additional Tests to Verify Compliance with the Specification (ir	T16	0.23	34	0.14	34	62.19	12	51.37%	35
Currency Fluctuation	T40	0.00	36	0.00	35	0.00	35	51.02%	36
Facilities provided to others by the contractor (in excess to those	T22	1.26	12	0.70	12	55.36	18	50.83%	37
Substantial Change in Quality of any item not resulting from a V	T07	0.00	36	0.00	35	0.00	35	50.00%	38
Interest on Un Paid Sums (Late Payment)	T37	0.24	33	0.18	32	76.03	2	48.57%	39
Instruction Issued by the Client/Consultant to Resolve Discrepar	T04	0.00	36	0.00	35	0.00	35	47.84%	40
Finance Charges For Loss Of Profit, Extended Performance Pon	T41	0.00	36	0.00	35	0.00	35	46.67%	41
Labour Strikes, Civil Unrest, Etc.	T45	0.00	36	0.00	35	0.00	35	44.49%	42
Overdue retention money	T38	0.00	36	0.00	35	0.00	35	42.45%	43
Damages To the Works Due to Exceptionally Adverse Weather,	T50	0.00	36	0.00	35	0.00	35	40.78%	44
Loss of / Damage to Materials on Site or During Transport	T23	0.00	36	0.00	35	0.00	35	39.61%	45
Rectification of Damage Caused by Un Excepted Risk	T51	0.00	36	0.00	35	0.00	35	36.80%	46
Custom Tariffs, New Taxes	T46	0.00	36	0.00	35	0.00	35	35.51%	47
Rectification of Damages To Other Property During Transport o	T24	0.20	35	0.00	35	0.00	35	35.10%	48
Delay/ Disruption to Regular Progress Due To Additional/ Unfo	T32	0.47	28	0.31	25	67.03	9	35.10%	48
Expropriation of Contractor's Equipment or Machinery	T48	0.00	36	0.00	35	0.00	35	33.75%	50
Embargoes on Project Imported Items	T47	0.00	36	0.00	35	0.00	35	31.11%	51

In the same way, a comparison **Table 8-47** below is presented to compare the results for the frequency of the types of claims and disputes from both surveys; the qualitative and the quantitative study.

Table 8-47 Types of Claims & Disputes: Subjective & Objective Frequency Comparison

FREQUENCY OF TYPES OF CLAIMS & DISPUTES ASSESSMENT							
Type of Assessment		Objective Assessment				Subjective	
DESCRIPTION	CODE	Claimed Frequency %	Claimed Rank	Paid Frequency %	Paid Rank	Over All Frequency %	Frequency Rank
Variations	T19	55.56	1	55.56	1	81.63%	1
Change of Design/ Design Omission / Errors by the Client (Engineer)	T03	31.11	13	31.11	9	76.60%	2
Delay/ Disruption to Regular Progress Due To Variation	T26	42.22	3	31.11	9	76.47%	3
Unanticipated Soil Condition	T12	37.78	7	35.56	5	72.65%	4
Differing Site Condition	T11	35.56	9	28.89	13	72.55%	5
Delay/ Disruption to Regular Progress Due To Late Issue of Consents	T28	40.00	4	40.00	2	72.50%	6
Unforeseen Ground Condition/ Unforeseeable Obstruction	T13	40.00	4	31.11	9	71.67%	7
Change of Project Profile and Site	T09	22.22	21	13.33	27	71.02%	8
Extension of Time For Completion	T35	0.00	36	0.00	35	70.22%	9
Delay Disruption to Regular Progress Caused by Utility Services (Contractor)	T31	28.89	14	26.67	15	69.79%	10
Ambiguity in Documents	T01	35.56	9	33.33	7	67.84%	11
Delayed Site Possession/ Restricted Access	T10	33.33	12	33.33	7	67.60%	12
Default of Subcontractor, Nominated Subcontractor Or Suppliers.	T43	26.67	17	26.67	15	67.50%	13
Delays Due to Incomplete Design/ Insufficient Information by Client	T02	24.44	18	24.44	17	66.94%	14
Delay/ Disruption to Regular Progress Due To Late Instruction by Client	T27	40.00	4	31.11	9	65.00%	15
Rectification of Works/ Specification Change Due to Defective Documents	T05	35.56	9	35.56	5	64.58%	16
Client's Breach of Contract	T33	0.00	36	0.00	35	58.33%	17
Liquidated and ascertained damages	T42	24.44	18	24.44	17	57.65%	18
Acceleration of Works	T18	22.22	21	11.11	28	57.50%	19
Unproductive / Idle Plants, Equipment or Labour	T44	46.67	2	37.78	3	57.25%	20
Delay/ Disruption to Regular Progress Due To Delays Caused by Client	T29	24.44	18	24.44	17	57.08%	21
Substantial Increase in Quantity of any item not resulting from a Variation	T06	13.33	30	8.89	29	56.73%	22
Late Issuance of final certificate	T34	0.00	36	0.00	35	55.32%	23
Suspension of Work	T17	28.89	14	28.89	13	55.00%	24
Delays Due to the Unavailability / Unsuitability of Project Materials	T25	15.56	26	6.67	31	54.51%	25
Investigation of Suspected Defects	T14	20.00	23	17.78	22	52.00%	26
Un Paid Sums (Late Payment)	T36	37.78	7	37.78	3	51.84%	27
Uncovering of Works For Testing (Examination)	T15	0.00	36	0.00	35	51.25%	28
Delays Due to Exceptional Inclement Weather, Flood, Storms, Earthquake	T49	2.22	35	2.22	34	50.42%	29
Client/ Engineer's Instruction to Change (not resulting from Variation)	T21	17.78	25	17.78	22	50.00%	30
Delay/ Disruption to Regular Progress Due To Late Delivery of Materials	T30	11.11	31	8.89	29	49.80%	31
Finance Charges For Loss Of Profit, Extended Performance Period	T41	0.00	36	0.00	35	49.80%	32
Error in Setting out Due to Incorrect Data Shown on Drawings	T08	17.78	25	17.78	22	49.58%	33
Inflation / Price Escalation	T39	15.56	28	15.56	26	49.58%	33
Currency Fluctuation	T40	0.00	36	0.00	35	48.16%	35
Additional Work (to other parts of the works) arising from repairs or alterations	T20	20.00	23	20.00	21	47.45%	36
Substantial Change in Quality of any item not resulting from a Variation	T07	0.00	36	0.00	35	46.53%	37
Interest on Un Paid Sums (Late Payment)	T37	6.67	32	4.44	32	46.38%	38
Facilities provided to others by the contractor (in excess to those normally provided)	T22	17.78	25	17.78	22	45.10%	39
Additional Tests to Verify Compliance with the Specification (in excess of those specified)	T16	6.67	32	4.44	32	42.86%	40
Instruction Issued by the Client/Consultant to Resolve Discrepancies	T04	0.00	36	0.00	35	42.80%	41
Labour Strikes, Civil Unrest, Etc.	T45	0.00	36	0.00	35	39.17%	42
Overdue retention money	T38	0.00	36	0.00	35	36.08%	43
Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen Work	T32	28.89	14	22.22	20	34.47%	44
Rectification of Damages To Other Property During Transport of Materials	T24	6.67	32	0.00	35	34.12%	45
Damages To the Works Due to Exceptionally Adverse Weather, Force Majeure	T50	0.00	36	0.00	35	33.75%	46
Loss of / Damage to Materials on Site or During Transport	T23	0.00	36	0.00	35	33.33%	47
Rectification of Damage Caused by Un Excepted Risk	T51	0.00	36	0.00	35	32.50%	48
Expropriation of Contractor's Equipment or Machinery	T48	0.00	36	0.00	35	31.02%	49
Custom Tariffs, New Taxes	T46	0.00	36	0.00	35	30.21%	50
Embargoes on Project Imported Items	T47	0.00	36	0.00	35	29.39%	51

The analysis shows that **T1903**, “*Variation*” is considered to be the most frequent type of claims and disputes. It can be shown that **T19** “*Variations claims and disputes*” is ranked number one as both “*claimed*” and “*paid*” types of claims and disputes. Comparing that with the subjective views as perceived by construction participants, it is found that this type is perceived the most frequent type of claims and

disputes. It has an importance index of 81.63 %. Furthermore, *T0303 “Design/change/ omission / errors by the client”* is ranked as the second highest over all. It is ranked thirteenth as “*claimed*” and ninth as “*paid*” types of claims and disputes. In addition, *T2603 “Delay: due to variation”* is ranked as the third highest as perceived by participants. It is ranked third as “*claimed*” and ninth as “*paid*” types of claims and disputes. In contrast, *T4703, “Embargoes on project imported items”* claims and disputes is ranked the lowest as it has an important index less than 29.39 %. *T4703* is ranked 51 by participants. Contractors did not claim or paid under this type of claims and disputes.

The comparison **Table 8-48** below is presented to compare the results for the frequency and magnitude of the sixteen significant types of claims and disputes from both surveys; the qualitative and the quantitative study. Note that this table is extracted from **Table 7-12, Table 7-18, Table 8-46** and **Table 8-47**. The analysis of these tables can be found in the following section.

Table 8-48 Significant Types of Claims & Disputes: Subjective & Objective Frequency & Magnitude Comparison

FREQUENCY & IMPACT (MAGNITUDE) OF TYPES OF CLAIMS & DISPUTES ASSESSMENT: SUBJECTIVE & OBJECTIVE COMPARISON																	
Type of Assessment		Objective Assessment										Subjective Assessment					
DESCRIPTION	CODE	Claimed Average %	Claimed Rank	Paid Average %	Paid Rank	Average % (Claimed/Paid)	Average Rank	Claimed Frequency %	Claimed Rank	Paid Frequency %	Paid Rank	Over All Frequency %	Frequency Rank	Over All Magnitude %	Magnitude Rank	Over All CFI %	CFI Rank
Variations	T19	12.18	1	7.94	1	65.18	11	55.56	1	55.56	1	81.63%	1	89.80%	1	82.50%	1
Change of Design/ Design Omission / Errors by the Client (E	T03	3.52	2	1.80	2	50.93	24	31.11	13	31.11	9	76.60%	2	83.92%	3	80.30%	2
Delay/ Disruption to Regular Progress Due To Variation	T26	1.66	8	1.27	5	76.59	1	42.22	3	31.11	9	76.47%	3	86.67%	2	78.51%	3
Ambiguity in Documents	T01	1.16	14	0.81	9	70.04	6	35.56	9	33.33	7	67.84%	11	74.51%	11	77.40%	4
Unanticipated Soil Condition	T12	1.97	5	0.84	8	42.90	31	37.78	7	35.56	5	72.65%	4	80.00%	4	75.46%	5
Unforeseen Ground Condition/ Unforeseeable Obstruction	T13	1.36	10	0.70	11	51.19	22	40.00	4	31.11	9	71.67%	7	79.13%	5	74.97%	6
Differing Site Condition	T11	3.05	3	1.68	3	54.89	19	35.56	9	28.89	13	72.55%	5	78.70%	6	74.86%	7
Change of Project Profile and Site	T09	2.69	4	1.26	6	46.74	28	22.22	21	13.33	27	71.02%	8	75.32%	8	73.88%	8
Rectification of Works/ Specification Change Due to Defect	T05	1.90	6	1.39	4	73.29	4	35.56	9	35.56	5	64.58%	16	72.16%	14	73.56%	9
Delay/ Disruption to Regular Progress Due To Late Issue of	T28	0.76	21	0.45	20	58.77	16	40.00	4	40.00	2	72.50%	6	77.50%	7	73.33%	10
Delays Due to Incomplete Design/ Insufficient Information b	T02	1.28	11	0.72	10	55.91	17	24.44	18	24.44	17	66.94%	14	71.76%	15	72.51%	11
Delayed Site Possession/ Restricted Access	T10	0.98	16	0.65	14	66.61	10	33.33	12	33.33	7	67.60%	12	75.29%	9	72.47%	12
Extension of Time For Completion	T35	0.00	36	0.00	35	0.00	35	0.00	36	0.00	35	70.22%	9	74.80%	10	69.90%	13
Delay/ Disruption to Regular Progress Due To Late Instructi	T27	0.72	23	0.34	22	47.67	25	40.00	4	31.11	9	65.00%	15	72.50%	13	69.76%	14
Delay Disruption to Regular Progress Caused by Utility Serv	T31	0.33	32	0.20	31	61.98	13	28.89	14	26.67	15	69.79%	10	74.29%	12	68.54%	15
Default of Subcontractor, Nominated Subcontractor Or Supp	T43	0.76	20	0.47	19	61.31	14	26.67	17	26.67	15	67.50%	13	69.02%	17	66.94%	16

8.5.5 OVER ALL FINDING RELATED TO TYPES OF CLAIMS AND DISPUTES

This chapter highlights the objective of the survey, the source of data and the survey format used in this quantitative study.

The scope of this study is focused on the exploration and investigation of the contractual claims and disputes raised in traditional (lump sum) contract strategy used for building construction projects for the government of Abu Dhabi, UAE according to Abu Dhabi General Condition of Contracts (AGCC). This investigation is based on feedback from experiential knowledge of construction professionals (i.e. clients, consultants, and contractors, claim experts). Moreover, the concluding results of this investigation are based on data collected from forty-five government projects developed by the government of Abu Dhabi. These various projects includes educational projects (i.e. schools and collages, etc.); religious projects (i.e. mosques, etc.); government buildings (i.e. ministries, departments, police stations and head quarters, etc.); and housing projects.

As previously mentioned, the main research outcomes are based on analysis of the data collected from three sources (see

Figure 8-8). These sources helped the researcher to increase the validity and credibility of the research results. Significant types of claims and disputes, as well as their associated and significant root causation were analysed, in order to achieve the objectives of the research.

Abu Dhabi Municipality, previously named “Works Department”, is the main developer for government projects in Abu Dhabi, United Arab Emirates. As a senior staff, Head of Quality Control/Assurance Section, and as a sponsored researcher by Abu Dhabi Municipality, tremendous services and information were provided by the department.

The survey was conducted with the help and support of the research and development section as well as the follow up unit of Abu Dhabi Municipality, previously named as Works Department. Engineers Raed Nasher, and Ahmed Al

Habshi from the execution section and the follow up unit, respectively, participated in collecting the data.

It was decided to collect data from claims on a cross-section of construction projects in Abu Dhabi, in order to compare the significant types of claims and disputes. Based on the projects' monthly progress report, projects were chosen to reflect the various types of projects and areas using a random sampling technique under each area of work (i.e. West of Abu Dhabi, East of Abu Dhabi, Al Mafraq, etc.). A list of projects can be found in Appendix (G).

A standardized data form was developed and used to collect information from each project in the sample as to the cost of claims and disputes. The classification of claims and disputes reflects the provisions of the Abu Dhabi Government Conditions of Contract and their risk areas. Relative magnitude and frequency of each type claims and disputes were quantified based on the collected data from those forty-five construction projects. A sample form used in the quantitative survey can be found in Appendix (E). The analysis of the collected data based on the frequency and magnitude of each type of claims and disputes is presented in the next section.

Significant Types of Claims & Disputes: Subjective & Objective Magnitude Comparison

The significance level has been allocated to the each of the task. In the above Table 8-46 the level of significance is based on the overall magnitude percentage achieved by the type of assessment i.e. the conflicts and the disputes of the project. The benchmark significance level is assumed to be, the average value above 60%. The ranking of the types of assessment is based on the subjective magnitude rank. From the table we can see that the total number of rankings attained by the assessments is 26 (i.e. the average magnitude values of the individual assessment is above the significant level 60%). The maximum overall magnitude is achieved by the assessment **T19 "Variations"** is about 89.80%. **T19 "Variations"** has also ranked number 1 in claimed rank and the paid rank but variation is quite high in the average rank (paid/claimed) which is about 11th rank. This means that if assessment **T19 "Variations"** has claimed about 12.18% and has got paid by 7.94% then the average percentage is 7.94/12.18 which is 65.18%. The ranked 2nd assessment **T26 "Delay/ Disruption to Regular Progress Due To Variation"** has claiming rank 8th and the paid rank 5th which means that the magnitude

of T26 “*Delay/ Disruption to Regular Progress Due To Variation*” is very less compared to other types of assessments in terms of the objective assessment. But it holds an average rank 1 with an average paid percentage of 1.27/1.66 about 76.59%. From the above study we can say that magnitude of the T19 “*Variations*” is high as it ranks 1.

Significant Types of Claims & Disputes: Subjective & Objective frequency Comparison

The significance level has been allocated to the each of the task. In the above Table 8-47 the level of significance is based on the overall frequency percentage achieved by the type of assessment i.e. the conflicts and the disputes of the project. The benchmark significance level is assumed to be, the average value above 60%. The ranking of the types of assessment is based on the subjective frequency rank similar to the level of significance. From the table we can see that the total number of rankings attained by the claims and disputes is 16 (i.e. the numbers of average frequencies of the individual claims and disputes are above the significant level 60%). The maximum overall frequency is achieved by the assessment T19 “*Variations*” is about 81.63%. T19 “*Variations*” has also ranked 1 in claimed rank and the paid rank. The average paid frequency is 100% for the assessment T19 “*Variations*”. The assessment T19 “*Variations*” has claimed about 55.66% and has got paid about 55.66% this shows the average percentage is 55.66/55.66 is 100%. Fro this study we can say that the T19 “*Variations*” is the most frequent type of claims and disputes.

Significant Types of Claims & Disputes: Subjective & Objective Frequency & Magnitude Comparison

In this section, the above **Table 8-48** is combined table with frequency and magnitude of the types of claims and disputes from both surveys for the qualitative and the quantitative study. (Note that this table is extracted from **Table 7-12, Table 7-18, Table 8-46** and **Table 8-47**).

A “*Claims focus indicator*” (CFI) was formulated to compare the perceived significance of each of these types such as the magnitude frequency and avoidability of claim and dispute as stated below.

- Relative frequency of types of claims and disputes

- Relative impact (magnitude) of types of claims and disputes
- Relative avoidability of types of claims and disputes is that a specific type is avoidable by avoiding/ controlling the root cause/s that can contribute to the generation of such type

Table 8-49 An example illustrating the priority of the significant types and their CFI values based on the frequency, magnitude, avoidability values for these types of claims and dispute

CODE	F	M	A	* CFI MEDIAN	RESULT
T19	3.94	4.29	3.65	3.96	SIG-1st Priority
T42	3.18	3.19	3.06	3.14	SIG-1st Priority
T06	2.94	3.12	4.00	3.35	SIG-2nd Priority
T17	2.63	3.20	3.24	3.02	SIG-2nd Priority
T34	3.06	2.94	2.94	2.98	NOT SIG
T04	2.29	2.29	4.24	2.97	NOT SIG
T14	2.65	3.19	3.06	2.96	NOT SIG

(Note that this table is extracted from **Table 7-28**)

The above **Table 8-49** is an example of illustrating the priority of the significance and their CFI values based on frequency, magnitude and avoidability for different types of claims and disputes which are calculated and tabulated. The **T19** and **T42** are stated as the significant 1st priority as the CFI median is more than 3. where as **T06** and **T17** has stated as significant 2nd priority as their individual CFI value for frequency is less than 3.

A benchmark significance level is assumed to be, the average value above 60%. **Table 8-48** is “*Subjective & Objective Frequency & Magnitude Comparison*” presents the CFI percentage that has been calculated and ranked with respect to the CFI value. An overall 16 types of claims and disputes have achieved its significance level above 60%.

While comparing the above **Table 8-46** “*Subjective & Objective Frequency & Magnitude Comparison*” we can term the the facts that subjective is an opinion and the objective is the realistic or practical term (from real case studies). Considering this fact a subjective and objective comparison has been made. If we see **Table 8-47** “*Subjective & Objective Frequency & Magnitude Comparison*” the total of 16 types

of claims and disputes have been ranked in accordance with the CFI% significance level above 60% as stated. Out of 16, about 11 ranks have been attained by different claims and disputes in both claimed and paid rankings. In both the claimed and paid ranking cases the first rank is achieved by the type **T19** “*Variations*”. While the second rank goes to type **T03** “*Change of Design/ Design Omission / Errors by the Client (Engineer)*”. This comparison states that when both the **T19** and **T03** have been very much frequent and the magnitude is very high in both subjective and objective, they are treated according to their priority of claim. Over all maximum frequency% and magnitude% for **T19** 81.63% and 89.80% respectively and Over all minimum frequency% and magnitude% for **T43** are 67.50% and 69.02% respectively.

CHAPTER NINE
DISCUSSIONS OF FINDINGS

9.1 INTRODUCTION

This chapter examines the process of the data analysis to achieve the aims and objectives of this study, which included introduction, analysis of data, 'Importance Index', findings and discussion, and conclusion.

9.2 RESEARCH FINDINGS

Here we examine each of the research objectives stated in Chapter One Section 1.3 namely:

Based on the above stated aims, the specific objectives are set as:

1. To identify the significant types of claims and disputes;
2. To identify the significant common causes of claims and disputes;
3. To identify the significant causes that may lead to a specific type significant of claims and disputes.
4. To conceptualize the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry

9.2.1 TYPES OF CLAIMS AND DISPUTES (RESEARCH OBJECTIVE ONE)

The second section of the questionnaire survey focused on the types of construction claims and disputes in the UAE. A table was provided with fifty-one possible types of claims and disputes. This section expected to provide answers to the following questions;

- ✓ Do the construction professionals agree that these suggested types contribute to the generation of construction claims and disputes? and, if so, to what extent in terms of their frequency and severity?;
- ✓ Can the frequency and/or severity of these types be avoided or at least controlled under the UAE general conditions of contract?

Therefore, this section aimed at exploring the respondents' perception on these suggested types of construction claims and disputes in the UAE. The section focused on the following four aspects:

- ✓ Identifying and confirming the common and potential types of construction claims and disputes;
- ✓ Estimating the relative frequency of each type of claims and disputes;
- ✓ Estimating the relative magnitude (severity/ impact) of each type of claims and disputes;
- ✓ Estimating the avoidability/ controllability of each type of claims and disputes

Respondents were first asked if the suggested and tabulated types were to be considered potential types, and three assessment indicators were used to further the research. These assessment indicators were frequency, severity and avoidability. For each of these assessments, respondents gave their responses based on the scale that were given. Through this dissertation, frequent, severe and avoidable types are those with an average score that is greater than three, and an important index of more than 60%. The response scale for each assessment is explained in details in the relevant sub-sections of this dissertation.

9.2.1.1 FACTORS INFLUENCING TYPES OF CLAIMS AND DISPUTES

Section 7.4 'Types of Claims and Disputes' of this dissertation reveals the findings of these assessments (i.e. frequency, Impact and avoidability) from different prospective (i.e., clients, consultants, contractors and overall responses).

➤ Identifying and confirming the suggested types of construction claims and disputes (agreement assessment)

In this section, respondents were asked to assess the type variables that are used in this study. Respondents were asked whether they agree that any of the suggested types of claims and disputes is a potential type or not by selecting one of the three given options; yes, no, and not sure, based on a three-point scale. Section 7.4.1 presents the findings of the agreement assessment from different prospective (i.e. clients, consultants, contractors and overall responses).

The collective assessment of the overall responses, based on the combination of the relative responses of all respondents, reveals that all of the suggested fifty-one types are potential ones, with different agreement percentages. All respondents (i.e. clients, consultants and contractors) believe that 37 out of 51 types are potential types (100 % agreement). In addition, six types, namely, *T4201*, *T0601*, *T2001*, *T2401*, *T4801* and *T3401* have an agreement percentage higher than 94 %. Five types, namely, *T4701*, *T0501*, *T4501*, *T4601* and *T4101* have an average agreement between 68 % - 72 % amongst all respondents. And finally the last three types, namely, *T0401*, *T3701* and *T3201* have the lowest percentage between 62.75 % - 63.8 %. Furthermore, a comparison **Table 7-7** is presented in Section 7.4.1.5 to compare the agreement assessment of the various groups (i.e. clients, consultants and contractors) for the fifty-one types of claims and disputes that are used in this research.

➤ ***Perceived Frequency for Types of Construction Claims and Disputes:***

In this section, respondents were asked to choose one of five options to rate the frequency of each type of claims and disputes in construction projects. A weight in a scale from 1 to 5 was given for each of the five frequencies with a weight of 1 for “never”, 2 for “rare”, 3 for “average”, 4 for “high frequency” and 5 for “very high frequency”. The analysis of the results for this assessment is based on the average mean score and Important Index. In this section, the types of construction claims and disputes are considered *frequent* if the mean score is higher than 3 and their important index is higher than 60 %. On the contrary, these types are considered *less frequent* if the mean score is lower than 3 and their important index is lower than 60 %. Hence, all types are ranked from 1 to 51 based on their frequency values, where rank number 1 is for the most frequent type and rank number 51 for the least frequent type. Section 7.4.2 reveals the findings of the perceived frequency assessment by various construction groups (i.e., clients, consultants, contractors and overall responses).

Furthermore, **Table 7-8**, **Table 7-9** and **Table 7-10** present the responses for the agreement assessment from the three responding groups. These three tables are found in Sections 7.4.2.1, 7.4.2.2 and 7.4.2.3, respectively. In addition, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 7-11**. In general, the most frequent types of claims and disputes

are categorised into sixteen types, as perceived by all respondents. However, thirty-five types are perceived as less frequent. The top ten frequent types of claims and disputes are:

1. T1902 Variations;
2. T0302 Design/ change/ omission / errors by the client;
3. T2602 Delay: Due to variation;
4. T1202 Unanticipated soil condition;
5. T1102 Differing site condition;
6. T2802 Delay: Due to late approval;
7. T1302 Unforeseen ground condition/ unforeseeable obstruction;
8. T0902 Change of project profile and site;
9. T3502 Extension of time for completion;
10. T3102 Delay: Caused by utility services organization.

Moreover, the comparison **Table 7-12** is presented in Section 7.4.2.5 to compare the frequency assessment, for the fifty-one types of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes.

Furthermore, **Table 7-13** presents the agreement of the responses between the respondents groups using the Rank Agreement Factor. The methodology used in computing the RAFs PDs and PAs is based on that described by Okpala & Aniekwu (1988). The agreement between clients and consultants is 82.38 %. In addition, this agreement equals to 86.54 % and 77.85 % for clients and contractors, as well as consultants and contractors, respectively. It can be clearly seen that the agreement between the clients and contractors is the highest amongst all the groups. It indicates that the both clients and contractors are aware of the frequency of these types since they are the ones who initiate such types. However, this does not mean that they agree on the legitimacy of these types because if they agree on that, then there will not be claims and counter claims from both groups as to the legitimacy of these claims and disputes. These findings are recognised by other researchers such as Yogeswaran (1996), Kumaraswamy (1997, 1998), Poh (2005) and others.

Kumaraswamy (1997) states that "...whilst there is a very good agreement amongst the various groups in the construction industry regarding the frequency of the types of claims and disputes, the general collective disagreement is not surprising. These differences are due to the different vantage points if not the vested interests of the different groups (i.e. clients, consultants and contractors). If there is no such disagreement, disputes will undoubtedly be fewer" (Kumaraswamy, 1997).

➤ ***Perceived Magnitude/ Impact for Types of Construction Claims and Disputes:***

In this section, respondents were asked to rate the impact or magnitude of each types of claims on their projects in terms of projects' cost, based on a 5 point scale. The analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be severe. On the contrary, If the mean score of a type less than three, then this type is said to be not severe. Section 7.4.3 reveals the findings of the perceived magnitude/ (impact) assessment by various construction groups (i.e., clients, consultants, contractors and overall responses).

In addition, **Table 7-14**, **Table 7-15** and **Table 7-16** present the responses for the magnitude/ impact assessment from the three responding groups. These three tables are found in Sections 7.4.3.1, 7.4.3.2 and 7.4.3.3, respectively. Similarly, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, for the magnitude/impact assessment are revealed in **Table 7-17**. In general, the most severe types of claims and disputes are twenty-six types as perceived by all respondents. However, twenty-five types are perceived as less severe. The top ten severe types of claims and disputes are as follows:

1. T1903 Variations;
2. T2603 D. D. R. P.: Due to variation;
3. T0303 Design/ change/ omission / errors by the client or (engineer);
4. T1203 Unanticipated soil condition;
5. T1303 D. D. R. P.: Due to unforeseen ground condition/unforeseeable obstruction;
6. T1103 Differing site condition;

7. T2803 D. D. R. P.: Due to late issue of consent (approval);
8. T0903 Change of project profile and site;
9. T1003 Delayed site possession/ works/ restricted access;
10. T3503 Extension of time for completion.

In addition, the comparison **Table 7-18** is presented in Section 7.4.3.5 to compare the magnitude/impact assessment, for the fifty-one types of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes. Furthermore, **Table 7-19** summarises the results for the 'Magnitude/impact assessment' using the Rank Agreement Factor. They present the agreement of the responses between the respondents groups. The agreement between clients' responses and contractors' responses is 90.92 %. However, the agreement between clients' responses and consultants' responses is 85.38%, while the responses agreement between consultants and contractors is 82.77 %. The agreement between the clients and contractors is the highest amongst all the groups. Despite the fact that there is a very good agreement, regarding the severity of the types of claims and disputes amongst the various groups in the construction industry, the general collective disagreement is not surprising. These differences are due to the different assessment by the different groups. If there is no such disagreement amongst the different groups regarding the severity (magnitude), disputes will definitely be fewer.

➤ ***Perceived Avoidability/ Controllability for Types of Claims and Disputes:***

Section 7.4.4 of this dissertation presents the responses of various groups regarding the avoidability/ controllability of various suggested potential types of construction claims and disputes. Respondents were asked to rate the degree of avoidability of the suggested types of construction claims and disputes. In another expression, respondents were requested to identify as to how easy or difficult it would be to avoid the claims and disputes from various types by avoiding/ controlling the root causes that lead to such types. The rating was based on a 5-point scale. The analysis of the results for this assessment is based on the average score, which equals to three (3.0). This average score is the same as an Important Index of 60%. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be avoidable/ controllable. On the contrary, If the mean

score of a type less than three, then this type is said to be unavoidable/ not controllable. Finally, if the score is exactly three, then the type of claim that is under consideration may or may not be avoided; it depends on the underlying cause/s.

Table 7-20, Table 7-21 and Table 7-22 illustrate the responses for the avoidability/controllability assessment by the various responding groups. These three tables are found in Sections 7.4.4.1, 7.4.4.2 and 7.4.4.3, respectively. Additionally, the overall responses of all responding groups regarding the avoidability of types of claims and disputes are analysed in this section, based on the combined responses of the different groups (i.e. clients, consultants and contractors). In general, the most avoidable types of claims and disputes are forty-two types as perceived by all respondents. However, nine types are perceived as less avoidable. The top ten most avoidable types of claims and disputes as perceived by contractors are listed below:

1. T0104 Ambiguity in documents;
2. T0404 Instruction by the client/ consultant to resolve discrepancy;
3. T0504 Rectification of works/ specification change due to defective design;
4. T0304 Design/ change/ omission / errors by the client or (engineer);
5. T0704 Substantial Change in quality of any item (not resulting from a variation);
6. T0204 Delays: Incomplete design/ insufficient information by client/ consultant;
7. T0604 substantial increase in quantity of any item (not resulting from a variation);
8. T1904 Variations;
9. T0904 Change of project profile and site;
10. T1004 Delayed site possession/ works/ restricted access.

In addition, the comparison **Table 7-24** in Section 7.4.4.5 is used to compare the avoidability/controllability assessment, for the fifty-one types of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). Similarly, it presents the mean score and important index values for each type of claims and disputes. Furthermore, a very strong agreement amongst the various groups in the construction industry regarding the avoidability of the types of claims and disputes can be noticed as shown in **Table 7-25** using the Rank Agreement Factor. However, the different views amongst these groups regarding the underlying causes that can generate/trigger these types of claims and disputes may justify the collective disagreement. Section 7.5 discusses the common

and potential causes that may lead to the types of claims and disputes. Additionally, Section 8.2 presents the discussion of underlying causes that can generate the different types of claims and disputes. Based on these discussions, the interactions amongst these variables are finally, unveiled.

9.2.1.2 CLAIMS FOCUS INDICATOR (CFI) INVESTIGATION

The respondents were requested to rate the frequency, impact and avoidability of the types of construction claims and disputes. Accordingly, the most frequent, severe and avoidable/controllable types were identified and ranked as described in Sections 7.4.2, 7.4.3 and 7.4.4, respectively. The purpose of this information is to identify the types of claims that should/ could be minimised in construction projects. However, the results may not directly point out the types of claims and disputes that should be addressed with a view to minimise them. Hence, A '*Claims focus indicator*' (CFI) was formulated to compare the perceived significance of each of these types, through an integration of the scores against the above three 'dimensions'. This new variable would allow the identification of the types that merit particular attention. The methodology used in computing the CFI is based on that described by Yogeswaran (1996) and Kumaraswamy (1998).

The recommended managerial attention on minimising construction claims and disputes arising from specific types is taken to depend on the following factors:

- Relative frequency of types of claims and disputes, in another word; how often these types of claims occur. For example, if a specific type of claims occurs in every project, then higher priority is given to minimise that type.
- Relative impact (magnitude) of types of claims and disputes, in another word; the magnitude expressed as a percentage of original contract Value. For example, if a specific type of claims appears to be severe or with a higher magnitude, then higher priority is given to minimise that type.
- Relative avoidability of types of claims and disputes is that a specific type is avoidable by avoiding/ controlling the root cause/s that can contribute to the generation of such type. In another word, how easy it is to avoid these types of claims and disputes. For example, if a specific type of claims can be avoided very easily, then priority is given to find ways to minimise such type.

Each value associated with these variables (frequency, magnitude and avoidability) was given a different weighting so that the weighted sum of the responses of these three variables would result in a new combined variable termed “*Claims focus indicator*” (*CFI*).

The ‘*CFI*’ for each type of claims and disputes is then computed as:

$$CFI = K_f R_f + K_m R_m + K_a R_a$$

Where, R_f , R_m and K_a are derived from the survey data, and K_f , K_m and K_a are chosen by management depending on the desired relative weightings (e.g. to focus on controlling potentially more frequent/ larger value/ more avoidable claims).

Different sets of values (7 sets) for the weighting factors K_f , K_m and K_a were used in calculating the *CFI*. These sets were used in order to compare the sensitivities to such variations. Despite the assumption of different values for the weighting factors, the results showed a similar trend. The *CFI* value for a type of claims and disputes can range from 1 to 5 (Importance Index range from 20 % to 100 %).

These indicators were obtained from the responses for each responding group (i.e. clients, consultants and contractors) and for over all responses. It is worth noting that the types of claims with *CFI* average values above three (important index above 60 %) are chosen as ‘types of claims that are *Significant*’. However, these significant types of claims and disputes can be prioritised. The *first priority* will be for those types that are frequent, severe and avoidable (their frequency, magnitude and avoidability mean values >3). In addition, the *second priority* will be for those types with one or more of their indicators have value less than three (i.e. R_f , R_m or $R_a <3$). Contrary, the types of claims with *CFI* average values below three (important index below 60 %) are chosen as ‘types of claims that are *Insignificant*’, even if one or more of their indicators have value more than three (i.e. R_f , R_m or $R_a <3$). Hence, these types of claims and disputes can be prioritised as follows:

- Significant types, which require first priority, are those with CFI value more than three and their R_f , R_m or R_a values are more than three.
- Significant types, which require second priority, are those with CFI value more than three, and their R_f , R_m or R_a values are less than three.
- Insignificant types are those ones with CFI value less than three.

Furthermore, the analysis shows that twenty-two of the fifty-one postulated types of claims and disputes emerged as relatively more significant (i.e. $CFI > 3$) than the other twenty-nine; however, only *sixteen* of them need *first priority* attention. Thus, the focus of the discussion and analysis in the next stage will be on those types that are *significant* and need *first priority* attention by construction managers to avoid. These types are frequent, severe and should'/ can easily be minimised.

Table 7-32 shows the CFI values that have been calculated for the types of claims and disputes based on the overall frequency, magnitude and avoidability response values. These CFI values are ranked in a descending order. Moreover, this table presents the seven sets of weighting factors for each type. Furthermore, CFI calculations for the significant types ranked according to the median of the seven sets weighting factor type of claims and are illustrated in **Figure 7-15**.

Furthermore, **Table 7-33** compares the calculated CFI values and Important Index for all types of claims and disputes based on the responses from the three responding groups. Based on these calculations, **T19 "Variations"** is found to be the most significant types of claims with a CFI value of 4.12. It can be seen that **T19** is ranked first by all groups. Additionally, **T03** is ranked second based on clients and consultants' response and third based on contractors' ones. In general, sixteen types are found to be significant with *first priority* to avoid/minimise. *These are T19, T03, T26, T01, T12, T13, T11, T09, T05, T28, T02, T10, T35, T27, T31 and T43.* Note the full agreement of all responding groups regarding the significance and the priority of these sixteen types to be avoided/ minimised. This implies that the focus should be on these types. Contrary, in spite of their values (>3), **T06, T18, T29, T44, T17 and T33** are not considered significant with first priority to avoid/minimise. These six types of claims and disputes are not frequent as explained earlier in Section 7.4.5.1, 7.4.5.2, 7.4.5.3 and 7.4.5.4. In addition, twelve types out of these significant types have CFI values of more than 3.5 and an Important Index of over 70 %. Finally, **Table 7-35**

compares the calculated CFI values for each Type of Claims & Disputes among the different responding groups along with those types significance' priority.

Table 9-1 Types of Claims & Disputes CFI Assessment (Overall Perception)

1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3), TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES: 22 TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority 16 TOTAL NUMBER OF INSIGNIFICANT TYPES: Second Priority 6 TOTAL NUMBER OF INSIGNIFICANT TYPES: 0												
2	0.50	0.15	0.35	1.00													
3	0.35	0.50	0.15	1.00													
4	0.15	0.50	0.35	1.00													
5	0.50	0.35	0.15	1.00													
6	0.15	0.35	0.50	1.00													
7	0.33	0.33	0.33	1.00													
CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK	
T19	4.08	4.49	3.80	4.00	4.05	4.24	4.19	4.18	4.09	4.12	4.00	4.24	4.12	4.00	YES	SIG-1st Priority	1
T03	3.83	4.20	4.02	3.98	3.95	4.04	4.08	3.99	4.05	4.01	3.95	4.08	4.01	YES	SIG-1st Priority	2	
T26	3.82	4.33	3.62	3.80	3.83	4.05	4.01	3.97	3.90	3.92	3.80	4.05	3.92	YES	SIG-1st Priority	3	
T01	3.39	3.73	4.49	3.99	3.83	3.72	3.94	3.67	4.06	3.87	3.67	4.06	3.87	YES	SIG-1st Priority	4	
T12	3.63	4.00	3.69	3.71	3.71	3.82	3.84	3.77	3.79	3.77	3.71	3.84	3.77	YES	SIG-1st Priority	5	
T13	3.58	3.96	3.71	3.70	3.68	3.79	3.81	3.73	3.78	3.74	3.68	3.81	3.74	YES	SIG-1st Priority	6	
T11	3.63	3.93	3.67	3.69	3.69	3.79	3.79	3.74	3.75	3.74	3.69	3.79	3.74	YES	SIG-1st Priority	7	
T09	3.55	3.77	3.76	3.69	3.66	3.69	3.73	3.66	3.73	3.69	3.66	3.73	3.69	YES	SIG-1st Priority	8	
T05	3.23	3.61	4.20	3.77	3.62	3.56	3.76	3.51	3.85	3.67	3.51	3.85	3.67	YES	SIG-1st Priority	9	
T28	3.63	3.88	3.50	3.60	3.62	3.73	3.71	3.69	3.65	3.66	3.60	3.73	3.66	YES	SIG-1st Priority	10	
T02	3.35	3.59	3.94	3.68	3.59	3.56	3.68	3.52	3.73	3.62	3.52	3.73	3.62	YES	SIG-1st Priority	11	
T10	3.38	3.76	3.73	3.61	3.56	3.62	3.69	3.57	3.69	3.62	3.56	3.69	3.62	YES	SIG-1st Priority	12	
T35	3.51	3.74	3.24	3.41	3.45	3.58	3.53	3.55	3.45	3.49	3.41	3.58	3.49	YES	SIG-1st Priority	13	
T27	3.25	3.63	3.59	3.48	3.42	3.49	3.56	3.43	3.55	3.48	3.42	3.56	3.48	YES	SIG-1st Priority	14	
T31	3.49	3.71	3.08	3.32	3.38	3.54	3.46	3.51	3.36	3.42	3.32	3.54	3.42	YES	SIG-1st Priority	15	
T43	3.38	3.45	3.22	3.31	3.33	3.39	3.36	3.38	3.32	3.34	3.31	3.39	3.34	YES	SIG-1st Priority	16	
T06	2.84	3.02	3.88	3.39	3.23	3.09	3.29	3.06	3.42	3.24	3.06	3.42	3.24	NO	SIG-2nd Priority	17	
T18	2.88	3.48	3.35	3.20	3.13	3.25	3.34	3.16	3.33	3.23	3.13	3.34	3.23	NO	SIG-2nd Priority	18	
T29	2.85	3.31	3.29	3.14	3.08	3.15	3.23	3.08	3.23	3.15	3.08	3.23	3.15	NO	SIG-2nd Priority	19	
T44	2.86	3.26	3.20	3.09	3.04	3.11	3.18	3.05	3.17	3.10	3.04	3.18	3.10	NO	SIG-2nd Priority	20	
T17	2.75	3.21	3.27	3.08	3.00	3.06	3.16	2.99	3.17	3.08	2.99	3.17	3.08	NO	SIG-2nd Priority	21	
T33	2.92	3.20	3.12	3.06	3.03	3.09	3.13	3.04	3.11	3.07	3.03	3.13	3.07	NO	SIG-2nd Priority	22	

(Note: this table is extracted from Table 7-32)

9.2.2 CAUSES OF CLAIMS AND DISPUTES (RESEARCH OBJECTIVE Two)

In the previous section, the findings regarding the types of claims and disputes to achieve the first objective are summarised.

Section 7.5 'Causes of Claims and Disputes' of this dissertation presents the discussion and analysis of the collected data from the third section of the questionnaire survey. It reveals the findings of these assessments (i.e. significance and avoidability) from different prospective (i.e., clients, consultants, contractors and overall responses). The third section of the questionnaire survey focused on the common and potential causes that lead to the types of claims and disputes, which were discussed in the previous section. A table was provided with thirty-two possible causes of claims and disputes. This section expected to provide answers to the following questions:

- ✓ Do the construction professionals agree that these suggested causes contribute to the generation of the types of construction claims and disputes? and, if so, to what extent?;
- ✓ Can these causes be avoided or at least controlled under the UAE general conditions of contract?

Therefore, this section aimed at exploring the respondents' perception on these suggested causes that lead to the types of claims and disputes in the UAE. The section focused on the following three aspects:

- ✓ Identifying and confirming the common and potential cause/s that contributes to the generation of types of construction claims and disputes.
- ✓ Estimating the relative significance of each cause of claims and disputes;
- ✓ Estimating the avoidability/ controllability of each cause of claims and disputes

Respondents were first asked if the suggested and tabulated causes were to be considered potential causes, and two assessment indicators were used to further the research. These assessment indicators were significance and avoidability. For each of these assessments, respondents gave their responses based on a 5 point scale that were given. Through out this section of this dissertation, significant and avoidable causes are those with an average score that is greater than three and an important index of more than 60%. The response scale for each assessment is explained in details in the relative sub-sections.

9.2.2.1 FACTORS INFLUENCING CAUSE OF CLAIMS AND DISPUTES

Section 7.5 '**Causes of Claims and Disputes**' reveals the findings of these assessments (i.e. significance and avoidability) from different prospective (i.e. clients, consultants, contractors and overall responses).

➤ Identifying and confirming the suggested causes of construction claims and disputes (agreement assessment)

In this section, respondents were asked to assess the cause variables that are used in this study. Respondents were asked whether they agree that any of the causes of claims and disputes, which were listed in the third part of the questionnaire, was to be considered a potential cause of claims and disputes or not. A three-point response

scale was given to the respondents, with a weight of 1 for “yes”, 2 for “no”, 3 for “not sure”. No weight was given when no response was provided. Section 7.5.1 presents the findings for the causes’ agreement assessment from different prospective (i.e. clients, consultants, contractors and overall responses).

Table 7-38, **Table 7-39** and **Table 7-40** present the responses for the agreement assessment from the three responding groups. These three tables are found in Sections 7.5.1.1, 7.5.1.2 and 7.5.1.3 respectively. Furthermore, the comparison **Table 7-42**, which can be found in Section 7.5.1.5, is used to compare the cause’s agreement assessment by the various responding groups (i.e. clients, consultants and contractors). These suggested thirty-two causes can contribute to the generation of types of construction claims and disputes

The analysis of the collective assessment for the overall responses reveals that all of the thirty-two suggested causes are potential. The respondents believe that these causes can contribute to the generation of types of construction claims and disputes. However, different agreement percentages were perceived by them.

All respondents (100%) believe that 23 out of 32 causes are potential and can contribute to the generation of types of construction claims and disputes. Where, 92.16 % and 89.8 % of all respondents think that **C18** and **C17**, respectively, are potential causes of claims and disputes. In addition, **C19** and **C28** are considered by all respondents to be potential causes with agreement percentage of 88.0 % and 79.59 %, respectively. Moreover, 71.43 % of all respondents think that **C15** is a potential cause of claims and disputes. Furthermore, **C13** and **C14** are considered potential causes of claims and disputes with agreement percentage of 70.59 % and 70.0 %, respectively. Finally, 60.0 % of all respondents think that **C25** and **C26** are potential causes, and may contribute to the generation of types of construction claims and disputes. In addition, the results reveal that the respondents were biased in some way depending on their experience and background. However, this bias is not surprising; in fact, it was reported by other researchers such as Kumaraswamy (1996) and Yogeswaran (1996).

➤ *Perceived Significance for Cause of Construction Claims and Disputes:*

In this section, respondents were asked to choose one of the following five options to rate the level of significance (importance) of each cause of claims and disputes in construction projects. These options are never, rare (low importance), average, high importance and very high importance. A weight in a scale from 1 to 5 was given for each of the five frequencies with a weight of 1 for “never”, 2 for “low importance”, 3 for “average”, 4 for “high importance” and 5 for “very high importance”. No weight was given when no response was provided. Similarly, the analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be significant. On the contrary, If the mean score of a type less than three, then this type is said to be insignificant. Section 7.5.2 reveals the findings of the perceived significance assessment by various construction groups (i.e., clients, consultants, contractors and overall responses).

Table 7-43, **Table 7-44** and **Table 7-45** present the responses for the cause’s significance assessment from the clients, consultants and contractors. These three tables are found in Sections 7.5.2.1, 7.5.2.3 and 7.5.2.3, respectively. Additionally, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 7-46**. In general, the most significant causes of claims and disputes are twenty-one causes as perceived by all respondents. However, the remaining eleven are perceived as less significant (insignificant).

In addition, the comparison **Table 7-47**, which can be found in the Section 7.5.2.5, is used to compare the cause’s significance assessment, for the thirty-two causes of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes. Furthermore, **Table 7-48** presents the cause significant assessment’s RAF and agreement percentage of the responses from the different responding groups. According to this table, the percentages of agreement amongst these groups are between 80% and 90%. Clients and consultants have the highest agreement of 89.84%, while clients and contractors

have the lowest of 82.81%. Therefore, there is a better agreement between clients and consultants as it has the highest percentage out of all the comparison.

The top ten most significant causes of types of claims and disputes as perceived by all responding groups are:

- C0203 Inadequate Design Documentation;
 - C0103 Inadequate/ Inaccurate Design Information;
 - C1503 Inappropriate/ Unexpected Time Control (Target);
 - C1603 Inappropriate/ Unexpected Cost Control (Target);
 - C1903 Lack of Information for Decision Making;
 - C2103 Changes by Client;
 - C1803 Poor Communications Among Project Participants;
 - C2003 Slow Client Response;
 - C2403 Inadequate Site Investigation;
 - C0303 Inadequate Brief;
10. C2903 Poor Management.

➤ ***Perceived Avoidability for Causes of Construction Claims and Disputes:***

Section 7.5.3 looks at the Avoidability assessment whereby respondents were asked to identify how avoidable the causes of the claims are for their projects. A five-point response scale will be used for this assessment and these are ‘Never’ or ‘No Avoidability’ (N) = 1, ‘Low Avoidability’ (LA) = 2, ‘Average’ (Av) = 3, ‘High Avoidability’ (HA) = 4, ‘Very High Avoidability’ (VHA) = 5. The analysis of the results for this assessment is based on the Average score which equals to three (3.0). This average score is the same as an Important Index of 60 %. That is, any types of claims with an average score greater than three (3), or important index of more than 60 % is said to be avoidable (very easy to avoid). On the contrary, if the mean score of a type less than three, then this type is said to be unavoidable (very difficult to avoid).

Table 7-49, Table 7-50 and Table 7-51 present the responses for the avoidability/controllability assessment by the various responding groups. These three tables are found in Sections 7.5.3.1, 7.5.3.2 and 7.5.3.3, respectively. Additionally, the overall responses of all responding groups regarding the avoidability of the causes of

claims and disputes are analysed in this section, based on the combined responses of the different groups (i.e. clients, consultants and contractors). **Table 7-52** presents their response for the top ten avoidable causes of claims and disputes. In general, there are twenty-four avoidable causes as perceived by all respondents. However, eight causes are perceived as less avoidable. The top ten most avoidable causes of types of claims and disputes as perceived by all groups are as follows:

1. C0507 Inappropriate contract type (strategy);
2. C0307 Inadequate brief;
3. C0407 Unclear & inadequate specifications;
4. C0607 Inappropriate contract form;
5. C0907 Incomplete tender information;
6. C0107 Inadequate / inaccurate design information;
7. C0207 Inadequate design documentation;
8. C1307 Inappropriate payment method;
9. C0707 Inadequate contract administration;
9. C2407 Inadequate site investigation.

In addition, the comparison **Table 7-53**, which can be found in Section 7.5.3.5, is used to compare the avoidability/controllability assessment, for the thirty-two causes of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). These thirty-two causes can generate the types of claims and disputes. Similarly, it presents the mean score and important index values for each type of claims and disputes. It can be seen that most of these suggested causes are avoidable and controllable. The least avoidable and controllable cause is **C3107** with the least importance index value. It was ranked last by all groups. This finding is inline with Kumaraswamy (1997)'s one. He says: .."An appraisal of the root causes, for example, reveals the apparent controllability of all except one - related to 'uncontrollable external events'." Furthermore, **Table 7-54** presents the agreement amongst the various groups in the construction industry regarding the avoidability of the causes, which can generate the types of claims and dispute. An agreement amongst these groups can be noticed using the Rank Agreement Factor.

9.2.3 UNDERLYING ROOT CAUSES (RESEARCH OBJECTIVE THREE)

Chapter Six discusses the types and causes of claims and disputes (the macro level). The four assessment indicators that were used are agreement (if the respondents agree that the types or causes are potential), frequency (how frequent are these types and causes), impact (the level of impact these types and causes have on respondents projects) and avoidability (the level of avoidability for the types and causes). CFI index was developed for the significant types of claims and disputes that require managerial attention and focus. These top sixteen types are frequent, severe and/or can be easily avoided. The next stage of analysis is to investigate and explore the significant cause/s that could lead to such significant types of claims and disputes (micro level). In this section, a detailed analysis and discussion is presented for the top five significant types (**T19, T03, T26, T01** and **T12**) and their related significant root causes.

As previously mentioned, the focal point of this study is to find out the types of claims and disputes that are significant and need for minimisation. These types were compared to verify which one had a relatively higher frequency with a relatively higher magnitude (impact) and can be easily avoided (higher avoidability). This stage of the analysis is called the *macro level* analysis. Moreover, the study endeavours to explore the root causation of such types of claims and disputes. This exploration enables the proper assessment of both the significance and the avoidability of these underlying root causes. This stage of the analysis is called the *micro level* analysis.

By combining these two levels of analysis, proper preventive measures can be suggested to reduce the frequency and/or magnitude of those types of claims and disputes. In short, if we can avoid or at least control the significant underlying causes of any type of claims and disputes, then this type can be avoided or at least controlled.

Section 7.4 presents those potentially significant types of claims and disputes that require managerial attention for minimisation. Moreover, Section 7.5 highlights the various causes that could give rise or contribute to such types of claims and disputes. Sections 7.4 ‘**Types of Claims and Disputes**’ and 7.5 ‘**Causes of Claims and Disputes**’ present the macro level analysis. A deeper analysis was performed on

the root causation of each type of claims and disputes in the next stage to present the result of the micro level analysis.

Section 8.2 presents discussion and analysis of the collected data from the third section of the questionnaire survey, which focused on the root causation of each type of claims and disputes.

The analysis of the collected data from the third section expected to provide an answer to the following question;

- ✓ Do the construction professionals agree that these suggested causes contribute to the generation of the types of construction claims and disputes? and, if so, to what extent?;

Therefore, this section aimed at exploring the respondents' perception on the suggested causes that could contribute to the rise of each type of claims and disputes in the UAE. The section focused on the following aspects:

- ✓ Confirming the common and potential cause/s that contributes to the generation of each type of construction claims and disputes;
- ✓ Estimating the relative significance of each cause of claims and disputes;

A table was provided with thirty-two possible causes that could lead to each type of claims and disputes. Respondents were asked to rate the level of significance (importance) of each root cause that underlies a specific type of claims and disputes in construction projects. A weight in a scale from 1 to 5 was given for each of the five options with a weight of 1 for "never", 2 for "low significance", 3 for "average", 4 for "high significance" and 5 for "very high significance". No weight was given when no response was provided. The analysis of the results for this assessment is based on the average score, which equals to three (3.0). This average score is the same as an Important Index of 60%. If any cause has an average score equal or greater than three (important index equal or more than 60%), then this cause is said to be significant. On the contrary, if the mean score of a specific cause is less than three, then this cause is said to be not significant (insignificant). Hence, all causes are ranked from 1 to 32

based on their perceived significance values, where rank number 1 is for the most significant cause and rank number 32 for the least significant type.

The results of this analysis for the top five significant types of claims and disputes such as (T19, T03, T26, T01 and T12) are revealed in Section 8.2.1 to Section 8.2.5. A comparison table is presented comparing the significance assessment of the various groups (i.e. clients, consultants and contractors). Finally, a Rank Agreement Factor comparison table is presented to correlate the significance assessment, and to explain the agreement of the responses of the various groups (i.e. clients, consultants and contractors) on the underlying root causation that could significantly contribute to the rise of specific types of claims and disputes.

The complete list and summary of the findings, for the significant root causes that could lead to the sixteen types of claims and disputes have been identified in Sections 7.4 with Claim Focus Index (CFI) values of equals to 60 % or above, can be found in Section 8.3. These types of claims and disputes require managerial attention with potential for avoiding their frequencies and/or magnitudes.

9.2.3.1 FACTORS INFLUENCING UNDERLYING ROOT CAUSES THAT CONTRIBUTE TO TYPES OF CLAIMS AND DISPUTES

Section 8.2 ‘Part A: Significant Causes Under Types of Claims and Disputes’ of this thesis reveals the findings of the significance assessments from different prospective (i.e., clients, consultants, contractors and overall responses). As previously mentioned, this assessment focused on the root causation of each type of claims and disputes.

➤ Identifying the perceived significant underlying causes that contribute to/trigger “Variations claims and disputes” (T 19):

In Section 8.2.1, respondents were asked to identify the significant underlying causes that contribute to/trigger “*Variations claims and disputes*” (T19). Respondents were asked to assess the perceived significance of these causes.

Table 8-3, Table 8-4 and Table 8-5 present the responses for the cause’s significance assessment from the three responding groups. These three tables are

found in Sections 8.2.1.1, 8.2.1.2 and 8.2.1.3, respectively. In addition, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 8-6**. In addition, the comparison **Table 8-7** is presented in Section 8.2.1.5 to compare the significance assessment, for the thirty-two causes of claims and disputes that are used in this research, by the various responding groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each cause of claims and disputes. Furthermore, **Table 8-8** presents the agreement of the responses between the respondents groups using the Rank Agreement Factor. In general, the most significant causes that can generate this type of claims and disputes are twelve causes as perceived by all respondents. These significant causes are listed below:

1. T190C01 Variations - Inadequate/ inaccurate design information
2. T190C02 Variations - Inadequate design documentation
3. T190C08 Variations - Inadequate contract documentation
4. T190C09 Variations - Incomplete tender information
5. T190C03 Variations - Inadequate brief
6. T190C21 Variations - Changes by client
7. T190C04 Variations - Unclear & inadequate specifications
8. T190C22 Variations - Lack of competence of project participants
9. T190C15 Variations - Inappropriate/ unexpected time control (target)
10. T190C29 Variations - Poor management
11. T190C16 Variations - Inappropriate/ unexpected cost control (target)
12. T190C07 Variations - Inadequate contract administration

➤ **Identifying the perceived significant underlying causes that contribute to/trigger “Design/change/omission/errors by the client claims and disputes” (T 03):**

In Section 8.2.2, respondents were asked to identify the significant underlying causes that contribute to/trigger “*Design/change/omission/errors by the client claims and disputes*” (T 03). Respondents were asked to assess the perceived significance of these causes.

Table 8-9, Table 8-10 and Table 8-11 present the responses for the cause's significance assessment from the three responding groups. These three tables are found in Sections 8.2.2.1, 8.2.2.2 and 8.2.2.3, respectively. In addition, the results of the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 8-12**. In the same way, the comparison **Table 8-13** is presented in Section and 8.2.2.5 to compare the average score and important index values amongst the different responding groups and the overall values of all the causes for **T03 "Design change / Design omission / Design errors by the client"**. Furthermore, **Table 8-14** presents the agreement of the responses between the respondents groups using the Rank Agreement Factor. Finally, the most significant causes that may trigger this type of claims and disputes as perceived by all groups are seven causes. These significant:

1. T030C01 Design/ change/ omission / errors by the client - inadequate/ inaccurate design information;
 2. T030C02 Design/ change/ omission / errors by the client - inadequate design documentation;
 3. T030C04 Design/ change/ omission / errors by the client - unclear & inadequate specifications;
 4. T030C09 Design/ change/ omission / errors by the client - incomplete tender information;
 5. T030C03 Design/ change/ omission / errors by the client - inadequate brief;
 6. T030C20 Design/ change/ omission / errors by the client - slow client response;
 7. T030C21 Design/ change/ omission / errors by the client - changes by client.
- **Identifying the perceived significant underlying causes that contribute to/trigger "Delay: due to variation claims and disputes" (T 26):**

In Section 8.2.3, respondents were asked to identify the significant underlying causes that contribute to/trigger "**Delay: due to variation claims and disputes**" (T 26). Respondents were asked to assess the perceived significance of these causes.

Table 8-15, Table 8-16 and Table 8-17 present the responses for the cause's significance assessment from the three responding groups. These three tables are found in Sections 8.2.3.1, 8.2.3.2 and 8.2.3.3, respectively. In addition, the results of

the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 8-18**. Furthermore, **Table 8-19** is presented in Section and 8.2.3.5 to compare the cause's significance assessment, for the thirty-two causes of claims and disputes that can contribute to this type of claims and disputes, by the various responding groups (i.e. clients, consultants and contractors). It presents the mean score and important index values for each type of claims and disputes. In addition to, **Table 8-20**, which presents the agreement of the responses between the different responding groups using the Rank Agreement Factor. In general, the most significant causes that can generate this type of claims and disputes, as perceived by all respondents, are thirteen causes. These significant causes are as follows:

1. T260C02 Delay: due to variation - inadequate design documentation;
2. T260C08 Delay: due to variation - inadequate contract documentation;
3. T260C21 Delay: due to variation - changes by client;
4. T260C01 Delay: due to variation - inadequate/ inaccurate design information;
5. T260C03 Delay: due to variation - inadequate brief;
6. T260C09 Delay: due to variation - incomplete tender information;
7. T260C04 Delay: due to variation - unclear & inadequate specifications;
8. T260C22 Delay: due to variation - lack of competence of project participants;
9. T260C15 Delay: due to variation - inappropriate/ unexpected time control (target);
10. T260C29 Delay: due to variation - poor management;
11. T260C16 Delay: due to variation - inappropriate/ unexpected cost control (target);
12. T260C07 Delay: due to variation - inadequate contract administration;
13. T260C20 Delay: due to variation - slow client response.

➤ **Identifying the perceived significant underlying causes that contribute to/trigger “Ambiguity in documents claims and disputes” (T 01):**

In Section 8.2.4, respondents were asked to identify the significant underlying causes that contribute to/trigger “*Ambiguity in documents claims and disputes*” (T 01). Respondents were asked to assess the perceived significance of these causes.

Table 8-21, **Table 8-22** and **Table 8-23** present the responses for the cause's significance assessment from the three responding groups. These three tables are found in Section 8.2.4.1, 8.2.4.2 and 8.2.4.3, respectively. In addition, the results of

the collective assessments of the overall responses, (i.e. clients, consultants and contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 8-23**. In the same way, the comparison **Table 8-25** presents the average score and important index for all of the suggested causes for **T01 “Ambiguity in documents”**. These values are based on the responses of the different responding groups (i.e. clients, consultants and contractors). Furthermore, **Table 8-26** presents the agreement of the responses between the respondents groups using the Rank Agreement Factor. These two tables are presented in Section 8.2.4.5. In general, the most significant causes that can generate this type of claims and disputes are nine significant causes, and twenty-one insignificant ones as perceived by all respondents. These significant causes:

1. T010C01 Ambiguity in documents - inadequate/ inaccurate design information;
2. T010C02 Ambiguity in documents - inadequate design documentation;
3. T010C04 Ambiguity in documents - unclear & inadequate specifications;
4. T010C09 Ambiguity in documents - incomplete tender information;
5. T010C03 Ambiguity in documents - inadequate brief;
6. T010C20 Ambiguity in documents - slow client response;
7. T010C08 Ambiguity in documents - inadequate contract documentation;
8. T010C18 Ambiguity in documents - poor communications among project participants;
9. T010C19 Ambiguity in documents - lack of information for decision making.

➤ **Identifying the perceived significant underlying causes that contribute to “Unanticipated soil condition claims and disputes” (T 12):**

Finally, Section 8.2.5 reveals the findings regarding the significant causes that can lead to this type of claims and disputes. Respondents were asked to identify the significant underlying causes that contribute to/trigger **“Unanticipated soil condition claims and disputes” (T 12)**. Respondents were asked to assess the perceived significance of these causes.

Table 8-27, **Table 8-28** and **Table 8-29** present the responses for the cause’s significance assessment from the three responding groups. These three tables are found in Sections, 8.2.5.1, 8.2.5.2 and 8.2.5.3 respectively. In addition, the results of the collective assessments of the overall responses, (i.e. clients, consultants and

contractors) based on the combination of the relative responses of all the respondents, are revealed in **Table 8-30**. In general, the most significant causes that can generate this type of claims and disputes are ten significant causes as perceived by all respondents. However, the remaining twenty-two causes are perceived as insignificant. These significant causes are listed below:

1. T120C24 Unanticipated soil condition - inadequate site investigation
2. T120C02 Unanticipated soil condition - inadequate design documentation
3. T120C01 Unanticipated soil condition - inadequate/ inaccurate design information
4. T120C09 Unanticipated soil condition - incomplete tender information
5. T120C08 Unanticipated soil condition - inadequate contract documentation
6. T120C03 Unanticipated soil condition - inadequate brief
7. T120C26 Unanticipated soil condition - unrealistic expected information by contractor
8. T120C04 Unanticipated soil condition - unclear & inadequate specifications
9. T120C21 Unanticipated soil condition - changes by client
10. T120C20 Unanticipated soil condition - slow client response

In the same way, the comparison **Table 8-31** presents the average score and important index for all of the suggested causes for *T12 “Unanticipated soil condition”*. These values are based on the responses of the different responding groups (i.e. clients, consultants and contractors). In addition, it can be used to compare these values amongst the different responding groups and the overall values. Furthermore, **Table 8-32** presents the agreement of the responses between the respondents groups using the Rank Agreement Factor. These two tables are presented in Section 8.2.5.5.

9.2.4 CONCEPTUALIZING THE CAUSATIVE PATTERN FOR THE SIGNIFICANT TYPES OF CLAIMS AND DISPUTES (FOURTH OBJECTIVE)

Construction claims are considered by many project participants to be one of the most disruptive and unpleasant events of a project (Ho, & Liu, 2004). Latham acknowledged this, and commented that: *“The best solution is to avoid disputes”*

(Fenn, 2002). However, there exists enormous interest in construction disputes amongst the construction's parties and researchers with the techniques used to resolve disputes, rather than any attempt to avoid claims and disputes. In order to avoid claims and disputes, we need to predict them (Fenn, 2002).

In addition, Kumaraswamy (1998) states that "Demands for a more viable service from the construction industry includes calls for curtailment of the proliferation of avoidable claims and disputes that have debilitated the industry. A more efficient service could be provided to construction clients if the sources and root causes of such claims and disputes could be identified and addressed in advance", (Kumaraswamy, 1998). He continues by saying that: "The identification of probable causative patterns of avoidable claims and disputes that merit special attention is seen to suggest managerial strategies to reduce such occurrences", (Kumaraswamy, 1998). Furthermore, he argues that claims managers should focus not merely on the significant claims categories but also on the avoidable ones, to minimize the damaging effects on a given project. In addition, "... it was felt necessary to identify the causes underlying different claims categories, on the premise that if the causes are identified, their controllability and hence avoidability can be assessed more realistically". He continues by saying, "Difficulties in such identifications arose from most claims being generated from overlapping causes and/or cumulative cause-effect cycles", (Kumaraswamy, 1996).

It was shown that the first three research objectives were achieved as explained in details in previous sections.

This section discusses the fourth objective namely, "To conceptualize the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry".

Using the Claim Focus Index (CFI) developed in this research, for the UAE construction industry. Sixteen significant types of claims and disputes have been identified in section 6-4 based on a questionnaire survey of 51 pre-selected respondents. These top sixteen significant types are frequent, severe and/or can be avoided. Thus, these types require managerial attention and focus, in order to avoid

their frequencies and/or magnitudes. Consequently, providing positive benefits in managing construction projects. Hence, basis for recommended strategies to Abu Dhabi construction industry on methods and ways to avoid the avoidable claims and disputes, and control the unavoidable ones in any construction project are presented accordingly. These sixteen significant types are:

1. Variations (T19)
2. Change of design/ design omission / errors by the client (engineer) (T03)
3. D. D. R. P.: Due to variation (T26)
4. Ambiguity in documents (T01)
5. Unanticipated soil condition (T12)
6. Unforeseen ground condition/ unforeseeable obstruction (T13)
7. Differing site condition (T11)
8. Change of project profile and site (T09)
9. Rectification of works/ specification change due to defective design (T05)
10. D. D. R. P.: Due to late issue of consent (approval) (T28)
11. Delays due to incomplete design/insufficient information by client/ consultant (T02)
12. Delayed site possession/ works/ restricted access (T10)
13. Extension of time for completion (T35)
14. D. D. R. P.: Due to late instruction by client/ consultant engineer (T27)
15. D. D. R. P.: Due to delay caused by utility services organization (T31)
16. Default of subcontractor, nominated subcontractor or suppliers (T43)

In addition, the network of principal cause-effect interactions leading to types of claims and disputes, particularly, these sixteen significant types of claims and disputes were examined. Hence, the next stage of analysis was to identify the significant and avoidable causes that could lead to such significant types of claims and disputes (micro level). The causes for these types of claims and disputes were tabulated to study their perceived significance to these types of claims and disputes. From these, the significant root causes were identified. Moreover, the perceived significant root causes that could trigger the top five types of claims and disputes were analysed. Furthermore, the perceived avoidability of the causes that may trigger the types of claims and disputes were also investigated.

Significance and avoidability values for the root causes that contribute to the sixteen significant types of claims and disputes that require managerial attention were plotted in a diagram to produce four groups. This categorization helps in developing proper actions/strategies to deal with these causes (see 8.2).

These proposed actions/ strategies are:

- If the root cause is both ‘Significant’ and ‘Avoidable’, then it is crucial to propose ways and techniques to ‘*Prevent/ minimise*’ such cause. (Group I),
- If the root cause is both ‘Insignificant’ and ‘Avoidable’, then it is crucial to propose ways and techniques to ‘*Minimise*’ such cause (depending on their significance). (Group II)
- If the root cause is both ‘Significant’ and ‘Unavoidable’, then it is crucial to propose ways and techniques to ‘*Control/Monitor*’ such cause. (Group III)
- If the root cause is both ‘Insignificant’ and ‘Unavoidable’, then notify construction managers of such cause. (Group IV)

Since the focus of this study was to first address significant claims, then significant causes, group 1 and 3 were the focus for proposing ways to prevent/minimise the avoidable causes and to control/monitor the unavoidable ones in. Moreover, group 1 will require further attention since the responding groups perceived these causes as an avoidable ones and are significant in contributing to the respective types of claims and disputes. This was discussed in details in Section 8.3.1

Having investigated the significance and the avoidability of those root causes, the relations between these two indicators were explored to form the basis for managerial strategies to reduce such occurrences.

It is recommended to develop strategies to minimize/ control the claims and to probe the following areas in particular, in order to develop additional tools for minimizing avoidable claims

(Group I) [HS-HA]:Significant and Avoidable Causes

The causes that were classified under the first group are listed under the respective types of claims and disputes as follows:

1. Inadequate/ inaccurate design information (C01)
2. Inadequate design documentation (C02)
3. Inadequate brief (C03)
4. Unclear & inadequate specifications (C04)
5. Inadequate contract documentation (C08)
6. Incomplete tender information (C09)
7. Inappropriate/ unexpected time control (target) (C15)
8. Poor communications among project participants (C18)
9. Lack of competence of project participants (C22)

The above-identified causes under the first group that *can/shall* be minimised by management/construction participants are summarised in table ()

(Group III) [HS-LA]: Significant and Unavoidable

The causes that were classified under the third group are significant and unavoidable. These causes are listed under the respective types of claims and disputes as follows:

1. Slow client response (C20)
2. Changes by client (C21)

The above-identified causes under the third group that *should/need* to be *controlled/ monitored* by management/ construction participants are summarised in Section 8.3.3, Table 8-37.

Having investigated these root causes, the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry were, finally, conceptualized and presented in a matrix format in section 8.3.2. Hence, objective four was achieved.

This research has demonstrated its unique contribution to the study of construction claims and disputes, the associated sets of root causes for significant types of claims and disputes identified by this research, and a proposed set of index system that will assist to identify significance and severity of potential occurrence of claims and disputes, so that strategies and solutions could be formulated to avoid or

reduce the impact of these construction claims and disputes in the UAE and, in particular, Abu Dhabi. The way that this research has been conducted, i.e. via a triangulation approach, should also render relevant reference and experience to this general field of subject area studies. However, further research will still be required for the perfection of employability in relation to the findings and recommendations that have been made by this research.

Many construction guidelines provide specific preventive techniques to control some specific causes and may be considered as rule of thumb. However, these techniques need to be studied further to evaluate their effectiveness to control such causes which is beyond the scope of this study. Some of these techniques as mentioned in these construction guidelines are:

C01 Inadequate / Inaccurate Design Information

- **Planning:** Describe who does what, when, at what cost & what specification
- **Final Design Kick-Off Meeting** to review: Project requirements; Project Schedule; All Project significant Decisions & Assure that all parties clearly understand resolution of issues indicated by the approved Preliminary Design
- **Assure Completeness of All Drawings:** & fully define the work as required
- **Assure Coordination of All Drawings** with the specifications required
- **Incorporate all Adjustments** as per the approved design drawings
- **All Drawings should be Drafted Clearly**
- **Include all Composite Drawings** for clarifications
- Assure inclusion of **Borings & other subsurface information** in the drawing
- **Use Graphic & Alphanumeric Scales** to avoid confusion on reduced prints & appropriate drafting scale and include symbols, legends and abbreviations
- **Assure Preparation of Final Specifications** including: Format of Specifications, Coordination of Specifications, Revision for final submission and commissioning specifications for HVAC, Plumbing & electrical system
- Insure **Conformity** of final Design Drawing & Specification with requirements in terms of: Drawing Format, Conformity with comments, Stamp, Signatures, Approvals of Regulatory Agency & clarity & Completeness of Specifications.
- Insure the production & Review of **Final Cost Estimate**

- Develop, review & follow **Final Design Procedures such as:** submittal & Reviews; Utility & Regulatory Agency Approval; Resolution of Questions
- Prepare the **Bid Form, General Condition & Special condition of contract,** and include any contractor special experience requirements
- **Conduct A Constructability Review** to facilitate production of contract documents including technical Specification that are clear, coordinated and complete
- **Conduct a Design Review** to plans, specifications, bid booklet & Addendums

C03 Inadequate Brief

- Define the **Scope of Work** by clarifying purpose/Function of the project
- Define the **Schedule of Accommodation**
- Define the **Quality Requirements/Standards**
- Define the **Operational Requirement**
- Define the **Equipment & Special Services**
- Define **Maintenance Requirements**
- Define **Environmental Needs**
- Define **Disposal Criteria**
- Define **Statutory Requirements**

C04 Unclear & Inadequate Specifications

- **Be aware of Different Type of Specifications** including; Output Based, Performance or Prescriptive
- **Developing The Project Specification According to;** Scope of Users Requirement; Quality & Performance Characteristics; Technical Characteristics
- Apply **Value Management**
- Proper **Structuring of the Project Specifications**
- Assess the **Whole Life Cost** Implications of Specifications
- Obtain **Final Approval** of the Specifications
- Proper **Coordination** with other contract documents
- Apply **Value Management**

C08 Inadequate Contract Documentation

- Clearly Define Contract Documentations
- Assure that the Contract's four elements convey a clear Understanding of the Scope of the Project
- Carefully Define the Responsibilities, Authorities, Roles & line of Communications of the contract parties
- Develop & Monitor progress according to preset monitoring
- Assure consistency of the contract's four elements
- Assure adequacy & accuracy of Design Information
- Assure adequacy & accuracy of Tender Information
- Conduct Constructability Review
- Review Contract Documentation for consistency & clear ambiguities before tendering
- Correct ambiguities & Inconsistencies when discovered during tender stage by issuing addenda
- Use Clear words when defining terms especially the terms "Works" & "Approved"
- Carefully draft the definitions section of the contract
- Assure Completion of all final contract Documentation

C09 Incomplete Tender Information

- Perform careful review/audit of all tender documents prior to tendering to avoid ambiguities & discrepancies
- Assure Clarity, consistency & completeness
- Selection of the Notice of Solicitation
- Adequate information for Solicitation such as: Project brief; place of collecting & reviewing bids; bid security requirements; bid due date, time & location
- Ensure adequate Instructions' information to bidders such as: Type of bid; Preparation of the bid; bid bonds & Security; Permits; bid's opening
- Arrange a Pre-tender site visit for potential bidders

- Ensure adequate bid Response forms' information such as: Project Identification; To whom the bid is directed; Person submitting the bid; validity of the bid Acknowledgments;; Pricing; Start & completion date
- Provide Specifications; Drawings; Contract forms; General & Specific Conditions & Bill of Quantities
- Identify the award Criteria and the essential requirements of a complete bid
- Clarify areas of concerns within the tender document
- Send all clarified questions and answer, to all bidders
- Avoid all unofficial communication with bidders
- All communication should be in writing
- Make a written notice of award after the evaluation
- Notify the winner to provide a secured complete set of its detailed tender papers and summary sheet.
- Assure Clarity, consistency & completeness
- Keep accurate records of the tender process in case.

C15 Inappropriate/ Unexpected Time Control (Target)

- Establish Time Control Procedure/System
- Establish a Time Budget: by fixing the overall project duration either by specific constraints or by contract strategy to use it as a key parameter
- Establish a Time Plan: Using different techniques to establish an overall project programme with definable start & finish points for each activity
- Assure Time Checking: Monitor actual time spent on each activity against planned time
- In case of any exceeds of time allowance:
- Allow the re-sequencing of later activities
- Allow the shortening of time by increasing the resource (This option will result in extra cost)
- Allow the programme for the time impacts of identified risks occurring
- Assess & Revise Contractor's Programme of Work

C18 Poor Communication among Project Participants

- Establish Clear lines of Responsibility

- Define the Method of communication
- Agree on Clear Measurable Objectives
- Be Aware of Body Language & its effect
- Initial Meeting expressing expectations
- Regular Meeting to Review Progress

C22 Lack of Competence of Project Participants

- Clearly Define & Review Project Staffing early in the Project Document
- **To be able to do strategic Planning;** including Value for Money; Value Management; Whole Life Costing; Procurement Strategies & Risk Management.
- **To be able to Procure Professional Services;** including Selection Procedures; Team working & Partnering; Contract Strategies; Tender Evaluation & Forms of Contract
- **To be able to Ensure Effective Delivery Of a Project;** including Project Execution Plan; Specification; Understanding Design Process & Design Quality & Claim Management
- **Ensure Effective Feedback From a Project;** Project Evaluation

(Group III) [HS-LA]: Significant and Unavoidable

C20 Slow Client Response

- Develop Project monitoring Mechanism
- Establish regular Meetings
- Seek assistance to obtain information from other to expedite the response
- Have confidence when time is short & Information is Limited

C21 Changes by Client

- Ensure that the Project brief is comprehensive & Clear
- Ensure the user's agreement on the project brief
- Ensure the early discussion with outside authorities to anticipate their requirements
- Spend adequate time in project planning

- Ensure & Approve the full Development & Coordination of the design
- Apply good project management including forward planning
- Identify risks allocated & adopt value for money criteria to evaluate & manage risk
- Produce a change control procedure & try to minimise changes as possible
- Spend adequate time in project planning

9.2.5 FINDINGS RELATED TO QUANTITATIVE OBJECTIVE STUDY

Bart B of Chapter Eight highlights the objective of the quantitative survey, the source of data and the survey format used in this quantitative study.

The scope of this study is focused on the exploration and investigation of the contractual claims and disputes raised in traditional (lump sum) contract strategy used for building construction projects for the government of Abu Dhabi, UAE according to Abu Dhabi General Condition of Contracts (AGCC). The concluding results of this investigation are based on data collected from forty-five government projects developed by the government of Abu Dhabi. These various projects includes educational projects (i.e. schools and collages, etc.); religious projects (i.e. mosques, etc.); government buildings (i.e. ministries, departments, police stations and head quarters, etc.); and housing projects.

It was decided to collect data from claims on a cross-section of construction projects in Abu Dhabi, in order to compare the significant types of claims and disputes. Based on the projects' monthly progress report, projects were chosen to reflect the various types of projects and areas using a random sampling technique under each area of work (i.e. West of Abu Dhabi, East of Abu Dhabi, Al Mafraq, etc.). A list of projects can be found in Appendix (G).

A standardized data form was developed and used to collect information from each project in the sample as to the cost of claims and disputes. The classification of claims and disputes reflects the provisions of the Abu Dhabi Government Conditions of Contract and their risk areas. Relative magnitude and frequency of each type claims and disputes were quantified based on the collected data from those forty-five construction projects.

Significant Types of Claims & Disputes: Subjective & Objective Magnitude Comparison

The significance level has been allocated to the each of the task. In the above Table 8-46 the level of significance is based on the overall magnitude percentage achieved by the type of claims and disputes of the project. The benchmark significance level is assumed to be, the average value above 60%. The ranking of the types of assessment is based on the subjective magnitude rank. From the table we can see that the total number of rankings attained by the assessments is 26 (i.e. the average magnitude values of the individual assessment is above the significant level 60%). The maximum overall magnitude is achieved by the assessment **T19 “Variations”** is about 89.80%. **T19 “Variations”** has also ranked number 1 in claimed rank and the paid rank but variation is quite high in the average rank (paid/claimed) which is about 11th rank. This means that if assessment **T19 “Variations”** has claimed about 12.18% and has got paid by 7.94% then the average percentage is $7.94/12.18$ which is 65.18%. The ranked 2nd assessment **T26 “Delay/ Disruption to Regular Progress Due To Variation”** has claiming rank 8th and the paid rank 5th which means that the magnitude of **T26 “Delay/ Disruption to Regular Progress Due To Variation”** is very less compared to other types of assessments in terms of the objective assessment. But it holds an average rank 1 with an average paid percentage of $1.27/1.66$ about 76.59%. From the above study we can say that magnitude of the **T19 “Variations”** is high as it ranks 1.

Significant Types of Claims & Disputes: Subjective & Objective frequency Comparison

The significance level has been allocated to the each of the task. In the above Table 8-47 the level of significance is based on the overall frequency percentage achieved by the type of assessment i.e. the conflicts and the disputes of the project. The benchmark significance level is assumed to be, the average value above 60%. The ranking of the types of assessment is based on the subjective frequency rank similar to the level of significance. From the table we can see that the total number of rankings attained by the claims and disputes is 16 (i.e. the numbers of average frequencies of the individual claims and disputes are above the significant level 60%). The maximum overall frequency is achieved by the assessment **T19 “Variations”** is about 81.63%.

T19 “Variations” has also ranked 1 in claimed rank and the paid rank. The average paid frequency is 100% for the assessment **T19 “Variations”**. The assessment **T19 “Variations”** has claimed about 55.66% and has got paid about 55.66% this shows the average percentage is 55.66/55.66 is 100%. From this study we can say that the **T19 “Variations”** is the most frequent type of claims and disputes.

Significant Types of Claims & Disputes: Subjective & Objective Frequency & Magnitude Comparison

In this section, the above **Table 8-48** is combined table with frequency and magnitude of the types of claims and disputes from both surveys for the qualitative and the quantitative study. (Note that this table is extracted from **Table 7-12, Table 7-18, Table 8-46** and **Table 8-47**).

A “*Claims focus indicator*” (CFI) was formulated to compare the perceived significance of each of these types such as the magnitude frequency and avoidability of claim and dispute as stated below.

- Relative frequency of types of claims and disputes
- Relative impact (magnitude) of types of claims and disputes
- Relative avoidability of types of claims and disputes is that a specific type is avoidable by avoiding/ controlling the root cause/s that can contribute to the generation of such type

A benchmark significance level is assumed to be, the average value above 60%. **Table 8-48** is “*Subjective & Objective Frequency & Magnitude Comparison*” presents the CFI percentage that has been calculated and ranked with respect to the CFI value. An overall 16 types of claims and disputes have achieved its significance level above 60%.

While comparing the above **Table 8-46 “Subjective & Objective Frequency & Magnitude Comparison”** we can term the the facts that subjective is an opinion and the objective is the realistic or practical term (from real case studies). Considering this fact a subjective and objective comparison has been made. If we see **Table 8-47 “Subjective & Objective Frequency & Magnitude Comparison”** the total of 16 types of claims and disputes have been ranked in accordance with the CFI% significance

level above 60% as stated. Out of 16, about 11 ranks have been attained by different claims and disputes in both claimed and paid rankings. In both the claimed and paid ranking cases the first rank is achieved by the type **T19** “*Variations*”. While the second rank goes to type **T03** “*Change of Design/ Design Omission / Errors by the Client (Engineer)*”. This comparison states that when both the **T19** and **T03** have been very much frequent and the magnitude is very high in both subjective and objective, they are treated according to their priority of claim. Over all maximum frequency% and magnitude% for **T19** 81.63% and 89.80% respectively and Over all minimum frequency% and magnitude% for **T03** are 67.50% and 69.02% respectively.

***CHAPTER TEN:
CONCLUSIONS AND RECOMMENDATIONS:***

10.1 CONCLUSION

Construction claims are considered by many project participants to be one of the most disruptive and unpleasant events of a project (Ho, & Liu, 2004). Loosemore (1994) adds that resolving the disputes, which develop as a consequence of the differences and conflict of interests that exist within the project team, is something that occupies much of the project manager's time. It is estimated that there has been a 500 % increase in disputes over the last twenty years (Fenn, 1991). Moreover, Yates (2000) states that great concern has been expressed in recent years regarding the dramatic increase in conflicts and disputes in the construction industry of many countries and areas (including Australia, USA, UK, and Hong Kong).

Latham acknowledged this, and commented that: *“The best solution is to avoid disputes”* (Fenn, 2002). However, there exists enormous interest in construction disputes amongst the construction's parties and researchers with the techniques used to resolve disputes, rather than any attempt to avoid claims and disputes. In order to avoid claims and disputes, we need to predict them (Fenn, 2002).

In the same way, Skene and Shaban (2002) conclude that some disputes will require the dispute resolution provisions of the contract including arbitration or litigation. However, this should not deter the participants in a construction project from examining the means and methods to avoid or minimize disputes before or during the course of the project. They add that in order to avoid disputes, it is necessary to have some appreciation for the reasons that disputes may arise on a construction project and to consider the steps that can be taken to minimize the likelihood of such disputes (Skene and Shaban, 2002).

In addition, Kumaraswamy (1998) states that “Demands for a more viable service from the construction industry includes calls for curtailment of the proliferation of avoidable claims and disputes that have debilitated the industry. A more efficient service could be provided to construction clients if the sources and root causes of such claims and disputes could be identified and addressed in advance”, (Kumaraswamy, 1998). He continues by saying that: “The identification of probable causative patterns of avoidable claims and disputes that merit special attention is seen to suggest managerial strategies to reduce such occurrences”, (Kumaraswamy, 1998),

Moreover, Kumaraswamy (1996) argues that claims managers should focus not merely on the significant claims categories but also on the avoidable ones, to minimize the damaging effects on a given project. In addition, "... it was felt necessary to identify the causes underlying different claims categories, on the premise that if the causes are identified, their controllability and hence avoidability can be assessed more realistically". He continues by saying, "Difficulties in such identifications arose from most claims being generated from overlapping causes and/or cumulative cause-effect cycles", (Kumaraswamy, 1996).

As such, claims and disputes are of major concern in construction projects, in terms of delays and extra cost .

This is particularly relevant to Abu Dhabi due to the large capital investment in construction projects.

Deficiencies in previous research were also identified e.g. Kumaraswamy (1997) and Fenn (2002) indicate the causes and root causes of claims and disputes are not fully understood and an appreciation of such root causes will be useful in resolving any ongoing unavoidable claims and disputes as well as avoiding any avoidable ones.

The primary aim of this research was thus to develop a greater understanding of the underlying root causes of claims in construction in the UAE and to identify those that have the greater impact on time delays and cost overruns.

The secondary aim is to investigate whether a knowledge of these root causes can be used to reduce the incidence and impact of claims and disputes in the construction industry in the UAE and in particular Abu Dhabi.

Based on the above stated aims, the specific objectives are set as:

1. To identify the significant types of claims and disputes;
2. To identify the common causes of claims and disputes;
3. To identify the significant causes that may lead to a specific significant type of claims and disputes.

4. To conceptualize the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry

The presented interim results and conclusions in the research were derived from observations that are consolidated from analysis of the detailed data collected from different sources including semi-structured interviews with 10 experts with greater familiarity who are more involved in claims and disputes management. In addition, these results are based on the detailed data of subjective views and observations from fifty-one construction professional, as well as data from quantitative study from forty-five construction projects and case studies related to claims and disputes. Hence, recommended strategies to Abu Dhabi construction industry on methods and ways to avoid the avoidable claims and disputes, and control the unavoidable ones in any construction project are presented.

Using the Claim Focus Index (CFI) developed in this research, for the UAE construction industry. Sixteen significant types of claims and disputes have been identified in section 6-4 based on a questionnaire survey of 51 pre-selected respondents. These top sixteen significant types are frequent, severe and/or can be avoided. Thus, these types require managerial attention and focus, in order to avoid their frequencies and/or magnitudes. Consequently, providing positive benefits in managing construction projects. These significant types are:

1. Variations (T19)
2. Change of design/ design omission / errors by the client (engineer) (T03)
3. D. D. R. P.: Due to variation (T26)
4. Ambiguity in documents (T01)
5. Unanticipated soil condition (T12)
6. Unforeseen ground condition/ unforeseeable obstruction (T13)
7. Differing site condition (T11)
8. Change of project profile and site (T09)
9. Rectification of works/ specification change due to defective design (T05)
10. D. D. R. P.: Due to late issue of consent (approval) (T28)
11. Delays due to incomplete design/insufficient information by client/ consultant (T02)

12. Delayed site possession/ works/ restricted access (T10)
13. Extension of time for completion (T35)
14. D. D. R. P.: Due to late instruction by client/ consultant engineer (T27)
15. D. D. R. P.: Due to delay caused by utility services organization (T31)
16. Default of subcontractor, nominated subcontractor or suppliers (T43)

In addition, the network of principal cause-effect interactions leading to types of claims and disputes, particularly, these sixteen significant types of claims and disputes were examined. Hence, the next stage of analysis was to identify the significant and avoidable causes that could lead to such significant types of claims and disputes (micro level). The causes for these types of claims and disputes were tabulated to study their perceived significance to these types of claims and disputes. From these, the significant root causes were identified. Moreover, the perceived significant root causes that could trigger the top five types of claims and disputes were analysed. Furthermore, the perceived avoidability of the causes that may trigger the types of claims and disputes were also investigated.

Having investigated the significance and the avoidability of those root causes, the relations between these two indicators were explored to form the basis for managerial strategies to reduce such occurrences.

Significance and avoidability values for the root causes that contribute to the sixteen significant types of claims and disputes that require managerial attention were plotted in a diagram to produce four groups. This categorization helps in developing proper actions/strategies to deal with these causes (see **Figure 10-1** below).

There groups were found to be:

(Group I) [HS-HA]: Significant and Avoidable Causes

(Identifying the causes that can/shall be minimised)

The causes that were classified under the first group are listed under the respective types of claims and disputes as follows:

1. Inadequate/ inaccurate design information (C01)

2. Inadequate design documentation (C02)
3. Inadequate brief (C03)
4. Unclear & inadequate specifications (C04)
5. Inadequate contract documentation (C08)
6. Incomplete tender information (C09)
7. Inappropriate/ unexpected time control (target) (C15)
8. Poor communications among project participants (C18)
9. Lack of competence of project participants (C22)

The above-identified causes under the first group that *can/shall* be minimised by management/construction participants are summarised in table ()

(Group III) [HS-LA]: Significant and Unavoidable

(Identifying the causes that should/need to be controlled/ monitored by construction participants)

The causes that were classified under the third group are significant and unavoidable. These causes are listed under the respective types of claims and disputes as follows:

1. Slow client response (C20)
2. Changes by client (C21)

The above-identified causes under the third group that *should/need* to be *controlled/ monitored* by management/ construction participants are summarised in Section 8.3.3, Table 8-37.

These proposed actions/ strategies are:

- If the root cause is both ‘Significant’ and ‘Avoidable’, then it is crucial to propose ways and techniques to ‘*Prevent/ minimise*’ such cause. (Group I),
- If the root cause is both ‘Insignificant’ and ‘Avoidable’, then it is crucial to propose ways and techniques to ‘*Minimise*’ such cause (depending on their significance). (Group II)

- If the root cause is both ‘Significant’ and ‘Unavoidable’, then it is crucial to propose ways and techniques to ‘Control/Monitor’ such cause. (Group III)
- If the root cause is both ‘Insignificant’ and ‘Unavoidable’, then notify construction managers of such cause. (Group IV)

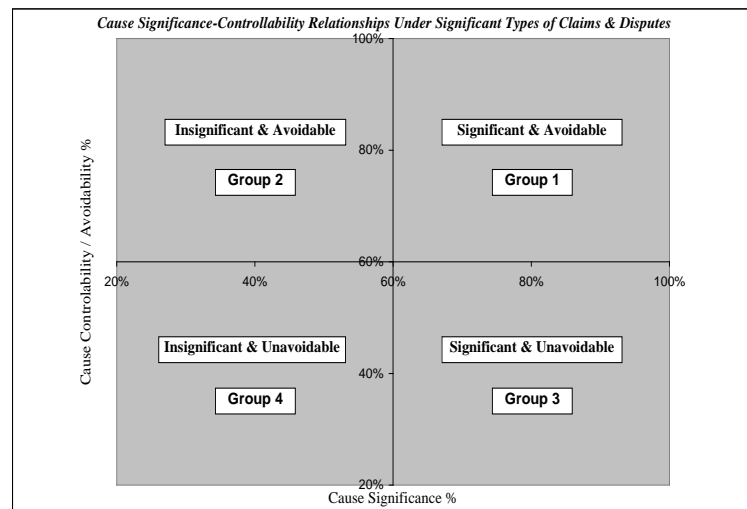


Figure 10-1 Categorization of Cause Significant and Avoidability *

(Note that this Figure is the same Figure 8-2)

Since the focus of this study was to first address significant claims, then significant causes, group 1 and 3 were the focus for proposing ways to prevent/minimise the avoidable causes and to control/monitor the unavoidable ones in. Moreover, group 1 will require further attention since the responding groups perceived these causes as an avoidable ones and are significant in contributing to the respective types of claims and disputes. This will be discussed in details in Section 8.1.1

Having investigated these root causes, the following step is aimed at presenting these different causes in a matrix format in order to conceptualise the causative pattern for the significant types that require managerial attention with potential for avoiding their frequencies and/or magnitudes in the UAE construction industry. This has been done in Section 8.3.2.

It is recommended to develop the suggested strategies to minimize/ control the claims and to probe the following areas in particular, in order to develop additional tools for minimizing avoidable claims

Based on the research findings and the above presentation, it can be seen that the research primary aim namely *'to develop a greater understanding of the underlying root causes of claims in construction in the UAE and to identify those that have the greater impact on time delays and cost overruns'* is achieved by:

1. identifying the significant types of claims and disputes;
2. identifying the common causes of claims and disputes;
3. identifying the significant causes that may lead to a specific significant type of claims and disputes.

Moreover, the secondary aim of this research, namely *'to investigate whether a knowledge of these root causes can be used to reduce the incidence and impact of claims and disputes in the construction industry in the UAE and in particular Abu Dhabi'*, was achieved.

Having investigated the significance and the avoidability of those root causes, the relations between these two indicators were explored to form the basis for managerial strategies to reduce such occurrences.

Thus, It was shown that based on the knowledge of these root causes, can be used to reduce the incidence and impact of claims and disputes in the construction industry in the UAE and in particular Abu Dhabi

CONCLUDING REMARKS

The general conclusion of this research was that construction claims can be used to indicate several problem areas in the construction procedure and process. These areas should be noted and monitored by construction participants during the various stages of the construction process. Steps should also be taken to clarify any issues or conflict that can possibly arise in these common problem areas.

Based on the presented results, it is recommended that special consideration should be given to contract clauses dealing with such issues. The best way to cope with risk of construction claims is to reduce or avoid them altogether. There are certain fundamental ways and methods of reducing the number of encountered claims.

The essential steps an client can take to minimize risks and deal with the abovementioned identified causes are to:

- Allow reasonable time for producing clear and complete drawings and specifications by the design team;
- Implement constructability review during the various stages of the project.
- Develop a proper procedure for processing and evaluating variations.
- Develop a proper procedure for processing and evaluating claims.
- The use of Critical Path Method (CPM) scheduling, cost control, and productivity analysis to control and monitor progress and productivity.

However, there is no guarantee that claims can be avoided entirely. Avoiding claims requires understanding their causes, understanding contractual terms and obligations, and early and continued communication. Therefore, it is expected that the findings of this research will assist all parties to a contract to reduce liability by resolving claims through reference to existing records of fact and clear interpretation of contract terms. It will also help them avoid the main causes of claims and disputes and; hence, minimize delays and cost overruns in construction projects. The author believes the suggested comments are essential for proper project management, which is far more advantageous and profitable than seeking advice of a construction claim consultants after the dispute is entrenched. The latter course often takes place too late and is too costly.

10.2 LIMITATION OF THE RESEARCH

The study is limited to the exploration and investigation of the contractual claims and disputes raised in traditional (Lump Sum) contract strategy used for building construction projects for the government of Abu Dhabi, UAE according to Abu Dhabi General Condition of Contracts (AGCC). In addition, this investigation and analysis has relied largely upon the feedback from experienced construction professionals (i.e. clients, consultants, and contractors, claim experts) in the region. The sample selected covers sufficient categories of professionals yet has a limited size; including 10 claims and disputes experts, 19 clients, 17 consultants and 15 contractors. In addition, data was collected from forty-five various government

projects developed by the government of Abu Dhabi. These projects include educational projects (i.e. schools and collages, etc.); religious projects (i.e. mosques, etc.); government buildings (i.e. ministries, departments, police stations and head quarters, etc.); and housing projects.

As mentioned earlier, the collected data were limited to forty five completed projects which may be considered insufficient to develop a reliable model for the prediction of claims based on typical frequencies and magnitudes from similar type of claims and disputes. Conversely, it provided a viable prototype, indicated potentially significant areas to be examined further. It facilitated the testing of the research methodology and helped to elicit feedback on some suggested strategies.

Although the Claims Focus Indicator was developed to provide a useful tool to focus the management attention on significant types of claims and disputes, the conditions and perceptions of the industry are subject to changes. As such, a continuous update of CFIs is recommended to cater for the varying conditions in the generation of claims and disputes. Confidentiality of the documents relating to claims and disputes has placed limitations on the unrestricted collection of useful data. These limitations can be overcome when the public sector establishes a control mechanisms that have been recommended from this study, for example by developing the expanded data base.

10.3 SIGNIFICANCE AND MAJOR CONTRIBUTION OF THE RESEARCH

As claims and disputes can have numerous negative impacts, namely, delays and cost overruns of construction projects; this study is carried out to identify the significant (important) types of claims and their associated significant causes that contribute to the rise of these claims and disputes. This identification will help the construction participants in assessing these factors and take the necessary proactive measures to reduce their adverse impact by applying the developed and suggested methods and strategies to control the controllable causes as a mean of avoiding any avoidable claims and disputes and mitigating any ongoing and unavoidable ones in the Arabian Gulf region. These recommendations and strategies are mainly improvement of documentation and administrative processes used in the construction

industry in order to reduce the number of claims and disputes and their associated costs.

Despite the scope and limitation of this study, which focuses mainly on government projects in Abu Dhabi, the general causative pattern of these claims and disputes can be taken as guidance for other construction projects, especially that most of the project developers in Abu Dhabi are using the traditional (lump sum) contract strategy. As previously mentioned, around \$50 Billion is invested in construction development during the last 8 years (intersect, 2003), as well as the overall percentage and the general trend of claims and disputes which equal to 15 % of the value of the building projects reported by other researchers in the UAE (Zaneldin, 2002). In view of this, one can really appreciate the amount of savings that could be made by developers by avoiding and controlling the causes of these claims and disputes.

A major significance of this study is that it is the first detailed study of its kind to address not only the classification of claims and disputes in terms of their types and causes, but also it is the only study that took these different factors into different layers of analysis (i.e. type, causes, causes and each type, etc.). This is described by the researcher as the macro and the micro levels of investigation, where most of the previous works by other researchers looked at claims and disputes from either the macro level or micro level perspectives. The macro level prospective is that when the previous researchers looked at types and causes in general without any discussion of the underlying causes of these types of claims and disputes; alternatively, the micro level is that when they looked at a specific type of claims and disputes (i.e. variations) and investigate the underlying causes of variations. In both ways of analysis, they proposed general method and strategies to avoid claims and disputes in general. This way of analysis has lead to conflicting causes of claims and disputes, and consequently, the proposed strategies to avoid or reduce such causes are conflicted and add additional confusion to the construction industry. However, this study looks at claims and disputes in two different layers, the analysis of the general types of claims and disputes (macro level), as well as the underlying causes of each type of claims and disputes (the micro level). This approach enabled the researcher to understand and assess those type and their underlying causes more realistically; hence, to propose an appropriate strategies and measures to avoid and control these causes of claims and disputes. The conclusion that was drawn by the researcher on

this issue is supported by other critic scholars such as Fenn and Kumaraswamy as mentioned earlier in this chapter.

The significance of this study is supported by the use of different methods of research, namely, methodological triangulation, which helped the researcher to increase the validity and credibility of the results of the significant types of claims and disputes and their associated and significant root causation, in order to achieve the objectives of the research as adequately as possible. This method of research study is acknowledged by various researchers such as Cohen and Manion (1986) who define triangulation as an *“attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint”*. Altrichter et al. (1996) contend that triangulation *“gives a more detailed and balanced picture of the situation”*; as well as, O’Donoghue and Punch (2003) who argue that triangulation is a *“method of cross-checking data from multiple sources to search for regularities in the research data”*.

Another major significance of this study is that, although, the reported surveys used in this study highlight particular types of claims and disputes and their relative root causation patterns in Abu Dhabi, UAE, a review of the international literature confirms the many parallels with other contractual regimes. It is also noted that the research methodology used in this study, is potentially applicable as a benchmark for studies in other contractual regimes with special considerations to the general conditions of contracts and the associated risks in those specific regimes. The ongoing development of innovative forms of construction procurement adds value to the services provided to construction participants (i.e. clients, consultants, contractors, experts, etc.), as well as to the construction industry in general. This development can be guided by the additional and crucial knowledge generated, specifically, to manage claims and disputes in construction projects by formulating ways and methods to avoid the avoidable claims and disputes and control the unavoidable ones.

This research has demonstrated its unique contribution to the study of construction claims and disputes, the associated sets of root causes for significant types of claims and disputes identified by this research, and a proposed set of index system that will assist to identify significance and severity of potential occurrence of claims and disputes, so that strategies and solutions could be formulated to avoid or

reduce the impact of these construction claims and disputes in the UAE and, in particular, Abu Dhabi. The way that this research has been conducted, i.e. via a triangulation approach, should also render relevant reference and experience to this general field of subject area studies. However, further research will still be required for the perfection of employability in relation to the findings and recommendations that have been made by this research.

10.4 RESEARCH RECOMMENDATIONS

More extensive investigations are recommended, particularly focused on the results presented and significant areas identified in this study. Quantitative data from more projects is needed. Furthermore, specific preventive techniques need to be developed and validated in order to tackle the identified significant types and causes of claims and disputes.

It is recommended to develop and deploy the basis of suggested strategies and methods to minimize/ control the claims and disputes; and to probe the following areas in particular in order to develop additional tools for minimizing avoidable claims and disputes. Suggested methods requiring further development and areas of study that could contribute to the development of additional tools for minimizing claims and disputes are:

- Establish a system for collecting and assembling a comprehensive database of claims classified according to categories, in order to project typical patterns and to predict frequencies/ magnitudes based on the methods as described in Chapter 7. The CFI values were calculated based on the perceived responses. It is recommended that the CFIs should be revised based on the frequencies and magnitudes obtained from the expanding data base of claims and the perceived avoidabilities of the respective types of claims and disputes. Any shifts in CFIs relating to particular sources of claims will require a re focus on such sources, for example to ascertain and address the reasons;
- The use of computer-based programmes in the assessment of claims for extensions of time and monitoring of progress using the CPM such as Primavera;
- Develop a database for resource records and programme updates using an information technology support system. For example daily and monthly records of

resources and activities should be recorded and analysed in spreadsheets (in digital format) with reference to activity numbers in the programme;

- . Incorporate decision tree flow charts in ‘Abu Dhabi Construction Guidelines’ in order to aid their decision-making in complex problem scenarios such as ‘Unanticipated ground conditions’ and ‘Delays caused by utility services organization’
- Encourage further research to study and evaluate the effectiveness of specific preventive techniques proposed by many construction guidelines and used to control specific root causes.

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*Understanding and Preventing Construction Conflict, Claims and
Disputes: A Critical In-depth Study into their Causes and
Recommendations to Control in the United Arab Emirates*

By

Nadhem Asaad Bin Asaad Taher

*A Thesis Submitted in Partial Fulfilment for the Degree of
Doctor of Philosophy
In Engineering Claims and Disputes*

Appendices, Volume II

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APPENDIX A: RESEARCH VARIABLES LISTS

A.1 TYPES OF CLAIMS AND DISPUTES:

Code	Types of Claims and Disputes
T 01	Ambiguity in Documents
T 02	Delays: Incomplete Design/ Insufficient Information by client/ consultant
T 03	Design/ Change/ Omission / Errors by the Client or (Engineer)
T 04	Instruction by the Client/ Consultant to Resolve Discrepancy
T 05	Rectification of Works/ Specification Change Due to Defective Design
T 06	Substantial Increase in Quantity of any item (not resulting from a Variation)
T 07	Substantial Change in Quality of any item (not resulting from a Variation)
T 08	Error in Setting out Due to Incorrect Data Shown on Drawings
T 09	Change of Project Profile and Site
T 10	Delayed Site Possession/ Works/ Restricted Access
T 11	Differing Site Condition
T 12	Unanticipated Soil Condition
T 13	D. D. R. P.: Due to Unforeseen Ground Condition/Unforeseeable Obstruction
T 14	Investigation of Suspected Defects
T 15	Uncovering of Works for Testing (Examination)
T 16	Additional Tests to Verify Compliance with the
T 17	Suspension of Work
T 18	Acceleration of Works
T 19	Variations
T 20	Additional Work to other Parts arising from repairs or defects
T 21	Client's Instruction to Change (not resulting from Variation)
T 22	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)
T 23	Loss of / Damage to Materials on Site or During Transport
T 24	Repair damages to other Property during Transport of Materials
T 25	Delays: Unavailability / Unsuitability of Project Materials
T 26	D. D. R. P.: Due to Variation
T 27	D. D. R. P.: Due to Late Instruction by Client/ Consultant Engineer
T 28	D. D. R. P.: Due to Late Issue of Consent (Approval)
T 29	D. D. R. P.: Due to Delay Caused by any Person/ Organization employed by client such as (Nominated Subcontractor, Suppliers or Others)
T 30	D. D. R. P.: Due to Late Delivery of Materials by the Client
T 31	D. D. R. P.: Due to Delay Caused by Utility Services Organization
T 32	D. D. R. P.: Due to Additional/ Unforeseen Building Regulations/Procedures
T 33	Client's Breach of Contract
T 34	Late Issuance of final certificate
T 35	Extension of Time for Completion
T 36	Late Payment
T 37	Interest on Late Payment
T 38	Overdue retention money
T 39	Inflation / Price Escalation
T 40	Currency Fluctuation
T 41	Finance Charges: Loss of Profit, Insurance, Retention, etc.
T 42	Liquidated and ascertained damages
T 43	Default of Subcontractor, Nominated Subcontractor or Suppliers
T 44	Unproductive / Idle Plants, Equipment or Labour

T 45	Labour Strikes, Civil Unrest, etc.
T 46	Custom Tariffs, New Taxes
T 47	Embargoes on Project Imported Items
T 48	Expropriation of Contractor's Equipment or Machinery, etc.
T 49	D. D. R. P.: Due to Inclement Weather, Flood, Storms, etc.
T 50	Damages to Work due to Exceptionally Inclement/ Adverse Weather
T 51	Rectification of Damage Due to Unexpected Risk

Where, D. D. R. P.: Delays/ Disruption to regular progress

A.2 CAUSES OF CLAIMS AND DISPUTES:

Code	Causes of Claims and Disputes
C01	Inadequate/ Inaccurate Design Information
C02	Inadequate Design Documentation
C03	Inadequate Brief
C04	Unclear & Inadequate Specifications
C05	Inappropriate Contract Type (Strategy)
C06	Inappropriate Contract Form
C07	Inadequate Contract Administration
C08	Inadequate Contract Documentation
C09	Incomplete Tender Information
C10	Inappropriate Contractor Selection
C11	Unrealistic Tender Pricing
C12	Unrealistic Client Expectations
C13	Inappropriate Payment Method
C14	Inappropriate Document Control
C15	Inappropriate/ Unexpected Time Control (Target)
C16	Inappropriate/ Unexpected Cost Control (Target)
C17	Inappropriate/ Unexpected Quality Control (Target)
C18	Poor Communications Among Project Participants
C19	Lack of Information for Decision Making; (Decisiveness)
C20	Slow Client Response
C21	Changes by Client
C22	Lack of Competence of Project Participants
C23	Poor Workmanship
C24	Inadequate Site Investigation
C25	Unrealistic Client Expectations
C26	Unrealistic Information Expectations (By the Contractor)
C27	Lack of Team Spirit Among Participants
C28	Personality Clashes Among Project Participants
C29	Poor Management By One or More Project Participants
C30	Adversarial (industry) Culture Among project Participants
C31	Uncontrollable External Events
C32	Exaggerated Claims

**A.3 SIGNIFICANT CAUSES UNDER TYPES OF CLAIMS AND DISPUTES):
(TYPE – CAUSE RELATIONSHIPS) (T01 C01) – (T51 C32):**

The following system used to code the causes that can trigger/ contribute to the types and their sub variables, which were used in the third section of the second part (Technical Assessment) of the questionnaire survey. In addition, the following table provides a description and the coding system used to code these causes.

➤ **The Coding System Used in this Study for this assessment is as follows:**

- **Type – Cause Interrelationships Variables:** **(T00 0 C00)**

(Significance of different Causes under a specific Type of Claims & Disputes)

Note: The Coding for these variables is the combination of both Types & Cause Coding (T00 & C00).

T00: Fifty One (51) Different Types (First two zeros) after **T** (1-51)

0: Duplication of the Same Type (Controlling Question) (3rd Zero)
(Need for a Sub coding)

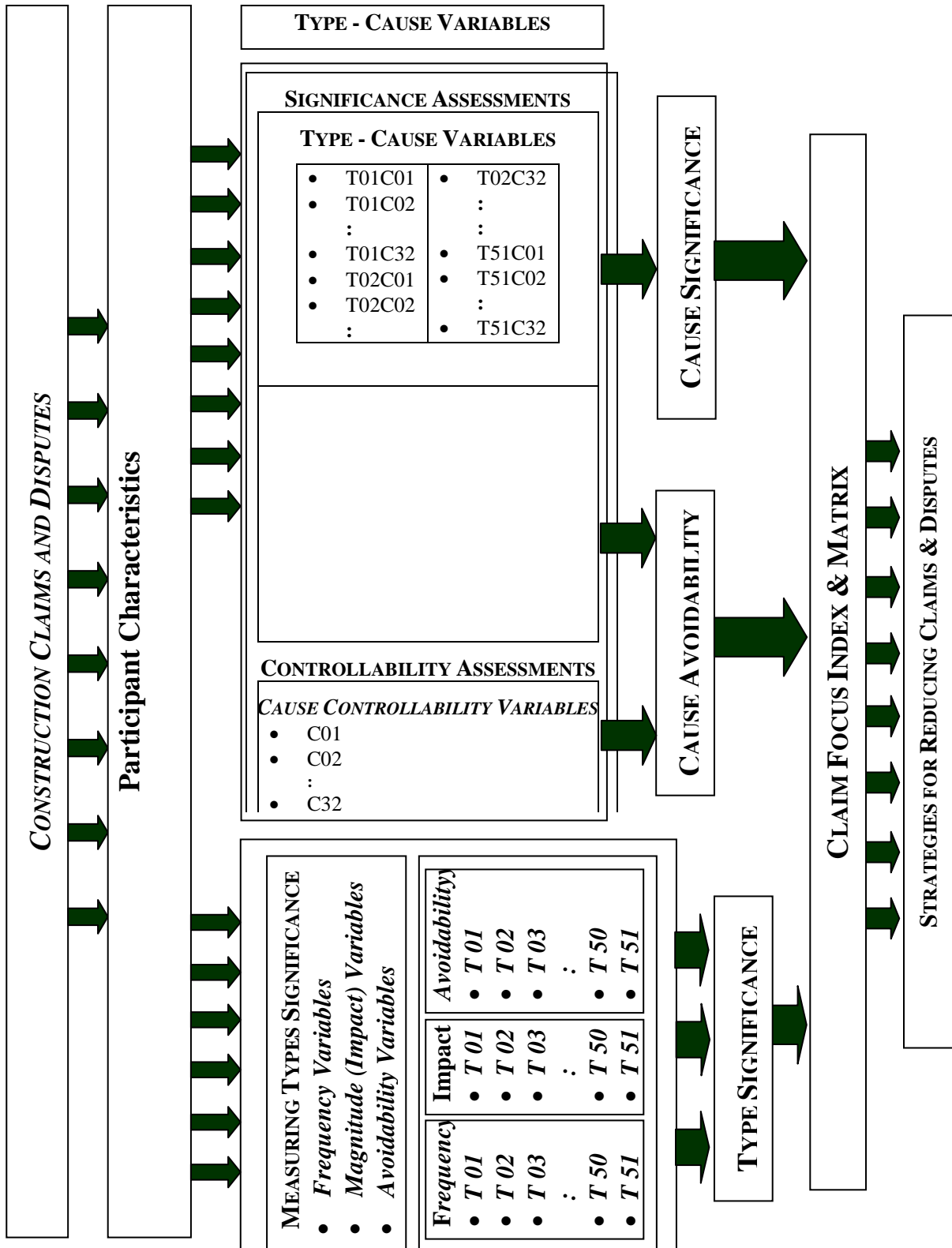
C00: Thirty Two (32) Different Causes (Fourth & Fifth zeros) after **C** (1-32)

(One question asked for each Type-Cause relations) (1)
(No Need for a second Sub coding)

Variable		Label	Description
Type – Cause Assessment (T000 C00)	T000 C00 1	Significance	Significance of a Specific Cause that can lead to a Specific Type of Claim

APPENDIX B: RESEARCH MODEL, CODING SYSTEM & VARIABLE LISTS

B.1 ASSESSING CONSTRUCTION CLAIMS AND DISPUTES FOCUS:



B.2 THE RESEARCH VARIABLES:

The research Variables

CATEGORY	INDEPENDENT VARIABLES	DEPENDENT VARIABLES
1	<ul style="list-style-type: none"> • Frequency of Types of Claims • Magnitude of Types of Claims • Avoidability of Types of Claims 	Potential Significant Types of Claims & Disputes (Type Significance)
2	<ul style="list-style-type: none"> • Type Variables – Cause Variables 	Potential Significant Cause /s Under Each Type of Claims & Disputes (Cause Significance)
3	<ul style="list-style-type: none"> • Cause Controlability 	Potential Avoidable Cause /s Under Each Type of Claims & Disputes (Cause Avoidability)
4	<ul style="list-style-type: none"> • Type Significance • Cause Significance • Cause Avoidability 	Claim Focus Index & Matrix

B.3 VARIABLES USED IN THE RESEARCH AND THEIR MEASUREMENT

METHODS:

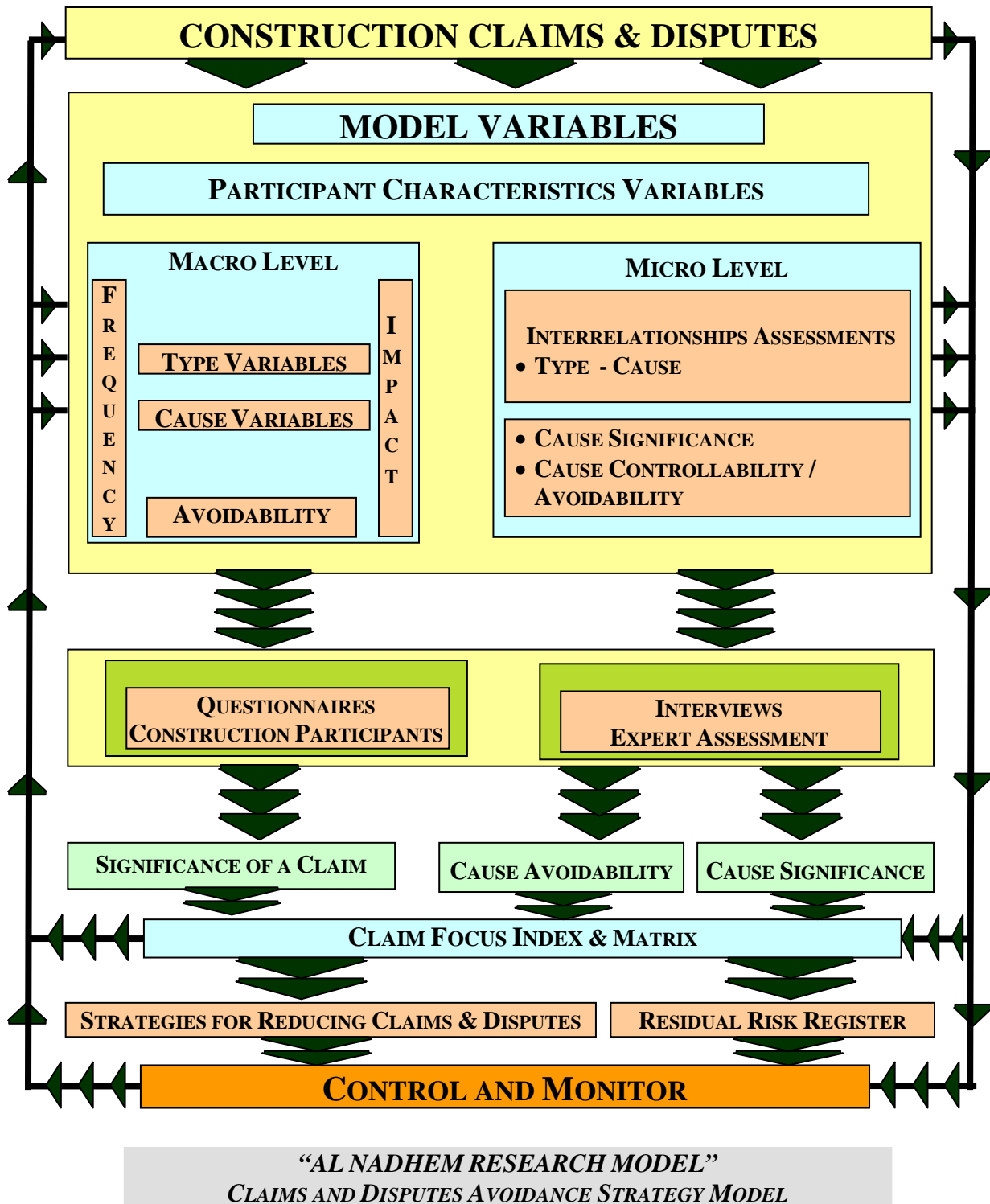
Variables used in the research and their measurement methods

Table 2-1: Variables Used in the Research and their Measurement Methods

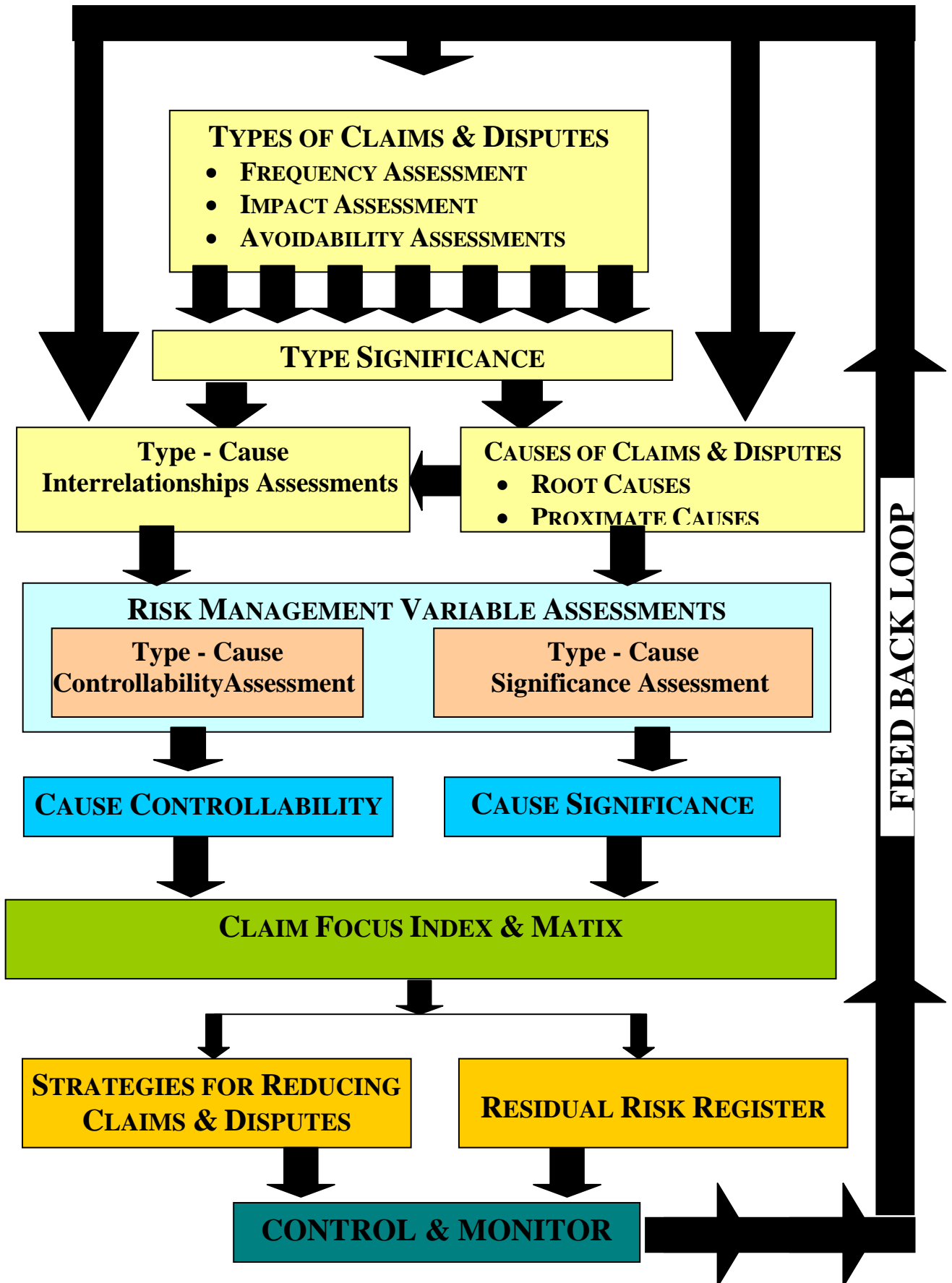
VARIABLES USED IN THE RESEARCH	MEASUREMENT METHODS		
	(QUALITATIVE) MEASUREMENT	(QUANTITATIVE) MEASUREMENT	
<p><u>Types of Claims Variables</u></p> <ul style="list-style-type: none"> • <u>Agreement:</u> T 01 01T 51 01 • <u>Frequency:</u> T 01 02T 51 02 • <u>Magnitude:</u> T 01 03T 51 03 • <u>Avoidability:</u> T 01 04T 51 04 	<p>Administrated Interviews with Experts in Claims & Disputes</p>	<p>Questionnaires Survey</p> <p>➤ 51 Construction Participants</p> <ul style="list-style-type: none"> • Clients • Consultants • Contractors 	
<p><u>Cause of Claims Variables (Over All)</u></p> <ul style="list-style-type: none"> • <u>Agreement:</u> C 01 01C 32 01 • <u>Significance:</u> C 01 03C 32 03 • <u>Avoidability:</u> C 01 07C 32 07 			
<p><u>Potential Cause That Could Lead To A Specific Type of Claims Variables</u></p> <ul style="list-style-type: none"> • <u>Significance:</u> T 01 C 01..... T 01 C 32 T 51 C 01.....T 51 C 32 			<p>Quantitative Survey</p> <p>➤ 45 Construction Projects</p>

A complete list of the variables and their coding system used in the present research can be found in Appendix (A and B, respectively)

B.4 THE RESEARCH MODEL:



B.5 THE RESEARCH FLOW CHART:



*“AL NADHEM RESEARCH MODEL”
CLAIMS AND DISPUTES AVOIDANCE STRATEGY MODEL*

B.6 THE RESEARCH CODING SYSTEM:

VARIABLE INFORMATION

RESEARCH MAIN VARIABLES:

Variable's Category	Variable	Variable Coding
Participant's Characteristics Variables	Participant's Characteristics	PC0
Sources of Claims & Disputes Variables	Type of Claims and Disputes	T0000
	Causes of Claims and Disputes	C0000
Interrelationships Assessment Variables	Type – Cause Interrelationships	T000C000

B.6.1 VARIABLES CODING DESCRIPTION:

➤ **Participant's Characteristics Variables:** **(PC 0)**

PC: Participant Characteristics
0: Eight (8) Different Characteristics (1-8)
 (One question asked for each characteristic) (No need for a Sub coding)

➤ **Sources of Claims & Disputes Classification:**

• **Types of Claims & Disputes Sub Variables:** **(T 00 0 0)**

T: Types of Claims & Disputes
00: Fifty One (51) Different Types (First two zeros) (1-51)
0: Duplication of the Same Type (Controlling Question) (3rd Digit) (Need for a Sub coding)
0: (Six different questions asked for each Type) (1-6) (4th Digit) (Need for a second Sub coding)

• **Causes of Claims & Disputes Sub Variables:** **(C 00 0 0)**

C: Cause of Claims & Disputes
00: Thirty Two (32) Different Causes (First two zeros) (1-32)
0: Duplication of the Same Cause (Controlling Question) (3rd Digit) (Need for a Sub coding)
0: (Seven different questions asked for each Cause) (1-7) (4th Digit) (Need for a second Sub coding)

➤ **Interrelationships Assessment Variables**

➤ **Type – Cause Interrelationships Variables:** **(T00 0 C00)**

(Significance of different Causes under a specific Type of Claims & Disputes)

Note: The Coding for these variables is the combination of both Types & Cause Coding (T00 & C00).

T00:	Fifty One (51) Different Types (First two zeros) after T	(1-51)
0:	Duplication of the Same Type (Controlling Question) (3 rd Digit)	(Need for a Sub coding)
C00:	Thirty Two (32) Different Causes (Fourth & Fifth zeros) after C	(1-32)
	(One question asked for each Type-Cause relations) (1)	(No Need for a second Sub coding)

B.6.2 RESEARCH SUB VARIABLES:

➤ **Participant's Characteristics Sub Variables: (PC 0)**

Variable		Label	Description
Participant's Characteristics (PC)	PC 1	Name of the Organization/ Firm	Participant's Characteristics
	PC 2	Identity: (Role of the Respondents)	
	PC 3	Managerial Level	
	PC 4	Personal Experience	
	PC 5	Organization/ Firm's Experience: (Firm's Number of Years in business)	
	PC 6	Organization's / Firm's Annual Number of Projects	
	PC 7	Organization's / Firm's Number of Employees	

➤ **Types of Claims and Disputes Sub Variables: (T000 0)**

Variable		Label	Description
Types of Construction Claims and Disputes (T000)	T000 1	Is this a potential type?	Specific Type of Claim Potentiality
	T000 2	Frequency	Probability of Occurrence of a Specific Type of Claim in a Construction Project.
	T000 3	Impact (Magnitude)	An Average Magnitude of a Specific Type of Claim Expressed as a Percentage of Original Contract Value, or Original Contract Period
	T000 4	Avoidability	Possibility of Avoiding a Specific <i>Type</i> by avoiding the underlying cause/s that can contribute to the generation of a Specific <i>Type</i> of Construction Claims and Disputes

➤ **Causes of Claims and Disputes Sub Variables: (C000 0)**

Variable		Label	Description
Causes of Construction Claims and Disputes (C000)	C000 1	Is this a potential Cause?	Specific Cause of Claim Potentiality that would lead to Type of Claims
	C000 3	Significance	Significance of a Specific Cause of Claims can be Expressed as a Function of the Impact (I) on a Construction Project, and the Probability of Occurrence (P). Where, (I): is the collective magnitude of a specific cause that would lead to the generation of Types of Claims in a Construction Project; expressed as a percentage of Original Contract Value, or Original Contract Period. And, (P): Probability of occurrence of a Specific Cause that would that would lead to the generation of Types of Claims in a Construction Project
	C000 5	Root Causation	Description & Evaluation of the Origin of a Specific Cause of claim
	C000 7	Cause Avoidability / Controllability	Possibility of Avoiding/ Controlling a Specific <u>Cause</u> that that would contribute to the generation of <u>Types</u> of Construction Claims and Disputes

➤ **Types – Cause Interrelationships Sub Variables: (T000 C00 0)**

Variable		Label	Description
Type – Cause Interrelationships (T000 C00)	T000C00 1	Significance	Significance of a Specific Cause that can lead to a Specific Type of Claim

B.6.3 TYPES OF CLAIMS AND DISPUTES: (T 000)

Variable		Label	Description
Types of Claims and Disputes (T 000)	T 010	Ambiguity in Documents	Ambiguity in Documents
	T 020	Delays: Incomplete Design/ Insufficient Information by Client	Delays Due to Incomplete Design/ Insufficient Information by Client/Consultant
	T 030	Design/ Change/ Omission / Errors by the Client	Change of Design/ Design Omission / Errors by the Client (Engineer)
	T 040	Instruction by the Client to Resolve Discrepancy	Instruction Issued by the Client/Consultant to Resolve Discrepancy
	T 050	Defective Design: Rectification of Works/ Specification Change	Rectification of Works/ Specification Change Due to Defective Design
	T 060	Quantity Increase (not resulting from a Variation)	Substantial Increase in Quantity of any item not resulting from a Variation
	T 070	Change in Quality (not resulting from a Variation)	Substantial Change in Quality of any item not resulting from a Variation
	T 080	Error in Setting out Due to Incorrect Data Shown on Drawings	Error in Setting out Due to Incorrect Data Shown on Drawings
	T 090	Change of Project Profile and Site	Change of Project Profile and Site
	T 100	Delayed Site Possession/ Restricted Access	Delayed Site Possession/ Restricted Access
	T 110	Differing Site Condition	Differing Site Condition
	T 120	Unanticipated Soil Condition	Unanticipated Soil Condition
	T 130	Unforeseen Ground Condition/ Unforeseeable Obstruction	Unforeseen Ground Condition/ Unforeseeable Obstruction
	T 140	Investigation of Suspected Defects	Investigation of Suspected Defects
	T 150	Uncovering of Works For Testing	Uncovering of Works For Testing (Examination)
	T 160	Additional Tests to Verify Compliance with the	Additional Tests to Verify Compliance with the Specification (in excess to those mentioned in tender documents)
	T 170	Suspension of Work	Suspension of Work
	T 180	Acceleration of Works	Acceleration of Works
	T 190	Variations	Variations
	T 200	Additional Work to other Parts arising from repairs or defects	Additional Work (to other parts of the works) arising from repairs or defects
	T 210	Client's Instruction to Change (not resulting from Variation)	Client/ Engineer's Instruction to Change (not resulting from Variation)
	T 220	Facilities provided to others by the contractor	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)
	T 230	Loss of / Damage to Materials on Site or During Transport	Loss of / Damage to Materials on Site or During Transport

Continue: Types of Claims and Disputes Variables: (T 000)

Variable	Label	Description	
Types of Claims and Disputes (T 000)	T 240	Repair damages to other Property during Transport of Materials	Rectification of Damages To Other Property During Transport of Materials
	T 250	Delays: Unavailability / Unsuitability of Project Materials	Delays Due to the Unavailability / Unsuitability of Project Materials
	T 260	Delay: Due To Variation	Delay/ Disruption to Regular Progress Due To Variation
	T 270	Delay: Due To Late Instruction by Client	Delay/ Disruption to Regular Progress Due To Late Instruction by the Client/Consultant Engineer
	T 280	Delay: Due To Late Approval	Delay/ Disruption to Regular Progress Due To Late Issue of Consent (Approval)
	T 290	Delay: caused by client or employed by Client	Delay/ Disruption to Regular Progress Due To Delays Caused by any Person/ Organization Employed by the Employer such as (Nominated Subcontractor, Suppliers or Others)
	T 300	Delay: Late Delivery of Materials by Client	Delay/ Disruption to Regular Progress Due To Late Delivery of Materials by the Employer
	T 310	Delay: Caused by Utility Services Organization	Delay Disruption to Regular Progress Caused by Utility Services Organization
	T 320	Delay: Additional building regulations/ procedures	Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen building regulations/ procedures
	T 330	Client's Breach of Contract	Client's Breach of Contract
	T 340	Late Issuance of final certificate	Late Issuance of final certificate
	T 350	Extension of Time For Completion	Extension of Time For Completion
	T 360	Late Payment	Un Paid Sums (Late Payment)
	T 370	Interest on Late Payment	Interest on Un Paid Sums (Late Payment)
	T 380	Overdue retention money	Overdue retention money
	T 390	Inflation / Price Escalation	Inflation / Price Escalation
	T 400	Currency Fluctuation	Currency Fluctuation
	T 410	Finance Charges: Loss of Profit, Insurance, Retention, Etc.	Finance Charges For Loss Of Profit, Extended Performance Pond, Insurance, Retention, Etc.
T 420	Liquidated and ascertained damages	Liquidated and ascertained damages	

Continue: Types of Claims and Disputes Variables: (T 000)

Variable	Label	Description	
Types of Claims and Disputes (T 000)	T 430	Default of Subcontractor, Nominated Subcontractor	Default of Subcontractor, Nominated Subcontractor Or Suppliers.
	T 440	Unproductive / Idle Plants, Equipment or Labour	Unproductive / Idle Plants, Equipment or Labour
	T 369	Late Payment	Un Paid Sums (Late Payment)
	T 450	Labour Strikes, Civil Unrest, Etc.	Labour Strikes, Civil Unrest, Etc.
	T 460	Custom Tariffs, New Taxes	Custom Tariffs, New Taxes
	T 470	Embargoes on Project Imported Items	Embargoes on Project Imported Items
	T 480	Expropriation of Contractor's Equipment etc.	Expropriation of Contractor's Equipment or Machinery
	T 490	Delays: Inclement Weather, Flood, Storms, , Etc.	Delays Due to Exceptional Inclement Weather, Flood, Storms, Earthquakes, Etc.
	T 500	Damages to Work due to Inclement Weather,	Damages To the Works Due to Exceptionally Adverse Weather, Flood, Storms, Earthquakes, Etc.
	T 510	Rectification of Damage due to Un Excepted Risk	Rectification of Damage Caused by Un Excepted Risk

B.6.4 CAUSES OF CLAIMS AND DISPUTES: (C 000)

Variable	Label	Description	
Causes of Claims and Disputes (C 000)	C 010	Inadequate/ Inaccurate Design Information	Inadequate/ Inaccurate Design Information
	C 020	Inadequate Design Documentation	Inadequate Design Documentation
	C 030	Inadequate Brief	Inadequate Project Brief
	C 040	Unclear & Inadequate Specifications	Unclear & Inadequate Project Specifications
	C 050	Inappropriate Contract Type (Strategy)	Inappropriate Contract Type (Strategy)
	C 060	Inappropriate Contract Form	Inappropriate Contract Form
	C 070	Inadequate Contract Administration	Inadequate Contract Administration
	C 080	Inadequate Contract Documentation	Inadequate Contract Documentation
	C 090	Incomplete Tender Information	Incomplete Tender Information
	C 100	Inappropriate Contractor Selection	Inappropriate Contractor Selection
	C 110	Unrealistic Tender Pricing	Unrealistic Tender Pricing
	C 120	Unclear Risk Allocation	Unclear Risk Allocation
	C 259	Unrealistic Client Expectations	Unrealistic Client Expectations
	C 130	Inappropriate Payment Method	Inappropriate Payment Method
	C 140	Inappropriate Document Control	Inappropriate Document Control
	C 150	Inappropriate/ Unexpected Time Control (Target)	Inappropriate/ Unexpected Time Control (Target)
	C 160	Inappropriate/ Unexpected Cost Control (Target)	Inappropriate/ Unexpected Cost Control (Target)
	C 170	Inappropriate/ Unexpected Quality Control (Target)	Inappropriate/ Unexpected Quality Control (Target)
	C 180	Poor Communications Among Project Participants	Poor Communications Among Project Participants
	C 190	Lack of Information for Decision Making	Lack of Information for Decision Making; (Decisiveness)
	C 200	Slow Client Response	Slow Client Response
	C 210	Changes by Client	Changes by Client
	C 220	Lack of Competence of Project Participants	Lack of Competence of Project Participants
C 230	Poor Workmanship	Poor Workmanship	

Continued': Causes of Claims and Disputes Variables: (C 000)

Variable	Label	Description	
Causes of Claims and Disputes (C 000)	C 240	Inadequate Site Investigation	Inadequate Site Investigation
	C 250	Unrealistic Client Expectations	Unrealistic Client Expectations
	C 260	Unrealistic Expected Information by Contractor	Unrealistic Information Expectations (By the Contractor)
	C 270	Lack of Team Spirit Among Participants	Lack of Team Spirit Among Participants
	C 280	Personality Clashes Among Project Participants	Personality Clashes Among Project Participants
	C 290	Poor Management	Poor Management By One or More Project Participants
	C 300	Adversarial (industry) Culture	Adversarial (industry) Culture Among project Participants
	C 310	Uncontrollable External Events	Uncontrollable External Events
	C 320	Exaggerated Claims	Exaggerated Claims

B.6.5 CAUSES UNDER TYPES OF CLAIMS AND DISPUTES): (TYPE – CAUSE INTERACTIONS) (T01 C01) – (T51 C32):

Variable		Label	Description
Type – Cause Interactions (T000 C00)	T000C00 1	Significance	Significance of a Specific Cause that can lead to a Specific Type of Claim

B.6.6 OTHER CODES: OVERALL PARTICIPANT ASSESSMENT OF THE RESEARCH QUESTIONNAIRE VARIABLES & RELATIONSHIPS:

	Variable	Variable Coding
	The Different Common Types of Claims & Disputes & it's Significance	PA 01 0
	The Different Common Causes of Claims & Disputes & it's Significance	PA 02 0
	The Root Causation of the Source of Claim	PA 03 0
	Type – Cause Interaction Assessment:	PA 04 0
	Do you think that the answers of the above question will help managers to Predict the Significance Types & Causes of Claims & Disputes	PA 05 0
	Do you think that the answers of the above question will help managers to Predict & Recommend Strategies to Avoid or Reduce to of Claims & Disputes	PA 06 0

APPENDIX C: RESEARCH QUESTIONNAIRE SURVEY (PART ONE)

C.1 QUESTIONNAIRE LETTER:

Emirate of Abu Dhabi
Department of
Municipalities and Agriculture
Abu Dhabi Municipality



إمارة أبوظبي
دائرة البلديات والزراعة
بلدية أبوظبي

الرقم: م / م / هـ / ٩ /
التاريخ: / / ٢٠٠٦ م

المحترمين

السادة /

ص.ب ()

فاكس ()

بعد التحية ..

الموضوع : استبيان حول المطالبات

في إطار الدراسات والبحوث الأكاديمية ، فإنه يرجى التكرم بالتعاون في تعبئة الاستبيان المرفق بالتنسيق مع المهندس / رائد ناشر موبايل رقم (٠٥٠/٦٤١٤٨٠٩) وذلك خلال أسبوع من تاريخه علماً بأنه سيتم إدراج هذا في ملف تقييم أداؤكم لدينا بالدائرة .

شاكرين لكم حسن تعاونكم معنا ...

وتقبلوا تحياتنا ...

المهندسة / فاطمة عبيد الجابر
الوكيل المساعد لقطاع مشاريع المباني

٢/١٩

المرفقات :- ما نكر أعلاه .

نسخة : الملف (فاتن) السادة - فورم ٢٠٠٦/٢/١٨

C.2 QUESTIONNAIRE PART ONE:

The University of Glamorgan
School of Technology
Wales, United Kingdom
April 2007

*Understanding and Preventing Construction Conflict, Claims
and Disputes: A Critical In-depth Study into their Causes and
Recommendations to Control in the United Arab Emirates*

By

Nadhem Asaad Bin Asaad Taher

- B.Sc., Engineering Management 1995
(University of the Pacific, California, USA)
- B.Sc., Civil Engineering 1997
(University of the Pacific, California, USA)
- M.Sc., Engineering Project Management 2001
(University of Glamorgan, Pontypridd, Wales, UK)

*A Questionnaire Survey Form proposed in Partial Fulfilment
For the Degree of
Doctor of Philosophy
In Engineering Claims and Disputes*

Ph D Research Questionnaire

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V. ORGANIZATION/ FIRM’S EXPERIENCE: (FIRM’S NUMBER OF YEARS IN BUSINESS) (PC 5):5

VI. ORGANIZATION/ FIRM’S ANNUAL NUMBER OF PROJECTS (PC 6):5

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Dear Sir,

Please allow me to introduce myself to you, my name is Nadhem Asaad bin Taher and I work with Works Department in Abu Dhabi, United Arab Emirates as the Head of Quality Control/ Assurance Division. Works Department has sponsored me with a full scholarship for my Ph D. Research in Construction Claims and Disputes in the United Kingdom. The Topic of the research is '**Understanding and Preventing Construction Conflict, Claims and Disputes: A Critical In-depth Study into their Causes and Recommendations to Control in the United Arab Emirates**'.

As you already know that Construction Claims and Disputes are considered to be one of the most disruptive and unpleasant issues of a project to the most of project participants. The claim mechanism powers appear not only to hinder the completion of construction and cause delays in delivering projects, but also time consuming, establishing conflict among project participants and often unfair cost spending of public budget which affect future public planning.

Thus, the main objective for the Ph. D. research is to investigate the significant types of construction claims and disputes, and their related root causes in order to suggest strategies to avoid or at least mitigate those claims and disputes in the context of the UAE and to provide recommendations to all project participants. This can be achieved by reviewing and evaluating previous Construction Claims' Theories. In addition to the collaboration and cooperation of several international experts, international parties as well as leading international and local project participants in the Gulf Region on this specific issue. This can be done by sharing their prospective, thoughts and experiences.

The main objective of the research will be achieved by analysing the data, which will be collected at three different phases along with the use of Construction Risk Management, Engineering Project Management tools and development of the Researcher's own Model.

In order to reach the above-mentioned objectives and after a long literature review, discussions with construction industry key personnel and national and

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

international professional parties, I felt that we, the project participants and my self, really have to understand the following main issues:

- I. The Most Common and Frequent Types of construction Claims and Disputes
- II. The Most Common and Frequent Causes of construction Claims and Disputes
- III. Potential Causes that could lead to Type of construction Claims and Disputes

After a long discussion with Abu Dhabi Works Department's key personnel, you have been selected amongst dozens of leading professional parties in the UAE in order to participate in this research, so your input to the questionnaire will be vital and will be evaluated thoroughly in order to achieve the objective of the research that come up with valuable strategies in order to reduce Construction Projects' Disputes & Claims, as well as to develop the UAE's Construction Industry.

Time is very crucial, so please try to respond to this questionnaire as soon as possible within the next One Week to Ten Days.

Please send your response either to:

1. Researcher:

Engineer Nadhem Taher.

33 Kilcredaun House

Prospect Place

Cardiff, Wales

United Kingdom

Tel. #: 0044-7886-527-384

E Mail: bintaher_na2000@yahoo.com, or

2. Coordinating personnel:

Engineer Raed Nasher.

Follow up Unit.

Government Building Project Directorate

Works Department

P O Box: 3.

Abu Dhabi, UAE.

Tel. #: 02- 4066999. Abu Dhabi.

Mobile #: 050 – 6414809.

E Mail: raednasher@yahoo.com

Note: Please use an electronic Copy to respond.

Please be patient and try to answer the **questions in the attached questionnaire** to your best professional knowledge and to Abu Dhabi General Condition of Contract (in some questions).

Thank you for your considerations in advance and hope to cooperate in the very near future.

Yours truly,

Nadhem Asaad Bin Taher

Date: -----

PART ONE: PARTICIPANT ASSESSMENT

PLEASE FILL THE FOLLOWING INFORMATION EITHER BY FILLING THE BLANKS OR CHOOSING THE CORRECT ANSWER FROM THE PROVIDED OPTIONS:

I. Name of the Organization/ Firm (***PC 1***):

II. Identity: (Role of the Respondents) (***PC 2***):

- a) Client;
- b) Client Representative/Consultant;
- c) Contractor;

III. Managerial Level (***PC 3***):

- a) Director / Manager / Senior Top Management;
- b) Middle Level Management; Please Specify -----;
- c) Staff / Engineer

IV. Personal Experience (***PC 4***):

- a) Less than 5 Years;
- b) 5 – 10 Years;
- c) 10 - 15 Years;
- d) 15 – 20 Years; or
- e) More than 20 Years

V. Organization/ Firm's Experience: (Firm's Number of Years in business) (***PC 5***):

- a) Less than 5 Years;

- b) 5 – 10 Years;
- c) 10 - 15 Years;
- d) 15 – 20 Years; or
- e) More than 20 Years

VI. Organization/ Firm's Annual Number of Projects (PC 6):

- a) Less than 11 Projects;
- b) 11 - 20 Projects;
- c) 21 - 30 Projects;
- d) 31 - 40 Projects; or
- e) More than 40 Projects.

VII. Organization/ Firm's Number of Employees (PC 7):

- a) Less than 100 Employees;
- b) 101 – 200 Employees;
- c) 201 – 300 Employees;
- d) 301 – 500 Employees; or
- e) More than 500 Employees.

PART TWO: TECHNICAL ASSESSMENT:

PLEASE BE PATIENT AND TRY TO ANSWER THE QUESTIONS TO YOUR BEST PROFESSIONAL KNOWLEDGE AND TO ABU DHABI GENERAL CONDITION OF CONTRACT (IN SOME QUESTIONS).

SECTION I: TYPES OF CLAIMS AND DISPUTES ASSESSMENT:

Q1) DO YOU AGREE THAT THE FOLLOWING SOURCE OF CLAIM IS A POTENTIAL TYPE OF CLAIM? ; PLEASE TICK (↑) IN THE APPROPRIATE (YES, NO, NOT SURE) BOX IN THE FOLLOWING TABLE BELOW.

Q2) PLEASE CHOOSE THE POSSIBLE OPTION TO DESCRIBE THE POSSIBLE **FREQUENCY**, **IMPACT** AND **AVOIDABILITY** OF A COMMON ***TYPE*** OF CLAIMS AND DISPUTES BASED ON YOUR PERSONAL JUDGMENT AND EXPERIENCE. USE THE FOLLOWING SCALE

IN TERMS OF FREQUENCY (P):

(PROBABILITY OF OCCURRENCE; P) IN A CONSTRUCTION PROJECT

1	2	3	4	5
NONE	LOW FREQUENCY	AVERAGE	HIGH FREQUENCY	VERY HIGH FREQUENCY

IN TERMS OF IMPACT (I):

AN AVERAGE MAGNITUDE EXPRESSED AS A PERCENTAGE OF ORIGINAL CONTRACT VALUE (OCV), OR ORIGINAL CONTRACT PERIOD (OCP)

1	2	3	4	5
NONE	LOW IMPACT	AVERAGE	HIGH IMPACT	VERY HIGH IMPACT

IN TERMS OF AVOIDABILITY (A):

POSSIBILITY OF AVOIDING A SPECIFIC TYPE OF CLAIMS AND DISPUTES BY AVOIDING/ CONTROLLING THEIR UNDERLYING ROOT CAUSES.

1	2	3	4	5
NONE	LOW AVOIDABILITY	AVERAGE	HIGH AVOIDABILITY	VERY HIGH AVOIDABILITY

Where: N (Non), LC (Low Avoidability), Av (Average), HC (High Avoidability), VHA (Very High Avoidability)

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First Section: Types of Claims and Disputes Assessment:

Number	Type of Claims and Disputes	Agreement			Frequency	Impact	Avoidability
		yes	No	Not S.			
		T 01					
T 01	Ambiguity in Documents						
T 02	Delays: Incomplete Design/ Insufficient Information by client/ consultant						
T 03	Design/ Change/ Omission / Errors by the Client or (Engineer)						
T 04	Instruction by the Client/ Consultant to Resolve Discrepancy						
T 05	Rectification of Works/ Specification Change Due to Defective Design						
T 06	Substantial Increase in Quantity of any item (not resulting from a Variation)						
T 07	Substantial Change in Quality of any item (not resulting from a Variation)						
T 08	Error in Setting out Due to Incorrect Data Shown on Drawings						
T 09	Change of Project Profile and Site						
T 10	Delayed Site Possession/ Works/ Restricted Access						
T 11	Differing Site Condition						
T 12	Unanticipated Soil Condition						
T 13	D. D. R. P.: Due to Unforeseen Ground Condition/Unforeseeable Obstruction						
T 14	Investigation of Suspected Defects						
T 15	Uncovering of Works for Testing (Examination)						
T 16	Additional Tests to Verify Compliance with the						
T 17	Suspension of Work						
T 18	Acceleration of Works						
T 19	Variations						
T 20	Additional Work to other Parts arising from repairs or defects						
T 21	Client's Instruction to Change (not resulting from Variation)						
T 22	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)						
T 23	Loss of / Damage to Materials on Site or During Transport						
T 24	Repair damages to other Property during Transport of Materials						
T 25	Delays: Unavailability / Unsuitability of Project Materials						
T 26	D. D. R. P.: Due to Variation						
T 27	D. D. R. P.: Due to Late Instruction by Client/ Consultant Engineer						
T 28	D. D. R. P.: Due to Late Issue of Consent (Approval)						

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

Continue: First Section: Types of Claims and Disputes Assessment:

Number	Type of Claims and Disputes	Agreement			Frequency	Impact	Avoidability
		yes	No	Not S.			
		T 01					
T 29	D. D. R. P.: Due to Delay Caused by any Person/ Organization employed by client such as (Nominated Subcontractor, Suppliers or Others)						
T 30	D. D. R. P.: Due to Late Delivery of Materials by the Client						
T 31	D. D. R. P.: Due to Delay Caused by Utility Services Organization						
T 32	D. D. R. P.: Due to Additional/ Unforeseen Building Regulations/Procedures						
T 33	Client's Breach of Contract						
T 34	Late Issuance of final certificate						
T 35	Extension of Time for Completion						
T 36	Late Payment						
T 37	Interest on Late Payment						
T 38	Overdue retention money						
T 39	Inflation / Price Escalation						
T 40	Currency Fluctuation						
T 41	Finance Charges: Loss of Profit, Insurance, Retention, etc.						
T 42	Liquidated and ascertained damages						
T 43	Default of Subcontractor, Nominated Subcontractor or Suppliers						
T 44	Unproductive / Idle Plants, Equipment or Labour						
T369	Late Payment						
T 45	Labour Strikes, Civil Unrest, etc.						
T 46	Custom Tariffs, New Taxes						
T 47	Embargoes on Project Imported Items						
T 48	Expropriation of Contractor's Equipment or Machinery, etc.						
T 49	D. D. R. P.: Due to Inclement Weather, Flood, Storms, etc.						
T 50	Damages to Work due to Exceptionally Inclement/ Adverse Weather						
T 51	Rectification of Damage Due to Unexpected Risk						

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

SECTION II: CAUSES OF CLAIMS AND DISPUTES ASSESSMENT:

PART I: SIGNIFICANCE OF A CAUSE:

Q1) DO YOU AGREE THAT THE FOLLOWING SOURCE OF CLAIM IS A POTENTIAL CAUSE OF CLAIM? ; PLEASE TICK (↑) IN THE APPROPRIATE (YES, NO, NOT SURE) BOX IN THE FOLLOWING TABLE BELOW.

Q2) PLEASE CHOOSE THE POSSIBLE OPTION TO DESCRIBE THE POSSIBLE SIGNIFICANCE OF A COMMON CAUSE OF CLAIMS AND DISPUTES BASED ON YOUR PERSONAL JUDGMENT AND EXPERIENCE. USE THE FOLLOWING SCALE

IN TERMS OF SIGNIFICANCE (S): SIGNIFICANCE OF THE CAUSE OF CLAIMS OR DISPUTE CAN BE EXPRESSED AS A FUNCTION OF THE IMPACT (I) ON A CONSTRUCTION PROJECT, AND THE PROBABILITY OF OCCURRENCE (P).

1	2	3	4	5
NONE	LOW SIGNIFICANCE	AVERAGE	HIGH SIGNIFICANCE	VERY HIGH SIGNIFICANCE

SECTION II: CAUSES OF CLAIMS AND DISPUTES ASSESSMENT:

PART II: CAUSE CONTROLLABILITY/ AVOIDABILITY

CLAIMS MANAGERS SHOULD FOCUS NOT ONLY ON THE SIGNIFICANT CLAIMS, BUT ALSO ON THE AVOIDABLE ONES IN ORDER TO MINIMIZE THE DAMAGING EFFECT ON A GIVEN CONSTRUCTION PROJECT.

THUS, IN ORDER TO AVOID CLAIMS, AN ASSESSMENT OF AVOIDING THE CAUSE/S THAT MAY GIVE RISE TO THIS SPECIFIC TYPE OF CLAIM IS REQUIRED.

IN TERMS OF CONTROLLABILITY (C):

POSSIBILITY OF CONTROLLING A SPECIFIC CAUSES THAT CAN GIVE RISE TO A SPECIFIC TYPE OF CONSTRUCTION CLAIMS AND DISPUTES.

1	2	3	4	5
NONE	LOW CONTROLLABILITY	AVERAGE	HIGH CONTROLLABILITY	VERY HIGH CONTROLLABILITY

Where: N (Non), LC (Low Controllability), Av (Average), C (Controllable), HC (High Controllability)

Q1) PLEASE RATE THE **CONTROLLABILITY & AVOIDABILITY** OF A COMMON CAUSES THAT WILL LEAD TO A SPECIFIC TYPE OF CLAIMS AND DISPUTES BASED ON YOUR PERSONAL JUDGMENT AND EXPERIENCE. USE THE ABOVE MENTIONED SCALE.

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

Second Section: Causes of Claims and Disputes Assessment:

Number	Causes of Claims and Disputes	Agreement			Significance	Avoidability
		yes	No	Not S.		
		C 01				
C01	Inadequate/ Inaccurate Design Information					
C02	Inadequate Design Documentation					
C03	Inadequate Brief					
C04	Unclear & Inadequate Specifications					
C05	Inappropriate Contract Type (Strategy)					
C06	Inappropriate Contract Form					
C07	Inadequate Contract Administration					
C08	Inadequate Contract Documentation					
C09	Incomplete Tender Information					
C10	Inappropriate Contractor Selection					
C11	Unrealistic Tender Pricing					
C12	Unclear Risk Allocation					
C259	Unrealistic Client Expectations					
C13	Inappropriate Payment Method					
C14	Inappropriate Document Control					
C15	Inappropriate/ Unexpected Time Control (Target)					
C16	Inappropriate/ Unexpected Cost Control (Target)					
C17	Inappropriate/ Unexpected Quality Control (Target)					
C18	Poor Communications Among Project Participants					
C19	Lack of Information for Decision Making; (Decisiveness)					
C20	Slow Client Response					
C21	Changes by Client					
C22	Lack of Competence of Project Participants					
C23	Poor Workmanship					
C24	Inadequate Site Investigation					
C25	Unrealistic Client Expectations					
C26	Unrealistic Information Expectations (By the Contractor)					
C27	Lack of Team Spirit Among Participants					
C28	Personality Clashes Among Project Participants					
C29	Poor Management By One or More Project Participants					
C30	Adversarial (industry) Culture Among project Participants					
C31	Uncontrollable External Events					
C32	Exaggerated Claims					

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

SECTION III: TYPES OF CLAIMS AND DISPUTES AND THEIR UNDERLYING ROOT CAUSES ASSESSMENT:

SIGNIFICANCE OF A SPECIFIC CAUSE TO A GIVEN TYPE OF CLAIMS & DISPUTES: (IN TERMS OF: FREQUENCY AND IMPACT)

Q1) PLEASE CHOOSE ONE OF THE FIVE POSSIBLE OPTION TO DESCRIBE THE **SIGNIFICANCE** OF THE POSSIBLE POTENTIAL AND COMMON SPECIFIC **CAUSE** IN THE LIST THAT WILL LEAD TO A SPECIFIC **TYPE** OF CLAMS AND DISPUTES

1

2

3

4

5

NONE	LOW SIGNIFICANCE	AVERAGE	HIGH SIGNIFICANCE	VERY HIGH SIGNIFICANCE
------	------------------	---------	-------------------	------------------------

WHERE,

None: (N)

Low Significance: (LS)

Average: (Av)

High Significance: (HS)

Very High Significance: (VHS)

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

<u><i>List of Causes</i></u>	<u><i>List of Types</i></u>	Ambiguity in Documents	Delays Due to Incomplete Design/ Insufficient Information by Client/Consultant	Change of Design/ Design Omission / Errors by the Client (Engineer)	Instruction Issued by the Client/Consultant to Resolve Discrepancy	Rectification of Works/ Specification Change Due to Defective Design	Substantial Increase in Quantity of any item not resulting from a Variation
		Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)					
Inadequate/ Inaccurate Design Information							
Inadequate Design Documentation							
Inadequate Brief							
Unclear & Inadequate Specifications							
Inappropriate Contract Type (Strategy)							
Inappropriate Contract Form							
Inadequate Contract Administration							
Inadequate Contract Documentation							
Incomplete Tender Information							
Inappropriate Contractor Selection							
Unrealistic Tender Pricing							
Unclear Risk Allocation							
Inappropriate Payment Method							
Inappropriate Document Control							
Inappropriate/ Unexpected Time Control (Target)							
Inappropriate/ Unexpected Cost Control (Target)							
Inappropriate/ Unexpected Quality Control (Target)							
Poor Communications Among Project Participants							
Lack of Information for Decision Making;(Decisiveness)							
Slow Client Response							
Changes by Client							
Lack of Competence of Project Participants							
Poor Workmanship							
Inadequate Site Investigation							
Unrealistic Client Expectations							
Unrealistic Information Expectations by the Contractor							
Lack of Team Spirit Among Participants							
Personality Clashes Among Project Participants							
Poor Management By One or More Project Participants							
Adversarial (industry) Culture Among project Participants							
Uncontrollable External Events							
Exaggerated Claims							

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

<u><i>List of Causes</i></u>	<u><i>List of Types</i></u>	Substantial Change in Quality of any item not resulting from a Variation	Error in Setting out Due to Incorrect Data Shown on Drawings	Change of Project Profile and Site	Delayed Site Possession/ Restricted Access	Differing Site Condition	Unanticipated Soil Condition	Unforeseen Ground Condition/ Unforeseeable Obstruction
		Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)						
Inadequate/ Inaccurate Design Information								
Inadequate Design Documentation								
Inadequate Brief								
Unclear & Inadequate Specifications								
Inappropriate Contract Type (Strategy)								
Inappropriate Contract Form								
Inadequate Contract Administration								
Inadequate Contract Documentation								
Incomplete Tender Information								
Inappropriate Contractor Selection								
Unrealistic Tender Pricing								
Unclear Risk Allocation								
Inappropriate Payment Method								
Inappropriate Document Control								
Inappropriate/ Unexpected Time Control (Target)								
Inappropriate/ Unexpected Cost Control (Target)								
Inappropriate/ Unexpected Quality Control (Target)								
Poor Communications Among Project Participants								
Lack of Information for Decision Making;(Decisiveness)								
Slow Client Response								
Changes by Client								
Lack of Competence of Project Participants								
Poor Workmanship								
Inadequate Site Investigation								
Unrealistic Client Expectations								
Unrealistic Information Expectations by the Contractor								
Lack of Team Spirit Among Participants								
Personality Clashes Among Project Participants								
Poor Management By One or More Project Participants								
Adversarial (industry) Culture Among project Participants								
Uncontrollable External Events								
Exaggerated Claims								

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

<u><i>List of Causes</i></u>	<u><i>List of Types</i></u>							
	Investigation of Suspected Defects	Uncovering of Works For Testing (Examination)	Compliance with the Specification (in excess to those mentioned in tender	Suspension of Work	Acceleration of Works	Variations	Additional Work (to other parts of the works) arising from repairs or defects	
	Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)							
Inadequate/ Inaccurate Design Information								
Inadequate Design Documentation								
Inadequate Brief								
Unclear & Inadequate Specifications								
Inappropriate Contract Type (Strategy)								
Inappropriate Contract Form								
Inadequate Contract Administration								
Inadequate Contract Documentation								
Incomplete Tender Information								
Inappropriate Contractor Selection								
Unrealistic Tender Pricing								
Unclear Risk Allocation								
Inappropriate Payment Method								
Inappropriate Document Control								
Inappropriate/ Unexpected Time Control (Target)								
Inappropriate/ Unexpected Cost Control (Target)								
Inappropriate/ Unexpected Quality Control (Target)								
Poor Communications Among Project Participants								
Lack of Information for Decision Making;(Decisiveness)								
Slow Client Response								
Changes by Client								
Lack of Competence of Project Participants								
Poor Workmanship								
Inadequate Site Investigation								
Unrealistic Client Expectations								
Unrealistic Information Expectations by the Contractor								
Lack of Team Spirit Among Participants								
Personality Clashes Among Project Participants								
Poor Management By One or More Project Participants								
Adversarial (industry) Culture Among project Participants								
Uncontrollable External Events								
Exaggerated Claims								

<u>List of Causes</u>	<u>List of Types</u>						
	Client/ Engineer's Instruction to Change (not resulting from Variation)	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)	Loss of / Damage to Materials on Site or During Transport	Rectification of Damages To Other Property During Transport of Materials	Delays Due to the Unavailability / Unsuitability of Project Materials	Delay/ Disruption to Regular Progress Due To Variation	
	Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)						
Inadequate/ Inaccurate Design Information							
Inadequate Design Documentation							
Inadequate Brief							
Unclear & Inadequate Specifications							
Inappropriate Contract Type (Strategy)							
Inappropriate Contract Form							
Inadequate Contract Administration							
Inadequate Contract Documentation							
Incomplete Tender Information							
Inappropriate Contractor Selection							
Unrealistic Tender Pricing							
Unclear Risk Allocation							
Inappropriate Payment Method							
Inappropriate Document Control							
Inappropriate/ Unexpected Time Control (Target)							
Inappropriate/ Unexpected Cost Control (Target)							
Inappropriate/ Unexpected Quality Control (Target)							
Poor Communications Among Project Participants							
Lack of Information for Decision Making;(Decisiveness)							
Slow Client Response							
Changes by Client							
Lack of Competence of Project Participants							
Poor Workmanship							
Inadequate Site Investigation							
Unrealistic Client Expectations							
Unrealistic Information Expectations by the Contractor							
Lack of Team Spirit Among Participants							
Personality Clashes Among Project Participants							
Poor Management By One or More Project Participants							
Adversarial (industry) Culture Among project Participants							
Uncontrollable External Events							
Exaggerated Claims							

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

<u><i>List of Causes</i></u>	<i>List of Types</i>					
	Delay/ Disruption to Regular Progress Due To Late Instruction by the Client / Engineer	Delay/ Disruption to Regular Progress Due To Late Issue of Consent (Approval)	Delays Caused by any Person/ Organization Employed by the Employer such as (Nominated Subcontractor, Suppliers or	Delay/ Disruption to Regular Progress Due To Late Delivery of Materials by the Employer	Delay Disruption to Regular Progress Caused by Utility Services Organization	Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen building regulations/ procedures
	Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)					
Inadequate/ Inaccurate Design Information						
Inadequate Design Documentation						
Inadequate Brief						
Unclear & Inadequate Specifications						
Inappropriate Contract Type (Strategy)						
Inappropriate Contract Form						
Inadequate Contract Administration						
Inadequate Contract Documentation						
Incomplete Tender Information						
Inappropriate Contractor Selection						
Unrealistic Tender Pricing						
Unclear Risk Allocation						
Inappropriate Payment Method						
Inappropriate Document Control						
Inappropriate/ Unexpected Time Control (Target)						
Inappropriate/ Unexpected Cost Control (Target)						
Inappropriate/ Unexpected Quality Control (Target)						
Poor Communications Among Project Participants						
Lack of Information for Decision Making;(Decisiveness)						
Slow Client Response						
Changes by Client						
Lack of Competence of Project Participants						
Poor Workmanship						
Inadequate Site Investigation						
Unrealistic Client Expectations						
Unrealistic Information Expectations by the Contractor						
Lack of Team Spirit Among Participants						
Personality Clashes Among Project Participants						
Poor Management By One or More Project Participants						
Adversarial (industry) Culture Among project Participants						
Uncontrollable External Events						
Exaggerated Claims						

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY)APPENDIX C

<u><i>List of Causes</i></u>	<i>List of Types</i>					
	Client's Breach of Contract	Late Issuance of final certificate	Extension of Time For Completion	Un Paid Sums (Late Payment)	Interest on Un Paid Sums (Late Payment)	Overdue retention money
	Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)					
Inadequate/ Inaccurate Design Information						
Inadequate Design Documentation						
Inadequate Brief						
Unclear & Inadequate Specifications						
Inappropriate Contract Type (Strategy)						
Inappropriate Contract Form						
Inadequate Contract Administration						
Inadequate Contract Documentation						
Incomplete Tender Information						
Inappropriate Contractor Selection						
Unrealistic Tender Pricing						
Unclear Risk Allocation						
Inappropriate Payment Method						
Inappropriate Document Control						
Inappropriate/ Unexpected Time Control (Target)						
Inappropriate/ Unexpected Cost Control (Target)						
Inappropriate/ Unexpected Quality Control (Target)						
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Lack of Information for Decision Making;(Decisiveness)						
Slow Client Response						
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Adversarial (industry) Culture Among project Participants						
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Exaggerated Claims						

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

<u><i>List of Causes</i></u>	<i>List of Types</i>						
	Inflation / Price Escalation	Currency Fluctuation	Finance Charges For Loss Of Profit, Extended Performance Bond, Insurance, Retention, Etc.	Variations	Liquitated and ascertained damages	Default of Subcontractor, Nominated Subcontractor, Or Suppliers	Unproductive / Idle Plants, Equipment or Labour
	Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)						
Inadequate/ Inaccurate Design Information							
Inadequate Design Documentation							
Inadequate Brief							
Unclear & Inadequate Specifications							
Inappropriate Contract Type (Strategy)							
Inappropriate Contract Form							
Inadequate Contract Administration							
Inadequate Contract Documentation							
Incomplete Tender Information							
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Inappropriate/ Unexpected Quality Control (Target)							
Poor Communications Among Project Participants							
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Unrealistic Client Expectations							
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Lack of Team Spirit Among Participants							
Personality Clashes Among Project Participants							
Poor Management By One or More Project Participants							
Adversarial (industry) Culture Among project Participants							
Uncontrollable External Events							
Exaggerated Claims							

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<u><i>List of Causes</i></u>	<i>List of Types</i>						
	Labour Strikes, Civil Unrest, Etc.	Custom Tariffs, New Taxes	Embargoes on Project Imported Items	Expropriation of Contractor's Equipment or Machinery	Delays Due to Exceptional Incident Weather, Flood, Storms, Earthquakes, Etc.	Damages To the Works Due to Exceptionally Adverse Weather, Flood, Storms, Earthquakes, Etc.	Rectification of Damage Caused by Un-Expected Risk
	Significance of the Specific Cause to the above Specific Type Scale: (N), (LS), (Av), (HS), (VHS)						
Inadequate/ Inaccurate Design Information							
Inadequate Design Documentation							
Inadequate Brief							
Unclear & Inadequate Specifications							
Inappropriate Contract Type (Strategy)							
Inappropriate Contract Form							
Inadequate Contract Administration							
Inadequate Contract Documentation							
Incomplete Tender Information							
Inappropriate Contractor Selection							
Unrealistic Tender Pricing							
Unclear Risk Allocation							
Inappropriate Payment Method							
Inappropriate Document Control							
Inappropriate/ Unexpected Time Control (Target)							
Inappropriate/ Unexpected Cost Control (Target)							
Inappropriate/ Unexpected Quality Control (Target)							
Poor Communications Among Project Participants							
Lack of Information for Decision Making;(Decisiveness)							
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Inadequate Site Investigation							
Unrealistic Client Expectations							
Unrealistic Information Expectations by the Contractor							
Lack of Team Spirit Among Participants							
Personality Clashes Among Project Participants							
Poor Management By One or More Project Participants							
Adversarial (industry) Culture Among project Participants							
Uncontrollable External Events							
Exaggerated Claims							

RESEARCH QUESTIONNAIRE PART ONE (QUALITATIVE STUDY) APPENDIX C

SECTION IV: OVERALL PARTICIPANT ASSESSMENT:

- Q1) DO YOU THINK THAT THE QUESTIONNAIRE ELEMENTS ANSWER & CLARIFY THE FOLLOWING ISSUES?
- Q2) IF YES, TO WHAT EXTENT; PLEASE GIVE A SCALE 1-10 (1 IS LOW, 10 IS HIGH).
- Q3) ARE THERE ANY COMMENTS YOU WANT TO ADD?

No.	ISSUES	Yes	No	NOT SURE	SCALE	COMMENTS
1	THE DIFFERENT COMMON TYPES OF CLAIMS & DISPUTES & IT'S SIGNIFICANCE					
2	THE DIFFERENT COMMON CAUSES OF CLAIMS & DISPUTES & IT'S SIGNIFICANCE					
3	THE ROOT CAUSATION OF THE SOURCE OF CLAIM					
4	TYPE – CAUSE INTERACTION ASSESSMENT:					
5	DO YOU THINK THAT THE ANSWERS OF THE ABOVE QUESTION WILL HELP MANAGERS TO PREDICT THE SIGNIFICANCE TYPES & CAUSES OF CLAIMS & DISPUTES					
6	DO YOU THINK THAT THE ANSWERS OF THE ABOVE QUESTION WILL HELP MANAGERS TO PREDICT & RECOMMEND STRATEGIES TO AVOID OR REDUCE TO OF CLAIMS & DISPUTES					

THE END

THANK YOU VERY MUCH FOR YOUR KIND COOPERATION

PLEASE USE AN ADDITIONAL BLANK PAPER IF YOU NEED TO ADD ANY OTHER
COMMENTS

APPENDIX D: RESEARCH INTERVIEW (PART TWO)

D.1 RESEARCH INTERVIEW LETTER:

Emirate of Abu Dhabi
Department of
Municipalities and Agriculture
Abu Dhabi Municipality



إمارة أبوظبي
دائرة البلديات والزراعة
بلدية أبوظبي

الرقم: م / م / هـ / ٩ /
التاريخ: / / ٢٠٠٦ م

المحترمين

السادة /

ص.ب ()

فاكس ()

بعد التحية ..

الموضوع : استبيان حول المطالبات

في إطار الدراسات والبحوث الأكاديمية ، فإنه يرجى التكرم بالتعاون في تعبئة الاستبيان المرفق بالتنسيق مع المهندس / رائد ناشر موبايل رقم (٠٥٠/٦٤١٤٨٠٩) وذلك خلال أسبوع من تاريخه علماً بأنه سيتم إدراج هذا في ملف تقييم أداؤكم لدينا بالدائرة .

شاكرين لكم حسن تعاونكم معنا ...

وتقبلوا تحياتنا ...

المهندسة / فاطمة عبيد الجابر
الوكيل المساعد لقطاع مشاريع المباني

٢/١٩

المرفقات :- ما نكر أعلاه .

نسخة : الملف (فاتن) السادة - فورم ٢٠٠٦/٢/١٨

D.2 RESEARCH INTERVIEW FORM (QUALITATIVE ASSESSMENT)

The University of Glamorgan
School of Technology
Wales, United Kingdom
August 2007

*Understanding and Preventing Construction Conflict, Claims
and Disputes: A Critical In-depth Study into their Causes and
Recommendations to Control in the United Arab Emirates*

By

Nadhem Asaad Bin Asaad Taher

- B.Sc., Engineering Management 1995
(University of the Pacific, California, USA)
- B.Sc., Civil Engineering 1997
(University of the Pacific, California, USA)
- M.Sc., Engineering Project Management 2001
(University of Glamorgan, Pontypridd, Wales, UK)

*A Survey Form Submitted in Partial Fulfilment
For the Degree of
Doctor of Philosophy
In Engineering Disputes and Claims*

Ph D Research Interview

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II. Identity: (Role of the Respondents):..... 1

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Dear Sir,

Please allow me to introduce myself to you, my name is Nadhem Asaad bin Taher and I work with Works Department in Abu Dhabi, United Arab Emirates as the Head of Quality Control/ Assurance Division. Works Department has sponsored me with a full scholarship for my Ph D. Research in Construction Claims and Disputes in the United Kingdom. The Topic of the research is '**Understanding and Preventing Construction Conflict, Claims and Disputes: A Critical In-depth Study into their Causes and Recommendations to Control in the United Arab Emirates**'.

As you already know that Construction Claims and Disputes are considered to be one of the most disruptive and unpleasant issues of a project to the most of project participants. The claim mechanism powers appear not only to hinder the completion of construction and cause delays in delivering projects, but also time consuming, establishing conflict among project participants and often unfair cost spending of public budget which affect future public planning.

Thus, the main objective for the Ph. D. research is to investigate the significant types of construction claims and disputes, and their related root causes in order to suggest strategies to avoid or at least mitigate those claims and disputes in the context of the UAE and to provide recommendations to all project participants. This can be achieved by reviewing and evaluating previous Construction Claims' Theories. In addition to the collaboration and cooperation of several international experts, international parties as well as leading international and local project participants in the Gulf Region on this specific issue. This can be done by sharing their prospective, thoughts and experiences.

The main objective of the research will be achieved by analysing the data, which will be collected at three different phases along with the use of Construction Risk Management, Engineering Project Management tools and development of the Researcher's own Model.

In order to reach the above-mentioned objectives and after a long literature review, discussions with construction industry key personnel and national and

international professional parties, I felt that we, the project participants and my self, really have to understand the following main issues:

- IV. The Most Common and Frequent Types of construction Claims and Disputes
- V. The Most Common and Frequent Causes of construction Claims and Disputes
- VI. Potential Causes that could lead to Type of construction Claims and Disputes

After a long discussion with Abu Dhabi Works Department's key personnel, you have been selected amongst various claim experts who work with leading professional parties in the UAE in order to participate in this research, so your in put to the interview will be vital and will be evaluated thoroughly in order to achieve the objective of the research that come up with valuable strategies in order to reduce Construction Projects' Disputes & Claims, as well as to develop the UAE's Construction Industry.

Please be patient and try to answer the questions in the attached questionnaire to your best professional knowledge and to Abu Dhabi General Condition of Contract (in some questions).

Thank you for your considerations in advance and hope to cooperate in the very near future.

Yours truly,

Nadhem Asaad Bin Taher

Date: -----

PART ONE: PARTICIPANT ASSESSMENT

PLEASE FILL THE FOLLOWING INFORMATION EITHER BY FILLING THE BLANKS OR CHOOSING THE CORRECT ANSWER FROM THE PROVIDED OPTIONS:

VIII. Name of the Organization/ Firm:

IX. Identity: (Role of the Respondents):

X. Personal Experience:

- f) Less than 5 Years;
- g) 5 – 10 Years;
- h) 10 - 15 Years;
- i) 15 – 20 Years; or
- j) More than 20 Years

PART TWO: TECHNICAL ASSESSMENT:**SECTION I: TYPES OF CLAIMS AND DISPUTES ASSESSMENT:**

DO YOU AGREE THAT THE LISTED SOURCES OF CLAIMS ARE POTENTIAL *TYPES* OF CLAIMS AND DISPUTES?

1. T 01 Ambiguity in Documents
2. T 02 Delays: Incomplete Design/ Insufficient Information by client/ consultant
3. T 03 Design/ Change/ Omission / Errors by the Client or (Engineer)
4. T 04 Instruction by the Client/ Consultant to Resolve Discrepancy
5. T 05 Rectification of Works/ Specification Change Due to Defective Design
6. T 06 Substantial Increase in Quantity of any item (not resulting from a Variation)
7. T 07 Substantial Change in Quality of any item (not resulting from a Variation)
8. T 08 Error in Setting out Due to Incorrect Data Shown on Drawings
9. T 09 Change of Project Profile and Site
10. T 10 Delayed Site Possession/ Works/ Restricted Access
11. T 11 Differing Site Condition
12. T 12 Unanticipated Soil Condition
13. T 13 D. D. R. P.: Due to Unforeseen Ground Condition/Unforeseeable Obstruction
14. T 14 Investigations of Suspected Defects
15. T 15 Uncovering of Works for Testing (Examination)
16. T 16 Additional Tests to Verify Compliance with the
17. T 17 Suspension of Work
18. T 18 Acceleration of Work
19. T 19 Variations
20. T 20 Additional Work to other Parts arising from repairs or defects
21. T 21 Client's Instruction to Change (not resulting from Variation)
22. T 22 Facilities provided to others by the contractor (in excess to those
23. T 23 Loss of / Damage to Materials on Site or During Transport
24. T 24 Repair damages to other Property during Transport of Materials
25. T 25 Delays: Unavailability / Unsuitability of Project Materials
26. T 26 D. D. R. P.: Due to Variation
27. T 27 D. D. R. P.: Due to Late Instruction by Client/ Consultant Engineer
28. T 28 D. D. R. P.: Due to Late Issue of Consent (Approval)
29. T 29 D. D. R. P.: Due to Delay Caused by any Person/ Organization employed by client such as (Nominated Subcontractor, Suppliers or Others)

30. T 30 D. D. R. P.: Due to Late Delivery of Materials by the Client
31. T 31 D. D. R. P.: Due to Delay Caused by Utility Services Organization
32. T 32 D. D. R. P.: Due to Additional/ Unforeseen Building Regulations/Procedures
33. T 33 Client's Breach of Contract
34. T 34 Late Issuance of final certificate
35. T 35 Extension of Time for Completion
36. T 36 Late Payments
37. T 37 Interests on Late Payment
38. T 38 Overdue retention money
39. T 39 Inflations/ Price Escalations
40. T 40 Currency Fluctuations
41. T 41 Finance Charges: Loss of Profit, Insurance, Retention, etc.
42. T 42 Liquidated and ascertained damages
43. T 43 Defaults of Subcontractor, Nominated Subcontractor or Suppliers
44. T 44 Unproductive / Idle Plants, Equipment or Labour
45. T 45 Labour Strikes, Civil Unrest, etc
46. T 46 Custom Tariffs, New Taxes
47. T 47 Embargoes on Project Imported Items
48. T 48 Expropriation of Contractor's Equipment or Machinery, etc
49. T 49 D. D. R. P.: Due to Inclement Weather, Flood, Storms, etc.
50. T 50 Damages to Work due to Exceptionally Inclement/ Adverse Weather
51. T 51 Rectification of Damage Due to Unexpected Risk

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

SECTION II: CAUSES OF CLAIMS AND DISPUTES ASSESSMENT:

DO YOU AGREE THAT THE LISTED SOURCES OF CLAIMS ARE POTENTIAL **CAUSES** OF CLAIMS AND DISPUTES?

1. **C01** Inadequate/ Inaccurate Design Information
2. **C02** Inadequate Design Documentation
3. **C03** Inadequate Brief
4. **C04** Unclear & Inadequate Specifications
5. **C05** Inappropriate Contract Type (Strategy)
6. **C06** Inappropriate Contract Form
7. **C07** Inadequate Contract Administration
8. **C08** Inadequate Contract Documentation
9. **C09** Incomplete Tender Information
10. **C10** Inappropriate Contractor Selection
11. **C11** Unrealistic Tender Pricing
12. **C12** Unclear Risk Allocation
13. **C13** Inappropriate Payment Method
14. **C14** Inappropriate Document Control
15. **C15** Inappropriate/ Unexpected Time Control (Target)
16. **C16** Inappropriate/ Unexpected Cost Control (Target)
17. **C17** Inappropriate/ Unexpected Quality Control (Target)
18. **C18** Poor Communications Among Project Participants
19. **C19** Lack of Information for Decision Making; (Decisiveness)
20. **C20** Slow Client Response
21. **C21** Changes by Client
22. **C22** Lack of Competence of Project Participants
23. **C23** Poor Workmanship
24. **C24** Inadequate Site Investigation
25. **C25** Unrealistic Client Expectations
26. **C26** Unrealistic Information Expectations (By the Contractor)
27. **C27** Lack of Team Spirit Among Participants
28. **C28** Personality Clashes Among Project Participants
29. **C29** Poor Management By One or More Project Participants
30. **C30** Adversarial (industry) Culture Among project Participants
31. **C31** Uncontrollable External Events
32. **C32** Exaggerated Claims

SECTION III: TYPES OF CLAIMS AND DISPUTES AND THEIR UNDERLYING ROOT CAUSES ASSESSMENT:

PROMOTED SIGNIFICANT TYPES OF CLAIMS AND DISPUTES AND THEIR UNDERLYING ROOT CAUSES ASSESSMENT:

1. Is this potential Type of claims and disputes frequent?
2. Does this potential Type of claims and disputes have a high or a low impact on construction project?
3. Is this potential Type of claims and disputes avoidable?
4. Do you think that this potential Type of claims and disputes is significant and avoidable?; if yes,
5. Do you agree that this potential Type of claims and disputes should be considered as a first or second priority to be avoided?
6. What are the significant causes that could lead to this significant Type of claims and disputes?; Or,
7. Do you agree that the promoted causes contribute significantly to this significant Type of claims and disputes?; if yes,
8. How can we avoid/control these causes?

Significant Types of Claims and Disputes (First & Second Priority)

1. T 01 Ambiguity in Documents (4)
2. T 02 Delays: Incomplete Design/ Insufficient Information by client/ consultant (11)
3. T 03 Design/ Change/ Omission / Errors by the Client or (Engineer) (2)
4. T 05 Rectification of Works/ Specification Change Due to Defective Design (9)
5. T 06 Substantial Increase in Quantity of any item (not resulting from a Variation) (17)
6. T 09 Change of Project Profile and Site (8)
7. T 10 Delayed Site Possession/ Works/ Restricted Access (12)
8. T 11 Differing Site Condition (7)
9. T 12 Unanticipated Soil Conditions (5)
10. T 13 D. D. R. P.: Due to Unforeseen Ground Condition/Unforeseeable Obstruction (6)
11. T 17 Suspension of Work (21)
12. T 18 Acceleration of Work (18)
13. T 19 Variations (1)
14. T 26 D. D. R. P.: Due to Variation (3)
15. T 27 D. D. R. P.: Due to Late Instruction by Client/ Consultant Engineer (14)
16. T 28 D. D. R. P.: Due to Late Issue of Consent (Approval) (10)
17. T 29 D. D. R. P.: Due to Delay Caused by any Person/ Organization employed by client such as (Nominated Subcontractor, Suppliers or Others) (19)
18. T 31 D. D. R. P.: Due to Delay Caused by Utility Services Organization (15)
19. T 33 Client's Breach of Contract (22)
20. T 35 Extension of Time for Completion (13)
21. T 43 Defaults of Subcontractor, Nominated Subcontractor or Suppliers (16)
22. T 44 Unproductive / Idle Plants, Equipment or Labour (20)

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

Significant Types of Claims and Disputes (First Priority)**1. T 01 Ambiguity in Documents (4)**

- T010C01 Inadequate/ Inaccurate Design Information
- T010C02 Inadequate Design Documentation
- T010C04 Unclear & Inadequate Specifications
- T010C09 Incomplete Tender Information
- T010C03 Inadequate Brief
- T010C20 Slow Client Response
- T010C08 Inadequate Contract Documentation
- T010C18 Poor Communications Among Project Participants
- T010C19 Lack of Information for Decision Making

2. T 02 Delays: Incomplete Design/ Insufficient Information by client/ consultant (11)

- T020C01 Inadequate/ Inaccurate Design Information
- T020C02 Inadequate Design Documentation
- T020C03 Inadequate Brief
- T020C09 Incomplete Tender Information
- T020C15 Inappropriate/ Unexpected Time Control (Target)
- T020C20 Slow Client Response
- T020C04 Unclear & Inadequate Specifications
- T020C08 Inadequate contract documentation
- T020C21 Changes by Client
- T020C18 Poor Communications Among Project Participants
- T020C19 Lack of Information for Decision Making;(Decisiveness)
- T020C22 Lack of Competence of Project Participants
- T020C17 Inappropriate/ Unexpected Quality Control (Target)
- T020C25 Unrealistic Client Expectations

3. T 03 Design/ Change/ Omission / Errors by the Client or (Engineer) (2)

- T030C01 Inadequate/ Inaccurate Design Information
- T030C02 Inadequate Design Documentation
- T030C04 Unclear & Inadequate Specifications

- T030C09 Incomplete Tender Information
 - T030C03 Inadequate Brief
 - T030C20 Slow Client Response
 - T030C21 Changes by Client
4. T 05 Rectification of Works/ Specification Change Due to Defective Design (9)
- T050C01 Inadequate/ Inaccurate Design Information
 - T050C02 Inadequate Design Documentation
 - T050C04 Unclear & Inadequate Specifications
 - T050C03 Inadequate Brief
 - T050C15 Inappropriate/ Unexpected Time Control (Target)
 - T050C09 Incomplete Tender Information
 - T050C08 Inadequate contract documentation
5. T 09 Change of Project Profile and Site (8)
- T090C01 Inadequate/ Inaccurate Design Information
 - T090C24 Inadequate Site Investigation
 - T090C09 Incomplete Tender Information
 - T090C03 Inadequate Brief
 - T090C02 Inadequate Design Documentation
 - T090C08 Inadequate contract documentation
 - T090C21 Changes by Client
 - T090C04 Unclear & Inadequate Specifications
 - T090C18 Poor Communications Among Project Participants
 - T090C15 Inappropriate/ Unexpected Time Control (Target)
6. T 10 Delayed Site Possession/ Works/ Restricted Access (12)
- T100C02 Inadequate Design Documentation
 - T100C01 Inadequate/ Inaccurate Design Information
 - T100C03 Inadequate Brief
 - T100C09 Incomplete Tender Information
 - T100C04 Unclear & Inadequate Specifications
 - T100C08 Inadequate contract documentation

- T100C21 Changes by Client
- T100C20 Slow Client Response
- T100C24 Inadequate Site Investigation
- T100C07 Inadequate Contract administration
- T100C10 Inappropriate Contractor Selection
- T100C15 Inappropriate/ Unexpected Time Control (Target)
- T100C31 Uncontrollable External Events
- T100C18 Poor Communications Among Project Participants
- T100C29 Poor Management By One or More Project Participants

7. T 11 Differing Site Condition (7)

- T110C24 Inadequate Site Investigation
- T110C02 Inadequate Design Documentation
- T110C01 Inadequate/ Inaccurate Design Information
- T110C09 Incomplete Tender Information
- T110C08 Inadequate contract documentation
- T110C03 Inadequate Brief
- T110C26 Unrealistic Information Expectations (By the Contractor)
- T110C04 Unclear & Inadequate Specifications
- T110C21 Changes by Client
- T110C20 Slow Client Response

8. T 12 Unanticipated Soil Conditions (5)

- T120C24 Inadequate Site Investigation
- T120C02 Inadequate Design Documentation
- T120C01 Inadequate/ Inaccurate Design Information
- T120C09 Incomplete Tender Information
- T120C08 Inadequate Contract Documentation
- T120C03 Inadequate Brief
- T120C26 Unrealistic Expected Information by Contractor
- T120C04 Unclear & Inadequate Specifications
- T120C21 Changes by Client
- T120C20 Slow Client Response

9. T 13 D. D. R. P.: Due to Unforeseen Ground Condition/Unforeseeable Obstruction
(6)

- T130C24 Inadequate Site Investigation
- T130C02 Inadequate Design Documentation
- T130C01 Inadequate/ Inaccurate Design Information
- T130C09 Incomplete Tender Information
- T130C08 Inadequate contract documentation
- T130C03 Inadequate Brief
- T130C26 Unrealistic Information Expectations (By the Contractor)
- T130C04 Unclear & Inadequate Specifications
- T130C21 Changes by Client
- T130C20 Slow Client Response

10. T 19 Variations (1)

- T190C01 Inadequate/ Inaccurate Design Information
- T190C02 Inadequate Design Documentation
- T190C08 Inadequate Contract Documentation
- T190C09 Incomplete Tender Information
- T190C03 Inadequate Brief
- T190C21 Variations - Changes by Client
- T190C04 Unclear & Inadequate Specifications
- T190C22 Lack of Competence of Project Participants
- T190C15 Inappropriate/ Unexpected Time Control (Target)
- T190C29 Poor Management
- T190C16 Inappropriate/ Unexpected Cost Control (Target)
- T190C07 Inadequate Contract Administration

11. T 26 D. D. R. P.: Due to Variation (3)

- T260C02 Inadequate Design Documentation
- T260C08 Inadequate Contract Documentation
- T260C21 Changes by Client
- T260C01 Inadequate/ Inaccurate Design Information
- T260C03 Inadequate Brief

- T260C09 Incomplete Tender Information
- T260C04 Unclear & Inadequate Specifications
- T260C22 Lack of Competence of Project Participants
- T260C15 Inappropriate/ Unexpected Time Control (Target)
- T260C29 Poor Management
- T260C16 Inappropriate/ Unexpected Cost Control (Target)
- T260C07 Inadequate Contract Administration
- T260C20 Slow Client Response

12. T 27 D. D. R. P.: Due to Late Instruction by Client/ Consultant Engineer (14)

- T270C01 Inadequate/ Inaccurate Design Information
- T270C02 Inadequate Design Documentation
- T270C09 Incomplete Tender Information
- T270C20 Slow Client Response
- T270C15 Inappropriate/ Unexpected Time Control (Target)
- T270C18 Poor Communications Among Project Participants
- T270C21 Changes by Client
- T270C03 Inadequate Brief
- T270C04 Unclear & Inadequate Specifications
- T270C19 Lack of Information for Decision Making;(Decisiveness)
- T270C22 Lack of Competence of Project Participants
- T270C25 Unrealistic Client Expectations
- T270C05 Inappropriate Contract Type (Strategy)
- T270C17 Inappropriate/ Unexpected Quality Control (Target)
- T270C16 Inappropriate/ Unexpected Cost Control (Target)
- T270C27 Lack of Team Spirit Among Participants

13. T 28 D. D. R. P.: Due to Late Issue of Consent (Approval) (10)

- T280C01 Inadequate/ Inaccurate Design Information
- T280C02 Inadequate Design Documentation
- T280C09 Incomplete Tender Information
- T280C15 Inappropriate/ Unexpected Time Control (Target)
- T280C20 Slow Client Response
- T280C18 Poor Communications Among Project Participants

- T280C21 Changes by Client
- T280C03 Inadequate Brief
- T280C04 Unclear & Inadequate Specifications
- T280C19 Lack of Information for Decision Making;(Decisiveness)
- T280C22 Lack of Competence of Project Participants
- T280C25 Unrealistic Client Expectations
- T280C17 Inappropriate/ Unexpected Quality Control (Target)
- T280C27 Lack of Team Spirit Among Participants
- T280C05 Inappropriate Contract Type (Strategy)
- T280C16 Inappropriate/ Unexpected Cost Control (Target)

14. T 31 D. D. R. P.: Due to Delay Caused by Utility Services Organization (15)

- T310C19 Lack of Information for Decision Making;(Decisiveness)
- T310C20 Slow Client Response
- T310C18 Poor Communications Among Project Participants
- T310C31 Uncontrollable External Events
- T310C15 Inappropriate/ Unexpected Time Control (Target)
- T310C04 Unclear & Inadequate Specifications
- T310C22 Lack of Competence of Project Participants
- T310C21 Changes by Client
- T310C29 Poor Management By One or More Project Participants
- T310C01 Inadequate/ Inaccurate Design Information
- T310C12 Unclear Risk Allocation
- T310C08 Inadequate contract documentation
- T310C28 Personality Clashes Among Project Participants
- T310C03 Inadequate Brief
- T310C27 Lack of Team Spirit Among Participants
- T310C02 Inadequate Design Documentation
- T310C07 Inadequate Contract administration

15. T 35 Extension of Time for Completion (13)

- T350C01 Inadequate/ Inaccurate Design Information
- T350C18 Poor Communications Among Project Participants
- T350C02 Inadequate Design Documentation

- T350C07 Inadequate Contract administration
- T350C21 Changes by Client
- T350C15 Inappropriate/ Unexpected Time Control (Target)
- T350C10 Inappropriate Contractor Selection
- T350C31 Uncontrollable External Events
- T350C19 Lack of Information for Decision Making;(Decisiveness)
- T350C20 Slow Client Response
- T350C03 Inadequate Brief
- T350C22 Lack of Competence of Project Participants
- T350C04 Unclear & Inadequate Specifications
- T350C29 Poor Management By One or More Project Participants
- T350C08 Inadequate contract documentation
- T350C09 Incomplete Tender Information
- T350C05 Inappropriate Contract Type (Strategy)
- T350C06 Inappropriate Contract Form
- T350C12 Unclear Risk Allocation
- T350C25 Unrealistic Client Expectations
- T350C23 Poor Workmanship
- T350C26 Unrealistic Information Expectations (By the Contractor)
- T350C28 Personality Clashes Among Project Participants
- T350C24 Inadequate Site Investigation
- T350C27 Lack of Team Spirit Among Participants

16. T 43 Defaults of Subcontractor, Nominated Subcontractor or Suppliers (16)

- T430C19 Lack of Information for Decision Making;(Decisiveness)
- T430C20 Slow Client Response
- T430C21 Changes by Client
- T430C18 Poor Communications Among Project Participants
- T430C15 Inappropriate/ Unexpected Time Control (Target)
- T430C29 Poor Management By One or More Project Participants
- T430C16 Inappropriate/ Unexpected Cost Control (Target)
- T430C17 Inappropriate/ Unexpected Quality Control (Target)
- T430C22 Lack of Competence of Project Participants
- T430C04 Unclear & Inadequate Specifications

- T430C02 Inadequate Design Documentation
- T430C08 Inadequate contract documentation
- T430C03 Inadequate Brief
- T430C01 Inadequate/ Inaccurate Design Information
- T430C27 Lack of Team Spirit Among Participants
- T430C07 Inadequate Contract administration
- T430C25 Unrealistic Client Expectations
- T430C14 Inappropriate Document Control
- T430C05 Inappropriate Contract Type (Strategy)
- T430C28 Personality Clashes Among Project Participants

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

Significant Types of Claims and Disputes (Second Priority)**1. T 06 Substantial Increase in Quantity of any item (not resulting from a Variation)
(17)**

- T060C09 Incomplete Tender Information
- T060C01 Inadequate/ Inaccurate Design Information
- T060C02 Inadequate Design Documentation
- T060C24 Inadequate Site Investigation
- T060C03 Inadequate Brief
- T060C20 Slow Client Response
- T060C19 Lack of Information for Decision Making;(Decisiveness)
- T060C21 Changes by Client

2. T 17 Suspension of Work (21)

- T170C01 Inadequate/ Inaccurate Design Information
- T170C21 Changes by Client
- T170C02 Inadequate Design Documentation
- T170C09 Incomplete Tender Information
- T170C03 Inadequate Brief
- T170C31 Uncontrollable External Events
- T170C15 Inappropriate/ Unexpected Time Control (Target)
- T170C08 Inadequate contract documentation
- T170C04 Unclear & Inadequate Specifications
- T170C20 Slow Client Response
- T170C19 Lack of Information for Decision Making;(Decisiveness)
- T170C25 Unrealistic Client Expectations
- T170C16 Inappropriate/ Unexpected Cost Control (Target)

3. T 18 Acceleration of Work (18)

- T180C01 Inadequate/ Inaccurate Design Information
- T180C02 Inadequate Design Documentation
- T180C15 Inappropriate/ Unexpected Time Control (Target)
- T180C21 Changes by Client

- T180C03 Inadequate Brief
- T180C19 Lack of Information for Decision Making;(Decisiveness)
- T180C20 Slow Client Response
- T180C09 Incomplete Tender Information
- T180C08 Inadequate contract documentation
- T180C22 Lack of Competence of Project Participants
- T180C07 Inadequate Contract administration
- T180C18 Poor Communications Among Project Participants
- T180C10 Inappropriate Contractor Selection
- T180C16 Inappropriate/ Unexpected Cost Control (Target)
- T180C31 Uncontrollable External Events
- T180C04 Unclear & Inadequate Specifications

4. T 29 D. D. R. P.: Due to Delay Caused by any Person/ Organization employed by client such as (Nominated Subcontractor, Suppliers or Others) (19)

- T290C19 Lack of Information for Decision Making;(Decisiveness)
- T290C20 Slow Client Response
- T290C21 Changes by Client
- T290C18 Poor Communications Among Project Participants
- T290C15 Inappropriate/ Unexpected Time Control (Target)
- T290C02 Inadequate Design Documentation
- T290C01 Inadequate/ Inaccurate Design Information
- T290C03 Inadequate Brief
- T290C22 Lack of Competence of Project Participants
- T290C16 Inappropriate/ Unexpected Cost Control (Target)
- T290C29 Poor Management By One or More Project Participants
- T290C17 Inappropriate/ Unexpected Quality Control (Target)
- T290C04 Unclear & Inadequate Specifications
- T290C08 Inadequate contract documentation
- T290C07 Inadequate Contract administration
- T290C27 Lack of Team Spirit Among Participants
- T290C25 Unrealistic Client Expectations
- T290C14 Inappropriate Document Control
- T290C05 Inappropriate Contract Type (Strategy)

5. T 33 Client's Breach of Contract (22)

- T330C01 Inadequate/ Inaccurate Design Information
- T330C20 Slow Client Response
- T330C02 Inadequate Design Documentation
- T330C15 Inappropriate/ Unexpected Time Control (Target)
- T330C21 Changes by Client
- T330C17 Inappropriate/ Unexpected Quality Control (Target)
- T330C16 Inappropriate/ Unexpected Cost Control (Target)
- T330C22 Lack of Competence of Project Participants
- T330C18 Poor Communications Among Project Participants
- T330C03 Inadequate Brief
- T330C25 Unrealistic Client Expectations
- T330C29 Poor Management By One or More Project Participants
- T330C12 Unclear Risk Allocation
- T330C08 Inadequate contract documentation
- T330C31 Uncontrollable External Events
- T330C07 Inadequate Contract administration

6. T 44 Unproductive / Idle Plants, Equipment or Labour (20)

- T440C01 Inadequate/ Inaccurate Design Information
- T440C02 Inadequate Design Documentation
- T440C08 Inadequate contract documentation
- T440C09 Incomplete Tender Information
- T440C03 Inadequate Brief
- T440C21 Changes by Client
- T440C04 Unclear & Inadequate Specifications
- T440C22 Lack of Competence of Project Participants
- T440C29 Poor Management By One or More Project Participants
- T440C16 Inappropriate/ Unexpected Cost Control (Target)
- T440C15 Inappropriate/ Unexpected Time Control (Target)
- T440C07 Inadequate Contract administration
- T440C20 Slow Client Response
- T440C06 Inappropriate Contract Form

ASSESSMENT’S SUMMARY TABLE:

1. Is this potential Type of claims and disputes frequent?
2. Does this potential Type of claims and disputes have a high or a low impact on construction project?
3. Is this potential Type of claims and disputes avoidable?
4. Do you think that this potential Type of claims and disputes is significant and avoidable?; if yes,
5. Do you agree that this potential Type of claims and disputes should be considered as a first or second priority to be avoided?
6. What are the significant causes that could lead to this significant Type of claims and disputes?; Or,
7. Do you agree that the promoted causes contribute significantly to this significant Type of claims and disputes?; if yes,
8. How can we avoid/control these causes?

Question Code	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
T01								
T02								
T03								
T05								
T09								
T10								
T11								
T12								
T13								
T19								
T26								
T27								
T28								
T31								
T35								
T43								

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

1. Is this potential Type of claims and disputes frequent?
2. Does this potential Type of claims and disputes have a high or a low impact on construction project?
3. Is this potential Type of claims and disputes avoidable?
4. Do you think that this potential Type of claims and disputes is significant and avoidable?; if yes,
5. Do you agree that this potential Type of claims and disputes should be considered as a first or second priority to be avoided?
6. What are the significant causes that could lead to this significant Type of claims and disputes?; Or,
7. Do you agree that the promoted causes contribute significantly to this significant Type of claims and disputes?; if yes,
8. How can we avoid/control these causes?

Question Code	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
T06								
T17								
T18								
T29								
T33								
T44								

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

Question Code	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
T01								
T02								
T03								
T05								
T06								
T09								
T10								
T11								
T12								
T13								
T17								
T18								
T19								
T26								
T27								
T28								
T29								
T31								
T33								
T35								
T43								
T44								

NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET.

SECTION IV: OVERALL PARTICIPANT ASSESSMENT:

- Q1) DO YOU THINK THAT THE QUESTIONNAIRE ELEMENTS ANSWER & CLARIFY THE FOLLOWING ISSUES?
- Q2) IF YES, TO WHAT EXTENT; PLEASE GIVE A SCALE 1-10 (1 IS LOW, 10 IS HIGH).
- Q3) ARE THERE ANY COMMENTS YOU WANT TO ADD?

No.	ISSUES	YES	NO	NOT SURE	SCALE	COMMENTS
1	THE DIFFERENT COMMON TYPES OF CLAIMS & DISPUTES & IT'S SIGNIFICANCE					
2	THE DIFFERENT COMMON CAUSES OF CLAIMS & DISPUTES & IT'S SIGNIFICANCE					
3	THE ROOT CAUSATION OF THE SOURCE OF CLAIM					
4	TYPE – CAUSE INTERACTION ASSESSMENT:					
5	DO YOU THINK THAT THE ANSWERS OF THE ABOVE QUESTION WILL HELP MANAGERS TO PREDICT THE SIGNIFICANCE TYPES & CAUSES OF CLAIMS & DISPUTES					
6	DO YOU THINK THAT THE ANSWERS OF THE ABOVE QUESTION WILL HELP MANAGERS TO PREDICT & RECOMMEND STRATEGIES TO AVOID OR REDUCE TO OF CLAIMS & DISPUTES					

THE END**THANK YOU VERY MUCH FOR YOUR KIND COOPERATION****NOTE: IF YOU NEED EXTRA SPACE, USE A SEPARATE SHEET**

***APPENDIX E: RESEARCH SURVEY (PART THREE)(QUANTITATIVE STUDY):
45 CONSTRUCTION PROJECTS***

E.1 RESEARCH SURVEY LETTER:

Emirate of Abu Dhabi
Department of
Municipalities and Agriculture
Abu Dhabi Municipality



إمارة أبوظبي
دائرة البلديات والزراعة
بلدية أبوظبي

الرقم: م / م / هـ / ٩ /
التاريخ: / / ٢٠٠٦ م

المحترمين

السادة /

ص.ب ()

فاكس ()

بعد التحية ..

الموضوع : استبيان حول المطالبات

في إطار الدراسات والبحوث الأكاديمية ، فإنه يرجى التكرم بالتعاون في تعبئة الاستبيان المرفق بالتنسيق مع المهندس / رائد ناشر موبايل رقم (٠٥٠/٦٤١٤٨٠٩) وذلك خلال أسبوع من تاريخه علماً بأنه سيتم إدراج هذا في ملف تقييم أداؤكم لدينا بالدائرة .

شاكرين لكم حسن تعاونكم معنا ...

وتقبلوا تحياتنا ...

المهندسة / فاطمة عبيد الجابر
الوكيل المساعد لقطاع مشاريع المباني

٢/١٩

المرفقات :- ما نكر أعلاه .

نسخة : الملف (فاتن) السادة - فورم ٢٠٠٦/٢/١٨

E.2 RESEARCH SURVEY FORM (QUANTITATIVE STUDY)

The University of Glamorgan
School of Technology
Wales, United Kingdom
April 2007

*Understanding and Preventing Construction Conflict, Claims
and Disputes: A Critical In-depth Study into their Causes and
Recommendations to Control in the United Arab Emirates*

By

Nadhem Asaad Bin Asaad Taher

- B.Sc., Engineering Management 1995
(University of the Pacific, California, USA)
- B.Sc., Civil Engineering 1997
(University of the Pacific, California, USA)
- M.Sc., Engineering Project Management 2001
(University of Glamorgan, Pontypridd, Wales, UK)

*A Survey Form Submitted in Partial Fulfilment
For the Degree of
Doctor of Philosophy
In Engineering Disputes and Claims*

*Quantitative Study
(Case Study)*

TABLE OF CONTENTS

SECTION I: PROJECT IDENTITY:..... 1

SECTION II: TECHNICAL SURVEY:..... 2

SECTION III: ADDITIONAL NOTES:..... 7

INTRODUCTION:

As you already know that Construction Claims and Disputes are considered to be one of the most disruptive and unpleasant issues of a project to the most of project participants. The claim mechanism powers appear not only to hinder the completion of construction and cause delays in delivering projects, but also time consuming, establishing conflict among project participants and often unfair cost spending of public budget which affect future public planning.

Abu municipality has sponsored the researcher with a full scholarship to carry out a Ph D. Research to explore and investigate the significant types of construction claims and disputes and their related root causes. This investigation will provide the basis for suggesting recommend strategies to avoid or at least mitigate construction claims and disputes by avoiding or at least controlling the underlying the root causes.

Thus, the main objective for the Ph. D. research is to investigate the significant types of construction claims and disputes, and their related root causes in order to suggest strategies to avoid or at least mitigate those claims and disputes in the context of the UAE and to provide recommendations to all project participants. This can be achieved by reviewing and evaluating previous Construction Claims' Theories. In addition to the collaboration and cooperation of several international experts, international parties as well as leading international and local project participants in the Gulf Region on this specific issue. This can be done by sharing their prospective, thoughts and experiences.

The main objective of the research will be achieved by analysing the collected data. The research data are collected in three different stages. The first two stages of data collection have been accomplished, and the collected data have been analysed. This survey, third stage, is concerned with the collection of quantitative objective data from real case studies of construction projects. This step will allow not only the validation of the previously analysed data, but also to provide different prospective.

After a review of the five year construction plan 2000-2005 for Abu Dhabi Government, a sample of forty five construction projects have been chosen representing all kind of projects that are developed by Abu Dhabi municipality. Thus, the data

collection inputs are vital and will be evaluated thoroughly in order to achieve the objective of the research that come up with valuable strategies in order to reduce Construction Projects' Disputes & Claims, as well as to develop the UAE's Construction Industry.

Time is very crucial, so please try to respond to this questionnaire as soon as possible within the next One Week to Ten Days.

Please send your response either to:

3. Researcher:

Engineer Nadhem Taher.

33 Kilcredaun House

Prospect Place

Cardiff, Wales

United Kingdom

Tel. #: 0044-7886-527-384

E Mail: bintaher_na2000@yahoo.com, or

4. Coordinating personnel:

Engineer Raed Nasher.

Follow up Unit.

Government Building Project Directorate

Works Department

P O Box: 3.

Abu Dhabi, UAE.

Tel. #: 02- 4066999. Abu Dhabi.

Mobile #: 050 – 6414809.

E Mail: raednasher@yahoo.com

Note: Please use an electronic Copy to respond.

Please be patient and try to answer the **questions in the attached questionnaire** to your best professional knowledge and to Abu Dhabi General Condition of Contract (in some questions).

Thank you for your considerations in advance and hope to cooperate in the very near future.

Yours truly,

Nadhem Asaad Bin Taher

Date:

SECTION I: PROJECT IDENTITY:

I. CONSULTANT NAME:

II. CONTRACTOR NAME:

III. PROJECT NAME/TITLE:

IV. BENEFICIARY NAME:

V. Type of Contract:

- a) Conventional, Lump Sum
- b) Design and Built
- c) Cost Plus
- d) Turned Key
- e) Others Please Specify -----.

VI. PROJECT DESCRIPTION:

.....

PROJECT VALUE (COST): (IN UAE DIRHAMS).

ORIGINAL CONTRACT VALUE (OCV):

ACTUAL CONTRACT VALUE (ACV):

PROJECT CONSTRUCTION DURATION: (IN DAYS)

ORIGINAL CONTRACT DURATION (OCD):

ACTUAL CONTRACT DURATION (ACD):

TOTAL AMOUNT OF VARIATION/S:

TOTAL NUMBER OF DAYS (DELAYS):

ARE THERE ANY CLAIMS?

YES No

IF THE ANSWER IS YES, THE GO TO SECTION 2

SECTION II: TECHNICAL SURVEY:

ACCORDING TO ABU DHABI GOVERNMENT GENERAL CONDITIONS OF CONTRACT,
PLEASE ANSWER THE FOLLOWING QUESTIONS:

Q1) DID THE CONTRACTOR CLAIM THIS GIVEN **TYPE** OF CONSTRUCTION CLAIMS AND DISPUTES?

YES No

If the answer is '**No**'; go to next Type of Claims and Disputes.

If the answer is '**Yes**'; continue:

Q2) DID THE CONTRACTOR CLAIM FOR EXTRA /ADDITIONAL TIME, COST OR BOTH?

TIME COST BOTH

A: IF COST CLAIMED, THEN CONTINUE: IF NOT GO TO B:

WHAT WAS THE **CLAIMED** AMOUNT (IN UAE DIRHAMS)? -----

WAS THE CONTRACTOR GIVEN/GRANTED THE CLAIMED AMOUNT?

YES NO PARTIALLY

WHAT WAS THE **GIVEN/GRANTED** AMOUNT (IN UAE DIRHAMS)? -----

B: IF TIME CLAIMED THEN CONTINUE,

WHAT WAS THE **CLAIMED** DURATION/TIME (IN DAYS)? -----

WAS THE CONTRACTOR GIVEN THE CLAIMED DURATION?

YES NO PARTIALLY

WHAT WAS THE **GIVEN/GRANTED** DURATION/TIME (IN DAYS)? -----

PLEASE TICK (↑) IN THE APPROPRIATE BOX IN THE TABLE BELOW TO ANSWER THE ABOVE MENTIONED QUESTIONS.

RESEARCH SURVEY PART THREE (QUANTITATIVE STUDY) APPENDIX E

<u>Code</u>	<u>Type</u> of Disputes and Claims	Claim Type			Cost Claim		Time Claim		General Condition Article Number
		Cost Claim	Time Claim	Both Cost & Time	<u>CLAIMED</u> AMOUNT	<u>GIVEN</u> <u>GRANTED</u> AMOUNT	<u>CLAIMED</u> DURATION	<u>GIVEN</u> <u>GRANTED</u> DURATION	
T 01	Ambiguity in Documents								
T 02	Delays: Incomplete Design/ Insufficient Information by client/ consultant								
T 03	Design/ Change/ Omission / Errors by the Client or (Engineer)								
T 04	Instruction by the Client/ Consultant to Resolve Discrepancy								
T 05	Rectification of Works/ Specification Change Due to Defective Design								
T 06	Substantial Increase in Quantity of any item (not resulting from a Variation)								
T 07	Substantial Change in Quality of any item (not resulting from a Variation)								
T 08	Error in Setting out Due to Incorrect Data Shown on Drawings								
T 09	Change of Project Profile and Site								
T 10	Delayed Site Possession/ Works/ Restricted Access								
T 11	Differing Site Condition								
T 12	Unanticipated Soil Condition								
T 13	D. D. R. P.: Due to Unforeseen Ground Condition/Unforeseeable Obstruction								
T 14	Investigation of Suspected Defects								

RESEARCH SURVEY PART THREE (QUANTITATIVE STUDY) APPENDIX E

<u>Code</u>	<u>Type</u> of Disputes and Claims	Claim Type			Cost Claim		Time Claim		General Condition Article Number
		Cost Claim	Time Claim	Both Cost & Time	<u>CLAIMED</u> AMOUNT	<u>GIVEN</u> <u>GRANTED</u> AMOUNT	<u>CLAIMED</u> DURATION	<u>GIVEN</u> <u>GRANTED</u> DURATION	
T 15	Uncovering of Works for Testing (Examination)								
T 16	Additional Tests to Verify Compliance with the								
T 17	Suspension of Work								
T 18	Acceleration of Works								
T 19	Variations								
T 20	Additional Work to other Parts arising from repairs or defects								
T 21	Client's Instruction to Change (not resulting from Variation)								
T 22	Facilities provided to others by the contractor (in excess to those mentioned in tender documents)								
T 23	Loss of / Damage to Materials on Site or During Transport								
T 24	Repair damages to other Property during Transport of Materials								
T 25	Delays: Unavailability / Unsuitability of Project Materials								
T 26	D. D. R. P.: Due to Variation								
T 27	D. D. R. P.: Due to Late Instruction by Client/ Consultant Engineer								
T 28	D. D. R. P.: Due to Late Issue of Consent (Approval)								

RESEARCH SURVEY PART THREE (QUANTITATIVE STUDY) APPENDIX E

<u>Code</u>	<u>Type</u> of Disputes and Claims	Claim Type			Cost Claim		Time Claim		General Condition Article Number
		Cost Claim	Time Claim	Both Cost & Time	<u>CLAIMED</u> AMOUNT	<u>GIVEN</u> <u>GRANTED</u> AMOUNT	<u>CLAIMED</u> DURATION	<u>GIVEN</u> <u>GRANTED</u> DURATION	
T 29	D. D. R. P.: Due to Delay Caused by any Person/ Organization employed by client such as (Nominated Subcontractor, Suppliers or Others)								
T 30	D. D. R. P.: Due to Late Delivery of Materials by the Client								
T 31	D. D. R. P.: Due to Delay Caused by Utility Services Organization								
T 32	D. D. R. P.: Due to Additional/ Unforeseen Building Regulations/Procedures								
T 33	Client's Breach of Contract								
T 34	Late Issuance of final certificate								
T 35	Extension of Time for Completion								
T 36	Late Payment								
T 37	Interest on Late Payment								
T 38	Overdue retention money								
T 39	Inflation / Price Escalation								
T 40	Currency Fluctuation								
T 41	Finance Charges: Loss of Profit, Insurance, Retention, etc.								
T 42	Liquidated and ascertained damages								

<u>Code</u>	<u>Type</u> of Disputes and Claims	Claim Type			Cost Claim		Time Claim		General Condition Article Number
		Cost Claim	Time Claim	Both Cost & Time	<u>CLAIMED</u> AMOUNT	<u>GIVEN</u> <u>GRANTED</u> AMOUNT	<u>CLAIMED</u> DURATION	<u>GIVEN</u> <u>GRANTED</u> DURATION	
T 43	Default of Subcontractor, Nominated Subcontractor or Suppliers								
T 44	Unproductive / Idle Plants, Equipment or Labour								
T 45	Labour Strikes, Civil Unrest, etc.								
T 46	Custom Tariffs, New Taxes								
T 47	Embargoes on Project Imported Items								
T 48	Expropriation of Contractor's Equipment or Machinery, etc.								
T 49	D. D. R. P.: Due to Inclement Weather, Flood, Storms, etc.								
T 50	Damages to Work due to Exceptionally Inclement/ Adverse Weather								
T 51	Rectification of Damage Due to Unexpected Risk								

Where, D. D. R. P.: Delays/ Disruption to regular progress

SECTION III: ADDITIONAL NOTES:

Use the Following Table to add any Type of Disputes and Claims and are not mentioned in the Previous Table.

<u>Type</u> of Disputes and Claims	Claim Type			Cost Claim		Time Claim		General Condition Article Number
	Cost Claim	Time Claim	Both Cost & Time	<u>CLAIMED</u> AMOUNT	<u>GIVEN</u> <u>GRANTED</u> AMOUNT	<u>CLAIMED</u> DURATION	<u>GIVEN</u> <u>GRANTED</u> DURATION	

PLEASE USE AN ADDITIONAL BLANK PAPER IF YOU NEED TO ADD ANY OTHER COMMENTS

THE END
THANK YOU VERY MUCH FOR YOUR KIND COOPERATION

APPENDIX F: CONSULTANTS' APPROVED LIST

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APPENDIX G: LIST OF CONSTRUCTION PROJECTS

G.1 PROJECTS' COST SUMMARY

Project Name & Description: Cost Schedule Table

Project No	Project Code	Project Name & Description	Contract Value		Claimed Value
			Official	Final	
1	1/1/251/11	Sports Club	55,000	79,800	24,800
2	1/3/103/1	Security Building	50,000	62,550	12,550
3	1/624/1	Documents and Research Library	90,000	124,800	34,800
4	1/3/354/1	2 Girl Schools in Abu Dhabi-centre	43,102	43,102	0
5	1/1/544/7	PWD Car Park	9,980	12,600	2,620
6	1/513/2	Administration & Organisations Dept.	31,195	34,645	3,450
7	1/3/361/1	Bany-Yas mosque 500 People	14,850	14,850	0
8	1/3/352/1	Al samha Kindergarten	9,435	10,710	1,275
9	1/3/215/1	Boys Combined High School in Bahia west	21,364	23,544	2,180
10	1/3/118/1	Musafah Police Department	29,251	36,526	7,275
11	1/3/113/1	E. Bany-Yas Police Department	28,789	35,399	6,610
12	1/3/117/1	Khaleefa A Police Department	29,427	35,627	6,200
13	1/1/554/1	UAE Traditional Club – Al Samalia	46,820	58,880	12,060
14	1/661/2	Theatre in Abu Dhabi Water Front	44,580	59,670	15,090
15	1/1/652/7	Covered Olympic Pool– Al Samalia	16,940	18,740	1,800
16	1/1/652/6	Covered Play Ground– Al Samalia	7,959	9,259	1,300
17	1/3/274/1	Boys Element School in Shawameq	15,480	15,480	0
18	1/615/2	30 Houses in S. Heilia-Contract 2	32,813	33,713	900
19	1/619/1	40 Houses in Wathba-Contract 1	39,060	40,260	1,200
20	1/1/593/11	40 Houses in Shawameq-Contract 8	41,400	42,600	1,200
21	1/1/593/15	30 Houses in Shawameq-Contract 12	29,910	30,810	900
22	1/1/622/1	30 Houses in Shawameq-Contract 1/2	29,001	29,901	900
23	1/1/622/2	30 Houses in Shawameq-Contract 2/2	30,728	31,628	900
24	3/262/1	Wathba mosque 700 People	6,788	6,972	184
25	1/619/2	40 Houses in Wathba-Contract 2	43,420	44,620	1,200
26	1/614/14	40 Houses in Ban-Yas-Contract 1	40,494	41,694	1,200

Project Name & Description: Cost Schedule Table

Project No	Project Code	Project Name & Description	Contract Value		Claimed Value
			Official	Final	
27	3/209/1	Boys Element School in Nahda	15,943	15,943	0
28	1/1/615/4	40 Houses in S. Heilia-Contract 4	43,888	45,088	1,200
29		2 Boys Compound Schools Ban-Yas	16,499	16,499	0
30	1/3/261/2	Shawameq mosque 300 People- 1	3,240	3,360	120
31	1/3/261/2	Shawameq mosque 300 People- 2	3,638	3,768	130
32		2 Girl Compound Schools Musafah-1	18,791	18,791	0
33		2 Girl Compound Schools Musafah-2	16,399	16,399	0
34	1/3/273/1	Shawameq Kindergarten	9,570	9,739	169
35	1/3/286/2	Element School in Bridges	17,700	17,700	0
36		2 Compound Schools Ban-Yas West	16,663	16,663	0
37	3/397/3	Falah & Shamkha Kindergarten	19,294	19,984	690
38	3/397/2	Shamkha Kindergarten	9,645	9,965	320
39	3/397/6	Two Kindergarten in Shamkha	18,790	19,784	994
40	1/3/265/2	Bahia mosque 300 People- 1	3,781	3,781	0
41	1/3/265/3	Bahia mosque 300 People- 2	4,330	4,330	0
42	1/3/214/2	Girl Element School in Bahia	17,277	17,487	210
43	1/3/286/4	Girl Element School in Shahama	17,846	18,368	522
44	1/1/603/3	Al Raha Beach Theatre	64,371	86,038	21,667
45	1/3/208/1	Al Rahba Police Department	28,970	36,892	7,922

G.2 PROJECTS' DURATION (TIME) SUMMARY

Project Name & Description: Time Schedule Table

Project No	Project Code	Project Name & Description	Starting Date	Finish Date	
				Official	Actual
1	1/1/251/11	Sports Club			
2	1/3/103/1	Security Building			
3	1/624/1	Documents and Research Library			
4	1/3/354/1	2 Girl Schools in Abu Dhabi-centre			
5	1/1/544/7	PWD Car Park			
6	1/513/2	Administration & Organisations Dept.			
7	1/3/361/1	Bany-Yas mosque 500 People			
8	1/3/352/1	Al samha Kindergarten			
9	1/3/215/1	Boys Combined High School in Bahja west			
10	1/3/118/1	Musafah Police Department			
11	1/3/113/1	E. Bany-Yas Police Department			
12	1/3/117/1	Khaleefa A Police Department			
13	1/1/554/1	UAE Traditional Club – Al Samalia			
14	1/661/2	Theatre in Abu Dhabi Water Front			
15	1/1/652/7	Covered Olympic Pool– Al Samalia			
16	1/1/652/6	Covered Play Ground– Al Samalia			
17	1/3/274/1	Boys Element School in Shawameq			
18	1/615/2	30 Houses in S. Heilia-Contract 2			
19	1/619/1	40 Houses in Wathba-Contract 1			
20	1/1/593/11	40 Houses in Shawameq-Contract 8			
21	1/1/593/15	30 Houses in Shawameq-Contract 12			
22	1/1/622/1	30 Houses in Shawameq-Contract 1/2			
23	1/1/622/2	30 Houses in Shawameq-Contract 2/2			
24	3/262/1	Wathba mosque 700 People			
25	1/619/2	40 Houses in Wathba-Contract 2			
26	1/614/14	40 Houses in Ban-Yas-Contract 1			
27	3/209/1	Boys Element School in Nahda			
28	1/1/615/4	40 Houses in S. Heilia-Contract 4			

Project Name & Description: Time Schedule Table

Project No	Project Code	Project Name & Description	Starting Date	Finish Date	
				Official	Actual
29		2 Boys Compound Schools Ban-Yas			
30	1/3/261/2	Shawameq mosque 300 People- 1			
31	1/3/261/2	Shawameq mosque 300 People- 2			
32		2 Girl Compound Schools Musafah-1			
33		2 Girl Compound Schools Musafah-2			
34	1/3/273/1	Shawameq Kindergarten			
35	1/3/286/2	Element School in Bridges			
36		2 Compound Schools Ban-Yas West			
37	3/397/3	Falah & Shamkha Kindergarten			
38	3/397/2	Shamkha Kindergarten			
39	3/397/6	Two Kindergarten in Shamkha			
40	1/3/265/2	Bahia mosque 300 People- 1			
41	1/3/265/3	Bahia mosque 300 People- 2			
42	1/3/214/2	Girl Element School in Bahia			
43	1/3/286/4	Girl Element School in Shahama			
44	1/1/603/3	Al Raha Beach Theatre			
45	1/3/208/1	Al Rahba Police Department			

APPENDIX Y: RESEARCH DATA TABLES AND CHART

Y.1 TYPES OF CLAIMS AND DISPUTES:

Y.1.1 TYPE AGREEMENT ASSESSMENT:

Y.1.1.1 TYPE AGREEMENT TABLES:

Table 7-7 Types of Claims & Disputes Agreement Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT					
Type Description	Code	Clients	Consultants	Contractors	Over All
Ambiguity in Documents - Is this a potential type?	T0101	100.00%	100.00%	100.00%	100.00%
Delays: Incomplete Design/ Insufficient Information by Client - Is this a po	T0201	100.00%	100.00%	100.00%	100.00%
Design/ Change/ Omission / Errors by the Client - Is this a potential type?	T0301	100.00%	100.00%	100.00%	100.00%
Change in Quality (not resulting from a Variation) - Is this a potential type?	T0701	100.00%	100.00%	100.00%	100.00%
Error in Setting out Due to Incorrect Data Shown on Drawings - Is this a po	T0801	100.00%	100.00%	100.00%	100.00%
Change of Project Profile and Site - Is this a potential type?	T0901	100.00%	100.00%	100.00%	100.00%
Delayed Site Possession/ Restricted Access - Is this a potential type?	T1001	100.00%	100.00%	100.00%	100.00%
Differing Site Condition - Is this a potential type?	T1101	100.00%	100.00%	100.00%	100.00%
Unanticipated Soil Condition - Is this a potential type?	T1201	100.00%	100.00%	100.00%	100.00%
Unforeseen Ground Condition/ Unforeseeable Obstruction - Is this a potent	T1301	100.00%	100.00%	100.00%	100.00%
Investigation of Suspected Defects - Is this a potential type?	T1401	100.00%	100.00%	100.00%	100.00%
Uncovering of Works For Testing - Is this a potential type?	T1501	100.00%	100.00%	100.00%	100.00%
Additional Tests to Verify Compliance with the - Is this a potential type?	T1601	100.00%	100.00%	100.00%	100.00%
Suspension of Work - Is this a potential type?	T1701	100.00%	100.00%	100.00%	100.00%
Acceleration of Works - Is this a potential type?	T1801	100.00%	100.00%	100.00%	100.00%
Variations - Is this a potential type?	T1901	100.00%	100.00%	100.00%	100.00%
Client's Instruction to Change (not resulting from Variation) - Is this a pote	T2101	100.00%	100.00%	100.00%	100.00%
Facilities provided to others by the contractor - Is this a potential type?	T2201	100.00%	100.00%	100.00%	100.00%
Loss of / Damage to Materials on Site or During Transport - Is this a potent	T2301	100.00%	100.00%	100.00%	100.00%
Delays: Unavailability / Unsuitability of Project Materials - Is this a potenti	T2501	100.00%	100.00%	100.00%	100.00%
Delay: Due To Variation - Is this a potential type?	T2601	100.00%	100.00%	100.00%	100.00%
Delay: Due To Late Instruction by Client - Is this a potential type?	T2701	100.00%	100.00%	100.00%	100.00%
Delay: Due To Late Approval - Is this a potential type?	T2801	100.00%	100.00%	100.00%	100.00%
Delay: caused by client or employed by Client - Is this a potential type?	T2901	100.00%	100.00%	100.00%	100.00%
Delay: Late Delivery of Materials by Client - Is this a potential type?	T3001	100.00%	100.00%	100.00%	100.00%
Delay: Caused by Utility Services Organization - Is this a potential type?	T3101	100.00%	100.00%	100.00%	100.00%
Client's Breach of Contract - Is this a potential type?	T3301	100.00%	100.00%	100.00%	100.00%
Extension of Time For Completion - Is this a potential type?	T3501	100.00%	100.00%	100.00%	100.00%
Late Payment - Is this a potential type?	T3601	100.00%	100.00%	100.00%	100.00%
Overdue retention money - Is this a potential type?	T3801	100.00%	100.00%	100.00%	100.00%
Inflation / Price Escalation - Is this a potential type?	T3901	100.00%	100.00%	100.00%	100.00%
Currency Fluctuation - Is this a potential type?	T4001	100.00%	100.00%	100.00%	100.00%
Default of Subcontractor, Nominated Subcontractor - Is this a potential type	T4301	100.00%	100.00%	100.00%	100.00%
Unproductive / Idle Plants, Equipment or Labour - Is this a potential type?	T4401	100.00%	100.00%	100.00%	100.00%
Delays: Inclement Weather, Flood, Storms, , Etc. - Is this a potential type?	T4901	100.00%	100.00%	100.00%	100.00%
Damages to Work due to Inclement Weather, - Is this a potential type?	T5001	100.00%	100.00%	100.00%	100.00%
Rectification of Damage due to Un Excepted Risk - Is this a potential type?	T5101	100.00%	100.00%	100.00%	100.00%
Quantity Increase (not resulting from a Variation) - Is this a potential type?	T0601	100.00%	100.00%	93.33%	98.04%
Additional Work to other Parts arising from repairs or defects - Is this a pot	T2001	100.00%	100.00%	93.33%	98.04%
Liquidated and ascertained damages - Is this a potential type?	T4201	94.74%	100.00%	100.00%	98.04%
Repair damages to other Property during Transport of Materials - Is this a p	T2401	100.00%	100.00%	93.33%	97.96%
Expropriation of Contractor's Equipment etc. - Is this a potential type?	T4801	94.74%	94.12%	100.00%	96.08%
Late Issuance of final certificate - Is this a potential type?	T3401	100.00%	82.35%	100.00%	94.12%
Embargoes on Project Imported Items - Is this a potential type?	T4701	68.42%	68.75%	78.57%	71.43%
Defective Design: Rectification of Works/ Specification Change - Is this a	T0501	73.68%	70.59%	66.67%	70.59%
Labour Strikes, Civil Unrest, Etc. - Is this a potential type?	T4501	68.42%	68.75%	73.33%	70.00%
Custom Tariffs, New Taxes - Is this a potential type?	T4601	64.71%	64.71%	80.00%	69.39%
Finance Charges: Loss of Profit, Insurance, Retention, Etc. - Is this a potent	T4101	70.59%	64.71%	69.23%	68.09%
Instruction by the Client to Resolve Discrepancy - Is this a potential type?	T0401	64.71%	56.25%	71.43%	63.83%
Interest on Late Payment - Is this a potential type?	T3701	55.56%	62.50%	73.33%	63.27%
Delay: Additional building regulations/ procedures - Is this a potential type?	T3201	57.89%	58.82%	73.33%	62.75%

Y.1.1.2 TYPE AGREEMENT BAR CHARTS:

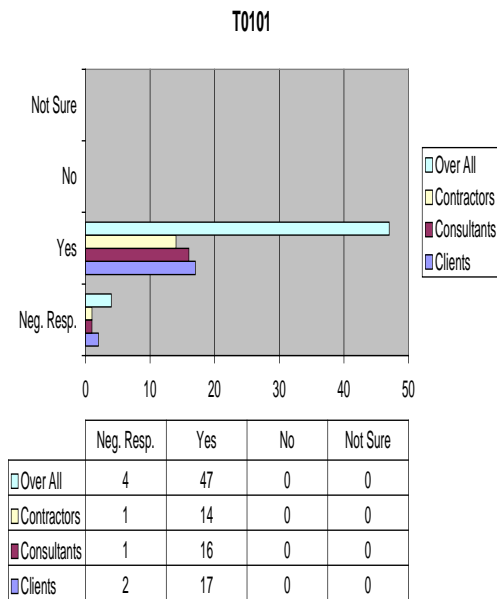


Figure 1 T0101

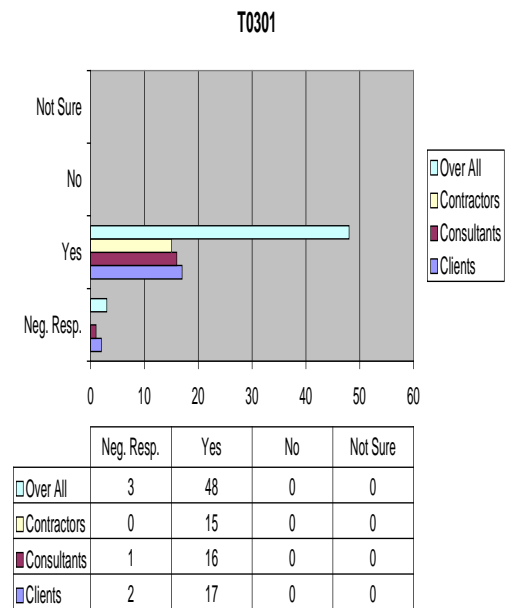


Figure 3 T0301

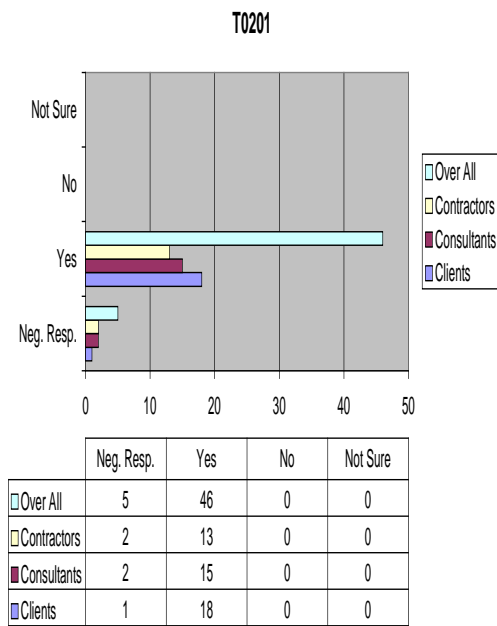


Figure 2 T0201

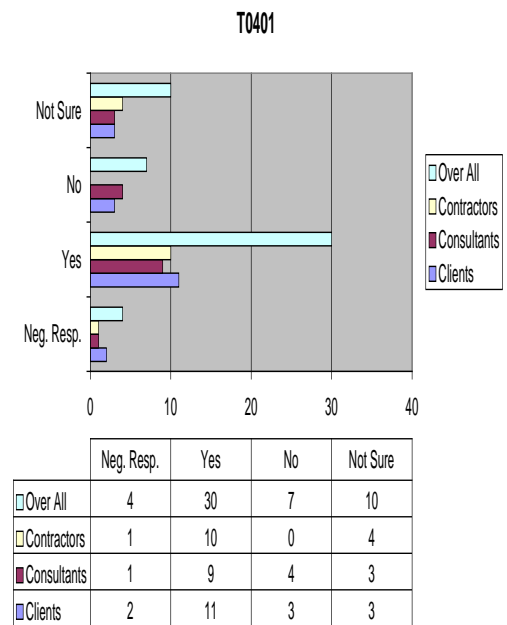


Figure 4 T0401

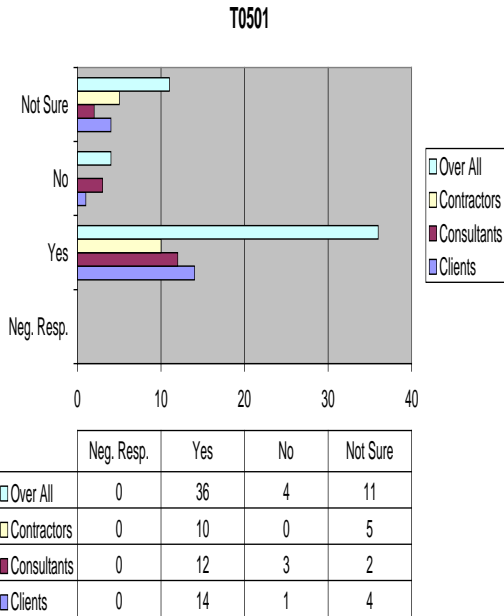


Figure 5 T0501

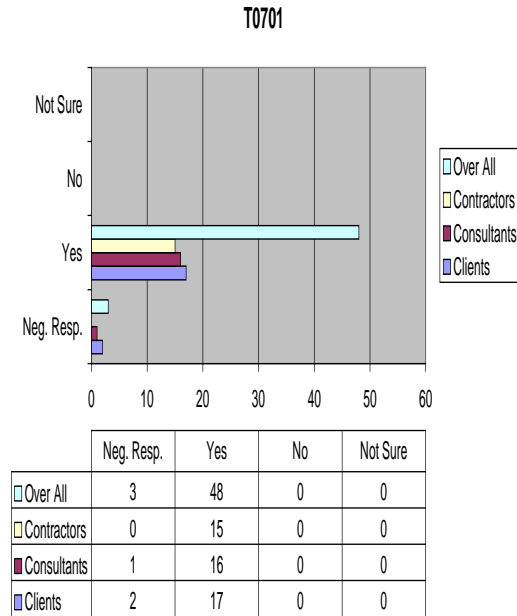


Figure 7 T0701

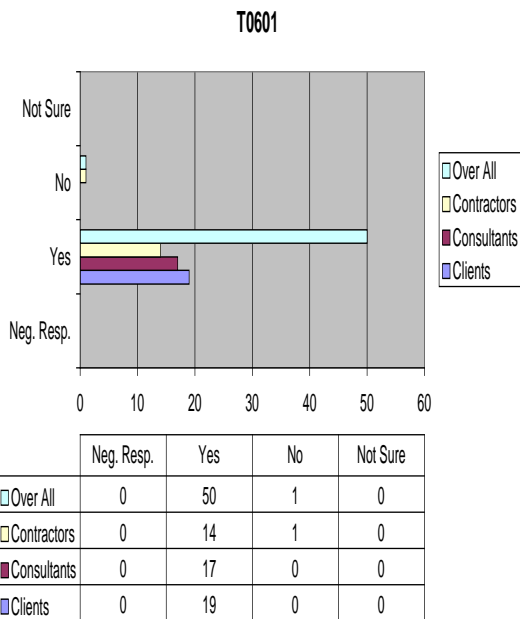


Figure 6 T0601

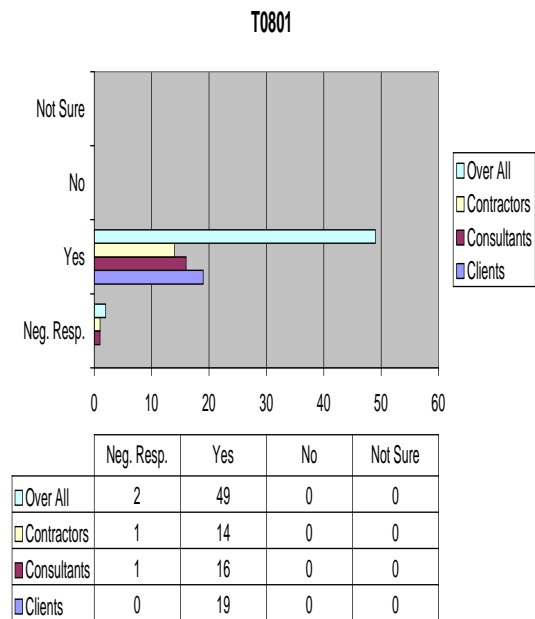


Figure 8 T0801

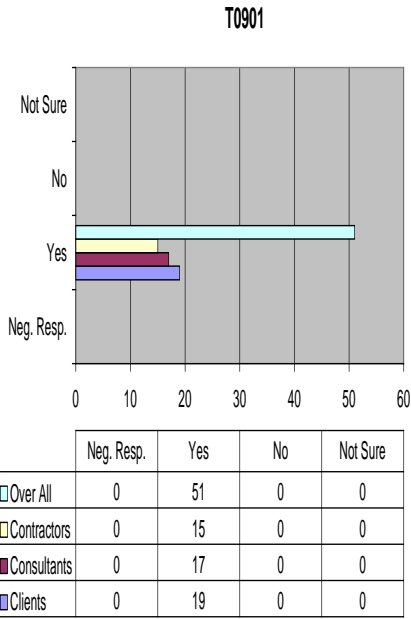


Figure 9 T0901

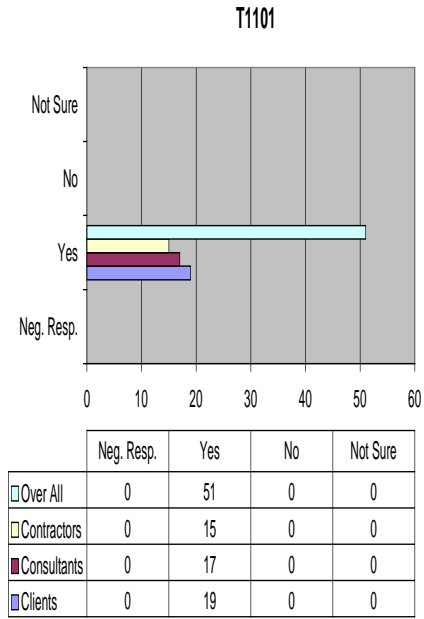


Figure 11 T1101

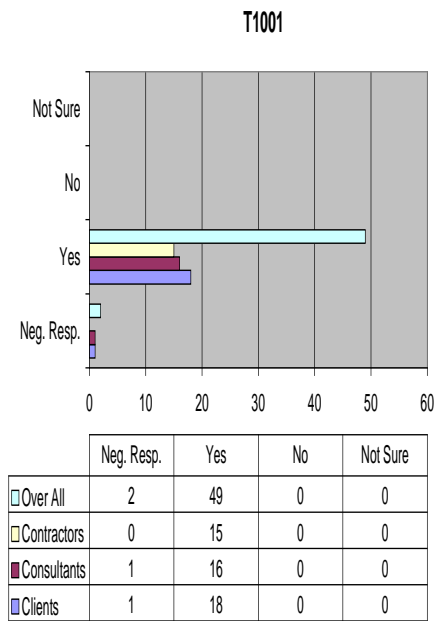


Figure 10 T1001

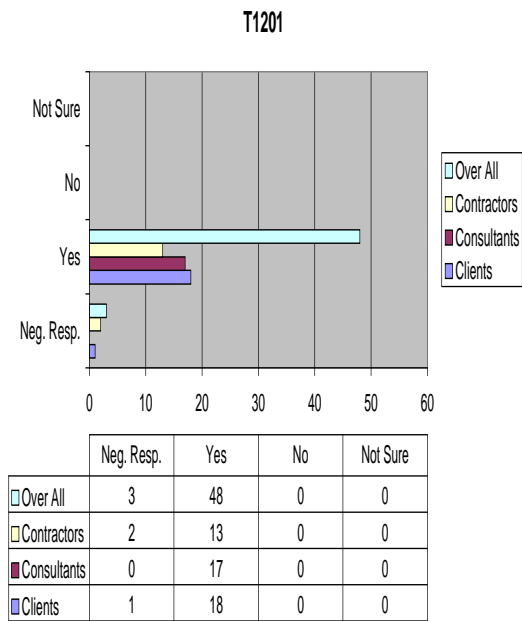


Figure 12 T1201

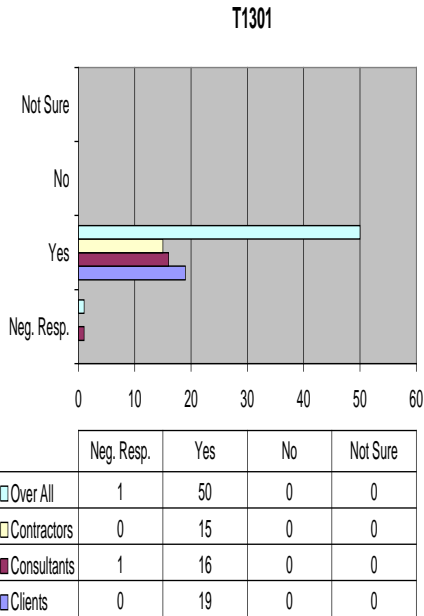


Figure 13 T1301

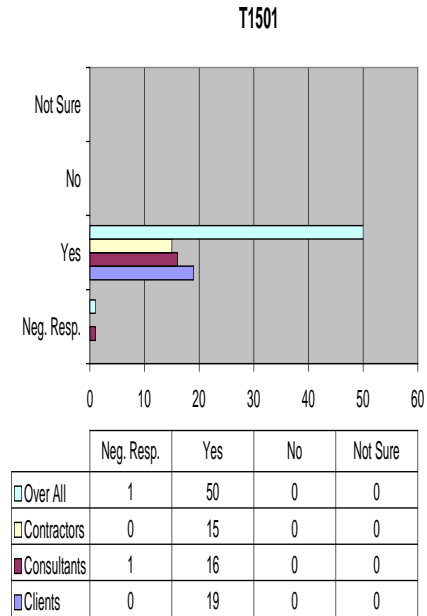


Figure 15 T1501

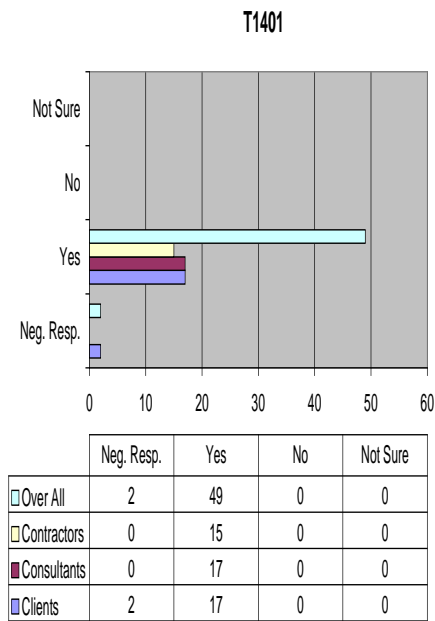


Figure 14 T1401

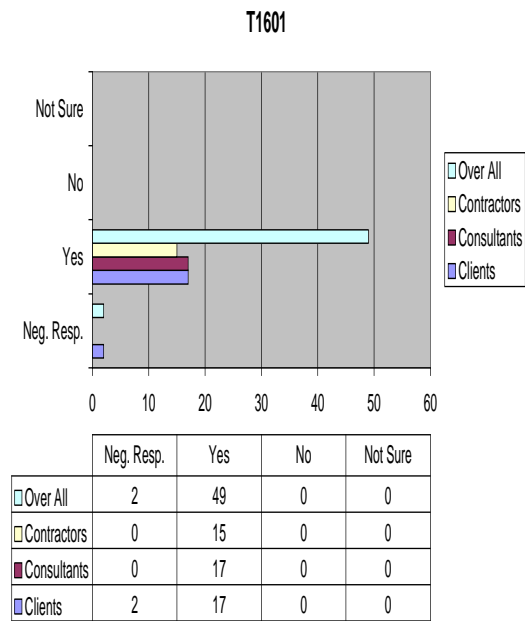


Figure 16 T1601

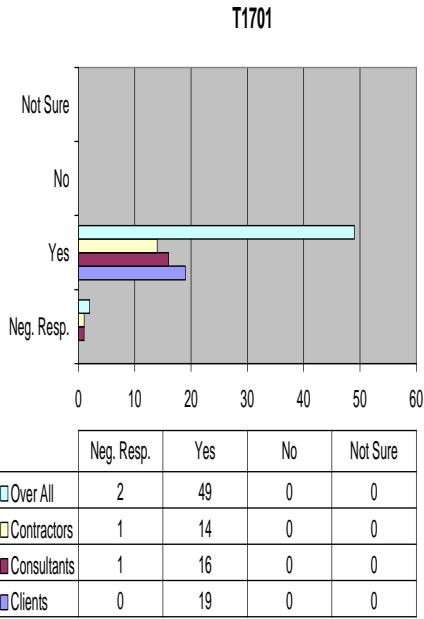


Figure 17 T1701

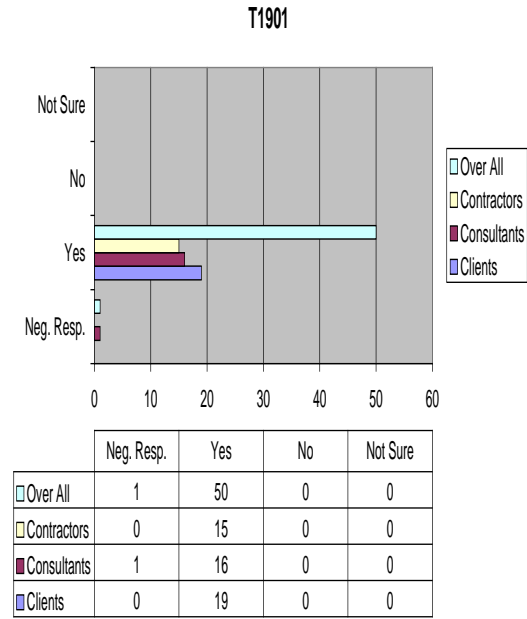


Figure 19 T1901

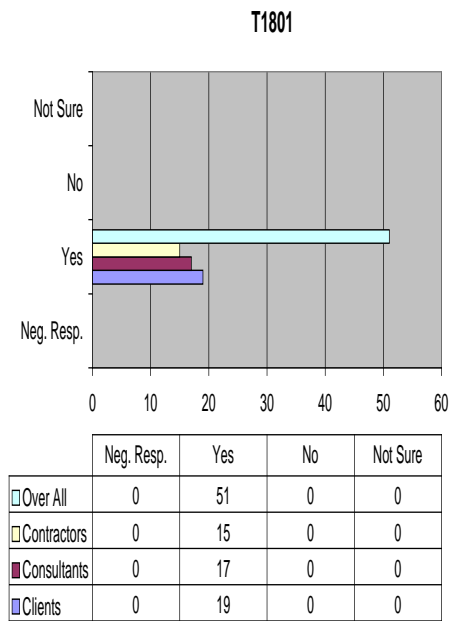


Figure 18 T1801

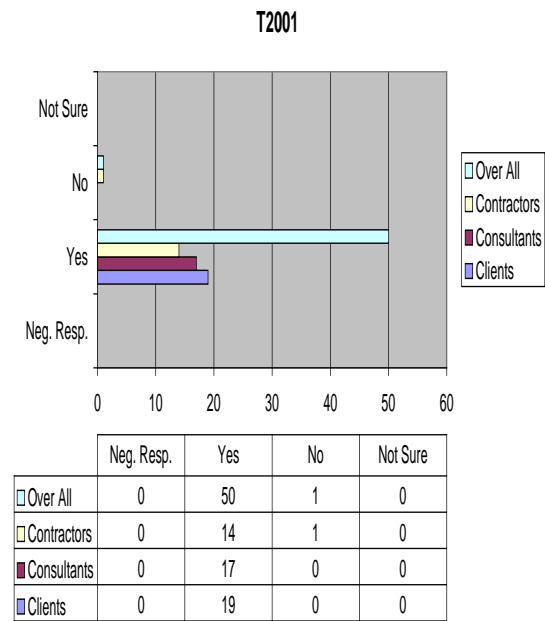


Figure 20 T2001

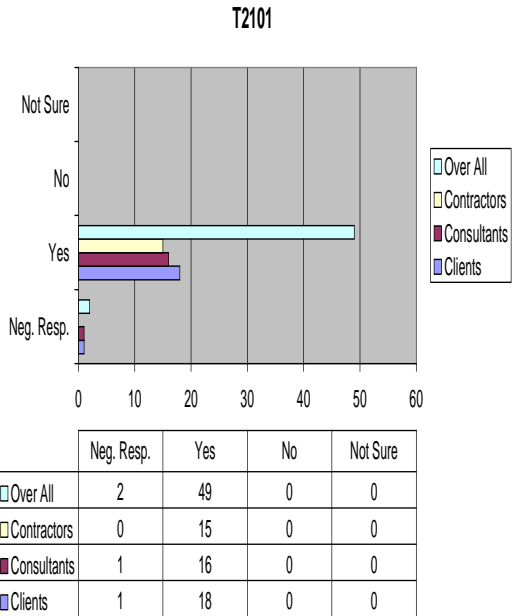


Figure 21 T2101

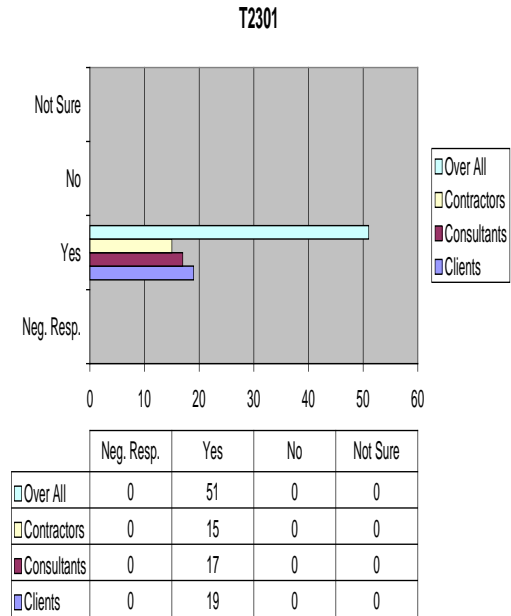


Figure 23 T2301

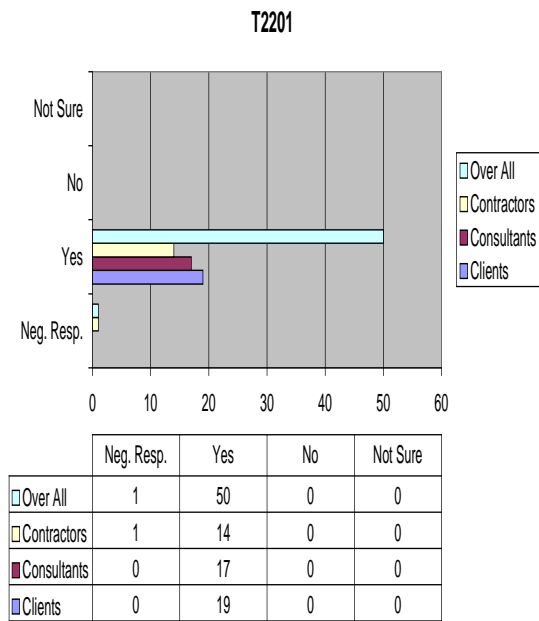


Figure 22 T2201

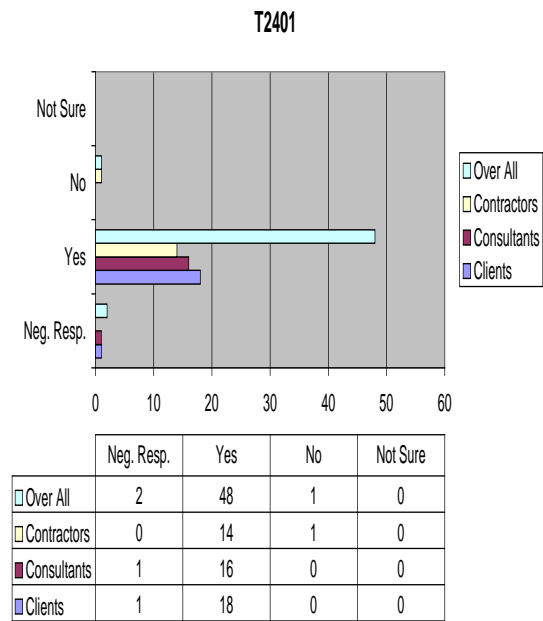


Figure 24 T2401

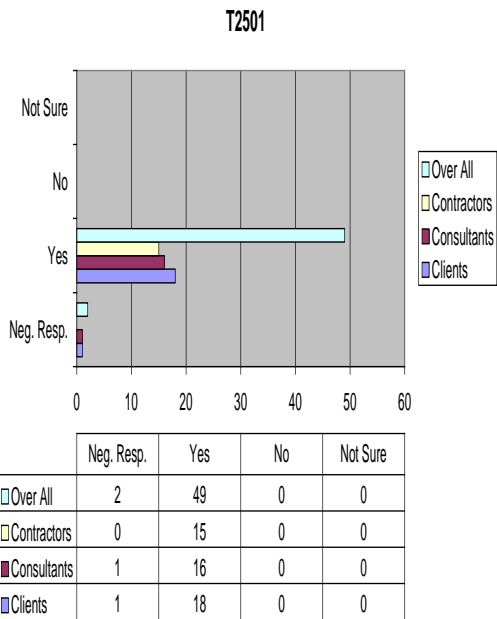


Figure 25 T2501

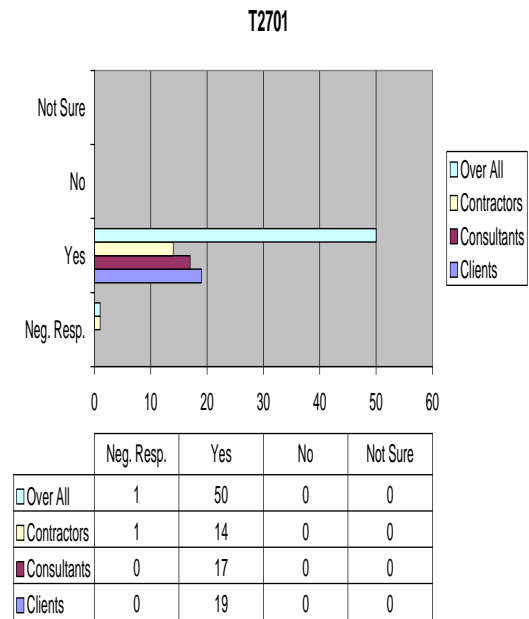


Figure 27 T2701

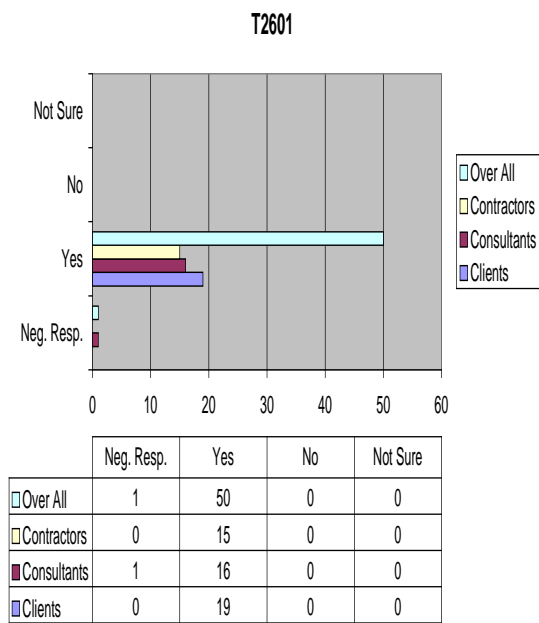


Figure 26 T2601

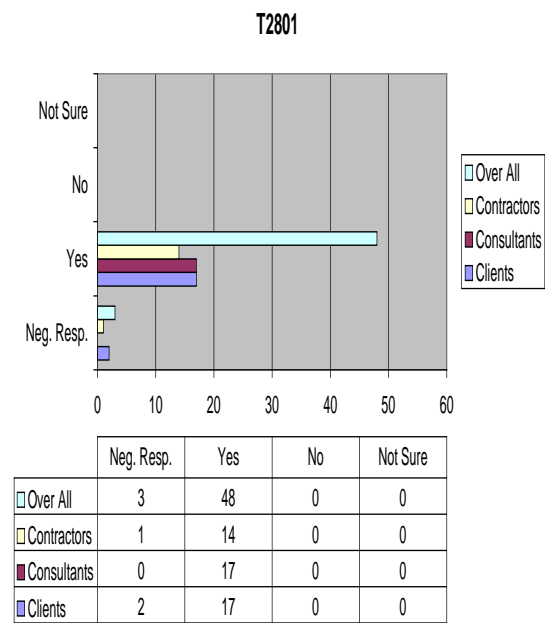


Figure 28 T2801

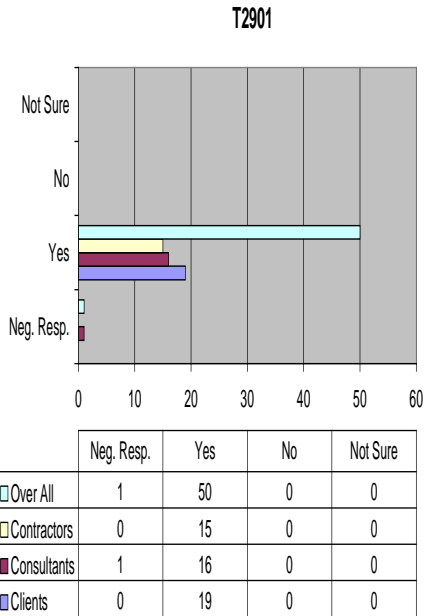


Figure 29 T2901

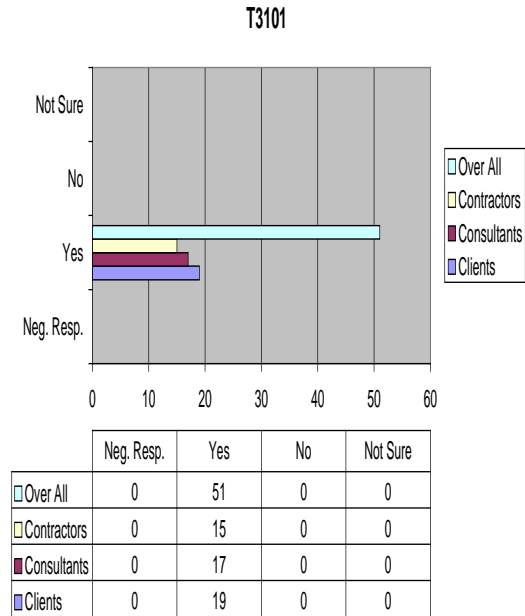


Figure 31 T3101

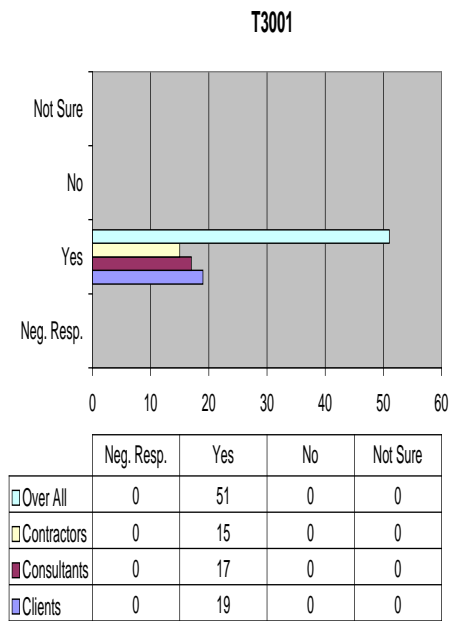


Figure 30 T3001

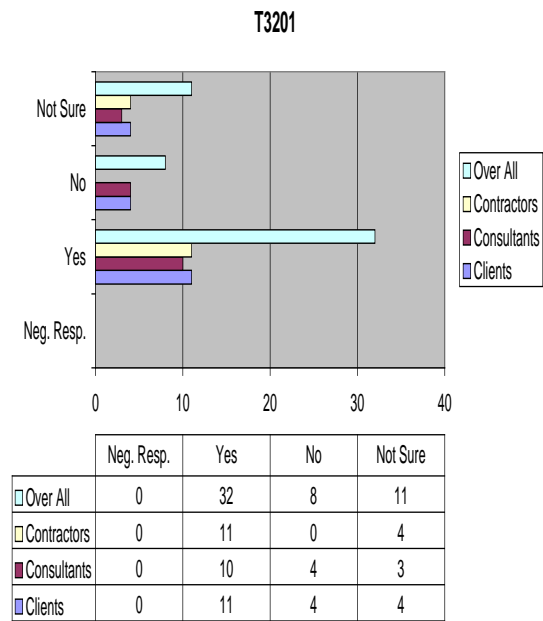


Figure 32 T3201

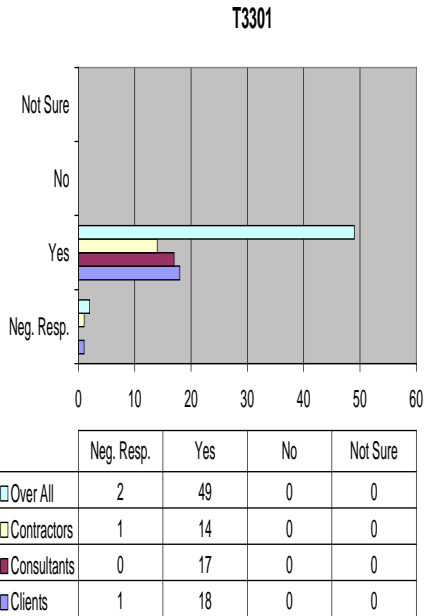


Figure 33 T3301

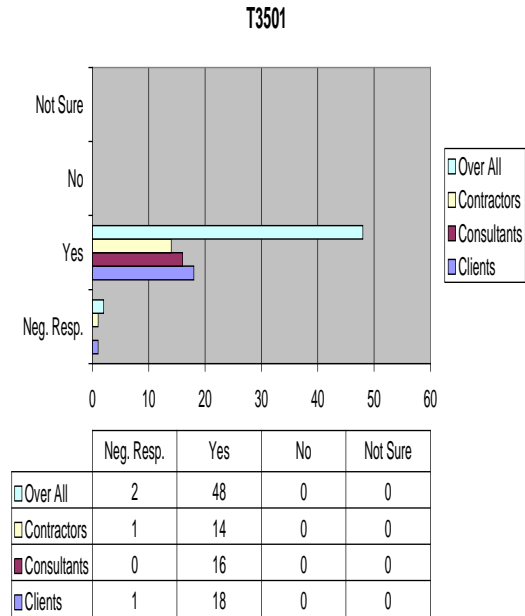


Figure 35 T3501

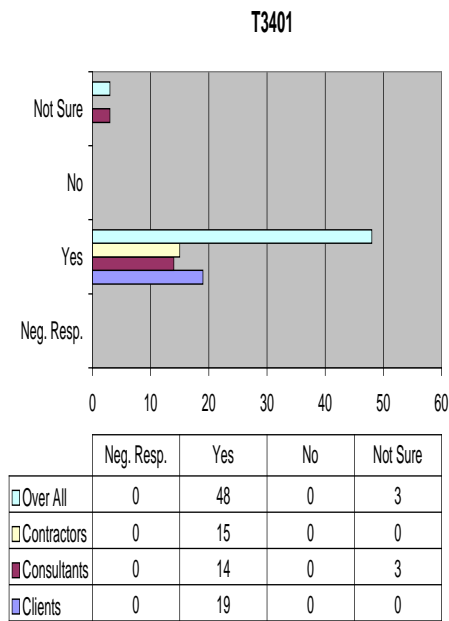


Figure 34 T3401

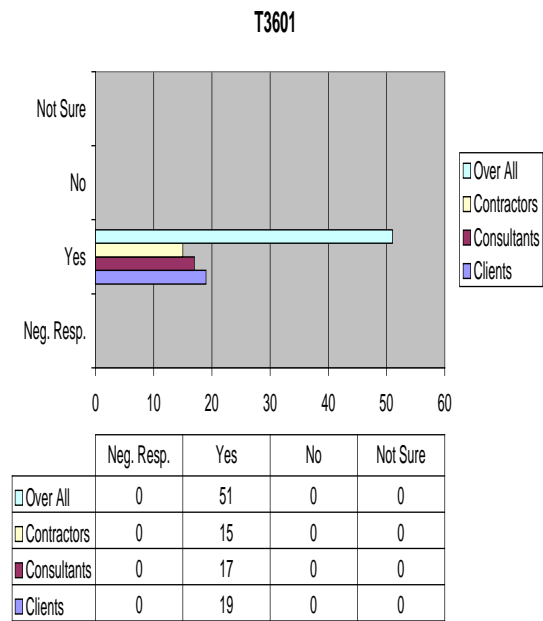


Figure 36 T3601

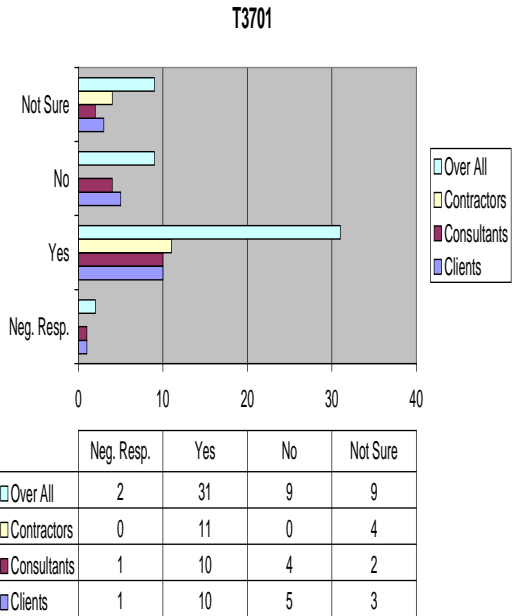


Figure 37 T3701

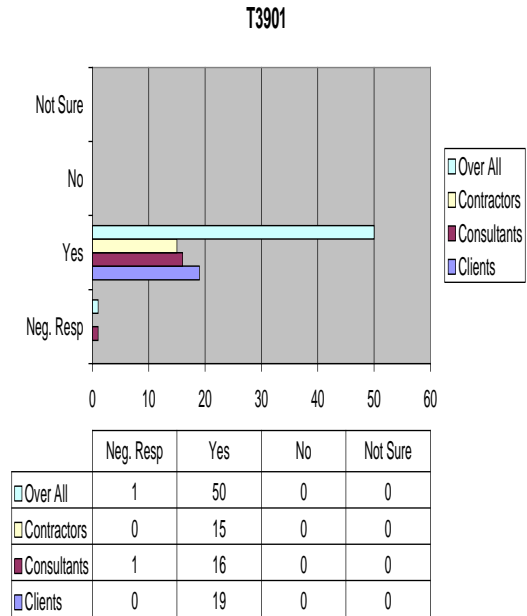


Figure 39 T3901

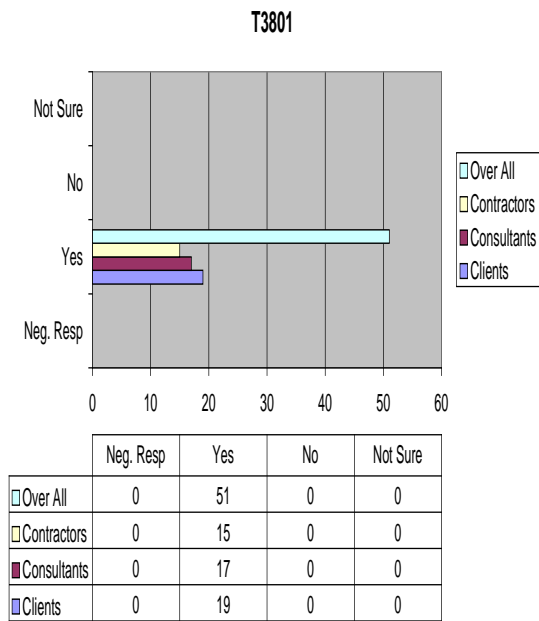


Figure 38 T3801

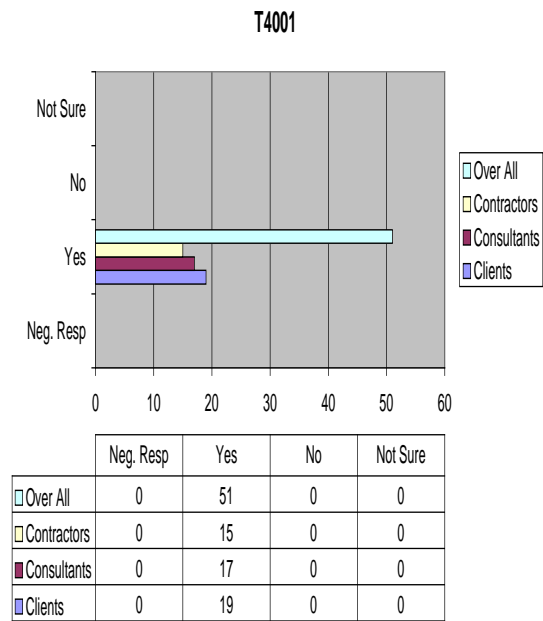


Figure 40 T4001

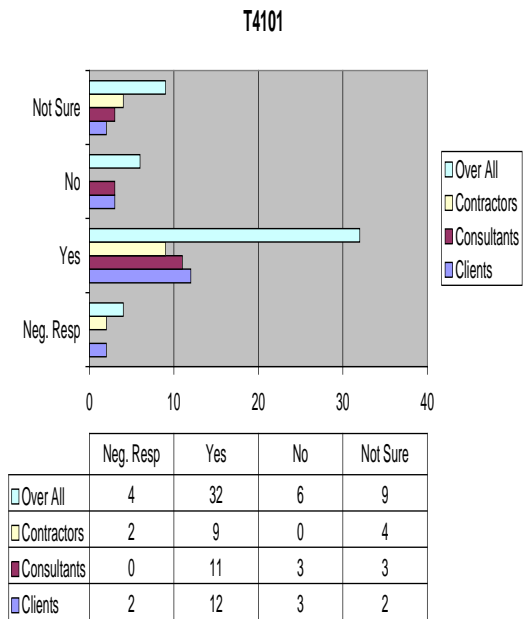


Figure 41 T4101

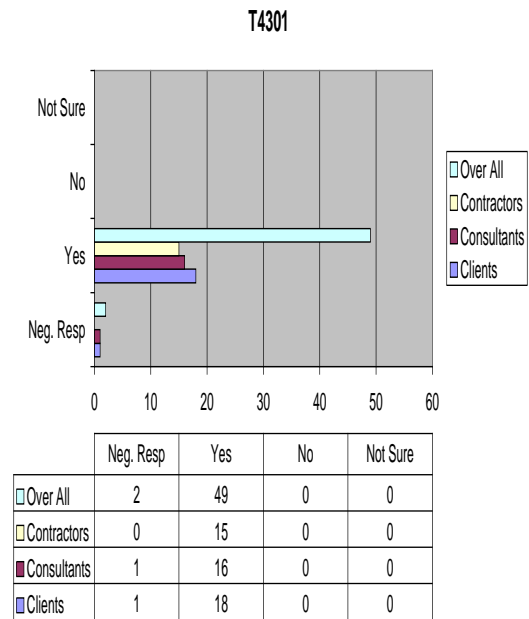


Figure 43 T4301

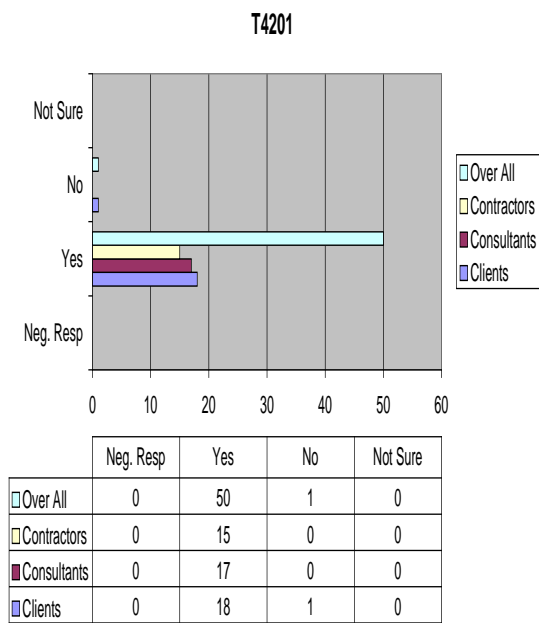


Figure 42 T4201

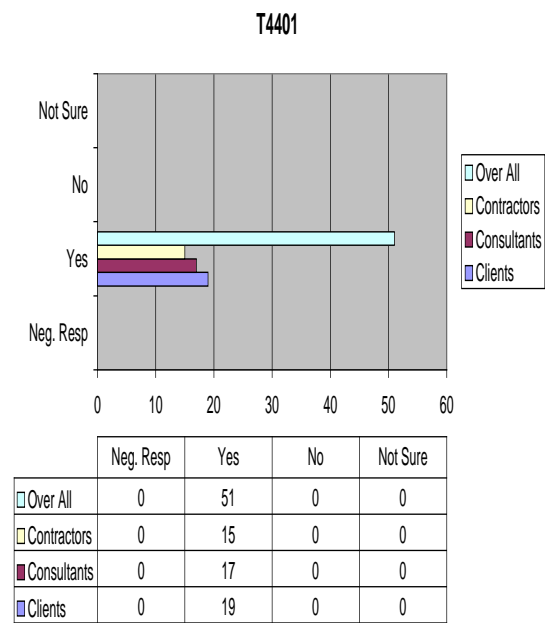


Figure 44 T4401

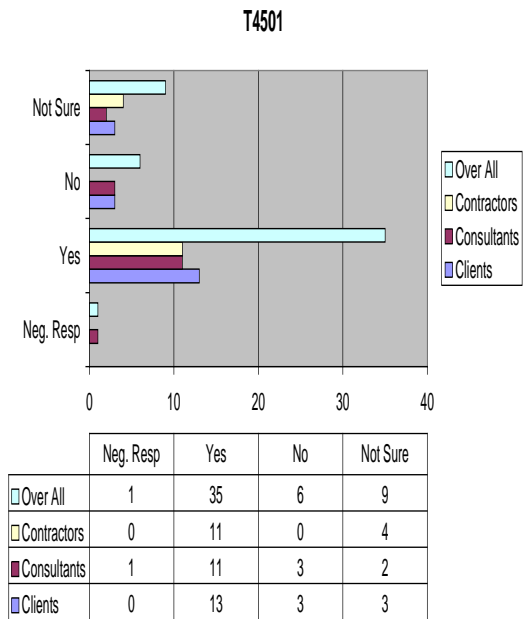


Figure 45 T4501

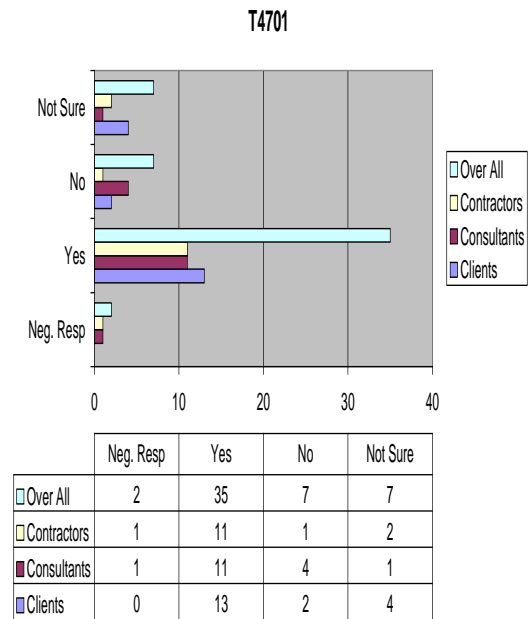


Figure 47 T4701

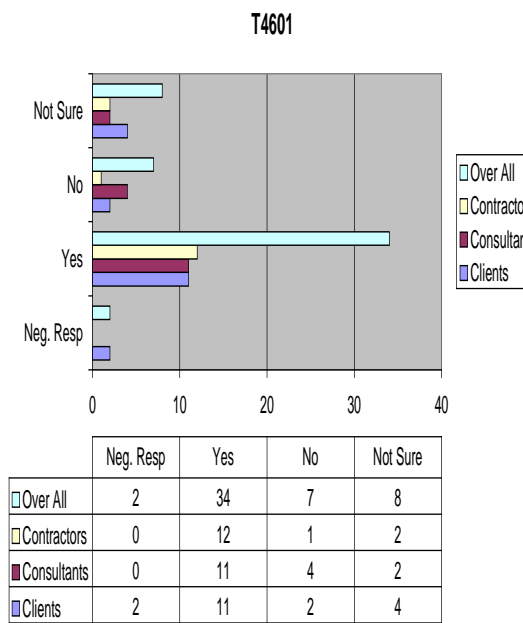


Figure 46 T4601

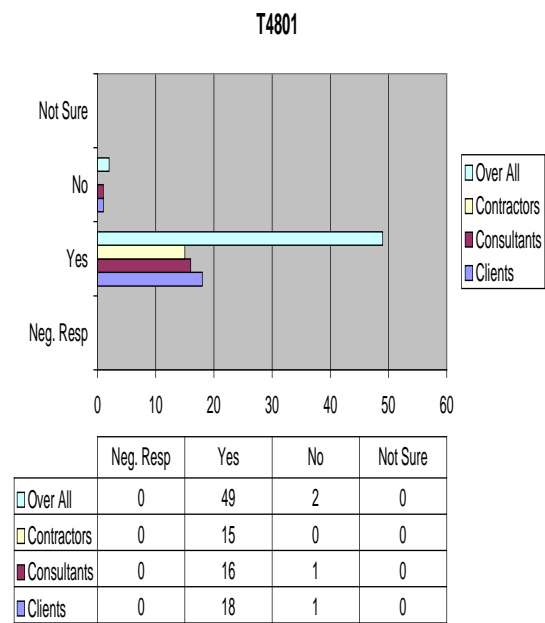


Figure 48 T4801

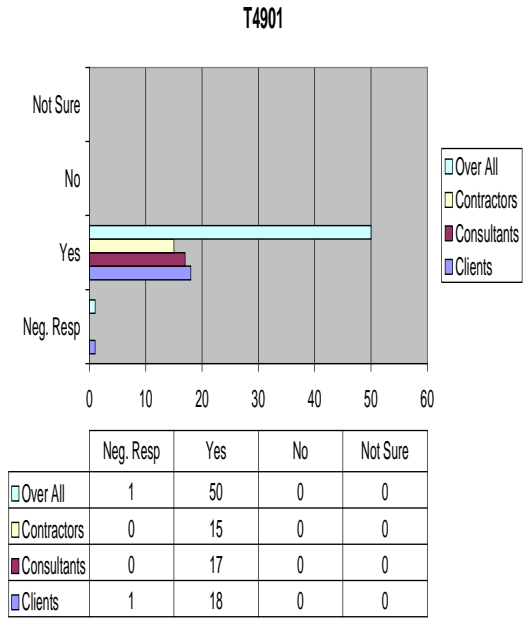


Figure 49 T4901

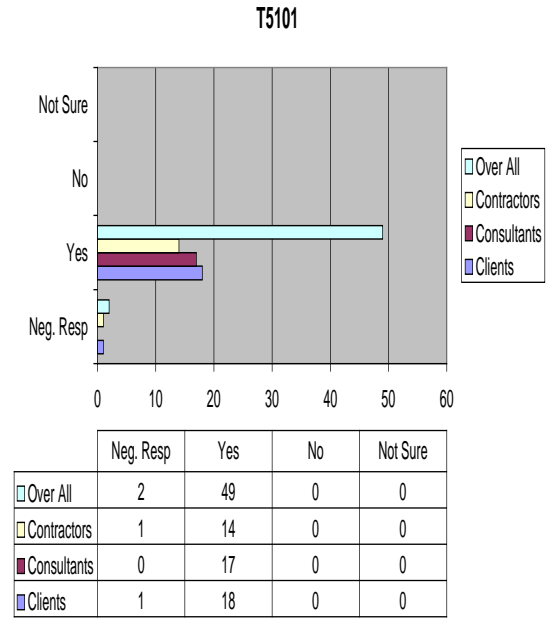


Figure 51 T5101

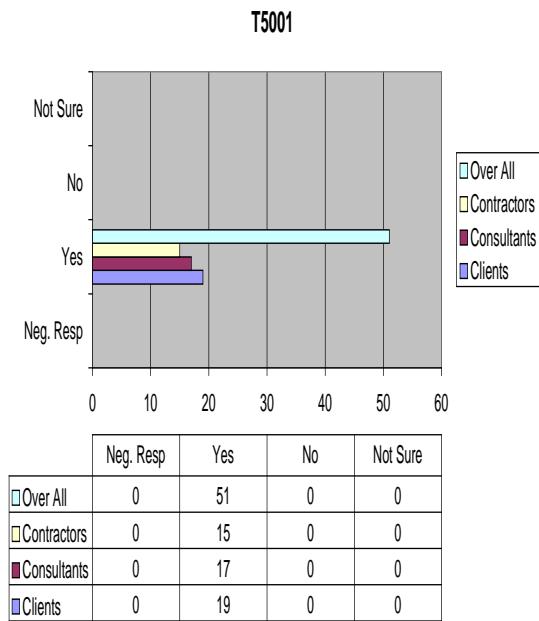


Figure 50 T5001

Y.1.2 TYPE FREQUENCY ASSESSMENT:

Y.1.2.1 TYPE FREQUENCY TABLES:

Table 7-12 Types of Claims & Disputes Frequency Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT														
Type Description	Code	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	
		Clients			Consultants			Contractors			Over All			
Variations - Frequency	T1902	4.118	82.35%	1	3.941	78.82%	1	4.200	84.00%	1	4.082	81.63%	1	
Design/ Change/ Omission / Errors by the Client - Frequency	T0302	3.882	77.65%	2	3.563	71.25%	4	4.071	81.43%	3	3.830	76.60%	2	
Delay: Due To Variation - Frequency	T2602	3.737	74.74%	5	3.647	72.94%	3	4.133	82.67%	2	3.824	76.47%	3	
Unanticipated Soil Condition - Frequency	T1202	3.833	76.67%	3	3.313	66.25%	6	3.733	74.67%	7	3.633	72.65%	4	
Differing Site Condition - Frequency	T1102	3.789	75.79%	4	3.118	62.35%	13	4.000	80.00%	4	3.627	72.55%	5	
Delay: Due To Late Approval - Frequency	T2802	3.444	68.89%	11	3.867	77.33%	2	3.600	72.00%	10	3.625	72.50%	6	
Unforeseen Ground Condition/ Unforeseeable Obstruction - Frequency	T1302	3.667	73.33%	6	3.313	66.25%	6	3.786	75.71%	6	3.583	71.67%	7	
Change of Project Profile and Site - Frequency	T0902	3.611	72.22%	7	3.118	62.35%	13	4.000	80.00%	4	3.551	71.02%	8	
Extension of Time For Completion - Frequency	T3502	3.611	72.22%	7	3.357	67.14%	5	3.538	70.77%	12	3.511	70.22%	9	
Delay: Caused by Utility Services Organization - Frequency	T3102	3.529	70.59%	9	3.313	66.25%	6	3.643	72.86%	9	3.489	69.79%	10	
Ambiguity in Documents - Frequency	T0102	3.474	69.47%	10	3.059	61.18%	18	3.667	73.33%	8	3.392	67.84%	11	
Delayed Site Possession/ Restricted Access - Frequency	T1002	3.316	66.32%	14	3.313	66.25%	6	3.533	70.67%	13	3.380	67.60%	12	
Default of Subcontractor, Nominated Subcontractor - Frequency	T4302	3.278	65.56%	15	3.313	66.25%	6	3.571	71.43%	11	3.375	67.50%	13	
Delays: Incomplete Design/ Insufficient Information by Client - Frequency	T0202	3.421	68.42%	12	3.313	66.25%	6	3.286	65.71%	16	3.347	66.94%	14	
Delay: Due To Late Instruction by Client - Frequency	T2702	3.333	66.67%	13	3.063	61.25%	15	3.357	67.14%	15	3.250	65.00%	15	
Defective Design: Rectification of Works/ Specification Change - Frequency	T0502	3.167	63.33%	16	3.063	61.25%	15	3.500	70.00%	14	3.229	64.58%	16	
Client's Breach of Contract - Frequency	T3302	2.944	58.89%	17	2.875	57.50%	23	2.929	58.57%	18	2.917	58.33%	17	
Liquidated and ascertained damages - Frequency	T4202	2.632	52.63%	23	3.176	63.53%	12	2.867	57.33%	21	2.882	57.65%	18	
Acceleration of Works - Frequency	T1802	2.778	55.56%	19	2.941	58.82%	21	2.923	58.46%	20	2.875	57.50%	19	
Unproductive / Idle Plants, Equipment or Labour - Frequency	T4402	2.789	55.79%	18	3.059	61.18%	18	2.733	54.67%	25	2.863	57.25%	20	
Delay: caused by client or employed by Client - Frequency	T2902	2.778	55.56%	19	2.824	56.47%	24	3.000	60.00%	17	2.854	57.08%	21	
Quantity Increase (not resulting from a Variation) - Frequency	T0602	2.737	54.74%	22	2.938	58.75%	22	2.857	57.14%	22	2.837	56.73%	22	
Late Issuance of final certificate - Frequency	T3402	2.500	50.00%	29	3.063	61.25%	15	2.769	55.38%	24	2.766	55.32%	23	
Suspension of Work - Frequency	T1702	2.778	55.56%	19	2.625	52.50%	28	2.857	57.14%	22	2.750	55.00%	24	
Delays: Unavailability / Unsuitability of Project Materials - Frequency	T2502	2.474	49.47%	32	3.059	61.18%	18	2.667	53.33%	30	2.725	54.51%	25	

Continued: Table 7-12 Types of Claims & Disputes Frequency Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking
		Clients			Consultants			Contractors			Over All		
Investigation of Suspected Defects - Frequency	T1402	2.556	51.11%	27	2.647	52.94%	27	2.600	52.00%	31	2.600	52.00%	27
Late Payment - Frequency	T3602	2.556	51.11%	24	2.563	51.25%	30	2.667	53.33%	27	2.592	51.84%	26
Uncovering of Works For Testing - Frequency	T1502	2.579	51.58%	25	2.400	48.00%	33	2.714	54.29%	27	2.563	51.25%	28
Delays: Inclement Weather, Flood, Storms, , Etc. - Frequency	T4902	2.389	47.78%	36	2.313	46.25%	36	2.929	58.57%	18	2.521	50.42%	29
Client’s Instruction to Change (not resulting from Variation) - Frequency	T2102	2.389	47.78%	34	2.400	48.00%	33	2.733	54.67%	25	2.500	50.00%	30
Delay: Late Delivery of Materials by Client - Frequency	T3002	2.526	50.53%	28	2.353	47.06%	35	2.600	52.00%	31	2.490	49.80%	31
Finance Charges: Loss of Profit, Insurance, Retention, Etc. - Frequency	T4102	2.278	45.56%	38	2.813	56.25%	25	2.400	48.00%	34	2.490	49.80%	32
Error in Setting out Due to Incorrect Data Shown on Drawings - Frequency	T0802	2.579	51.58%	25	2.188	43.75%	39	2.692	53.85%	29	2.479	49.58%	33
Inflation / Price Escalation - Frequency	T3902	2.500	50.00%	30	2.688	53.75%	26	2.214	44.29%	38	2.479	49.58%	33
Currency Fluctuation - Frequency	T4002	2.278	45.56%	36	2.588	51.76%	29	2.357	47.14%	36	2.408	48.16%	35
Additional Work to other Parts arising from repairs or defects - Frequency	T2002	2.474	49.47%	30	2.529	50.59%	31	2.067	41.33%	40	2.373	47.45%	36
Change in Quality (not resulting from a Variation) - Frequency	T0702	2.444	48.89%	32	2.125	42.50%	40	2.400	48.00%	34	2.327	46.53%	37
Interest on Late Payment - Frequency	T3702	2.444	48.89%	34	2.438	48.75%	32	2.000	40.00%	41	2.319	46.38%	38
Facilities provided to others by the contractor - Frequency	T2202	2.263	45.26%	38	2.235	44.71%	38	2.267	45.33%	37	2.255	45.10%	39
Additional Tests to Verify Compliance with the - Frequency	T1602	2.211	44.21%	41	1.813	36.25%	42	2.429	48.57%	33	2.143	42.86%	40
Instruction by the Client to Resolve Discrepancy - Frequency	T0402	2.222	44.44%	40	2.294	45.88%	37	1.867	37.33%	43	2.140	42.80%	41
Labour Strikes, Civil Unrest, Etc. - Frequency	T4502	1.944	38.89%	42	2.125	42.50%	40	1.786	35.71%	45	1.958	39.17%	42
Overdue retention money - Frequency	T3802	1.737	34.74%	43	1.765	35.29%	43	1.933	38.67%	42	1.804	36.08%	43
Delay: Additional building regulations/ procedures - Frequency	T3202	1.706	34.12%	44	1.313	26.25%	51	2.214	44.29%	38	1.723	34.47%	44
Repair damages to other Property during Transport of Materials - Frequency	T2402	1.684	33.68%	47	1.588	31.76%	47	1.867	37.33%	43	1.706	34.12%	45
Damages to Work due to Inclement Weather, - Frequency	T5002	1.667	33.33%	47	1.750	35.00%	45	1.643	32.86%	46	1.688	33.75%	46
Loss of / Damage to Materials on Site or During Transport - Frequency	T2302	1.684	33.68%	45	1.765	35.29%	43	1.533	30.67%	49	1.667	33.33%	47
Rectification of Damage due to Un Excepted Risk - Frequency	T5102	1.706	34.12%	45	1.706	34.12%	46	1.429	28.57%	51	1.625	32.50%	48
Expropriation of Contractor’s Equipment etc. - Frequency	T4802	1.526	30.53%	49	1.529	30.59%	50	1.615	32.31%	48	1.551	31.02%	49
Custom Tariffs, New Taxes - Frequency	T4602	1.353	27.06%	51	1.563	31.25%	48	1.643	32.86%	46	1.511	30.21%	50
Embargoes on Project Imported Items - Frequency	T4702	1.389	27.78%	50	1.563	31.25%	48	1.467	29.33%	50	1.469	29.39%	51

Y.1.2.2 TYPE FREQUENCY BAR CHARTS:

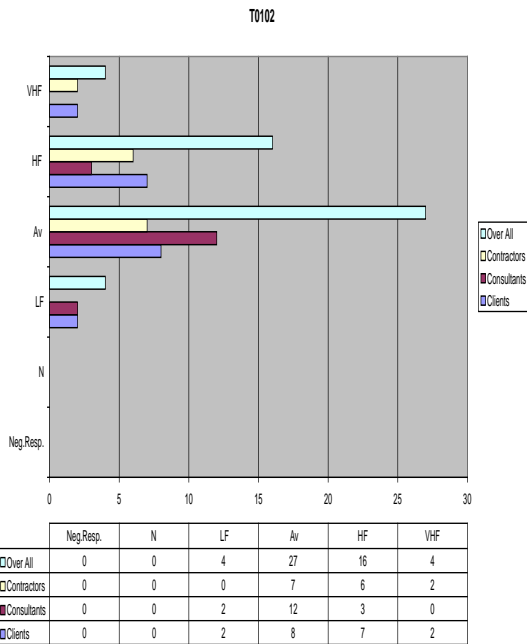


Figure 52 T0102

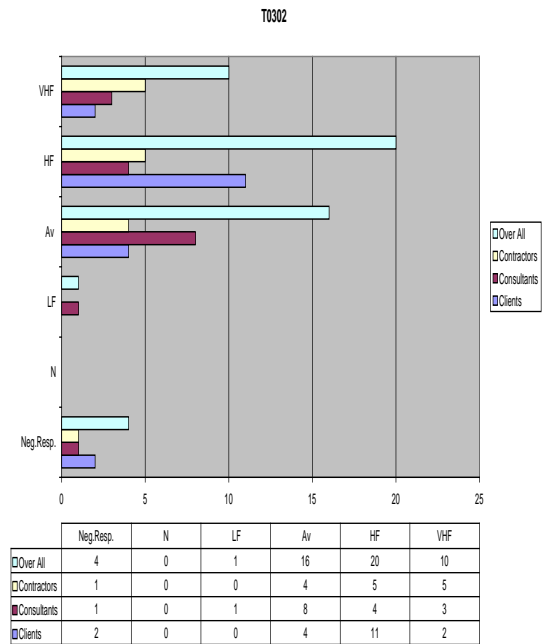


Figure 54 T0302

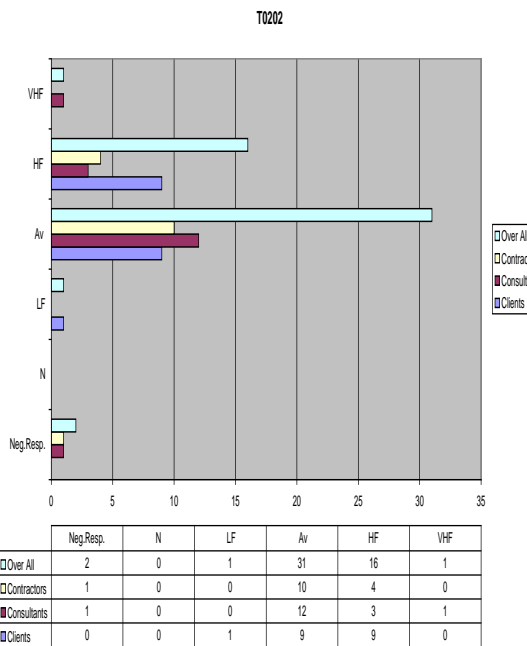


Figure 53 T0202

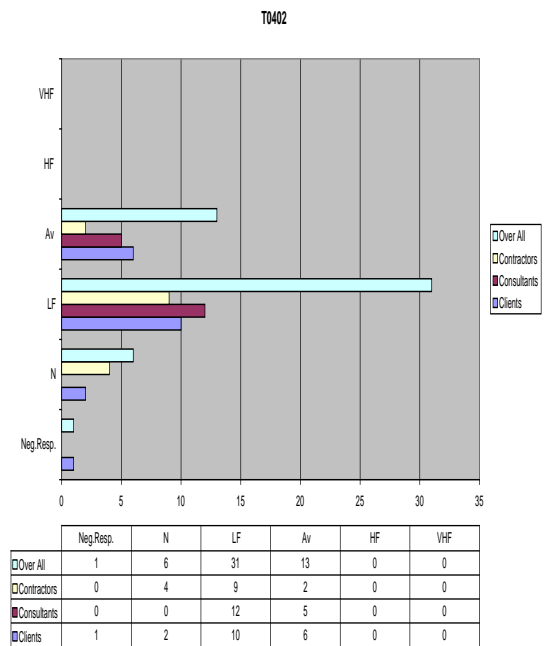


Figure 55 T0402

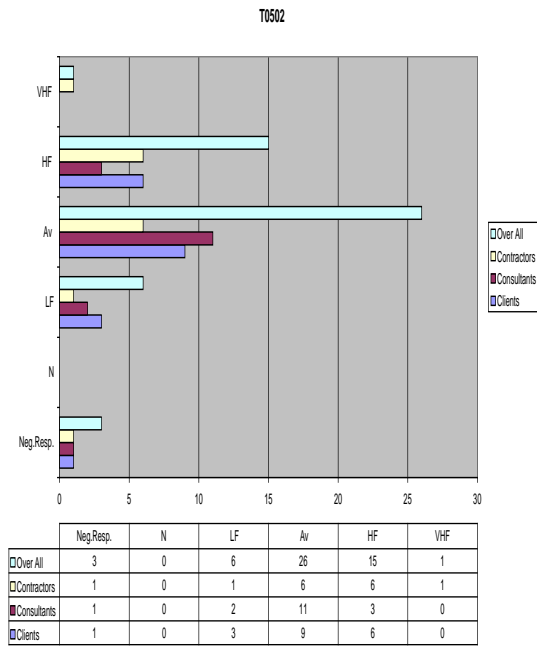


Figure 56 T0502

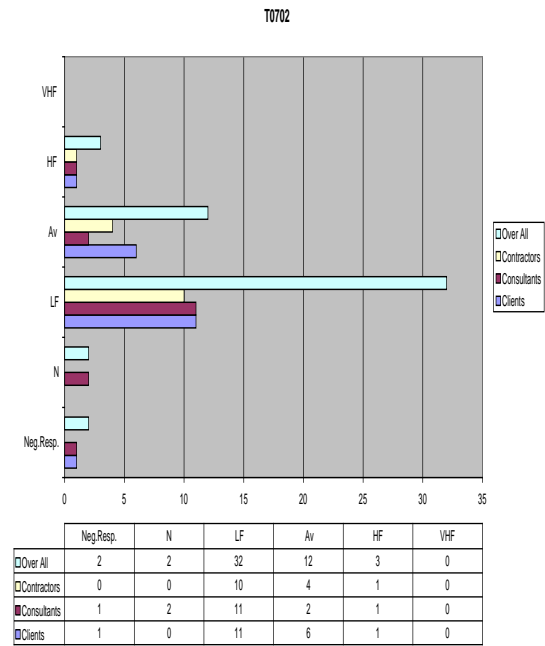


Figure 58 T0702

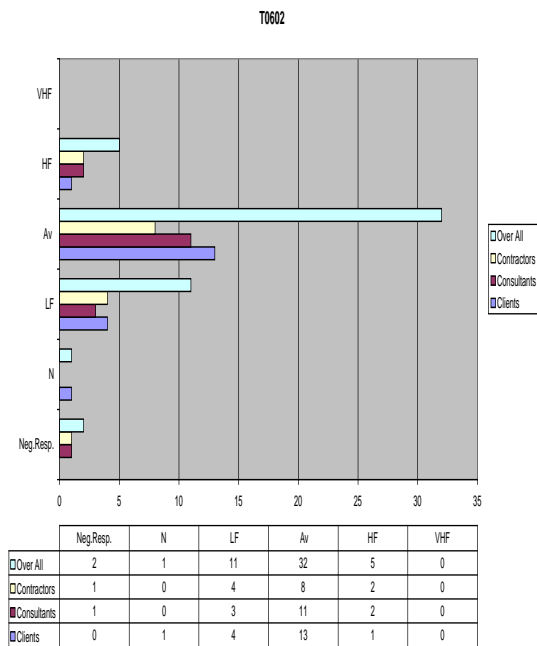


Figure 57 T0602

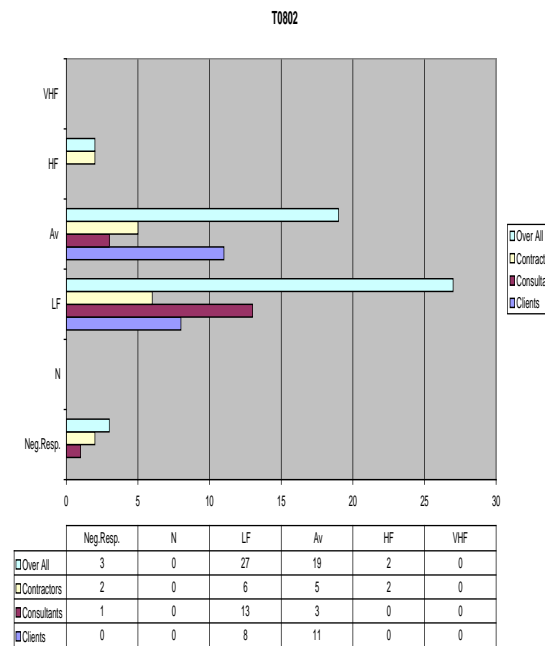


Figure 59 T0802

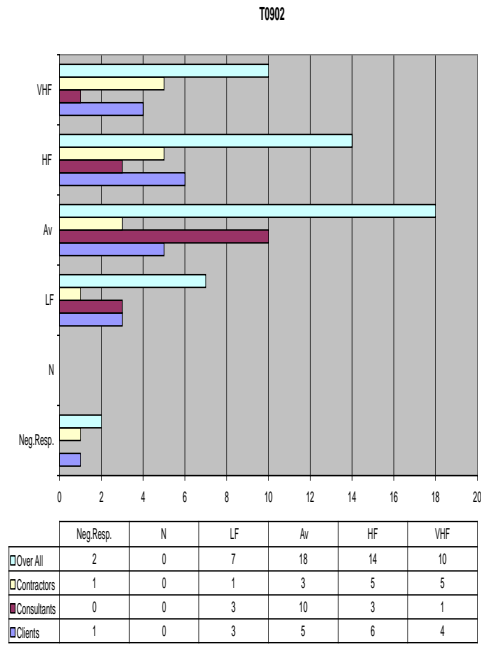


Figure 60 T0902

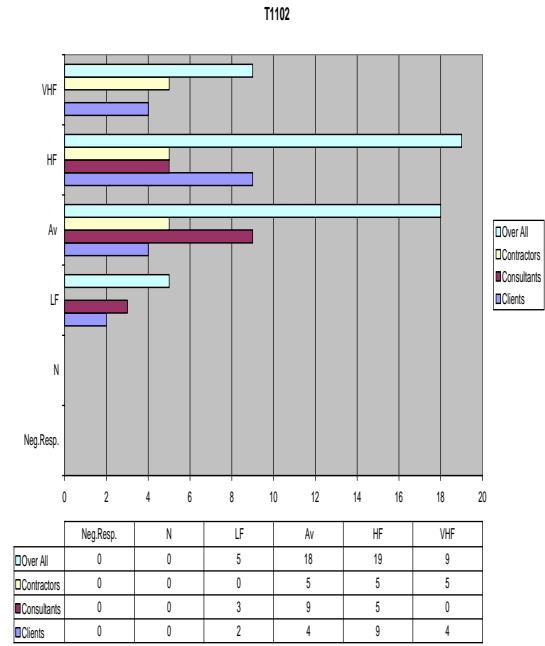


Figure 62 T1102

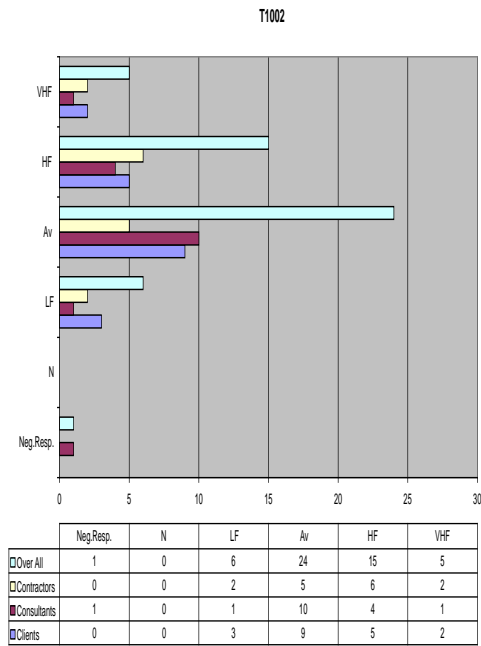


Figure 61 T1002

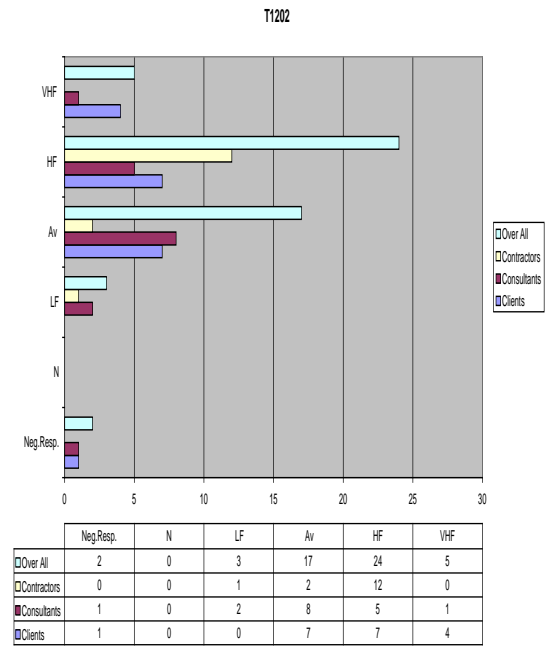


Figure 63 T1202

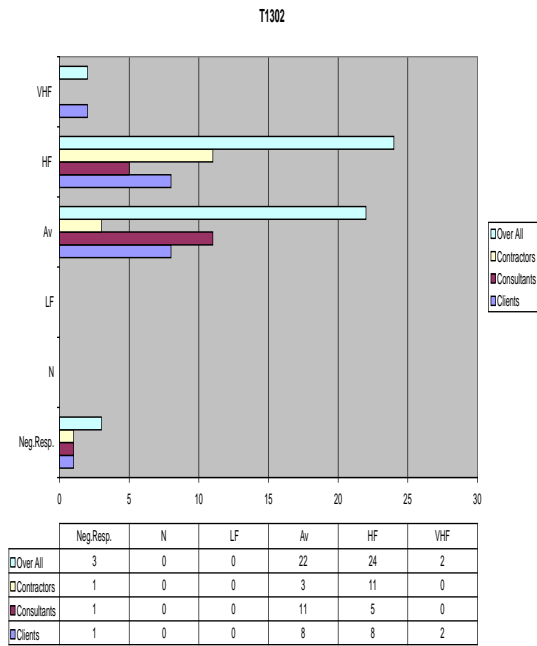


Figure 64 T1302

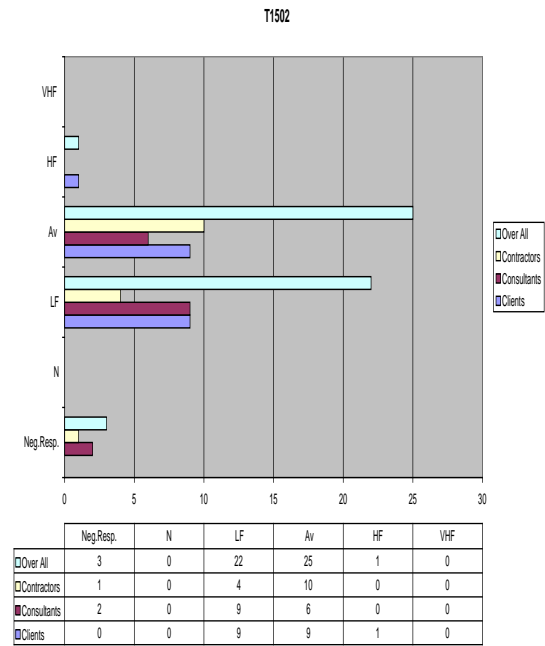


Figure 66 T1502

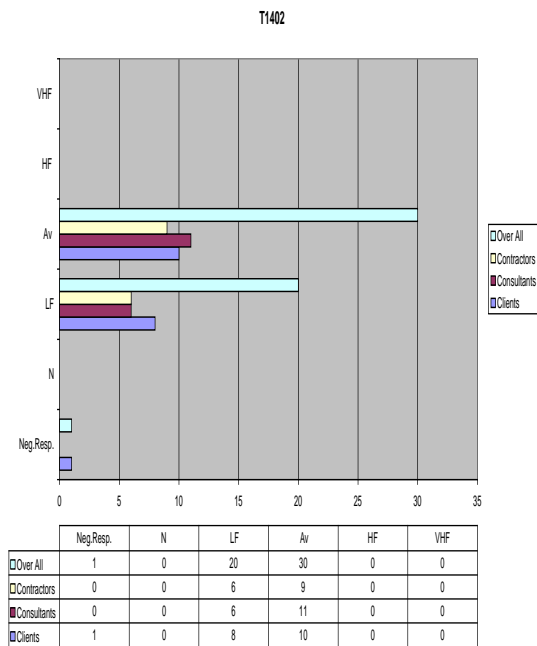


Figure 65 T1402

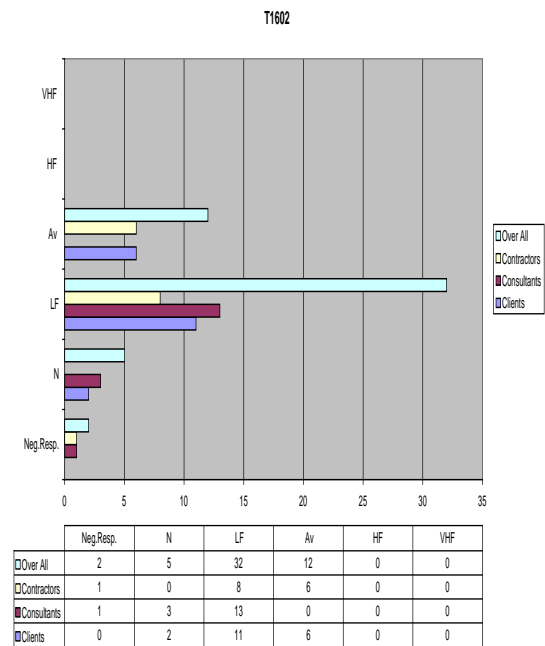


Figure 67 T1602

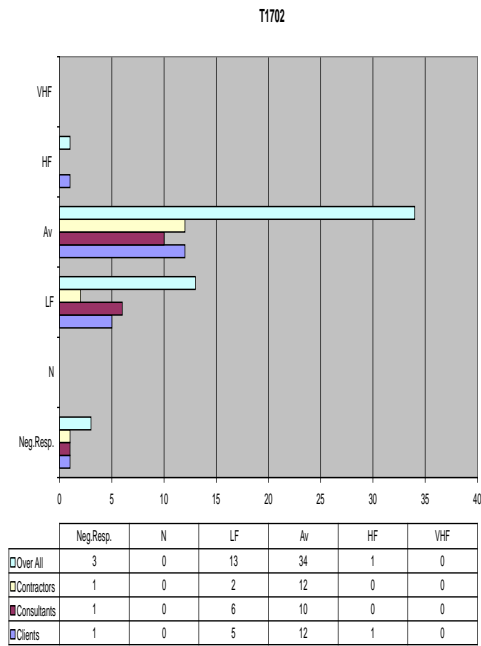


Figure 68 T1702

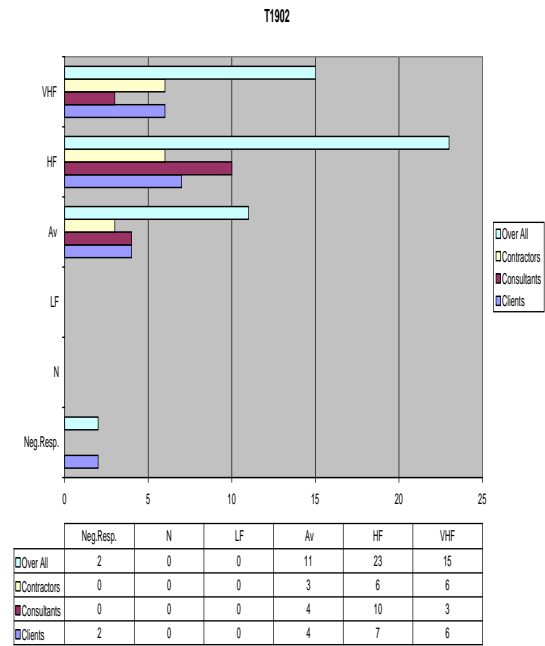


Figure 70 T1902

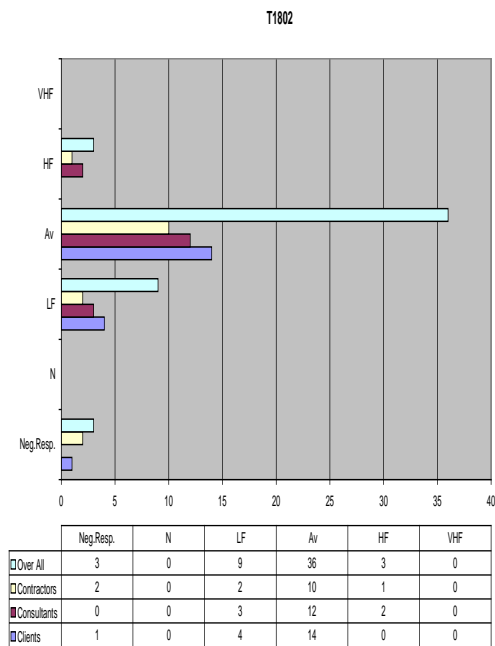


Figure 69 T1802

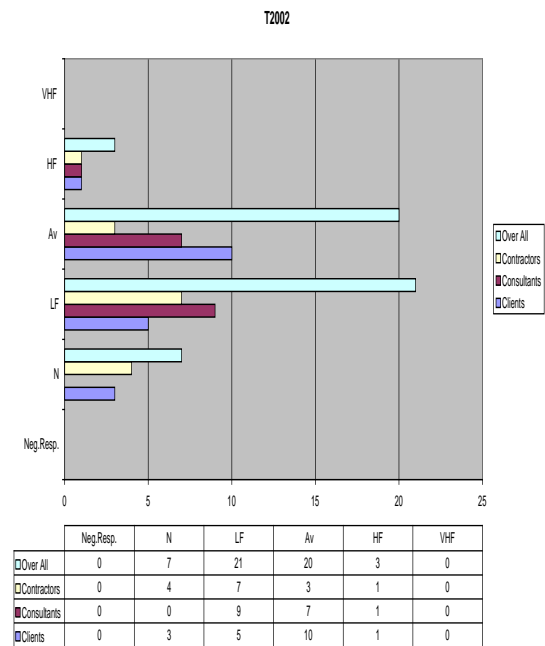


Figure 71 T2002

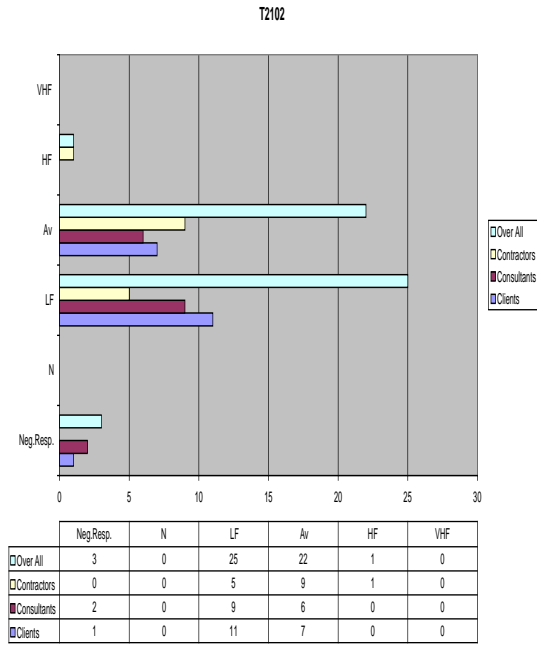


Figure 72 T2102

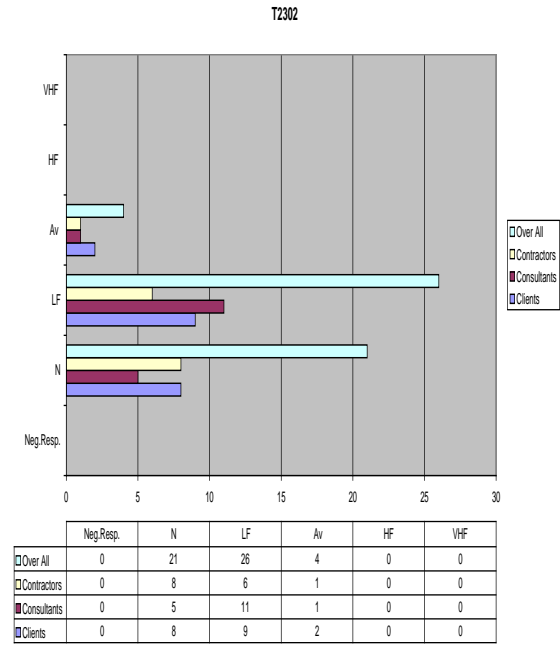


Figure 74 T2302

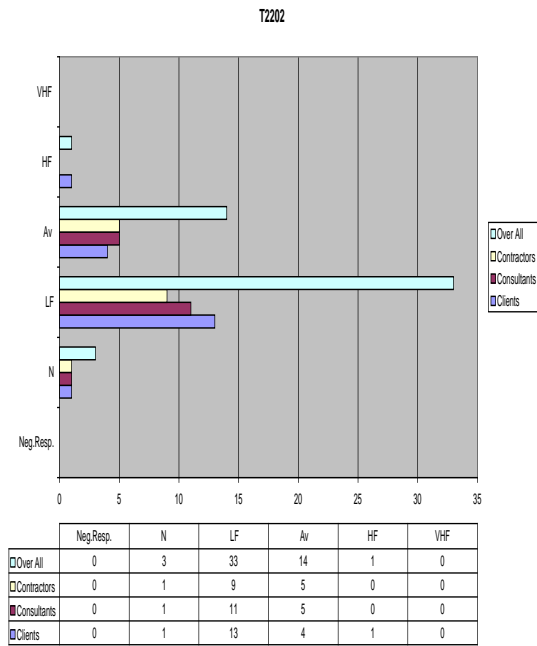


Figure 73 T2202

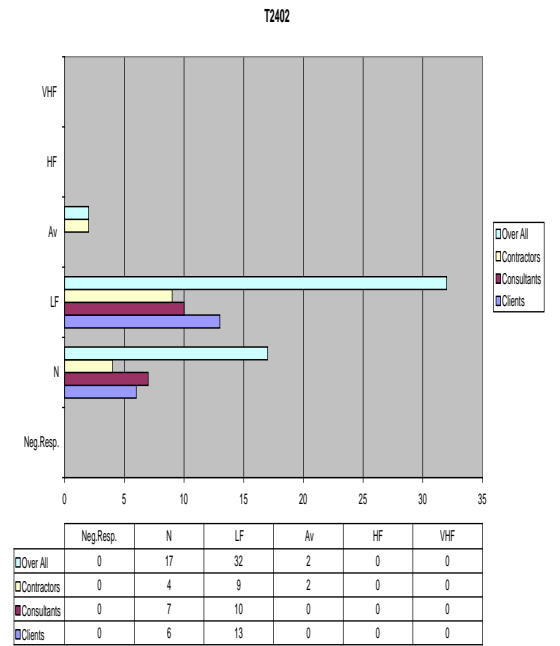


Figure 75 T2402

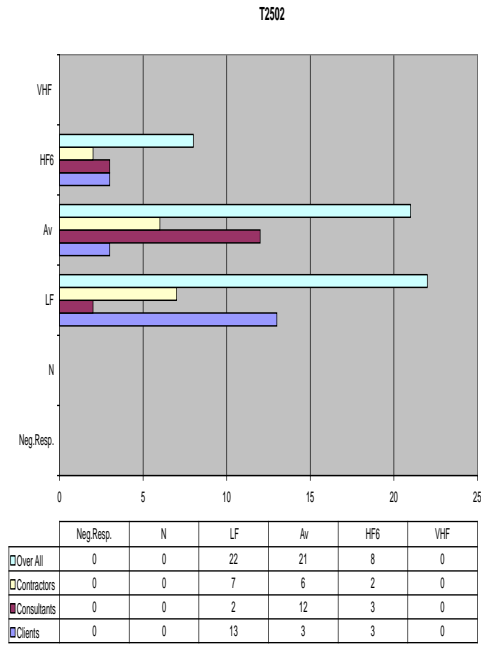


Figure 76 T2502

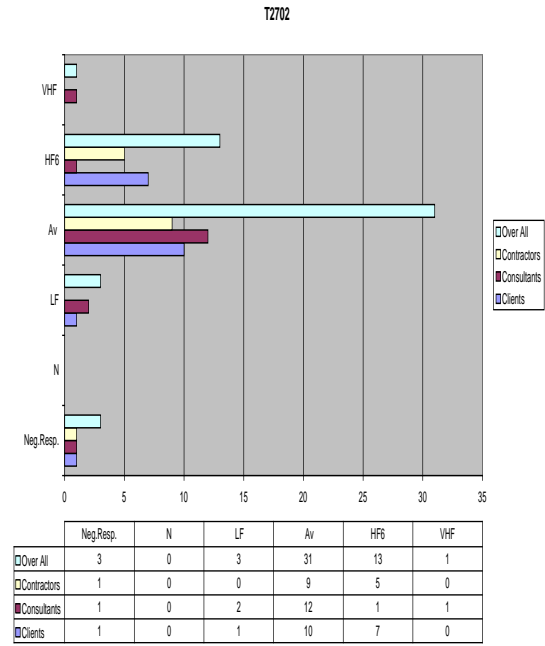


Figure 78 T2702

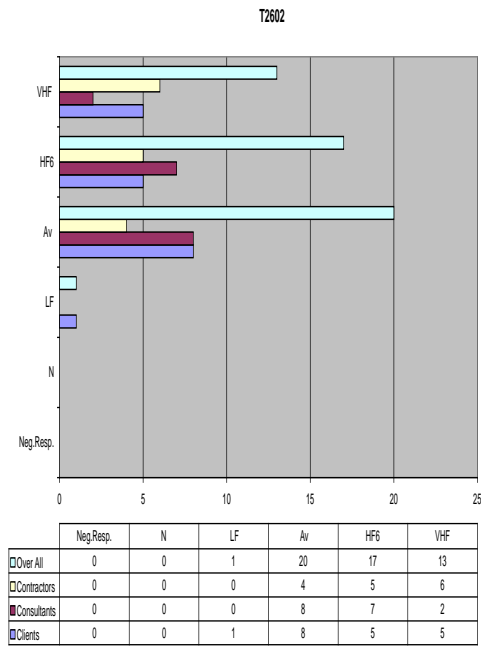


Figure 77 T2602

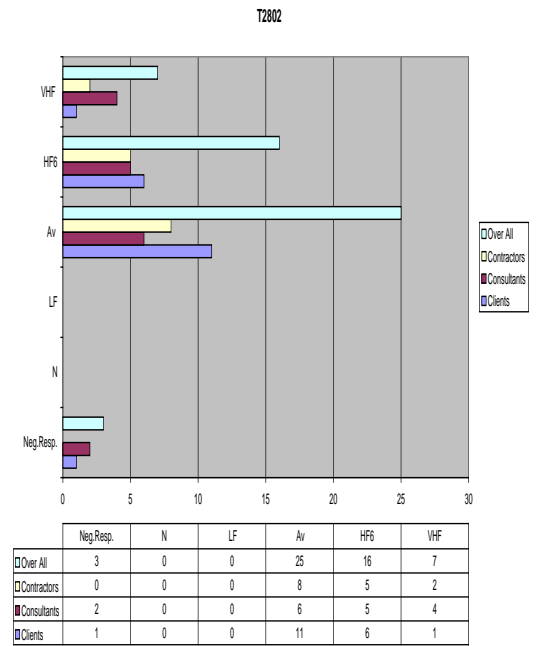


Figure 79 T2802

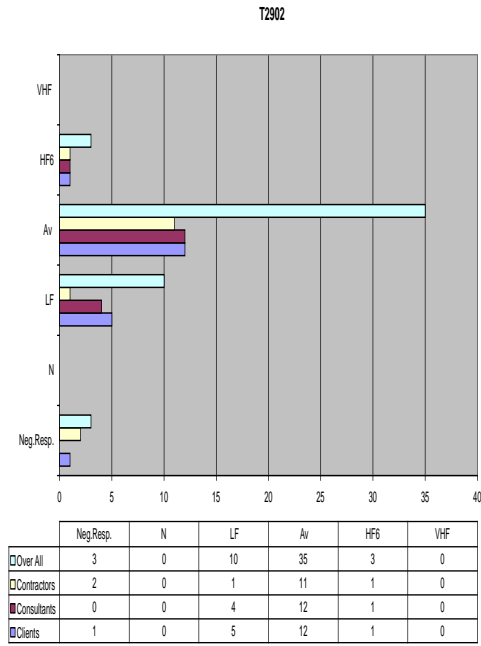


Figure 80 T2902

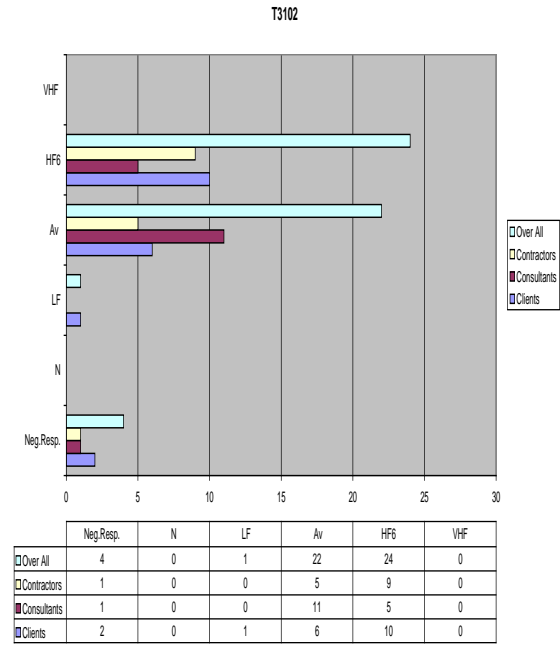


Figure 82 T3102

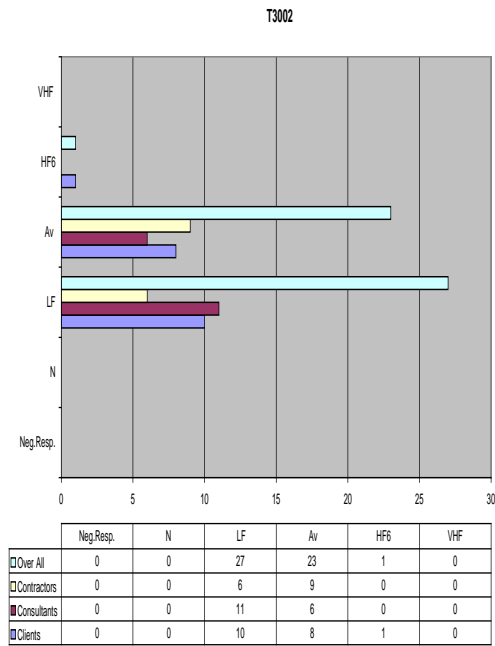


Figure 81 T3002

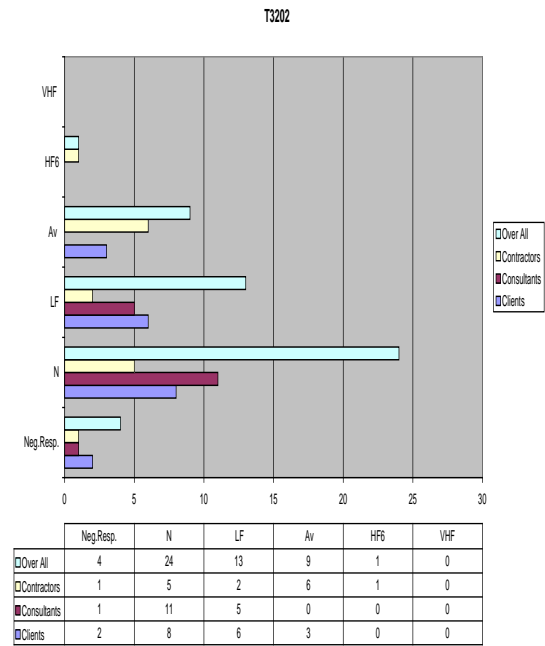


Figure 83 T3202

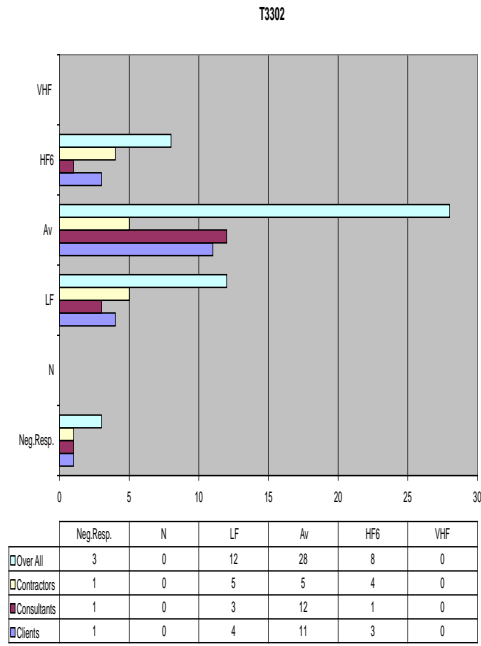


Figure 84 T3302

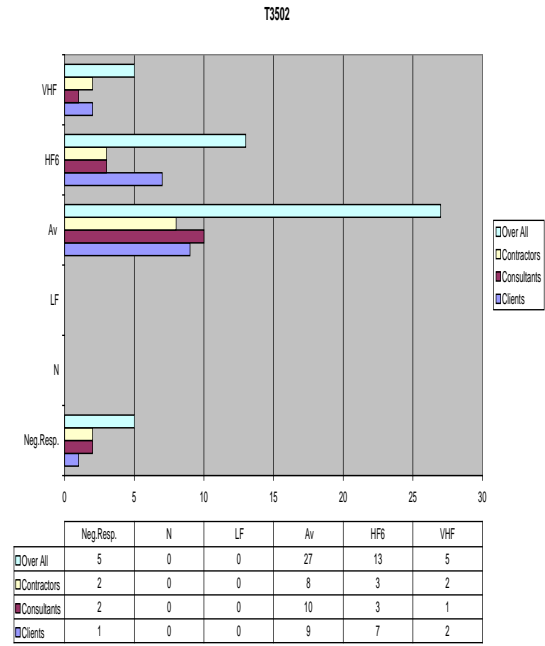


Figure 86 T3502

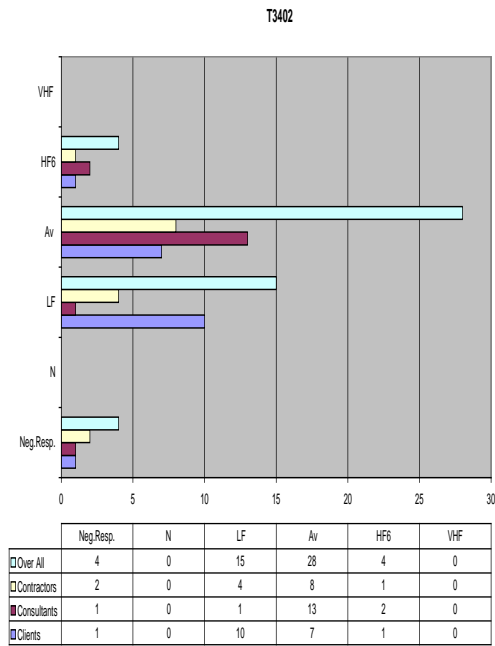


Figure 85 T3402

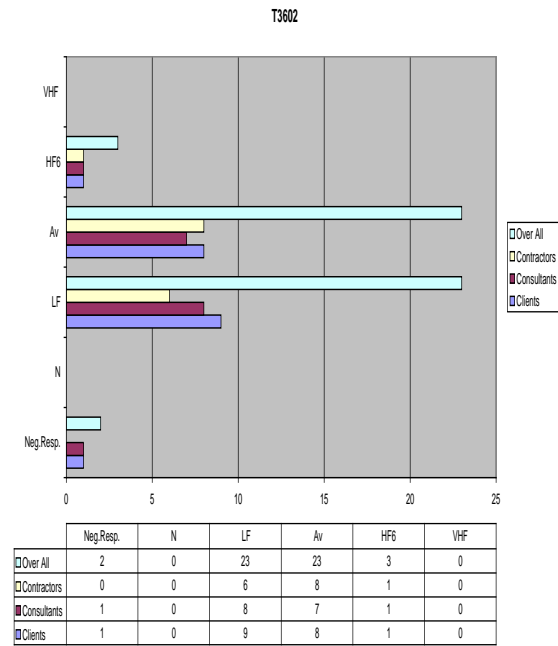


Figure 87 T3602

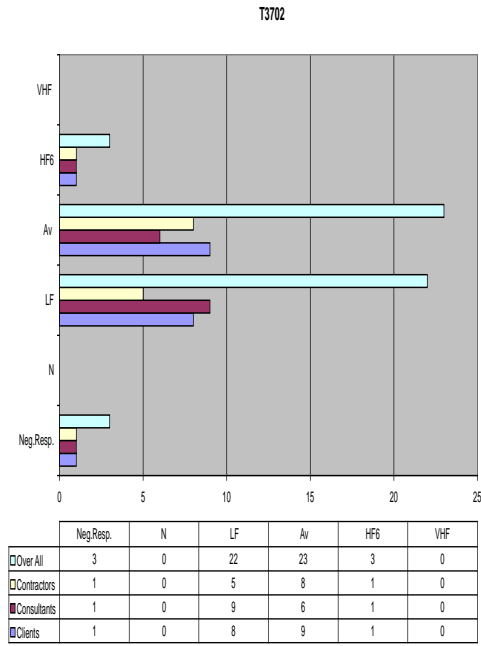


Figure 88 T3702

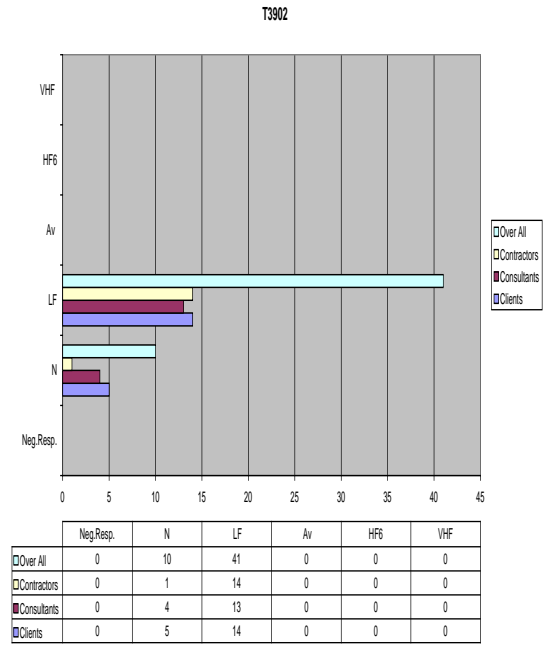


Figure 90 T3902

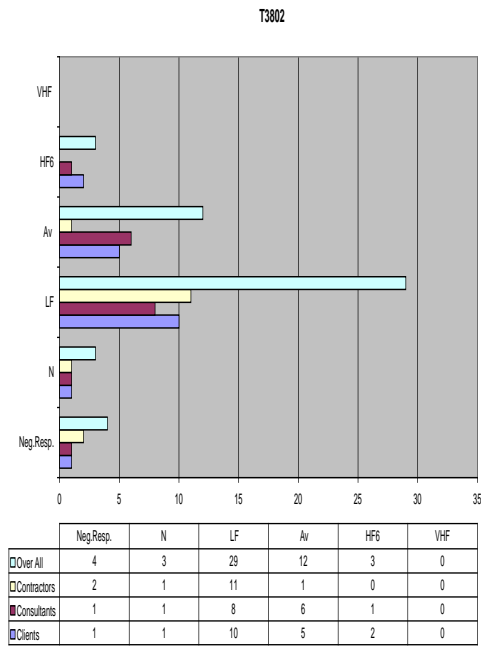


Figure 89 T3802

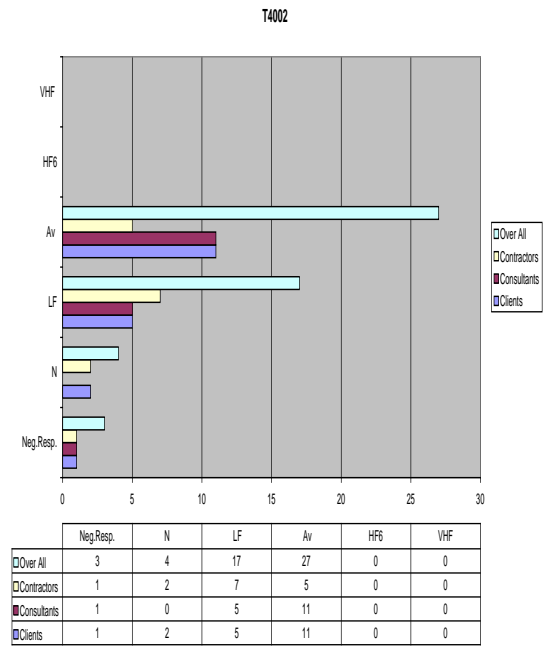


Figure 91 T4002

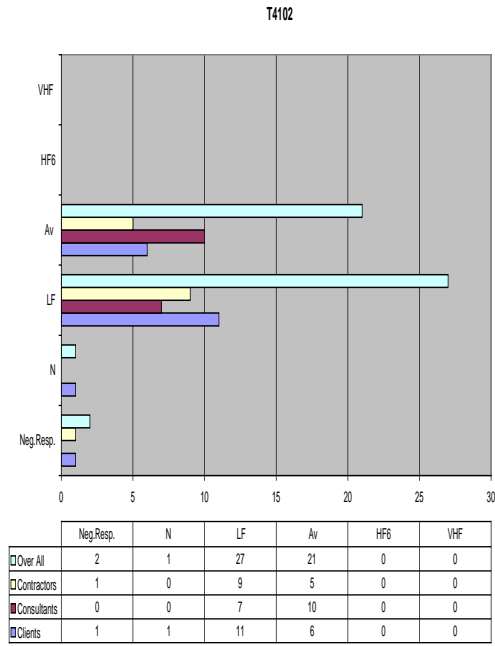


Figure 92 T4102

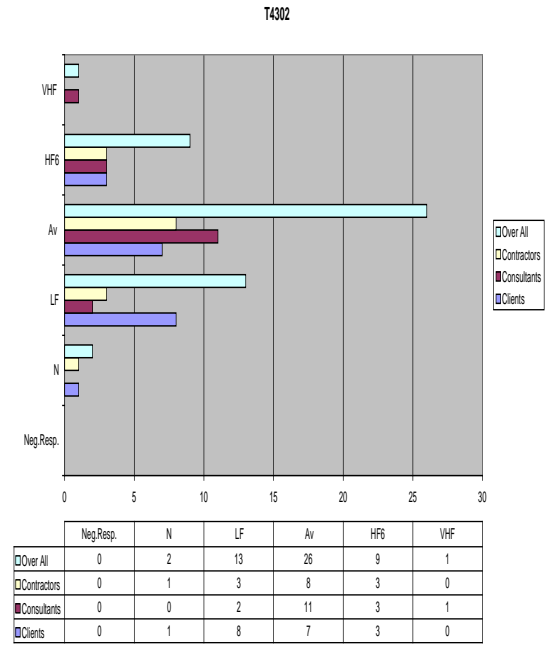


Figure 94 T4302

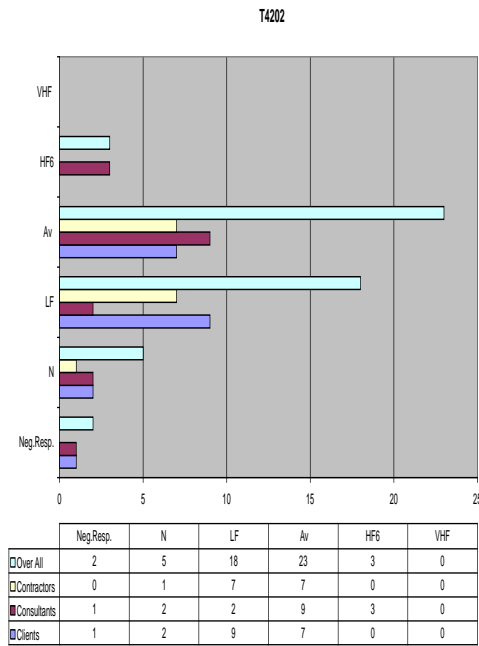


Figure 93 T4202

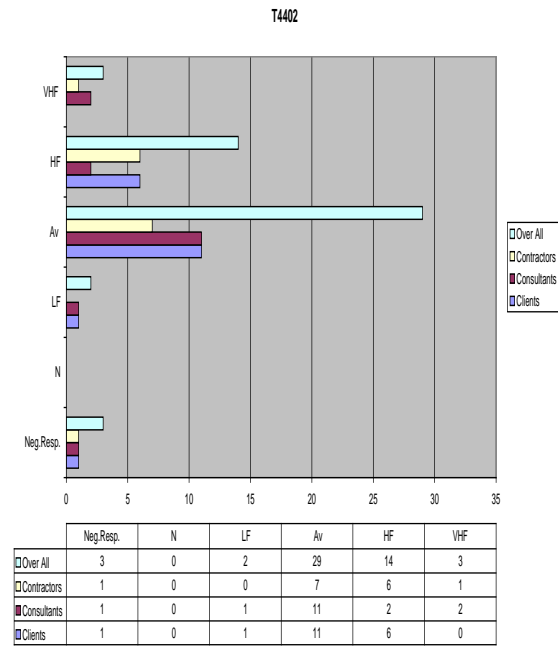


Figure 95 T4402

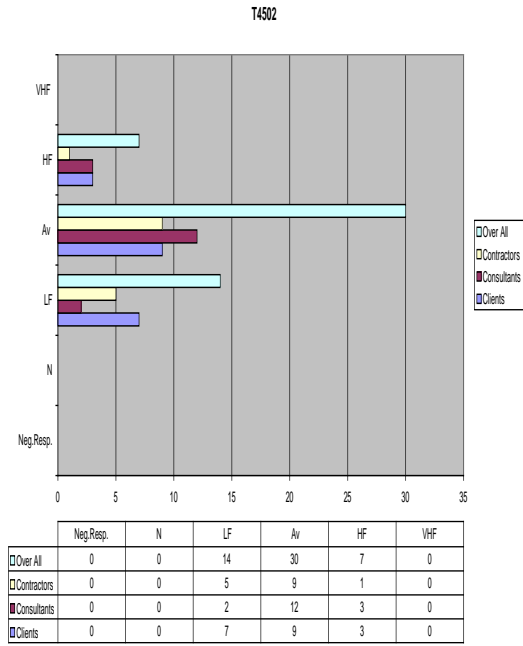


Figure 96 T4502

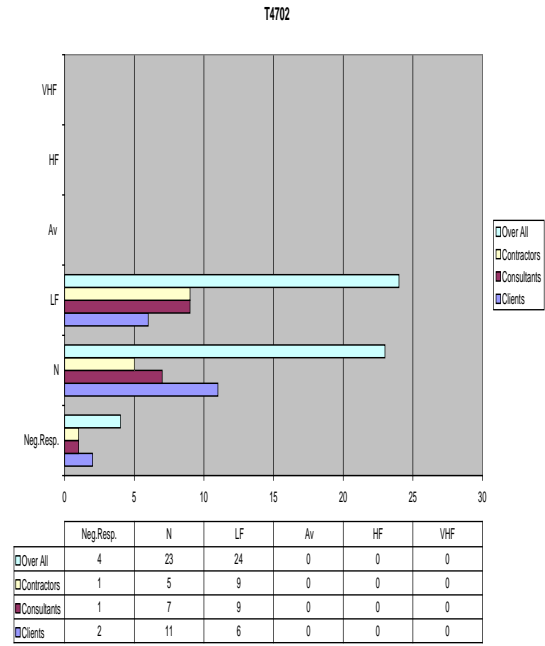


Figure 98 T4702

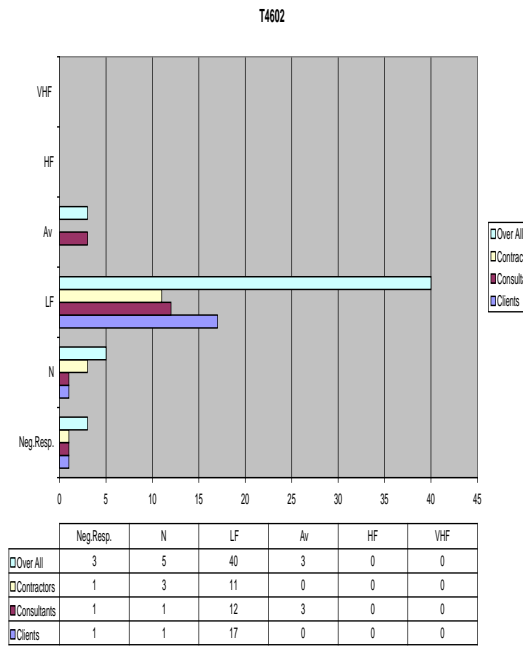


Figure 97 T4602

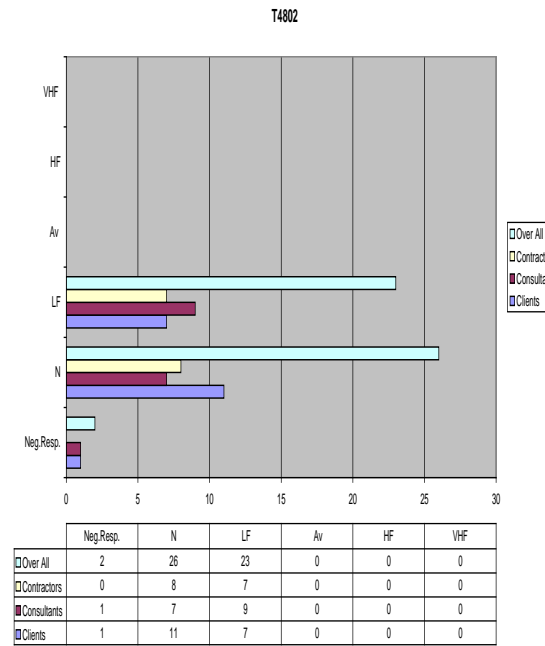


Figure 99 T4802

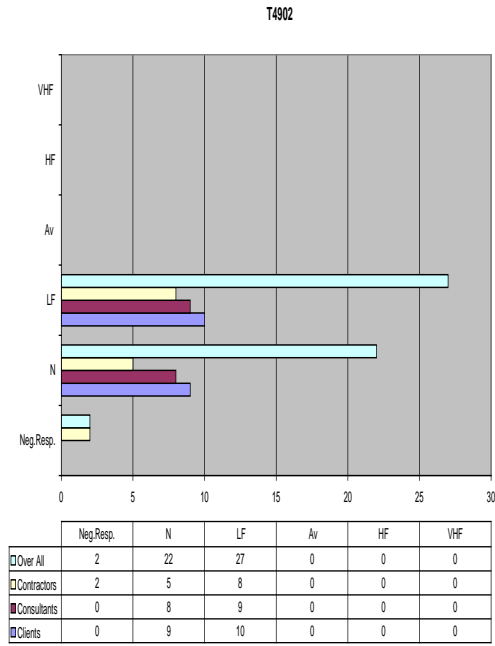


Figure 100 T4902

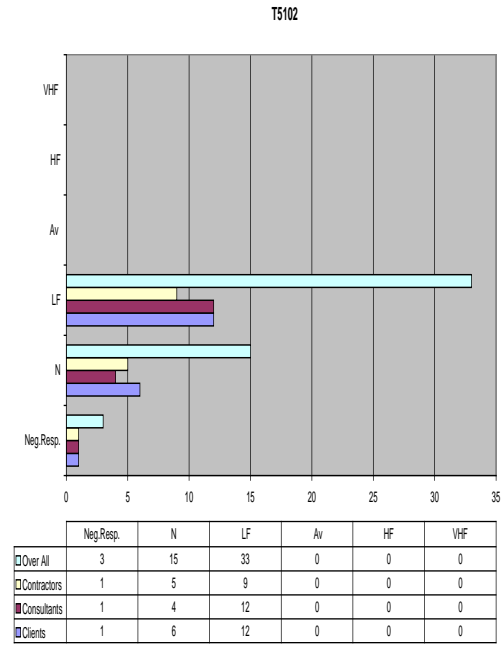


Figure 102 T5102

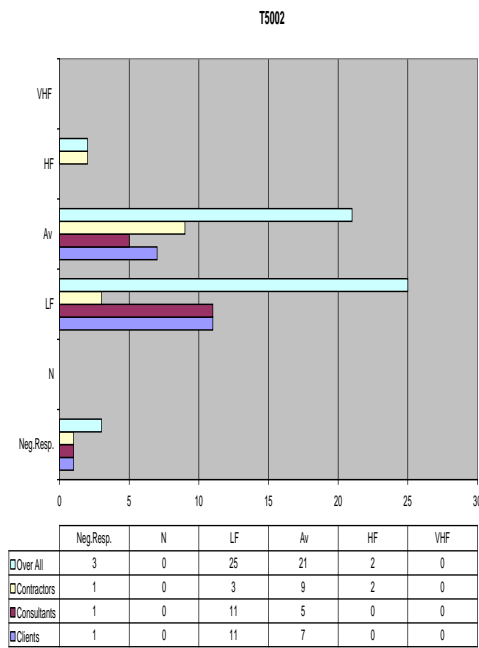


Figure 101 T5002

Y.1.3 TYPE MAGNITUDE (IMPACT) ASSESSMENT:

Y.1.3.1 TYPE MAGNITUDE (IMPACT) TABLES:

Table 7-18 Types of Claims & Disputes Magnitude Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking
		Clients			Consultants			Contractors			Over All		
Variations - Impact(Magnitude)	T1903	4.526	90.53%	1	4.294	85.88%	2	4.667	93.33%	1	4.490	89.80%	1
Delay: Due To Variation - Impact(Magnitude)	T2603	4.211	84.21%	3	4.313	86.25%	1	4.538	90.77%	2	4.333	86.67%	2
Design/ Change/ Omission / Errors by the Client - Impact(Magnitude)	T0303	4.211	84.21%	2	3.882	77.65%	5	4.533	90.67%	3	4.196	83.92%	3
Unanticipated Soil Condition - Impact(Magnitude)	T1203	4.000	80.00%	5	4.000	80.00%	4	4.000	80.00%	7	4.000	80.00%	4
Unforeseen Ground Condition/ Unforeseeable Obstruction - Impact(Magnitude)	T1303	3.941	78.82%	6	3.867	77.33%	6	4.071	81.43%	6	3.957	79.13%	5
Differing Site Condition - Impact(Magnitude)	T1103	4.118	82.35%	4	3.467	69.33%	13	4.214	84.29%	4	3.935	78.70%	6
Delay: Due To Late Approval - Impact(Magnitude)	T2803	3.778	75.56%	9	4.063	81.25%	3	3.786	75.71%	11	3.875	77.50%	7
Change of Project Profile and Site - Impact(Magnitude)	T0903	3.722	74.44%	13	3.563	71.25%	10	4.077	81.54%	5	3.766	75.32%	8
Delayed Site Possession/ Restricted Access - Impact(Magnitude)	T1003	3.737	74.74%	10	3.706	74.12%	8	3.867	77.33%	10	3.765	75.29%	9
Extension of Time For Completion - Impact(Magnitude)	T3503	3.737	74.74%	10	3.813	76.25%	7	3.667	73.33%	14	3.740	74.80%	10
Ambiguity in Documents - Impact(Magnitude)	T0103	3.789	75.79%	7	3.412	68.24%	14	4.000	80.00%	7	3.725	74.51%	11
Delay: Caused by Utility Services Organization - Impact(Magnitude)	T3103	3.789	75.79%	7	3.625	72.50%	9	3.714	74.29%	13	3.714	74.29%	12
Delay: Due To Late Instruction by Client - Impact(Magnitude)	T2703	3.722	74.44%	13	3.500	70.00%	11	3.643	72.86%	15	3.625	72.50%	13
Defective Design: Rectification of Works/ Specification Change - Impact(Magnitude)	T0503	3.632	72.63%	15	3.294	65.88%	17	3.933	78.67%	9	3.608	72.16%	14
Delays: Incomplete Design/ Insufficient Information by Client - Impact(Magnitude)	T0203	3.737	74.74%	10	3.294	65.88%	17	3.733	74.67%	12	3.588	71.76%	15
Acceleration of Works - Impact(Magnitude)	T1803	3.500	70.00%	16	3.375	67.50%	15	3.571	71.43%	16	3.479	69.58%	16
Default of Subcontractor, Nominated Subcontractor - Impact(Magnitude)	T4303	3.421	68.42%	17	3.471	69.41%	12	3.467	69.33%	17	3.451	69.02%	17
Delay: caused by client or employed by Client - Impact(Magnitude)	T2903	3.316	66.32%	19	3.313	66.25%	16	3.286	65.71%	21	3.306	66.12%	18
Unproductive / Idle Plants, Equipment or Labour - Impact(Magnitude)	T4403	3.412	68.24%	18	3.250	65.00%	19	3.071	61.43%	25	3.255	65.11%	19
Suspension of Work - Impact(Magnitude)	T1703	3.056	61.11%	25	3.200	64.00%	21	3.429	68.57%	18	3.213	64.26%	20
Late Payment - Impact(Magnitude)	T3603	3.222	64.44%	20	3.125	62.50%	24	3.286	65.71%	19	3.208	64.17%	21
Client's Breach of Contract - Impact(Magnitude)	T3303	3.158	63.16%	21	3.235	64.71%	20	3.200	64.00%	22	3.196	63.92%	22
Liquidated and ascertained damages - Impact(Magnitude)	T4203	3.053	61.05%	26	3.188	63.75%	22	3.308	66.15%	20	3.167	63.33%	23
Client's Instruction to Change (not resulting from Variation) - Impact(Magnitude)	T2103	3.111	62.22%	22	2.933	58.67%	31	3.083	61.67%	24	3.044	60.89%	24
Investigation of Suspected Defects - Impact(Magnitude)	T1403	3.000	60.00%	28	3.188	63.75%	22	2.923	58.46%	29	3.043	60.85%	25

Continued: Table 7-18 Types of Claims & Disputes Magnitude Assessment (Comparison Table)

Type Description	Code	TYPE OF CLAIMS & DISPUTES ASSESSMENT											
		Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking
		Clients			Consultants			Contractors			Over All		
Quantity Increase (not resulting from a Variation) - Impact(Magnitude)	T0603	3.053	61.05%	26	3.118	62.35%	25	2.867	57.33%	30	3.020	60.39%	26
Uncovering of Works For Testing - Impact(Magnitude)	T1503	2.947	58.95%	29	2.941	58.82%	28	3.067	61.33%	27	2.980	59.61%	27
Delays: Inclement Weather, Flood, Storms, , Etc. - Impact(Magnitude)	T4903	3.105	62.11%	23	2.706	54.12%	34	3.143	62.86%	23	2.980	59.60%	28
Delay: Late Delivery of Materials by Client - Impact(Magnitude)	T3003	3.105	62.11%	23	2.750	55.00%	32	3.071	61.43%	25	2.980	59.59%	29
Delays: Unavailability / Unsuitability of Project Materials - Impact(Magnitude)	T2503	2.889	57.78%	30	3.063	61.25%	26	3.000	60.00%	28	2.979	59.58%	30
Inflation / Price Escalation - Impact(Magnitude)	T3903	2.611	52.22%	34	3.059	61.18%	27	2.667	53.33%	33	2.780	55.60%	31
Additional Work to other Parts arising from repairs or defects - Impact(Magnitude)	T2003	2.737	54.74%	31	2.941	58.82%	28	2.600	52.00%	36	2.765	55.29%	32
Late Issuance of final certificate - Impact(Magnitude)	T3403	2.526	50.53%	37	2.941	58.82%	28	2.667	53.33%	33	2.706	54.12%	33
Error in Setting out Due to Incorrect Data Shown on Drawings - Impact(Magnitude)	T0803	2.611	52.22%	34	2.400	48.00%	39	2.714	54.29%	32	2.574	51.49%	34
Additional Tests to Verify Compliance with the - Impact(Magnitude)	T1603	2.684	53.68%	33	2.294	45.88%	40	2.733	54.67%	31	2.569	51.37%	35
Currency Fluctuation - Impact(Magnitude)	T4003	2.389	47.78%	40	2.750	55.00%	32	2.533	50.67%	37	2.551	51.02%	36
Facilities provided to others by the contractor - Impact(Magnitude)	T2203	2.722	54.44%	32	2.250	45.00%	42	2.643	52.86%	35	2.542	50.83%	37
Change in Quality (not resulting from a Variation) - Impact(Magnitude)	T0703	2.588	51.76%	36	2.563	51.25%	35	2.333	46.67%	40	2.500	50.00%	38
Interest on Late Payment - Impact(Magnitude)	T3703	2.421	48.42%	39	2.438	48.75%	38	2.429	48.57%	38	2.429	48.57%	39
Instruction by the Client to Resolve Discrepancy - Impact(Magnitude)	T0403	2.474	49.47%	38	2.294	45.88%	40	2.400	48.00%	39	2.392	47.84%	40
Finance Charges: Loss of Profit, Insurance, Retention, Etc. - Impact(Magnitude)	T4103	2.263	45.26%	41	2.533	50.67%	36	2.214	44.29%	42	2.333	46.67%	41
Labour Strikes, Civil Unrest, Etc. - Impact(Magnitude)	T4503	2.222	44.44%	42	2.471	49.41%	37	1.929	38.57%	45	2.224	44.49%	42
Overdue retention money - Impact(Magnitude)	T3803	1.947	38.95%	44	2.176	43.53%	43	2.308	46.15%	41	2.122	42.45%	43
Damages to Work due to Inclement Weather, - Impact(Magnitude)	T5003	2.000	40.00%	43	2.059	41.18%	45	2.067	41.33%	44	2.039	40.78%	44
Loss of / Damage to Materials on Site or During Transport - Impact(Magnitude)	T2303	1.895	37.89%	45	2.176	43.53%	43	1.867	37.33%	46	1.980	39.61%	45
Rectification of Damage due to Un Excepted Risk - Impact(Magnitude)	T5103	1.895	37.89%	45	1.941	38.82%	46	1.643	32.86%	50	1.840	36.80%	46
Custom Tariffs, New Taxes - Impact(Magnitude)	T4603	1.842	36.84%	47	1.667	33.33%	48	1.800	36.00%	48	1.776	35.51%	47
Repair damages to other Property during Transport of Materials - Impact(Magnitude)	T2403	1.778	35.56%	49	1.647	32.94%	49	1.857	37.14%	47	1.755	35.10%	48
Delay: Additional building regulations/ procedures - Impact(Magnitude)	T3203	1.789	35.79%	48	1.471	29.41%	51	2.077	41.54%	43	1.755	35.10%	48
Expropriation of Contractor's Equipment etc. - Impact(Magnitude)	T4803	1.667	33.33%	50	1.688	33.75%	47	1.714	34.29%	49	1.688	33.75%	50
Embargoes on Project Imported Items - Impact(Magnitude)	T4703	1.529	30.59%	51	1.533	30.67%	50	1.615	32.31%	51	1.556	31.11%	51

Y.1.3.2 TYPE MAGNITUDE (IMPACT) BAR CHARTS:

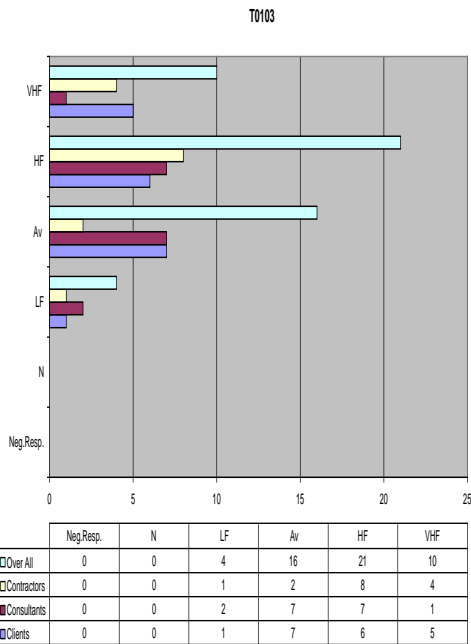


Figure 103 T0103

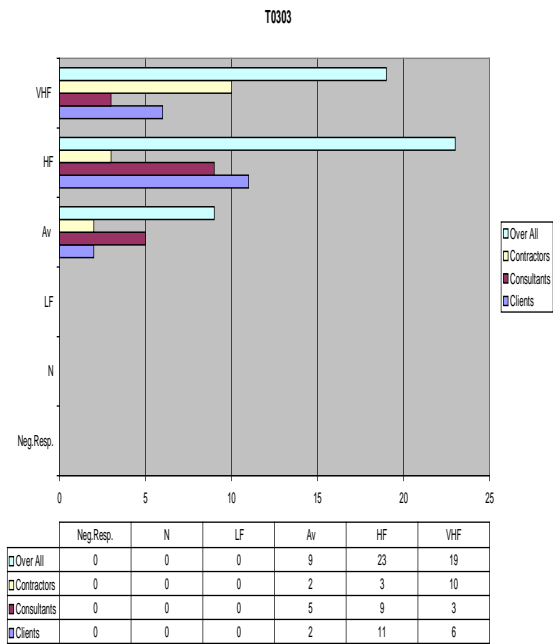


Figure 105 T0103

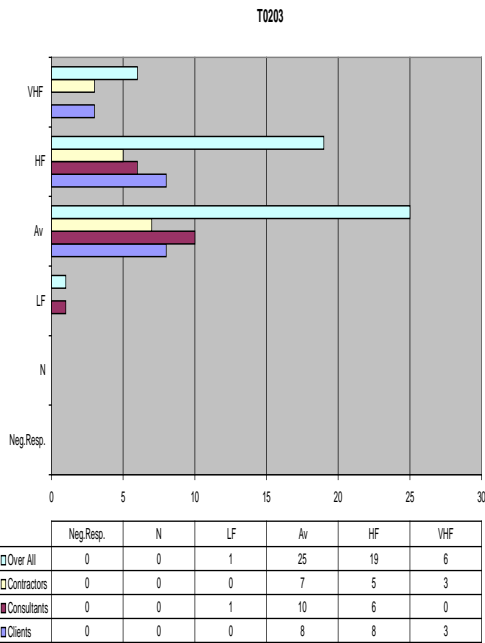


Figure 104 T0203

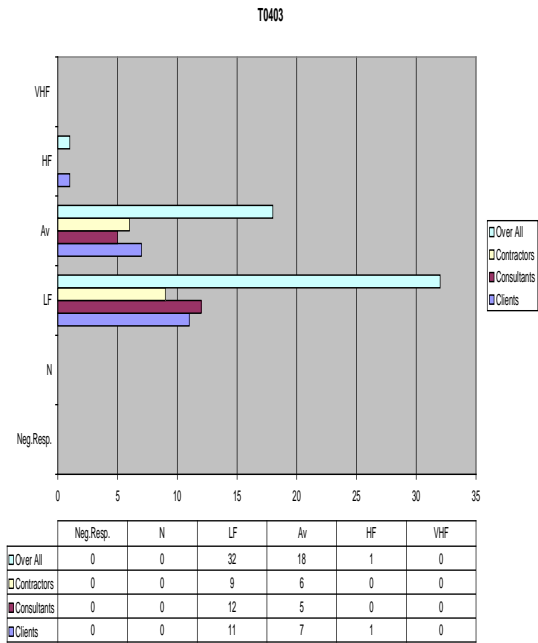


Figure 106 T0403

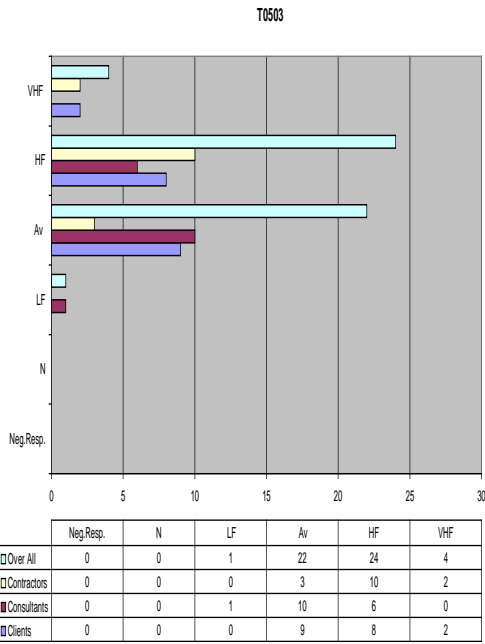


Figure 107 T0503

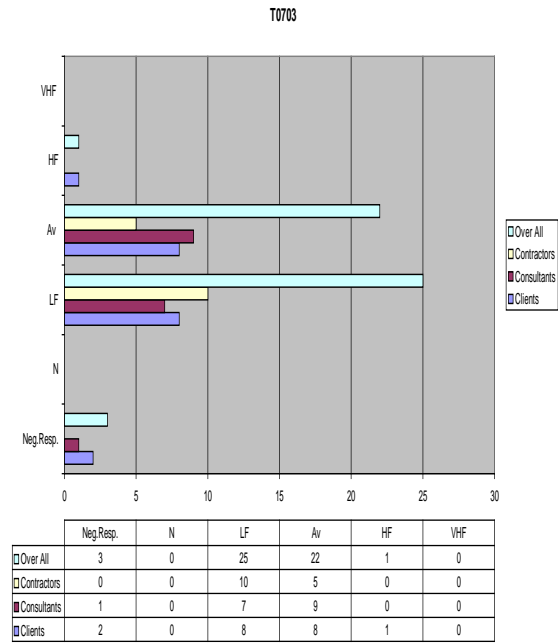


Figure 109 T0703

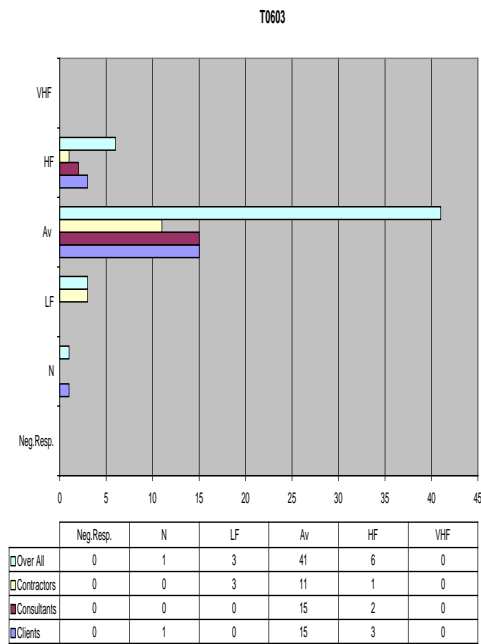


Figure 108 T0603

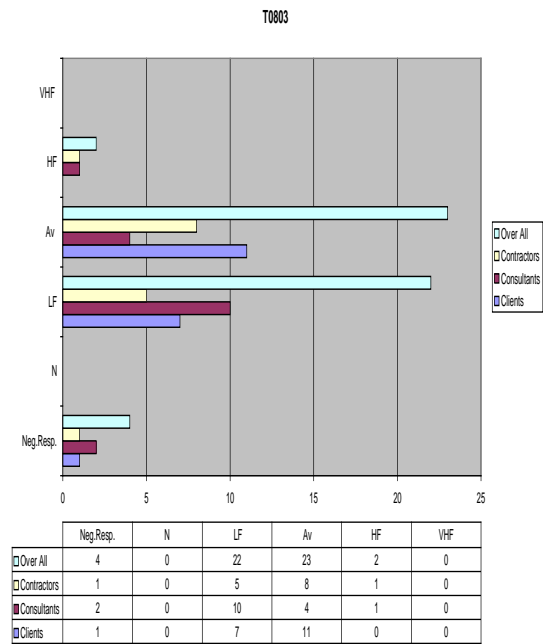


Figure 110 T0803

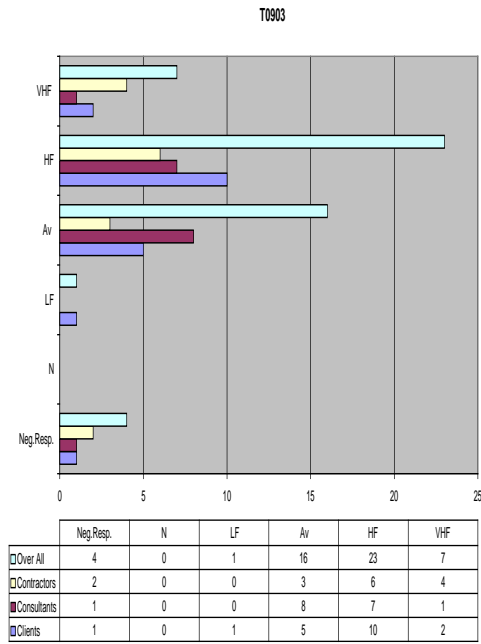


Figure 111 T0903

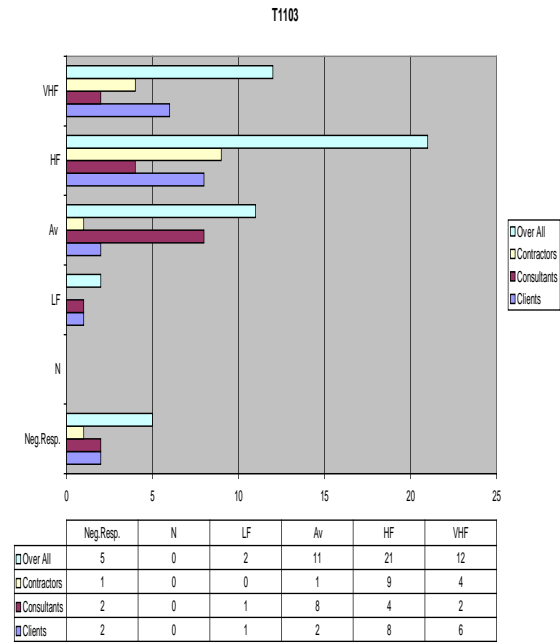


Figure 113 T1103

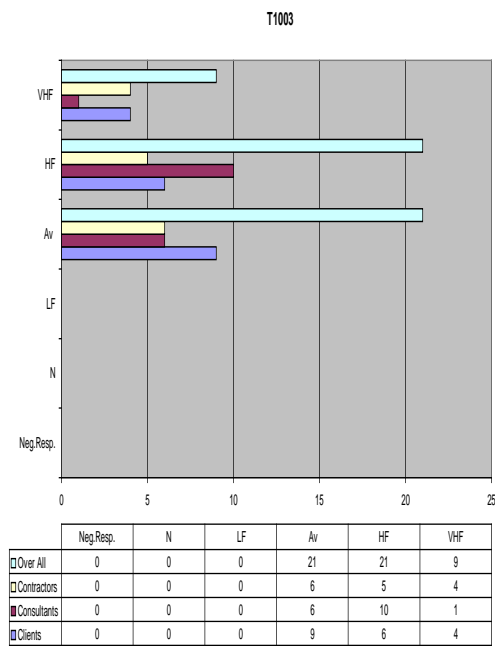


Figure 112 T1003

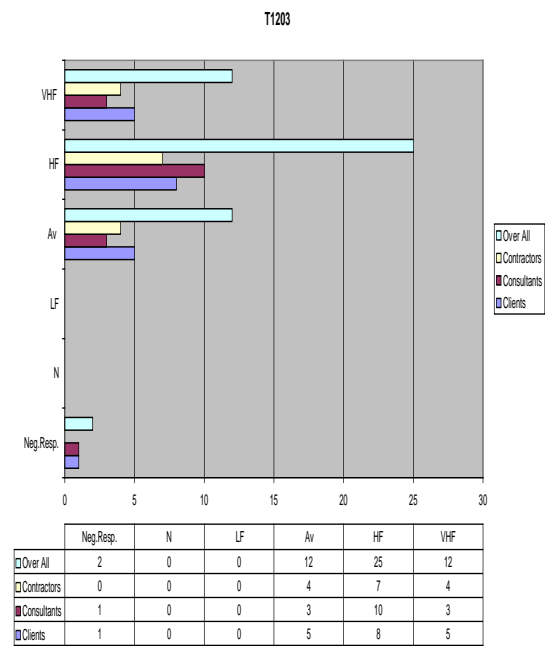


Figure 114 T1203

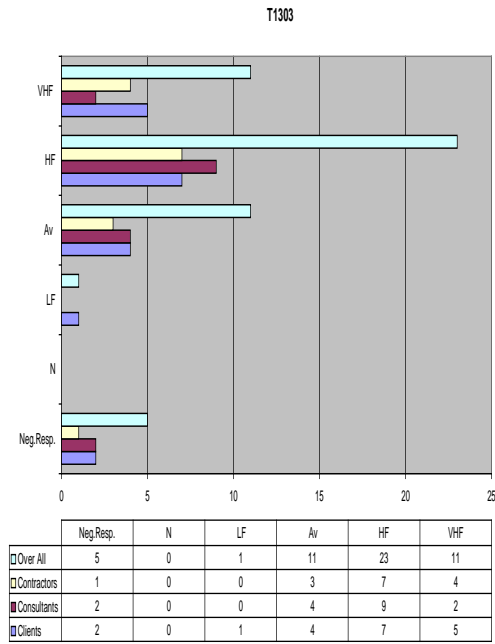


Figure 115 T1303

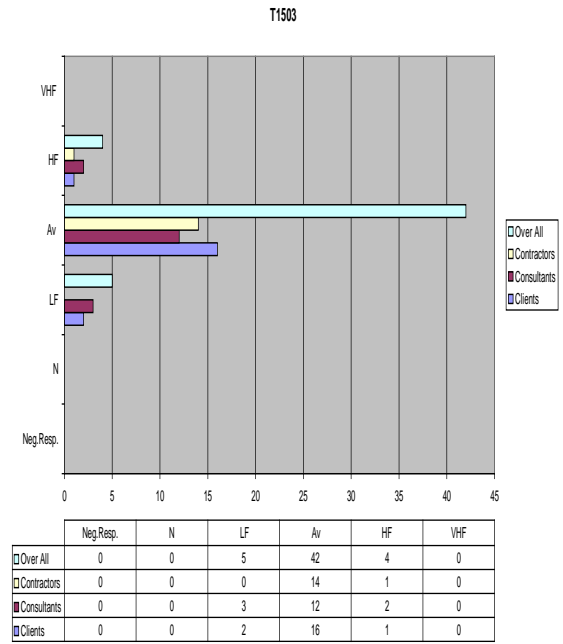


Figure 117 T1503

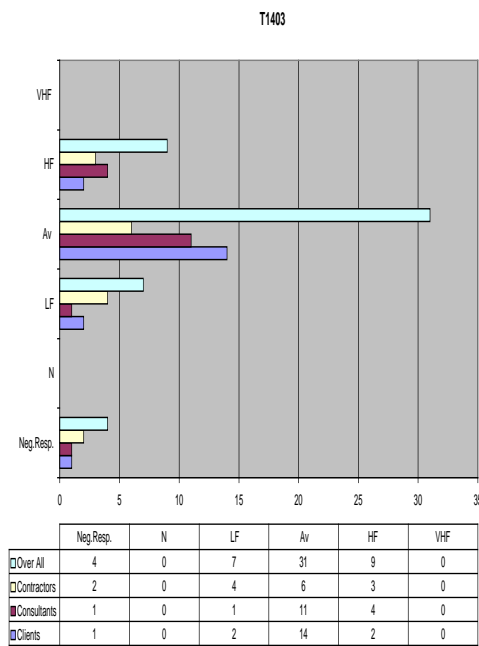


Figure 116 T1403

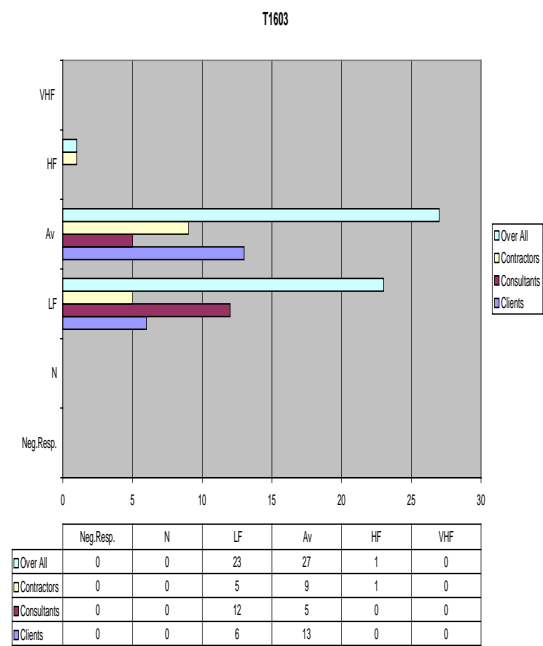


Figure 118 T1603

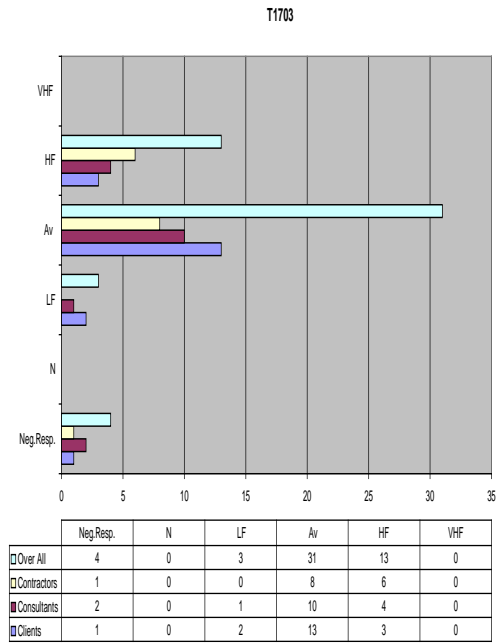


Figure 119 T1703

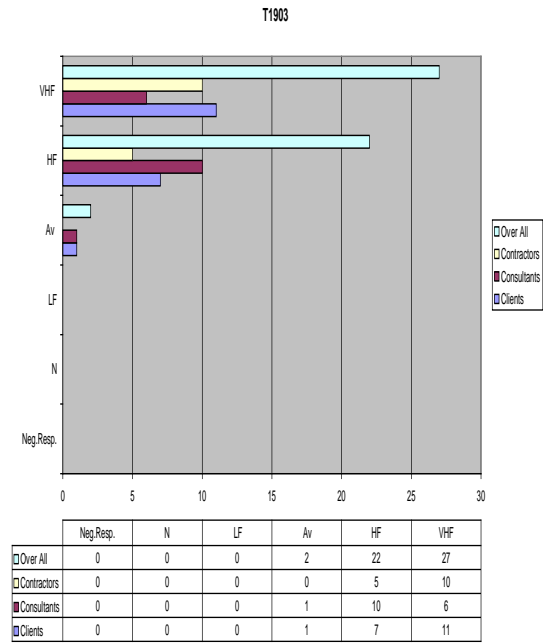


Figure 121 T1903

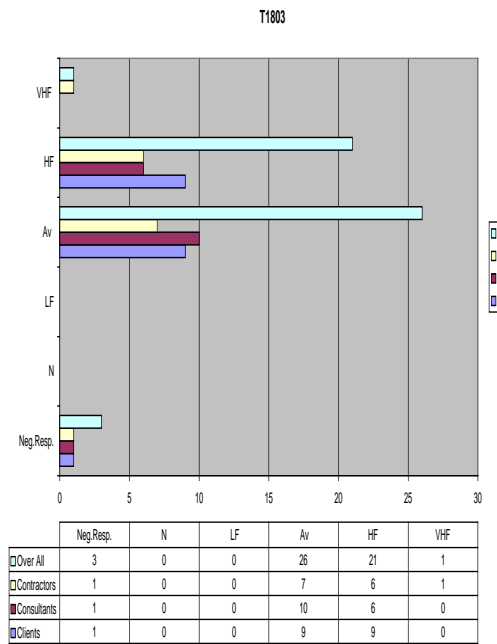


Figure 120 T1803

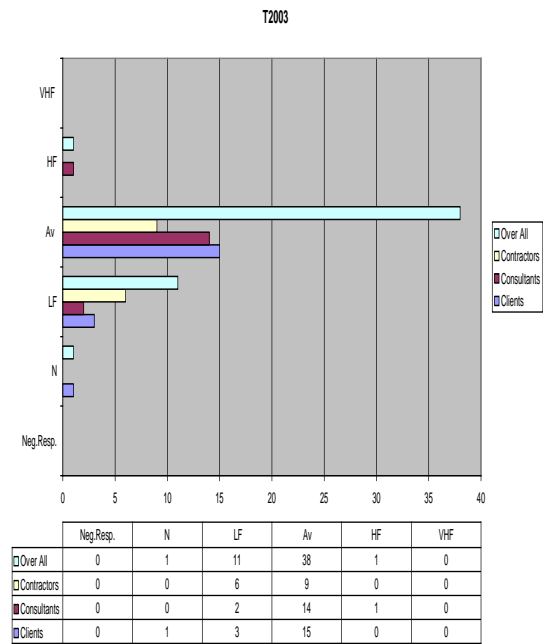


Figure 122 T2003

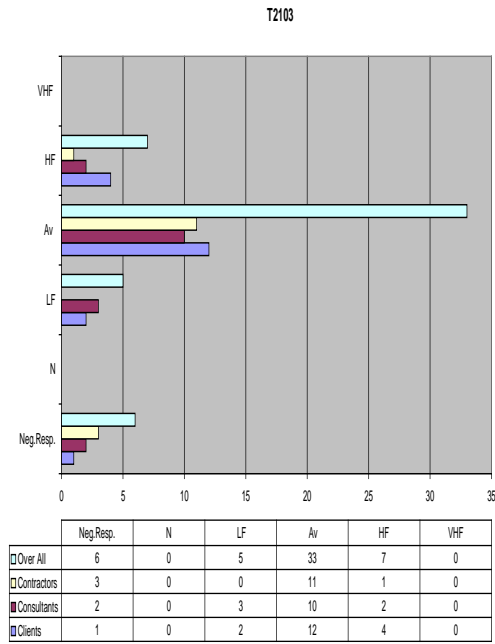


Figure 123 T2103

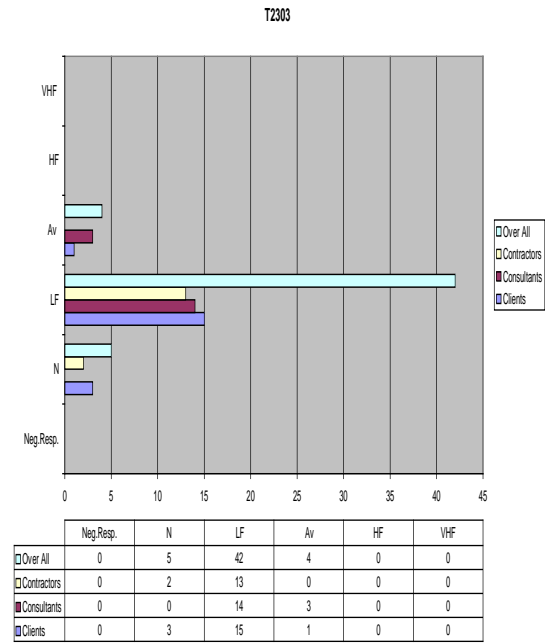


Figure 125 T2303

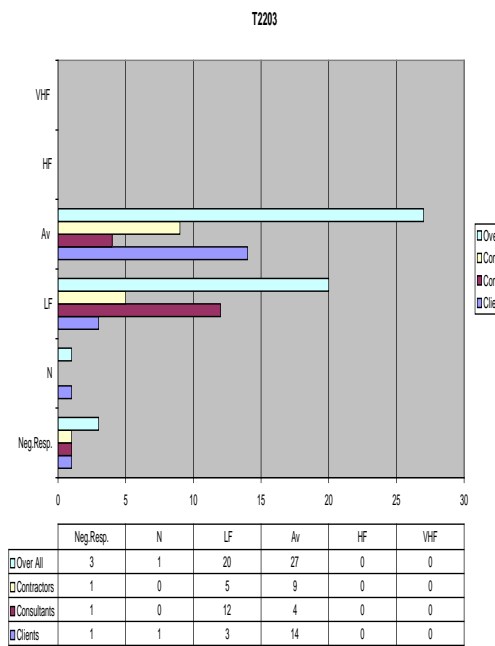


Figure 124 T2203

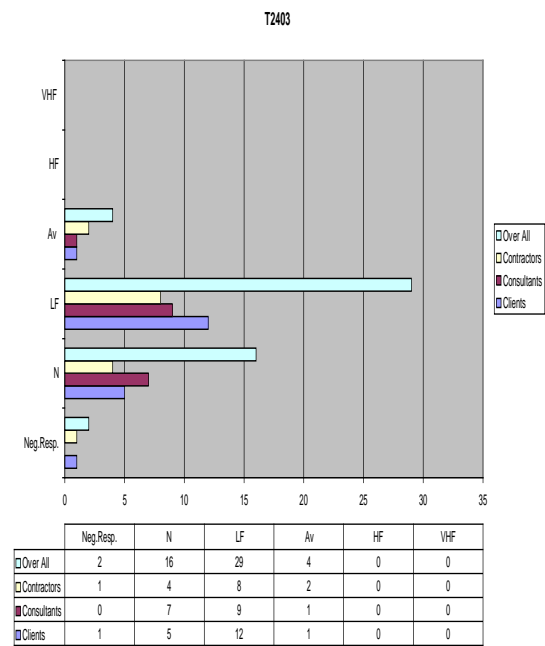


Figure 126 T2403

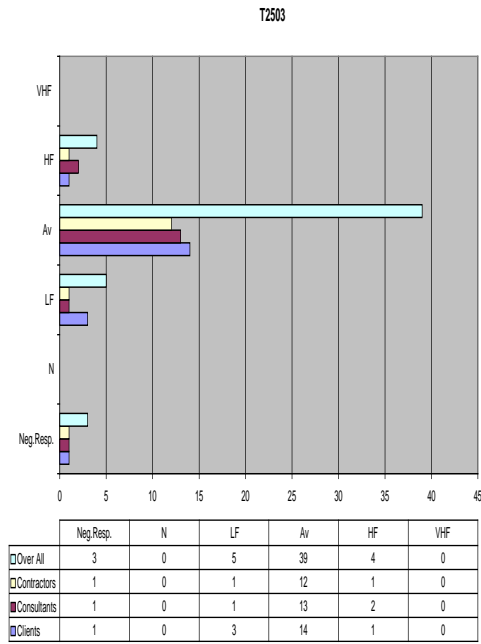


Figure 127 T2503

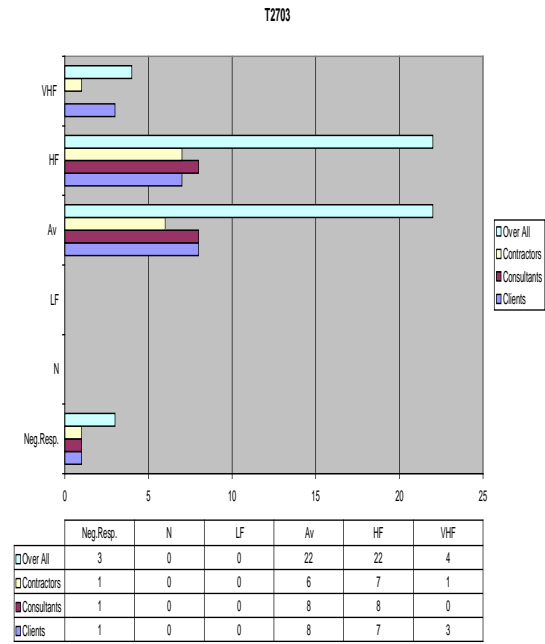


Figure 129 T2703

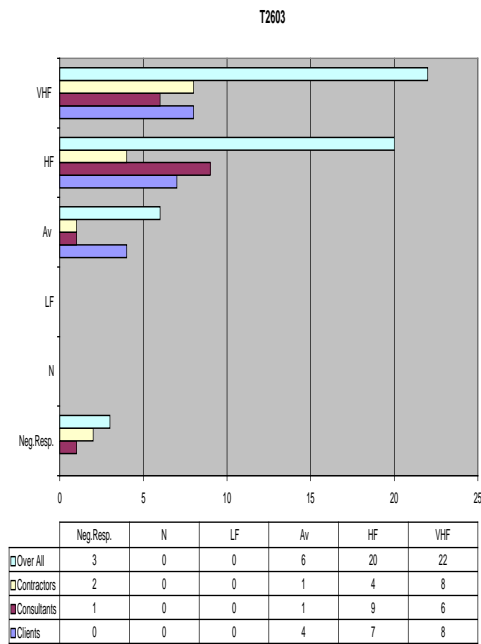


Figure 128 T2603

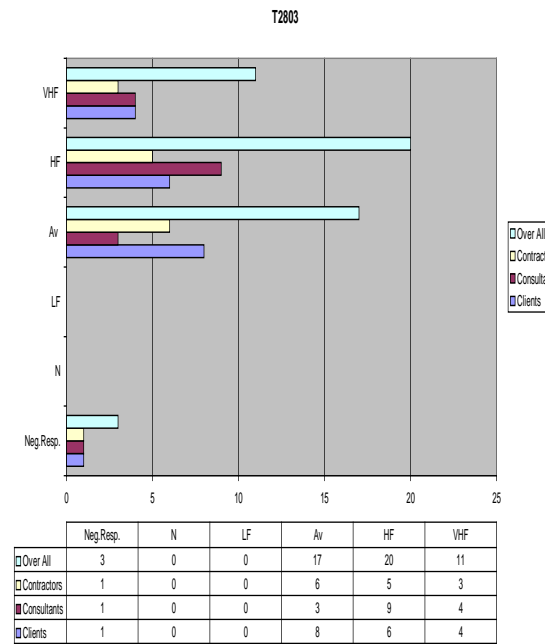


Figure 130 T2803

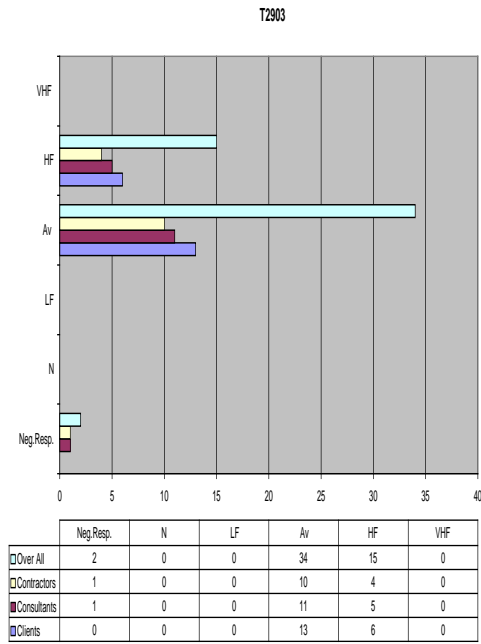


Figure 131 T2903

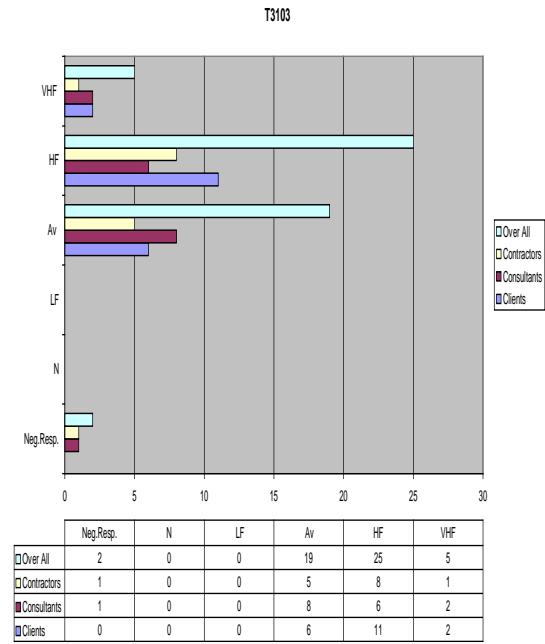


Figure 133 T3103

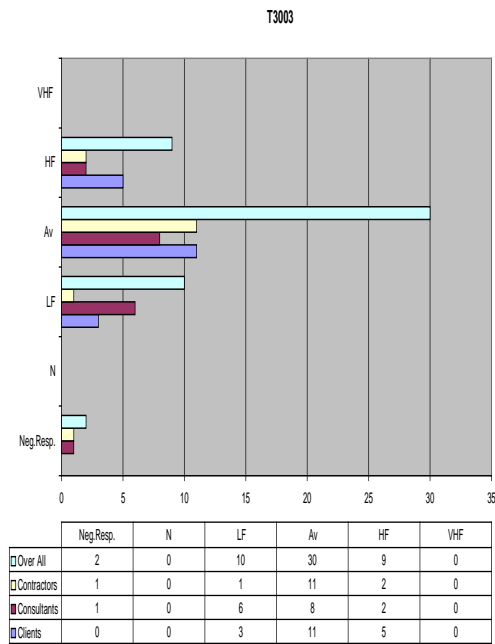


Figure 132 T3003

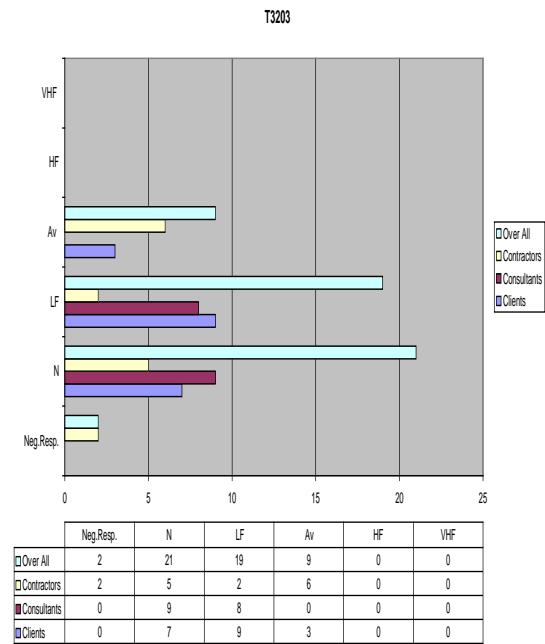


Figure 134 T3203

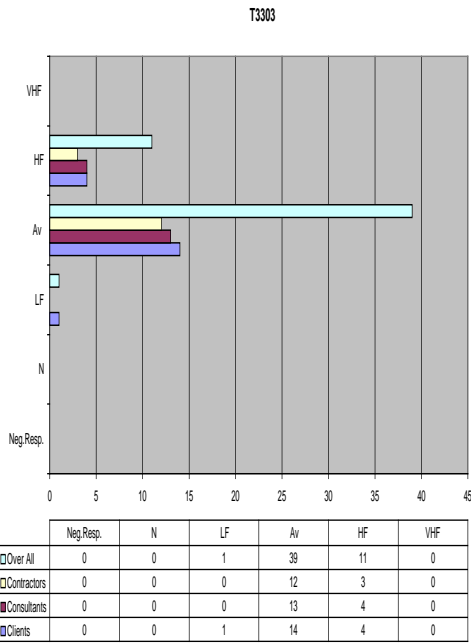


Figure 135 T3303

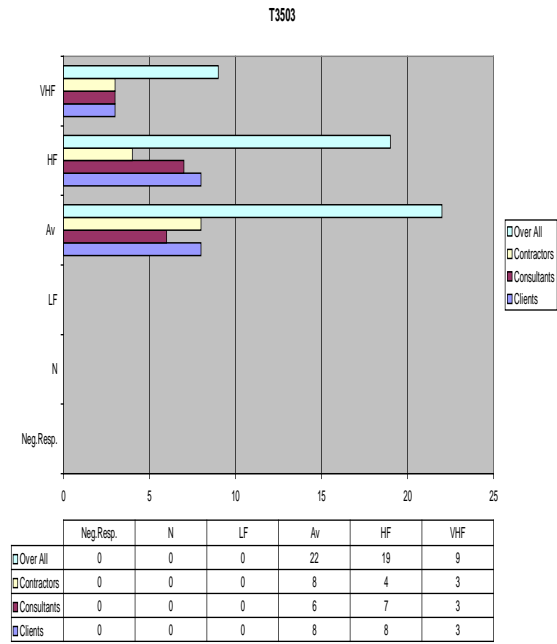


Figure 137 T3503

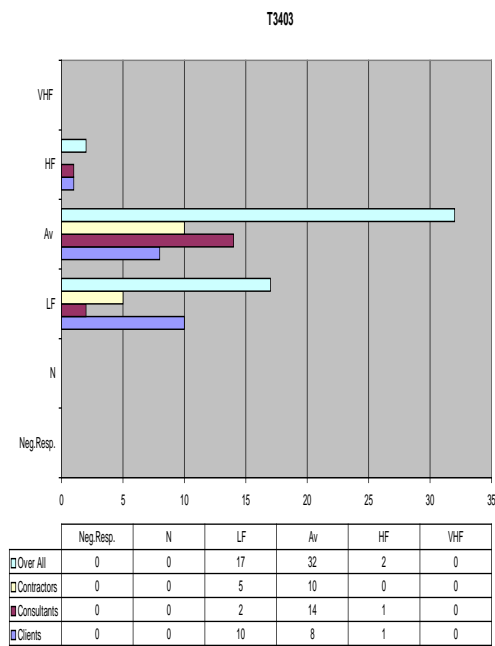


Figure 136 T3403

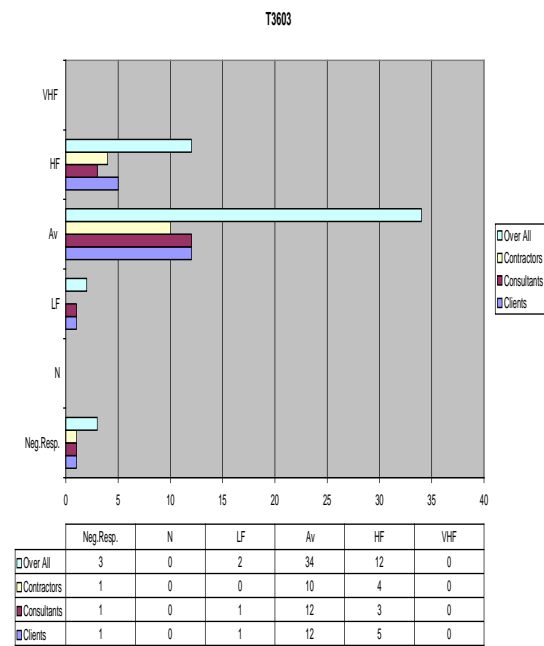


Figure 138 T3603

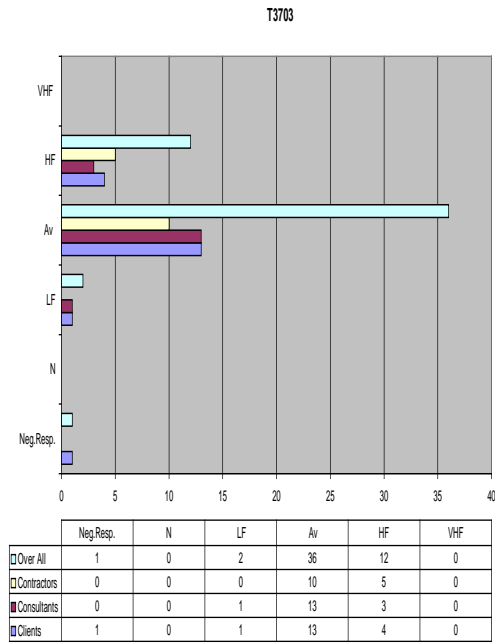


Figure 139 T3703

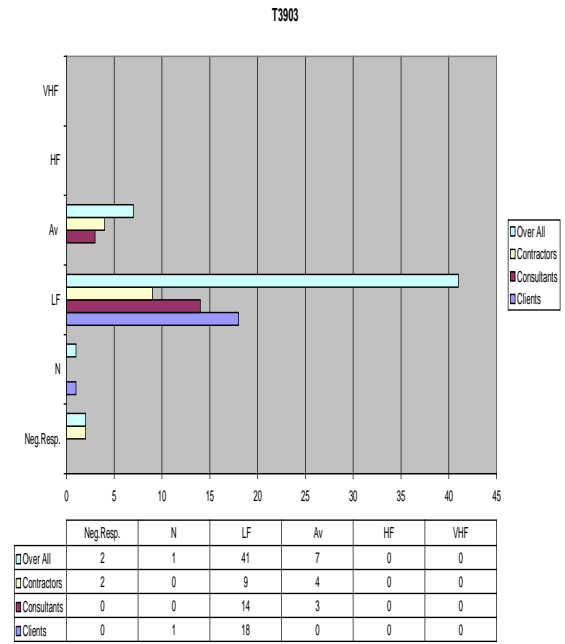


Figure 141 T3903

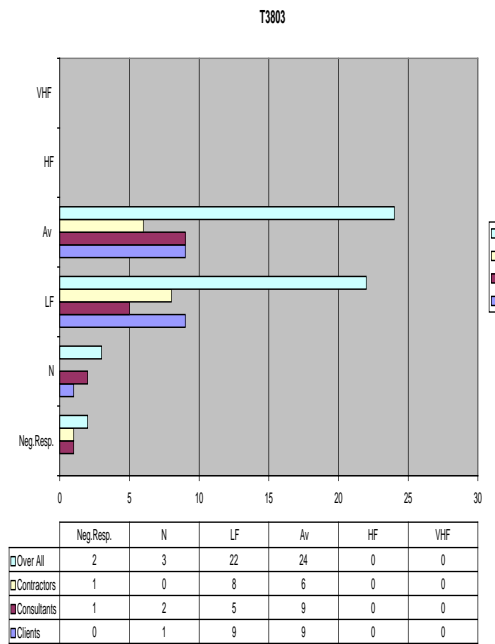


Figure 140 T3803

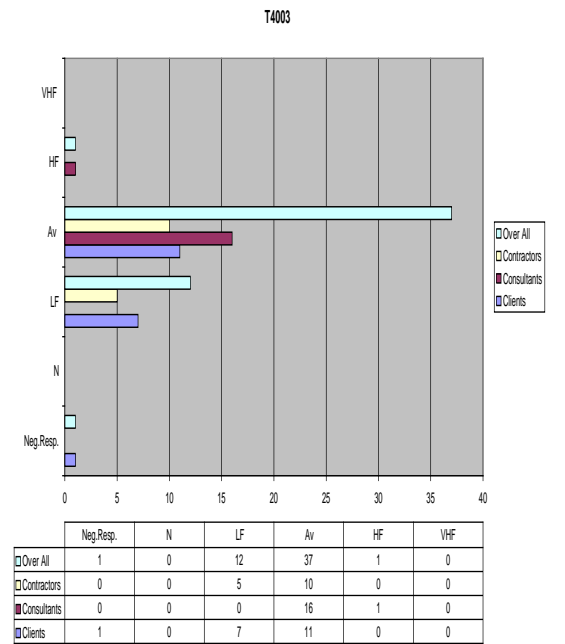


Figure 142 T4003

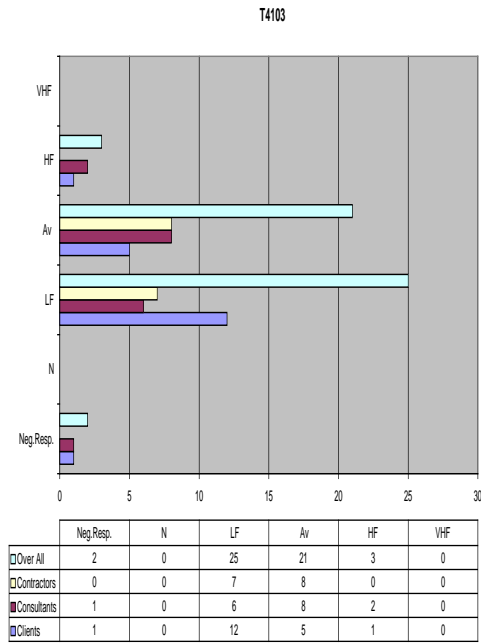


Figure 143 T4103

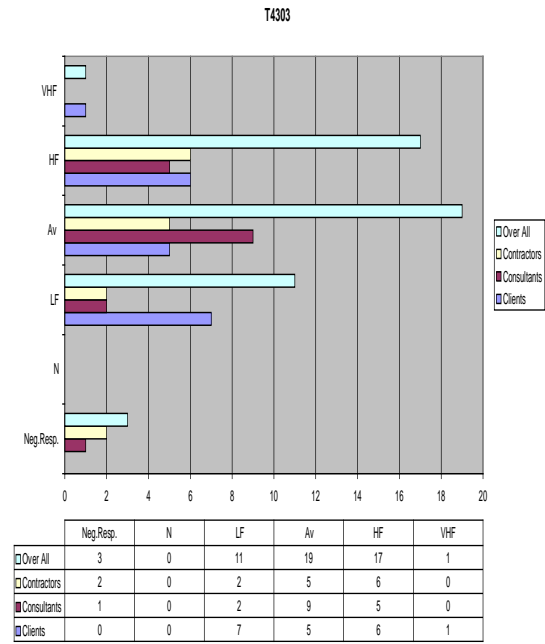


Figure 145 T4303

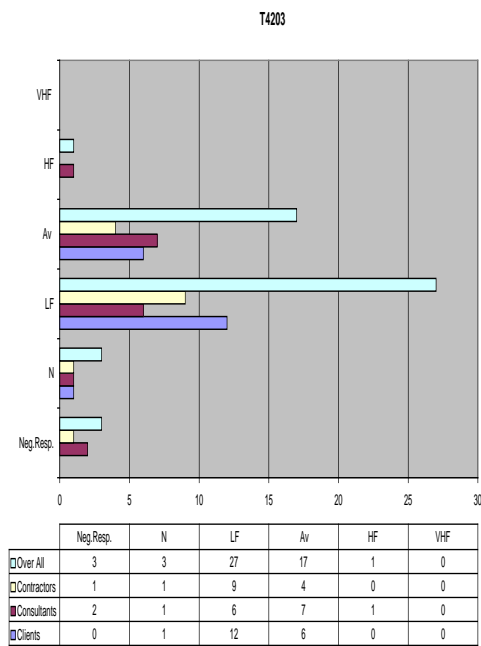


Figure 144 T4203

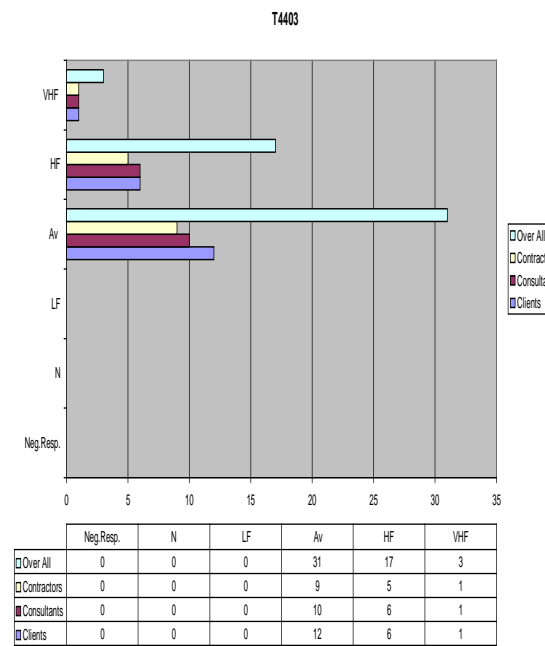


Figure 146 T4403

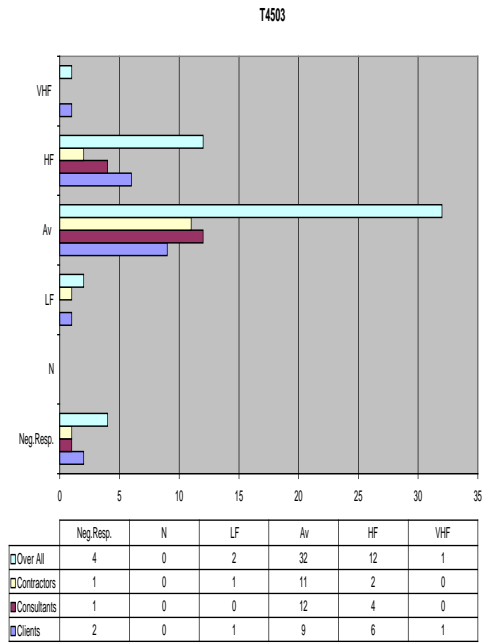


Figure 147 T4503

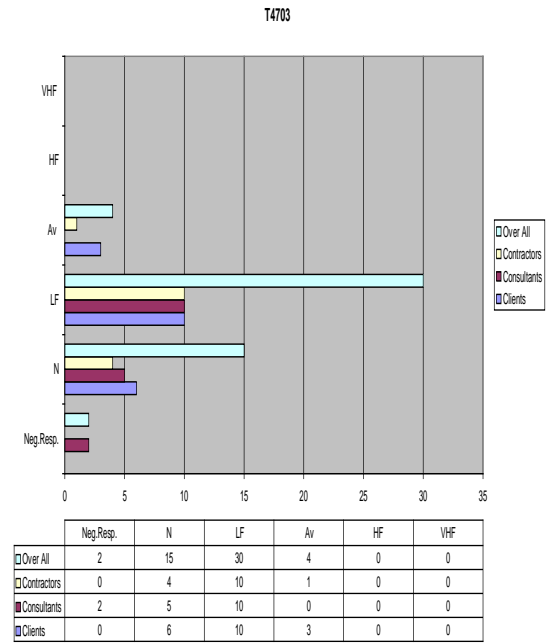


Figure 149 T4703

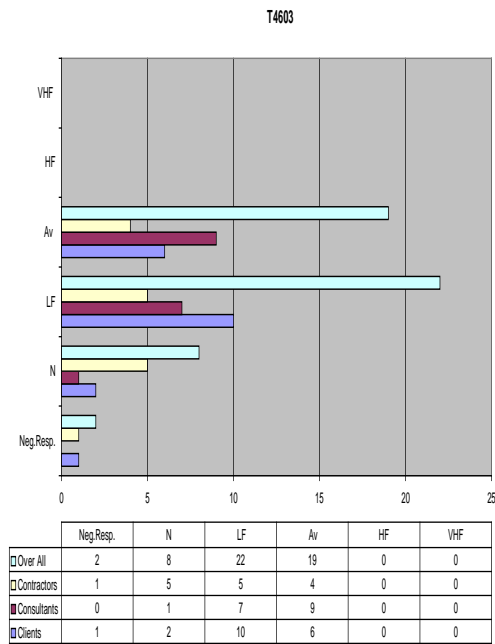


Figure 148 T4603

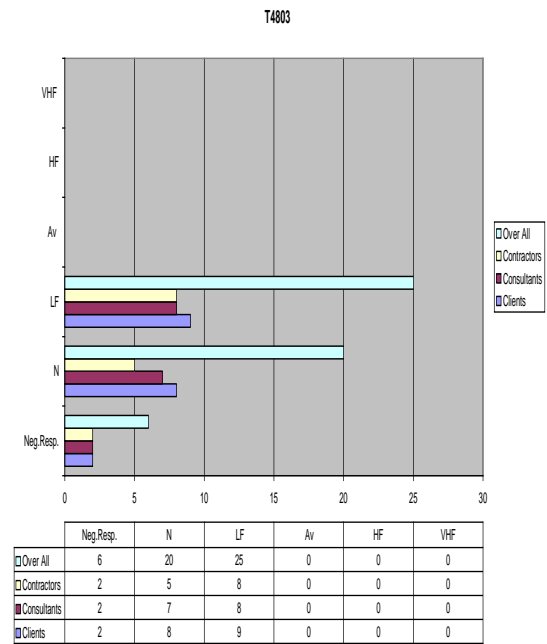


Figure 150 T4803

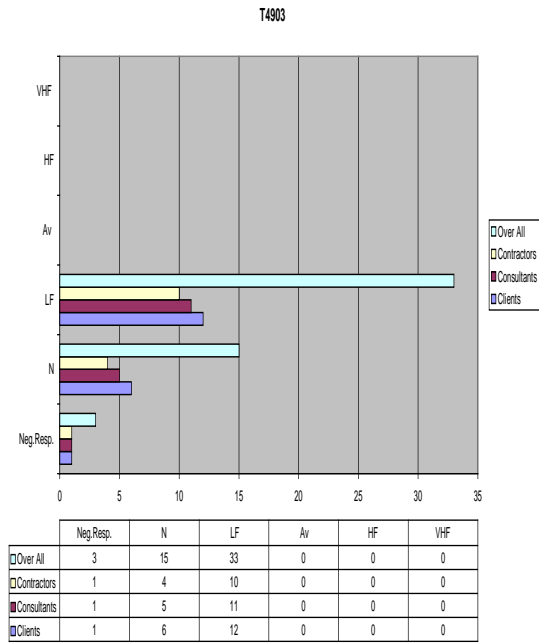


Figure 151 T4903

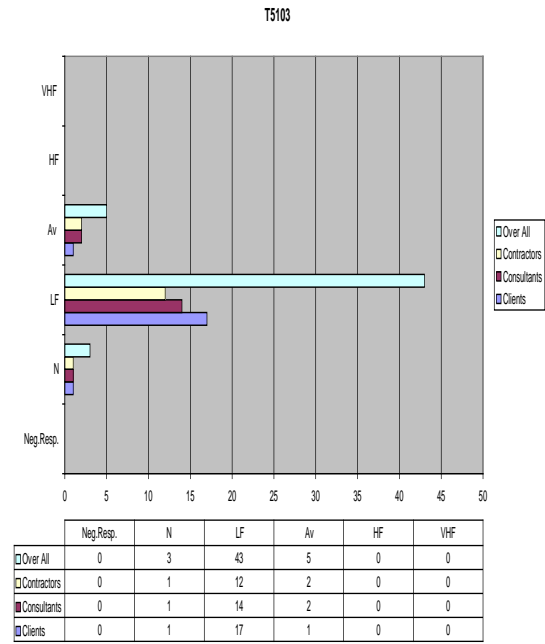


Figure 153 T5103

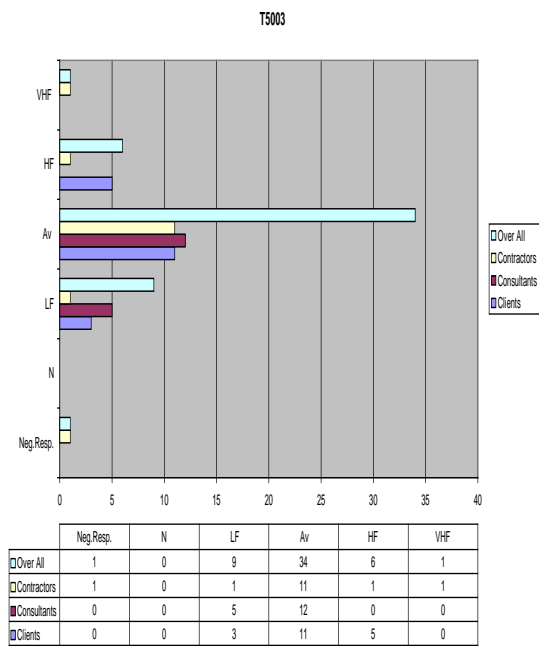


Figure 152 T5003

Y.1.4 TYPE AVOIDABILITY ASSESSMENT:

Y.1.4.1 TYPE AVOIDABILITY TABLES:

Table 7-24 Types of Claims & Disputes Avoidability Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking
		Clients			Consultants			Contractors			Over All		
Ambiguity in Documents-Avoidability	T0104	4.526	90.53%	1	4.353	87.06%	1	4.600	92.00%	1	4.490	89.80%	1
Instruction Issued by the Client/Consultant to Resolve Discrepancy -Avoidability	T0404	4.211	84.21%	2	4.235	84.71%	2	4.467	89.33%	3	4.294	85.88%	2
Rectification of Works/ Specification Change Due to Defective Design-Avoidability	T0504	4.211	84.21%	2	3.882	77.65%	5	4.533	90.67%	2	4.196	83.92%	3
Change of Design/ Design Omission / Errors by the Client (Engineer)-Avoidability	T0304	4.053	81.05%	5	4.000	80.00%	3	4.000	80.00%	7	4.020	80.39%	4
Substantial Change in Quality of any item not resulting from a Variation-Avoidability	T0704	3.947	78.95%	6	3.882	77.65%	5	4.143	82.86%	5	3.980	79.60%	5
Delays Due to Incomplete Design/ Insufficient Information by Client/Consultant-Avoidability	T0204	4.105	82.11%	4	3.500	70.00%	11	4.200	84.00%	4	3.940	78.80%	6
Substantial Increase in Quantity of any item not resulting from a Variation-Avoidability	T0604	3.842	76.84%	7	4.000	80.00%	3	3.800	76.00%	11	3.882	77.65%	7
Variations -Avoidability	T1904	3.684	73.68%	14	3.647	72.94%	9	4.133	82.67%	6	3.804	76.08%	8
Change of Project Profile and Site-Avoidability	T0904	3.737	74.74%	10	3.706	74.12%	8	3.867	77.33%	10	3.765	75.29%	9
Delayed Site Possession/ Restricted Access-Avoidability	T1104	3.789	75.79%	8	3.412	68.24%	13	4.000	80.00%	7	3.725	74.51%	10
Unforeseen Ground Condition/ Unforeseeable Obstruction-Avoidability	T1304	3.789	75.79%	8	3.647	72.94%	9	3.667	73.33%	14	3.706	74.12%	11
Unanticipated Soil Condition-Avoidability	T1204	3.737	74.74%	10	3.824	76.47%	7	3.467	69.33%	17	3.686	73.73%	12
Differing Site Condition -Avoidability	T1104	3.737	74.74%	10	3.471	69.41%	12	3.800	76.00%	11	3.667	73.33%	13
Delay/ Disruption to Regular Progress Due To Variation -Avoidability	T2604	3.667	73.33%	15	3.294	65.88%	15	3.933	78.67%	9	3.620	72.40%	14
Delay/ Disruption to Regular Progress Due To Late Instruction by the Client-Avoidability	T2704	3.737	74.74%	10	3.294	65.88%	15	3.733	74.67%	13	3.588	71.76%	15
Delay/ Disruption to Regular Progress Due To Late Issue of Consent (Approval)-Avoidability	T2804	3.526	70.53%	16	3.313	66.25%	14	3.667	73.33%	14	3.500	70.00%	16
Error in Setting out Due to Incorrect Data Shown on Drawings-Avoidability	T0804	3.316	66.32%	20	3.250	65.00%	21	3.533	70.67%	16	3.360	67.20%	17
Acceleration of Works-Avoidability	T1804	3.474	69.47%	17	3.294	65.88%	15	3.267	65.33%	28	3.353	67.06%	18
Client/ Engineer's Instruction to Change (not resulting from Variation)-Avoidability	T2104	3.444	68.89%	18	3.294	65.88%	15	3.267	65.33%	28	3.340	66.80%	19
Person/ Organization Employed by the Employer such as (Nominated Subcontractor, Suppliers or Others)-Avoidability	T2904	3.421	68.42%	19	3.118	62.35%	32	3.333	66.67%	22	3.294	65.88%	20
Suspension of Work -Avoidability	T1704	3.263	65.26%	21	3.235	64.71%	22	3.333	66.67%	22	3.275	65.49%	21
Delays Due to the Unavailability / Unsuitability of Project Materials-Avoidability	T2504	3.105	62.11%	31	3.294	65.88%	15	3.400	68.00%	18	3.255	65.10%	22
Inflation / Price Escalation-Avoidability	T3904	3.263	65.26%	21	3.118	62.35%	32	3.400	68.00%	18	3.255	65.10%	22
Currency Fluctuation-Avoidability	T4004	3.211	64.21%	23	3.235	64.71%	22	3.333	66.67%	22	3.255	65.10%	22
Extension of Time For Completion-Avoidability	T3504	3.105	62.11%	31	3.294	65.88%	15	3.333	66.67%	22	3.235	64.71%	25

Continued Table 7-24 Types of Claims & Disputes Avoidability Assessment (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking
		Clients			Consultants			Contractors			Over All		
Uncovering of Works For Testing (Examination)-Avoidability	T1504	3.105	62.11%	31	3.176	63.53%	26	3.400	68.00%	18	3.216	64.31%	26
Liquidated and ascertained damages -Avoidability	T4204	3.053	61.05%	37	3.235	64.71%	22	3.400	68.00%	18	3.216	64.31%	26
Additional Tests to Verify Compliance with the Specification (in excess to	T1604	3.158	63.16%	24	3.235	64.71%	22	3.200	64.00%	32	3.196	63.92%	28
Default of Subcontractor, Nominated Subcontractor Or Suppliers. -Avoidability	T4304	3.158	63.16%	24	3.176	63.53%	26	3.267	65.33%	28	3.196	63.92%	28
Additional Work (to other parts of the works) arising from repairs or defects	T2004	3.158	63.16%	24	3.059	61.18%	35	3.333	66.67%	22	3.176	63.53%	30
Investigation of Suspected Defects-Avoidability	T1404	3.105	62.11%	31	3.059	61.18%	35	3.267	65.33%	28	3.137	62.75%	31
Delay/ Disruption to Regular Progress Due To Late Delivery of Materials b	T3004	3.158	63.16%	24	2.941	58.82%	42	3.333	66.67%	22	3.137	62.75%	31
Client's Breach of Contract -Avoidability	T3304	3.105	62.11%	31	3.176	63.53%	26	3.067	61.33%	36	3.118	62.35%	33
Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen built	T3204	3.158	63.16%	24	3.059	61.18%	35	3.067	61.33%	36	3.098	61.96%	34
Un Paid Sums (Late Payment)-Avoidability	T3694	2.947	58.95%	39	3.176	63.53%	26	3.200	64.00%	32	3.098	61.96%	34
Rectification of Damages To Other Property During Transport of Materials	T2404	3.158	63.16%	24	2.941	58.82%	42	3.133	62.67%	34	3.078	61.57%	36
Delay Disruption to Regular Progress Caused by Utility Services Organizat	T3104	3.158	63.16%	24	3.059	61.18%	35	3.000	60.00%	42	3.078	61.57%	36
Un Paid Sums (Late Payment)-Avoidability	T3604	3.000	60.00%	38	3.176	63.53%	26	3.067	61.33%	36	3.078	61.57%	36
Interest on Un Paid Sums (Late Payment)-Avoidability	T3704	2.947	58.95%	39	3.176	63.53%	26	3.133	62.67%	34	3.078	61.57%	36
Facilities provided to others by the contractor (in excess to those mentioned	T2204	3.105	62.11%	31	3.118	62.35%	32	2.933	58.67%	43	3.059	61.18%	40
Overdue retention money-Avoidability	T3804	2.895	57.89%	42	3.059	61.18%	35	3.067	61.33%	36	3.000	60.00%	41
Custom Tariffs, New Taxes-Avoidability	T4604	2.895	57.89%	42	3.059	61.18%	35	3.067	61.33%	36	3.000	60.00%	41
Loss of / Damage to Materials on Site or During Transport -Avoidability	T2304	2.947	58.95%	39	2.941	58.82%	42	3.067	61.33%	36	2.980	59.61%	43
Finance Charges For Loss Of Profit, Extended Performance Pond, Insuranc	T4104	2.684	53.68%	47	3.059	61.18%	35	2.867	57.33%	45	2.863	57.25%	44
Late Issuance of final certificate -Avoidability	T3404	2.833	56.67%	44	2.941	58.82%	42	2.667	53.33%	50	2.820	56.40%	45
Expropriation of Contractor's Equipment or Machinery-Avoidability	T4804	2.556	51.11%	49	2.941	58.82%	42	2.867	57.33%	45	2.780	55.60%	46
Labour Strikes, Civil Unrest, Etc.-Avoidability	T4504	2.684	53.68%	47	2.353	47.06%	49	2.933	58.67%	43	2.647	52.94%	47
Embargoes on Project Imported Items-Avoidability	T4704	2.421	48.42%	51	2.824	56.47%	47	2.733	54.67%	47	2.647	52.94%	47
Damages To the Works Due to Exceptionally Adverse Weather, Flood, Stor	T5004	2.737	54.74%	45	2.294	45.88%	50	2.733	54.67%	47	2.588	51.76%	49
Rectification of Damage Caused by Un Excepted Risk-Avoidability	T5104	2.737	54.74%	45	2.294	45.88%	50	2.733	54.67%	47	2.588	51.76%	49
Delays Due to Exceptional Inclement Weather, Flood, Storms, Earthquakes	T4904	2.526	50.53%	50	2.588	51.76%	48	2.400	48.00%	51	2.510	50.20%	51

Y.1.4.2 TYPE AVOIDABILITY BAR CHARTS:

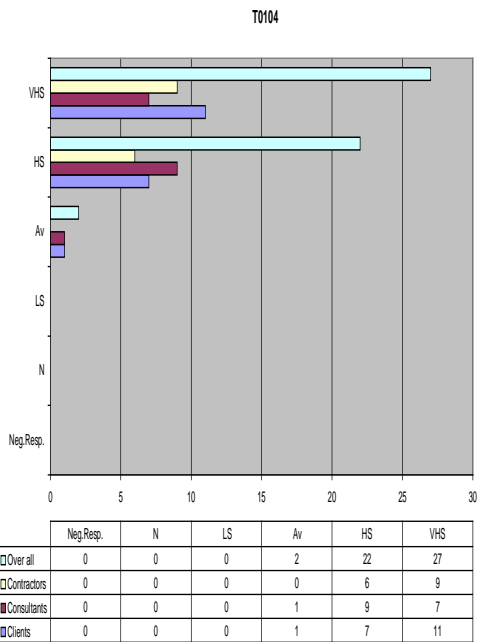


Figure 154 T0104

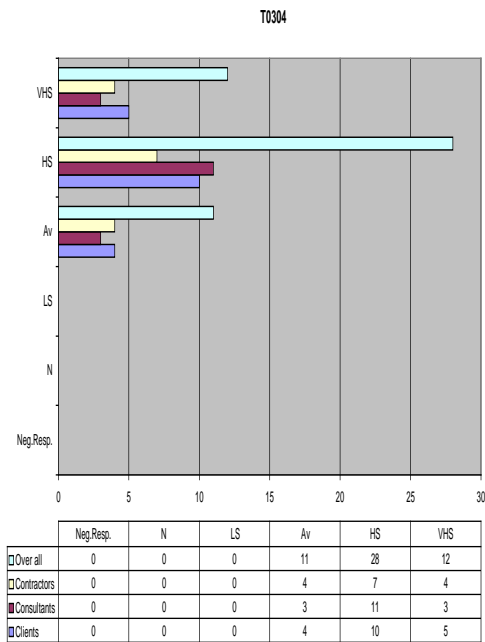


Figure 156 T0304

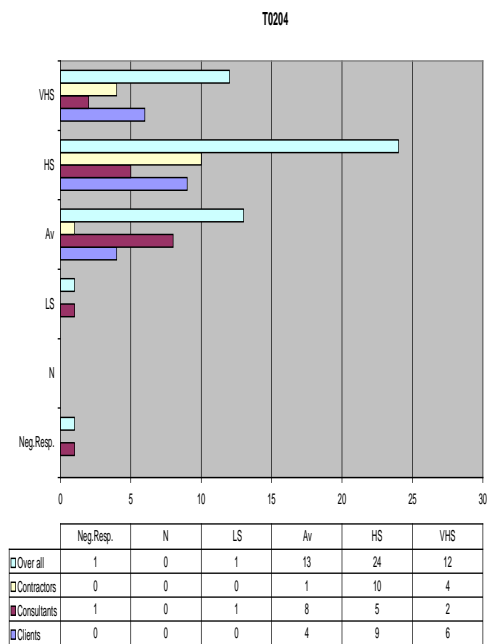


Figure 155 T0204

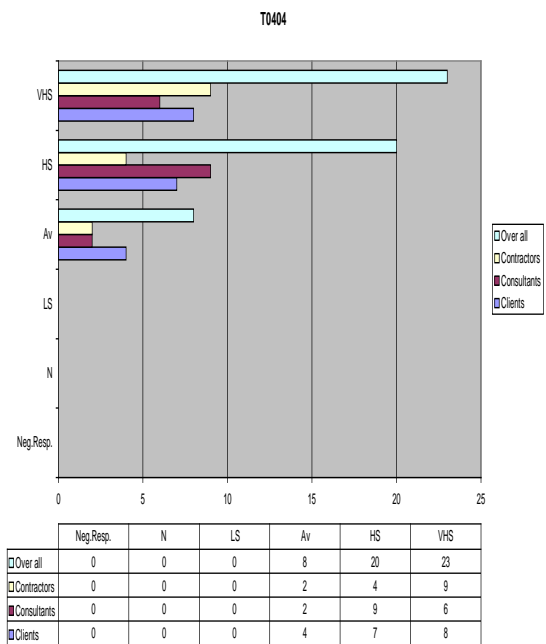


Figure 157 T0404

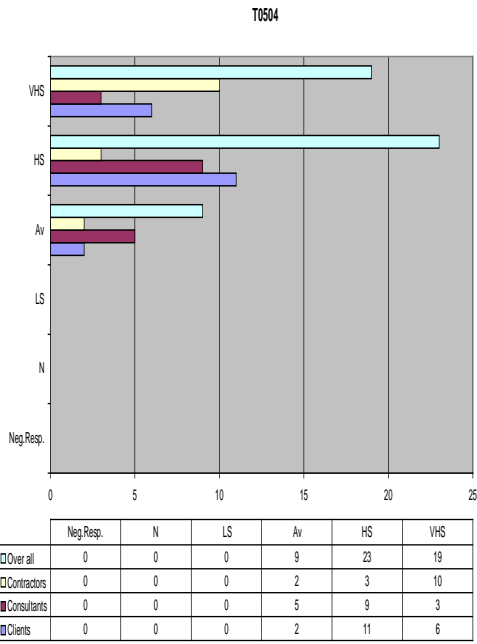


Figure 158 T0504

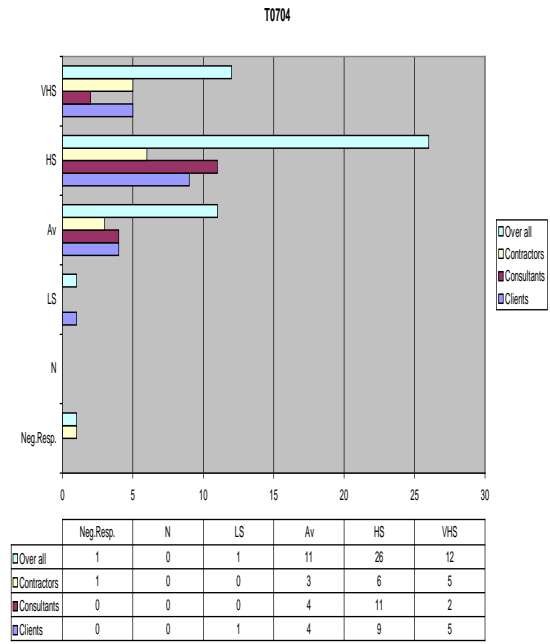


Figure 160 T0704

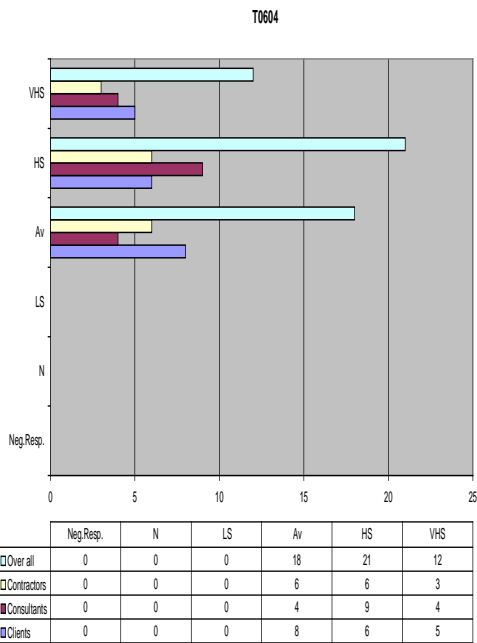


Figure 159 T0604

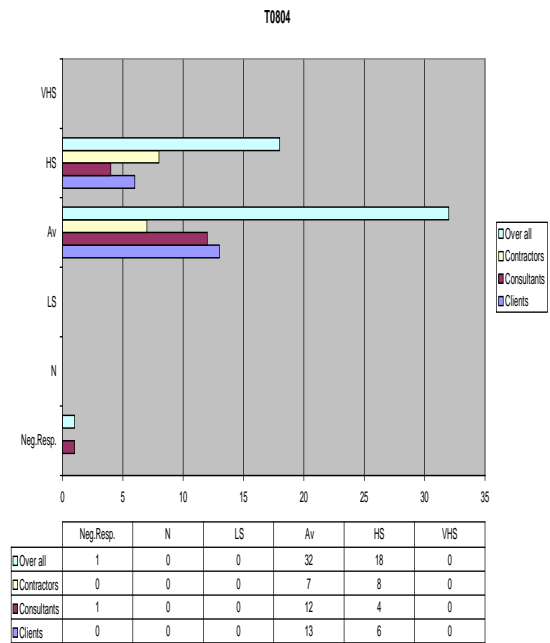


Figure 161 T0804

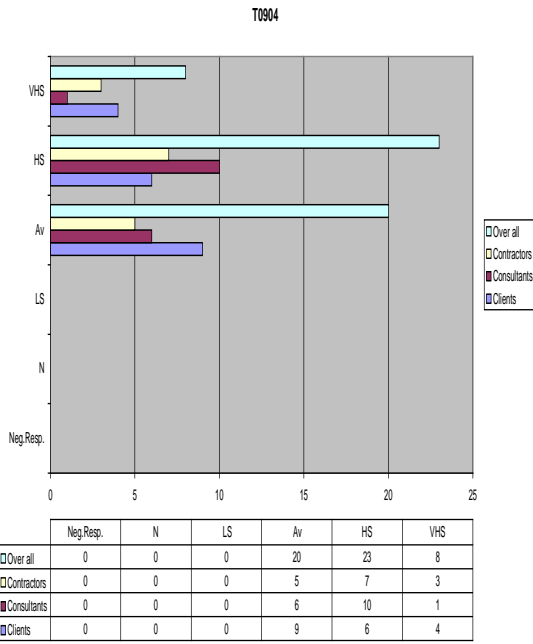


Figure 162 T0904

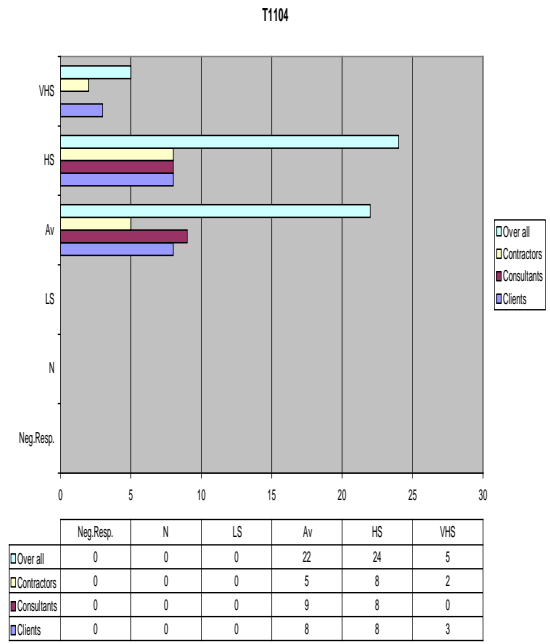


Figure 164 T1104

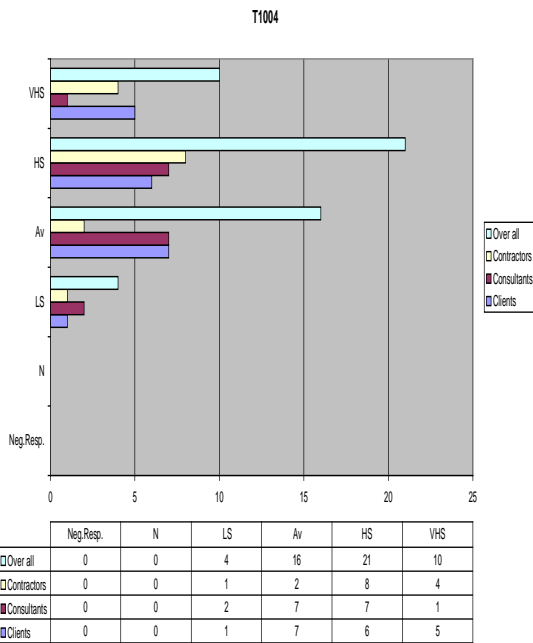


Figure 163 T1004

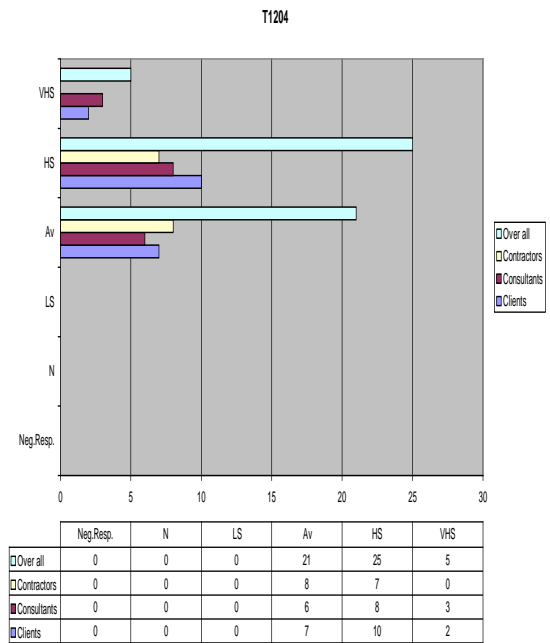


Figure 165 T1204

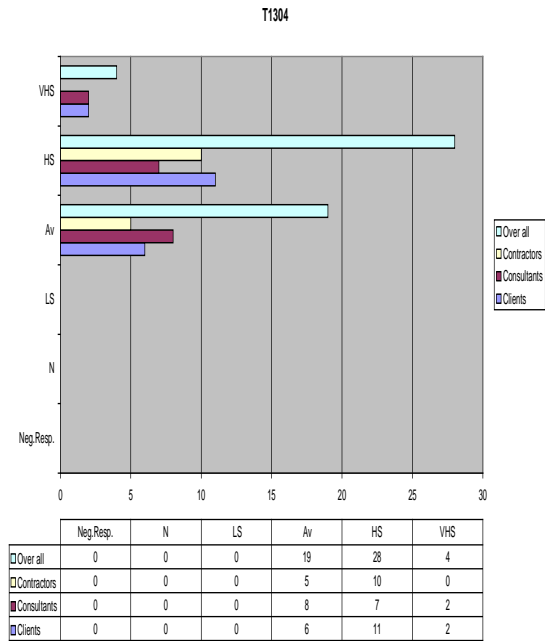


Figure 166 T1304

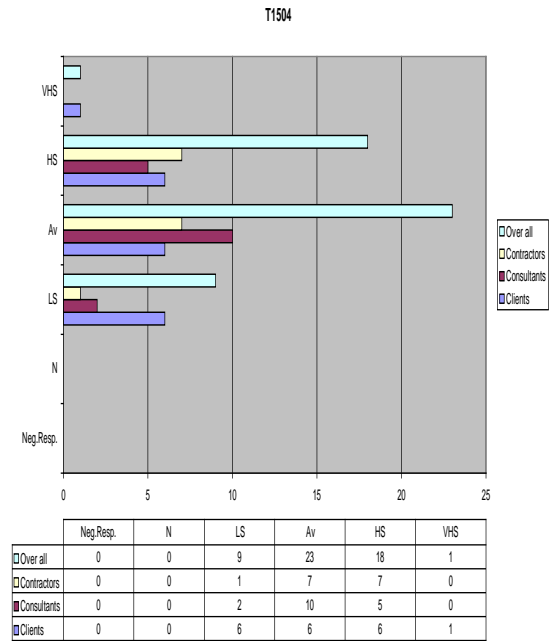


Figure 168 T1504

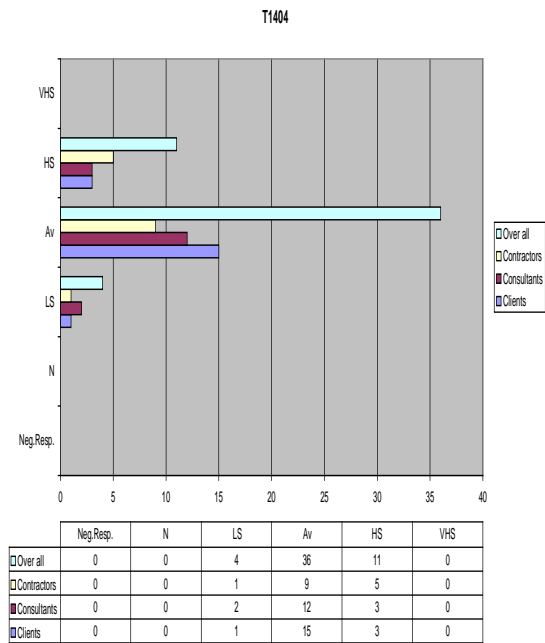


Figure 167 T1404

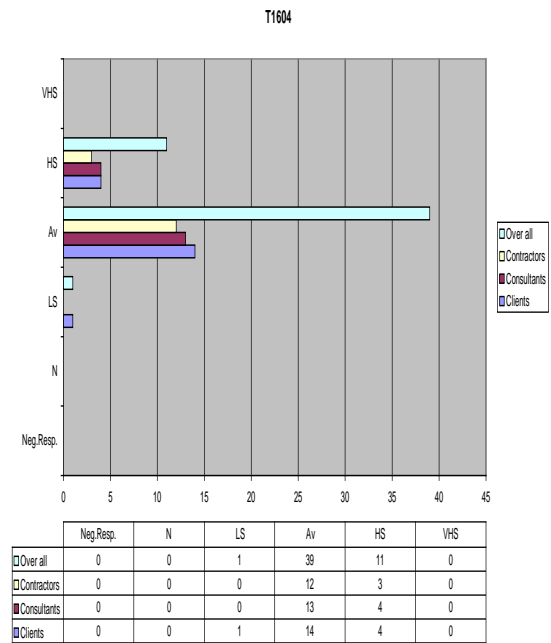


Figure 169 T1604

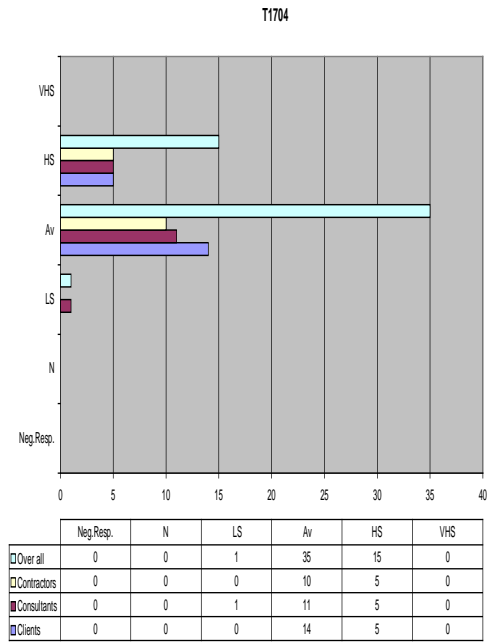


Figure 170 T1704

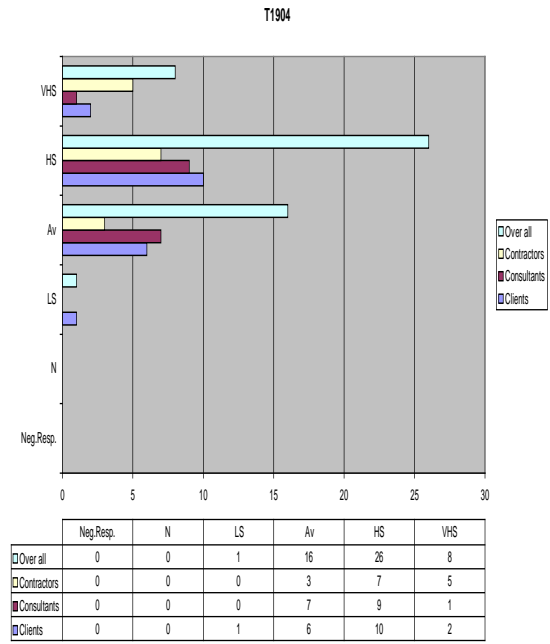


Figure 172 T1904

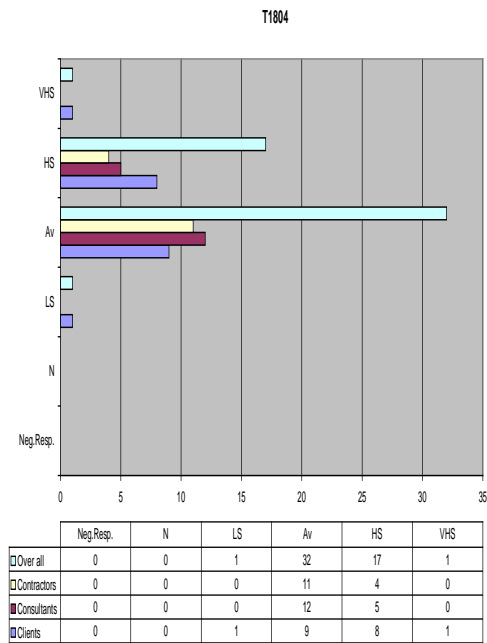


Figure 171 T1804

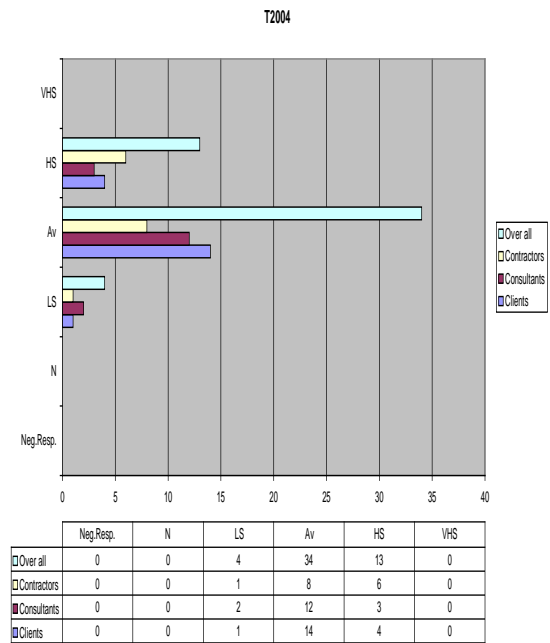


Figure 173 T2004

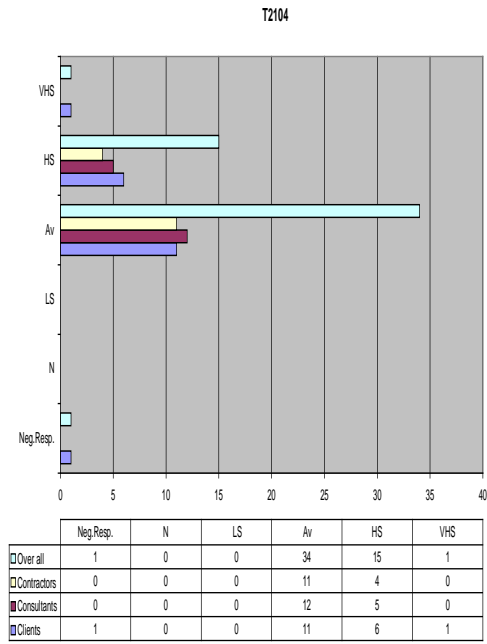


Figure 174 T2104

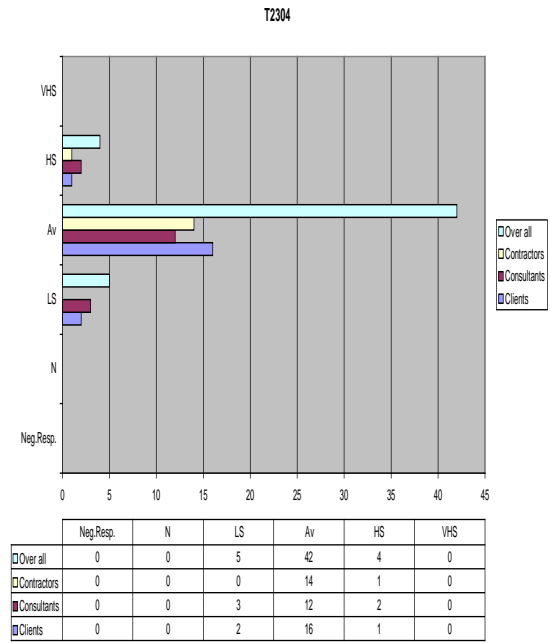


Figure 176 T2304

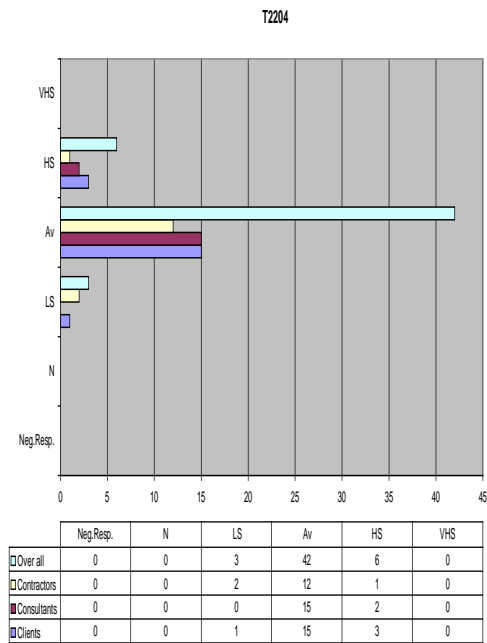


Figure 175 T2204

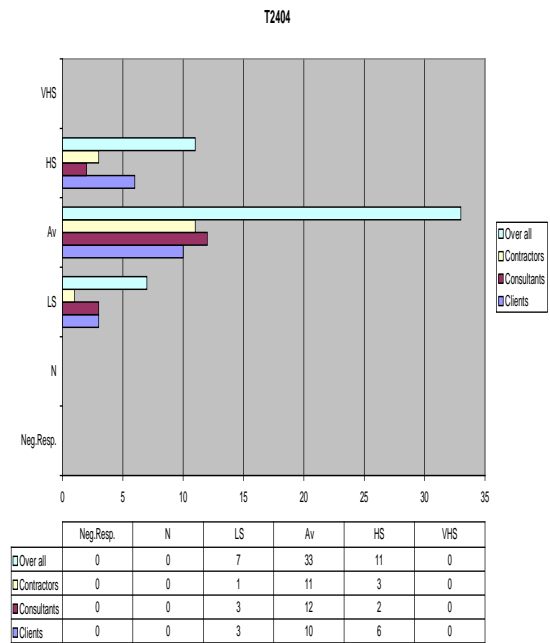


Figure 177 T2404

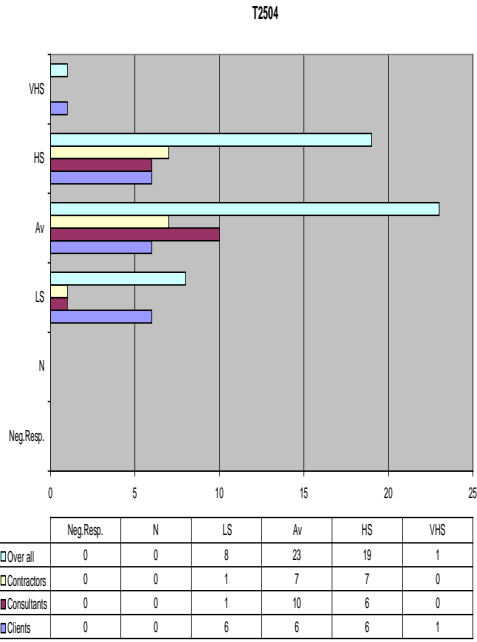


Figure 178 T2504

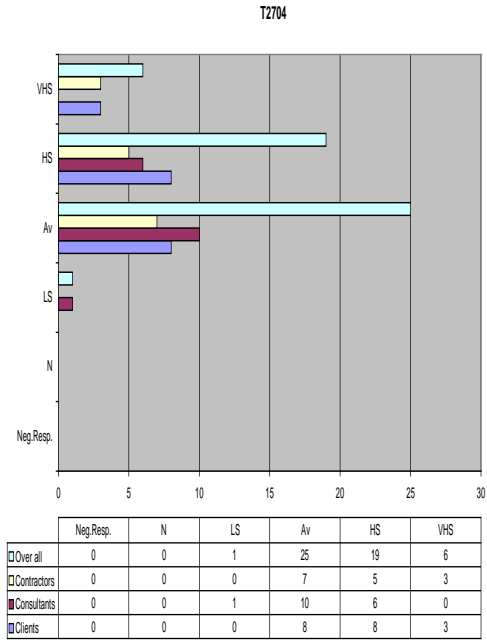


Figure 180 T2704

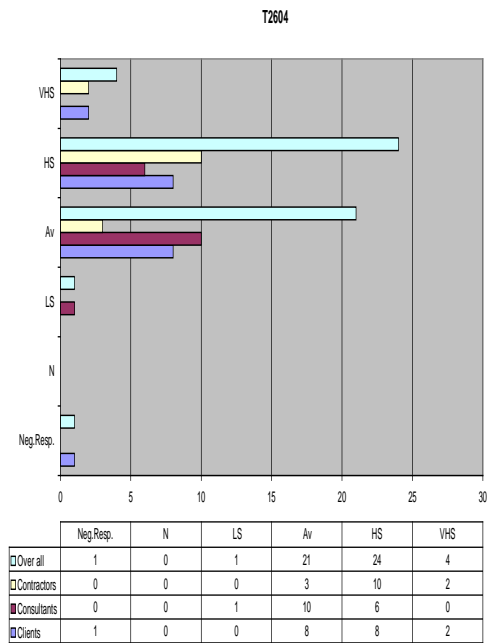


Figure 179 T2604

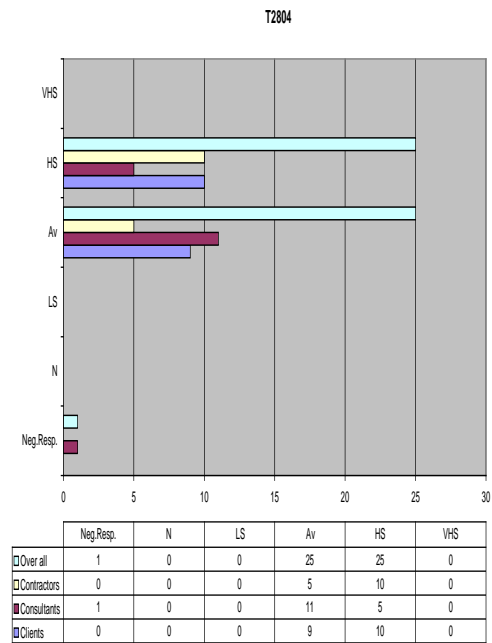


Figure 181 T2804

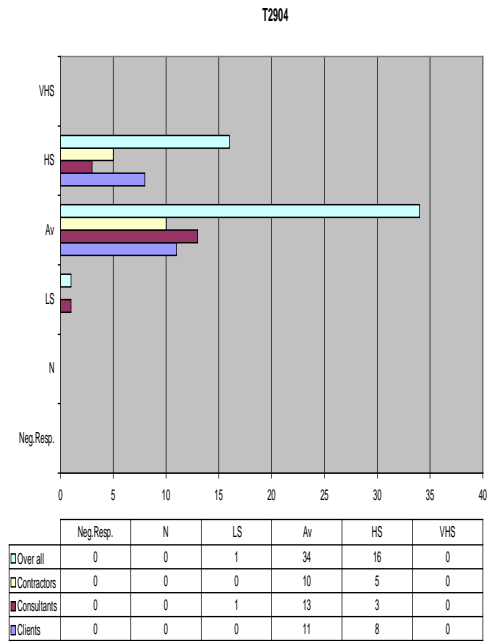


Figure 182 T2904

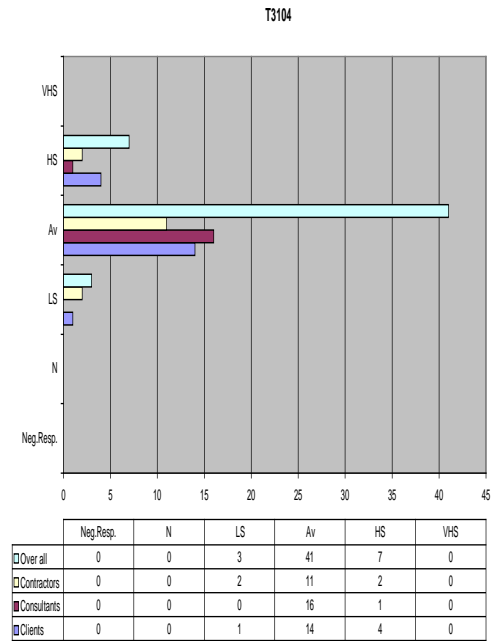


Figure 184 T3104

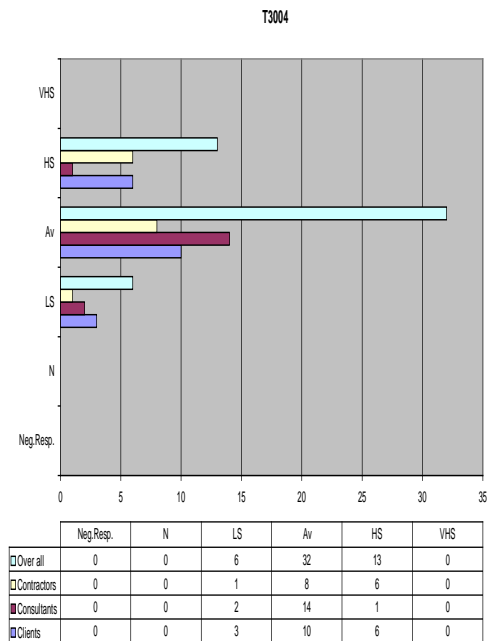


Figure 183 T3004

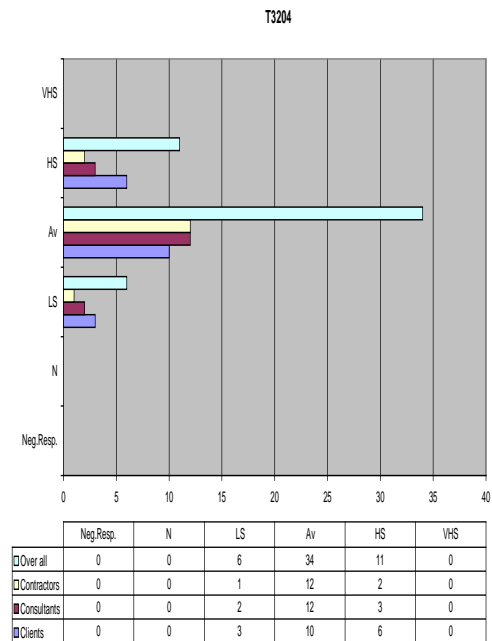


Figure 185 T3204

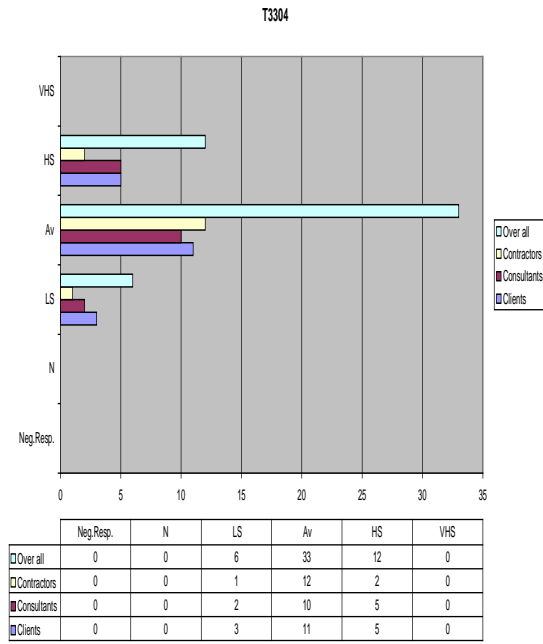


Figure 186 T3304

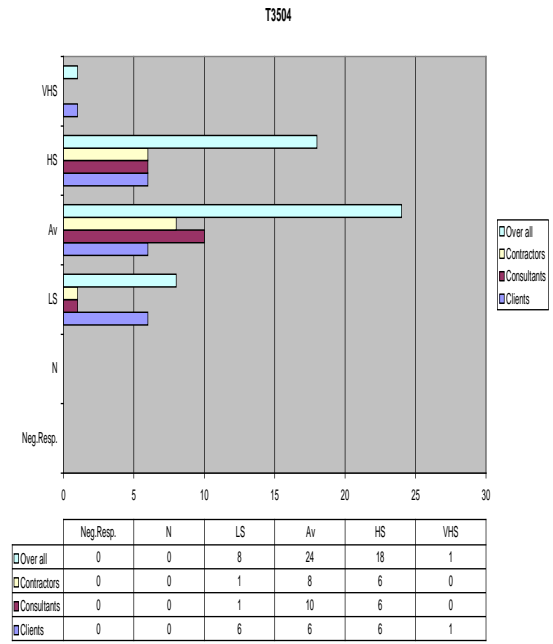


Figure 188 T3504

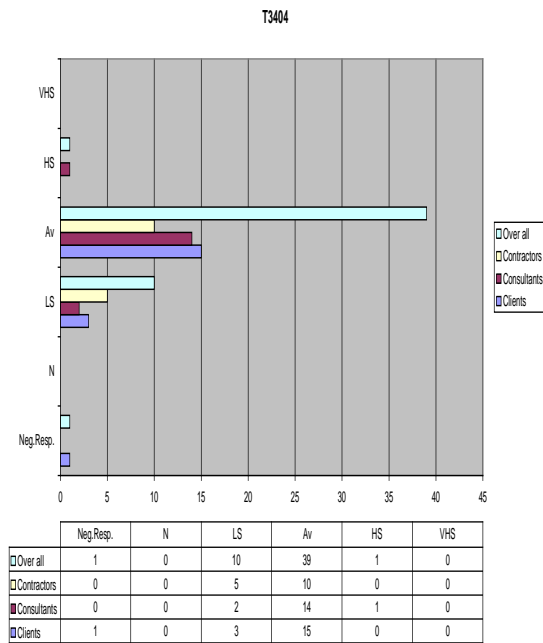


Figure 187 T3404

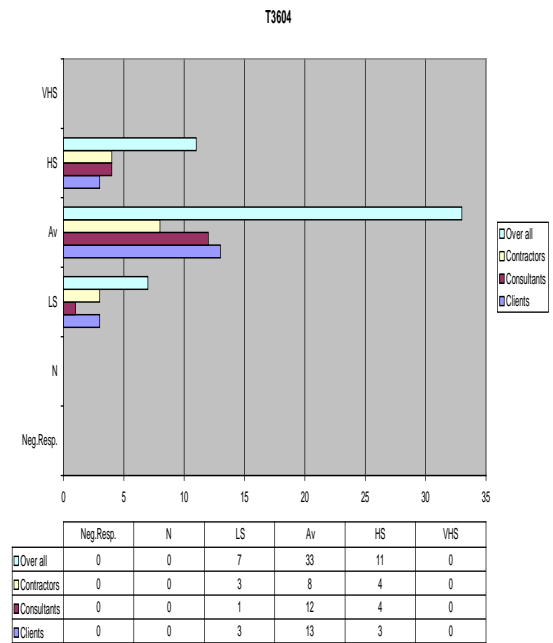


Figure 189 T3604

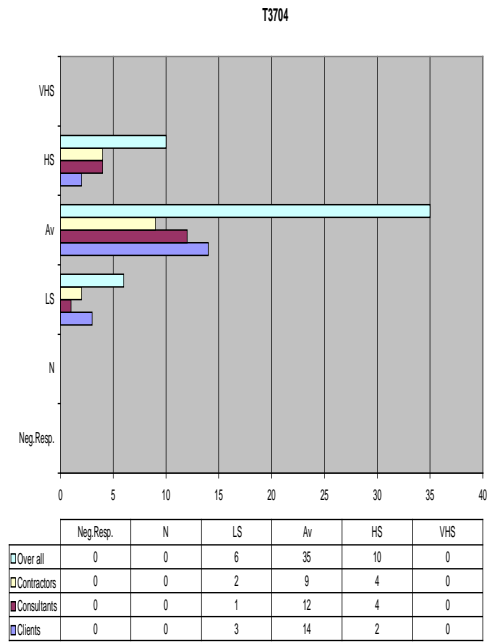


Figure 190 T3704

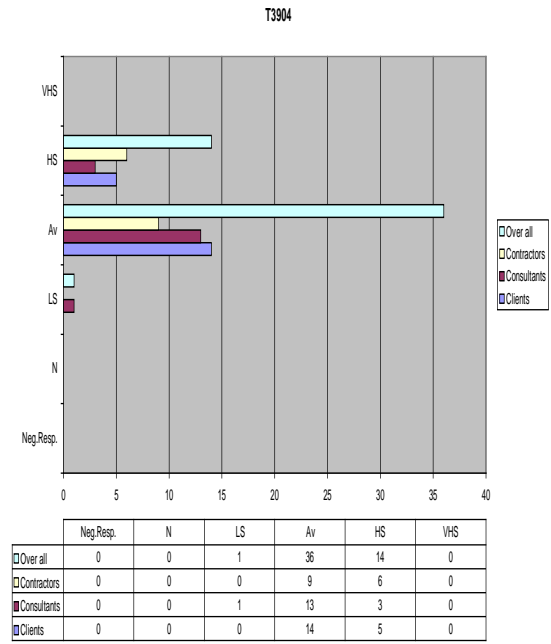


Figure 192 T3904

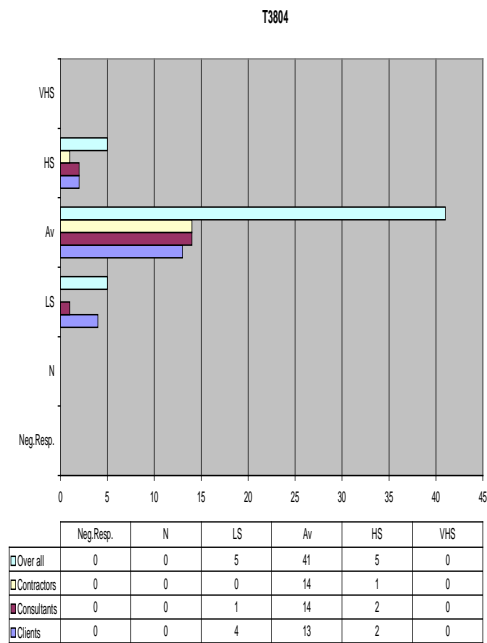


Figure 191 T3804

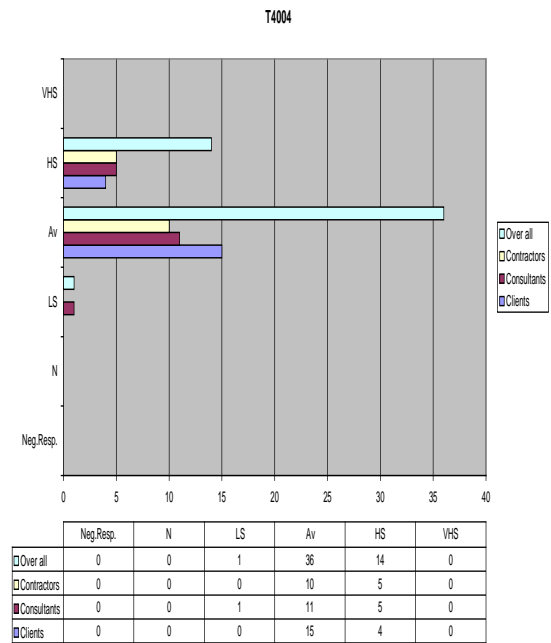


Figure 193 T4004

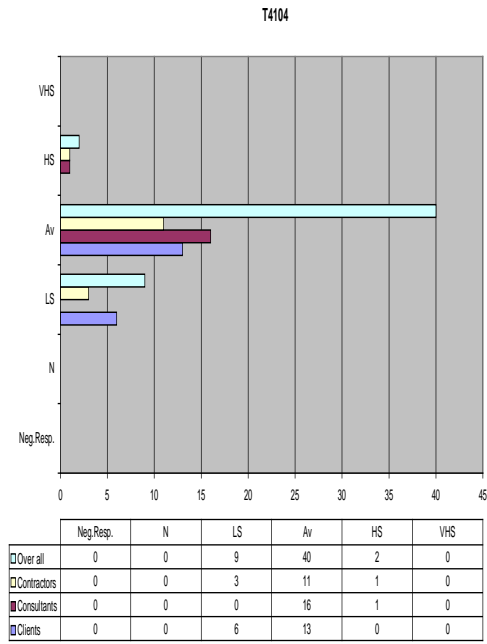


Figure 194 T4104

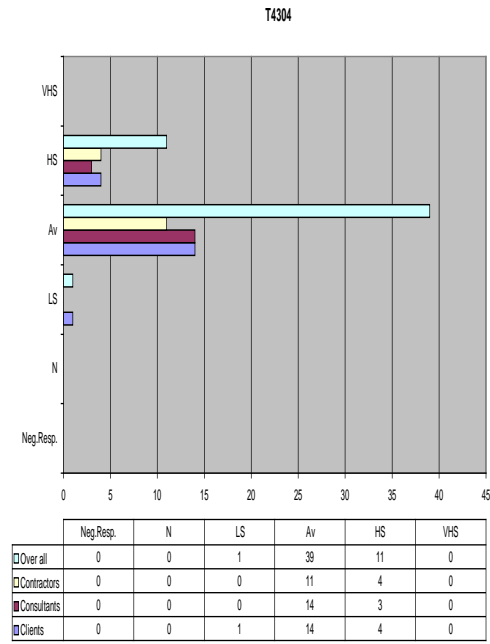


Figure 196 T4304

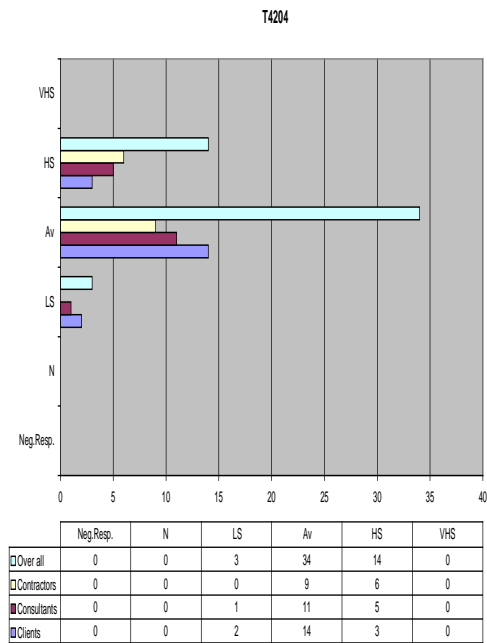


Figure 195 T4204

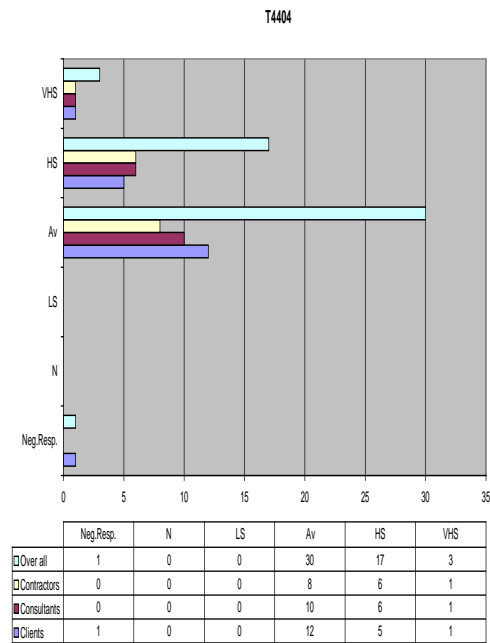


Figure 197 T4404

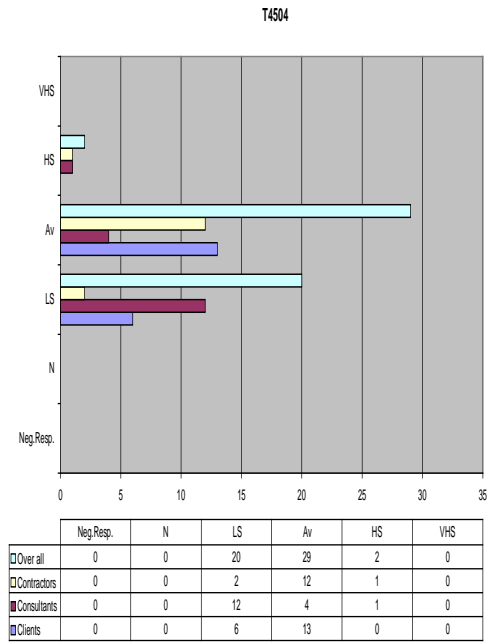


Figure 198 T4504

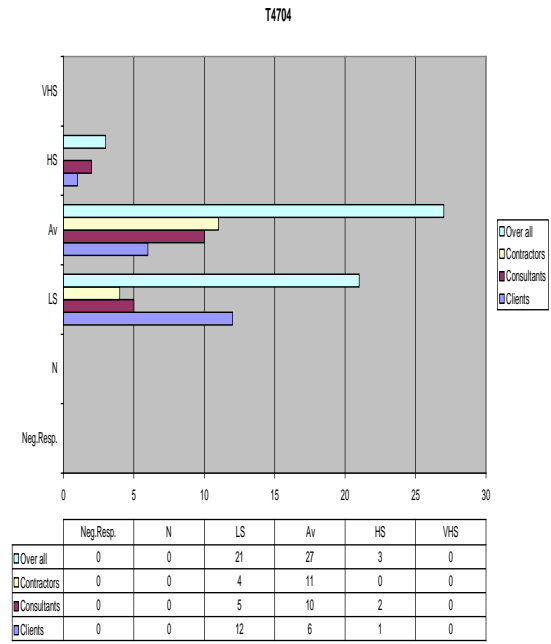


Figure 200 T4704

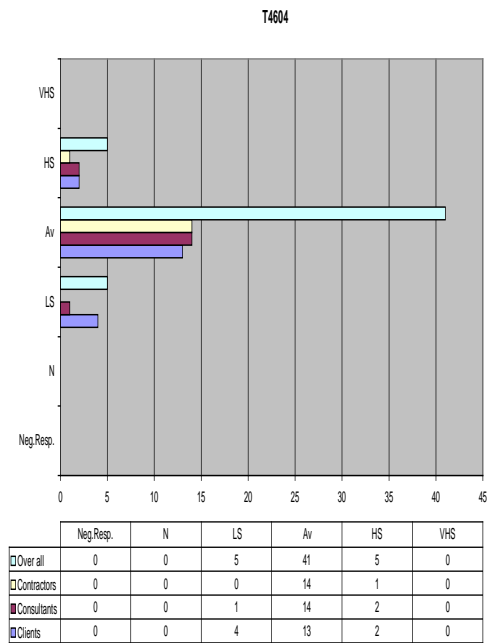


Figure 199 T4604

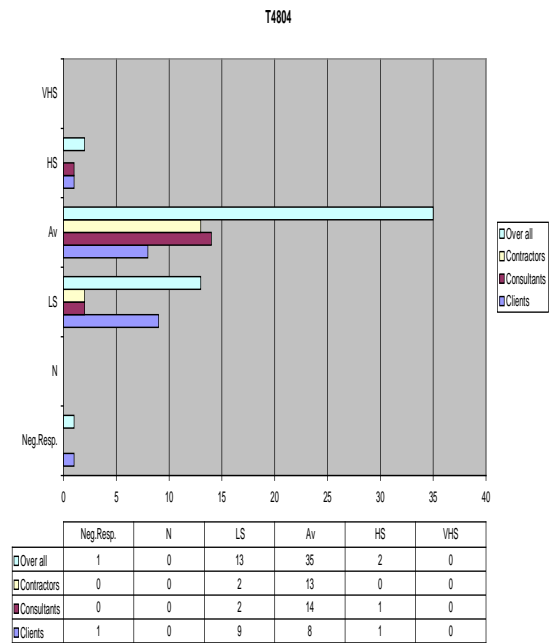


Figure 201 T4804

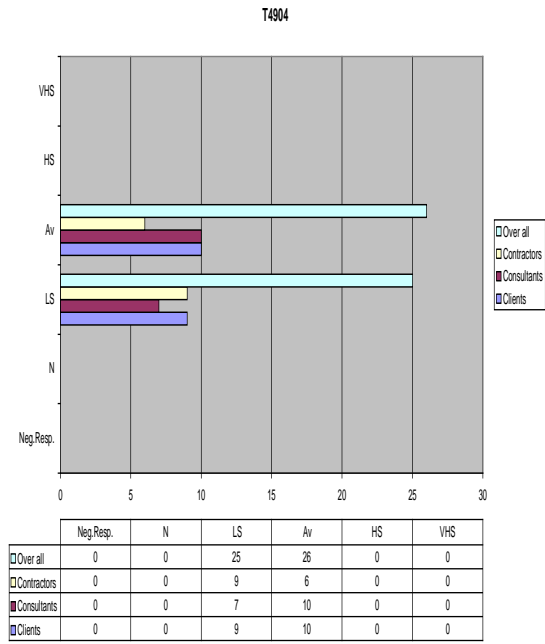


Figure 202 T4904

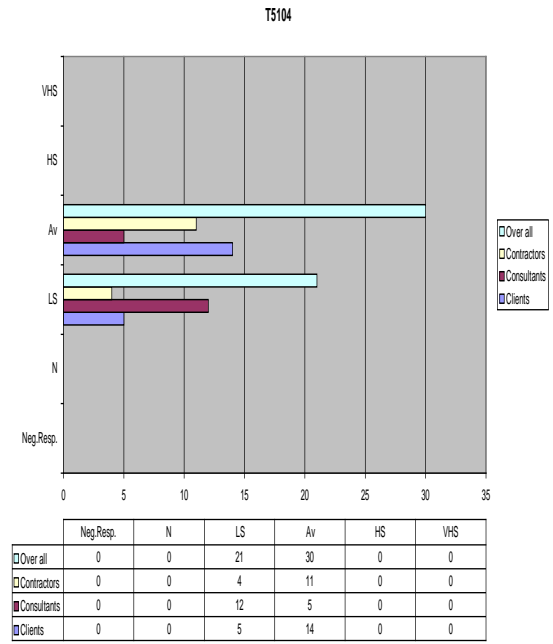


Figure 204 T5104

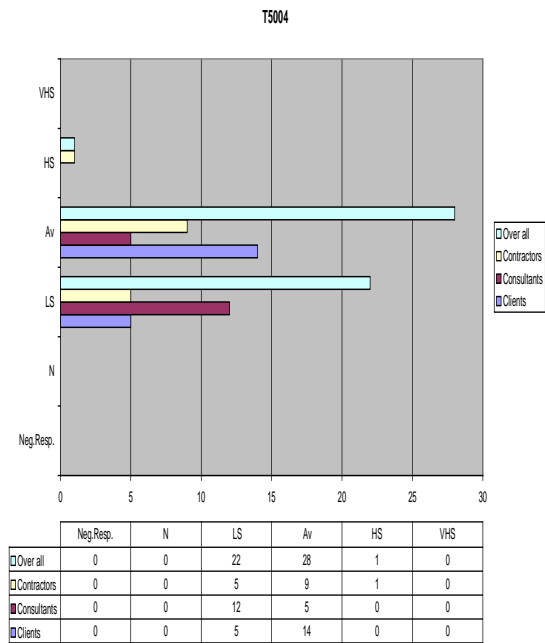


Figure 203 T5004

***Y.1.5 CLAIM MANAGEMENT FOCUS (CMF) RANKED
ACCORDING TO OVER ALL PARTICIPANT ASSESSMENT:***

Y.1.5.1 CLAIM MANAGEMENT FOCUS (CMF) RANKED ACCORDING TO OVER ALL PARTICIPANT TABLES:

CLIENT'S ASSESSMENT:

Table 7-29 Types of Claims & Disputes CFI Assessment (Clients' Perception)

SET Number	Kf	Km	Ka	TOTAL													
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK												
2	0.50	0.15	0.35	1.00	Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),												
3	0.35	0.50	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:												22
4	0.15	0.50	0.35	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority												16
5	0.50	0.35	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority												6
6	0.15	0.35	0.50	1.00	TOTAL NUMBER OF INSIGNIFICANT TYPES:												29
7	0.33	0.33	0.33	1.00													
CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK	
T19	4.12	4.53	3.68	3.96	4.03	4.26	4.17	4.20	4.04	4.11	3.96	4.26	4.11	YES	SIG-1st Priority	1	
T03	3.88	4.21	4.05	4.02	3.99	4.07	4.11	4.02	4.08	4.04	3.99	4.11	4.04	YES	SIG-1st Priority	2	
T01	3.47	3.79	4.53	4.05	3.89	3.79	4.00	3.74	4.11	3.93	3.74	4.11	3.93	YES	SIG-1st Priority	3	
T11	3.79	4.12	3.74	3.81	3.82	3.95	3.94	3.90	3.88	3.88	3.81	3.95	3.88	YES	SIG-1st Priority	4	
T26	3.74	4.21	3.67	3.77	3.78	3.96	3.95	3.89	3.87	3.87	3.77	3.96	3.87	YES	SIG-1st Priority	5	
T12	3.83	4.00	3.74	3.81	3.82	3.90	3.88	3.88	3.84	3.85	3.81	3.90	3.85	YES	SIG-1st Priority	6	
T13	3.67	3.94	3.79	3.77	3.75	3.82	3.85	3.78	3.82	3.80	3.75	3.85	3.80	YES	SIG-1st Priority	7	
T02	3.42	3.74	4.11	3.81	3.71	3.68	3.82	3.63	3.87	3.75	3.63	3.87	3.75	YES	SIG-1st Priority	8	
T09	3.61	3.72	3.74	3.69	3.67	3.69	3.71	3.67	3.71	3.69	3.67	3.71	3.69	YES	SIG-1st Priority	9	
T05	3.17	3.63	4.21	3.76	3.60	3.56	3.76	3.49	3.85	3.67	3.49	3.85	3.67	YES	SIG-1st Priority	10	
T10	3.32	3.74	3.79	3.62	3.54	3.60	3.69	3.53	3.70	3.61	3.53	3.70	3.61	YES	SIG-1st Priority	11	
T27	3.33	3.72	3.74	3.59	3.53	3.59	3.67	3.53	3.67	3.59	3.53	3.67	3.59	YES	SIG-1st Priority	12	
T28	3.44	3.78	3.53	3.54	3.52	3.62	3.64	3.57	3.60	3.58	3.52	3.64	3.58	YES	SIG-1st Priority	13	
T31	3.53	3.79	3.16	3.38	3.44	3.60	3.53	3.56	3.43	3.49	3.38	3.60	3.49	YES	SIG-1st Priority	14	
T35	3.61	3.74	3.11	3.38	3.45	3.60	3.50	3.58	3.40	3.48	3.38	3.60	3.48	YES	SIG-1st Priority	15	
T43	3.28	3.42	3.05	3.19	3.22	3.32	3.27	3.29	3.22	3.25	3.19	3.32	3.25	YES	SIG-1st Priority	16	
T18	2.78	3.50	3.47	3.23	3.13	3.24	3.38	3.13	3.38	3.25	3.13	3.38	3.24	NO	SIG-2nd Priority	17	
T06	2.74	3.05	3.84	3.34	3.17	3.06	3.28	3.01	3.40	3.21	3.01	3.40	3.21	NO	SIG-2nd Priority	18	
T29	2.78	3.32	3.42	3.18	3.08	3.14	3.27	3.06	3.29	3.17	3.06	3.29	3.17	NO	SIG-2nd Priority	19	
T44	2.79	3.41	3.16	3.07	3.01	3.16	3.23	3.06	3.19	3.12	3.01	3.23	3.12	NO	SIG-2nd Priority	20	
T33	2.94	3.16	3.11	3.06	3.03	3.08	3.11	3.04	3.10	3.07	3.03	3.11	3.07	NO	SIG-2nd Priority	21	
T17	2.78	3.06	3.26	3.06	2.99	2.99	3.09	3.05	3.12	3.03	2.95	3.12	3.03	NO	SIG-2nd Priority	22	
T07	2.44	2.59	3.95	3.22	2.99	2.74	3.04	2.72	3.25	2.99	2.72	3.25	2.99	NO	NOT SIG	23	
T21	2.39	3.11	3.44	3.03	2.87	2.91	3.12	2.80	3.17	2.98	2.80	3.17	2.98	NO	NOT SIG	24	
T04	2.22	2.47	4.21	3.25	2.96	2.65	3.04	2.61	3.30	2.97	2.61	3.30	2.97	NO	NOT SIG	25	
T30	2.53	3.11	3.16	2.93	2.83	2.91	3.04	2.82	3.04	2.93	2.82	3.04	2.93	NO	NOT SIG	26	
T36	2.56	3.22	3.00	2.88	2.81	2.96	3.04	2.86	3.01	2.92	2.81	3.04	2.92	NO	NOT SIG	27	
T14	2.56	3.00	3.11	2.90	2.81	2.86	2.97	2.79	2.99	2.88	2.79	2.99	2.88	NO	NOT SIG	28	
T15	2.58	2.95	3.11	2.90	2.82	2.84	2.95	2.79	2.97	2.87	2.79	2.97	2.87	NO	NOT SIG	29	
T08	2.58	2.61	3.32	2.95	2.84	2.71	2.85	2.70	2.96	2.83	2.70	2.96	2.84	NO	NOT SIG	30	
T25	2.47	2.89	3.11	2.85	2.76	2.78	2.90	2.71	2.93	2.82	2.71	2.93	2.82	NO	NOT SIG	31	
T42	2.63	3.05	2.68	2.72	2.71	2.85	2.86	2.79	2.81	2.79	2.71	2.86	2.79	NO	NOT SIG	32	
T20	2.47	2.74	3.16	2.86	2.75	2.71	2.84	2.67	2.91	2.79	2.67	2.91	2.79	NO	NOT SIG	33	
T22	2.26	2.72	3.11	2.75	2.63	2.62	2.79	2.55	2.84	2.69	2.55	2.84	2.69	NO	NOT SIG	34	
T16	2.21	2.68	3.16	2.76	2.61	2.59	2.78	2.52	2.85	2.68	2.52	2.85	2.68	NO	NOT SIG	35	
T49	2.39	3.11	2.53	2.57	2.54	2.77	2.80	2.66	2.71	2.67	2.54	2.80	2.67	NO	NOT SIG	36	
T39	2.50	2.61	2.89	2.71	2.65	2.61	2.69	2.60	2.74	2.67	2.60	2.74	2.67	NO	NOT SIG	37	
T40	2.28	2.39	3.26	2.79	2.64	2.48	2.68	2.46	2.81	2.64	2.46	2.81	2.64	NO	NOT SIG	38	
T34	2.50	2.53	2.83	2.67	2.62	2.56	2.63	2.56	2.68	2.62	2.56	2.68	2.62	NO	NOT SIG	39	
T37	2.44	2.42	2.95	2.69	2.62	2.51	2.61	2.51	2.69	2.60	2.51	2.69	2.61	NO	NOT SIG	40	
T41	2.28	2.26	3.21	2.74	2.60	2.41	2.60	2.41	2.74	2.58	2.41	2.74	2.60	NO	NOT SIG	41	
T45	1.94	2.22	2.68	2.36	2.25	2.19	2.34	2.15	2.41	2.28	2.15	2.41	2.28	NO	NOT SIG	42	
T32	1.71	1.79	3.16	2.44	2.23	1.97	2.26	1.95	2.46	2.22	1.95	2.46	2.23	NO	NOT SIG	43	
T24	1.68	1.78	3.16	2.44	2.21	1.95	2.25	1.94	2.45	2.20	1.94	2.45	2.21	NO	NOT SIG	44	
T38	1.74	1.95	2.95	2.37	2.19	2.02	2.27	1.99	2.42	2.21	1.99	2.42	2.21	NO	NOT SIG	45	
T23	1.68	1.89	2.95	2.35	2.16	1.98	2.23	1.95	2.39	2.17	1.95	2.39	2.17	NO	NOT SIG	46	
T50	1.67	2.00	2.74	2.25	2.09	1.99	2.21	1.94	2.32	2.13	1.94	2.32	2.13	NO	NOT SIG	47	
T51	1.71	1.89	2.74	2.25	2.10	1.95	2.16	1.93	2.29	2.11	1.93	2.29	2.11	NO	NOT SIG	48	
T46	1.35	1.84	2.89	2.20	1.97	1.83	2.14	1.76	2.30	2.03	1.76	2.30	2.03	NO	NOT SIG	49	
T48	1.53	1.67	2.56	2.06	1.91	1.75	1.96	1.73	2.09	1.91	1.73	2.09	1.91	NO	NOT SIG	50	
T47	1.39	1.53	2.42	1.93	1.77	1.61	1.82	1.59	1.95	1.78	1.59	1.95	1.78	NO	NOT SIG	51	

CONSULTANT'S ASSESSMENT:

Table 7-30 Types of Claims & Disputes CFI Assessment (Consultants' Perception)

SET Number	Kf	Km	Ka	TOTAL															
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK (
2	0.50	0.15	0.35	1.00	Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),														
3	0.35	0.50	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:													24	
4	0.15	0.50	0.35	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority													19	
5	0.50	0.35	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority													5	
6	0.15	0.35	0.50	1.00	TOTAL NUMBER OF INSIGNIFICANT TYPES:													27	
7	0.33	0.33	0.33	1.00															

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	3.94	4.29	3.65	3.85	3.89	4.07	4.01	4.02	3.92	3.96	3.85	4.07	3.96	YES	SIG-1st Priority	1
T03	3.56	3.88	4.00	3.83	3.76	3.79	3.88	3.74	3.89	3.81	3.74	3.89	3.81	YES	SIG-1st Priority	2
T26	3.65	4.31	3.29	3.57	3.62	3.93	3.86	3.83	3.70	3.75	3.57	3.93	3.75	YES	SIG-1st Priority	3
T28	3.87	4.06	3.31	3.62	3.70	3.88	3.77	3.85	3.66	3.74	3.62	3.88	3.74	YES	SIG-1st Priority	4
T12	3.31	4.00	3.82	3.67	3.59	3.73	3.84	3.63	3.81	3.71	3.59	3.84	3.71	YES	SIG-1st Priority	5
T13	3.31	3.87	3.65	3.56	3.51	3.64	3.71	3.56	3.67	3.61	3.51	3.71	3.61	YES	SIG-1st Priority	6
T01	3.06	3.41	4.35	3.76	3.56	3.43	3.69	3.38	3.83	3.60	3.38	3.83	3.60	YES	SIG-1st Priority	7
T35	3.36	3.81	3.29	3.39	3.40	3.58	3.56	3.51	3.49	3.48	3.39	3.58	3.49	YES	SIG-1st Priority	8
T10	3.31	3.71	3.41	3.42	3.41	3.52	3.54	3.47	3.50	3.47	3.41	3.54	3.47	YES	SIG-1st Priority	9
T09	3.12	3.56	3.71	3.48	3.39	3.43	3.55	3.36	3.57	3.46	3.36	3.57	3.46	YES	SIG-1st Priority	10
T05	3.06	3.29	3.88	3.51	3.38	3.30	3.47	3.27	3.55	3.41	3.27	3.55	3.41	YES	SIG-1st Priority	11
T02	3.31	3.29	3.50	3.40	3.38	3.33	3.37	3.33	3.40	3.37	3.33	3.40	3.37	YES	SIG-1st Priority	12
T11	3.12	3.47	3.47	3.35	3.29	3.35	3.42	3.29	3.42	3.35	3.29	3.42	3.35	YES	SIG-1st Priority	13
T43	3.31	3.47	3.24	3.30	3.31	3.38	3.36	3.36	3.33	3.34	3.30	3.38	3.34	YES	SIG-1st Priority	14
T31	3.31	3.63	3.06	3.23	3.27	3.43	3.38	3.38	3.30	3.33	3.23	3.43	3.33	YES	SIG-1st Priority	15
T27	3.06	3.50	3.29	3.24	3.21	3.32	3.36	3.25	3.33	3.28	3.21	3.36	3.28	YES	SIG-1st Priority	16
T44	3.06	3.25	3.18	3.15	3.13	3.17	3.20	3.14	3.18	3.16	3.13	3.20	3.16	YES	SIG-1st Priority	17
T25	3.06	3.06	3.29	3.18	3.14	3.10	3.14	3.10	3.18	3.14	3.10	3.18	3.14	YES	SIG-1st Priority	18
T42	3.18	3.19	3.06	3.12	3.14	3.16	3.14	3.16	3.12	3.14	3.12	3.16	3.14	YES	SIG-1st Priority	19
T06	2.94	3.12	4.00	3.50	3.34	3.19	3.40	3.16	3.53	3.35	3.16	3.53	3.35	NO	SIG-2nd Priority	20
T18	2.94	3.38	3.29	3.18	3.13	3.21	3.28	3.15	3.27	3.20	3.13	3.28	3.20	NO	SIG-2nd Priority	21
T33	2.88	3.24	3.18	3.08	3.03	3.10	3.16	3.05	3.15	3.09	3.03	3.16	3.09	NO	SIG-2nd Priority	22
T29	2.82	3.31	3.12	3.04	3.00	3.11	3.17	3.04	3.14	3.08	3.00	3.17	3.08	NO	SIG-2nd Priority	23
T17	2.63	3.20	3.24	3.02	2.92	3.00	3.13	2.92	3.13	3.02	2.92	3.13	3.02	NO	SIG-2nd Priority	24
T34	3.06	2.94	2.94	2.98	3.00	2.98	2.96	3.00	2.96	2.98	2.96	3.00	2.98	NO	NOT SIG	25
T04	2.29	2.29	4.24	3.26	2.97	2.59	2.97	2.59	3.26	2.94	2.59	3.26	2.97	NO	NOT SIG	26
T14	2.65	3.19	3.06	2.93	2.87	2.98	3.06	2.90	3.04	2.96	2.87	3.06	2.96	NO	NOT SIG	27
T36	2.56	3.13	3.18	2.95	2.86	2.94	3.06	2.85	3.07	2.95	2.85	3.07	2.95	NO	NOT SIG	28
T39	2.69	3.06	3.06	2.93	2.87	2.93	3.00	2.87	3.00	2.93	2.87	3.00	2.93	NO	NOT SIG	29
T21	2.40	2.93	3.29	2.93	2.79	2.80	2.98	2.72	3.03	2.87	2.72	3.03	2.87	NO	NOT SIG	30
T41	2.81	2.53	3.24	2.98	2.92	2.74	2.82	2.78	2.93	2.86	2.74	2.98	2.86	NO	NOT SIG	31
T07	2.13	2.56	3.88	3.07	2.81	2.61	2.96	2.54	3.16	2.85	2.54	3.16	2.85	NO	NOT SIG	32
T20	2.53	2.94	3.06	2.86	2.78	2.81	2.92	2.75	2.94	2.84	2.75	2.94	2.84	NO	NOT SIG	33
T15	2.40	2.94	3.18	2.87	2.75	2.79	2.94	2.71	2.98	2.84	2.71	2.98	2.84	NO	NOT SIG	34
T40	2.59	2.75	3.12	2.88	2.80	2.75	2.85	2.72	2.91	2.82	2.72	2.91	2.82	NO	NOT SIG	35
T37	2.44	2.44	3.18	2.81	2.70	2.55	2.70	2.55	2.81	2.68	2.55	2.81	2.70	NO	NOT SIG	36
T30	2.35	2.75	2.94	2.71	2.62	2.64	2.76	2.58	2.79	2.68	2.58	2.79	2.68	NO	NOT SIG	37
T08	2.19	2.40	3.25	2.75	2.59	2.45	2.67	2.42	2.79	2.61	2.42	2.79	2.61	NO	NOT SIG	38
T22	2.24	2.25	3.12	2.68	2.55	2.38	2.55	2.37	2.68	2.53	2.37	2.68	2.55	NO	NOT SIG	39
T49	2.31	2.71	2.59	2.51	2.47	2.55	2.61	2.49	2.59	2.53	2.47	2.61	2.53	NO	NOT SIG	40
T16	1.81	2.29	3.24	2.60	2.38	2.27	2.55	2.19	2.69	2.44	2.19	2.69	2.44	NO	NOT SIG	41
T38	1.76	2.18	3.18	2.53	2.32	2.18	2.46	2.12	2.61	2.37	2.12	2.61	2.37	NO	NOT SIG	42
T45	2.13	2.47	2.35	2.29	2.26	2.33	2.38	2.28	2.36	2.31	2.26	2.38	2.31	NO	NOT SIG	43
T23	1.76	2.18	2.94	2.41	2.24	2.15	2.38	2.09	2.50	2.29	2.09	2.50	2.29	NO	NOT SIG	44
T46	1.56	1.67	3.06	2.33	2.10	1.84	2.14	1.82	2.35	2.09	1.82	2.35	2.10	NO	NOT SIG	45
T24	1.59	1.65	2.94	2.27	2.07	1.82	2.09	1.81	2.29	2.06	1.81	2.29	2.07	NO	NOT SIG	46
T48	1.53	1.69	2.94	2.26	2.05	1.82	2.10	1.80	2.29	2.05	1.80	2.29	2.05	NO	NOT SIG	47
T50	1.75	2.06	2.29	2.07	1.99	1.99	2.09	1.94	2.13	2.03	1.94	2.13	2.03	NO	NOT SIG	48
T47	1.56	1.53	2.82	2.19	2.00	1.74	1.99	1.74	2.18	1.97	1.74	2.19	1.99	NO	NOT SIG	49
T51	1.71	1.94	2.29	2.04	1.95	1.91	2.03	1.88	2.08	1.98	1.88	2.08	1.98	NO	NOT SIG	50
T32	1.31	1.47	3.06	2.21	1.95	1.65	2.00	1.63	2.24	1.95	1.63	2.24	1.95	NO	NOT SIG	51

CONTRACTOR’S ASSESSMENT:

Table 7-31 Types of Claims & Disputes CFI Assessment (Contractors’ Perception)

SET Number	Kf	Km	Ka	TOTAL	
1	0.35	0.15	0.50	1.00	Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK
2	0.50	0.15	0.35	1.00	Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),
3	0.35	0.50	0.15	1.00	
4	0.15	0.50	0.35	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES: 27
5	0.50	0.35	0.15	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority 17
6	0.15	0.35	0.50	1.00	TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority 10
7	0.33	0.33	0.33	1.00	TOTAL NUMBER OF INSIGNIFICANT TYPES: 24

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	4.20	4.67	4.13	4.24	4.25	4.42	4.41	4.35	4.33	4.33	4.24	4.42	4.33	YES	SIG-1st Priority	1
T26	4.13	4.54	3.93	4.09	4.12	4.31	4.27	4.25	4.18	4.20	4.09	4.31	4.20	YES	SIG-1st Priority	2
T03	4.07	4.53	4.00	4.11	4.12	4.29	4.28	4.22	4.20	4.20	4.11	4.29	4.20	YES	SIG-1st Priority	3
T01	3.67	4.00	4.60	4.18	4.04	3.97	4.16	3.92	4.25	4.08	3.92	4.25	4.08	YES	SIG-1st Priority	4
T11	4.00	4.21	3.80	3.93	3.96	4.08	4.04	4.05	3.98	4.00	3.93	4.08	4.00	YES	SIG-1st Priority	5
T05	3.50	3.93	4.53	4.08	3.93	3.87	4.08	3.81	4.17	3.98	3.81	4.17	3.98	YES	SIG-1st Priority	6
T09	4.00	4.08	3.87	3.94	3.96	4.02	3.99	4.01	3.96	3.98	3.94	4.02	3.98	YES	SIG-1st Priority	7
T13	3.79	4.07	3.67	3.77	3.79	3.91	3.89	3.87	3.83	3.84	3.77	3.91	3.84	YES	SIG-1st Priority	8
T10	3.53	3.87	4.00	3.82	3.75	3.77	3.86	3.72	3.88	3.80	3.72	3.88	3.80	YES	SIG-1st Priority	9
T02	3.29	3.73	4.20	3.81	3.67	3.65	3.83	3.58	3.90	3.74	3.58	3.90	3.74	YES	SIG-1st Priority	10
T12	3.73	4.00	3.47	3.64	3.68	3.83	3.77	3.79	3.69	3.73	3.64	3.83	3.73	YES	SIG-1st Priority	11
T28	3.60	3.79	3.67	3.66	3.65	3.70	3.72	3.68	3.70	3.68	3.65	3.72	3.68	YES	SIG-1st Priority	12
T27	3.36	3.64	3.73	3.59	3.53	3.56	3.63	3.51	3.65	3.57	3.51	3.65	3.57	YES	SIG-1st Priority	13
T35	3.54	3.67	3.33	3.46	3.49	3.57	3.53	3.55	3.48	3.51	3.46	3.57	3.51	YES	SIG-1st Priority	14
T43	3.57	3.47	3.40	3.47	3.50	3.49	3.46	3.51	3.45	3.48	3.45	3.51	3.48	YES	SIG-1st Priority	15
T31	3.64	3.71	3.00	3.33	3.43	3.58	3.45	3.57	3.35	3.45	3.33	3.58	3.45	YES	SIG-1st Priority	16
T29	3.00	3.29	3.33	3.21	3.16	3.19	3.26	3.15	3.27	3.20	3.15	3.27	3.20	YES	SIG-1st Priority	17
T18	2.92	3.57	3.27	3.19	3.14	3.30	3.37	3.20	3.32	3.25	3.14	3.37	3.25	NO	SIG-2nd Priority	18
T17	2.86	3.43	3.33	3.18	3.11	3.21	3.31	3.13	3.30	3.20	3.11	3.31	3.20	NO	SIG-2nd Priority	19
T06	2.86	2.87	3.80	3.33	3.19	3.00	3.19	3.00	3.33	3.17	3.00	3.33	3.19	NO	SIG-2nd Priority	20
T33	2.93	3.20	3.07	3.04	3.02	3.09	3.11	3.04	3.09	3.06	3.02	3.11	3.06	NO	SIG-2nd Priority	21
T15	2.71	3.07	3.40	3.11	3.01	2.99	3.13	2.94	3.18	3.06	2.94	3.18	3.06	NO	SIG-2nd Priority	22
T21	2.73	3.08	3.27	3.05	2.97	2.99	3.10	2.94	3.12	3.02	2.94	3.12	3.02	NO	SIG-2nd Priority	23
T42	2.87	3.31	2.87	2.93	2.93	3.09	3.09	3.02	3.02	3.01	2.93	3.09	3.02	NO	SIG-2nd Priority	24
T44	2.73	3.07	3.27	3.05	2.97	2.98	3.09	2.93	3.12	3.02	2.93	3.12	3.02	NO	SIG-2nd Priority	25
T25	2.67	3.00	3.40	3.08	2.97	2.94	3.09	2.89	3.15	3.02	2.89	3.15	3.02	NO	SIG-2nd Priority	26
T36	2.67	3.29	3.07	2.96	2.90	3.04	3.12	2.94	3.08	3.00	2.90	3.12	3.00	NO	SIG-2nd Priority	27
T30	2.60	3.07	3.33	3.04	2.93	2.95	3.09	2.88	3.13	3.00	2.88	3.13	3.00	NO	NOT SIG	28
T08	2.69	2.71	3.53	3.12	2.99	2.83	3.00	2.83	3.12	2.98	2.83	3.12	2.99	NO	NOT SIG	29
T07	2.40	2.33	4.14	3.26	3.00	2.63	2.98	2.64	3.25	2.96	2.63	3.26	2.98	NO	NOT SIG	30
T14	2.60	2.92	3.27	2.98	2.88	2.86	2.99	2.81	3.05	2.93	2.81	3.05	2.93	NO	NOT SIG	31
T04	1.87	2.40	4.47	3.25	2.86	2.52	3.04	2.44	3.35	2.91	2.44	3.35	2.91	NO	NOT SIG	32
T49	2.93	3.14	2.40	2.70	2.78	2.96	2.85	2.92	2.74	2.82	2.70	2.96	2.82	NO	NOT SIG	33
T16	2.43	2.73	3.20	2.86	2.74	2.70	2.85	2.65	2.92	2.78	2.65	2.92	2.78	NO	NOT SIG	34
T40	2.36	2.53	3.40	2.91	2.75	2.60	2.81	2.58	2.94	2.76	2.58	2.94	2.76	NO	NOT SIG	35
T34	2.77	2.67	2.67	2.70	2.72	2.70	2.68	2.72	2.68	2.70	2.68	2.72	2.70	NO	NOT SIG	36
T20	2.07	2.60	3.33	2.78	2.59	2.52	2.78	2.44	2.89	2.66	2.44	2.89	2.66	NO	NOT SIG	37
T39	2.21	2.67	3.07	2.71	2.58	2.57	2.74	2.50	2.80	2.65	2.50	2.80	2.65	NO	NOT SIG	38
T41	2.40	2.21	3.33	2.84	2.70	2.45	2.63	2.48	2.80	2.65	2.45	2.84	2.65	NO	NOT SIG	38
T22	2.27	2.64	2.93	2.66	2.56	2.55	2.69	2.50	2.73	2.61	2.50	2.73	2.61	NO	NOT SIG	40
T37	2.00	2.43	3.20	2.66	2.48	2.39	2.63	2.33	2.75	2.54	2.33	2.75	2.54	NO	NOT SIG	41
T38	1.93	2.31	3.13	2.59	2.41	2.30	2.54	2.24	2.66	2.46	2.24	2.66	2.46	NO	NOT SIG	42
T32	2.21	2.08	3.07	2.62	2.49	2.27	2.44	2.29	2.59	2.45	2.27	2.62	2.45	NO	NOT SIG	43
T24	1.87	1.86	3.13	2.50	2.31	2.05	2.31	2.05	2.50	2.28	2.05	2.50	2.31	NO	NOT SIG	44
T45	1.79	1.93	2.93	2.38	2.21	2.03	2.26	2.01	2.41	2.21	2.01	2.41	2.21	NO	NOT SIG	45
T46	1.64	1.80	3.07	2.38	2.16	1.94	2.22	1.91	2.41	2.17	1.91	2.41	2.17	NO	NOT SIG	46
T23	1.53	1.87	3.07	2.35	2.12	1.93	2.24	1.88	2.42	2.15	1.88	2.42	2.15	NO	NOT SIG	47
T50	1.64	2.07	2.73	2.25	2.09	2.02	2.24	1.95	2.34	2.15	1.95	2.34	2.15	NO	NOT SIG	48
T48	1.62	1.71	2.87	2.26	2.07	1.85	2.10	1.84	2.28	2.06	1.84	2.28	2.07	NO	NOT SIG	49
T47	1.47	1.62	2.73	2.12	1.93	1.73	1.98	1.71	2.15	1.94	1.71	2.15	1.94	NO	NOT SIG	50
T51	1.43	1.64	2.73	2.11	1.92	1.73	1.99	1.70	2.16	1.93	1.70	2.16	1.93	NO	NOT SIG	51

OVERALL ASSESSMENT:

Table 7-32 Types of Claims & Disputes CFI Assessment (Overall Perception)

SET Number	Kf	Km	Ka	TOTAL
1	0.35	0.15	0.50	1.00
2	0.50	0.15	0.35	1.00
3	0.35	0.50	0.15	1.00
4	0.15	0.50	0.35	1.00
5	0.50	0.35	0.15	1.00
6	0.15	0.35	0.50	1.00
7	0.33	0.33	0.33	1.00

Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK
Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3),

TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES: 22
 TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority 16
 TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority 6
 TOTAL NUMBER OF INSIGNIFICANT TYPES: 29

CODE	F	M	A	SET 1	SET 2	SET 3	SET 4	SET 5	SET 6	SET 7	Min.	Max.	MEDIAN	Q1	RESULT	RANK
T19	4.08	4.49	3.80	4.00	4.05	4.24	4.19	4.18	4.09	4.12	4.00	4.24	4.12	YES	SIG-1st Priority	1
T03	3.83	4.20	4.02	3.98	3.95	4.04	4.08	3.99	4.05	4.01	3.95	4.08	4.01	YES	SIG-1st Priority	2
T26	3.82	4.33	3.62	3.80	3.83	4.05	4.01	3.97	3.90	3.92	3.80	4.05	3.92	YES	SIG-1st Priority	3
T01	3.39	3.73	4.49	3.99	3.83	3.72	3.94	3.67	4.06	3.87	3.67	4.06	3.87	YES	SIG-1st Priority	4
T12	3.63	4.00	3.69	3.71	3.71	3.82	3.84	3.77	3.79	3.77	3.71	3.84	3.77	YES	SIG-1st Priority	5
T13	3.58	3.96	3.71	3.70	3.68	3.79	3.81	3.73	3.78	3.74	3.68	3.81	3.74	YES	SIG-1st Priority	6
T11	3.63	3.93	3.67	3.69	3.69	3.79	3.79	3.74	3.75	3.74	3.69	3.79	3.74	YES	SIG-1st Priority	7
T09	3.55	3.77	3.76	3.69	3.66	3.69	3.73	3.66	3.73	3.69	3.66	3.73	3.69	YES	SIG-1st Priority	8
T05	3.23	3.61	4.20	3.77	3.62	3.56	3.76	3.51	3.85	3.67	3.51	3.85	3.67	YES	SIG-1st Priority	9
T28	3.63	3.88	3.50	3.60	3.62	3.73	3.71	3.69	3.65	3.66	3.60	3.73	3.66	YES	SIG-1st Priority	10
T02	3.35	3.59	3.94	3.68	3.59	3.56	3.68	3.52	3.73	3.62	3.52	3.73	3.62	YES	SIG-1st Priority	11
T10	3.38	3.76	3.73	3.61	3.56	3.62	3.69	3.57	3.69	3.62	3.56	3.69	3.62	YES	SIG-1st Priority	12
T35	3.51	3.74	3.24	3.41	3.45	3.48	3.53	3.55	3.45	3.49	3.41	3.58	3.49	YES	SIG-1st Priority	13
T27	3.25	3.63	3.59	3.48	3.42	3.49	3.56	3.43	3.55	3.48	3.42	3.56	3.48	YES	SIG-1st Priority	14
T31	3.49	3.71	3.08	3.32	3.38	3.54	3.46	3.51	3.36	3.42	3.32	3.54	3.42	YES	SIG-1st Priority	15
T43	3.38	3.45	3.22	3.31	3.33	3.39	3.36	3.38	3.32	3.34	3.31	3.39	3.34	YES	SIG-1st Priority	16
T06	2.84	3.02	3.88	3.39	3.23	3.09	3.29	3.06	3.42	3.24	3.06	3.42	3.24	NO	SIG-2nd Priority	17
T18	2.88	3.48	3.35	3.20	3.13	3.25	3.34	3.16	3.33	3.23	3.13	3.34	3.23	NO	SIG-2nd Priority	18
T29	2.85	3.31	3.29	3.14	3.08	3.15	3.23	3.08	3.23	3.15	3.08	3.23	3.15	NO	SIG-2nd Priority	19
T44	2.86	3.26	3.20	3.09	3.04	3.11	3.18	3.05	3.17	3.10	3.04	3.18	3.10	NO	SIG-2nd Priority	20
T17	2.75	3.21	3.27	3.08	3.00	3.06	3.16	2.99	3.17	3.08	2.99	3.17	3.08	NO	SIG-2nd Priority	21
T33	2.92	3.20	3.12	3.06	3.03	3.09	3.13	3.04	3.11	3.07	3.03	3.13	3.07	NO	SIG-2nd Priority	22
T25	2.73	2.98	3.25	3.03	2.95	2.93	3.04	2.89	3.08	2.98	2.89	3.08	2.98	NO	NOT SIG	23
T42	2.88	3.17	2.86	2.92	2.92	3.02	3.02	2.98	2.97	2.97	2.92	3.02	2.97	NO	NOT SIG	24
T21	2.50	3.04	3.34	3.00	2.88	2.90	3.07	2.82	3.11	2.96	2.82	3.11	2.96	NO	NOT SIG	25
T36	2.59	3.21	3.08	2.93	2.85	2.97	3.07	2.88	3.05	2.96	2.85	3.07	2.96	NO	NOT SIG	26
T04	2.14	2.39	4.29	3.25	2.93	2.59	3.02	2.55	3.31	2.94	2.55	3.31	2.94	NO	NOT SIG	27
T07	2.33	2.50	3.98	3.18	2.93	2.66	2.99	2.64	3.21	2.93	2.64	3.21	2.93	NO	NOT SIG	28
T14	2.60	3.04	3.14	2.94	2.85	2.90	3.01	2.84	3.02	2.92	2.84	3.02	2.92	NO	NOT SIG	29
T15	2.56	2.98	3.22	2.95	2.85	2.87	3.00	2.81	3.04	2.92	2.81	3.04	2.92	NO	NOT SIG	30
T30	2.49	2.98	3.14	2.89	2.79	2.83	2.96	2.76	2.99	2.87	2.76	2.99	2.87	NO	NOT SIG	31
T08	2.48	2.57	3.36	2.93	2.80	2.66	2.84	2.64	2.95	2.80	2.64	2.95	2.80	NO	NOT SIG	32
T20	2.37	2.76	3.18	2.83	2.71	2.69	2.85	2.63	2.91	2.77	2.63	2.91	2.77	NO	NOT SIG	33
T34	2.77	2.71	2.82	2.78	2.78	2.74	2.75	2.75	2.77	2.76	2.74	2.78	2.76	NO	NOT SIG	34
T39	2.48	2.78	3.00	2.78	2.71	2.71	2.81	2.66	2.84	2.75	2.66	2.84	2.75	NO	NOT SIG	35
T40	2.41	2.55	3.25	2.85	2.73	2.61	2.78	2.59	2.88	2.74	2.59	2.88	2.74	NO	NOT SIG	36
T41	2.49	2.33	3.25	2.85	2.73	2.53	2.68	2.55	2.82	2.69	2.53	2.85	2.69	NO	NOT SIG	37
T49	2.52	2.98	2.51	2.58	2.59	2.75	2.75	2.68	2.68	2.67	2.58	2.75	2.68	NO	NOT SIG	38
T16	2.14	2.57	3.20	2.73	2.58	2.51	2.72	2.45	2.82	2.63	2.45	2.82	2.63	NO	NOT SIG	39
T22	2.25	2.54	3.06	2.70	2.58	2.52	2.68	2.48	2.76	2.62	2.48	2.76	2.62	NO	NOT SIG	40
T37	2.32	2.43	3.10	2.73	2.61	2.49	2.65	2.47	2.75	2.61	2.47	2.75	2.61	NO	NOT SIG	41
T38	1.80	2.12	3.08	2.49	2.30	2.15	2.41	2.11	2.55	2.33	2.11	2.55	2.33	NO	NOT SIG	42
T45	1.96	2.22	2.65	2.34	2.24	2.19	2.33	2.15	2.40	2.27	2.15	2.40	2.27	NO	NOT SIG	43
T32	1.72	1.76	3.10	2.42	2.21	1.95	2.22	1.94	2.42	2.19	1.94	2.42	2.21	NO	NOT SIG	44
T23	1.67	1.98	2.98	2.37	2.17	2.02	2.28	1.97	2.43	2.21	1.97	2.43	2.21	NO	NOT SIG	45
T24	1.71	1.76	3.08	2.40	2.19	1.94	2.21	1.93	2.41	2.18	1.93	2.41	2.19	NO	NOT SIG	46
T50	1.69	2.04	2.59	2.19	2.06	2.00	2.18	1.95	2.26	2.10	1.95	2.26	2.10	NO	NOT SIG	47
T46	1.51	1.78	3.00	2.30	2.07	1.87	2.16	1.83	2.35	2.09	1.83	2.35	2.09	NO	NOT SIG	48
T51	1.63	1.84	2.59	2.14	1.99	1.88	2.07	1.84	2.18	2.02	1.84	2.18	2.02	NO	NOT SIG	49
T48	1.55	1.69	2.78	2.19	2.00	1.80	2.05	1.78	2.21	2.00	1.78	2.21	2.00	NO	NOT SIG	50
T47	1.47	1.56	2.65	2.07	1.89	1.69	1.92	1.68	2.09	1.89	1.68	2.09	1.89	NO	NOT SIG	51

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.1569	16.31%	83.69%
Clients & Contractors	2.451	9.62%	90.38%
Consultants & Contractors	3.9804	15.62%	84.38%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.9608	7.69%	92.31%
Consultants & Over All	2.4706	9.69%	90.31%
Contractors & Over All	2.098	8.23%	91.77%

D(Max) = 1300 Di = 212
 R(Max) = 25.4902 RA = 4.156863
 PD = 16.31%

Table 7-33 Types of Claims & Disputes Claim Management Focus (Comparison Table)

TYPE OF CLAIMS & DISPUTES ASSESSMENT													
Type Description	Code	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking
		Clients			Consultants			Contractors			Over All		
Variations	T19	4.11	82.11	1	4.11	82.11	1	4.11	82.11	1	4.12	82.42	1
Change of Design/ Design Omission / Errors by the Client (Engineer)	T03	4.04	80.89	2	4.04	80.89	2	4.04	80.89	3	4.01	80.22	2
Delay/ Disruption to Regular Progress Due To Variation	T26	3.87	77.35	5	3.87	77.35	3	3.87	77.35	2	3.92	78.43	3
Ambiguity in Documents	T01	3.93	78.52	3	3.93	78.52	7	3.93	78.52	4	3.87	77.31	4
Unanticipated Soil Condition	T12	3.85	77.06	6	3.85	77.06	5	3.85	77.06	11	3.77	75.39	5
Unforeseen Ground Condition/ Unforeseeable Obstruction	T13	3.80	75.91	7	3.80	75.91	6	3.80	75.91	8	3.74	74.90	6
Differing Site Condition	T11	3.88	77.56	4	3.88	77.56	13	3.88	77.56	5	3.74	74.82	7
Change of Project Profile and Site	T09	3.69	73.73	9	3.69	73.73	10	3.69	73.73	7	3.69	73.80	8
Rectification of Works/ Specification Change Due to Defective Design	T05	3.67	73.32	10	3.67	73.32	11	3.67	73.32	6	3.67	73.48	9
Delay/ Disruption to Regular Progress Due To Late Issue of Consent (A	T28	3.58	71.59	13	3.58	71.59	4	3.58	71.59	12	3.66	73.26	10
Delays Due to Incomplete Design/ Insufficient Information by Client/C	T02	3.75	75.01	8	3.75	75.01	12	3.75	75.01	10	3.62	72.43	11
Delayed Site Possession/ Restricted Access	T10	3.61	72.21	11	3.61	72.21	9	3.61	72.21	9	3.62	72.40	12
Extension of Time For Completion	T35	3.48	69.62	15	3.48	69.62	8	3.48	69.62	14	3.49	69.84	13
Delay/ Disruption to Regular Progress Due To Late Instruction by the C	T27	3.59	71.87	12	3.59	71.87	16	3.59	71.87	13	3.48	69.69	14
Delay Disruption to Regular Progress Caused by Utility Services Orga	T31	3.49	69.78	14	3.49	69.78	15	3.49	69.78	16	3.42	68.48	15
Default of Subcontractor, Nominated Subcontractor Or Suppliers.	T43	3.25	64.94	16	3.25	64.94	14	3.25	64.94	15	3.34	66.88	16
Substantial Increase in Quantity of any item not resulting from a Variat	T06	3.21	64.15	18	3.21	64.15	20	3.21	64.15	20	3.24	64.86	17
Acceleration of Works	T18	3.24	64.87	17	3.24	64.87	21	3.24	64.87	18	3.23	64.65	18
Delay/ Disruption to Regular Progress Due To Delays Caused by any Person/ Organization Employed by the Employer such as (Nominated	T29	3.17	63.37	19	3.17	63.37	23	3.17	63.37	17	3.15	62.92	19
Unproductive / Idle Plants, Equipment or Labour	T44	3.12	62.33	20	3.12	62.33	17	3.12	62.33	25	3.10	62.03	20
Suspension of Work	T17	3.03	60.58	22	3.03	60.58	24	3.03	60.58	19	3.08	61.52	21
Client's Breach of Contract	T33	3.07	61.32	21	3.07	61.32	22	3.07	61.32	21	3.07	61.47	22
Delays Due to the Unavailability / Unsuitability of Project Materials	T25	2.82	56.40	31	2.82	56.40	18	2.82	56.40	26	2.98	59.67	23
Liquidated and ascertained damages	T42	2.79	55.74	32	2.79	55.74	19	2.79	55.74	24	2.97	59.44	24
Client/ Engineer's Instruction to Change (not resulting from Variation)	T21	2.98	59.57	24	2.98	59.57	30	2.98	59.57	23	2.96	59.17	25
Un Paid Sums (Late Payment)	T36	2.92	58.46	27	2.92	58.46	28	2.92	58.46	27	2.96	59.13	26
Instruction Issued by the Client/Consultant to Resolve Discrepancy	T04	2.97	59.32	25	2.97	59.32	26	2.97	59.32	32	2.94	58.78	27
Substantial Change in Quality of any item not resulting from a Variatio	T07	2.99	59.84	23	2.99	59.84	32	2.99	59.84	30	2.93	58.65	28
Investigation of Suspected Defects	T14	2.88	57.68	28	2.88	57.68	27	2.88	57.68	31	2.92	58.47	29
Uncovering of Works For Testing (Examination)	T15	2.87	57.49	29	2.87	57.49	34	2.87	57.49	22	2.92	58.33	30
Delay/ Disruption to Regular Progress Due To Late Delivery of Materi	T30	2.93	58.54	26	2.93	58.54	37	2.93	58.54	28	2.87	57.32	31
Error in Setting out Due to Incorrect Data Shown on Drawings	T08	2.84	56.83	30	2.84	56.83	38	2.84	56.83	29	2.80	56.04	32

Continued Table 7-33 Types of Claims & Disputes Claim Management Focus (Comparison Table)

Type Description	Code	TYPE OF CLAIMS & DISPUTES ASSESSMENT											
		CMF Avg. Mean	CMF Imp. Index	CMF Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking
		Clients			Consultants			Contractors			Over All		
Additional Work (to other parts of the works) arising from repairs or de	T20	2.79	55.73	33	2.79	55.73	33	2.79	55.73	37	2.77	55.37	33
Late Issuance of final certificate	T34	2.62	52.41	39	2.62	52.41	25	2.62	52.41	36	2.76	55.22	34
Inflation / Price Escalation	T39	2.67	53.32	37	2.67	53.32	29	2.67	53.32	38	2.75	55.01	35
Currency Fluctuation	T40	2.64	52.81	38	2.64	52.81	35	2.64	52.81	35	2.74	54.71	36
Finance Charges For Loss Of Profit, Extended Performance Bond, Insu	T41	2.60	51.94	41	2.60	51.94	31	2.60	51.94	38	2.69	53.80	37
Delays Due to Exceptional Inclement Weather, Flood, Storms, Earthqu	T49	2.67	53.42	36	2.67	53.42	40	2.67	53.42	33	2.68	53.52	38
Additional Tests to Verify Compliance with the Specification (in excess to those mentioned in tender documents)	T16	2.68	53.63	35	2.68	53.63	41	2.68	53.63	34	2.63	52.66	39
Facilities provided to others by the contractor (in excess to those menti	T22	2.69	53.88	34	2.69	53.88	39	2.69	53.88	40	2.62	52.32	40
Interest on Un Paid Sums (Late Payment)	T37	2.61	52.18	40	2.61	52.18	36	2.61	52.18	41	2.61	52.25	41
Overdue retention money	T38	2.21	44.17	45	2.21	44.17	42	2.21	44.17	42	2.33	46.65	42
Labour Strikes, Civil Unrest, Etc.	T45	2.28	45.63	42	2.28	45.63	43	2.28	45.63	45	2.27	45.49	43
Delay/ Disruption to Regular Progress Due To Additional/ Unforeseen	T32	2.23	44.53	43	2.23	44.53	51	2.23	44.53	43	2.21	44.19	44
Loss of / Damage to Materials on Site or During Transport	T23	2.17	43.47	46	2.17	43.47	44	2.17	43.47	47	2.21	44.14	45
Rectification of Damages To Other Property During Transport of Mate	T24	2.21	44.28	44	2.21	44.28	46	2.21	44.28	44	2.19	43.87	46
Damages To the Works Due to Exceptionally Adverse Weather, Flood,	T50	2.13	42.65	47	2.13	42.65	48	2.13	42.65	48	2.10	42.06	47
Custom Tariffs, New Taxes	T46	2.03	40.56	49	2.03	40.56	45	2.03	40.56	46	2.09	41.87	48
Rectification of Damage Caused by Un Excepted Risk	T51	2.11	42.21	48	2.11	42.21	50	2.11	42.21	51	2.02	40.31	49
Expropriation of Contractor's Equipment or Machinery	T48	1.91	38.29	50	1.91	38.29	47	1.91	38.29	49	2.00	40.08	50
Embargoes on Project Imported Items	T47	1.78	35.56	51	1.78	35.56	49	1.78	35.56	50	1.89	37.89	51

Table 7-34 Types of Claims & Disputes CFI Assessment: (Rank Agreement Factor Comparison)

Agreement Amongst Groups			
Groups	RAF	PD	PA
Clients & Consultants	4.157	16.31%	83.69%
Clients & Contractors	2.451	9.62%	90.38%
Consultants & Contractors	3.980	15.62%	84.38%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

Table 7-35 Comparison of the calculated CFI values for each Type of Claims & Disputes among the different responding groups, based on their perceptions for the frequency, magnitude and avoidability of each Type of Claims & Disputes; (Ranked according to Types' significance).

RANK ACCORDING TO MEDIAN WITH PRIORITY																				
Q1: IS THIS TYPE FREUENT, SEVERE AND AVOIDABLE?(>=3), IF YES CHECK Q2															Types of Claims & Disputes		Significance Results			
Q2: IS THIS TYPE SIGNIFICANT? (CFI MEDIAN VALUE >=3)															CL	CONS	CONT	Over All		
TOTAL NUMBER OF SIGNIFICANT TYPES OF CLAIMS AND DISPUTES:															22	24	27	22		
TOTAL NUMBER OF SIGNIFICANT TYPES: First Priority															16	19	17	16		
TOTAL NUMBER OF SIGNIFICANT TYPES: Second Priority															6	5	10	6		
TOTAL NUMBER OF INSIGNIFICANT TYPES:															29	27	24	29		
R.M.N.:RANK ACCORDING TO MEDIAN VALUES (WITH OUT PRIORITY)															CL: CLIENTS AND CONS: CONSULTANTS					
R.M.P.: RANK ACCORDING TO MEDIAN VALUES (WITH PRIORITY)															CONT: CONTRACTORS AND OA: OVERALL F					
MED: AVERAGE MEAN MEDIAN VALUES															M. I. I. %:MEDIAN VALUE AS A PERCENTAG					
	CLIENETS					CONSULTANTS					CONTRACTORS					OVERALL				
CODE	MED	MI%	M.N	M.P	RESULT	MED	MI%	M.N	M.P	RESULT	MED	MI%	M.N	M.P	RESULT	MED	MI%	M.N	M.P	RESULT
T19	4.11	82.11	1	1	SIG-1st Priority	4.11	82.11	1	1	SIG-1st Priority	4.11	82.11	1	1	SIG-1st Priority	4.12	82.42	1	1	SIG-1st Priority
T03	4.04	80.89	2	2	SIG-1st Priority	4.04	80.89	2	2	SIG-1st Priority	4.04	80.89	3	3	SIG-1st Priority	4.01	80.22	2	2	SIG-1st Priority
T26	3.87	77.35	5	5	SIG-1st Priority	3.87	77.35	3	3	SIG-1st Priority	3.87	77.35	2	2	SIG-1st Priority	3.92	78.43	3	3	SIG-1st Priority
T01	3.93	78.52	3	3	SIG-1st Priority	3.93	78.52	7	7	SIG-1st Priority	3.93	78.52	4	4	SIG-1st Priority	3.87	77.31	4	4	SIG-1st Priority
T12	3.85	77.06	6	6	SIG-1st Priority	3.85	77.06	5	5	SIG-1st Priority	3.85	77.06	11	11	SIG-1st Priority	3.77	75.39	5	5	SIG-1st Priority
T13	3.80	75.91	7	7	SIG-1st Priority	3.80	75.91	6	6	SIG-1st Priority	3.80	75.91	8	8	SIG-1st Priority	3.74	74.90	6	6	SIG-1st Priority
T11	3.88	77.56	4	4	SIG-1st Priority	3.88	77.56	14	13	SIG-1st Priority	3.88	77.56	5	5	SIG-1st Priority	3.74	74.82	7	7	SIG-1st Priority
T09	3.69	73.73	9	9	SIG-1st Priority	3.69	73.73	10	10	SIG-1st Priority	3.69	73.73	7	7	SIG-1st Priority	3.69	73.80	8	8	SIG-1st Priority
T05	3.67	73.32	10	10	SIG-1st Priority	3.67	73.32	11	11	SIG-1st Priority	3.67	73.32	6	6	SIG-1st Priority	3.67	73.48	9	9	SIG-1st Priority
T28	3.58	71.59	13	13	SIG-1st Priority	3.58	71.59	4	4	SIG-1st Priority	3.58	71.59	12	12	SIG-1st Priority	3.66	73.26	10	10	SIG-1st Priority
T02	3.75	75.01	8	8	SIG-1st Priority	3.75	75.01	12	12	SIG-1st Priority	3.75	75.01	10	10	SIG-1st Priority	3.62	72.43	11	11	SIG-1st Priority
T10	3.61	72.21	11	11	SIG-1st Priority	3.61	72.21	9	9	SIG-1st Priority	3.61	72.21	9	9	SIG-1st Priority	3.62	72.40	12	12	SIG-1st Priority
T35	3.48	69.62	15	15	SIG-1st Priority	3.48	69.62	8	8	SIG-1st Priority	3.48	69.62	14	14	SIG-1st Priority	3.49	69.84	13	13	SIG-1st Priority
T27	3.59	71.87	12	12	SIG-1st Priority	3.59	71.87	17	16	SIG-1st Priority	3.59	71.87	13	13	SIG-1st Priority	3.48	69.69	14	14	SIG-1st Priority
T31	3.49	69.78	14	14	SIG-1st Priority	3.49	69.78	16	15	SIG-1st Priority	3.49	69.78	16	16	SIG-1st Priority	3.42	68.48	15	15	SIG-1st Priority
T43	3.25	64.94	16	16	SIG-1st Priority	3.25	64.94	15	14	SIG-1st Priority	3.25	64.94	15	15	SIG-1st Priority	3.34	66.88	16	16	SIG-1st Priority
T06	3.21	64.15	18	18	SIG-2nd Priority	3.21	64.15	13	20	SIG-2nd Priority	3.21	64.15	20	20	SIG-2nd Priority	3.24	64.86	17	17	SIG-2nd Priority
T18	3.24	64.87	17	17	SIG-2nd Priority	3.24	64.87	18	21	SIG-2nd Priority	3.24	64.87	17	18	SIG-2nd Priority	3.23	64.65	18	18	SIG-2nd Priority
T29	3.17	63.37	19	19	SIG-2nd Priority	3.17	63.37	23	23	SIG-2nd Priority	3.17	63.37	18	17	SIG-1st Priority	3.15	62.92	19	19	SIG-2nd Priority
T44	3.12	62.33	20	20	SIG-2nd Priority	3.12	62.33	19	17	SIG-1st Priority	3.12	62.33	25	25	SIG-2nd Priority	3.10	62.03	20	20	SIG-2nd Priority
T17	3.03	60.58	22	22	SIG-2nd Priority	3.03	60.58	24	24	SIG-2nd Priority	3.03	60.58	18	19	SIG-2nd Priority	3.08	61.52	21	21	SIG-2nd Priority
T33	3.07	61.32	21	21	SIG-2nd Priority	3.07	61.32	22	22	SIG-2nd Priority	3.07	61.32	21	21	SIG-2nd Priority	3.07	61.47	22	22	SIG-2nd Priority
T25	2.82	56.40	31	31	NOT SIG	2.82	56.40	20	18	SIG-1st Priority	2.82	56.40	26	26	SIG-2nd Priority	2.98	59.67	23	23	NOT SIG
T42	2.79	55.74	32	32	NOT SIG	2.79	55.74	21	19	SIG-1st Priority	2.79	55.74	24	24	SIG-2nd Priority	2.97	59.44	24	24	NOT SIG
T21	2.98	59.57	24	24	NOT SIG	2.98	59.57	30	30	NOT SIG	2.98	59.57	23	23	SIG-2nd Priority	2.96	59.17	25	25	NOT SIG
T36	2.92	58.46	27	27	NOT SIG	2.92	58.46	28	28	NOT SIG	2.92	58.46	27	27	SIG-2nd Priority	2.96	59.13	26	26	NOT SIG
T04	2.97	59.32	25	25	NOT SIG	2.97	59.32	26	26	NOT SIG	2.97	59.32	32	32	NOT SIG	2.94	58.78	27	27	NOT SIG
T07	2.99	59.84	23	23	NOT SIG	2.99	59.84	32	32	NOT SIG	2.99	59.84	30	30	NOT SIG	2.93	58.65	28	28	NOT SIG
T14	2.88	57.68	28	28	NOT SIG	2.88	57.68	27	27	NOT SIG	2.88	57.68	31	31	NOT SIG	2.92	58.47	29	29	NOT SIG
T15	2.87	57.49	29	29	NOT SIG	2.87	57.49	34	34	NOT SIG	2.87	57.49	22	22	SIG-2nd Priority	2.92	58.33	30	30	NOT SIG
T30	2.93	58.54	26	26	NOT SIG	2.93	58.54	37	37	NOT SIG	2.93	58.54	28	28	NOT SIG	2.87	57.32	31	31	NOT SIG
T08	2.84	56.83	30	30	NOT SIG	2.84	56.83	38	38	NOT SIG	2.84	56.83	29	29	NOT SIG	2.80	56.04	32	32	NOT SIG
T20	2.79	55.73	33	33	NOT SIG	2.79	55.73	33	33	NOT SIG	2.79	55.73	37	37	NOT SIG	2.77	55.37	33	33	NOT SIG
T34	2.62	52.41	39	39	NOT SIG	2.62	52.41	25	25	NOT SIG	2.62	52.41	36	36	NOT SIG	2.76	55.22	34	34	NOT SIG
T39	2.67	53.32	37	37	NOT SIG	2.67	53.32	29	29	NOT SIG	2.67	53.32	38	38	NOT SIG	2.75	55.01	35	35	NOT SIG
T40	2.64	52.81	38	38	NOT SIG	2.64	52.81	35	35	NOT SIG	2.64	52.81	35	35	NOT SIG	2.74	54.71	36	36	NOT SIG
T41	2.60	51.94	41	41	NOT SIG	2.60	51.94	31	31	NOT SIG	2.60	51.94	38	38	NOT SIG	2.69	53.80	37	37	NOT SIG
T49	2.67	53.42	36	36	NOT SIG	2.67	53.42	40	40	NOT SIG	2.67	53.42	33	33	NOT SIG	2.68	53.52	38	38	NOT SIG
T16	2.68	53.63	35	35	NOT SIG	2.68	53.63	41	41	NOT SIG	2.68	53.63	34	34	NOT SIG	2.63	52.66	39	39	NOT SIG
T22	2.69	53.88	34	34	NOT SIG	2.69	53.88	39	39	NOT SIG	2.69	53.88	40	40	NOT SIG	2.62	52.32	40	40	NOT SIG
T37	2.61	52.18	40	40	NOT SIG	2.61	52.18	36	36	NOT SIG	2.61	52.18	41	41	NOT SIG	2.61	52.25	41	41	NOT SIG
T38	2.21	44.17	45	45	NOT SIG	2.21	44.17	42	42	NOT SIG	2.21	44.17	42	42	NOT SIG	2.33	46.65	42	42	NOT SIG
T45	2.28	45.63	42	42	NOT SIG	2.28	45.63	43	43	NOT SIG	2.28	45.63	45	45	NOT SIG	2.27	45.49	43	43	NOT SIG
T32	2.23	44.53	43	43	NOT SIG	2.23	44.53	51	51	NOT SIG	2.23	44.53	43	43	NOT SIG	2.21	44.19	44	44	NOT SIG
T23	2.17	43.47	46	46	NOT SIG	2.17	43.47	44	44	NOT SIG	2.17	43.47	47	47	NOT SIG	2.21	44.14	45	45	NOT SIG
T24	2.21	44.28	44	44	NOT SIG	2.21	44.28	46	46	NOT SIG	2.21	44.28	44	44	NOT SIG	2.19	43.87	46	46	NOT SIG
T50	2.13	42.65	47	47	NOT SIG	2.13	42.65	48	48	NOT SIG	2.13	42.65	48	48	NOT SIG	2.10	42.06	47	47	NOT SIG
T46	2.03	40.56	49	49	NOT SIG	2.03	40.56	45	45	NOT SIG	2.03	40.56	46	46	NOT SIG	2.09	41.87	48	48	NOT SIG
T51	2.11	42.21	48	48	NOT SIG	2.11	42.21	50	50	NOT SIG	2.11	42.21	51	51	NOT SIG	2.02	40.31	49	49	NOT SIG
T48	1.91	38.29	50	50	NOT SIG	1.91	38.29	47	47	NOT SIG	1.91	38.29	49	49	NOT SIG	2.00	40.08	50	50	NOT SIG
T47	1.78	35.56	51	51	NOT SIG	1.78	35.56	49	49	NOT SIG	1.78	35.56	50	50	NOT SIG	1.89	37.89	51	51	NOT SIG

Y.1.5.2 CLAIM MANAGEMENT FOCUS (CMF) CHARTS:

CLIENT’S ASSESSMENT:

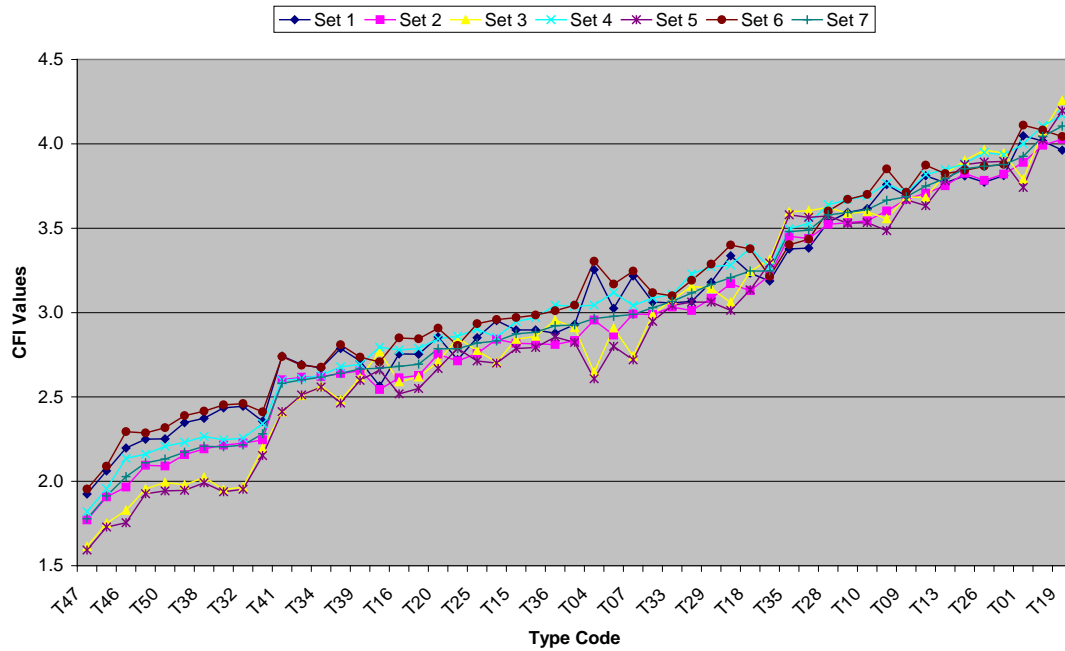


Figure 7-8 Types of Claims & Disputes (CFI) Assessment: All Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Clients’ Perception’.

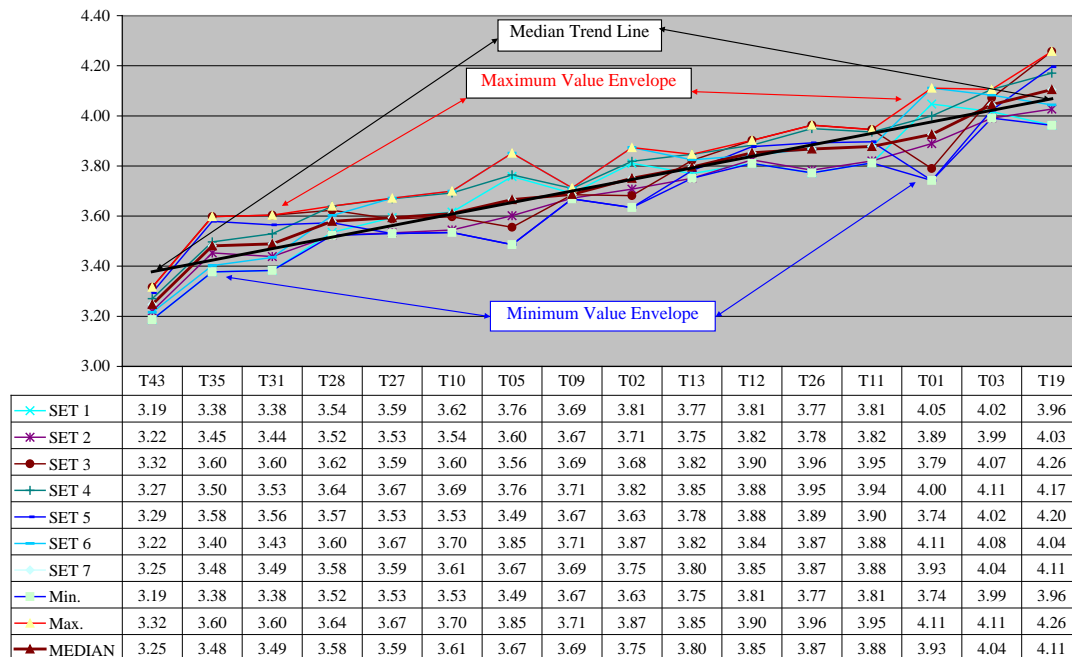


Figure 7-9 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Clients’ Perception’.

CONSULTANT’S ASSESSMENT:

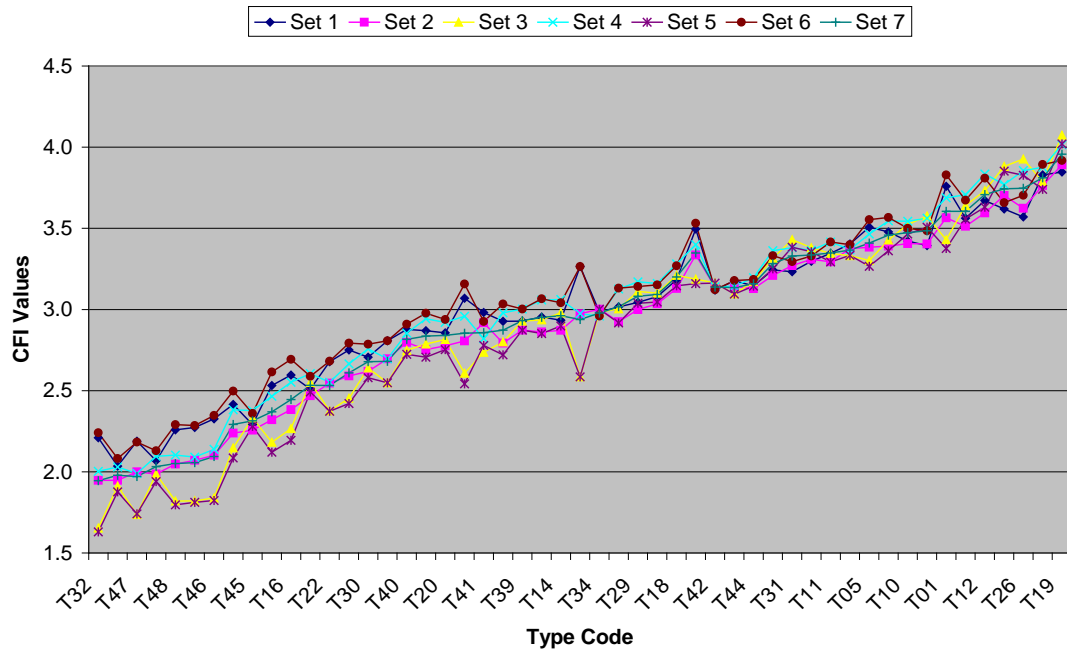


Figure 7-10 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Consultants’ Perception’.

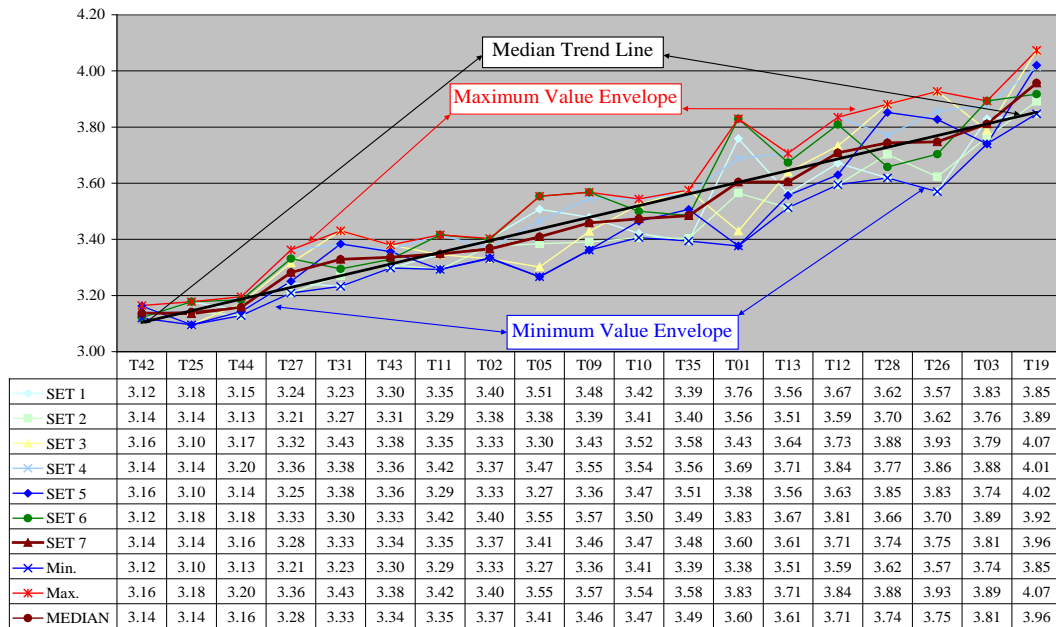


Figure 7-11 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, ‘Consultants’ Perception’.

CONTRACTOR'S ASSESSMENT:

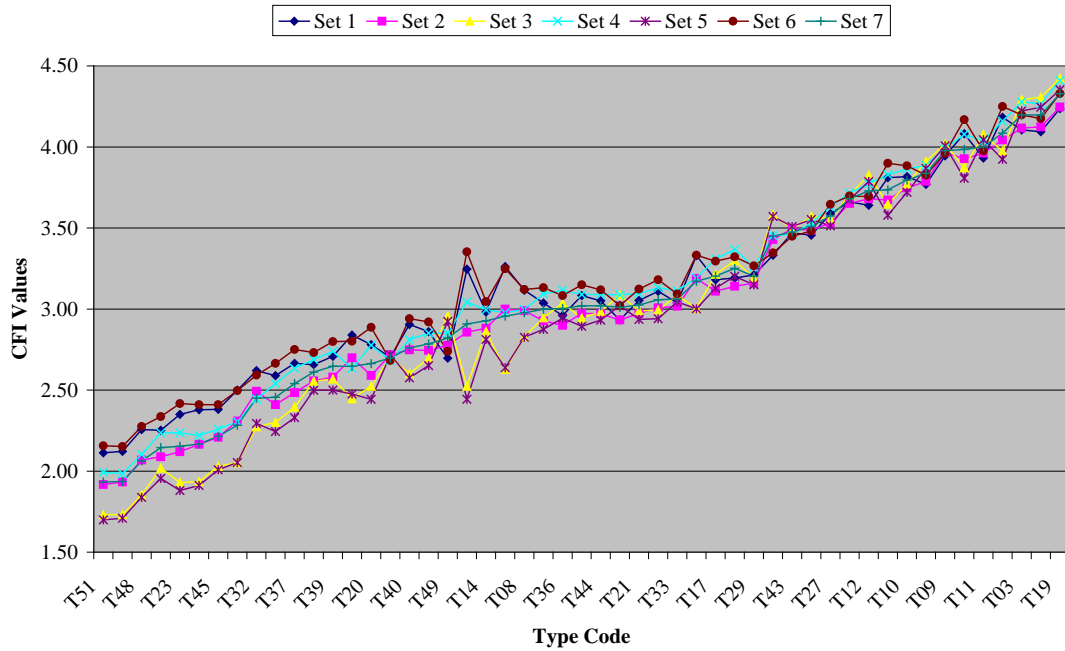


Figure 7-12 Types of Claims & Disputes (CFI) Assessment: All Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Contractors' Perception'.

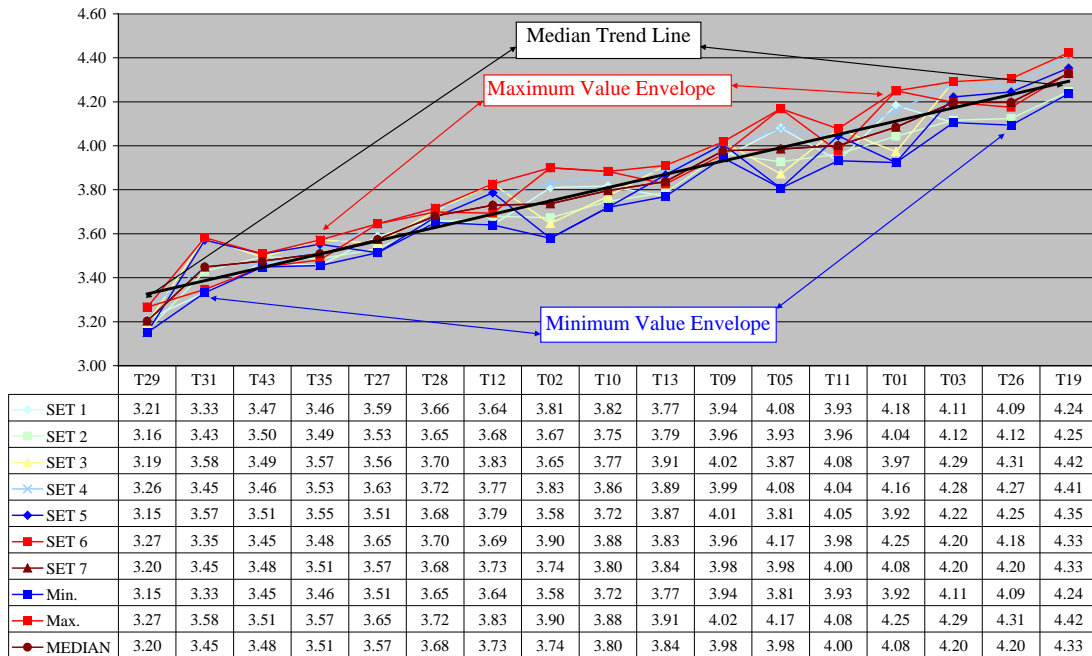


Figure 7-13 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Contractors' Perception'.

OVERALL ASSESSMENT:

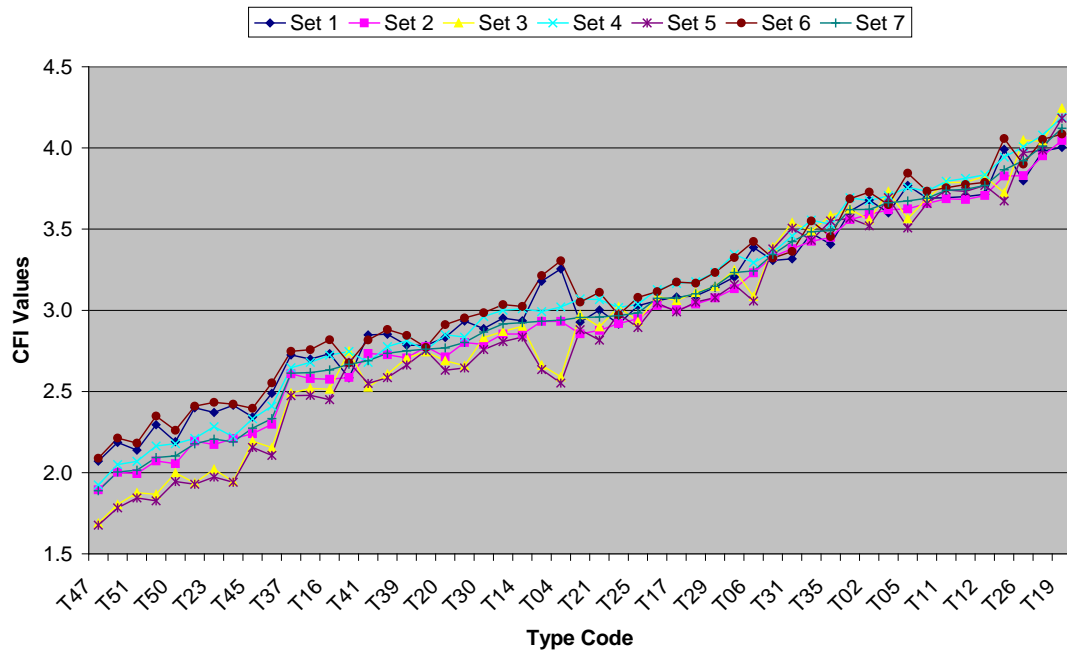


Figure 7-14 Types of Claims & Disputes (CFI) Assessment: All Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Overall Perception'.

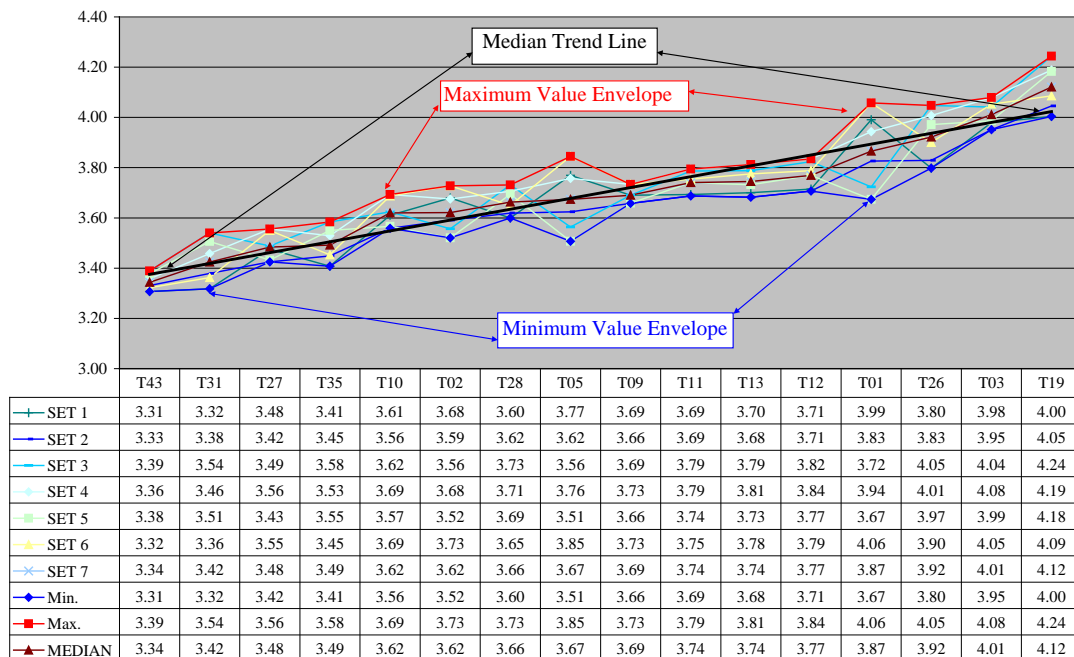


Figure 7-15 Types of Claims & Disputes (CFI) Assessment: Significant Types Ranked in Descending Order Based on Calculated CFI Median Values, 'Overall Perception'.

Y.2 CAUSES OF CLAIMS AND DISPUTES:

Y.2.1 CAUSE AGREEMENT ASSESSMENT:

Y.2.1.1 CAUSE AGREEMENT TABLES:

Table 7-42 Causes of Claims & Disputes Agreement Assessment (Comparison Table)

CAUSE OF CLAIMS & DISPUTES ASSESSMENT					
Cause Description	Code	Clients	Consultants	Contractors	Over All
Inadequate/ Inaccurate Design Information - Is this a potential Cause?	C0101	100.00%	100.00%	100.00%	100.00%
Inadequate Design Documentation - Is this a potential Cause?	C0201	100.00%	100.00%	100.00%	100.00%
Inadequate Brief - Is this a potential Cause?	C0301	100.00%	100.00%	100.00%	100.00%
Unclear & Inadequate Specifications - Is this a potential Cause?	C0401	100.00%	100.00%	100.00%	100.00%
Inappropriate Contract Type (Strategy) - Is this a potential Cause?	C0501	100.00%	100.00%	100.00%	100.00%
Inappropriate Contract Form - Is this a potential Cause?	C0601	100.00%	100.00%	100.00%	100.00%
Inadequate Contract Administration - Is this a potential Cause?	C0701	100.00%	100.00%	100.00%	100.00%
Inadequate Contract Documentation - Is this a potential Cause?	C0801	100.00%	100.00%	100.00%	100.00%
Incomplete Tender Information - Is this a potential Cause?	C0901	100.00%	100.00%	100.00%	100.00%
Inappropriate Contractor Selection - Is this a potential Cause?	C1001	100.00%	100.00%	100.00%	100.00%
Unrealistic Tender Pricing - Is this a potential Cause?	C1101	100.00%	100.00%	100.00%	100.00%
Unclear Risk Allocation - Is this a potential Cause?	C1201	100.00%	100.00%	100.00%	100.00%
Inappropriate Payment Method - Is this a potential Cause?	C1301	63.16%	64.71%	86.67%	70.59%
Inappropriate Document Control - Is this a potential Cause?	C1401	63.16%	68.75%	80.00%	70.00%
Inappropriate/ Unexpected Time Control (Target) - Is this a potential Cause?	C1501	61.11%	70.59%	85.71%	71.43%
Inappropriate/ Unexpected Cost Control (Target) - Is this a potential Cause?	C1601	100.00%	100.00%	100.00%	100.00%
Inappropriate/ Unexpected Quality Control (Target) - Is this a potential Cause?	C1701	100.00%	87.50%	80.00%	89.80%
Poor Communications Among Project Participants - Is this a potential Cause?	C1801	100.00%	88.24%	86.67%	92.16%
Lack of Information for Decision Making - Is this a potential Cause?	C1901	100.00%	82.35%	80.00%	88.00%
Slow Client Response - Is this a potential Cause?	C2001	100.00%	100.00%	100.00%	100.00%
Changes by Client - Is this a potential Cause?	C2101	100.00%	100.00%	100.00%	100.00%
Lack of Competence of Project Participants - Is this a potential Cause?	C2201	100.00%	100.00%	100.00%	100.00%
Poor Workmanship - Is this a potential Cause?	C2301	100.00%	100.00%	100.00%	100.00%
Inadequate Site Investigation - Is this a potential Cause?	C2401	100.00%	100.00%	100.00%	100.00%
Unrealistic Client Expectations - Is this a potential Cause?	C2501	63.16%	64.71%	71.43%	66.00%
Unrealistic Expected Information by Contractor - Is this a potential Cause?	C2601	72.22%	58.82%	66.67%	66.00%
Lack of Team Spirit Among Participants - Is this a potential Cause?	C2701	100.00%	100.00%	100.00%	100.00%
Personality Clashes Among Project Participants - Is this a potential Cause?	C2801	94.44%	68.75%	73.33%	79.59%
Poor Management - Is this a potential Cause?	C2901	100.00%	100.00%	100.00%	100.00%
Adversarial (industry) Culture - Is this a potential Cause?	C3001	100.00%	100.00%	100.00%	100.00%
Uncontrollable External Events - Is this a potential Cause?	C3101	100.00%	100.00%	100.00%	100.00%
Exaggerated Claims - Is this a potential Cause?	C3201	100.00%	100.00%	100.00%	100.00%

Y.2.1.2 CAUSE AGREEMENT BAR CHARTS:

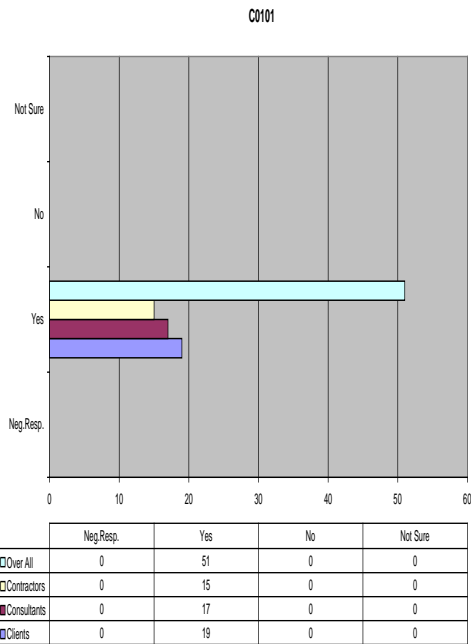


Figure 205 C0101

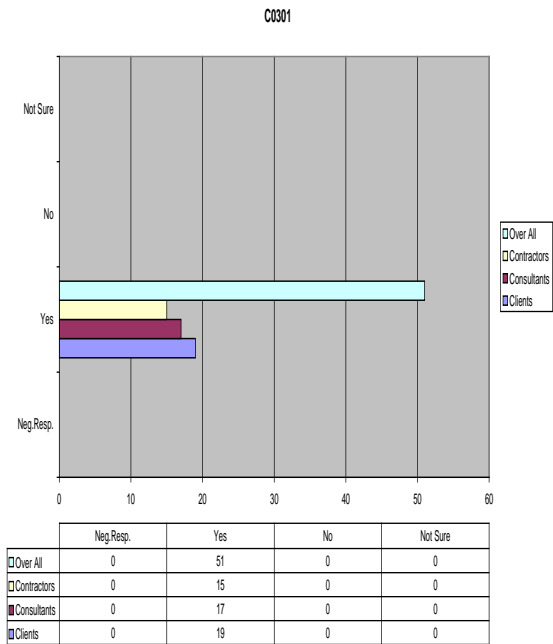


Figure 207 C0301

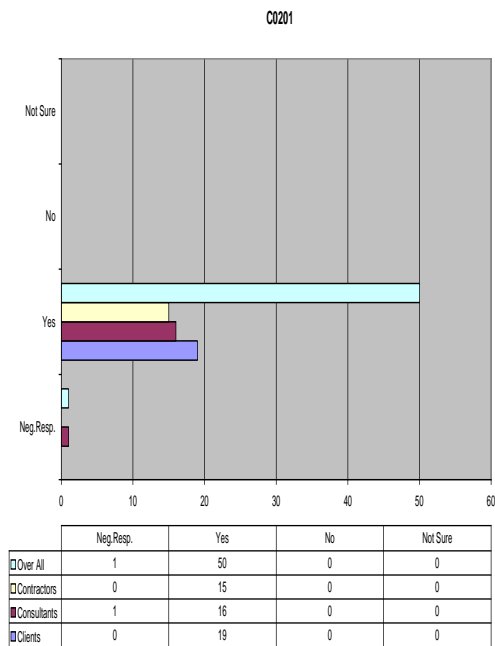


Figure 206 C0201

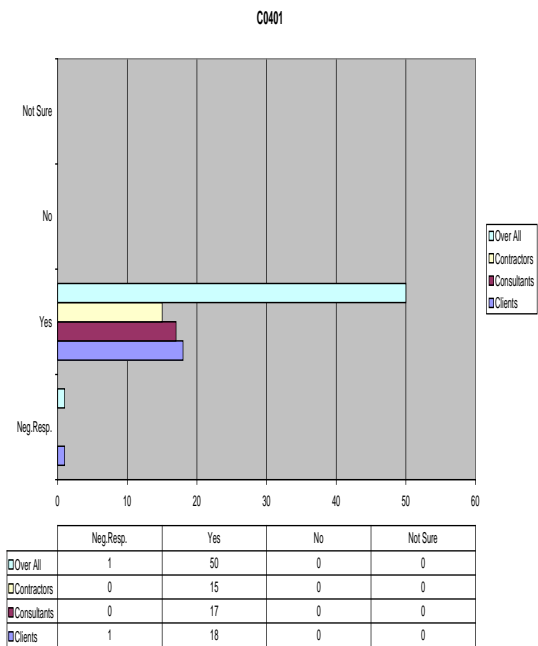


Figure 208 C0401

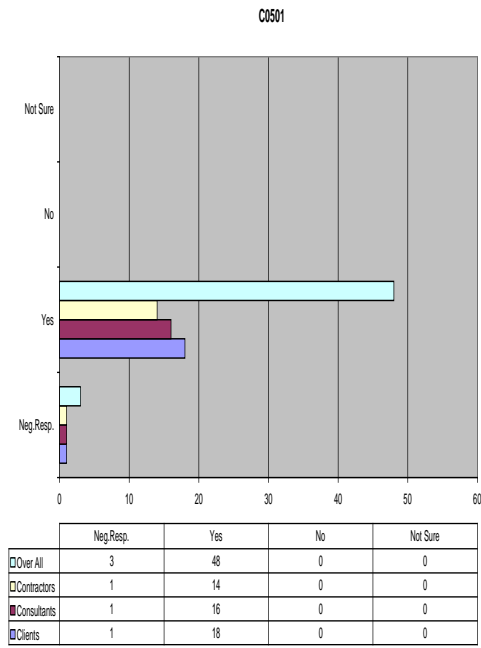


Figure 209 C0501

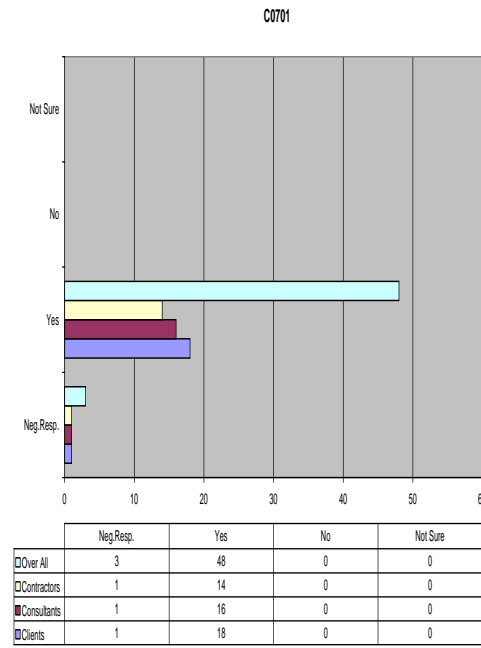


Figure 211 C0701

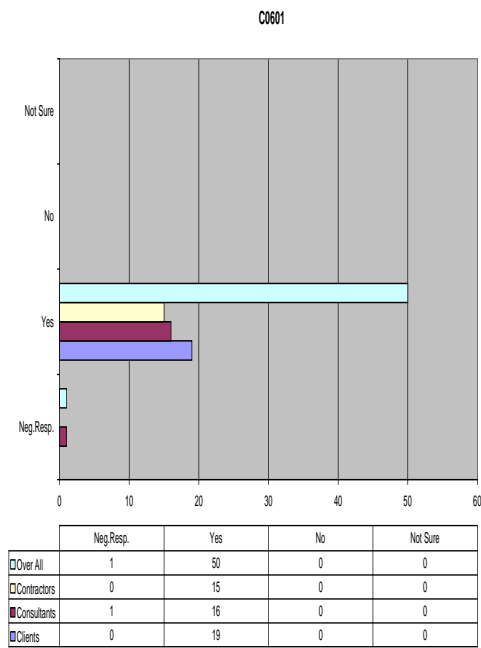


Figure 210 C0601

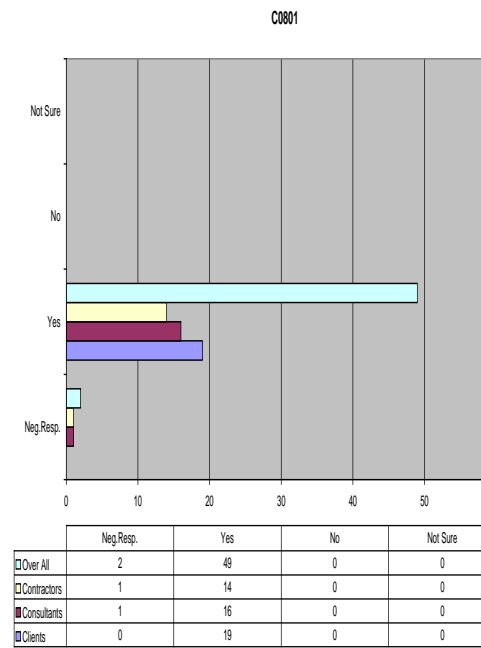


Figure 212 C0801

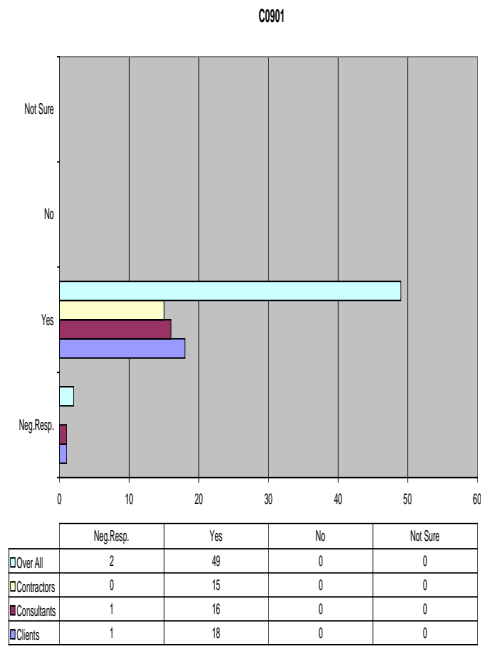


Figure 213 C0901

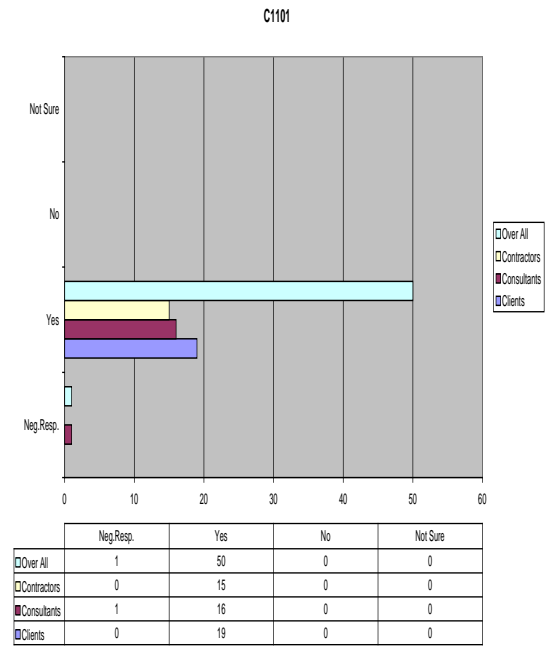


Figure 215 C1101

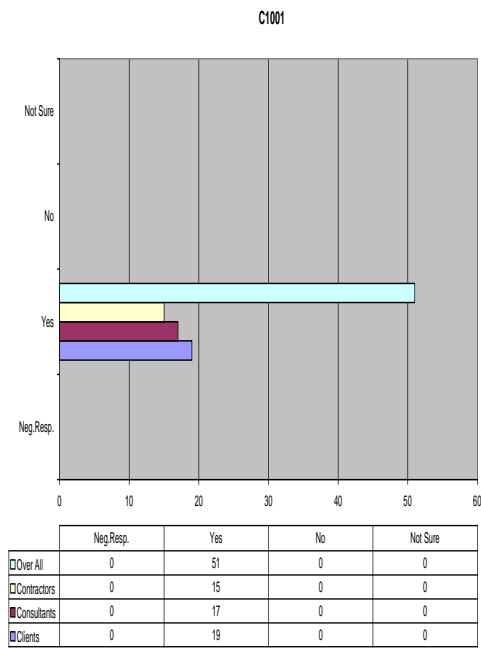


Figure 214 C1001

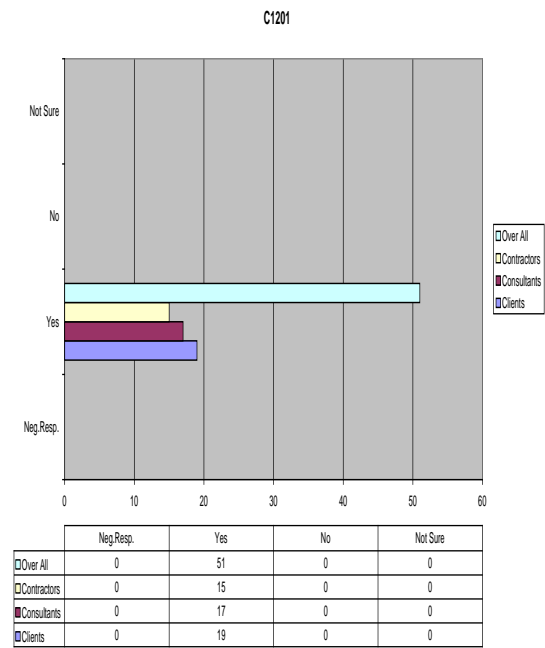


Figure 216 C1201

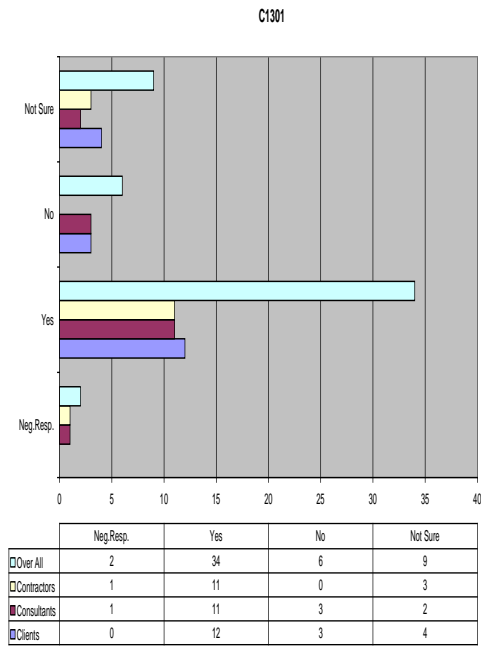


Figure 217 C1301

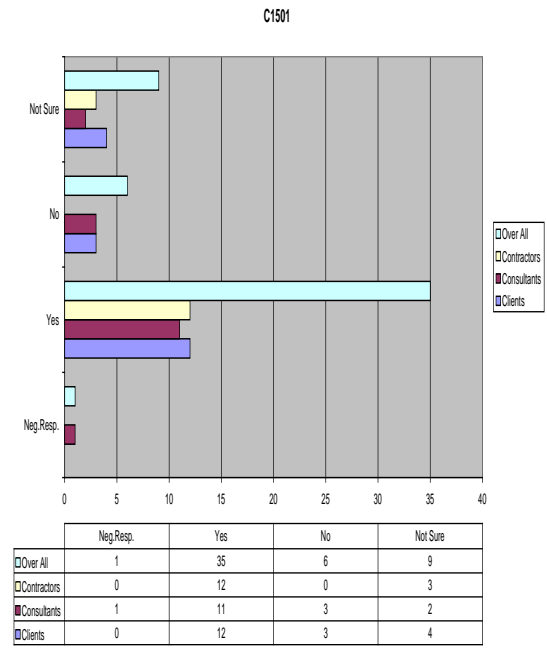


Figure 219 C1501

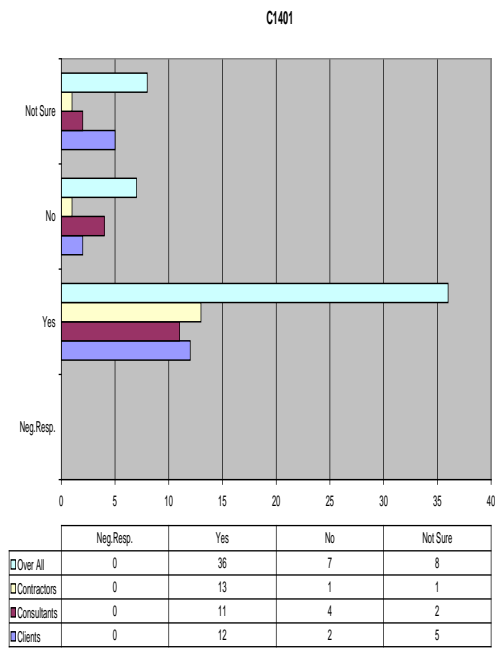


Figure 218 C1401

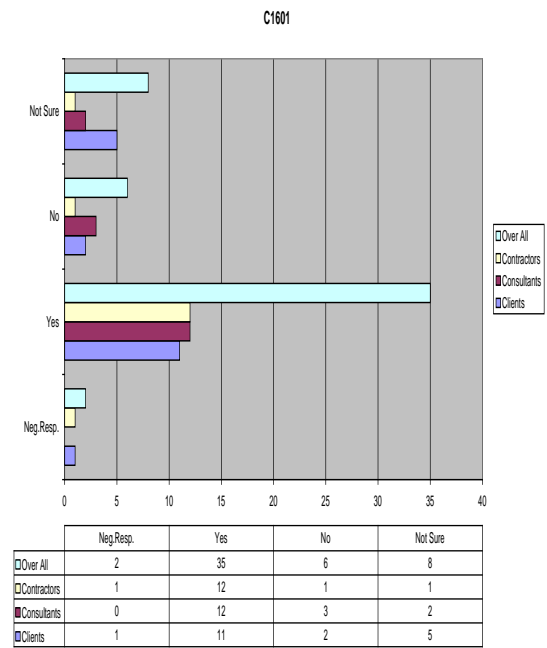


Figure 220 C1601

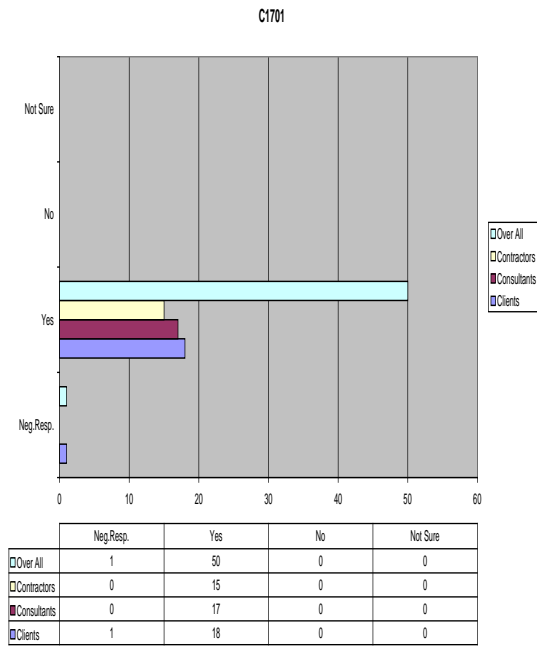


Figure 221 C1701

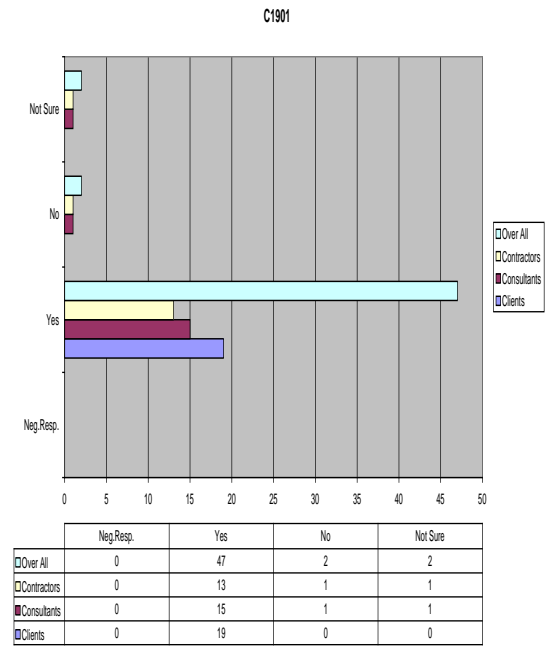


Figure 223 C1901

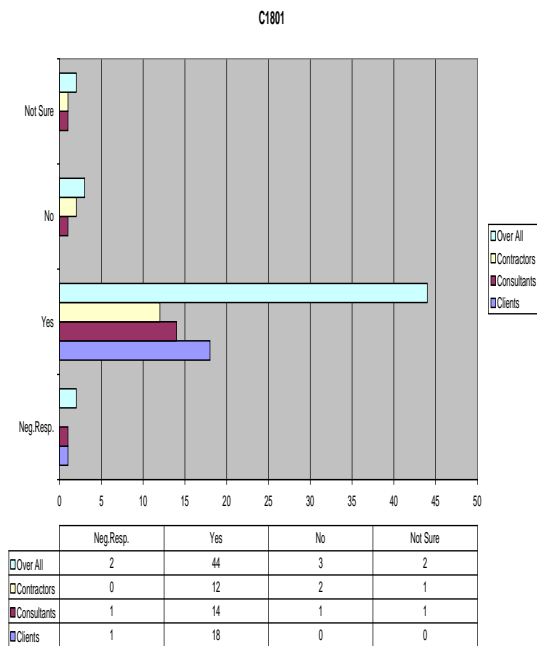


Figure 222 C1801

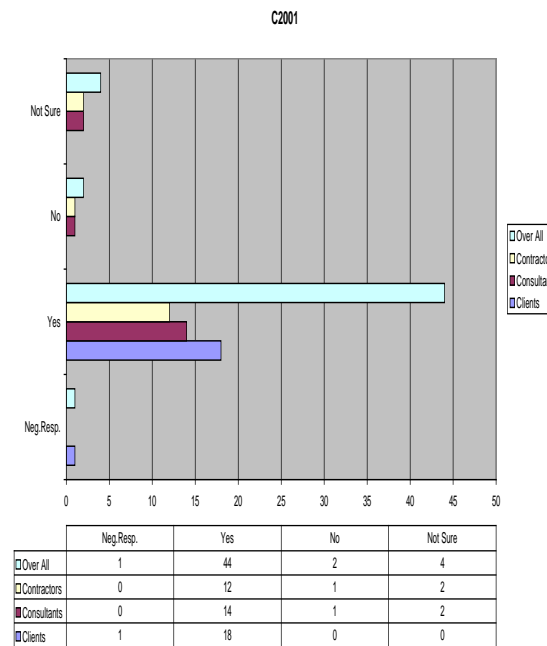


Figure 224 C2001

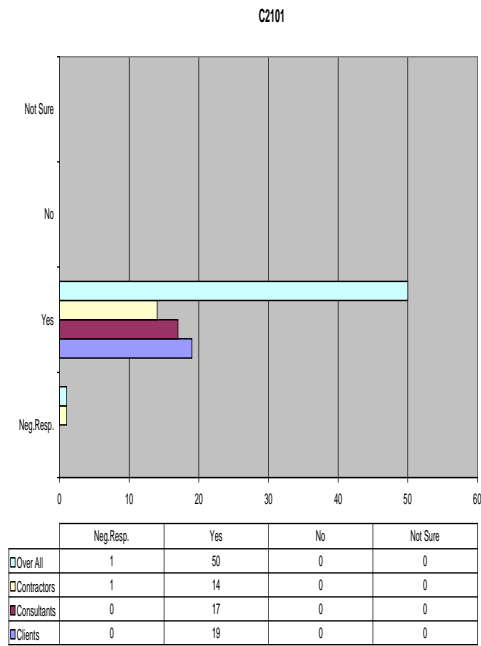


Figure 225 C2101

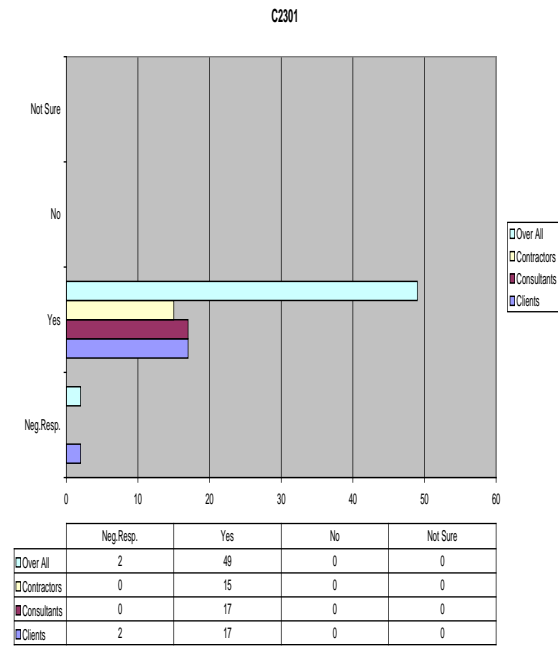


Figure 227 C2301

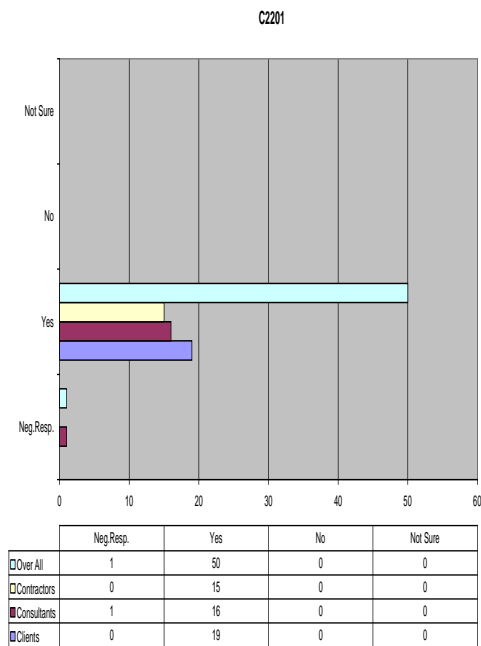


Figure 226 C2201

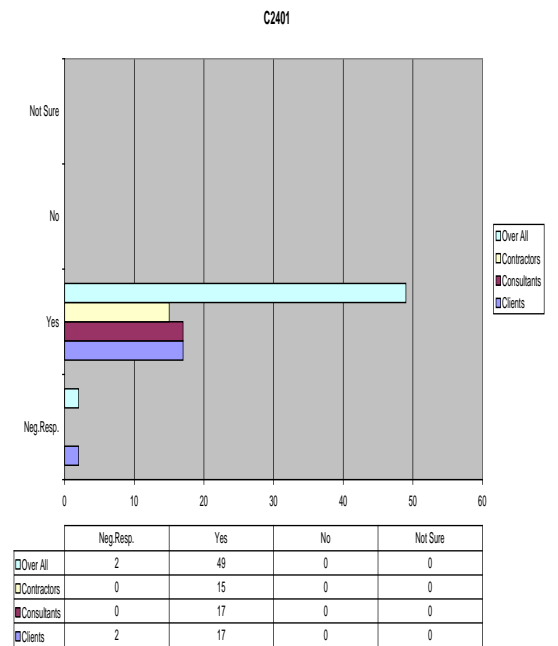


Figure 228 C2401

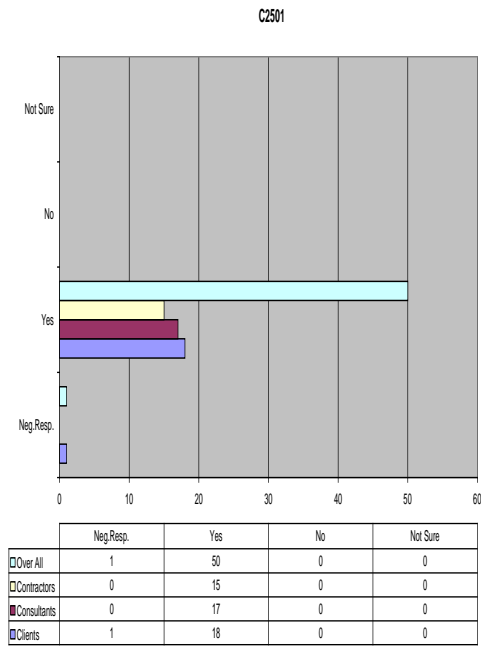


Figure 229 C2501

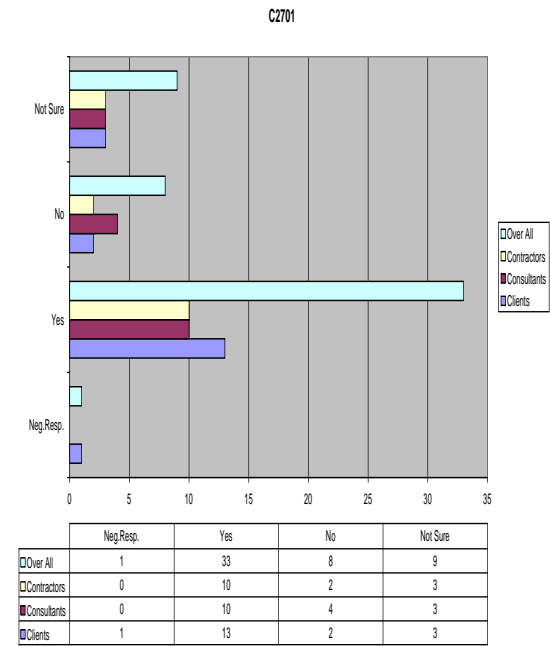


Figure 231 C2701

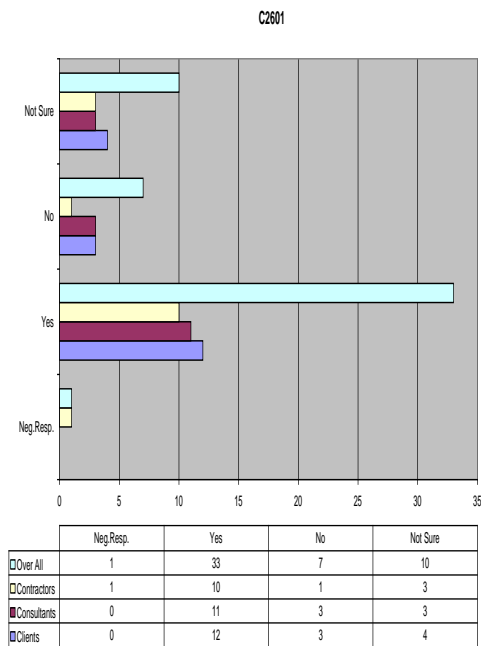


Figure 230 C2601

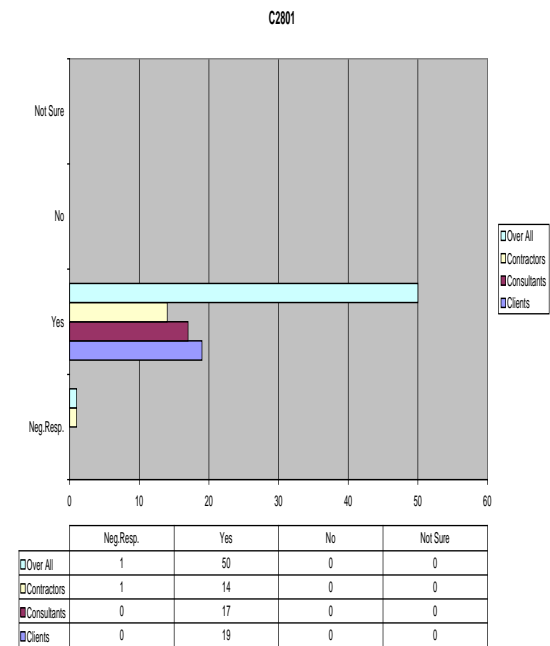


Figure 232 C2801

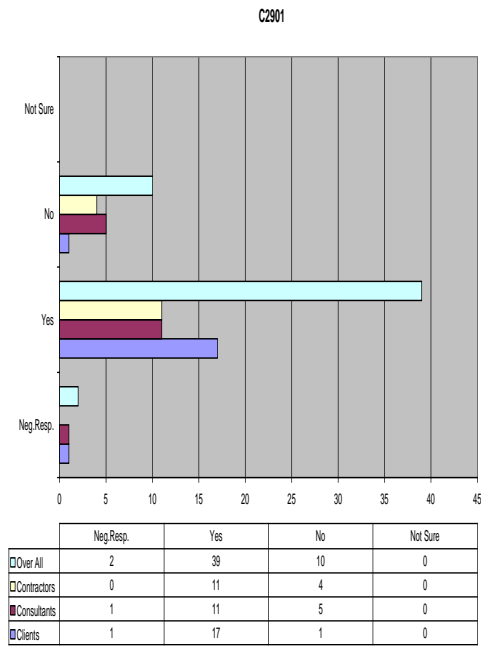


Figure 233 C2901

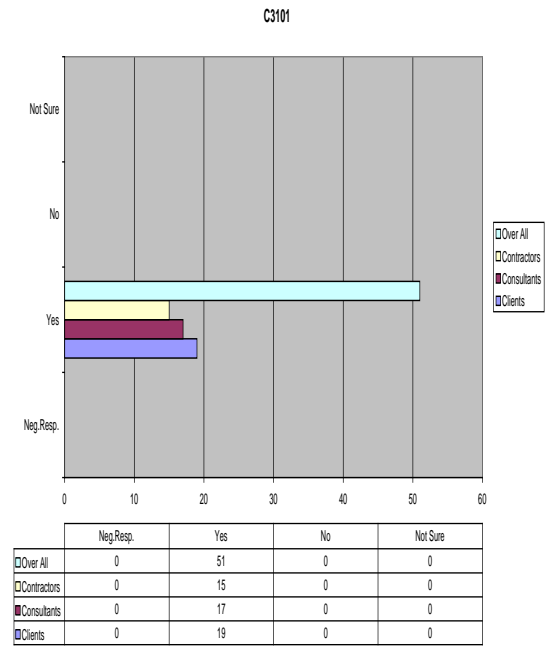


Figure 235 C3101

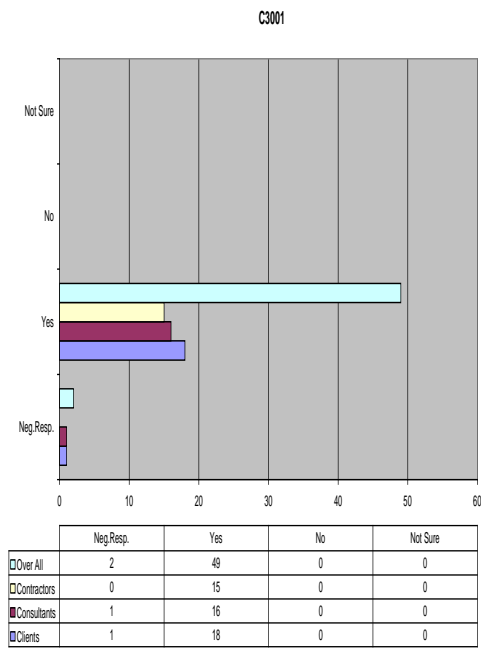


Figure 234 C3001

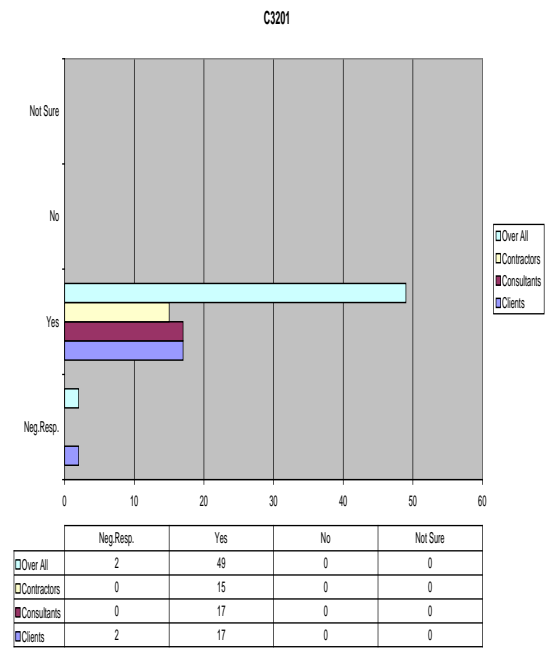


Figure 236 C3201

Y.2.2 CAUSE SIGNIFICANCE (IMPACT) ASSESSMENT:

Y.2.2.1 CAUSE SIGNIFICANCE (IMPACT) TABLES:

Table 7-47 Causes of Claims & Disputes Significance Assessment (Comparison Table)

CAUSES OF CLAIMS & DISPUTES ASSESSMENT													
Cause Description	Code	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking
		Clients			Consultants			Contractors			Over All		
Inadequate Design Documentation - Impact(Magnitude)	C0203	4.211	84.21%	1	4.125	82.50%	2	4.067	81.33%	1	4.140	82.80%	1
Inadequate/ Inaccurate Design Information - Impact(Magnitude)	C0103	4.056	81.11%	2	4.176	83.53%	1	4.000	80.00%	2	4.080	81.60%	2
Inappropriate/ Unexpected Time Control (Target) - Impact(Magnitude)	C1503	3.947	78.95%	3	3.941	78.82%	5	3.867	77.33%	3	3.922	78.43%	3
Inappropriate/ Unexpected Cost Control (Target) - Impact(Magnitude)	C1603	3.833	76.67%	4	4.000	80.00%	4	3.800	76.00%	4	3.878	77.55%	4
Lack of Information for Decision Making - Impact(Magnitude)	C1903	3.632	72.63%	6	4.063	81.25%	3	3.800	76.00%	4	3.820	76.40%	5
Changes by Client - Impact(Magnitude)	C2103	3.833	76.67%	4	3.824	76.47%	6	3.600	72.00%	9	3.760	75.20%	6
Poor Communications Among Project Participants - Impact(Magnitude)	C1803	3.526	70.53%	8	3.765	75.29%	7	3.800	76.00%	4	3.686	73.73%	7
Slow Client Response - Impact(Magnitude)	C2003	3.579	71.58%	7	3.647	72.94%	9	3.714	74.29%	7	3.640	72.80%	8
Inadequate Site Investigation - Impact(Magnitude)	C2403	3.421	68.42%	11	3.706	74.12%	8	3.667	73.33%	8	3.588	71.76%	9
Inadequate Brief - Impact(Magnitude)	C0303	3.474	69.47%	9	3.588	71.76%	10	3.467	69.33%	13	3.510	70.20%	10
Poor Management - Impact(Magnitude)	C2903	3.474	69.47%	9	3.529	70.59%	12	3.533	70.67%	11	3.510	70.20%	10
Unclear & Inadequate Specifications - Impact(Magnitude)	C0403	3.421	68.42%	11	3.588	71.76%	10	3.333	66.67%	15	3.451	69.02%	12
Unclear Risk Allocation - Impact(Magnitude)	C1203	3.263	65.26%	14	3.438	68.75%	13	3.533	70.67%	11	3.400	68.00%	13
Inadequate Contract Documentation - Impact(Magnitude)	C0803	3.211	64.21%	15	3.353	67.06%	14	3.571	71.43%	10	3.360	67.20%	14
Adversarial (industry) Culture - Impact(Magnitude)	C3003	3.368	67.37%	13	3.353	67.06%	14	3.286	65.71%	16	3.340	66.80%	15
Inappropriate Contractor Selection - Impact(Magnitude)	C1003	3.105	62.11%	17	3.353	67.06%	14	3.400	68.00%	14	3.275	65.49%	16
Unrealistic Tender Pricing - Impact(Magnitude)	C1103	3.111	62.22%	16	3.176	63.53%	18	3.200	64.00%	17	3.160	63.20%	17
Incomplete Tender Information - Impact(Magnitude)	C0903	3.105	62.11%	17	3.000	60.00%	19	3.200	64.00%	17	3.102	62.04%	18
Inappropriate Contract Type (Strategy) - Impact(Magnitude)	C0503	3.053	61.05%	19	3.000	60.00%	19	3.067	61.33%	21	3.041	60.82%	19
Uncontrollable External Events - Impact(Magnitude)	C3103	2.941	58.82%	24	3.235	64.71%	17	2.867	57.33%	25	3.020	60.41%	20

Continued Table 7-47 Causes of Claims & Disputes Significance Assessment (Comparison Table)

CAUSES OF CLAIMS & DISPUTES ASSESSMENT													
Cause Description	Code	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking
		Clients			Consultants			Contractors			Over All		
Lack of Competence of Project Participants - Impact(Magnitude)	C2203	3.000	60.00%	20	3.000	60.00%	19	3.000	60.00%	23	3.000	60.00%	21
Unrealistic Client Expectations - Impact(Magnitude)	C2503	3.000	60.00%	20	2.941	58.82%	24	2.929	58.57%	24	2.960	59.20%	22
Inappropriate Contract Form - Impact(Magnitude)	C0603	3.000	60.00%	20	2.941	58.82%	22	2.867	57.33%	25	2.940	58.80%	23
Inadequate Contract Administration - Impact(Magnitude)	C0703	2.895	57.89%	25	2.882	57.65%	25	3.071	61.43%	20	2.940	58.80%	23
Poor Workmanship - Impact(Magnitude)	C2303	3.000	60.00%	20	2.941	58.82%	22	2.800	56.00%	27	2.922	58.43%	25
Personality Clashes Among Project Participants - Impact(Magnitude)	C2803	2.842	56.84%	26	2.765	55.29%	27	3.133	62.67%	19	2.902	58.04%	26
Unrealistic Expected Information by Contractor - Impact(Magnitude)	C2603	2.833	56.67%	27	2.813	56.25%	26	3.067	61.33%	21	2.898	57.96%	27
Lack of Team Spirit Among Participants - Impact(Magnitude)	C2703	2.526	50.53%	30	2.733	54.67%	29	2.786	55.71%	29	2.667	53.33%	28
Inappropriate Document Control - Impact(Magnitude)	C1403	2.684	53.68%	28	2.765	55.29%	27	2.467	49.33%	31	2.647	52.94%	29
Exaggerated Claims - Impact(Magnitude)	C3203	2.632	52.63%	29	2.353	47.06%	31	2.600	52.00%	30	2.529	50.59%	30
Inappropriate/ Unexpected Quality Control (Target) - Impact(Magnitude)	C1703	2.389	47.78%	31	2.353	47.06%	31	2.800	56.00%	27	2.500	50.00%	31
Inappropriate Payment Method - Impact(Magnitude)	C1303	2.158	43.16%	32	2.500	50.00%	30	2.214	44.29%	32	2.286	45.71%	32

Table 7-48 Causes of Claims & Disputes (Significance Rank Agreement Factor Comparison)

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	1.625	10.16%	89.84%
Clients & Contractors	2.75	17.19%	82.81%
Consultants & Contractors	2.6875	16.80%	83.20%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.1875	7.42%	92.58%
Consultants & Over All	1.125	7.03%	92.97%
Contractors & Over All	2	12.50%	87.50%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

Y.2.2.2 CAUSE SIGNIFICANCE (IMPACT) BAR CHARTS:

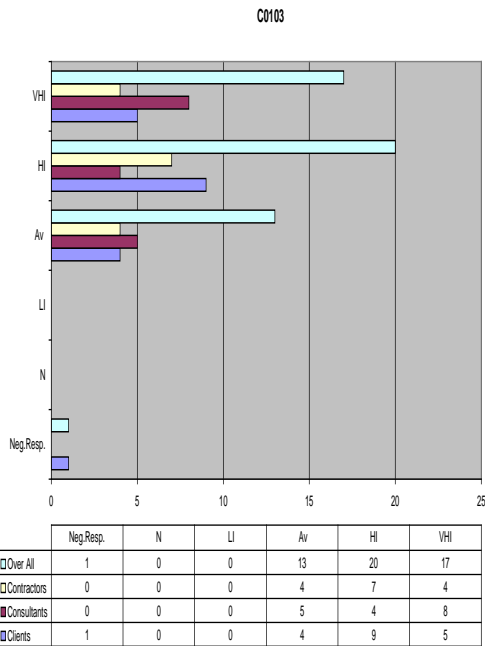


Figure 237 C0103

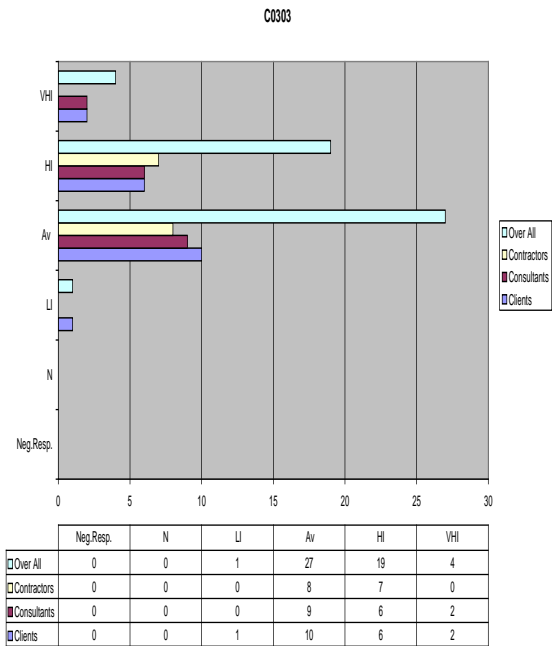


Figure 239 C0303

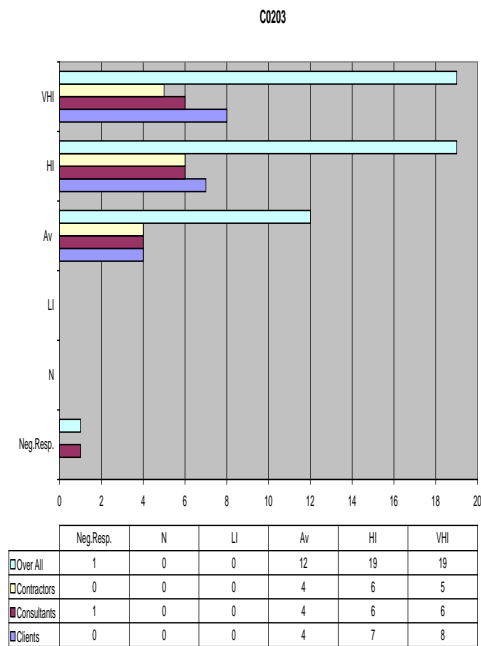


Figure 238 C0203

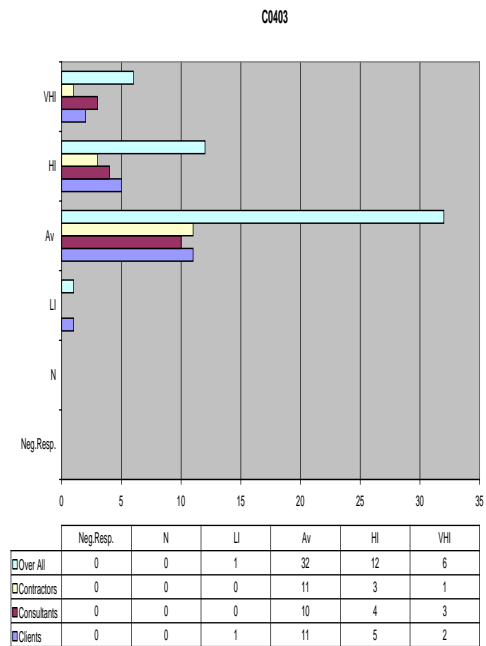


Figure 240 C0403

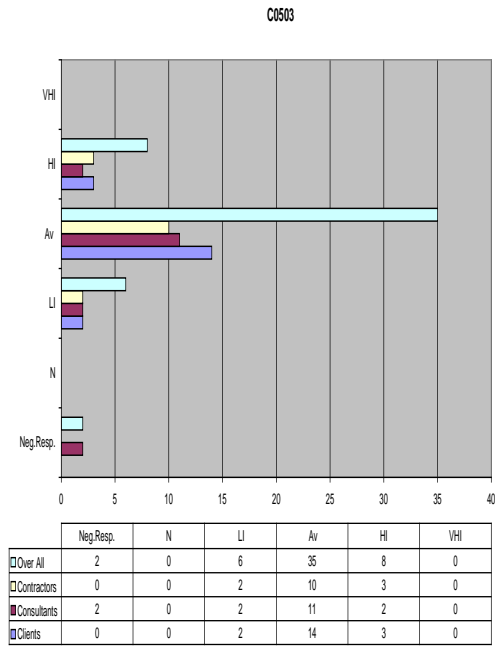


Figure 241 C0503

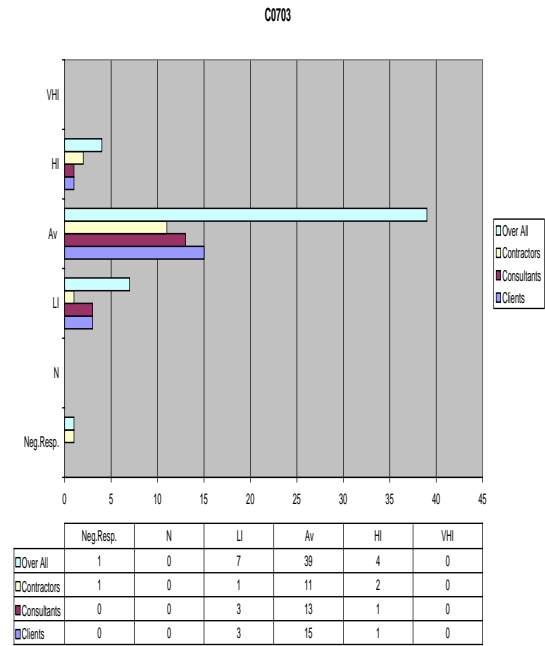


Figure 243 C0703

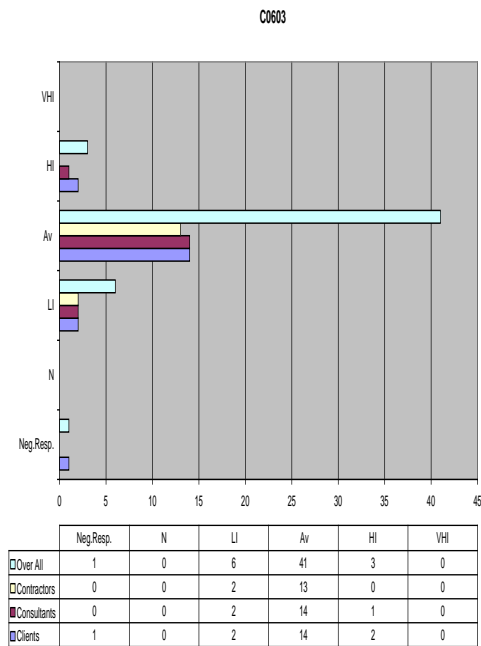


Figure 242 C0603

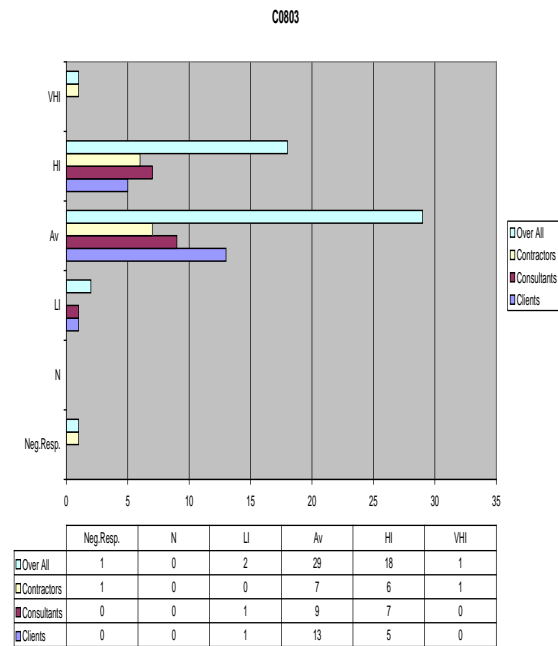


Figure 244 C0803

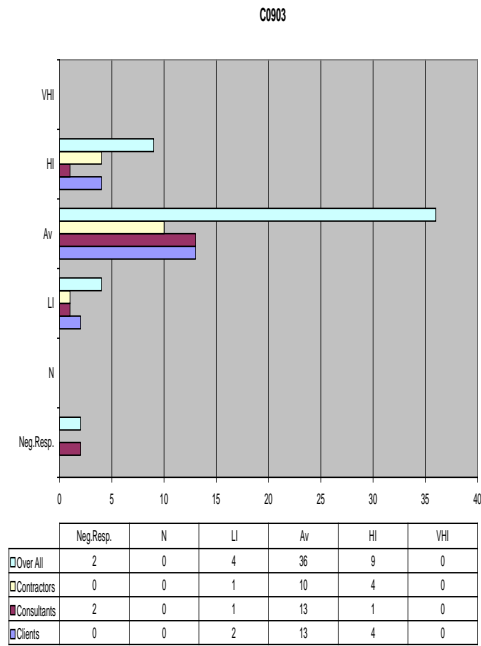


Figure 245 C0903

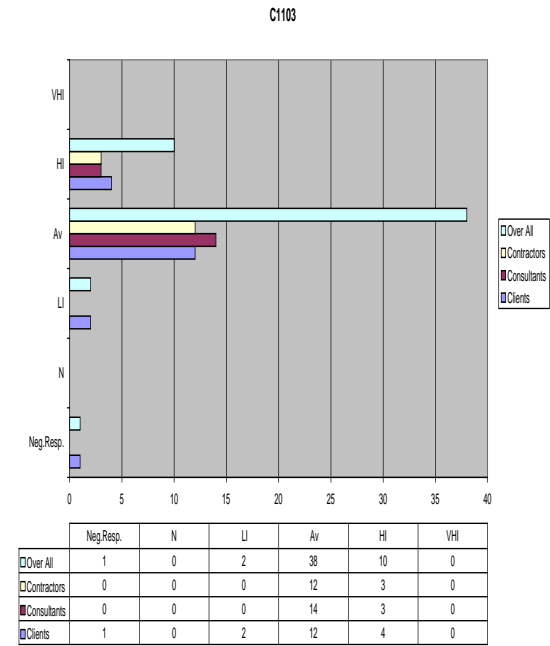


Figure 247 C1103

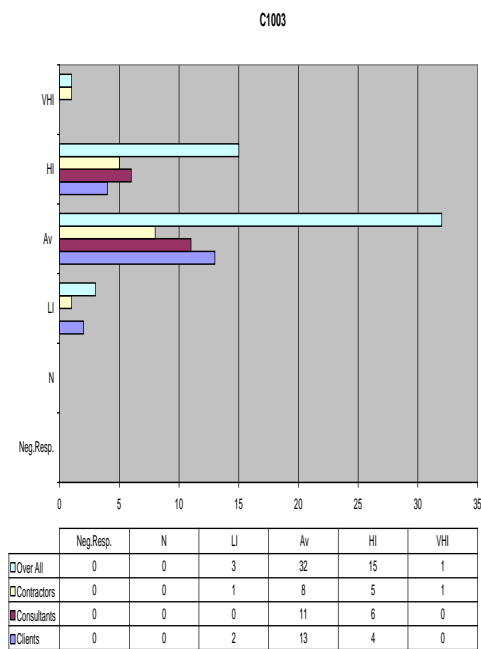


Figure 246 C1003

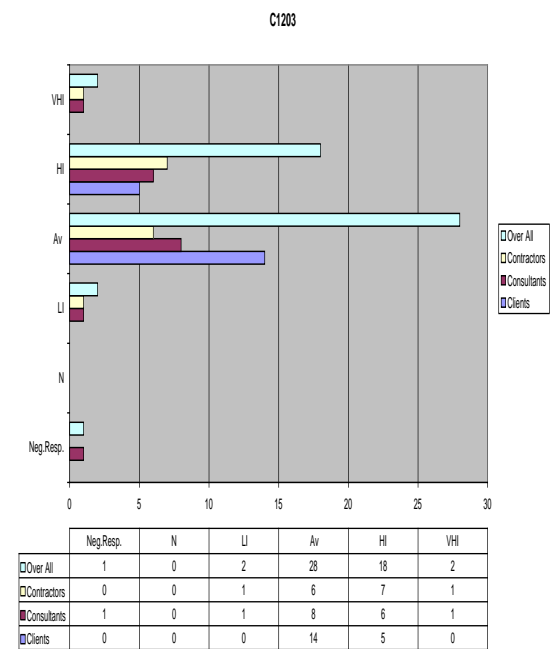


Figure 248 C1203

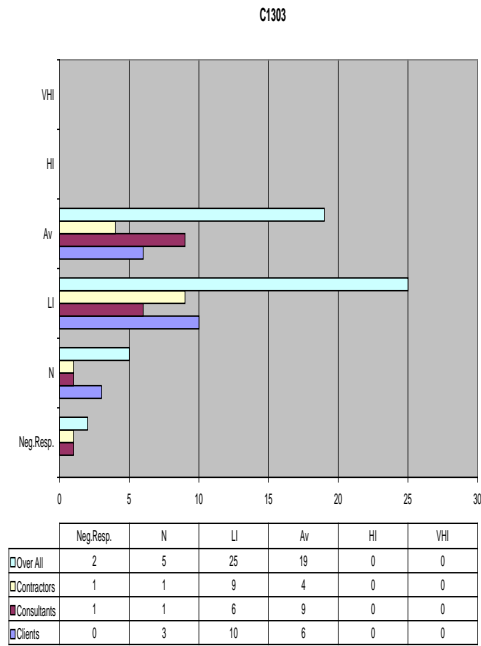


Figure 249 C1303

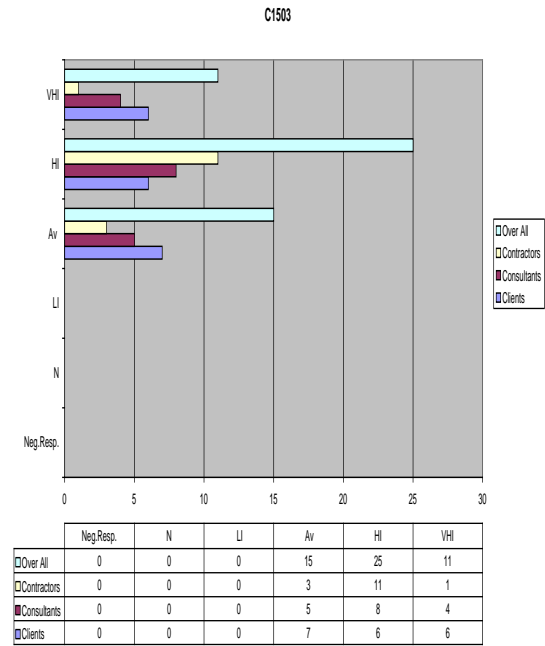


Figure 251 C1503

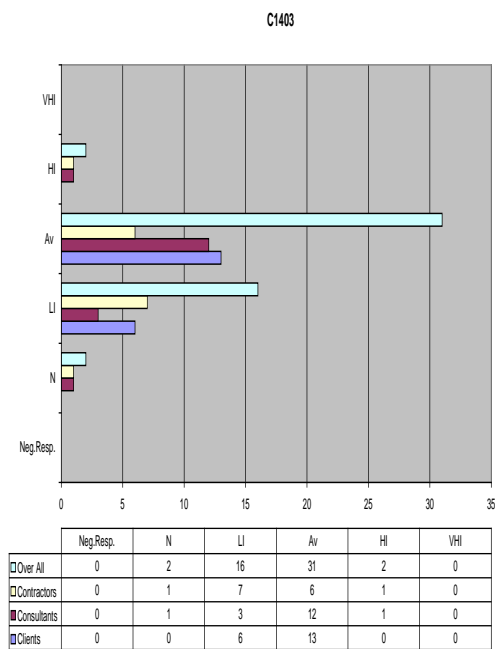


Figure 250 C1403

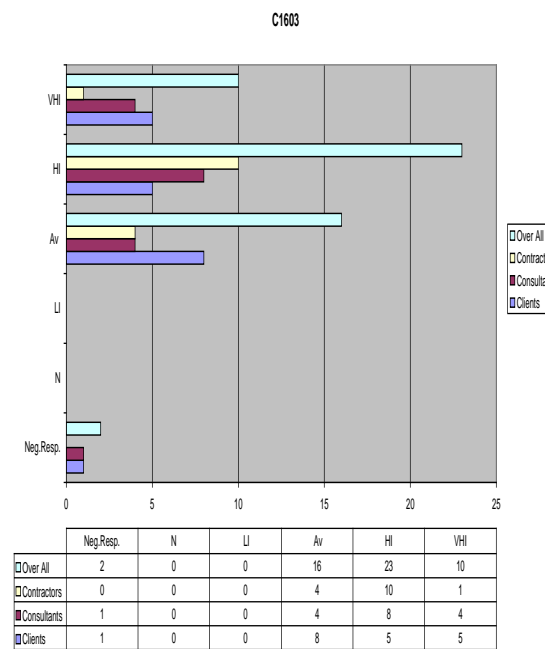


Figure 252 C1603

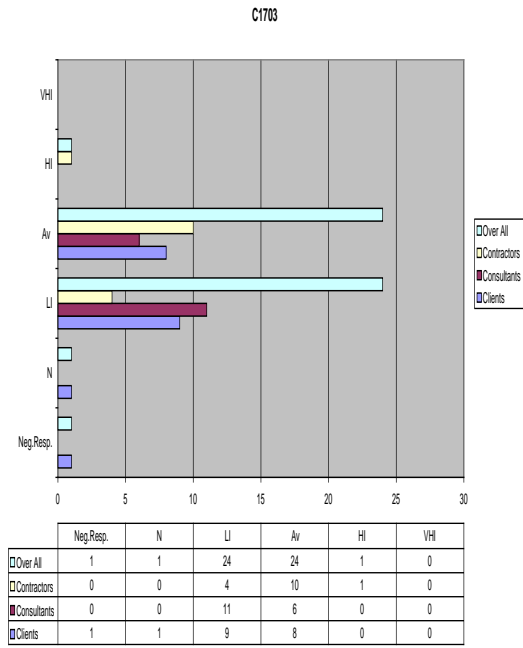


Figure 253 C1703

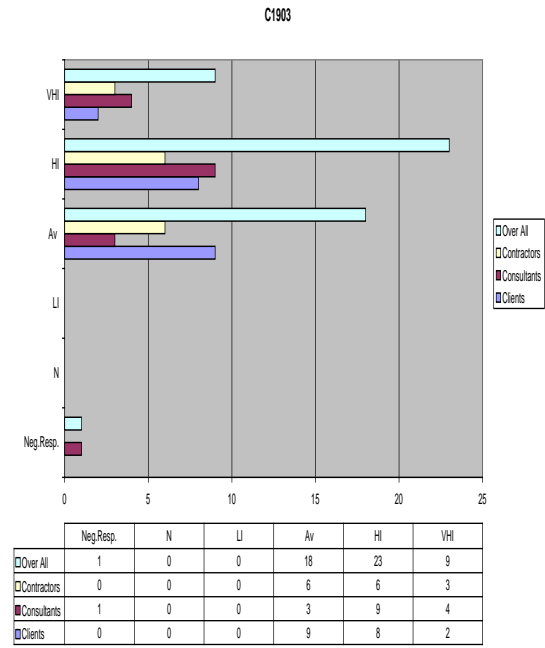


Figure 255 C1903

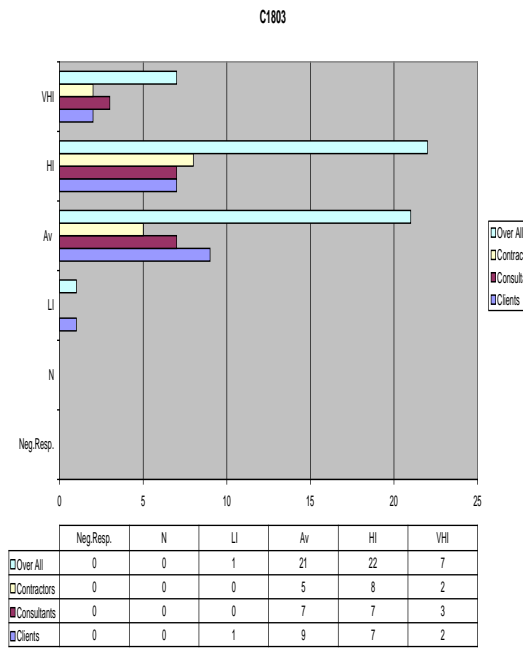


Figure 254 C1803

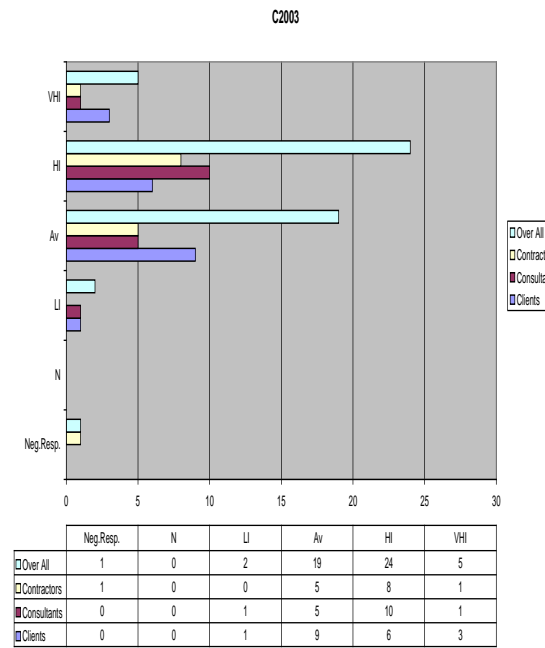


Figure 256 C2003

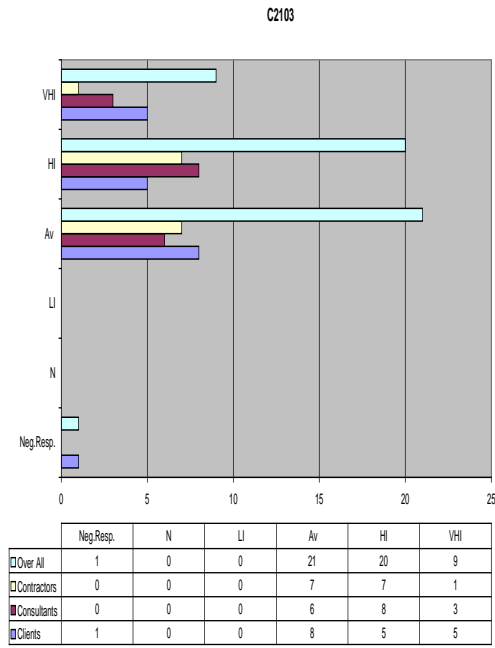


Figure 257 C2103

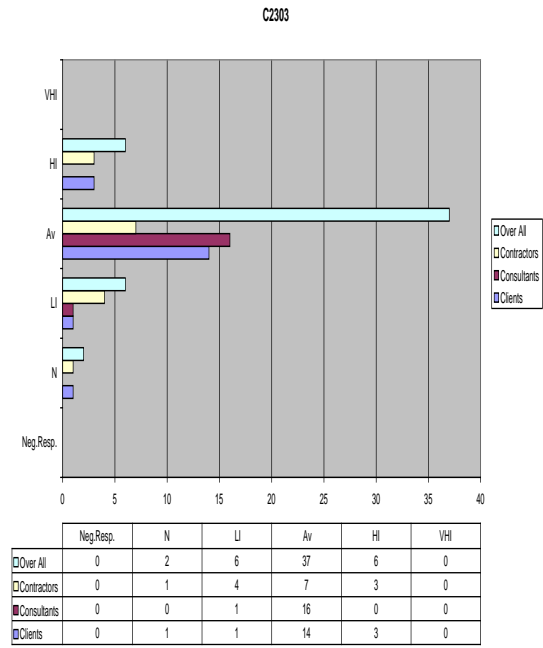


Figure 259 C2303

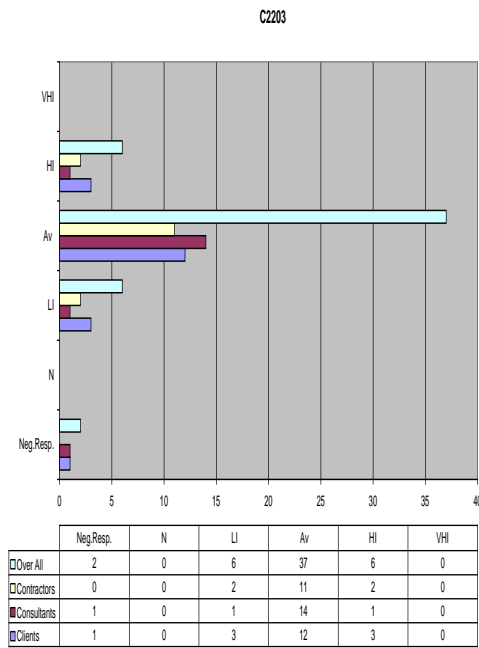


Figure 258 C2203

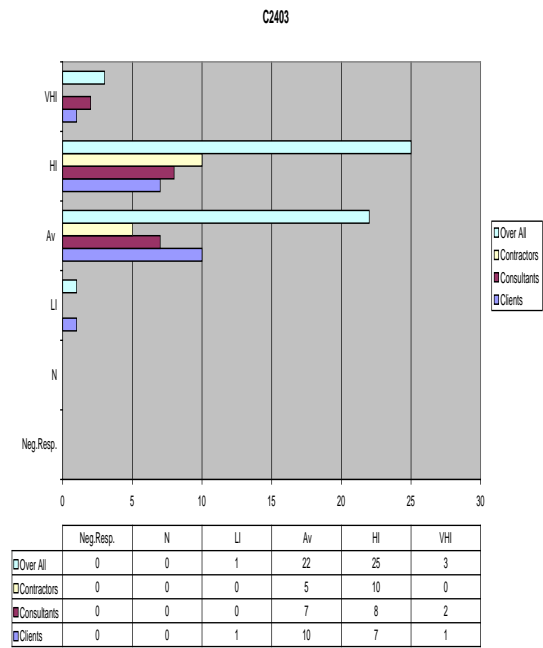


Figure 260 C2403

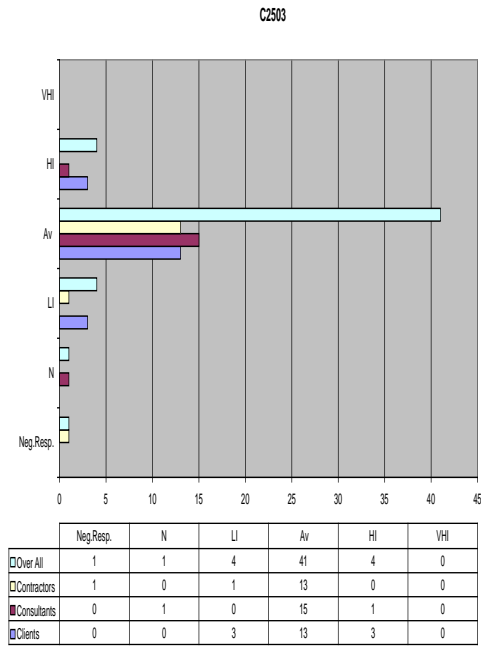


Figure 261 C2503

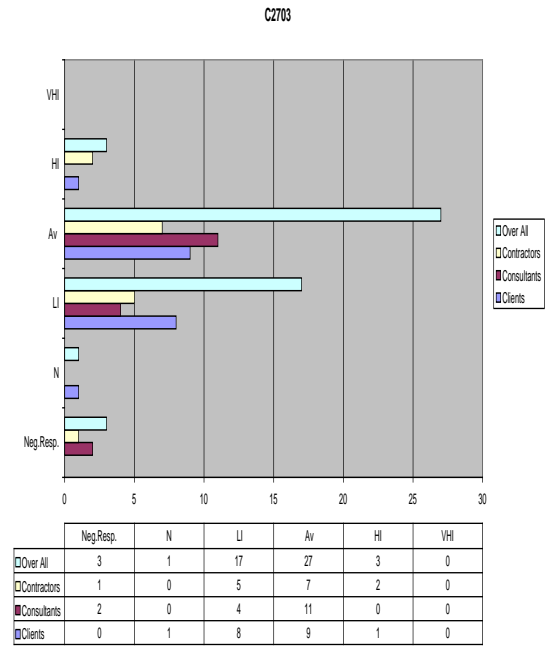


Figure 263 C2703

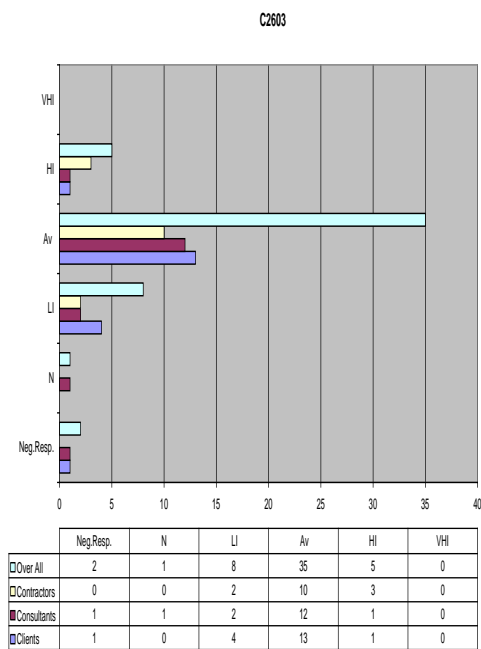


Figure 262 C2603

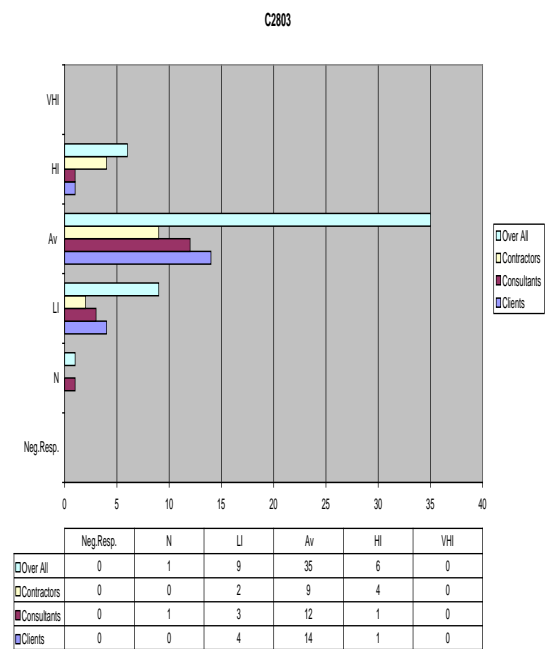


Figure 264 C2803

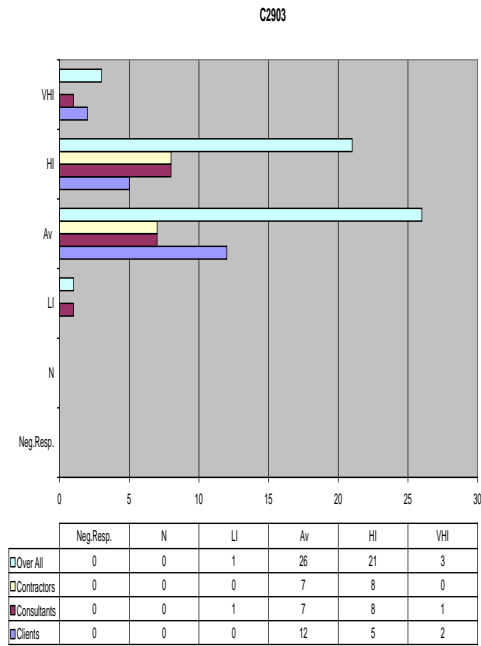


Figure 265 C2903

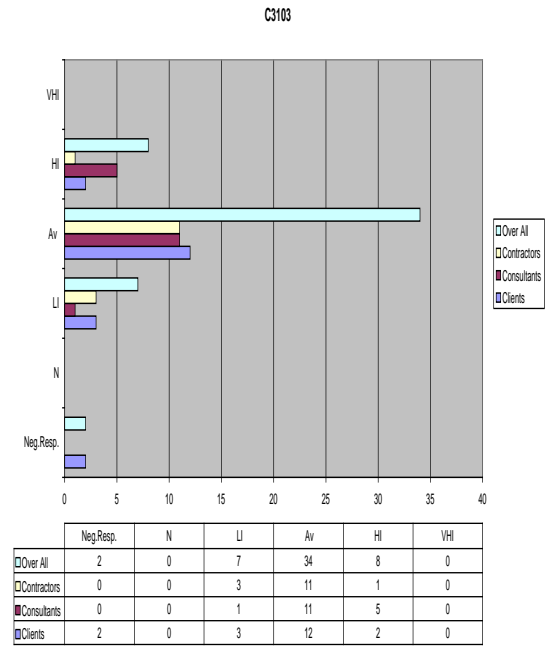


Figure 267 C3103

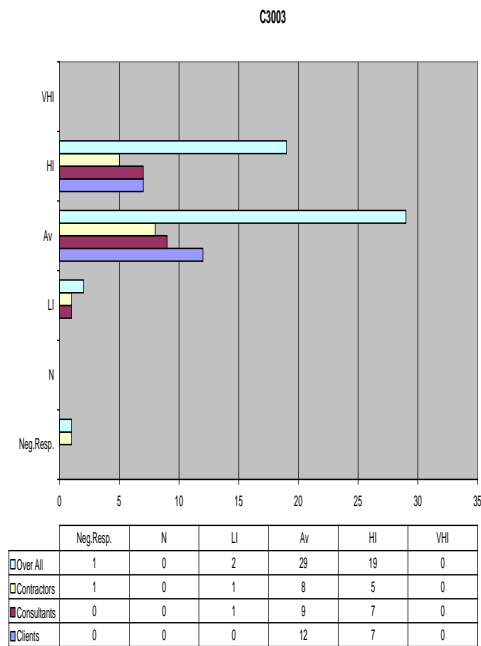


Figure 266 C3003

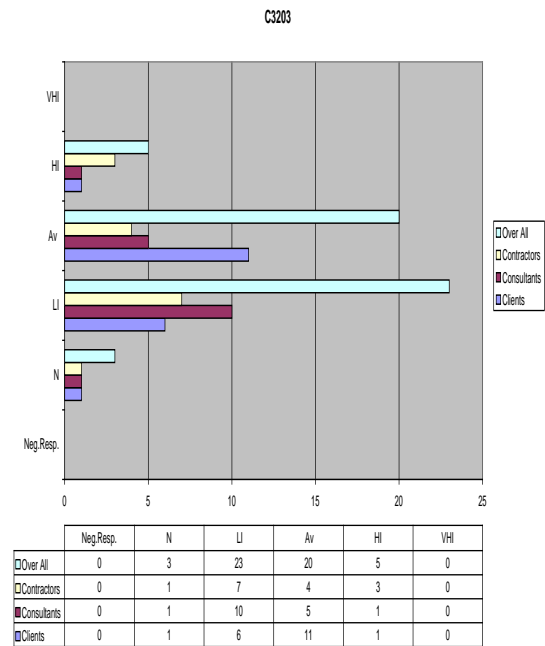


Figure 268 C3203

Y.2.5 CAUSE AVOIDABILITY/ CONTROLLABILITY ASSESSMENT:

Y.2.5.1 CAUSE AVOIDABILITY/CONTROLLABILITY TABLES:

Table 7-53 Causes of Claims & Disputes Avoidability Assessment (Comparison Table)

CAUSES OF CLAIMS & DISPUTES AVOIDABILITY ASSESSMENT													
NOTE THAT THE RED COLOUR INDICATES THE AVOIDABLE CAUSES; HOWEVER THE GREEN COLOUR INDICATES THE UNAVOIDABLE CAUSE OF CLAIMS & DISPUTES													
Cause Description	Code	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking
		Clients			Consultants			Contractors			Over All		
Inappropriate Contract Type (Strategy) - Cause Avoidability	C0507	4.21	84.21%	1	4.00	80.00%	4	4.33	86.67%	2	4.18	83.53%	1
Inadequate Brief - Cause Avoidability	C0307	4.11	82.11%	3	4.12	82.35%	1	4.27	85.33%	3	4.16	83.14%	2
Unclear & Inadequate Specifications - Cause Avoidability	C0407	4.00	80.00%	6	4.06	81.18%	2	4.40	88.00%	1	4.14	82.75%	3
Inappropriate Contract Form - Cause Avoidability	C0607	4.05	81.05%	4	4.06	81.18%	2	4.27	85.33%	3	4.12	82.35%	4
Incomplete Tender Information - Cause Avoidability	C0907	4.16	83.16%	2	3.94	78.82%	6	4.27	85.33%	3	4.12	82.35%	4
Inadequate/ Inaccurate Design Information - Cause Avoidability	C0107	4.05	81.05%	4	4.00	80.00%	4	4.13	82.67%	6	4.06	81.18%	6
Inadequate Design Documentation - Cause Avoidability	C0207	4.00	80.00%	6	3.76	75.29%	7	4.00	80.00%	7	3.92	78.43%	7
Inappropriate Payment Method - Cause Avoidability	C1307	3.79	75.79%	8	3.76	75.29%	7	3.67	73.33%	8	3.75	74.90%	8
Inadequate Contract Administration - Cause Avoidability	C0707	3.53	70.53%	9	3.53	70.59%	10	3.60	72.00%	9	3.55	70.98%	9
Inadequate Site Investigation - Cause Avoidability	C2407	3.53	70.53%	9	3.53	70.59%	10	3.60	72.00%	9	3.55	70.98%	9
Inappropriate Contractor Selection - Cause Avoidability	C1007	3.53	70.53%	9	3.53	70.59%	10	3.53	70.67%	11	3.53	70.59%	11
Inappropriate Document Control - Cause Avoidability	C1407	3.42	68.42%	12	3.65	72.94%	9	3.47	69.33%	14	3.51	70.20%	12
Unclear Risk Allocation - Cause Avoidability	C1207	3.37	67.37%	13	3.47	69.41%	13	3.53	70.67%	11	3.45	69.02%	13
Inadequate Contract Documentation - Cause Avoidability	C0807	3.35	67.06%	14	3.47	69.41%	13	3.53	70.67%	11	3.45	68.98%	14
Inappropriate/ Unexpected Quality Control (Target) - Cause Avoidability	C1707	3.32	66.32%	15	3.12	62.35%	15	3.27	65.33%	18	3.24	64.71%	15
Lack of Information for Decision Making - Cause Avoidability	C1907	3.11	62.11%	22	3.06	61.18%	19	3.47	69.33%	14	3.20	63.92%	16
Poor Communications Among Project Participants - Cause Avoidability	C1807	3.22	64.44%	16	3.00	60.00%	22	3.33	66.67%	16	3.18	63.60%	17
Lack of Competence of Project Participants - Cause Avoidability	C2207	3.16	63.16%	18	3.12	62.35%	15	3.27	65.33%	18	3.18	63.53%	18
Unrealistic Client Expectations - Cause Avoidability	C2607	3.16	63.16%	18	3.06	61.18%	19	3.27	65.33%	18	3.16	63.14%	19
Personality Clashes Among Project Participants - Cause Avoidability	C2807	3.05	61.05%	25	3.06	61.18%	19	3.33	66.67%	16	3.14	62.75%	20

Continued Table 7-53 Causes of Claims & Disputes Avoidability Assessment (Comparison Table)

CAUSES OF CLAIMS & DISPUTES AVOIDABILITY ASSESSMENT													
NOTE THAT THE RED COLOUR INDICATES THE AVOIDABLE CAUSES; HOWEVER THE GREEN COLOUR INDICATES THE UNAVOIDABLE CAUSE OF CLAIMS & DISPUTES													
Cause Description	Code	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking	Avoidability Avg. Mean	Avoidability Imp. Index	Avoidability Ranking
		Clients			Consultants			Contractors			Over All		
Unrealistic Tender Pricing - Cause Avoidability	C1107	3.11	62.22%	21	3.12	62.35%	15	3.13	62.67%	21	3.12	62.40%	21
Lack of Team Spirit Among Participants - Cause Avoidability	C2707	3.11	62.11%	22	3.12	62.35%	15	3.13	62.67%	21	3.12	62.35%	22
Unrealistic Expected Information by Contractor - Cause Avoidability	C2507	3.21	64.21%	17	2.88	57.65%	25	3.00	60.00%	24	3.04	60.78%	23
Inappropriate/ Unexpected Time Control (Target) - Cause Avoidability	C1507	3.00	60.00%	28	2.94	58.82%	23	3.07	61.33%	23	3.00	60.00%	24
Poor Management - Cause Avoidability	C2907	3.16	63.16%	18	2.82	56.47%	26	2.73	54.67%	29	2.92	58.43%	25
Poor Workmanship - Cause Avoidability	C2307	3.05	61.05%	25	2.82	56.47%	26	2.80	56.00%	27	2.90	58.04%	26
Adversarial (industry) Culture - Cause Avoidability	C3007	2.84	56.84%	29	2.94	58.82%	23	2.87	57.33%	25	2.88	57.65%	27
Inappropriate/ Unexpected Cost Control (Target) - Cause Avoidability	C1607	3.05	61.05%	25	2.71	54.12%	28	2.80	56.00%	27	2.86	57.25%	28
Exaggerated Claims - Cause Avoidability	C3207	3.11	62.11%	22	2.65	52.94%	30	2.73	54.67%	29	2.84	56.86%	29
Changes by Client - Cause Avoidability	C2107	2.79	55.79%	30	2.71	54.12%	28	2.87	57.33%	25	2.78	55.69%	30
Slow Client Response - Cause Avoidability	C2007	2.79	55.79%	30	2.47	49.41%	31	2.67	53.33%	31	2.65	52.94%	31
Uncontrollable External Events - Cause Avoidability	C3107	2.00	40.00%	32	2.12	42.35%	32	2.20	44.00%	32	2.10	41.96%	32

Table 7-54 Causes of Claims & Disputes (Avoidability Rank Agreement Factor Comparison)*

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.063	19.14%	80.86%
Clients & Contractors	2.656	16.60%	83.40%
Consultants & Contractors	2.156	13.48%	86.52%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.719	10.74%	89.26%
Consultants & Over All	1.719	10.74%	89.26%
Contractors & Over All	1.250	7.81%	92.19%

* RAF: Rank Agreement Factor, PD: Percentage of Disagreement and PA: Percentage of Agreement

Y.2.5.2 CAUSE AVOIDABILITY/CONTROLLABILITY BAR CHARTS:

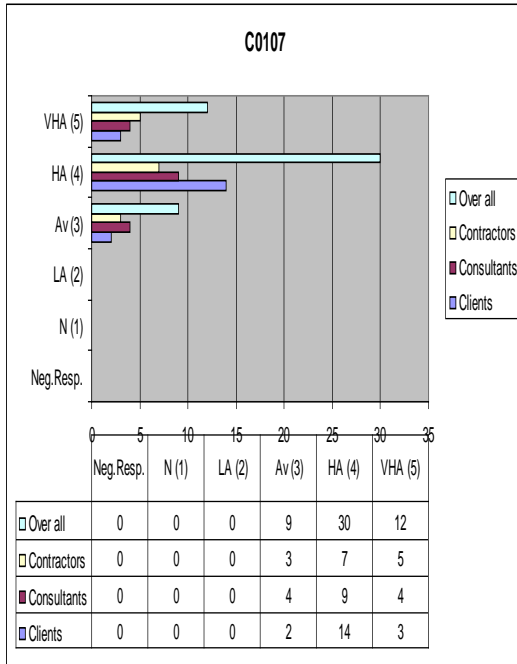


Figure 269 C0107

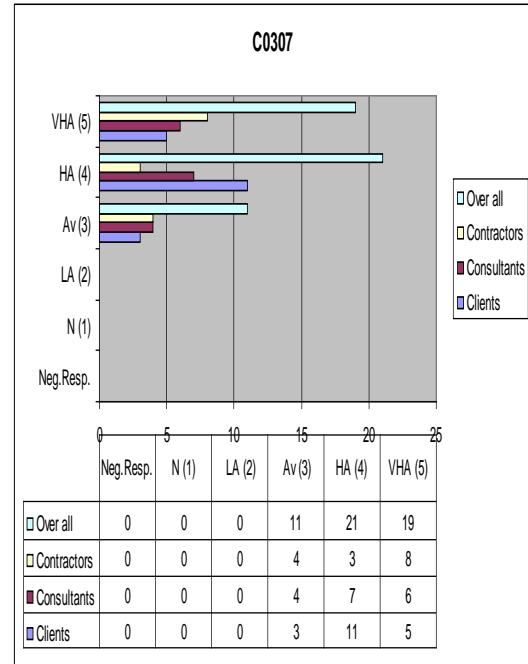


Figure 271 C0307

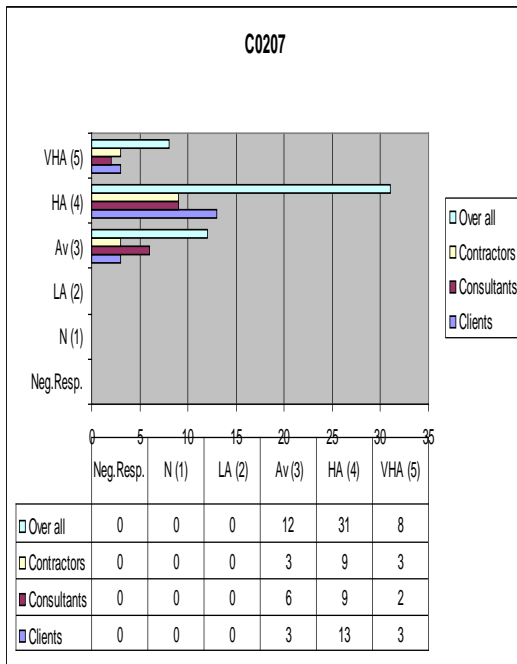


Figure 270 C0207

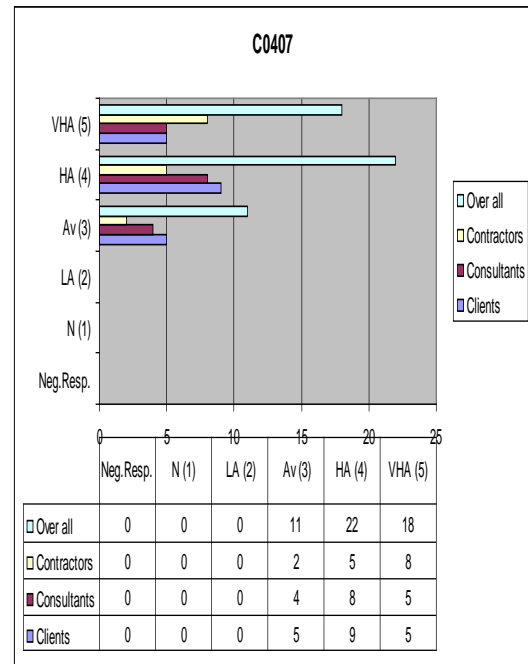


Figure 272 C0407

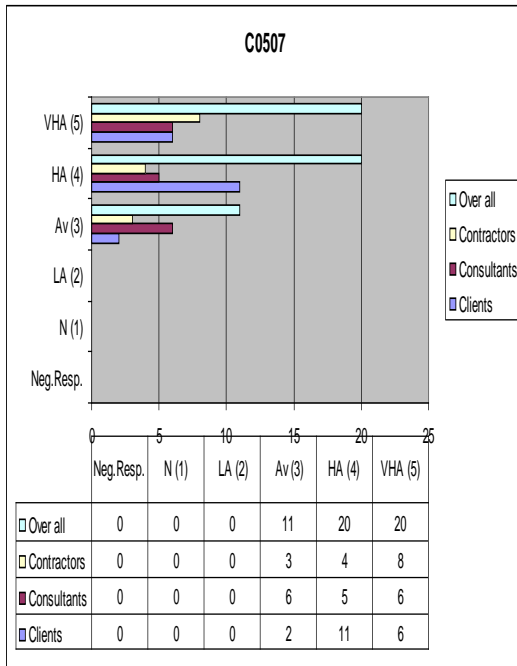


Figure 273 C05107

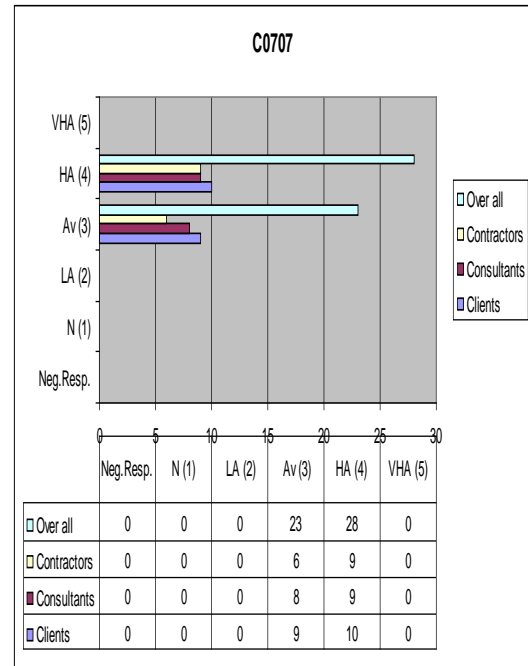


Figure 275 C0707

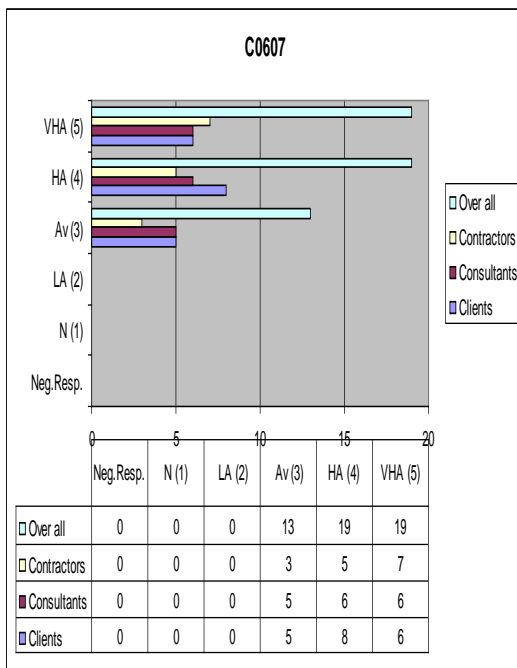


Figure 274 C0607

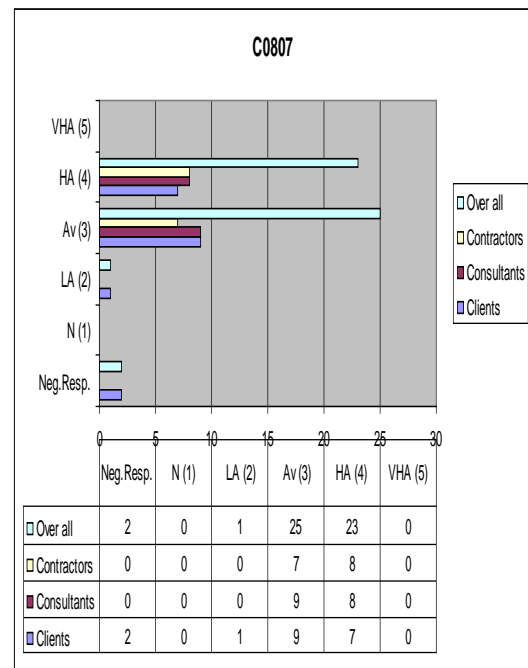


Figure 276 C0807

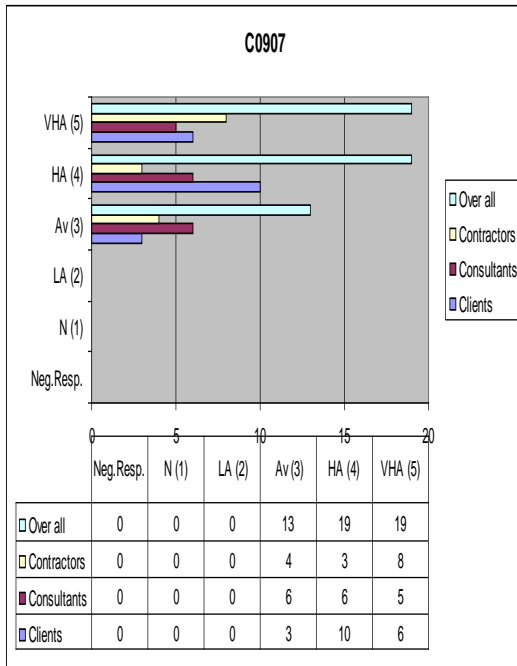


Figure 277 C0907

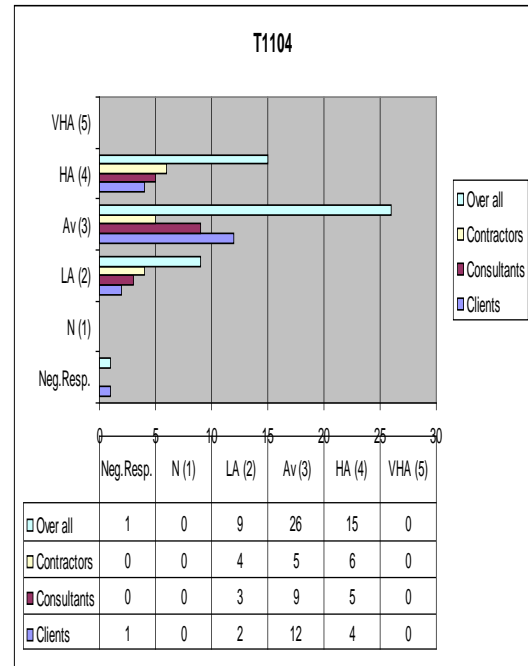


Figure 279 C1107

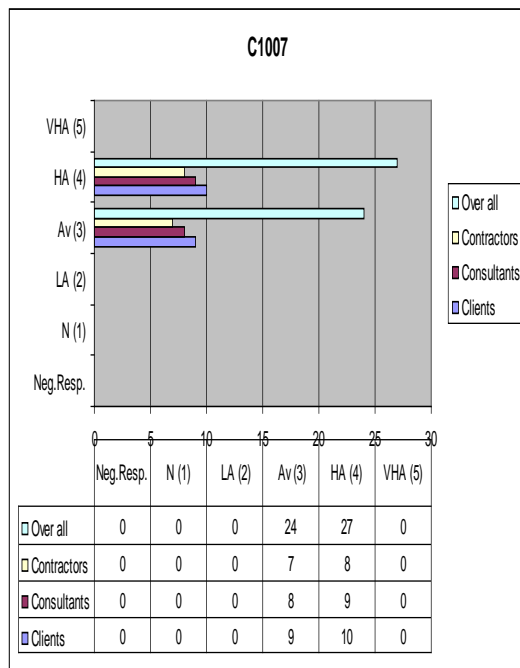


Figure 278 C1007

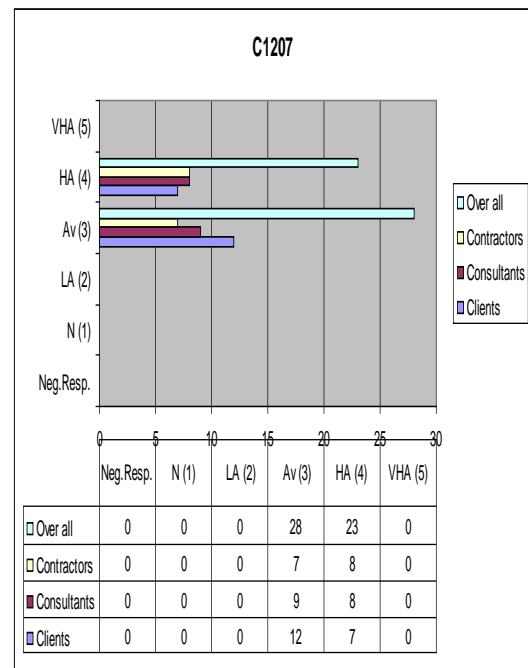


Figure 280 C1207

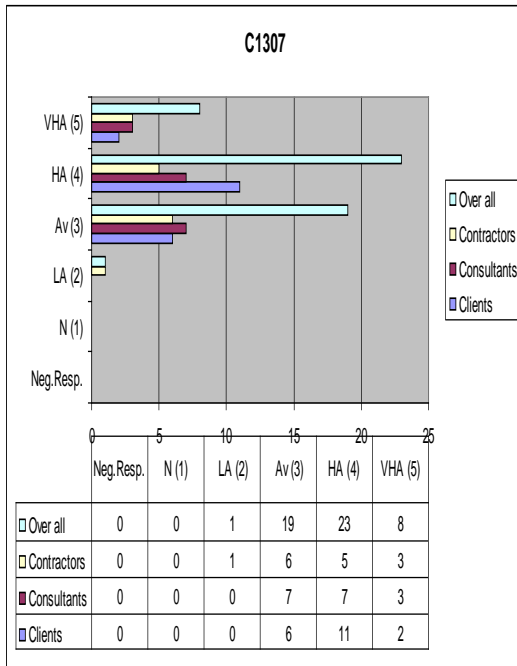


Figure 281 C1307

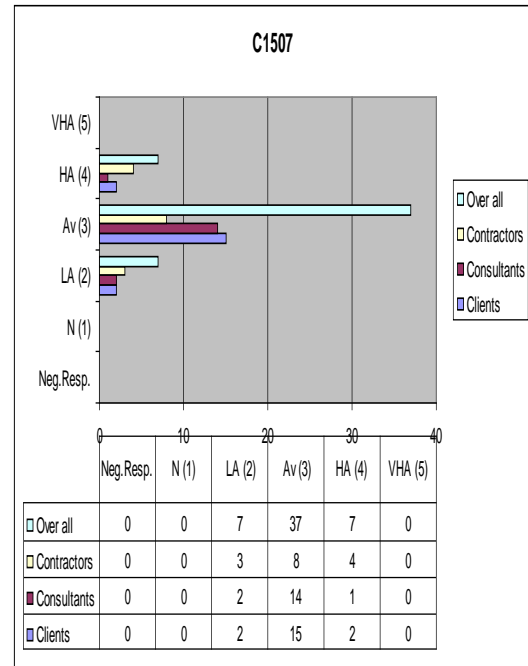


Figure 283 C1507

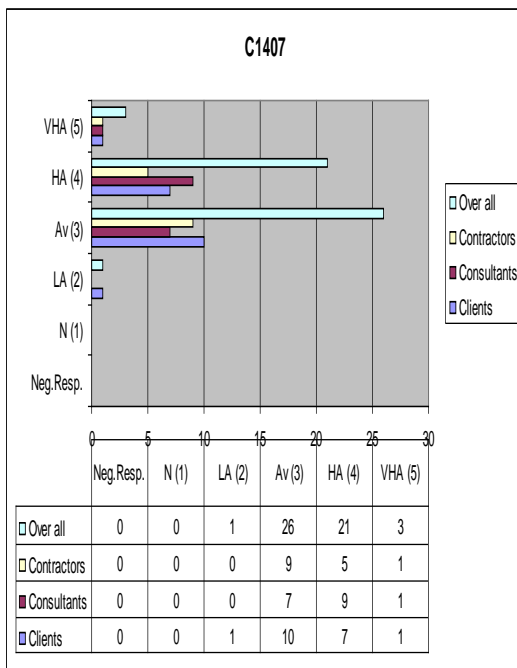


Figure 282 C1407

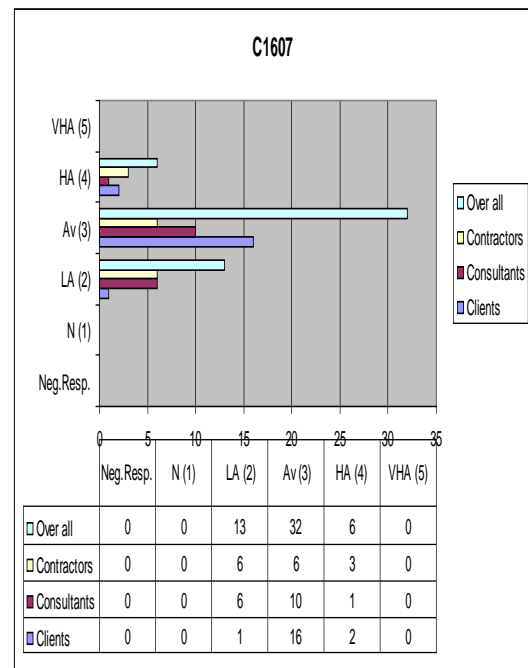


Figure 284 C1607

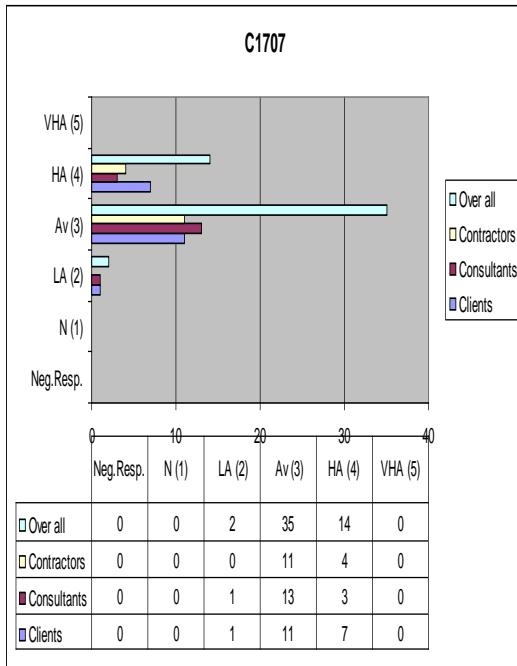


Figure 285 C1707

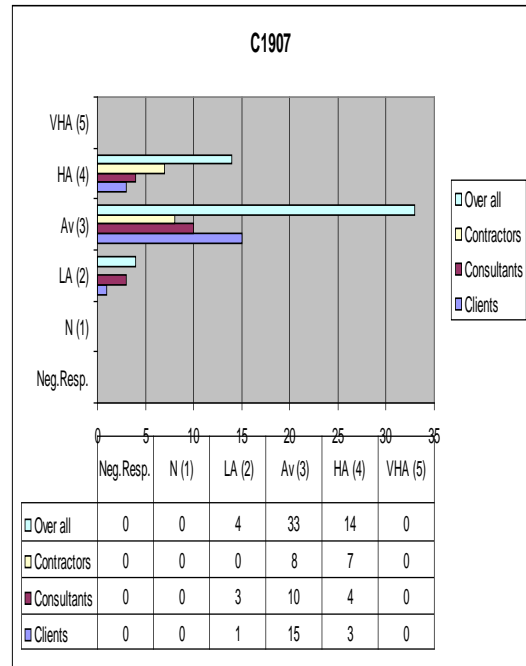


Figure 287 C1907

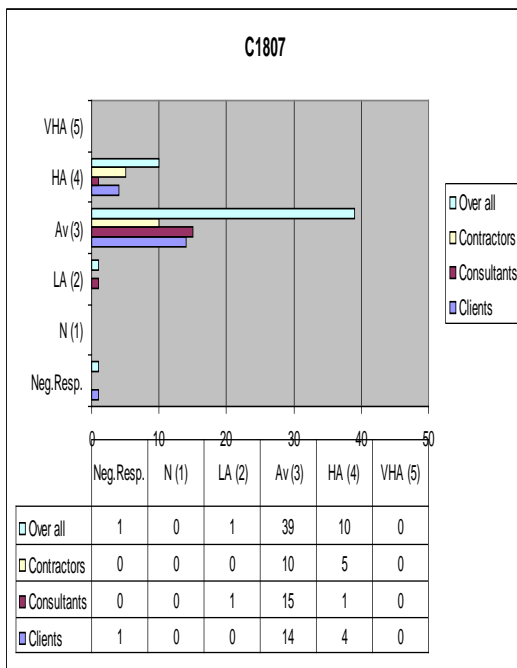


Figure 286 C1807

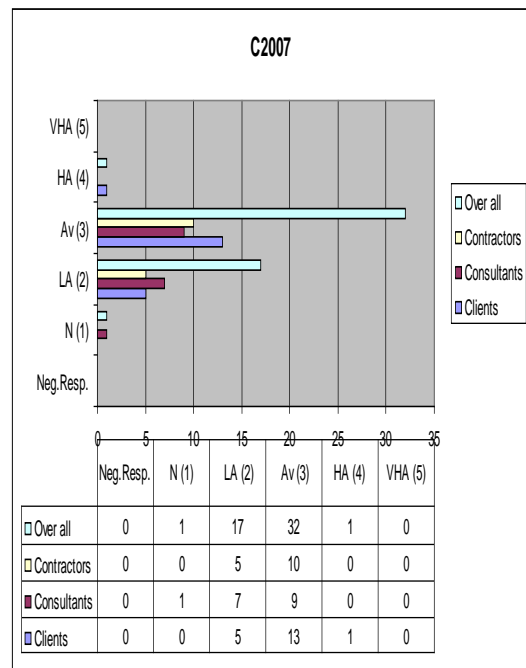


Figure 288 C2007

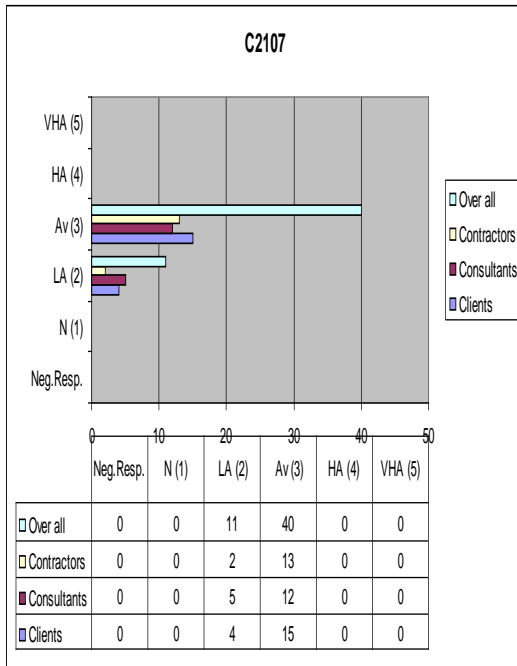


Figure 289 C2107

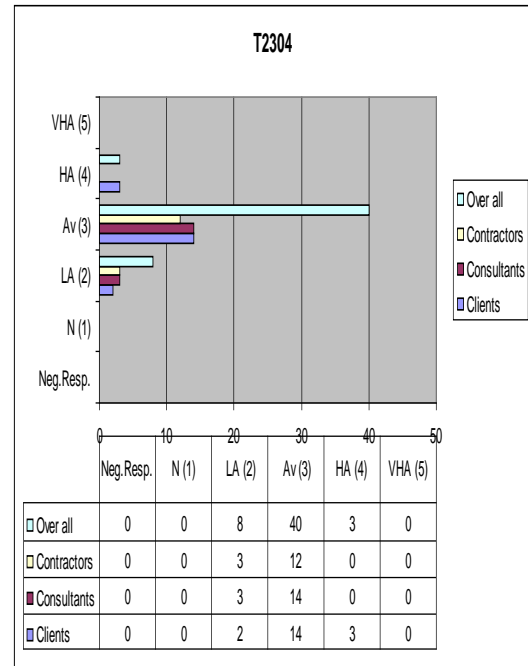


Figure 291 C2307

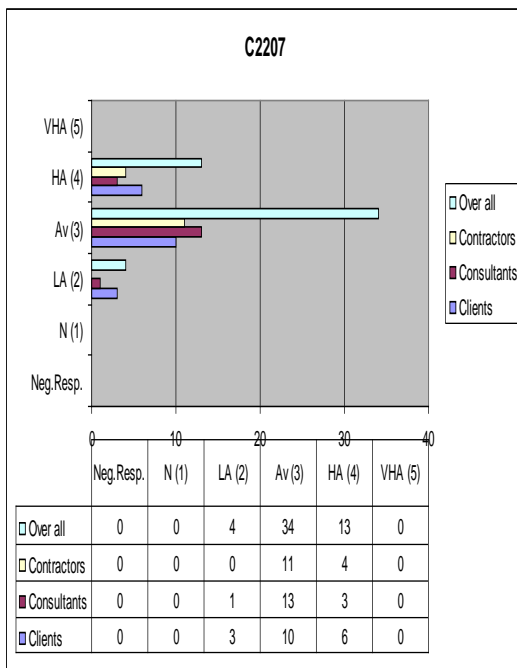


Figure 290 C2207

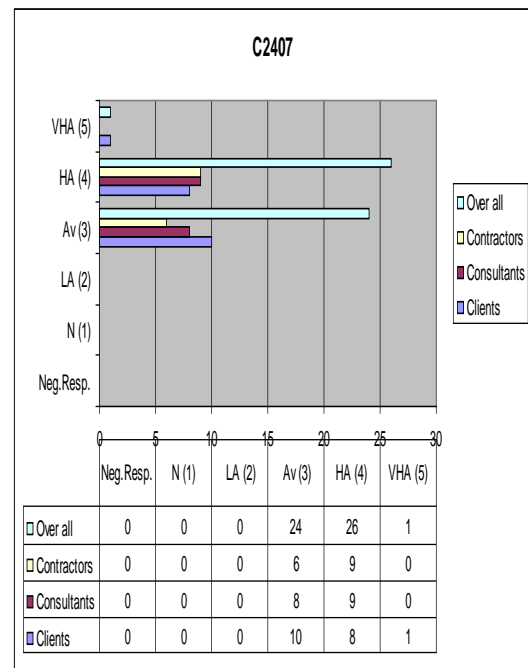


Figure 292 C2407

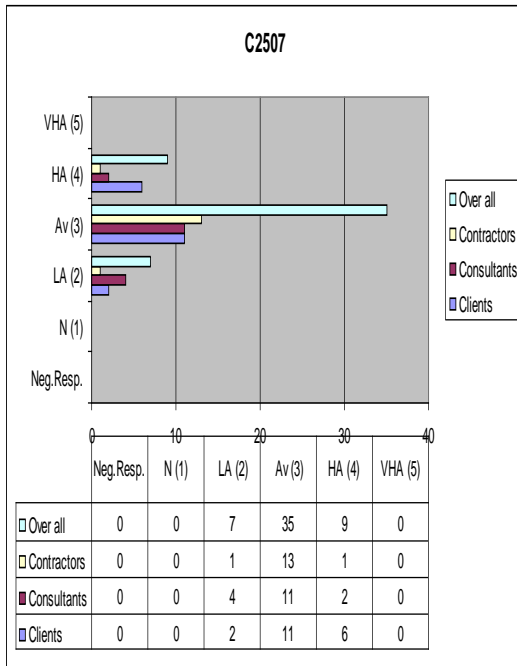


Figure 293 C2507

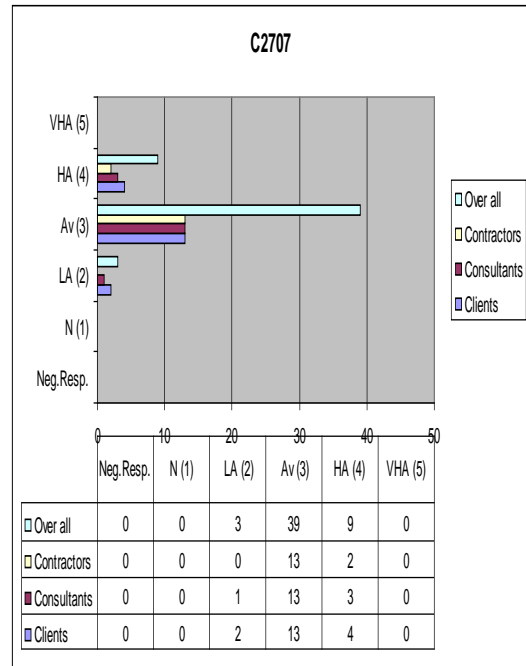


Figure 295 C2707

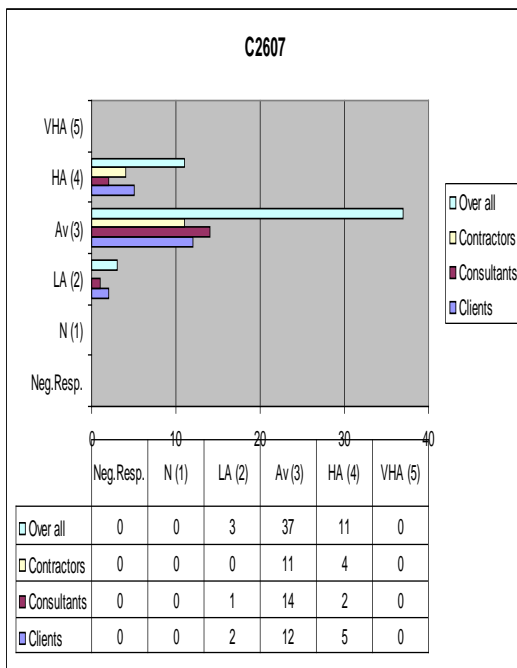


Figure 294 C2607

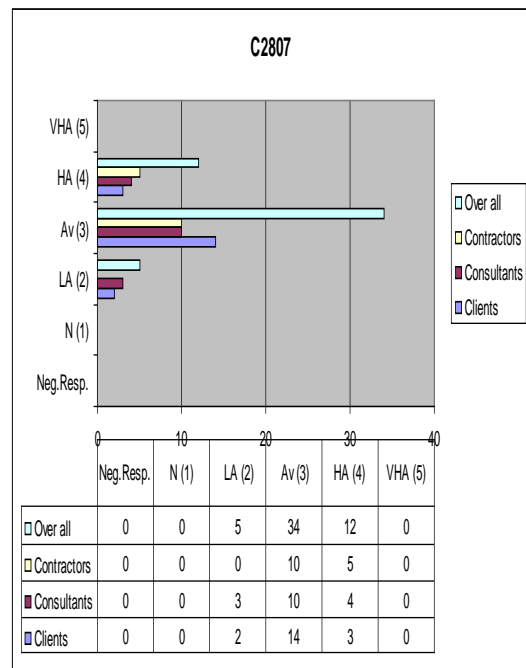


Figure 296 C2807

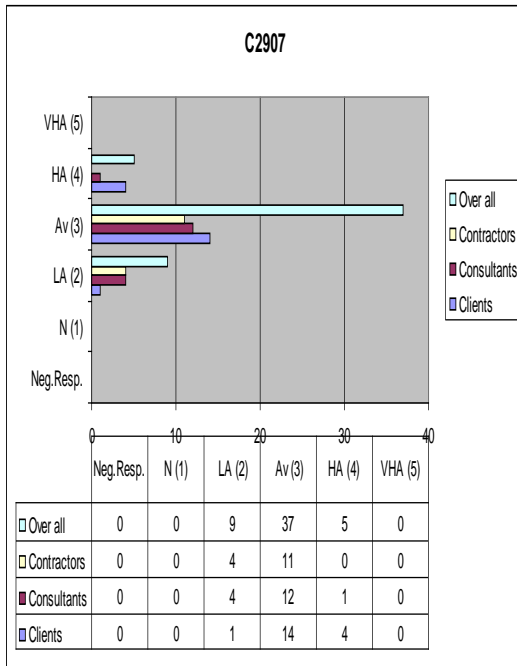


Figure 297 C2907

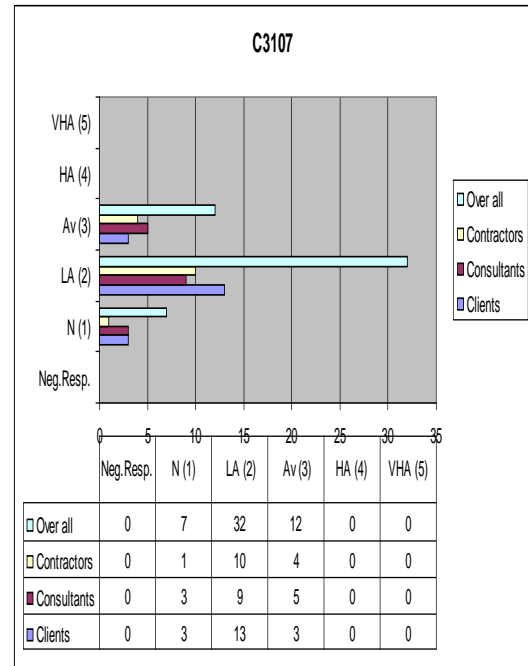


Figure 299 C3107

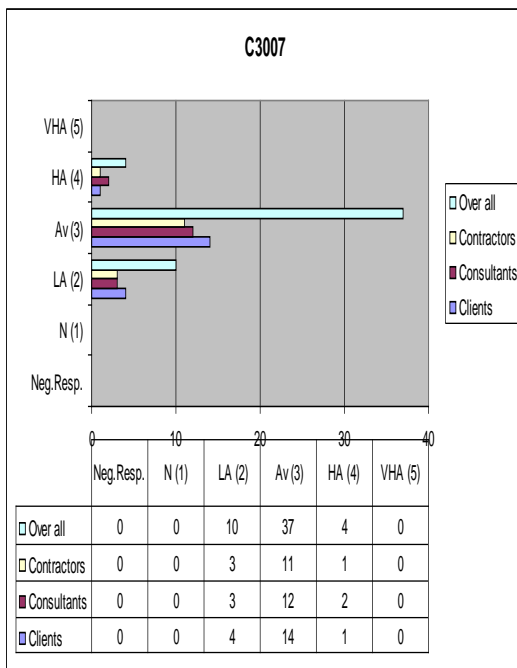


Figure 298 C3007

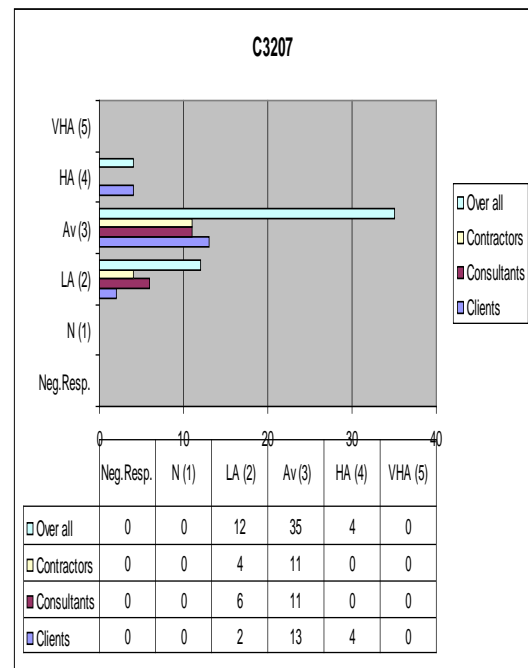


Figure 300 C3207

***Y.3 SIGNIFICANT CAUSES UNDER TYPES OF CLAIMS AND DISPUTES:
CAUSE SIGNIFICANCE ASSESSMENT (T01 C01-C32) – (T51 C01-
C32):***

Y.3.1 CAUSE SIGNIFICANCE TABLES:

Y.3.1.1 CAUSE SIGNIFICANCE ASSESSMENT: (T01 C01) – (T01 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T010C01	4.105	82.11%	1	4.235	84.71%	1	3.933	78.67%	1	4.098	81.96%	1
Inadequate Design Documentation	T010C02	3.579	71.58%	3	4.059	81.18%	2	3.800	76.00%	4	3.804	76.08%	2
Unclear & Inadequate Specifications	T010C04	3.684	73.68%	2	3.765	75.29%	3	3.867	77.33%	3	3.765	75.29%	3
Incomplete Tender Information	T010C09	3.526	70.53%	4	3.706	74.12%	4	3.933	78.67%	1	3.706	74.12%	4
Inadequate Brief	T010C03	3.474	69.47%	5	3.471	69.41%	6	3.600	72.00%	5	3.510	70.20%	5
Slow Client Response	T010C20	3.211	64.21%	6	3.625	72.50%	5	3.400	68.00%	6	3.400	68.00%	6
Inadequate contract documentation	T010C08	3.105	62.11%	8	3.294	65.88%	7	3.333	66.67%	7	3.235	64.71%	7
Poor Communications Among Project Participants	T010C18	3.105	62.11%	8	3.176	63.53%	8	3.133	62.67%	11	3.137	62.75%	8
Lack of Information for Decision Making;(Decisiveness)	T010C19	3.158	63.16%	7	3.059	61.18%	10	3.200	64.00%	8	3.137	62.75%	8
Inappropriate Contract Type (Strategy)	T010C05	3.105	62.11%	8	3.000	60.00%	12	2.733	54.67%	15	2.961	59.22%	10
Lack of Competence of Project Participants	T010C22	3.000	60.00%	11	3.059	61.18%	10	2.800	56.00%	14	2.961	59.22%	10
Inappropriate Contract Form	T010C06	3.000	60.00%	11	3.000	60.00%	12	1.929	38.57%	16	2.700	54.00%	12
Poor Management By One or More Project Participant	T010C29	2.053	41.05%	16	2.824	56.47%	14	3.200	64.00%	8	2.647	52.94%	13
Changes by Client	T010C21	1.526	30.53%	21	3.118	62.35%	9	3.200	64.00%	8	2.549	50.98%	14
Inadequate Site Investigation	T010C24	1.438	28.75%	26	2.824	56.47%	14	3.067	61.33%	13	2.438	48.75%	15
Unrealistic Client Expectations	T010C25	1.588	31.76%	18	2.059	41.18%	16	3.133	62.67%	11	2.224	44.49%	16
Unclear Risk Allocation	T010C12	3.000	60.00%	11	1.600	32.00%	18	1.786	35.71%	17	2.208	44.17%	17
Inadequate Contract administration	T010C07	2.684	53.68%	15	1.824	36.47%	17	1.733	34.67%	18	2.118	42.35%	18
Unrealistic Tender Pricing	T010C11	2.895	57.89%	14	1.471	29.41%	21	1.733	34.67%	18	2.078	41.57%	19
Poor Workmanship	T010C23	1.789	35.79%	17	1.588	31.76%	19	1.733	34.67%	18	1.706	34.12%	20
Lack of Team Spirit Among Participants	T010C27	1.588	31.76%	18	1.471	29.41%	21	1.333	26.67%	27	1.469	29.39%	21
Personality Clashes Among Project Participants	T010C28	1.529	30.59%	20	1.471	29.41%	21	1.400	28.00%	26	1.469	29.39%	21
Inappropriate Document Control	T010C14	1.389	27.78%	28	1.471	29.41%	21	1.533	30.67%	24	1.460	29.20%	23
Adversarial (industry) Culture Among Project Participants	T010C30	1.444	28.89%	25	1.471	29.41%	21	1.429	28.57%	25	1.449	28.98%	24
Inappropriate/ Unexpected Time Control (Target)	T010C15	1.375	27.50%	29	1.438	28.75%	26	1.533	30.67%	24	1.447	28.94%	25
Exaggerated Claims	T010C32	1.471	29.41%	24	1.529	30.59%	20	1.267	25.33%	29	1.429	28.57%	26
Inappropriate/ Unexpected Cost Control (Target)	T010C16	1.316	26.32%	30	1.412	28.24%	27	1.533	30.67%	24	1.412	28.24%	27
Inappropriate/ Unexpected Quality Control (Target)	T010C17	1.316	26.32%	30	1.400	28.00%	28	1.467	29.33%	24	1.388	27.76%	28
Unrealistic Information Expectations (By the Contractor)	T010C26	1.500	30.00%	22	1.333	26.67%	29	1.267	25.33%	29	1.375	27.50%	29
Inappropriate Payment Method	T010C13	1.412	28.24%	27	1.125	22.50%	31	1.333	26.67%	27	1.292	25.83%	30
Uncontrollable External Events	T010C31	1.278	25.56%	32	1.313	26.25%	30	1.200	24.00%	31	1.265	25.31%	31
Inappropriate Contractor Selection	T010C10	1.474	29.47%	23	1.125	22.50%	31	1.071	21.43%	32	1.245	24.90%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.375	21.09%	78.91%
Clients & Contractors	4.594	28.71%	71.29%
Consultants & Contractors	2.719	16.99%	83.01%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.781	17.38%	82.62%
Consultants & Over All	1.031	6.45%	93.55%
Contractors & Over All	2.375	14.84%	85.16%

Y.3.1.2 CAUSE SIGNIFICANCE ASSESSMENT: (T02 C01) – (T02 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T020C01	4.053	81.05%	1	4.176	83.53%	1	3.933	78.67%	1	4.059	81.18%	1
Inadequate Design Documentation	T020C02	3.684	73.68%	3	4.118	82.35%	2	3.933	78.67%	1	3.902	78.04%	2
Inadequate Brief	T020C03	3.368	67.37%	6	3.882	77.65%	4	3.800	76.00%	5	3.667	73.33%	3
Incomplete Tender Information	T020C09	3.526	70.53%	4	3.647	72.94%	6	3.867	77.33%	3	3.667	73.33%	3
Inappropriate/ Unexpected Time Control (Target)	T020C15	4.000	80.00%	2	3.471	69.41%	7	3.200	64.00%	11	3.588	71.76%	5
Slow Client Response	T020C20	3.263	65.26%	8	4.059	81.18%	3	3.333	66.67%	8	3.549	70.98%	6
Unclear & Inadequate Specifications	T020C04	3.368	67.37%	6	3.706	74.12%	5	3.400	68.00%	7	3.490	69.80%	7
Inadequate contract documentation	T020C08	3.105	62.11%	10	3.294	65.88%	9	3.867	77.33%	3	3.392	67.84%	8
Changes by Client	T020C21	3.158	63.16%	9	3.412	68.24%	8	3.600	72.00%	6	3.373	67.45%	9
Poor Communications Among Project Participants	T020C18	3.421	68.42%	5	2.875	57.50%	16	3.214	64.29%	10	3.184	63.67%	10
Lack of Information for Decision Making;(Decisiven	T020C19	2.895	57.89%	16	3.059	61.18%	10	3.286	65.71%	9	3.060	61.20%	11
Lack of Competence of Project A108	T020C22	2.947	58.95%	14	3.000	60.00%	11	3.133	62.67%	14	3.020	60.39%	12
Inappropriate/ Unexpected Quality Control (Target)	T020C17	3.053	61.05%	11	2.882	57.65%	15	3.067	61.33%	17	3.000	60.00%	13
Unrealistic Client Expectations	T020C25	3.000	60.00%	12	2.824	56.47%	17	3.200	64.00%	11	3.000	60.00%	13
Inappropriate Document Control	T020C14	2.842	56.84%	18	2.941	58.82%	13	3.200	64.00%	11	2.980	59.61%	15
Inappropriate/ Unexpected Cost Control (Target)	T020C16	2.789	55.79%	19	2.941	58.82%	13	3.133	62.67%	14	2.941	58.82%	16
Inappropriate Contract Type (Strategy)	T020C05	2.684	53.68%	21	3.000	60.00%	11	3.133	62.67%	14	2.922	58.43%	17
Lack of Team Spirit Among Participants	T020C27	2.947	58.95%	14	2.529	50.59%	23	2.933	58.67%	19	2.804	56.08%	18
Poor Management By One or More Project Participan	T020C29	2.722	54.44%	20	2.813	56.25%	18	2.600	52.00%	20	2.714	54.29%	19
Inappropriate Contract Form	T020C06	2.421	48.42%	22	2.706	54.12%	19	2.533	50.67%	21	2.549	50.98%	20
Inadequate Contract administration	T020C07	1.611	32.22%	25	2.647	52.94%	20	3.000	60.00%	18	2.367	47.35%	21
Personality Clashes Among Project Participants	T020C28	3.000	60.00%	12	1.706	34.12%	24	2.267	45.33%	23	2.353	47.06%	22
Unclear Risk Allocation	T020C12	2.333	46.67%	23	1.375	27.50%	31	2.467	49.33%	22	2.061	41.22%	23
Uncontrollable External Events	T020C31	2.895	57.89%	16	1.500	30.00%	26	1.286	25.71%	28	1.980	39.59%	24
Poor Workmanship	T020C23	1.316	26.32%	31	2.588	51.76%	21	1.769	35.38%	24	1.878	37.55%	25
Inadequate Site Investigation	T020C24	1.500	30.00%	27	2.563	51.25%	22	1.286	25.71%	28	1.792	35.83%	26
Adversarial (industry) Culture Among Project Participi	T020C30	1.750	35.00%	24	1.563	31.25%	25	1.500	30.00%	25	1.614	32.27%	27
Unrealistic Tender Pricing	T020C11	1.529	30.59%	26	1.500	30.00%	26	1.333	26.67%	27	1.458	29.17%	28
Exaggerated Claims	T020C32	1.471	29.41%	28	1.500	30.00%	26	1.286	25.71%	28	1.426	28.51%	29
Unrealistic Information Expectations (By the Contract	T020C26	1.294	25.88%	32	1.471	29.41%	29	1.400	28.00%	26	1.388	27.76%	30
Inappropriate Contractor Selection	T020C10	1.444	28.89%	29	1.467	29.33%	30	1.200	24.00%	32	1.375	27.50%	31
Inappropriate Payment Method	T020C13	1.444	28.89%	29	1.333	26.67%	32	1.231	24.62%	31	1.348	26.96%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.438	27.73%	72.27%
Clients & Contractors	3.75	23.44%	76.56%
Consultants & Contractors	2.75	17.19%	82.81%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.719	16.99%	83.01%
Consultants & Over All	2.344	14.65%	85.35%
Contractors & Over All	1.969	12.30%	87.70%

Y.3.1.3 CAUSE SIGNIFICANCE ASSESSMENT: (T03 C01) – (T03 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T030C01	4.053	81.05%	1	4.176	83.53%	1	3.933	78.67%	1	4.059	81.18%	1
Inadequate Design Documentation	T030C02	3.684	73.68%	2	4.059	81.18%	2	3.867	77.33%	2	3.863	77.25%	2
Unclear & Inadequate Specifications	T030C04	3.526	70.53%	3	3.412	68.24%	6	3.600	72.00%	4	3.510	70.20%	3
Incomplete Tender Information	T030C09	3.368	67.37%	4	3.294	65.88%	7	3.800	76.00%	3	3.471	69.41%	4
Inadequate Brief	T030C03	3.368	67.37%	4	3.471	69.41%	5	3.400	68.00%	5	3.412	68.24%	5
Slow Client Response	T030C20	3.158	63.16%	7	3.706	74.12%	3	3.333	66.67%	6	3.392	67.84%	6
Changes by Client	T030C21	3.263	65.26%	6	3.647	72.94%	4	3.200	64.00%	7	3.373	67.45%	7
Inadequate contract documentation	T030C08	2.947	58.95%	9	2.882	57.65%	8	3.133	62.67%	8	2.980	59.61%	8
Lack of Information for Decision Making;(Decisiveness)	T030C19	3.000	60.00%	8	2.706	54.12%	10	3.067	61.33%	9	2.918	58.37%	9
Inappropriate/ Unexpected Time Control (Target)	T030C15	2.500	50.00%	15	2.882	57.65%	8	2.533	50.67%	13	2.640	52.80%	10
Inappropriate Contract Type (Strategy)	T030C05	2.789	55.79%	13	2.588	51.76%	12	2.467	49.33%	14	2.627	52.55%	11
Poor Management By One or More Project Participants	T030C29	2.947	58.95%	9	2.059	41.18%	18	2.733	54.67%	11	2.588	51.76%	12
Lack of Competence of Project Participants	T030C22	2.421	48.42%	16	2.647	52.94%	11	2.667	53.33%	12	2.569	51.37%	13
Poor Communications Among Project Participants	T030C18	2.316	46.32%	18	2.588	51.76%	12	2.786	55.71%	10	2.540	50.80%	14
Unrealistic Client Expectations	T030C25	2.889	57.78%	12	2.235	44.71%	17	2.200	44.00%	16	2.460	49.20%	15
Inappropriate Contract Form	T030C06	2.684	53.68%	14	1.941	38.82%	19	2.267	45.33%	15	2.314	46.27%	16
Inappropriate Document Control	T030C14	2.278	45.56%	19	2.588	51.76%	12	1.857	37.14%	21	2.265	45.31%	17
Unclear Risk Allocation	T030C12	2.895	57.89%	11	1.294	25.88%	31	2.133	42.67%	18	2.137	42.75%	18
Uncontrollable External Events	T030C31	2.421	48.42%	16	1.667	33.33%	23	2.143	42.86%	17	2.104	42.08%	19
Inappropriate/ Unexpected Cost Control (Target)	T030C16	1.722	34.44%	24	2.529	50.59%	15	1.786	35.71%	22	2.020	40.41%	20
Personality Clashes Among Project Participants	T030C28	2.278	45.56%	19	1.765	35.29%	22	1.867	37.33%	19	1.980	39.60%	21
Lack of Team Spirit Among Participants	T030C27	1.778	35.56%	23	1.875	37.50%	21	1.867	37.33%	19	1.837	36.73%	22
Inappropriate/ Unexpected Quality Control (Target)	T030C17	1.333	26.67%	31	2.438	48.75%	16	1.533	30.67%	25	1.755	35.10%	23
Inadequate Site Investigation	T030C24	1.944	38.89%	22	1.533	30.67%	26	1.733	34.67%	23	1.750	35.00%	24
Exaggerated Claims	T030C32	2.105	42.11%	21	1.529	30.59%	27	1.267	25.33%	31	1.667	33.33%	25
Inadequate Contract administration	T030C07	1.500	30.00%	28	1.941	38.82%	19	1.500	30.00%	26	1.653	33.06%	26
Poor Workmanship	T030C23	1.647	32.94%	25	1.563	31.25%	25	1.429	28.57%	27	1.553	31.06%	27
Adversarial (industry) Culture Among Project Participants	T030C30	1.333	26.67%	31	1.588	31.76%	24	1.733	34.67%	23	1.540	30.80%	28
Unrealistic Tender Pricing	T030C11	1.556	31.11%	27	1.467	29.33%	28	1.400	28.00%	28	1.479	29.58%	29
Unrealistic Information Expectations (By the Contractor)	T030C26	1.632	32.63%	26	1.467	29.33%	28	1.267	25.33%	31	1.469	29.39%	30
Inappropriate Contractor Selection	T030C10	1.474	29.47%	29	1.400	28.00%	30	1.333	26.67%	30	1.408	28.16%	31
Inappropriate Payment Method	T030C13	1.444	28.89%	30	1.250	25.00%	32	1.357	27.14%	29	1.354	27.08%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.656	29.10%	70.90%
Clients & Contractors	2.563	16.02%	83.98%
Consultants & Contractors	3.344	20.90%	79.10%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.406	15.04%	84.96%
Consultants & Over All	2.75	17.19%	82.81%
Contractors & Over All	1.531	9.57%	90.43%

Y.3.1.4 CAUSE SIGNIFICANCE ASSESSMENT: (T04 C01) – (T04 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T040C01	4.053	81.05%	1	4.176	83.53%	1	3.933	78.67%	1	4.059	81.18%	1
Inadequate Design Documentation	T040C02	3.526	70.53%	3	4.059	81.18%	2	3.867	77.33%	2	3.804	76.08%	2
Unclear & Inadequate Specifications	T040C04	3.684	73.68%	2	3.647	72.94%	4	3.800	76.00%	3	3.706	74.12%	3
Incomplete Tender Information	T040C09	3.368	67.37%	4	3.471	69.41%	5	3.600	72.00%	4	3.471	69.41%	4
Inadequate Brief	T040C03	3.158	63.16%	5	3.706	74.12%	3	3.400	68.00%	5	3.412	68.24%	5
Inadequate contract documentation	T040C08	3.000	60.00%	8	3.235	64.71%	7	3.067	61.33%	9	3.100	62.00%	6
Slow Client Response	T040C20	3.158	63.16%	5	2.706	54.12%	10	3.333	66.67%	6	3.059	61.18%	7
Lack of Information for Decision Making;(Decisiveness)	T040C19	3.105	62.11%	7	2.882	57.65%	8	3.133	62.67%	8	3.039	60.78%	8
Changes by Client	T040C21	2.789	55.79%	12	2.647	52.94%	11	3.200	64.00%	7	2.863	57.25%	9
Inappropriate/ Unexpected Time Control (Target)	T040C15	2.684	53.68%	14	3.294	65.88%	6	2.286	45.71%	15	2.780	55.60%	10
Inappropriate Contract Type (Strategy)	T040C05	2.895	57.89%	10	2.625	52.50%	13	2.533	50.67%	13	2.700	54.00%	11
Poor Communications Among Project Participants	T040C18	2.947	58.95%	9	2.882	57.65%	8	2.133	42.67%	18	2.686	53.73%	12
Inappropriate Document Control	T040C14	2.895	57.89%	10	2.588	51.76%	14	2.200	44.00%	16	2.588	51.76%	13
Lack of Competence of Project Participants	T040C22	2.421	48.42%	15	2.647	52.94%	11	2.200	44.00%	16	2.431	48.63%	14
Unrealistic Client Expectations	T040C25	2.316	46.32%	18	2.313	46.25%	17	2.667	53.33%	12	2.420	48.40%	15
Poor Management By One or More Project Participant	T040C29	2.421	48.42%	15	2.059	41.18%	18	2.733	54.67%	10	2.392	47.84%	16
Unclear Risk Allocation	T040C12	2.789	55.79%	12	1.333	26.67%	31	2.733	54.67%	10	2.327	46.53%	17
Inappropriate/ Unexpected Cost Control (Target)	T040C16	2.211	44.21%	19	2.529	50.59%	15	1.867	37.33%	19	2.216	44.31%	18
Inappropriate Contract Form	T040C06	1.895	37.89%	22	1.941	38.82%	19	2.467	49.33%	14	2.078	41.57%	19
Poor Workmanship	T040C23	2.421	48.42%	15	1.824	36.47%	21	1.750	35.00%	22	2.042	40.83%	20
Inappropriate/ Unexpected Quality Control (Target)	T040C17	1.667	33.33%	25	2.353	47.06%	16	1.800	36.00%	21	1.940	38.80%	21
Lack of Team Spirit Among Participants	T040C27	2.211	44.21%	19	1.625	32.50%	23	1.533	30.67%	26	1.820	36.40%	22
Personality Clashes Among Project Participants	T040C28	2.111	42.22%	21	1.588	31.76%	24	1.571	31.43%	25	1.776	35.51%	23
Inadequate Contract administration	T040C07	1.611	32.22%	26	1.941	38.82%	19	1.733	34.67%	23	1.760	35.20%	24
Inadequate Site Investigation	T040C24	1.737	34.74%	23	1.813	36.25%	22	1.733	34.67%	23	1.760	35.20%	24
Uncontrollable External Events	T040C31	1.722	34.44%	24	1.529	30.59%	26	1.867	37.33%	19	1.700	34.00%	26
Inappropriate Contractor Selection	T040C10	1.611	32.22%	26	1.529	30.59%	26	1.333	26.67%	29	1.500	30.00%	27
Unrealistic Tender Pricing	T040C11	1.474	29.47%	28	1.529	30.59%	26	1.400	28.00%	27	1.471	29.41%	28
Unrealistic Information Expectations (By the Contractor)	T040C26	1.474	29.47%	28	1.412	28.24%	30	1.400	28.00%	27	1.431	28.63%	29
Adversarial (industry) Culture Among Project Participants	T040C30	1.421	28.42%	30	1.533	30.67%	25	1.267	25.33%	31	1.408	28.16%	30
Exaggerated Claims	T040C32	1.368	27.37%	31	1.529	30.59%	26	1.267	25.33%	31	1.392	27.84%	31
Inappropriate Payment Method	T040C13	1.316	26.32%	32	1.294	25.88%	32	1.333	26.67%	29	1.314	26.27%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.438	21.48%	78.52%
Clients & Contractors	2.813	17.58%	82.42%
Consultants & Contractors	3.938	24.61%	75.39%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.75	10.94%	89.06%
Consultants & Over All	2.313	14.45%	85.55%
Contractors & Over All	2.25	14.06%	85.94%

Y.3.1.5 CAUSE SIGNIFICANCE ASSESSMENT: (T05 C01) – (T05 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T050C01	3.474	69.47%	3	4.118	82.35%	1	3.933	78.67%	1	3.824	76.47%	1
Inadequate Design Documentation	T050C02	3.632	72.63%	2	4.000	80.00%	2	3.800	76.00%	3	3.804	76.08%	2
Unclear & Inadequate Specifications	T050C04	4.000	80.00%	1	3.412	68.24%	5	3.867	77.33%	2	3.765	75.29%	3
Inadequate Brief	T050C03	3.316	66.32%	4	3.588	71.76%	4	3.600	72.00%	4	3.490	69.80%	4
Inappropriate/ Unexpected Time Control (Target)	T050C15	3.053	61.05%	7	3.647	72.94%	3	3.333	66.67%	6	3.333	66.67%	5
Incomplete Tender Information	T050C09	3.105	62.11%	6	3.235	64.71%	6	3.400	68.00%	5	3.235	64.71%	6
Inadequate contract documentation	T050C08	3.158	63.16%	5	3.235	64.71%	6	3.200	64.00%	7	3.196	63.92%	7
Changes by Client	T050C21	2.947	58.95%	8	2.882	57.65%	8	3.133	62.67%	8	2.980	59.61%	8
Lack of Information for Decision Making;(Decisiveness)	T050C19	2.895	57.89%	10	2.882	57.65%	8	3.067	61.33%	9	2.941	58.82%	9
Poor Communications Among Project Participants	T050C18	2.789	55.79%	12	2.529	50.59%	15	2.733	54.67%	10	2.686	53.73%	10
Lack of Competence of Project Participants	T050C22	2.842	56.84%	11	2.706	54.12%	10	2.467	49.33%	14	2.686	53.73%	10
Inappropriate Contract Type (Strategy)	T050C05	2.684	53.68%	14	2.688	53.75%	11	2.533	50.67%	13	2.640	52.80%	12
Inappropriate/ Unexpected Quality Control (Target)	T050C17	2.947	58.95%	8	2.588	51.76%	12	2.286	45.71%	15	2.640	52.80%	12
Inappropriate Document Control	T050C14	2.444	48.89%	15	2.588	51.76%	12	2.714	54.29%	11	2.571	51.43%	14
Inappropriate/ Unexpected Cost Control (Target)	T050C16	2.444	48.89%	15	2.588	51.76%	12	2.667	53.33%	12	2.560	51.20%	15
Poor Workmanship	T050C23	2.789	55.79%	12	2.313	46.25%	17	2.133	42.67%	18	2.440	48.80%	16
Slow Client Response	T050C20	2.421	48.42%	17	2.438	48.75%	16	2.200	44.00%	16	2.360	47.20%	17
Inappropriate Contract Form	T050C06	2.105	42.11%	21	1.941	38.82%	19	1.867	37.33%	20	1.980	39.61%	18
Unrealistic Client Expectations	T050C25	1.632	32.63%	26	2.200	44.00%	18	2.200	44.00%	16	1.980	39.59%	19
Lack of Team Spirit Among Participants	T050C27	2.316	46.32%	18	1.625	32.50%	23	1.846	36.92%	22	1.958	39.17%	20
Personality Clashes Among Project Participants	T050C28	2.211	44.21%	19	1.615	32.31%	24	1.733	34.67%	23	1.894	37.87%	21
Inadequate Contract administration	T050C07	1.895	37.89%	22	1.824	36.47%	21	1.929	38.57%	19	1.880	37.60%	22
Uncontrollable External Events	T050C31	2.211	44.21%	19	1.563	31.25%	26	1.571	31.43%	25	1.816	36.33%	23
Poor Management By One or More Project Participant	T050C29	1.667	33.33%	25	1.941	38.82%	19	1.733	34.67%	23	1.780	35.60%	24
Inadequate Site Investigation	T050C24	1.737	34.74%	23	1.750	35.00%	22	1.857	37.14%	21	1.776	35.51%	25
Exaggerated Claims	T050C32	1.684	33.68%	24	1.563	31.25%	26	1.333	26.67%	30	1.540	30.80%	26
Adversarial (industry) Culture Among Project Participants	T050C30	1.474	29.47%	29	1.588	31.76%	25	1.533	30.67%	26	1.529	30.59%	27
Inappropriate Contractor Selection	T050C10	1.474	29.47%	29	1.563	31.25%	26	1.400	28.00%	27	1.480	29.60%	28
Unclear Risk Allocation	T050C12	1.556	31.11%	27	1.333	26.67%	31	1.357	27.14%	29	1.426	28.51%	29
Unrealistic Tender Pricing	T050C11	1.316	26.32%	32	1.500	30.00%	29	1.400	28.00%	27	1.400	28.00%	30
Unrealistic Information Expectations (By the Contractor)	T050C26	1.500	30.00%	28	1.412	28.24%	30	1.267	25.33%	31	1.396	27.92%	31
Inappropriate Payment Method	T050C13	1.368	27.37%	31	1.294	25.88%	32	1.267	25.33%	31	1.314	26.27%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.813	17.58%	82.42%
Clients & Contractors	2.781	17.38%	82.62%
Consultants & Contractors	1.594	9.96%	90.04%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.7813	11.13%	###
Consultants & Over All	1.4688	9.18%	###
Contractors & Over All	1.5625	9.77%	###

Y.3.1.6 CAUSE SIGNIFICANCE ASSESSMENT: (T06 C01) – (T06 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Incomplete Tender Information	T060C09	4.000	80.00%	1	4.059	81.18%	2	3.867	77.33%	3	3.980	79.61%	1
Inadequate/ Inaccurate Design Information	T060C01	3.842	76.84%	2	4.059	81.18%	2	3.933	78.67%	1	3.941	78.82%	2
Inadequate Design Documentation	T060C02	3.684	73.68%	3	3.941	78.82%	4	3.933	78.67%	1	3.843	76.86%	3
Inadequate Site Investigation	T060C24	3.474	69.47%	4	4.118	82.35%	1	3.400	68.00%	5	3.667	73.33%	4
Inadequate Brief	T060C03	3.211	64.21%	5	3.412	68.24%	5	3.867	77.33%	3	3.471	69.41%	5
Slow Client Response	T060C20	3.105	62.11%	7	3.235	64.71%	7	3.333	66.67%	6	3.216	64.31%	6
Lack of Information for Decision Making;(Decisive)	T060C19	2.947	58.95%	8	3.294	65.88%	6	3.133	62.67%	8	3.118	62.35%	7
Changes by Client	T060C21	3.158	63.16%	6	2.824	56.47%	8	3.214	64.29%	7	3.060	61.20%	8
Unclear & Inadequate Specifications	T060C04	2.944	58.89%	9	2.824	56.47%	8	3.133	62.67%	8	2.960	59.20%	9
Inadequate contract documentation	T060C08	2.895	57.89%	10	2.824	56.47%	8	3.133	62.67%	8	2.941	58.82%	10
Unrealistic Tender Pricing	T060C11	2.895	57.89%	10	2.800	56.00%	12	3.133	62.67%	8	2.939	58.78%	11
Inappropriate/ Unexpected Time Control (Target)	T060C15	2.842	56.84%	12	2.765	55.29%	13	2.933	58.67%	14	2.843	56.86%	12
Inappropriate/ Unexpected Cost Control (Target)	T060C16	2.833	56.67%	13	2.765	55.29%	13	2.933	58.67%	14	2.840	56.80%	13
Poor Communications Among Project Participants	T060C18	2.789	55.79%	15	2.529	50.59%	21	3.133	62.67%	8	2.804	56.08%	14
Poor Management By One or More Project Participan	T060C29	2.789	55.79%	15	2.706	54.12%	16	2.933	58.67%	14	2.804	56.08%	14
Unrealistic Information Expectations (By the Contrac	T060C26	2.824	56.47%	14	2.706	54.12%	16	2.867	57.33%	18	2.796	55.92%	16
Unclear Risk Allocation	T060C12	2.789	55.79%	15	2.529	50.59%	21	3.067	61.33%	13	2.784	55.69%	17
Inappropriate Contract Type (Strategy)	T060C05	2.684	53.68%	20	2.824	56.47%	8	2.533	50.67%	20	2.686	53.73%	18
Lack of Competence of Project Participants	T060C22	2.684	53.68%	20	2.765	55.29%	13	2.267	45.33%	22	2.588	51.76%	19
Lack of Team Spirit Among Participants	T060C27	2.737	54.74%	18	1.588	31.76%	24	2.933	58.67%	14	2.412	48.24%	20
Poor Workmanship	T060C23	2.722	54.44%	19	2.706	54.12%	16	1.533	30.67%	26	2.360	47.20%	21
Personality Clashes Among Project Participants	T060C28	2.421	48.42%	22	1.588	31.76%	24	2.786	55.71%	19	2.240	44.80%	22
Inappropriate Contract Form	T060C06	1.632	32.63%	26	2.647	52.94%	19	2.467	49.33%	21	2.216	44.31%	23
Uncontrollable External Events	T060C31	2.235	44.71%	23	1.235	24.71%	31	2.267	45.33%	22	1.898	37.96%	24
Inadequate Contract administration	T060C07	1.632	32.63%	25	2.588	51.76%	20	1.333	26.67%	29	1.896	37.92%	25
Unrealistic Client Expectations	T060C25	1.526	30.53%	27	2.267	45.33%	23	1.733	34.67%	24	1.816	36.33%	26
Adversarial (industry) Culture Among Project Participi	T060C30	1.824	36.47%	24	1.563	31.25%	26	1.400	28.00%	27	1.604	32.08%	27
Inappropriate Contractor Selection	T060C10	1.412	28.24%	29	1.529	30.59%	28	1.733	34.67%	24	1.551	31.02%	28
Inappropriate Document Control	T060C14	1.333	26.67%	32	1.471	29.41%	29	1.400	28.00%	27	1.400	28.00%	29
Inappropriate/ Unexpected Quality Control (Target)	T060C17	1.471	29.41%	28	1.412	28.24%	30	1.214	24.29%	31	1.375	27.50%	30
Exaggerated Claims	T060C32	1.368	27.37%	30	1.563	31.25%	26	1.071	21.43%	32	1.347	26.94%	31
Inappropriate Payment Method	T060C13	1.353	27.06%	31	1.200	24.00%	32	1.286	25.71%	30	1.283	25.65%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.031	18.95%	81.05%
Clients & Contractors	2.5	15.63%	84.38%
Consultants & Contractors	4.031	25.20%	74.80%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.063	6.64%	93.36%
Consultants & Over All	2.406	15.04%	84.96%
Contractors & Over All	2.188	13.67%	86.33%

Y.3.1.7 CAUSE SIGNIFICANCE ASSESSMENT: (T07 C01) – (T07 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate Design Documentation	T070C02	3.895	77.89%	1	3.824	76.47%	2	3.933	78.67%	1	3.882	77.65%	1
Inadequate/ Inaccurate Design Information	T070C01	3.579	71.58%	2	4.118	82.35%	1	3.400	68.00%	4	3.706	74.12%	2
Incomplete Tender Information	T070C09	3.158	63.16%	4	3.765	75.29%	3	3.933	78.67%	1	3.588	71.76%	3
Inadequate Brief	T070C03	3.526	70.53%	3	3.471	69.41%	4	3.400	68.00%	4	3.471	69.41%	4
Inadequate contract documentation	T070C08	3.053	61.05%	7	3.176	63.53%	6	3.867	77.33%	3	3.333	66.67%	5
Unclear & Inadequate Specifications	T070C04	3.105	62.11%	6	3.412	68.24%	5	3.400	68.00%	4	3.294	65.88%	6
Changes by Client	T070C21	3.000	60.00%	8	3.059	61.18%	7	3.133	62.67%	7	3.060	61.20%	7
Inappropriate/ Unexpected Time Control (Target)	T070C15	3.105	62.11%	5	2.824	56.47%	8	3.133	62.67%	7	3.020	60.39%	8
Inappropriate/ Unexpected Cost Control (Target)	T070C16	3.000	60.00%	8	2.765	55.29%	9	2.933	58.67%	11	2.900	58.00%	9
Inappropriate/ Unexpected Quality Control (Target)	T070C17	2.789	55.79%	13	2.765	55.29%	9	3.067	61.33%	9	2.863	57.25%	10
Poor Communications Among Project Participants	T070C18	2.944	58.89%	10	2.706	54.12%	11	2.933	58.67%	11	2.860	57.20%	11
Lack of Information for Decision Making;(Decisiveness)	T070C19	2.895	57.89%	11	2.647	52.94%	12	2.800	56.00%	14	2.784	55.69%	12
Lack of Competence of Project Participants	T070C22	2.632	52.63%	15	2.647	52.94%	12	2.400	48.00%	15	2.569	51.37%	13
Personality Clashes Among Project Participants	T070C28	2.250	45.00%	16	2.471	49.41%	15	3.000	60.00%	10	2.563	51.25%	14
Poor Management By One or More Project Participant	T070C29	1.875	37.50%	17	2.333	46.67%	16	2.933	58.67%	11	2.370	47.39%	15
Slow Client Response	T070C20	2.842	56.84%	12	2.647	52.94%	12	1.333	26.67%	24	2.333	46.67%	16
Unrealistic Client Expectations	T070C25	2.737	54.74%	14	1.941	38.82%	17	1.733	34.67%	19	2.176	43.53%	17
Adversarial (industry) Culture Among Project Participants	T070C30	1.778	35.56%	18	1.600	32.00%	19	2.385	47.69%	16	1.891	37.83%	18
Unclear Risk Allocation	T070C12	1.444	28.89%	26	1.529	30.59%	23	2.000	40.00%	17	1.633	32.65%	19
Inappropriate Contract Type (Strategy)	T070C05	1.526	30.53%	22	1.588	31.76%	20	1.733	34.67%	19	1.608	32.16%	20
Inappropriate Document Control	T070C14	1.474	29.47%	24	1.529	30.59%	23	1.692	33.85%	21	1.551	31.02%	21
Inappropriate Contractor Selection	T070C10	1.625	32.50%	20	1.533	30.67%	21	1.429	28.57%	23	1.533	30.67%	22
Unrealistic Tender Pricing	T070C11	1.353	27.06%	29	1.267	25.33%	29	2.000	40.00%	18	1.522	30.43%	23
Unrealistic Information Expectations (By the Contractor)	T070C26	1.556	31.11%	21	1.643	32.86%	18	1.333	26.67%	24	1.511	30.21%	24
Inappropriate Contract Form	T070C06	1.688	33.75%	19	1.533	30.67%	21	1.267	25.33%	27	1.500	30.00%	25
Poor Workmanship	T070C23	1.444	28.89%	26	1.529	30.59%	23	1.533	30.67%	22	1.500	30.00%	25
Uncontrollable External Events	T070C31	1.500	30.00%	23	1.400	28.00%	28	1.267	25.33%	27	1.396	27.92%	27
Inadequate Site Investigation	T070C24	1.474	29.47%	24	1.471	29.41%	26	1.200	24.00%	31	1.392	27.84%	28
Lack of Team Spirit Among Participants	T070C27	1.353	27.06%	29	1.412	28.24%	27	1.308	26.15%	26	1.362	27.23%	29
Inadequate Contract administration	T070C07	1.368	27.37%	28	1.267	25.33%	29	1.267	25.33%	27	1.306	26.12%	30
Inappropriate Payment Method	T070C13	1.278	25.56%	31	1.176	23.53%	32	1.214	24.29%	30	1.224	24.49%	31
Exaggerated Claims	T070C32	1.211	24.21%	32	1.267	25.33%	29	1.200	24.00%	31	1.224	24.49%	31

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	1.719	10.74%	89.26%
Clients & Contractors	3.688	23.05%	76.95%
Consultants & Contractors	2.906	18.16%	81.84%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.125	13.28%	86.72%
Consultants & Over All	1.469	9.18%	90.82%
Contractors & Over All	1.875	11.72%	88.28%

Y.3.1.8 CAUSE SIGNIFICANCE ASSESSMENT: (T08 C01) – (T08 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T080C01	4.053	81.05%	1	4.176	83.53%	1	3.933	78.67%	1	4.059	81.18%	1
Inadequate contract documentation	T080C08	4.000	80.00%	2	4.000	80.00%	4	3.933	78.67%	1	3.980	79.61%	2
Inadequate Site Investigation	T080C24	3.947	78.95%	3	4.000	80.00%	4	3.867	77.33%	5	3.941	78.82%	3
Incomplete Tender Information	T080C09	3.684	73.68%	4	4.118	82.35%	2	3.867	77.33%	5	3.882	77.65%	4
Inadequate Design Documentation	T080C02	3.579	71.58%	5	4.059	81.18%	3	3.933	78.67%	1	3.843	76.86%	5
Inappropriate/ Unexpected Time Control (Target)	T080C15	3.158	63.16%	8	3.765	75.29%	6	3.933	78.67%	1	3.588	71.76%	6
Inappropriate/ Unexpected Cost Control (Target)	T080C16	3.526	70.53%	6	3.706	74.12%	7	3.400	68.00%	8	3.549	70.98%	7
Poor Management By One or More Project Participan	T080C29	3.053	61.05%	9	3.412	68.24%	8	3.857	77.14%	7	3.400	68.00%	8
Inadequate Brief	T080C03	2.944	58.89%	11	3.353	67.06%	9	3.400	68.00%	8	3.220	64.40%	9
Poor Communications Among Project Participants	T080C18	3.474	69.47%	7	2.824	56.47%	11	3.133	62.67%	10	3.157	63.14%	10
Inappropriate/ Unexpected Quality Control (Target)	T080C17	3.053	61.05%	9	2.824	56.47%	11	3.133	62.67%	10	3.000	60.00%	11
Unclear & Inadequate Specifications	T080C04	2.895	57.89%	12	2.882	57.65%	10	3.133	62.67%	10	2.961	59.22%	12
Slow Client Response	T080C20	2.789	55.79%	15	2.800	56.00%	13	3.133	62.67%	10	2.898	57.96%	13
Changes by Client	T080C21	2.895	57.89%	12	2.765	55.29%	14	2.933	58.67%	15	2.863	57.25%	14
Unrealistic Client Expectations	T080C25	2.895	57.89%	12	2.765	55.29%	14	2.933	58.67%	15	2.863	57.25%	14
Lack of Information for Decision Making;(Decisiven	T080C19	2.789	55.79%	15	2.706	54.12%	16	3.000	60.00%	14	2.824	56.47%	16
Unclear Risk Allocation	T080C12	2.722	54.44%	19	2.706	54.12%	16	2.933	58.67%	15	2.780	55.60%	17
Lack of Competence of Project Participants	T080C22	2.737	54.74%	17	2.706	54.12%	16	2.000	40.00%	21	2.510	50.20%	18
Unrealistic Information Expectations (By the Contrac	T080C26	1.667	33.33%	22	2.688	53.75%	19	2.933	58.67%	15	2.388	47.76%	19
Personality Clashes Among Project Participants	T080C28	2.737	54.74%	17	2.375	47.50%	20	1.733	34.67%	22	2.320	46.40%	20
Adversarial (industry) Culture Among Project Particip	T080C30	1.800	36.00%	21	1.563	31.25%	21	2.800	56.00%	19	2.043	40.87%	21
Uncontrollable External Events	T080C31	1.529	30.59%	23	1.529	30.59%	22	2.286	45.71%	20	1.750	35.00%	22
Inappropriate Contract Form	T080C06	2.333	46.67%	20	1.529	30.59%	22	1.357	27.14%	25	1.739	34.78%	23
Inappropriate Contractor Selection	T080C10	1.500	30.00%	24	1.500	30.00%	25	1.571	31.43%	24	1.521	30.42%	24
Poor Workmanship	T080C23	1.474	29.47%	25	1.412	28.24%	28	1.714	34.29%	23	1.520	30.40%	25
Inappropriate Contract Type (Strategy)	T080C05	1.421	28.42%	28	1.529	30.59%	22	1.333	26.67%	26	1.431	28.63%	26
Inadequate Contract administration	T080C07	1.444	28.89%	27	1.500	30.00%	25	1.333	26.67%	26	1.429	28.57%	27
Lack of Team Spirit Among Participants	T080C27	1.474	29.47%	25	1.375	27.50%	29	1.200	24.00%	31	1.360	27.20%	28
Inappropriate Document Control	T080C14	1.278	25.56%	32	1.467	29.33%	27	1.267	25.33%	30	1.333	26.67%	29
Exaggerated Claims	T080C32	1.368	27.37%	31	1.313	26.25%	30	1.267	25.33%	28	1.320	26.40%	30
Unrealistic Tender Pricing	T080C11	1.400	28.00%	29	1.235	24.71%	31	1.267	25.33%	28	1.298	25.96%	31
Inappropriate Payment Method	T080C13	1.389	27.78%	30	1.235	24.71%	31	1.200	24.00%	31	1.280	25.60%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.063	12.89%	87.11%
Clients & Contractors	2.75	17.19%	82.81%
Consultants & Contractors	2.063	12.89%	87.11%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	1.375	8.59%	91.41%
Consultants & Over All	0.875	5.47%	94.53%
Contractors & Over All	1.75	10.94%	89.06%

Y.3.1.9 CAUSE SIGNIFICANCE ASSESSMENT: (T09 C01) – (T09 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T090C01	3.684	73.68%	1	3.941	78.82%	2	3.933	78.67%	1	3.843	76.86%	1
Inadequate Site Investigation	T090C24	3.579	71.58%	2	4.059	81.18%	1	3.933	78.67%	1	3.843	76.86%	1
Incomplete Tender Information	T090C09	3.526	70.53%	3	3.824	76.47%	4	3.933	78.67%	1	3.745	74.90%	3
Inadequate Brief	T090C03	3.474	69.47%	4	3.765	75.29%	5	3.933	78.67%	1	3.706	74.12%	4
Inadequate Design Documentation	T090C02	3.474	69.47%	4	3.882	77.65%	3	3.733	74.67%	5	3.686	73.73%	5
Inadequate contract documentation	T090C08	3.474	69.47%	4	3.706	74.12%	6	3.400	68.00%	8	3.529	70.59%	6
Changes by Client	T090C21	2.947	58.95%	9	3.471	69.41%	7	3.667	73.33%	6	3.333	66.67%	7
Unclear & Inadequate Specifications	T090C04	3.263	65.26%	7	3.353	67.06%	8	3.267	65.33%	9	3.294	65.88%	8
Poor Communications Among Project Participants	T090C18	2.895	57.89%	10	2.824	56.47%	9	3.533	70.67%	7	3.059	61.18%	9
Inappropriate/ Unexpected Time Control (Target)	T090C15	3.158	63.16%	8	2.824	56.47%	9	3.067	61.33%	11	3.020	60.39%	10
Slow Client Response	T090C20	2.895	57.89%	10	2.824	56.47%	9	3.133	62.67%	10	2.941	58.82%	11
Inappropriate/ Unexpected Cost Control (Target)	T090C16	2.895	57.89%	10	2.824	56.47%	9	3.000	60.00%	12	2.902	58.04%	12
Unrealistic Client Expectations	T090C25	2.895	57.89%	10	2.765	55.29%	13	2.933	58.67%	14	2.863	57.25%	13
Inappropriate/ Unexpected Quality Control (Target)	T090C17	2.789	55.79%	15	2.765	55.29%	13	3.000	60.00%	12	2.840	56.80%	14
Lack of Information for Decision Making;(Decisiven	T090C19	2.789	55.79%	15	2.765	55.29%	13	2.933	58.67%	14	2.824	56.47%	15
Poor Management By One or More Project Participan	T090C29	2.842	56.84%	14	2.688	53.75%	17	2.867	57.33%	16	2.800	56.00%	16
Lack of Competence of Project Participants	T090C22	2.789	55.79%	15	2.706	54.12%	16	1.867	37.33%	19	2.490	49.80%	17
Adversarial (industry) Culture Among Project Particip	T090C30	1.647	32.94%	21	2.235	44.71%	18	2.800	56.00%	17	2.204	44.08%	18
Uncontrollable External Events	T090C31	2.111	42.22%	18	1.625	32.50%	19	1.733	34.67%	22	1.837	36.73%	19
Inappropriate Contract Type (Strategy)	T090C05	1.647	32.94%	21	1.588	31.76%	20	2.071	41.43%	18	1.750	35.00%	20
Inappropriate Contractor Selection	T090C10	1.688	33.75%	19	1.571	31.43%	21	1.786	35.71%	21	1.682	33.64%	21
Inappropriate Document Control	T090C14	1.667	33.33%	20	1.529	30.59%	22	1.733	34.67%	22	1.638	32.77%	22
Unrealistic Information Expectations (By the Contrac	T090C26	1.588	31.76%	25	1.467	29.33%	24	1.800	36.00%	20	1.617	32.34%	23
Personality Clashes Among Project Participants	T090C28	1.611	32.22%	24	1.412	28.24%	26	1.733	34.67%	22	1.580	31.60%	24
Inappropriate Contract Form	T090C06	1.647	32.94%	21	1.375	27.50%	28	1.583	31.67%	25	1.533	30.67%	25
Poor Workmanship	T090C23	1.474	29.47%	27	1.500	30.00%	23	1.333	26.67%	27	1.440	28.80%	26
Lack of Team Spirit Among Participants	T090C27	1.526	30.53%	26	1.438	28.75%	25	1.333	26.67%	27	1.440	28.80%	26
Unrealistic Tender Pricing	T090C11	1.389	27.78%	28	1.313	26.25%	30	1.267	25.33%	30	1.327	26.53%	28
Inadequate Contract administration	T090C07	1.211	24.21%	32	1.353	27.06%	29	1.429	28.57%	26	1.320	26.40%	29
Unclear Risk Allocation	T090C12	1.353	27.06%	29	1.267	25.33%	31	1.333	26.67%	27	1.319	26.38%	30
Exaggerated Claims	T090C32	1.333	26.67%	30	1.385	27.69%	27	1.200	24.00%	32	1.304	26.09%	31
Inappropriate Payment Method	T090C13	1.316	26.32%	31	1.176	23.53%	32	1.267	25.33%	30	1.255	25.10%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	1.875	11.72%	88.28%
Clients & Contractors	2.438	15.23%	84.77%
Consultants & Contractors	2.063	12.89%	87.11%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	1.344	8.40%	91.60%
Consultants & Over All	1.031	6.45%	93.55%
Contractors & Over All	1.344	8.40%	91.60%

Y.3.1.10 CAUSE SIGNIFICANCE ASSESSMENT: (T10 C01) – (T10 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate Design Documentation	T100C02	3.611	72.22%	1	3.824	76.47%	2	4.000	80.00%	1	3.800	76.00%	1
Inadequate/ Inaccurate Design Information	T100C01	3.526	70.53%	4	3.882	77.65%	1	3.933	78.67%	2	3.765	75.29%	2
Inadequate Brief	T100C03	3.579	71.58%	2	3.765	75.29%	3	3.933	78.67%	2	3.745	74.90%	3
Incomplete Tender Information	T100C09	3.579	71.58%	2	3.765	75.29%	3	3.933	78.67%	2	3.745	74.90%	3
Unclear & Inadequate Specifications	T100C04	3.526	70.53%	4	3.706	74.12%	5	3.800	76.00%	6	3.667	73.33%	5
Inadequate contract documentation	T100C08	3.158	63.16%	8	3.706	74.12%	5	3.933	78.67%	2	3.569	71.37%	6
Changes by Client	T100C21	3.526	70.53%	4	3.412	68.24%	8	3.533	70.67%	7	3.490	69.80%	7
Slow Client Response	T100C20	3.474	69.47%	7	3.471	69.41%	7	3.400	68.00%	9	3.451	69.02%	8
Inadequate Site Investigation	T100C24	3.158	63.16%	8	3.412	68.24%	8	3.467	69.33%	8	3.333	66.67%	9
Inadequate Contract administration	T100C07	3.105	62.11%	10	3.353	67.06%	11	3.400	68.00%	9	3.275	65.49%	10
Inappropriate Contractor Selection	T100C10	3.105	62.11%	10	3.235	64.71%	12	3.400	68.00%	9	3.235	64.71%	11
Inappropriate/ Unexpected Time Control (Target)	T100C15	3.105	62.11%	10	3.059	61.18%	13	3.400	68.00%	9	3.176	63.53%	12
Uncontrollable External Events	T100C31	2.737	54.74%	21	3.412	68.24%	8	3.333	66.67%	13	3.137	62.75%	13
Poor Communications Among Project Participants	T100C18	3.053	61.05%	13	2.824	56.47%	14	3.133	62.67%	15	3.000	60.00%	14
Poor Management By One or More Project Participan	T100C29	3.000	60.00%	14	2.813	56.25%	17	3.200	64.00%	14	3.000	60.00%	14
Lack of Competence of Project Participants	T100C22	2.833	56.67%	19	2.824	56.47%	14	3.133	62.67%	15	2.920	58.40%	16
Lack of Information for Decision Making;(Decisiven	T100C19	2.824	56.47%	20	2.824	56.47%	14	3.133	62.67%	15	2.918	58.37%	17
Inappropriate Contract Type (Strategy)	T100C05	2.947	58.95%	15	2.813	56.25%	17	2.933	58.67%	20	2.900	58.00%	18
Inappropriate/ Unexpected Cost Control (Target)	T100C16	2.895	57.89%	16	2.647	52.94%	21	3.000	60.00%	19	2.843	56.86%	19
Unrealistic Client Expectations	T100C25	2.842	56.84%	17	2.647	52.94%	21	2.933	58.67%	20	2.804	56.08%	20
Inappropriate Contract Form	T100C06	1.500	30.00%	26	2.813	56.25%	17	3.071	61.43%	18	2.396	47.92%	21
Unrealistic Tender Pricing	T100C11	1.526	30.53%	25	2.765	55.29%	20	2.800	56.00%	22	2.314	46.27%	22
Adversarial (industry) Culture Among Project Participi	T100C30	2.842	56.84%	17	1.563	31.25%	24	1.714	34.29%	25	2.102	42.04%	23
Unclear Risk Allocation	T100C12	2.737	54.74%	21	1.500	30.00%	25	1.533	30.67%	26	1.980	39.60%	24
Inappropriate Document Control	T100C14	1.563	31.25%	24	1.500	30.00%	25	1.750	35.00%	24	1.591	31.82%	25
Poor Workmanship	T100C23	1.471	29.41%	27	1.471	29.41%	27	1.769	35.38%	23	1.553	31.06%	26
Personality Clashes Among Project Participants	T100C28	1.471	29.41%	27	1.588	31.76%	23	1.400	28.00%	27	1.490	29.80%	27
Inappropriate Payment Method	T100C13	1.737	34.74%	23	1.313	26.25%	30	1.286	25.71%	29	1.469	29.39%	28
Lack of Team Spirit Among Participants	T100C27	1.471	29.41%	27	1.313	26.25%	30	1.357	27.14%	28	1.383	27.66%	29
Inappropriate/ Unexpected Quality Control (Target)	T100C17	1.333	26.67%	30	1.471	29.41%	27	1.286	25.71%	29	1.367	27.35%	30
Unrealistic Information Expectations (By the Contract	T100C26	1.222	24.44%	32	1.412	28.24%	29	1.214	24.29%	32	1.286	25.71%	31
Exaggerated Claims	T100C32	1.235	24.71%	31	1.235	24.71%	32	1.231	24.62%	31	1.234	24.68%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.313	20.70%	79.30%
Clients & Contractors	2.625	16.41%	83.59%
Consultants & Contractors	1.875	11.72%	88.28%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.094	13.09%	86.91%
Consultants & Over All	1.469	9.18%	90.82%
Contractors & Over All	1.156	7.23%	92.77%

Y.3.1.11 CAUSE SIGNIFICANCE ASSESSMENT: (T11 C01) – (T11 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate Site Investigation	T110C24	3.684	73.68%	1	4.059	81.18%	1	3.733	74.67%	5	3.824	76.47%	1
Inadequate Design Documentation	T110C02	3.611	72.22%	2	3.882	77.65%	3	3.933	78.67%	1	3.800	76.00%	2
Inadequate/ Inaccurate Design Information	T110C01	3.526	70.53%	4	3.941	78.82%	2	3.933	78.67%	1	3.784	75.69%	3
Incomplete Tender Information	T110C09	3.474	69.47%	5	3.824	76.47%	4	3.933	78.67%	1	3.725	74.51%	4
Inadequate contract documentation	T110C08	3.474	69.47%	5	3.765	75.29%	5	3.133	62.67%	8	3.471	69.41%	5
Inadequate Brief	T110C03	2.944	58.89%	8	3.471	69.41%	7	3.933	78.67%	1	3.420	68.40%	6
Unrealistic Information Expectations (By the Contract)	T110C26	3.579	71.58%	3	3.706	74.12%	6	1.714	34.29%	22	3.100	62.00%	7
Unclear & Inadequate Specifications	T110C04	3.158	63.16%	7	2.824	56.47%	8	3.133	62.67%	8	3.039	60.78%	8
Changes by Client	T110C21	2.833	56.67%	13	2.765	55.29%	10	3.533	70.67%	6	3.020	60.40%	9
Slow Client Response	T110C20	2.895	57.89%	10	2.824	56.47%	8	3.400	68.00%	7	3.020	60.39%	10
Poor Management By One or More Project Participants	T110C29	2.895	57.89%	10	2.750	55.00%	11	3.133	62.67%	8	2.920	58.40%	11
Poor Communications Among Project Participants	T110C18	2.944	58.89%	8	2.706	54.12%	13	2.933	58.67%	11	2.860	57.20%	12
Lack of Information for Decision Making;(Decisiveness)	T110C19	2.842	56.84%	12	2.706	54.12%	13	2.933	58.67%	11	2.824	56.47%	13
Uncontrollable External Events	T110C31	2.778	55.56%	15	2.733	54.67%	12	2.933	58.67%	11	2.813	56.25%	14
Lack of Competence of Project Participants	T110C22	2.789	55.79%	14	2.647	52.94%	15	1.846	36.92%	19	2.490	49.80%	15
Inappropriate Contractor Selection	T110C10	1.526	30.53%	26	1.688	33.75%	16	2.933	58.67%	11	2.000	40.00%	16
Inappropriate/ Unexpected Time Control (Target)	T110C15	1.632	32.63%	20	1.563	31.25%	18	2.933	58.67%	11	2.000	40.00%	16
Inappropriate Document Control	T110C14	1.750	35.00%	16	1.588	31.76%	17	1.800	36.00%	20	1.708	34.17%	18
Unrealistic Client Expectations	T110C25	1.632	32.63%	20	1.529	30.59%	21	1.857	37.14%	17	1.660	33.20%	19
Adversarial (industry) Culture Among Project Participants	T110C30	1.667	33.33%	18	1.438	28.75%	24	1.857	37.14%	17	1.646	32.92%	20
Poor Workmanship	T110C23	1.579	31.58%	24	1.533	30.67%	20	1.714	34.29%	22	1.604	32.08%	21
Inadequate Contract administration	T110C07	1.667	33.33%	18	1.375	27.50%	27	1.692	33.85%	24	1.574	31.49%	22
Inappropriate Contract Type (Strategy)	T110C05	1.526	30.53%	26	1.412	28.24%	25	1.800	36.00%	20	1.569	31.37%	23
Inappropriate/ Unexpected Cost Control (Target)	T110C16	1.278	25.56%	32	1.563	31.25%	18	1.867	37.33%	16	1.551	31.02%	24
Unrealistic Tender Pricing	T110C11	1.684	33.68%	17	1.353	27.06%	28	1.538	30.77%	25	1.531	30.61%	25
Lack of Team Spirit Among Participants	T110C27	1.625	32.50%	23	1.500	30.00%	22	1.333	26.67%	27	1.489	29.79%	26
Personality Clashes Among Project Participants	T110C28	1.529	30.59%	25	1.500	30.00%	22	1.333	26.67%	27	1.458	29.17%	27
Inappropriate Contract Form	T110C06	1.474	29.47%	28	1.412	28.24%	25	1.400	28.00%	26	1.431	28.63%	28
Unclear Risk Allocation	T110C12	1.632	32.63%	20	1.353	27.06%	28	1.267	25.33%	32	1.431	28.63%	28
Inappropriate Payment Method	T110C13	1.316	26.32%	31	1.353	27.06%	28	1.286	25.71%	29	1.320	26.40%	30
Inappropriate/ Unexpected Quality Control (Target)	T110C17	1.368	27.37%	29	1.294	25.88%	31	1.286	25.71%	29	1.320	26.40%	30
Exaggerated Claims	T110C32	1.333	26.67%	30	1.294	25.88%	31	1.286	25.71%	29	1.306	26.12%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.281	20.51%	79.49%
Clients & Contractors	5	31.25%	68.75%
Consultants & Contractors	3.531	22.07%	77.93%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.594	16.21%	83.79%
Consultants & Over All	1.625	10.16%	89.84%
Contractors & Over All	2.969	18.55%	81.45%

Y.3.1.12 CAUSE SIGNIFICANCE ASSESSMENT: (T12 C01) – (T12 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate Site Investigation	T120C24	3.684	73.68%	1	4.059	81.18%	1	3.733	74.67%	5	3.824	76.47%	1
Inadequate Design Documentation	T120C02	3.579	71.58%	2	3.882	77.65%	3	3.933	78.67%	1	3.784	75.69%	2
Inadequate/ Inaccurate Design Information	T120C01	3.474	69.47%	4	3.941	78.82%	2	3.933	78.67%	1	3.765	75.29%	3
Incomplete Tender Information	T120C09	3.474	69.47%	4	3.824	76.47%	4	3.933	78.67%	1	3.725	74.51%	4
Inadequate contract documentation	T120C08	3.474	69.47%	4	3.765	75.29%	5	3.133	62.67%	8	3.471	69.41%	5
Inadequate Brief	T120C03	2.944	58.89%	8	3.471	69.41%	7	3.933	78.67%	1	3.420	68.40%	6
Unrealistic Information Expectations (By the Contract)	T120C26	3.526	70.53%	3	3.706	74.12%	6	1.769	35.38%	22	3.122	62.45%	7
Unclear & Inadequate Specifications	T120C04	3.158	63.16%	7	2.824	56.47%	8	3.133	62.67%	8	3.039	60.78%	8
Changes by Client	T120C21	2.789	55.79%	13	2.800	56.00%	10	3.533	70.67%	6	3.020	60.41%	9
Slow Client Response	T120C20	2.842	56.84%	11	2.813	56.25%	9	3.400	68.00%	7	3.000	60.00%	10
Poor Management By One or More Project Participants	T120C29	2.895	57.89%	9	2.765	55.29%	11	3.133	62.67%	8	2.922	58.43%	11
Poor Communications Among Project Participants	T120C18	2.895	57.89%	9	2.706	54.12%	12	2.933	58.67%	12	2.843	56.86%	12
Lack of Information for Decision Making;(Decisiveness)	T120C19	2.842	56.84%	11	2.647	52.94%	14	2.933	58.67%	12	2.804	56.08%	13
Uncontrollable External Events	T120C31	2.737	54.74%	15	2.706	54.12%	12	2.933	58.67%	12	2.784	55.69%	14
Lack of Competence of Project Participants	T120C22	2.789	55.79%	13	2.647	52.94%	14	1.857	37.14%	18	2.480	49.60%	15
Inappropriate Contractor Selection	T120C10	1.526	30.53%	27	1.615	32.31%	16	3.077	61.54%	11	2.000	40.00%	16
Inappropriate/ Unexpected Time Control (Target)	T120C15	1.632	32.63%	18	1.588	31.76%	17	2.933	58.67%	12	2.000	40.00%	16
Inappropriate Document Control	T120C14	1.706	34.12%	16	1.588	31.76%	17	1.800	36.00%	20	1.694	33.88%	18
Unrealistic Client Expectations	T120C25	1.632	32.63%	18	1.529	30.59%	19	1.867	37.33%	17	1.667	33.33%	19
Adversarial (industry) Culture Among Project Participants	T120C30	1.632	32.63%	18	1.471	29.41%	22	1.857	37.14%	18	1.640	32.80%	20
Poor Workmanship	T120C23	1.579	31.58%	23	1.529	30.59%	19	1.714	34.29%	23	1.600	32.00%	21
Inappropriate Contract Type (Strategy)	T120C05	1.556	31.11%	26	1.412	28.24%	25	1.800	36.00%	20	1.580	31.60%	22
Inadequate Contract administration	T120C07	1.632	32.63%	18	1.375	27.50%	27	1.692	33.85%	24	1.563	31.25%	23
Unrealistic Tender Pricing	T120C11	1.667	33.33%	17	1.357	27.14%	28	1.533	30.67%	25	1.532	30.64%	24
Inappropriate/ Unexpected Cost Control (Target)	T120C16	1.263	25.26%	32	1.529	30.59%	19	1.867	37.33%	16	1.529	30.59%	25
Lack of Team Spirit Among Participants	T120C27	1.579	31.58%	23	1.471	29.41%	22	1.333	26.67%	27	1.471	29.41%	26
Personality Clashes Among Project Participants	T120C28	1.563	31.25%	25	1.471	29.41%	22	1.333	26.67%	27	1.458	29.17%	27
Inappropriate Contract Form	T120C06	1.474	29.47%	28	1.400	28.00%	26	1.455	29.09%	26	1.444	28.89%	28
Unclear Risk Allocation	T120C12	1.632	32.63%	18	1.353	27.06%	29	1.286	25.71%	29	1.440	28.80%	29
Inappropriate/ Unexpected Quality Control (Target)	T120C17	1.368	27.37%	29	1.313	26.25%	31	1.286	25.71%	29	1.327	26.53%	30
Inappropriate Payment Method	T120C13	1.316	26.32%	31	1.353	27.06%	29	1.286	25.71%	29	1.320	26.40%	31
Exaggerated Claims	T120C32	1.333	26.67%	30	1.286	25.71%	32	1.286	25.71%	29	1.304	26.09%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.281	20.51%	79.49%
Clients & Contractors	4.719	29.49%	70.51%
Consultants & Contractors	3.188	19.92%	80.08%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.688	16.80%	83.20%
Consultants & Over All	1.469	9.18%	90.82%
Contractors & Over All	2.719	16.99%	83.01%

Y.3.1.13 CAUSE SIGNIFICANCE ASSESSMENT: (T13 C01) – (T13 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate Site Investigation	T130C24	3.684	73.68%	1	4.059	81.18%	1	3.733	74.67%	5	3.824	76.47%	1
Inadequate Design Documentation	T130C02	3.579	71.58%	2	3.882	77.65%	3	4.000	80.00%	1	3.800	76.00%	2
Inadequate/ Inaccurate Design Information	T130C01	3.474	69.47%	4	3.941	78.82%	2	3.933	78.67%	3	3.765	75.29%	3
Incomplete Tender Information	T130C09	3.474	69.47%	4	3.824	76.47%	4	4.000	80.00%	1	3.740	74.80%	4
Inadequate contract documentation	T130C08	3.474	69.47%	4	3.765	75.29%	5	3.133	62.67%	8	3.471	69.41%	5
Inadequate Brief	T130C03	3.000	60.00%	8	3.471	69.41%	7	3.933	78.67%	3	3.449	68.98%	6
Unrealistic Information Expectations (By the Contract)	T130C26	3.526	70.53%	3	3.706	74.12%	6	1.714	34.29%	22	3.080	61.60%	7
Unclear & Inadequate Specifications	T130C04	3.158	63.16%	7	2.875	57.50%	8	3.133	62.67%	8	3.060	61.20%	8
Changes by Client	T130C21	2.789	55.79%	13	2.800	56.00%	10	3.533	70.67%	6	3.020	60.41%	9
Slow Client Response	T130C20	2.895	57.89%	11	2.824	56.47%	9	3.400	68.00%	7	3.020	60.39%	10
Poor Management By One or More Project Participants	T130C29	2.944	58.89%	10	2.750	55.00%	11	3.133	62.67%	8	2.939	58.78%	11
Poor Communications Among Project Participants	T130C18	3.000	60.00%	9	2.706	54.12%	12	3.000	60.00%	11	2.891	57.83%	12
Lack of Information for Decision Making;(Decisiveness)	T130C19	2.842	56.84%	12	2.688	53.75%	14	2.933	58.67%	14	2.820	56.40%	13
Uncontrollable External Events	T130C31	2.737	54.74%	15	2.706	54.12%	12	2.933	58.67%	14	2.784	55.69%	14
Lack of Competence of Project Participants	T130C22	2.789	55.79%	13	2.647	52.94%	15	1.857	37.14%	16	2.480	49.60%	15
Inappropriate/ Unexpected Time Control (Target)	T130C15	1.632	32.63%	19	1.563	31.25%	18	3.000	60.00%	11	2.000	40.00%	16
Inappropriate Contractor Selection	T130C10	1.500	30.00%	27	1.600	32.00%	16	3.000	60.00%	11	1.979	39.57%	17
Inappropriate Document Control	T130C14	1.750	35.00%	16	1.588	31.76%	17	1.800	36.00%	20	1.708	34.17%	18
Adversarial (industry) Culture Among Project Participants	T130C30	1.706	34.12%	18	1.471	29.41%	22	1.857	37.14%	16	1.667	33.33%	19
Unrealistic Client Expectations	T130C25	1.632	32.63%	19	1.500	30.00%	21	1.857	37.14%	16	1.653	33.06%	20
Poor Workmanship	T130C23	1.579	31.58%	23	1.529	30.59%	20	1.692	33.85%	23	1.592	31.84%	21
Inappropriate Contract Type (Strategy)	T130C05	1.526	30.53%	26	1.429	28.57%	25	1.800	36.00%	20	1.583	31.67%	22
Inadequate Contract administration	T130C07	1.632	32.63%	19	1.400	28.00%	27	1.692	33.85%	23	1.574	31.49%	23
Unrealistic Tender Pricing	T130C11	1.722	34.44%	17	1.400	28.00%	27	1.533	30.67%	25	1.563	31.25%	24
Inappropriate/ Unexpected Cost Control (Target)	T130C16	1.263	25.26%	32	1.533	30.67%	19	1.857	37.14%	16	1.521	30.42%	25
Lack of Team Spirit Among Participants	T130C27	1.579	31.58%	23	1.471	29.41%	22	1.308	26.15%	28	1.469	29.39%	26
Personality Clashes Among Project Participants	T130C28	1.571	31.43%	25	1.471	29.41%	22	1.333	26.67%	27	1.457	29.13%	27
Unclear Risk Allocation	T130C12	1.632	32.63%	19	1.375	27.50%	29	1.267	25.33%	32	1.440	28.80%	28
Inappropriate Contract Form	T130C06	1.474	29.47%	28	1.412	28.24%	26	1.357	27.14%	26	1.420	28.40%	29
Inappropriate/ Unexpected Quality Control (Target)	T130C17	1.368	27.37%	29	1.313	26.25%	31	1.308	26.15%	28	1.333	26.67%	30
Inappropriate Payment Method	T130C13	1.316	26.32%	31	1.333	26.67%	30	1.308	26.15%	28	1.319	26.38%	31
Exaggerated Claims	T130C32	1.333	26.67%	30	1.286	25.71%	32	1.286	25.71%	31	1.304	26.09%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.125	19.53%	80.47%
Clients & Contractors	4.781	29.88%	70.12%
Consultants & Contractors	3.406	21.29%	78.71%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.531	15.82%	84.18%
Consultants & Over All	1.531	9.57%	90.43%
Contractors & Over All	2.813	17.58%	82.42%

Y.3.1.14 CAUSE SIGNIFICANCE ASSESSMENT: (T14 C01) – (T14 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Poor Workmanship	T140C23	3.526	70.53%	3	4.176	83.53%	1	3.933	78.67%	1	3.863	77.25%	1
Lack of Competence of Project Participants	T140C22	4.053	81.05%	1	3.353	67.06%	6	3.933	78.67%	1	3.784	75.69%	2
Inappropriate Contractor Selection	T140C10	3.611	72.22%	2	3.941	78.82%	2	3.133	62.67%	15	3.580	71.60%	3
Poor Management By One or More Project Participan	T140C29	3.474	69.47%	4	3.353	67.06%	6	3.933	78.67%	1	3.569	71.37%	4
Unrealistic Tender Pricing	T140C11	3.000	60.00%	12	3.813	76.25%	3	3.867	77.33%	4	3.553	71.06%	5
Inappropriate/ Unexpected Quality Control (Target)	T140C17	3.333	66.67%	5	3.765	75.29%	4	3.333	66.67%	10	3.480	69.60%	6
Inadequate/ Inaccurate Design Information	T140C01	3.211	64.21%	6	3.353	67.06%	6	3.600	72.00%	5	3.373	67.45%	7
Inadequate Design Documentation	T140C02	3.211	64.21%	6	3.294	65.88%	9	3.400	68.00%	8	3.294	65.88%	8
Changes by Client	T140C21	2.889	57.78%	16	3.412	68.24%	5	3.600	72.00%	5	3.280	65.60%	9
Unclear & Inadequate Specifications	T140C04	3.105	62.11%	8	3.294	65.88%	9	3.400	68.00%	8	3.255	65.10%	10
Incomplete Tender Information	T140C09	3.105	62.11%	8	3.294	65.88%	9	3.133	62.67%	15	3.176	63.53%	11
Inappropriate/ Unexpected Time Control (Target)	T140C15	3.105	62.11%	8	2.824	56.47%	13	3.600	72.00%	5	3.157	63.14%	12
Poor Communications Among Project Participants	T140C18	3.000	60.00%	12	2.824	56.47%	13	3.333	66.67%	10	3.040	60.80%	13
Unclear Risk Allocation	T140C12	2.947	58.95%	15	2.933	58.67%	12	3.133	62.67%	15	3.000	60.00%	14
Inappropriate/ Unexpected Cost Control (Target)	T140C16	3.059	61.18%	11	2.824	56.47%	13	3.000	60.00%	19	2.959	59.18%	15
Unrealistic Information Expectations (By the Contrac	T140C26	3.000	60.00%	12	2.824	56.47%	13	3.071	61.43%	18	2.959	59.18%	15
Unrealistic Client Expectations	T140C25	2.842	56.84%	17	2.824	56.47%	13	3.250	65.00%	12	2.938	58.75%	17
Lack of Team Spirit Among Participants	T140C27	2.789	55.79%	19	2.800	56.00%	18	3.200	64.00%	13	2.918	58.37%	18
Personality Clashes Among Project Participants	T140C28	2.833	56.67%	18	2.706	54.12%	19	3.143	62.86%	14	2.878	57.55%	19
Uncontrollable External Events	T140C31	2.789	55.79%	19	2.688	53.75%	21	3.000	60.00%	19	2.820	56.40%	20
Adversarial (industry) Culture Among Project Particip	T140C30	2.789	55.79%	19	2.706	54.12%	19	2.867	57.33%	22	2.784	55.69%	21
Lack of Information for Decision Making;(Decisivene	T140C19	2.789	55.79%	19	1.588	31.76%	24	2.933	58.67%	21	2.431	48.63%	22
Inadequate Brief	T140C03	2.737	54.74%	23	2.588	51.76%	22	1.733	34.67%	25	2.392	47.84%	23
Inadequate contract documentation	T140C08	1.533	30.67%	24	2.529	50.59%	23	2.800	56.00%	23	2.298	45.96%	24
Inappropriate Contract Form	T140C06	1.444	28.89%	29	1.529	30.59%	26	1.733	34.67%	25	1.560	31.20%	25
Inappropriate Contract Type (Strategy)	T140C05	1.474	29.47%	26	1.529	30.59%	26	1.667	33.33%	27	1.549	30.98%	26
Inadequate Contract administration	T140C07	1.526	30.53%	25	1.429	28.57%	28	1.462	29.23%	28	1.478	29.57%	27
Exaggerated Claims	T140C32	1.263	25.26%	32	1.375	27.50%	31	1.786	35.71%	24	1.449	28.98%	28
Inadequate Site Investigation	T140C24	1.474	29.47%	26	1.533	30.67%	25	1.267	25.33%	30	1.429	28.57%	29
Inappropriate Document Control	T140C14	1.474	29.47%	26	1.412	28.24%	29	1.200	24.00%	31	1.373	27.45%	30
Slow Client Response	T140C20	1.333	26.67%	31	1.412	28.24%	29	1.286	25.71%	29	1.347	26.94%	31
Inappropriate Payment Method	T140C13	1.438	28.75%	30	1.250	25.00%	32	1.200	24.00%	31	1.298	25.96%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.406	15.04%	84.96%
Clients & Contractors	3.813	23.83%	76.17%
Consultants & Contractors	3.219	20.12%	79.88%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.094	13.09%	86.91%
Consultants & Over All	1.563	9.77%	90.23%
Contractors & Over All	2.594	16.21%	83.79%

Y.3.1.15 CAUSE SIGNIFICANCE ASSESSMENT: (T15 C01) – (T15 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Poor Workmanship	T150C23	4.000	80.00%	1	4.176	83.53%	1	3.933	78.67%	2	4.040	80.80%	1
Lack of Competence of Project Participants	T150C22	3.526	70.53%	2	3.500	70.00%	5	4.000	80.00%	1	3.653	73.06%	2
Inappropriate Contractor Selection	T150C10	3.526	70.53%	2	4.000	80.00%	2	2.867	57.33%	16	3.490	69.80%	3
Unclear & Inadequate Specifications	T150C04	3.263	65.26%	7	3.765	75.29%	3	3.400	68.00%	8	3.471	69.41%	4
Inadequate/ Inaccurate Design Information	T150C01	3.316	66.32%	5	3.353	67.06%	6	3.714	74.29%	5	3.440	68.80%	5
Poor Management By One or More Project Participan	T150C29	3.500	70.00%	4	2.733	54.67%	17	3.933	78.67%	2	3.396	67.92%	6
Inappropriate/ Unexpected Quality Control (Target)	T150C17	3.000	60.00%	9	3.750	75.00%	4	3.200	64.00%	9	3.306	66.12%	7
Inadequate Design Documentation	T150C02	3.278	65.56%	6	3.294	65.88%	7	3.200	64.00%	9	3.260	65.20%	8
Unrealistic Tender Pricing	T150C11	2.842	56.84%	14	3.235	64.71%	8	3.857	77.14%	4	3.260	65.20%	8
Inappropriate/ Unexpected Time Control (Target)	T150C15	3.105	62.11%	8	3.063	61.25%	10	3.600	72.00%	6	3.240	64.80%	10
Incomplete Tender Information	T150C09	3.000	60.00%	9	3.235	64.71%	8	2.929	58.57%	15	3.061	61.22%	11
Changes by Client	T150C21	2.789	55.79%	16	2.824	56.47%	12	3.600	72.00%	6	3.039	60.78%	12
Poor Communications Among Project Participants	T150C18	2.947	58.95%	11	2.824	56.47%	12	3.133	62.67%	11	2.961	59.22%	13
Inappropriate/ Unexpected Cost Control (Target)	T150C16	2.944	58.89%	13	2.882	57.65%	11	2.857	57.14%	18	2.898	57.96%	14
Unrealistic Information Expectations (By the Contrac	T150C26	2.947	58.95%	11	2.813	56.25%	14	2.857	57.14%	18	2.878	57.55%	15
Lack of Team Spirit Among Participants	T150C27	2.789	55.79%	16	2.813	56.25%	14	2.933	58.67%	13	2.840	56.80%	16
Personality Clashes Among Project Participants	T150C28	2.789	55.79%	16	2.765	55.29%	16	2.933	58.67%	13	2.824	56.47%	17
Unclear Risk Allocation	T150C12	2.842	56.84%	14	2.588	51.76%	20	2.867	57.33%	16	2.765	55.29%	18
Unrealistic Client Expectations	T150C25	2.789	55.79%	16	1.588	31.76%	21	3.067	61.33%	12	2.471	49.41%	19
Lack of Information for Decision Making;(Decisivene	T150C19	2.737	54.74%	20	1.500	30.00%	25	1.733	34.67%	21	2.040	40.80%	20
Adversarial (industry) Culture Among Project Particip	T150C30	1.579	31.58%	21	2.706	54.12%	18	1.714	34.29%	22	2.000	40.00%	21
Inadequate Brief	T150C03	1.526	30.53%	22	2.688	53.75%	19	1.667	33.33%	25	1.940	38.80%	22
Uncontrollable External Events	T150C31	1.526	30.53%	22	1.533	30.67%	23	2.733	54.67%	20	1.898	37.96%	23
Inadequate contract documentation	T150C08	1.500	30.00%	24	1.250	25.00%	30	1.714	34.29%	22	1.479	29.58%	24
Exaggerated Claims	T150C32	1.211	24.21%	32	1.438	28.75%	27	1.714	34.29%	22	1.429	28.57%	25
Inadequate Site Investigation	T150C24	1.421	28.42%	26	1.588	31.76%	21	1.214	24.29%	30	1.420	28.40%	26
Inappropriate Contract Form	T150C06	1.316	26.32%	29	1.353	27.06%	28	1.467	29.33%	26	1.373	27.45%	27
Inadequate Contract administration	T150C07	1.474	29.47%	25	1.250	25.00%	30	1.267	25.33%	28	1.340	26.80%	28
Slow Client Response	T150C20	1.263	25.26%	31	1.471	29.41%	26	1.267	25.33%	28	1.333	26.67%	29
Inappropriate Contract Type (Strategy)	T150C05	1.333	26.67%	27	1.353	27.06%	28	1.286	25.71%	27	1.327	26.53%	30
Inappropriate Document Control	T150C14	1.333	26.67%	27	1.529	30.59%	24	1.000	20.00%	32	1.306	26.12%	31
Inappropriate Payment Method	T150C13	1.316	26.32%	29	1.176	23.53%	32	1.200	24.00%	31	1.235	24.71%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.281	20.51%	79.49%
Clients & Contractors	3.531	22.07%	77.93%
Consultants & Contractors	4.75	29.69%	70.31%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2	12.50%	87.50%
Consultants & Over All	2.344	14.65%	85.35%
Contractors & Over All	2.906	18.16%	81.84%

Y.3.1.16 CAUSE SIGNIFICANCE ASSESSMENT: (T16 C01) – (T16 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Poor Workmanship	T160C23	4.053	81.05%	1	4.176	83.53%	1	3.933	78.67%	1	4.059	81.18%	1
Lack of Competence of Project Participants	T160C22	3.526	70.53%	2	3.375	67.50%	5	3.933	78.67%	1	3.600	72.00%	2
Unclear & Inadequate Specifications	T160C04	3.526	70.53%	2	3.765	75.29%	3	3.400	68.00%	8	3.569	71.37%	3
Inappropriate Contractor Selection	T160C10	3.526	70.53%	2	4.000	80.00%	2	3.000	60.00%	13	3.529	70.59%	4
Inadequate/ Inaccurate Design Information	T160C01	3.263	65.26%	5	3.313	66.25%	6	3.600	72.00%	5	3.380	67.60%	5
Poor Management By One or More Project Participan	T160C29	3.211	64.21%	6	2.882	57.65%	11	3.929	78.57%	3	3.300	66.00%	6
Inappropriate/ Unexpected Quality Control (Target)	T160C17	2.947	58.95%	9	3.765	75.29%	3	3.200	64.00%	10	3.294	65.88%	7
Inadequate Design Documentation	T160C02	3.211	64.21%	6	3.294	65.88%	7	3.333	66.67%	9	3.275	65.49%	8
Unrealistic Tender Pricing	T160C11	2.842	56.84%	14	3.188	63.75%	9	3.867	77.33%	4	3.260	65.20%	9
Inappropriate/ Unexpected Time Control (Target)	T160C15	3.105	62.11%	8	3.000	60.00%	10	3.600	72.00%	5	3.220	64.40%	10
Incomplete Tender Information	T160C09	2.947	58.95%	9	3.250	65.00%	8	3.000	60.00%	13	3.060	61.20%	11
Changes by Client	T160C21	2.789	55.79%	16	2.824	56.47%	12	3.571	71.43%	7	3.020	60.40%	12
Poor Communications Among Project Participants	T160C18	2.944	58.89%	12	2.824	56.47%	12	3.133	62.67%	11	2.960	59.20%	13
Unrealistic Information Expectations (By the Contrac	T160C26	2.947	58.95%	9	2.813	56.25%	14	2.867	57.33%	18	2.880	57.60%	14
Inappropriate/ Unexpected Cost Control (Target)	T160C16	2.944	58.89%	12	2.688	53.75%	16	2.857	57.14%	19	2.833	56.67%	15
Lack of Team Spirit Among Participants	T160C27	2.778	55.56%	18	2.706	54.12%	15	3.000	60.00%	13	2.820	56.40%	16
Personality Clashes Among Project Participants	T160C28	2.778	55.56%	18	2.688	53.75%	16	3.000	60.00%	13	2.813	56.25%	17
Unclear Risk Allocation	T160C12	2.842	56.84%	14	2.588	51.76%	20	3.000	60.00%	13	2.804	56.08%	18
Unrealistic Client Expectations	T160C25	2.789	55.79%	16	1.563	31.25%	22	3.067	61.33%	12	2.480	49.60%	19
Lack of Information for Decision Making;(Decisivene	T160C19	2.722	54.44%	20	1.471	29.41%	25	1.733	34.67%	21	2.000	40.00%	20
Adversarial (industry) Culture Among Project Particip	T160C30	1.579	31.58%	21	2.688	53.75%	16	1.733	34.67%	21	1.980	39.60%	21
Inadequate Brief	T160C03	1.500	30.00%	23	2.647	52.94%	19	1.643	32.86%	25	1.939	38.78%	22
Uncontrollable External Events	T160C31	1.526	30.53%	22	1.533	30.67%	23	2.733	54.67%	20	1.898	37.96%	23
Inadequate contract documentation	T160C08	1.474	29.47%	24	1.235	24.71%	31	1.733	34.67%	21	1.471	29.41%	24
Exaggerated Claims	T160C32	1.211	24.21%	32	1.438	28.75%	27	1.733	34.67%	21	1.440	28.80%	25
Inadequate Site Investigation	T160C24	1.421	28.42%	26	1.600	32.00%	21	1.200	24.00%	30	1.408	28.16%	26
Inappropriate Contract Form	T160C06	1.316	26.32%	29	1.353	27.06%	29	1.400	28.00%	26	1.353	27.06%	27
Inadequate Contract administration	T160C07	1.474	29.47%	24	1.250	25.00%	30	1.267	25.33%	28	1.340	26.80%	28
Slow Client Response	T160C20	1.278	25.56%	30	1.471	29.41%	25	1.267	25.33%	28	1.340	26.80%	28
Inappropriate Contract Type (Strategy)	T160C05	1.316	26.32%	28	1.375	27.50%	28	1.286	25.71%	27	1.327	26.53%	30
Inappropriate Document Control	T160C14	1.333	26.67%	27	1.529	30.59%	24	1.071	21.43%	32	1.327	26.53%	30
Inappropriate Payment Method	T160C13	1.278	25.56%	30	1.176	23.53%	32	1.200	24.00%	30	1.220	24.40%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.219	20.12%	79.88%
Clients & Contractors	3.781	23.63%	76.37%
Consultants & Contractors	4.688	29.30%	70.70%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	1.969	12.30%	87.70%
Consultants & Over All	2.188	13.67%	86.33%
Contractors & Over All	2.938	18.36%	81.64%

Y.3.1.17 CAUSE SIGNIFICANCE ASSESSMENT: (T17 C01) – (T17 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T170C01	3.737	74.74%	1	4.000	80.00%	2	3.857	77.14%	5	3.860	77.20%	1
Changes by Client	T170C21	3.526	70.53%	4	4.059	81.18%	1	4.000	80.00%	2	3.843	76.86%	2
Inadequate Design Documentation	T170C02	3.667	73.33%	2	3.941	78.82%	4	3.933	78.67%	3	3.840	76.80%	3
Incomplete Tender Information	T170C09	3.579	71.58%	3	3.824	76.47%	6	4.067	81.33%	1	3.804	76.08%	4
Inadequate Brief	T170C03	3.438	68.75%	6	3.882	77.65%	5	3.600	72.00%	7	3.646	72.92%	5
Uncontrollable External Events	T170C31	3.158	63.16%	9	4.000	80.00%	2	3.857	77.14%	5	3.640	72.80%	6
Inappropriate/ Unexpected Time Control (Target)	T170C15	3.263	65.26%	7	3.353	67.06%	7	3.533	70.67%	9	3.373	67.45%	7
Inadequate contract documentation	T170C08	3.188	63.75%	8	3.000	60.00%	14	3.929	78.57%	4	3.356	67.11%	8
Unclear & Inadequate Specifications	T170C04	3.474	69.47%	5	3.059	61.18%	12	3.500	70.00%	10	3.340	66.80%	9
Slow Client Response	T170C20	3.000	60.00%	15	3.294	65.88%	9	3.571	71.43%	8	3.265	65.31%	10
Lack of Information for Decision Making;(Decisiveness)	T170C19	3.158	63.16%	9	3.294	65.88%	9	3.214	64.29%	12	3.220	64.40%	11
Unrealistic Client Expectations	T170C25	3.158	63.16%	9	3.250	65.00%	11	3.143	62.86%	15	3.184	63.67%	12
Inappropriate/ Unexpected Cost Control (Target)	T170C16	3.158	63.16%	9	2.765	55.29%	17	3.357	67.14%	11	3.080	61.60%	13
Inappropriate Contract Type (Strategy)	T170C05	2.947	58.95%	17	3.059	61.18%	12	2.933	58.67%	18	2.980	59.61%	14
Inappropriate/ Unexpected Quality Control (Target)	T170C17	3.000	60.00%	15	2.765	55.29%	17	3.200	64.00%	13	2.980	59.61%	14
Inadequate Contract administration	T170C07	2.895	57.89%	18	3.000	60.00%	14	3.071	61.43%	16	2.980	59.59%	16
Poor Workmanship	T170C23	2.895	57.89%	18	2.688	53.75%	20	3.200	64.00%	13	2.920	58.40%	17
Lack of Competence of Project Participants	T170C22	3.059	61.18%	14	2.688	53.75%	20	2.929	58.57%	21	2.894	57.87%	18
Unclear Risk Allocation	T170C12	2.789	55.79%	21	2.813	56.25%	16	2.933	58.67%	18	2.840	56.80%	19
Poor Communications Among Project Participants	T170C18	2.824	56.47%	20	2.706	54.12%	19	3.000	60.00%	17	2.837	56.73%	20
Inappropriate Contractor Selection	T170C10	3.111	62.22%	13	3.353	67.06%	7	1.643	32.86%	28	2.776	55.51%	21
Poor Management By One or More Project Participant	T170C29	1.947	38.95%	23	1.813	36.25%	24	2.933	58.67%	18	2.200	44.00%	22
Inappropriate Contract Form	T170C06	2.105	42.11%	22	1.688	33.75%	25	2.077	41.54%	22	1.958	39.17%	23
Inadequate Site Investigation	T170C24	1.632	32.63%	27	2.235	44.71%	22	1.267	25.33%	32	1.725	34.51%	24
Lack of Team Spirit Among Participants	T170C27	1.842	36.84%	24	1.588	31.76%	26	1.733	34.67%	26	1.725	34.51%	24
Unrealistic Tender Pricing	T170C11	1.737	34.74%	26	1.588	31.76%	26	1.800	36.00%	23	1.706	34.12%	26
Unrealistic Information Expectations (By the Contractor)	T170C26	1.833	36.67%	25	1.882	37.65%	23	1.286	25.71%	31	1.694	33.88%	27
Inappropriate Payment Method	T170C13	1.579	31.58%	28	1.588	31.76%	26	1.786	35.71%	25	1.640	32.80%	28
Personality Clashes Among Project Participants	T170C28	1.526	30.53%	30	1.471	29.41%	29	1.800	36.00%	23	1.588	31.76%	29
Adversarial (industry) Culture Among Project Participants	T170C30	1.526	30.53%	30	1.438	28.75%	30	1.714	34.29%	27	1.551	31.02%	30
Exaggerated Claims	T170C32	1.579	31.58%	28	1.353	27.06%	32	1.333	26.67%	29	1.431	28.63%	31
Inappropriate Document Control	T170C14	1.278	25.56%	32	1.438	28.75%	30	1.333	26.67%	29	1.347	26.94%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.094	19.34%	80.66%
Clients & Contractors	3.719	23.24%	76.76%
Consultants & Contractors	4.125	25.78%	74.22%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.813	11.33%	88.67%
Consultants & Over All	2.281	14.26%	85.74%
Contractors & Over All	2.719	16.99%	83.01%

Y.3.1.18 CAUSE SIGNIFICANCE ASSESSMENT: (T18 C01) – (T18 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T180C01	4.000	80.00%	1	4.000	80.00%	3	4.000	80.00%	1	4.000	80.00%	1
Inadequate Design Documentation	T180C02	3.947	78.95%	2	3.941	78.82%	4	4.000	80.00%	1	3.960	79.20%	2
Inappropriate/ Unexpected Time Control (Target)	T180C15	3.611	72.22%	3	4.118	82.35%	1	3.933	78.67%	4	3.880	77.60%	3
Changes by Client	T180C21	3.556	71.11%	4	4.059	81.18%	2	4.000	80.00%	1	3.857	77.14%	4
Inadequate Brief	T180C03	3.526	70.53%	5	3.706	74.12%	7	3.933	78.67%	4	3.706	74.12%	5
Lack of Information for Decision Making;(Decisivene	T180C19	3.474	69.47%	8	3.765	75.29%	5	3.933	78.67%	4	3.706	74.12%	5
Slow Client Response	T180C20	3.474	69.47%	8	3.765	75.29%	5	3.929	78.57%	8	3.700	74.00%	7
Incomplete Tender Information	T180C09	3.526	70.53%	5	3.313	66.25%	11	3.933	78.67%	4	3.580	71.60%	8
Inadequate contract documentation	T180C08	3.500	70.00%	7	3.353	67.06%	10	3.857	77.14%	9	3.551	71.02%	9
Lack of Competence of Project Participants	T180C22	3.263	65.26%	11	3.706	74.12%	7	3.600	72.00%	10	3.510	70.20%	10
Inadequate Contract administration	T180C07	3.053	61.05%	13	3.706	74.12%	7	3.467	69.33%	12	3.392	67.84%	11
Poor Communications Among Project Participants	T180C18	3.474	69.47%	8	2.824	56.47%	14	3.533	70.67%	11	3.275	65.49%	12
Inappropriate Contractor Selection	T180C10	2.895	57.89%	15	3.294	65.88%	12	3.400	68.00%	13	3.176	63.53%	13
Inappropriate/ Unexpected Cost Control (Target)	T180C16	2.895	57.89%	15	3.235	64.71%	13	3.214	64.29%	14	3.100	62.00%	14
Uncontrollable External Events	T180C31	3.211	64.21%	12	2.824	56.47%	14	3.214	64.29%	14	3.080	61.60%	15
Unclear & Inadequate Specifications	T180C04	3.000	60.00%	14	2.813	56.25%	17	3.200	64.00%	16	3.000	60.00%	16
Inappropriate Contract Type (Strategy)	T180C05	2.842	56.84%	18	2.765	55.29%	18	3.133	62.67%	17	2.902	58.04%	17
Inappropriate Contract Form	T180C06	2.778	55.56%	20	2.765	55.29%	18	3.133	62.67%	17	2.880	57.60%	18
Inappropriate/ Unexpected Quality Control (Target)	T180C17	2.895	57.89%	15	2.750	55.00%	20	3.000	60.00%	19	2.880	57.60%	18
Unrealistic Client Expectations	T180C25	2.706	54.12%	24	2.824	56.47%	14	3.000	60.00%	19	2.837	56.73%	20
Lack of Team Spirit Among Participants	T180C27	2.737	54.74%	21	2.667	53.33%	23	2.933	58.67%	21	2.776	55.51%	21
Unrealistic Information Expectations (By the Contract	T180C26	2.842	56.84%	18	2.706	54.12%	22	1.733	34.67%	28	2.471	49.41%	22
Personality Clashes Among Project Participants	T180C28	2.737	54.74%	21	2.647	52.94%	24	1.857	37.14%	25	2.460	49.20%	23
Poor Management By One or More Project Participan	T180C29	2.737	54.74%	21	1.647	32.94%	25	2.933	58.67%	21	2.431	48.63%	24
Poor Workmanship	T180C23	1.833	36.67%	25	2.750	55.00%	20	2.733	54.67%	24	2.408	48.16%	25
Unclear Risk Allocation	T180C12	1.789	35.79%	26	1.529	30.59%	27	2.933	58.67%	21	2.039	40.78%	26
Unrealistic Tender Pricing	T180C11	1.632	32.63%	28	1.600	32.00%	26	1.800	36.00%	27	1.673	33.47%	27
Inappropriate Document Control	T180C14	1.789	35.79%	26	1.294	25.88%	31	1.357	27.14%	30	1.500	30.00%	28
Inadequate Site Investigation	T180C24	1.526	30.53%	29	1.529	30.59%	27	1.400	28.00%	29	1.490	29.80%	29
Inappropriate Payment Method	T180C13	1.316	26.32%	31	1.375	27.50%	30	1.857	37.14%	25	1.490	29.80%	30
Exaggerated Claims	T180C32	1.474	29.47%	30	1.200	24.00%	32	1.267	25.33%	31	1.327	26.53%	31
Adversarial (industry) Culture Among Project Participi	T180C30	1.222	24.44%	32	1.412	28.24%	29	1.214	24.29%	32	1.286	25.71%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.188	19.92%	80.08%
Clients & Contractors	2.188	13.67%	86.33%
Consultants & Contractors	2.563	16.02%	83.98%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.5	9.38%	90.63%
Consultants & Over All	1.813	11.33%	88.67%
Contractors & Over All	1.313	8.20%	91.80%

Y.3.1.19 CAUSE SIGNIFICANCE ASSESSMENT: (T19 C01) – (T19 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T190C01	4.056	81.11%	1	4.059	81.18%	2	3.857	77.14%	5	4.000	80.00%	1
Inadequate Design Documentation	T190C02	3.684	73.68%	2	4.118	82.35%	1	4.000	80.00%	1	3.922	78.43%	2
Inadequate contract documentation	T190C08	3.667	73.33%	3	4.000	80.00%	3	3.933	78.67%	2	3.860	77.20%	3
Incomplete Tender Information	T190C09	3.278	65.56%	6	4.000	80.00%	3	3.933	78.67%	2	3.720	74.40%	4
Inadequate Brief	T190C03	3.667	73.33%	3	3.353	67.06%	6	3.643	72.86%	6	3.551	71.02%	5
Changes by Client	T190C21	2.947	58.95%	13	3.824	76.47%	5	3.933	78.67%	2	3.529	70.59%	6
Unclear & Inadequate Specifications	T190C04	3.579	71.58%	5	3.353	67.06%	6	3.600	72.00%	7	3.510	70.20%	7
Lack of Competence of Project Participants	T190C22	3.263	65.26%	8	3.294	65.88%	10	3.600	72.00%	7	3.373	67.45%	8
Inappropriate/ Unexpected Time Control (Target)	T190C15	3.000	60.00%	11	3.333	66.67%	8	3.467	69.33%	10	3.250	65.00%	9
Poor Management By One or More Project Participan	T190C29	3.105	62.11%	10	2.800	56.00%	12	3.600	72.00%	7	3.163	63.27%	10
Inappropriate/ Unexpected Cost Control (Target)	T190C16	2.947	58.95%	13	3.313	66.25%	9	3.200	64.00%	11	3.140	62.80%	11
Inadequate Contract administration	T190C07	3.278	65.56%	6	2.765	55.29%	13	3.200	64.00%	11	3.080	61.60%	12
Slow Client Response	T190C20	3.263	65.26%	8	2.706	54.12%	16	2.933	58.67%	15	2.980	59.61%	13
Unclear Risk Allocation	T190C12	2.895	57.89%	16	2.706	54.12%	16	3.000	60.00%	13	2.863	57.25%	14
Inappropriate/ Unexpected Quality Control (Target)	T190C17	2.895	57.89%	16	2.706	54.12%	16	3.000	60.00%	13	2.860	57.20%	15
Lack of Information for Decision Making;(Decisiven	T190C19	2.944	58.89%	15	2.706	54.12%	16	2.933	58.67%	15	2.860	57.20%	15
Inappropriate Contract Form	T190C06	2.833	56.67%	20	2.765	55.29%	13	1.733	34.67%	24	2.480	49.60%	17
Unrealistic Client Expectations	T190C25	1.500	30.00%	29	2.875	57.50%	11	2.933	58.67%	15	2.388	47.76%	18
Inappropriate Contractor Selection	T190C10	2.895	57.89%	16	2.706	54.12%	16	1.143	22.86%	32	2.340	46.80%	19
Uncontrollable External Events	T190C31	1.842	36.84%	23	2.375	47.50%	22	2.929	58.57%	20	2.327	46.53%	20
Inappropriate Document Control	T190C14	2.263	45.26%	22	1.313	26.25%	31	2.933	58.67%	15	2.160	43.20%	21
Poor Communications Among Project Participants	T190C18	2.895	57.89%	16	1.625	32.50%	24	1.800	36.00%	23	2.160	43.20%	21
Inappropriate Contract Type (Strategy)	T190C05	1.526	30.53%	26	2.765	55.29%	13	1.733	34.67%	24	2.000	40.00%	23
Unrealistic Tender Pricing	T190C11	1.526	30.53%	26	1.647	32.94%	23	2.929	58.57%	20	1.960	39.20%	24
Unrealistic Information Expectations (By the Contrac	T190C26	3.000	60.00%	11	1.471	29.41%	26	1.267	25.33%	28	1.939	38.78%	25
Exaggerated Claims	T190C32	2.737	54.74%	21	1.294	25.88%	32	1.267	25.33%	28	1.824	36.47%	26
Inappropriate Payment Method	T190C13	1.333	26.67%	32	1.353	27.06%	30	2.933	58.67%	15	1.820	36.40%	27
Poor Workmanship	T190C23	1.389	27.78%	31	2.667	53.33%	21	1.267	25.33%	28	1.750	35.00%	28
Inadequate Site Investigation	T190C24	1.526	30.53%	26	1.563	31.25%	25	2.143	42.86%	22	1.714	34.29%	29
Lack of Team Spirit Among Participants	T190C27	1.556	31.11%	25	1.471	29.41%	26	1.400	28.00%	26	1.480	29.60%	30
Personality Clashes Among Project Participants	T190C28	1.579	31.58%	24	1.471	29.41%	26	1.333	26.67%	27	1.471	29.41%	31
Adversarial (industry) Culture Among Project Participi	T190C30	1.421	28.42%	30	1.438	28.75%	29	1.214	24.29%	31	1.367	27.35%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.563	28.52%	71.48%
Clients & Contractors	5.094	31.84%	68.16%
Consultants & Contractors	4.031	25.20%	74.80%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	3.313	20.70%	79.30%
Consultants & Over All	2.938	18.36%	81.64%
Contractors & Over All	2.906	18.16%	81.84%

Y.3.1.20 CAUSE SIGNIFICANCE ASSESSMENT: (T20 C01) – (T20 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Poor Workmanship	T200C23	4.053	81.05%	1	4.059	81.18%	2	3.933	78.67%	1	4.020	80.39%	1
Lack of Competence of Project Participants	T200C22	3.667	73.33%	2	3.412	68.24%	3	3.867	77.33%	2	3.640	72.80%	2
Inappropriate Contractor Selection	T200C10	3.263	65.26%	3	4.125	82.50%	1	2.929	58.57%	18	3.449	68.98%	3
Inappropriate/ Unexpected Time Control (Target)	T200C15	3.263	65.26%	3	3.294	65.88%	7	3.692	73.85%	3	3.388	67.76%	4
Inappropriate/ Unexpected Quality Control (Target)	T200C17	3.105	62.11%	6	3.353	67.06%	4	3.600	72.00%	4	3.333	66.67%	5
Unrealistic Tender Pricing	T200C11	3.105	62.11%	6	3.353	67.06%	4	3.429	68.57%	7	3.280	65.60%	6
Inappropriate/ Unexpected Cost Control (Target)	T200C16	3.222	64.44%	5	2.882	57.65%	8	3.600	72.00%	4	3.220	64.40%	7
Poor Management By One or More Project Participan	T200C29	3.000	60.00%	8	3.353	67.06%	4	3.182	63.64%	11	3.170	63.40%	8
Inadequate Design Documentation	T200C02	2.944	58.89%	9	2.800	56.00%	13	3.500	70.00%	6	3.064	61.28%	9
Slow Client Response	T200C20	2.824	56.47%	17	2.882	57.65%	8	3.214	64.29%	8	2.958	59.17%	10
Changes by Client	T200C21	2.789	55.79%	18	2.824	56.47%	11	3.214	64.29%	8	2.920	58.40%	11
Unclear & Inadequate Specifications	T200C04	2.889	57.78%	12	2.714	54.29%	15	3.143	62.86%	12	2.913	58.26%	12
Lack of Information for Decision Making;(Decisivene	T200C19	2.833	56.67%	13	2.867	57.33%	10	3.000	60.00%	15	2.896	57.92%	13
Incomplete Tender Information	T200C09	2.833	56.67%	13	2.688	53.75%	19	3.133	62.67%	13	2.878	57.55%	14
Inadequate/ Inaccurate Design Information	T200C01	2.944	58.89%	9	2.824	56.47%	11	2.800	56.00%	20	2.860	57.20%	15
Inadequate Contract administration	T200C07	2.833	56.67%	13	2.625	52.50%	20	3.133	62.67%	13	2.857	57.14%	16
Inadequate Brief	T200C03	2.895	57.89%	11	2.733	54.67%	14	2.800	56.00%	20	2.816	56.33%	17
Unrealistic Information Expectations (By the Contrac	T200C26	2.778	55.56%	20	2.706	54.12%	16	2.933	58.67%	16	2.800	56.00%	18
Uncontrollable External Events	T200C31	2.765	55.29%	21	2.706	54.12%	16	2.929	58.57%	18	2.792	55.83%	19
Inadequate contract documentation	T200C08	2.833	56.67%	13	2.706	54.12%	16	2.800	56.00%	20	2.780	55.60%	20
Unrealistic Client Expectations	T200C25	2.789	55.79%	18	2.588	51.76%	21	2.933	58.67%	16	2.765	55.29%	21
Poor Communications Among Project Participants	T200C18	1.556	31.11%	25	1.667	33.33%	23	3.200	64.00%	10	2.104	42.08%	22
Inappropriate Contract Type (Strategy)	T200C05	2.737	54.74%	22	1.471	29.41%	27	1.800	36.00%	23	2.039	40.78%	23
Unclear Risk Allocation	T200C12	1.579	31.58%	24	2.588	51.76%	21	1.733	34.67%	24	1.961	39.22%	24
Adversarial (industry) Culture Among Project Participi	T200C30	1.444	28.89%	29	1.588	31.76%	24	1.714	34.29%	25	1.571	31.43%	25
Inappropriate Contract Form	T200C06	1.842	36.84%	23	1.467	29.33%	28	1.286	25.71%	27	1.563	31.25%	26
Lack of Team Spirit Among Participants	T200C27	1.526	30.53%	26	1.588	31.76%	24	1.200	24.00%	30	1.451	29.02%	27
Personality Clashes Among Project Participants	T200C28	1.526	30.53%	26	1.313	26.25%	31	1.400	28.00%	26	1.420	28.40%	28
Inappropriate Document Control	T200C14	1.421	28.42%	30	1.500	30.00%	26	1.267	25.33%	29	1.400	28.00%	29
Inadequate Site Investigation	T200C24	1.526	30.53%	26	1.250	25.00%	32	1.200	24.00%	30	1.340	26.80%	30
Exaggerated Claims	T200C32	1.333	26.67%	31	1.412	28.24%	29	1.200	24.00%	30	1.320	26.40%	31
Inappropriate Payment Method	T200C13	1.278	25.56%	32	1.353	27.06%	30	1.286	25.71%	27	1.306	26.12%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.719	23.24%	76.76%
Clients & Contractors	3.781	23.63%	76.37%
Consultants & Contractors	4.25	26.56%	73.44%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.094	13.09%	86.91%
Consultants & Over All	2.438	15.23%	84.77%
Contractors & Over All	2.438	15.23%	84.77%

Y.3.1.21 CAUSE SIGNIFICANCE ASSESSMENT: (T21 C01) – (T21 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Incomplete Tender Information	T210C09	4.000	80.00%	1	4.063	81.25%	2	3.786	75.71%	2	3.959	79.18%	1
Inadequate/ Inaccurate Design Information	T210C01	3.789	75.79%	2	3.688	73.75%	3	3.929	78.57%	1	3.796	75.92%	2
Inadequate Site Investigation	T210C24	3.579	71.58%	3	4.200	84.00%	1	3.533	70.67%	5	3.755	75.10%	3
Inadequate Design Documentation	T210C02	3.158	63.16%	5	3.412	68.24%	4	3.786	75.71%	2	3.420	68.40%	4
Inadequate Brief	T210C03	3.105	62.11%	6	3.313	66.25%	5	3.733	74.67%	4	3.360	67.20%	5
Changes by Client	T210C21	3.444	68.89%	4	3.125	62.50%	6	3.267	65.33%	7	3.286	65.71%	6
Slow Client Response	T210C20	3.105	62.11%	7	3.059	61.18%	8	3.400	68.00%	6	3.176	63.53%	7
Unclear & Inadequate Specifications	T210C04	3.056	61.11%	9	3.063	61.25%	7	3.267	65.33%	7	3.122	62.45%	8
Lack of Information for Decision Making;(Decisive)	T210C19	3.105	62.11%	7	3.059	61.18%	8	3.214	64.29%	10	3.120	62.40%	9
Unrealistic Tender Pricing	T210C11	3.056	61.11%	9	3.059	61.18%	8	3.214	64.29%	10	3.102	62.04%	10
Inadequate contract documentation	T210C08	3.056	61.11%	9	3.000	60.00%	11	3.231	64.62%	9	3.087	61.74%	11
Unclear Risk Allocation	T210C12	3.053	61.05%	15	3.000	60.00%	11	3.214	64.29%	10	3.080	61.60%	12
Poor Management By One or More Project Participan	T210C29	3.053	61.05%	15	3.000	60.00%	11	3.200	64.00%	15	3.078	61.57%	13
Inappropriate/ Unexpected Cost Control (Target)	T210C16	3.056	61.11%	9	2.933	58.67%	18	3.214	64.29%	10	3.064	61.28%	14
Inappropriate/ Unexpected Time Control (Target)	T210C15	3.056	61.11%	9	2.938	58.75%	17	3.200	64.00%	15	3.061	61.22%	15
Poor Communications Among Project Participants	T210C18	3.000	60.00%	17	3.000	60.00%	11	3.214	64.29%	10	3.060	61.20%	16
Lack of Team Spirit Among Participants	T210C27	2.944	58.89%	18	2.941	58.82%	16	3.200	64.00%	15	3.020	60.40%	17
Unrealistic Information Expectations (By the Contrac	T210C26	3.056	61.11%	9	3.000	60.00%	11	1.667	33.33%	24	2.612	52.24%	18
Inappropriate Contract Type (Strategy)	T210C05	2.833	56.67%	21	1.765	35.29%	23	3.143	62.86%	19	2.551	51.02%	19
Lack of Competence of Project Participants	T210C22	2.842	56.84%	20	2.882	57.65%	19	1.733	34.67%	23	2.529	50.59%	20
Personality Clashes Among Project Participants	T210C28	2.529	50.59%	22	1.765	35.29%	23	3.143	62.86%	19	2.438	48.75%	21
Uncontrollable External Events	T210C31	1.737	34.74%	23	2.706	54.12%	21	2.867	57.33%	22	2.392	47.84%	22
Unrealistic Client Expectations	T210C25	1.474	29.47%	26	2.824	56.47%	20	3.167	63.33%	18	2.375	47.50%	23
Poor Workmanship	T210C23	2.889	57.78%	19	1.647	32.94%	25	1.667	33.33%	24	2.100	42.00%	24
Adversarial (industry) Culture Among Project Participi	T210C30	1.737	34.74%	23	2.647	52.94%	22	1.286	25.71%	28	1.920	38.40%	25
Inappropriate Contract Form	T210C06	1.474	29.47%	26	1.529	30.59%	27	3.000	60.00%	21	1.898	37.96%	26
Inadequate Contract administration	T210C07	1.579	31.58%	25	1.588	31.76%	26	1.267	25.33%	29	1.490	29.80%	27
Inappropriate Contractor Selection	T210C10	1.333	26.67%	29	1.375	27.50%	28	1.667	33.33%	24	1.449	28.98%	28
Inappropriate Document Control	T210C14	1.316	26.32%	30	1.294	25.88%	29	1.429	28.57%	27	1.340	26.80%	29
Inappropriate/ Unexpected Quality Control (Target)	T210C17	1.421	28.42%	28	1.235	24.71%	31	1.077	21.54%	31	1.265	25.31%	30
Inappropriate Payment Method	T210C13	1.316	26.32%	30	1.235	24.71%	31	1.133	22.67%	30	1.235	24.71%	31
Exaggerated Claims	T210C32	1.316	26.32%	30	1.294	25.88%	29	1.000	20.00%	32	1.220	24.40%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.438	15.23%	84.77%
Clients & Contractors	3.281	20.51%	79.49%
Consultants & Contractors	2.781	17.38%	82.62%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	1.875	11.72%	88.28%
Consultants & Over All	1.625	10.16%	89.84%
Contractors & Over All	1.969	12.30%	87.70%

Y.3.1.22 CAUSE SIGNIFICANCE ASSESSMENT: (T22 C01) – (T22 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate contract documentation	T220C08	3.947	78.95%	1	3.941	78.82%	2	4.000	80.00%	1	3.959	79.18%	1
Incomplete Tender Information	T220C09	3.579	71.58%	2	4.063	81.25%	1	4.000	80.00%	1	3.854	77.08%	2
Poor Management By One or More Project Participan	T220C29	3.556	71.11%	3	3.765	75.29%	3	3.929	78.57%	4	3.735	74.69%	3
Unclear & Inadequate Specifications	T220C04	3.526	70.53%	4	3.750	75.00%	4	3.933	78.67%	3	3.720	74.40%	4
Lack of Information for Decision Making;(Decisivene	T220C19	3.368	67.37%	7	3.706	74.12%	5	3.867	77.33%	5	3.627	72.55%	5
Uncontrollable External Events	T220C31	3.526	70.53%	4	3.625	72.50%	6	3.200	64.00%	10	3.460	69.20%	6
Slow Client Response	T220C20	3.111	62.22%	8	3.313	66.25%	8	3.786	75.71%	7	3.375	67.50%	7
Lack of Competence of Project Participants	T220C22	3.111	62.22%	8	3.313	66.25%	8	3.833	76.67%	6	3.370	67.39%	8
Poor Communications Among Project Participants	T220C18	3.474	69.47%	6	3.000	60.00%	10	3.533	70.67%	8	3.340	66.80%	9
Unrealistic Information Expectations (By the Contrac	T220C26	3.000	60.00%	11	3.375	67.50%	7	1.214	24.29%	24	2.604	52.08%	10
Changes by Client	T220C21	1.722	34.44%	11	1.706	34.12%	11	3.500	70.00%	9	2.224	44.49%	11
Inadequate Brief	T220C03	1.706	34.12%	13	1.706	34.12%	11	1.786	35.71%	11	1.729	34.58%	12
Inadequate/ Inaccurate Design Information	T220C01	1.722	34.44%	11	1.706	34.12%	11	1.692	33.85%	14	1.708	34.17%	13
Inadequate Contract administration	T220C07	1.684	33.68%	14	1.688	33.75%	14	1.667	33.33%	15	1.680	33.60%	14
Unrealistic Client Expectations	T220C25	1.353	27.06%	24	1.688	33.75%	14	1.714	34.29%	13	1.574	31.49%	15
Unclear Risk Allocation	T220C12	1.684	33.68%	14	1.294	25.88%	24	1.733	34.67%	12	1.569	31.37%	16
Adversarial (industry) Culture Among Project Participi	T220C30	1.444	28.89%	18	1.625	32.50%	16	1.615	32.31%	17	1.553	31.06%	17
Personality Clashes Among Project Participants	T220C28	1.500	30.00%	17	1.438	28.75%	19	1.667	33.33%	15	1.531	30.61%	18
Lack of Team Spirit Among Participants	T220C27	1.526	30.53%	16	1.467	29.33%	18	1.231	24.62%	23	1.426	28.51%	19
Inappropriate Contract Form	T220C06	1.368	27.37%	20	1.438	28.75%	19	1.357	27.14%	18	1.388	27.76%	20
Inappropriate Contractor Selection	T220C10	1.389	27.78%	19	1.529	30.59%	17	1.200	24.00%	26	1.380	27.60%	21
Unrealistic Tender Pricing	T220C11	1.368	27.37%	20	1.438	28.75%	19	1.333	26.67%	19	1.380	27.60%	21
Inappropriate/ Unexpected Quality Control (Target)	T220C17	1.316	26.32%	27	1.375	27.50%	23	1.286	25.71%	20	1.327	26.53%	23
Inappropriate/ Unexpected Time Control (Target)	T220C15	1.316	26.32%	27	1.412	28.24%	22	1.214	24.29%	24	1.320	26.40%	24
Inappropriate Contract Type (Strategy)	T220C05	1.368	27.37%	20	1.235	24.71%	27	1.200	24.00%	26	1.275	25.49%	25
Inappropriate Document Control	T220C14	1.333	26.67%	25	1.188	23.75%	30	1.286	25.71%	20	1.271	25.42%	26
Inappropriate Payment Method	T220C13	1.333	26.67%	25	1.235	24.71%	27	1.200	24.00%	26	1.260	25.20%	27
Inappropriate/ Unexpected Cost Control (Target)	T220C16	1.316	26.32%	27	1.250	25.00%	25	1.200	24.00%	26	1.260	25.20%	27
Poor Workmanship	T220C23	1.316	26.32%	27	1.235	24.71%	27	1.154	23.08%	30	1.245	24.90%	29
Inadequate Design Documentation	T220C02	1.368	27.37%	20	1.250	25.00%	25	1.067	21.33%	32	1.240	24.80%	30
Inadequate Site Investigation	T220C24	1.294	25.88%	31	1.133	22.67%	32	1.286	25.71%	20	1.239	24.78%	31
Exaggerated Claims	T220C32	1.278	25.56%	32	1.188	23.75%	30	1.143	22.86%	31	1.208	24.17%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.469	15.43%	84.57%
Clients & Contractors	3.75	23.44%	76.56%
Consultants & Contractors	3.406	21.29%	78.71%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	1.813	11.33%	88.67%
Consultants & Over All	1.531	9.57%	90.43%
Contractors & Over All	2.438	15.23%	84.77%

Y.3.1.23 CAUSE SIGNIFICANCE ASSESSMENT: (T23 C01) – (T23 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Poor Workmanship	T230C23	3.526	70.53%	2	3.813	76.25%	2	4.077	81.54%	1	3.771	75.42%	1
Lack of Competence of Project Participants	T230C22	3.444	68.89%	3	3.588	71.76%	3	3.867	77.33%	3	3.620	72.40%	2
Inappropriate Contractor Selection	T230C10	3.947	78.95%	1	4.067	81.33%	1	1.267	25.33%	13	3.163	63.27%	3
Poor Communications Among Project Participants	T230C18	3.056	61.11%	6	3.000	60.00%	5	3.267	65.33%	4	3.100	62.00%	4
Inappropriate/ Unexpected Time Control (Target)	T230C15	3.105	62.11%	4	3.000	60.00%	5	3.200	64.00%	7	3.098	61.96%	5
Inappropriate/ Unexpected Cost Control (Target)	T230C16	3.059	61.18%	5	3.000	60.00%	5	3.200	64.00%	7	3.083	61.67%	6
Uncontrollable External Events	T230C31	2.947	58.95%	8	3.063	61.25%	4	3.267	65.33%	4	3.080	61.60%	7
Inappropriate/ Unexpected Quality Control (Target)	T230C17	3.053	61.05%	7	2.941	58.82%	8	3.231	64.62%	6	3.061	61.22%	8
Incomplete Tender Information	T230C09	1.316	26.32%	12	1.235	24.71%	19	3.933	78.67%	2	2.059	41.18%	9
Inadequate Design Documentation	T230C02	1.368	27.37%	9	1.250	25.00%	16	1.333	26.67%	9	1.320	26.40%	10
Inadequate contract documentation	T230C08	1.333	26.67%	10	1.250	25.00%	16	1.333	26.67%	9	1.306	26.12%	11
Unrealistic Tender Pricing	T230C11	1.333	26.67%	10	1.353	27.06%	9	1.214	24.29%	17	1.306	26.12%	11
Inadequate/ Inaccurate Design Information	T230C01	1.313	26.25%	20	1.353	27.06%	9	1.231	24.62%	15	1.304	26.09%	13
Inadequate Contract administration	T230C07	1.263	25.26%	23	1.353	27.06%	9	1.214	24.29%	17	1.280	25.60%	14
Unclear Risk Allocation	T230C12	1.316	26.32%	12	1.235	24.71%	19	1.286	25.71%	11	1.280	25.60%	14
Slow Client Response	T230C20	1.316	26.32%	12	1.235	24.71%	19	1.286	25.71%	11	1.280	25.60%	14
Inadequate Site Investigation	T230C24	1.263	25.26%	23	1.353	27.06%	9	1.214	24.29%	17	1.280	25.60%	14
Adversarial (industry) Culture Among Project Particip	T230C30	1.316	26.32%	12	1.294	25.88%	14	1.200	24.00%	23	1.275	25.49%	18
Inadequate Brief	T230C03	1.316	26.32%	12	1.250	25.00%	16	1.231	24.62%	15	1.271	25.42%	19
Inappropriate Payment Method	T230C13	1.316	26.32%	12	1.235	24.71%	19	1.214	24.29%	17	1.260	25.20%	20
Lack of Information for Decision Making;(Decisiven	T230C19	1.263	25.26%	23	1.313	26.25%	13	1.200	24.00%	23	1.260	25.20%	20
Changes by Client	T230C21	1.316	26.32%	12	1.235	24.71%	19	1.200	24.00%	23	1.255	25.10%	22
Unrealistic Information Expectations (By the Contrac	T230C26	1.316	26.32%	12	1.235	24.71%	19	1.200	24.00%	23	1.255	25.10%	22
Inappropriate Contract Type (Strategy)	T230C05	1.294	25.88%	21	1.235	24.71%	19	1.214	24.29%	17	1.250	25.00%	24
Unrealistic Client Expectations	T230C25	1.235	24.71%	27	1.235	24.71%	19	1.267	25.33%	13	1.245	24.90%	25
Inappropriate Contract Form	T230C06	1.278	25.56%	22	1.200	24.00%	27	1.214	24.29%	17	1.234	24.68%	26
Personality Clashes Among Project Participants	T230C28	1.263	25.26%	23	1.188	23.75%	28	1.200	24.00%	23	1.220	24.40%	27
Exaggerated Claims	T230C32	1.222	24.44%	29	1.267	25.33%	15	1.143	22.86%	29	1.213	24.26%	28
Poor Management By One or More Project Participan	T230C29	1.235	24.71%	27	1.176	23.53%	29	1.200	24.00%	23	1.204	24.08%	29
Unclear & Inadequate Specifications	T230C04	1.222	24.44%	29	1.118	22.35%	30	1.077	21.54%	30	1.146	22.92%	30
Inappropriate Document Control	T230C14	1.222	24.44%	29	1.118	22.35%	30	1.067	21.33%	31	1.140	22.80%	31
Lack of Team Spirit Among Participants	T230C27	1.211	24.21%	32	1.118	22.35%	30	1.000	20.00%	32	1.122	22.45%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.938	30.86%	69.14%
Clients & Contractors	4.156	25.98%	74.02%
Consultants & Contractors	5.406	33.79%	66.21%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	3.375	21.09%	78.91%
Consultants & Over All	3.313	20.70%	79.30%
Contractors & Over All	3.281	20.51%	79.49%

Y.3.1.24 CAUSE SIGNIFICANCE ASSESSMENT: (T24 C01) – (T24 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Poor Workmanship	T240C23	3.474	69.47%	2	3.588	71.76%	2	3.933	78.67%	1	3.647	72.94%	1
Lack of Competence of Project Participants	T240C22	3.105	62.11%	3	3.059	61.18%	3	3.214	64.29%	3	3.120	62.40%	2
Inappropriate Contractor Selection	T240C10	3.526	70.53%	1	3.765	75.29%	1	1.231	24.62%	13	3.000	60.00%	3
Incomplete Tender Information	T240C09	1.316	26.32%	14	1.235	24.71%	18	3.923	78.46%	2	1.980	39.59%	4
Poor Communications Among Project Participants	T240C18	1.667	33.33%	6	1.500	30.00%	7	1.933	38.67%	4	1.694	33.88%	5
Inappropriate/ Unexpected Cost Control (Target)	T240C16	1.684	33.68%	5	1.706	34.12%	6	1.667	33.33%	7	1.686	33.73%	6
Uncontrollable External Events	T240C31	1.389	27.78%	8	1.733	34.67%	4	1.867	37.33%	5	1.646	32.92%	7
Inappropriate/ Unexpected Time Control (Target)	T240C15	1.737	34.74%	4	1.733	34.67%	4	1.333	26.67%	8	1.612	32.24%	8
Inappropriate/ Unexpected Quality Control (Target)	T240C17	1.529	30.59%	7	1.375	27.50%	8	1.714	34.29%	6	1.532	30.64%	9
Inadequate Design Documentation	T240C02	1.389	27.78%	8	1.250	25.00%	16	1.267	25.33%	9	1.306	26.12%	10
Unrealistic Tender Pricing	T240C11	1.353	27.06%	11	1.353	27.06%	9	1.200	24.00%	18	1.306	26.12%	10
Inadequate contract documentation	T240C08	1.368	27.37%	10	1.235	24.71%	18	1.267	25.33%	9	1.294	25.88%	12
Inadequate/ Inaccurate Design Information	T240C01	1.278	25.56%	20	1.353	27.06%	9	1.214	24.29%	14	1.286	25.71%	13
Inadequate Contract administration	T240C07	1.278	25.56%	20	1.353	27.06%	9	1.200	24.00%	18	1.280	25.60%	14
Unclear Risk Allocation	T240C12	1.333	26.67%	12	1.235	24.71%	18	1.267	25.33%	9	1.280	25.60%	14
Inadequate Site Investigation	T240C24	1.263	25.26%	25	1.353	27.06%	9	1.200	24.00%	18	1.275	25.49%	16
Slow Client Response	T240C20	1.333	26.67%	12	1.235	24.71%	18	1.231	24.62%	12	1.271	25.42%	17
Adversarial (industry) Culture Among Project Particip	T240C30	1.316	26.32%	14	1.294	25.88%	14	1.167	23.33%	28	1.271	25.42%	17
Inadequate Brief	T240C03	1.316	26.32%	14	1.250	25.00%	16	1.214	24.29%	14	1.265	25.31%	19
Lack of Information for Decision Making;(Decisiven	T240C19	1.278	25.56%	20	1.313	26.25%	13	1.200	24.00%	18	1.265	25.31%	19
Inappropriate Payment Method	T240C13	1.316	26.32%	14	1.235	24.71%	18	1.200	24.00%	18	1.255	25.10%	21
Changes by Client	T240C21	1.316	26.32%	14	1.235	24.71%	18	1.200	24.00%	18	1.255	25.10%	21
Unrealistic Information Expectations (By the Contrac	T240C26	1.316	26.32%	14	1.235	24.71%	18	1.200	24.00%	18	1.255	25.10%	21
Inappropriate Contract Type (Strategy)	T240C05	1.278	25.56%	20	1.235	24.71%	18	1.214	24.29%	14	1.245	24.90%	24
Inappropriate Contract Form	T240C06	1.278	25.56%	20	1.235	24.71%	18	1.200	24.00%	18	1.240	24.80%	25
Unrealistic Client Expectations	T240C25	1.222	24.44%	27	1.235	24.71%	18	1.214	24.29%	14	1.224	24.49%	26
Exaggerated Claims	T240C32	1.222	24.44%	27	1.267	25.33%	15	1.143	22.86%	29	1.213	24.26%	27
Personality Clashes Among Project Participants	T240C28	1.235	24.71%	26	1.176	23.53%	28	1.200	24.00%	18	1.204	24.08%	28
Poor Management By One or More Project Participan	T240C29	1.222	24.44%	27	1.176	23.53%	28	1.200	24.00%	18	1.200	24.00%	29
Unclear & Inadequate Specifications	T240C04	1.222	24.44%	27	1.125	22.50%	30	1.067	21.33%	30	1.143	22.86%	30
Inappropriate Document Control	T240C14	1.211	24.21%	31	1.118	22.35%	31	1.067	21.33%	30	1.137	22.75%	31
Lack of Team Spirit Among Participants	T240C27	1.211	24.21%	31	1.118	22.35%	31	1.067	21.33%	30	1.137	22.75%	31

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.094	25.59%	74.41%
Clients & Contractors	4.281	26.76%	73.24%
Consultants & Contractors	5.25	32.81%	67.19%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	3.25	20.31%	79.69%
Consultants & Over All	3.656	22.85%	77.15%
Contractors & Over All	4.031	25.20%	74.80%

Y.3.1.25 CAUSE SIGNIFICANCE ASSESSMENT: (T25 C01) – (T25 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Uncontrollable External Events	T250C31	3.368	67.37%	4	4.118	82.35%	1	3.867	77.33%	1	3.765	75.29%	1
Inadequate Design Documentation	T250C02	3.111	62.22%	6	3.706	74.12%	2	3.857	77.14%	3	3.531	70.61%	2
Inadequate/ Inaccurate Design Information	T250C01	3.368	67.37%	4	3.294	65.88%	6	3.867	77.33%	1	3.490	69.80%	3
Inappropriate Contractor Selection	T250C10	4.000	80.00%	1	2.813	56.25%	14	3.333	66.67%	8	3.420	68.40%	4
Inadequate Brief	T250C03	3.105	62.11%	7	3.353	67.06%	4	3.643	72.86%	5	3.340	66.80%	5
Poor Management By One or More Project Participan	T250C29	3.526	70.53%	2	3.059	61.18%	8	3.200	64.00%	15	3.275	65.49%	6
Unrealistic Tender Pricing	T250C11	2.842	56.84%	14	3.000	60.00%	9	3.333	66.67%	8	3.039	60.78%	7
Inappropriate/ Unexpected Cost Control (Target)	T250C16	1.684	33.68%	19	3.706	74.12%	2	3.571	71.43%	6	2.900	58.00%	8
Inappropriate/ Unexpected Time Control (Target)	T250C15	1.706	34.12%	18	3.294	65.88%	6	3.733	74.67%	4	2.878	57.55%	9
Inappropriate/ Unexpected Quality Control (Target)	T250C17	1.684	33.68%	19	3.313	66.25%	5	3.533	70.67%	7	2.760	55.20%	10
Lack of Information for Decision Making;(Decisiven	T250C19	1.667	33.33%	21	3.000	60.00%	9	3.286	65.71%	11	2.592	51.84%	11
Poor Communications Among Project Participants	T250C18	1.667	33.33%	21	2.933	58.67%	13	3.333	66.67%	8	2.583	51.67%	12
Slow Client Response	T250C20	1.500	30.00%	23	2.765	55.29%	15	3.267	65.33%	12	2.460	49.20%	13
Changes by Client	T250C21	1.474	29.47%	24	3.000	60.00%	9	3.250	65.00%	13	2.458	49.17%	14
Lack of Competence of Project Participants	T250C22	1.474	29.47%	24	2.938	58.75%	12	3.214	64.29%	14	2.449	48.98%	15
Unrealistic Client Expectations	T250C25	1.294	25.88%	28	2.733	54.67%	16	3.200	64.00%	15	2.362	47.23%	16
Unclear & Inadequate Specifications	T250C04	3.105	62.11%	7	1.750	35.00%	18	1.733	34.67%	17	2.260	45.20%	17
Adversarial (industry) Culture Among Project Particip	T250C30	3.444	68.89%	3	1.765	35.29%	17	1.400	28.00%	24	2.260	45.20%	17
Unrealistic Information Expectations (By the Contrac	T250C26	3.056	61.11%	9	1.667	33.33%	21	1.615	32.31%	22	2.196	43.91%	19
Inadequate Contract administration	T250C07	3.000	60.00%	11	1.706	34.12%	19	1.667	33.33%	18	2.125	42.50%	20
Inadequate contract documentation	T250C08	3.000	60.00%	11	1.563	31.25%	23	1.643	32.86%	19	2.125	42.50%	20
Unclear Risk Allocation	T250C12	2.789	55.79%	15	1.706	34.12%	19	1.643	32.86%	19	2.100	42.00%	22
Incomplete Tender Information	T250C09	2.941	58.82%	13	1.353	27.06%	26	1.643	32.86%	19	2.000	40.00%	23
Inappropriate Contract Type (Strategy)	T250C05	3.056	61.11%	9	1.375	27.50%	25	1.286	25.71%	25	1.979	39.58%	24
Inappropriate Payment Method	T250C13	2.789	55.79%	15	1.353	27.06%	26	1.214	24.29%	27	1.860	37.20%	25
Personality Clashes Among Project Participants	T250C28	1.222	24.44%	29	1.667	33.33%	21	1.583	31.67%	23	1.467	29.33%	26
Inappropriate Document Control	T250C14	1.737	34.74%	17	1.235	24.71%	31	1.214	24.29%	27	1.420	28.40%	27
Poor Workmanship	T250C23	1.353	27.06%	26	1.313	26.25%	28	1.214	24.29%	27	1.298	25.96%	28
Exaggerated Claims	T250C32	1.222	24.44%	29	1.412	28.24%	24	1.154	23.08%	32	1.271	25.42%	29
Inadequate Site Investigation	T250C24	1.333	26.67%	27	1.235	24.71%	31	1.200	24.00%	30	1.260	25.20%	30
Inappropriate Contract Form	T250C06	1.278	25.56%	29	1.250	25.00%	29	1.231	24.62%	26	1.255	25.11%	31
Lack of Team Spirit Among Participants	T250C27	1.222	24.44%	29	1.250	25.00%	29	1.200	24.00%	30	1.224	24.49%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	8.75	54.69%	45.31%
Clients & Contractors	8.375	52.34%	47.66%
Consultants & Contractors	2.75	17.19%	82.81%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	7.188	44.92%	55.08%
Consultants & Over All	2.5	15.63%	84.38%
Contractors & Over All	2.25	14.06%	85.94%

Y.3.1.26 CAUSE SIGNIFICANCE ASSESSMENT: (T26 C01) – (T26 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate Design Documentation	T260C02	3.722	74.44%	2	4.133	82.67%	1	3.857	77.14%	4	3.894	77.87%	1
Inadequate contract documentation	T260C08	3.579	71.58%	4	4.059	81.18%	3	4.000	80.00%	2	3.863	77.25%	2
Changes by Client	T260C21	3.474	69.47%	6	4.125	82.50%	2	4.071	81.43%	1	3.857	77.14%	3
Inadequate/ Inaccurate Design Information	T260C01	3.882	77.65%	1	3.824	76.47%	5	3.857	77.14%	4	3.854	77.08%	4
Inadequate Brief	T260C03	3.632	72.63%	3	3.813	76.25%	6	3.846	76.92%	6	3.750	75.00%	5
Incomplete Tender Information	T260C09	3.222	64.44%	7	3.867	77.33%	4	3.867	77.33%	3	3.625	72.50%	6
Unclear & Inadequate Specifications	T260C04	3.579	71.58%	4	3.294	65.88%	7	3.600	72.00%	8	3.490	69.80%	7
Lack of Competence of Project Participants	T260C22	3.211	64.21%	8	3.250	65.00%	10	3.615	72.31%	7	3.333	66.67%	8
Inappropriate/ Unexpected Time Control (Target)	T260C15	3.056	61.11%	11	3.267	65.33%	8	3.571	71.43%	10	3.277	65.53%	9
Poor Management By One or More Project Participan	T260C29	3.167	63.33%	10	3.000	60.00%	12	3.600	72.00%	8	3.240	64.80%	10
Inappropriate/ Unexpected Cost Control (Target)	T260C16	3.053	61.05%	13	3.267	65.33%	8	3.333	66.67%	11	3.204	64.08%	11
Inadequate Contract administration	T260C07	3.211	64.21%	8	2.938	58.75%	15	3.200	64.00%	12	3.120	62.40%	12
Slow Client Response	T260C20	3.000	60.00%	14	3.188	63.75%	11	3.154	63.08%	15	3.106	62.13%	13
Inappropriate/ Unexpected Quality Control (Target)	T260C17	3.000	60.00%	14	2.706	54.12%	17	3.167	63.33%	14	2.938	58.75%	14
Lack of Information for Decision Making;(Decisivene	T260C19	3.000	60.00%	14	2.667	53.33%	19	3.000	60.00%	16	2.894	57.87%	15
Unclear Risk Allocation	T260C12	2.895	57.89%	17	2.706	54.12%	17	2.933	58.67%	19	2.843	56.86%	16
Inappropriate Contract Form	T260C06	2.842	56.84%	20	3.000	60.00%	12	1.800	36.00%	24	2.580	51.60%	17
Unrealistic Client Expectations	T260C25	1.526	30.53%	29	2.813	56.25%	16	3.200	64.00%	12	2.440	48.80%	18
Unrealistic Information Expectations (By the Contrac	T260C26	3.056	61.11%	11	2.625	52.50%	20	1.357	27.14%	29	2.417	48.33%	19
Uncontrollable External Events	T260C31	1.842	36.84%	23	2.235	44.71%	22	2.929	58.57%	20	2.280	45.60%	20
Poor Communications Among Project Participants	T260C18	2.895	57.89%	17	1.750	35.00%	24	1.923	38.46%	23	2.250	45.00%	21
Inappropriate Contract Type (Strategy)	T260C05	1.611	32.22%	27	3.000	60.00%	12	1.800	36.00%	24	2.140	42.80%	22
Inappropriate Document Control	T260C14	2.167	43.33%	22	1.294	25.88%	31	3.000	60.00%	16	2.102	42.04%	23
Unrealistic Tender Pricing	T260C11	1.579	31.58%	28	1.765	35.29%	23	2.857	57.14%	21	2.000	40.00%	24
Inappropriate Contractor Selection	T260C10	2.895	57.89%	17	1.588	31.76%	26	1.267	25.33%	31	1.980	39.61%	25
Exaggerated Claims	T260C32	2.824	56.47%	21	1.286	25.71%	32	1.333	26.67%	30	1.870	37.39%	26
Poor Workmanship	T260C23	1.278	25.56%	31	2.625	52.50%	20	1.643	32.86%	28	1.833	36.67%	27
Inappropriate Payment Method	T260C13	1.263	25.26%	32	1.400	28.00%	30	3.000	60.00%	16	1.813	36.25%	28
Inadequate Site Investigation	T260C24	1.684	33.68%	26	1.600	32.00%	25	2.133	42.67%	22	1.796	35.92%	29
Personality Clashes Among Project Participants	T260C28	1.833	36.67%	24	1.529	30.59%	28	1.733	34.67%	27	1.700	34.00%	30
Lack of Team Spirit Among Participants	T260C27	1.722	34.44%	25	1.563	31.25%	27	1.769	35.38%	26	1.681	33.62%	31
Adversarial (industry) Culture Among Project Participi	T260C30	1.444	28.89%	30	1.500	30.00%	29	1.267	25.33%	31	1.408	28.16%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.906	30.66%	69.34%
Clients & Contractors	4.781	29.88%	70.12%
Consultants & Contractors	4	25.00%	75.00%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.219	20.12%	79.88%
Consultants & Over All	2.75	17.19%	82.81%
Contractors & Over All	3	18.75%	81.25%

Y.3.1.27 CAUSE SIGNIFICANCE ASSESSMENT: (T27 C01) – (T27 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T270C01	4.000	80.00%	1	4.118	82.35%	2	3.933	78.67%	2	4.020	80.39%	1
Inadequate Design Documentation	T270C02	3.938	78.75%	3	4.143	82.86%	1	3.933	78.67%	2	4.000	80.00%	2
Incomplete Tender Information	T270C09	3.778	75.56%	4	3.882	77.65%	7	3.867	77.33%	6	3.840	76.80%	3
Slow Client Response	T270C20	3.529	70.59%	8	4.000	80.00%	3	4.000	80.00%	1	3.830	76.60%	4
Inappropriate/ Unexpected Time Control (Target)	T270C15	4.000	80.00%	1	4.000	80.00%	3	3.400	68.00%	11	3.820	76.40%	5
Poor Communications Among Project Participants	T270C18	3.706	74.12%	5	3.824	76.47%	8	3.867	77.33%	6	3.796	75.92%	6
Changes by Client	T270C21	3.526	70.53%	9	3.941	78.82%	5	3.929	78.57%	4	3.780	75.60%	7
Inadequate Brief	T270C03	3.632	72.63%	6	3.813	76.25%	9	3.923	78.46%	5	3.771	75.42%	8
Unclear & Inadequate Specifications	T270C04	3.579	71.58%	7	3.647	72.94%	10	3.867	77.33%	6	3.686	73.73%	9
Lack of Information for Decision Making;(Decisiveness)	T270C19	3.353	67.06%	10	3.412	68.24%	11	3.857	77.14%	9	3.521	70.42%	10
Lack of Competence of Project Participants	T270C22	3.053	61.05%	14	3.938	78.75%	6	3.200	64.00%	15	3.380	67.60%	11
Unrealistic Client Expectations	T270C25	2.947	58.95%	19	3.000	60.00%	15	3.600	72.00%	10	3.157	63.14%	12
Inappropriate Contract Type (Strategy)	T270C05	3.000	60.00%	16	3.200	64.00%	12	3.214	64.29%	13	3.128	62.55%	13
Inappropriate/ Unexpected Quality Control (Target)	T270C17	3.167	63.33%	11	3.000	60.00%	15	3.200	64.00%	15	3.120	62.40%	14
Inappropriate/ Unexpected Cost Control (Target)	T270C16	3.111	62.22%	12	3.000	60.00%	15	3.200	64.00%	15	3.100	62.00%	15
Lack of Team Spirit Among Participants	T270C27	3.053	61.05%	14	3.063	61.25%	13	3.167	63.33%	19	3.085	61.70%	16
Poor Management By One or More Project Participants	T270C29	3.000	60.00%	16	3.000	60.00%	15	2.933	58.67%	20	2.980	59.60%	17
Personality Clashes Among Project Participants	T270C28	3.056	61.11%	13	3.059	61.18%	14	2.267	45.33%	23	2.820	56.40%	18
Inadequate contract documentation	T270C08	2.706	54.12%	21	1.941	38.82%	24	3.214	64.29%	13	2.583	51.67%	19
Inappropriate Document Control	T270C14	3.000	60.00%	16	1.529	30.59%	26	3.308	66.15%	12	2.571	51.43%	20
Inappropriate Contract Form	T270C06	2.444	48.89%	22	2.571	51.43%	23	2.571	51.43%	21	2.522	50.43%	21
Inadequate Contract administration	T270C07	1.737	34.74%	25	2.688	53.75%	20	3.200	64.00%	15	2.480	49.60%	22
Uncontrollable External Events	T270C31	2.944	58.89%	20	2.938	58.75%	19	1.333	26.67%	28	2.449	48.98%	23
Unclear Risk Allocation	T270C12	2.368	47.37%	23	1.375	27.50%	31	2.533	50.67%	22	2.100	42.00%	24
Poor Workmanship	T270C23	1.316	26.32%	31	2.667	53.33%	21	1.714	34.29%	24	1.854	37.08%	25
Inadequate Site Investigation	T270C24	1.474	29.47%	27	2.647	52.94%	22	1.333	26.67%	28	1.824	36.47%	26
Adversarial (industry) Culture Among Project Participants	T270C30	2.158	43.16%	24	1.688	33.75%	25	1.533	30.67%	25	1.820	36.40%	27
Unrealistic Tender Pricing	T270C11	1.632	32.63%	26	1.471	29.41%	28	1.357	27.14%	27	1.500	30.00%	28
Exaggerated Claims	T270C32	1.444	28.89%	28	1.500	30.00%	27	1.286	25.71%	30	1.417	28.33%	29
Unrealistic Information Expectations (By the Contractor)	T270C26	1.278	25.56%	32	1.471	29.41%	28	1.400	28.00%	26	1.380	27.60%	30
Inappropriate Contractor Selection	T270C10	1.412	28.24%	30	1.412	28.24%	30	1.214	24.29%	32	1.354	27.08%	31
Inappropriate Payment Method	T270C13	1.421	28.42%	29	1.250	25.00%	32	1.267	25.33%	31	1.320	26.40%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.344	20.90%	79.10%
Clients & Contractors	3.844	24.02%	75.98%
Consultants & Contractors	4	25.00%	75.00%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.406	15.04%	84.96%
Consultants & Over All	2.375	14.84%	85.16%
Contractors & Over All	2.563	16.02%	83.98%

Y.3.1.28 CAUSE SIGNIFICANCE ASSESSMENT: (T28 C01) – (T28 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T280C01	4.056	81.11%	1	4.063	81.25%	2	3.933	78.67%	2	4.020	80.41%	1
Inadequate Design Documentation	T280C02	3.778	75.56%	3	4.188	83.75%	1	3.929	78.57%	3	3.958	79.17%	2
Incomplete Tender Information	T280C09	3.750	75.00%	4	3.938	78.75%	7	3.857	77.14%	8	3.848	76.96%	3
Inappropriate/ Unexpected Time Control (Target)	T280C15	3.947	78.95%	2	4.059	81.18%	3	3.400	68.00%	11	3.824	76.47%	4
Slow Client Response	T280C20	3.526	70.53%	8	4.000	80.00%	4	4.000	80.00%	1	3.813	76.25%	5
Poor Communications Among Project Participants	T280C18	3.667	73.33%	5	3.875	77.50%	8	3.867	77.33%	4	3.796	75.92%	6
Changes by Client	T280C21	3.500	70.00%	9	3.941	78.82%	5	3.867	77.33%	4	3.760	75.20%	7
Inadequate Brief	T280C03	3.611	72.22%	6	3.813	76.25%	9	3.867	77.33%	4	3.755	75.10%	8
Unclear & Inadequate Specifications	T280C04	3.556	71.11%	7	3.588	71.76%	10	3.867	77.33%	4	3.660	73.20%	9
Lack of Information for Decision Making;(Decisiveness)	T280C19	3.263	65.26%	10	3.313	66.25%	11	3.786	75.71%	9	3.429	68.57%	10
Lack of Competence of Project Participants	T280C22	3.053	61.05%	13	3.941	78.82%	5	3.200	64.00%	15	3.392	67.84%	11
Unrealistic Client Expectations	T280C25	2.944	58.89%	19	2.938	58.75%	17	3.643	72.86%	10	3.146	62.92%	12
Inappropriate/ Unexpected Quality Control (Target)	T280C17	3.167	63.33%	11	2.941	58.82%	16	3.200	64.00%	15	3.100	62.00%	13
Lack of Team Spirit Among Participants	T280C27	3.000	60.00%	15	3.063	61.25%	13	3.200	64.00%	15	3.083	61.67%	14
Inappropriate Contract Type (Strategy)	T280C05	2.947	58.95%	16	3.125	62.50%	12	3.214	64.29%	12	3.082	61.63%	15
Inappropriate/ Unexpected Cost Control (Target)	T280C16	3.056	61.11%	12	3.000	60.00%	15	3.200	64.00%	15	3.082	61.63%	15
Poor Management By One or More Project Participants	T280C29	2.947	58.95%	16	2.938	58.75%	17	2.923	58.46%	20	2.938	58.75%	17
Personality Clashes Among Project Participants	T280C28	3.053	61.05%	13	3.059	61.18%	14	2.267	45.33%	23	2.824	56.47%	18
Inadequate contract documentation	T280C08	2.722	54.44%	21	2.000	40.00%	24	3.214	64.29%	12	2.612	52.24%	19
Inappropriate Document Control	T280C14	2.947	58.95%	16	1.500	30.00%	26	3.214	64.29%	12	2.551	51.02%	20
Inadequate Contract administration	T280C07	1.706	34.12%	25	2.706	54.12%	20	3.200	64.00%	15	2.510	50.20%	21
Uncontrollable External Events	T280C31	2.895	57.89%	20	2.933	58.67%	19	1.308	26.15%	29	2.468	49.36%	22
Inappropriate Contract Form	T280C06	2.368	47.37%	22	2.467	49.33%	23	2.571	51.43%	24	2.458	49.17%	23
Unclear Risk Allocation	T280C12	2.333	46.67%	23	1.375	27.50%	31	2.500	50.00%	22	2.063	41.25%	24
Poor Workmanship	T280C23	1.278	25.56%	31	2.706	54.12%	20	1.667	33.33%	24	1.880	37.60%	25
Adversarial (industry) Culture Among Project Participants	T280C30	2.111	42.22%	24	1.750	35.00%	25	1.538	30.77%	25	1.830	36.60%	26
Inadequate Site Investigation	T280C24	1.471	29.41%	27	2.588	51.76%	22	1.333	26.67%	28	1.816	36.33%	27
Unrealistic Tender Pricing	T280C11	1.632	32.63%	26	1.471	29.41%	27	1.357	27.14%	26	1.500	30.00%	28
Exaggerated Claims	T280C32	1.421	28.42%	28	1.471	29.41%	27	1.308	26.15%	29	1.408	28.16%	29
Unrealistic Information Expectations (By the Contractor)	T280C26	1.278	25.56%	31	1.438	28.75%	29	1.357	27.14%	26	1.354	27.08%	30
Inappropriate Contractor Selection	T280C10	1.389	27.78%	29	1.412	28.24%	30	1.214	24.29%	32	1.347	26.94%	31
Inappropriate Payment Method	T280C13	1.389	27.78%	29	1.200	24.00%	32	1.286	25.71%	31	1.298	25.96%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.25	20.31%	79.69%
Clients & Contractors	3.844	24.02%	75.98%
Consultants & Contractors	4.219	26.37%	73.63%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.094	13.09%	86.91%
Consultants & Over All	2.344	14.65%	85.35%
Contractors & Over All	3	18.75%	81.25%

Y.3.1.29 CAUSE SIGNIFICANCE ASSESSMENT: (T29 C01) – (T29 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Lack of Information for Decision Making;(Decisive)	T290C19	4.118	82.35%	1	4.063	81.25%	3	3.933	78.67%	2	4.042	80.83%	1
Slow Client Response	T290C20	3.684	73.68%	3	4.188	83.75%	1	3.933	78.67%	2	3.920	78.40%	2
Changes by Client	T290C21	3.579	71.58%	7	4.133	82.67%	2	4.000	80.00%	1	3.875	77.50%	3
Poor Communications Among Project Participants	T290C18	3.722	74.44%	2	3.750	75.00%	11	3.867	77.33%	7	3.776	75.51%	4
Inappropriate/ Unexpected Time Control (Target)	T290C15	3.632	72.63%	4	3.353	67.06%	13	3.933	78.67%	2	3.627	72.55%	5
Inadequate Design Documentation	T290C02	3.067	61.33%	15	3.875	77.50%	6	3.867	77.33%	7	3.609	72.17%	6
Inadequate/ Inaccurate Design Information	T290C01	3.125	62.50%	14	3.824	76.47%	8	3.867	77.33%	7	3.604	72.08%	7
Inadequate Brief	T290C03	3.176	63.53%	13	3.824	76.47%	8	3.786	75.71%	11	3.583	71.67%	8
Lack of Competence of Project Participants	T290C22	3.444	68.89%	12	4.000	80.00%	4	3.214	64.29%	15	3.553	71.06%	9
Inappropriate/ Unexpected Cost Control (Target)	T290C16	3.611	72.22%	5	3.125	62.50%	14	3.929	78.57%	6	3.542	70.83%	10
Poor Management By One or More Project Participan	T290C29	3.529	70.59%	9	3.875	77.50%	6	3.200	64.00%	18	3.542	70.83%	10
Inappropriate/ Unexpected Quality Control (Target)	T290C17	3.611	72.22%	5	3.125	62.50%	14	3.867	77.33%	7	3.531	70.61%	12
Unclear & Inadequate Specifications	T290C04	3.556	71.11%	8	3.706	74.12%	12	3.214	64.29%	15	3.510	70.20%	13
Inadequate contract documentation	T290C08	3.000	60.00%	18	3.882	77.65%	5	3.200	64.00%	18	3.367	67.35%	14
Inadequate Contract administration	T290C07	3.059	61.18%	16	3.813	76.25%	10	3.200	64.00%	18	3.354	67.08%	15
Lack of Team Spirit Among Participants	T290C27	3.526	70.53%	10	3.059	61.18%	16	3.400	68.00%	13	3.333	66.67%	16
Unrealistic Client Expectations	T290C25	3.000	60.00%	18	3.000	60.00%	17	3.933	78.67%	2	3.292	65.83%	17
Inappropriate Document Control	T290C14	2.941	58.82%	22	3.000	60.00%	17	3.786	75.71%	11	3.213	64.26%	18
Inappropriate Contract Type (Strategy)	T290C05	3.000	60.00%	18	3.000	60.00%	17	3.231	64.62%	14	3.065	61.30%	19
Incomplete Tender Information	T290C09	1.722	34.44%	24	3.000	60.00%	17	3.214	64.29%	15	2.592	51.84%	20
Unclear Risk Allocation	T290C12	2.222	44.44%	23	1.563	31.25%	25	3.143	62.86%	21	2.271	45.42%	21
Inappropriate Contract Form	T290C06	1.579	31.58%	25	2.071	41.43%	23	3.143	62.86%	21	2.191	43.83%	22
Personality Clashes Among Project Participants	T290C28	3.056	61.11%	17	1.706	34.12%	24	1.643	32.86%	23	2.184	43.67%	23
Unrealistic Information Expectations (By the Contrac	T290C26	3.471	69.41%	11	1.200	24.00%	29	1.286	25.71%	26	2.065	41.30%	24
Poor Workmanship	T290C23	1.278	25.56%	31	3.000	60.00%	17	1.538	30.77%	24	1.958	39.17%	25
Uncontrollable External Events	T290C31	3.000	60.00%	18	1.471	29.41%	26	1.200	24.00%	28	1.918	38.37%	26
Inadequate Site Investigation	T290C24	1.421	28.42%	26	2.938	58.75%	22	1.200	24.00%	28	1.840	36.80%	27
Unrealistic Tender Pricing	T290C11	1.421	28.42%	26	1.250	25.00%	28	1.273	25.45%	27	1.326	26.52%	28
Exaggerated Claims	T290C32	1.263	25.26%	32	1.438	28.75%	27	1.200	24.00%	28	1.300	26.00%	29
Adversarial (industry) Culture Among Project Particip	T290C30	1.316	26.32%	28	1.188	23.75%	31	1.333	26.67%	25	1.280	25.60%	30
Inappropriate Payment Method	T290C13	1.316	26.32%	28	1.176	23.53%	32	1.143	22.86%	31	1.220	24.40%	31
Inappropriate Contractor Selection	T290C10	1.294	25.88%	30	1.200	24.00%	29	1.000	20.00%	32	1.174	23.48%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	5.906	36.91%	63.09%
Clients & Contractors	4.938	30.86%	69.14%
Consultants & Contractors	4.719	29.49%	70.51%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	3.813	23.83%	76.17%
Consultants & Over All	2.719	16.99%	83.01%
Contractors & Over All	2.938	18.36%	81.64%

Y.3.1.30 CAUSE SIGNIFICANCE ASSESSMENT: (T30 C01) – (T30 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Lack of Information for Decision Making;(Decisive)	T300C19	4.056	81.11%	1	3.882	77.65%	5	3.857	77.14%	5	3.939	78.78%	1
Slow Client Response	T300C20	3.684	73.68%	2	4.200	84.00%	1	4.000	80.00%	1	3.936	78.72%	2
Poor Communications Among Project Participants	T300C18	3.684	73.68%	2	4.000	80.00%	3	3.929	78.57%	4	3.860	77.20%	3
Changes by Client	T300C21	3.471	69.41%	7	4.059	81.18%	2	4.000	80.00%	1	3.833	76.67%	4
Inappropriate/ Unexpected Time Control (Target)	T300C15	3.667	73.33%	4	3.938	78.75%	4	3.214	64.29%	12	3.625	72.50%	5
Inappropriate/ Unexpected Cost Control (Target)	T300C16	3.632	72.63%	5	3.750	75.00%	8	3.214	64.29%	12	3.551	71.02%	6
Poor Management By One or More Project Participan	T300C29	3.444	68.89%	9	3.800	76.00%	7	3.214	64.29%	12	3.489	69.79%	7
Inappropriate/ Unexpected Quality Control (Target)	T300C17	3.474	69.47%	6	3.750	75.00%	8	3.200	64.00%	17	3.480	69.60%	8
Unclear & Inadequate Specifications	T300C04	3.471	69.41%	7	2.941	58.82%	18	3.933	78.67%	3	3.429	68.57%	9
Lack of Competence of Project Participants	T300C22	3.056	61.11%	12	3.824	76.47%	6	3.357	67.14%	10	3.408	68.16%	10
Inadequate/ Inaccurate Design Information	T300C01	3.176	63.53%	10	3.000	60.00%	14	3.857	77.14%	5	3.326	66.52%	11
Inadequate Brief	T300C03	3.059	61.18%	11	3.063	61.25%	12	3.857	77.14%	5	3.298	65.96%	12
Unrealistic Client Expectations	T300C25	3.000	60.00%	16	3.059	61.18%	13	3.833	76.67%	9	3.239	64.78%	13
Inadequate contract documentation	T300C08	3.053	61.05%	15	3.118	62.35%	10	3.214	64.29%	12	3.120	62.40%	14
Personality Clashes Among Project Participants	T300C28	3.000	60.00%	16	3.067	61.33%	11	3.214	64.29%	12	3.083	61.67%	15
Uncontrollable External Events	T300C31	3.000	60.00%	16	3.000	60.00%	14	3.267	65.33%	11	3.078	61.57%	16
Lack of Team Spirit Among Participants	T300C27	3.000	60.00%	16	3.000	60.00%	14	3.200	64.00%	17	3.059	61.18%	17
Inadequate Design Documentation	T300C02	3.056	61.11%	11	2.875	57.50%	21	3.071	61.43%	19	3.000	60.00%	18
Inadequate Contract administration	T300C07	3.000	60.00%	16	2.938	58.75%	19	3.067	61.33%	20	3.000	60.00%	18
Incomplete Tender Information	T300C09	1.737	34.74%	24	3.000	60.00%	14	3.846	76.92%	8	2.735	54.69%	20
Unclear Risk Allocation	T300C12	1.778	35.56%	23	2.933	58.67%	20	3.067	61.33%	20	2.542	50.83%	21
Inappropriate Contract Type (Strategy)	T300C05	3.000	60.00%	16	1.750	35.00%	23	1.714	34.29%	22	2.224	44.49%	22
Unrealistic Information Expectations (By the Contract)	T300C26	3.056	61.11%	11	1.235	24.71%	29	1.571	31.43%	27	2.000	40.00%	23
Inappropriate Contract Form	T300C06	1.737	34.74%	24	1.588	31.76%	27	1.714	34.29%	22	1.680	33.60%	24
Inadequate Site Investigation	T300C24	1.556	31.11%	27	1.733	34.67%	24	1.667	33.33%	24	1.646	32.92%	25
Adversarial (industry) Culture Among Project Participi	T300C30	1.444	28.89%	28	1.706	34.12%	25	1.667	33.33%	24	1.600	32.00%	26
Inappropriate Contractor Selection	T300C10	1.375	27.50%	30	1.706	34.12%	25	1.667	33.33%	24	1.583	31.67%	27
Poor Workmanship	T300C23	1.353	27.06%	31	2.000	40.00%	22	1.333	26.67%	28	1.553	31.06%	28
Inappropriate Document Control	T300C14	2.158	43.16%	22	1.188	23.75%	32	1.071	21.43%	32	1.531	30.61%	29
Unrealistic Tender Pricing	T300C11	1.647	32.94%	26	1.235	24.71%	29	1.214	24.29%	31	1.375	27.50%	30
Inappropriate Payment Method	T300C13	1.444	28.89%	28	1.235	24.71%	29	1.231	24.62%	29	1.313	26.25%	31
Exaggerated Claims	T300C32	1.222	24.44%	32	1.471	29.41%	28	1.231	24.62%	29	1.313	26.25%	31

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.656	29.10%	70.90%
Clients & Contractors	5.281	33.01%	66.99%
Consultants & Contractors	3.25	20.31%	79.69%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.5	15.63%	84.38%
Consultants & Over All	2.469	15.43%	84.57%
Contractors & Over All	3.281	20.51%	79.49%

Y.3.1.31 CAUSE SIGNIFICANCE ASSESSMENT: (T31 C01) – (T31 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Lack of Information for Decision Making;(Decisive)	T310C19	3.947	78.95%	1	3.941	78.82%	2	3.800	76.00%	5	3.902	78.04%	1
Slow Client Response	T310C20	3.667	73.33%	3	3.882	77.65%	3	4.000	80.00%	1	3.837	76.73%	2
Poor Communications Among Project Participants	T310C18	3.722	74.44%	2	3.882	77.65%	3	3.857	77.14%	4	3.816	76.33%	3
Uncontrollable External Events	T310C31	3.118	62.35%	6	4.063	81.25%	1	4.000	80.00%	1	3.702	74.04%	4
Inappropriate/ Unexpected Time Control (Target)	T310C15	3.471	69.41%	4	3.765	75.29%	5	3.200	64.00%	12	3.490	69.80%	5
Unclear & Inadequate Specifications	T310C04	3.118	62.35%	6	3.000	60.00%	11	3.923	78.46%	3	3.304	66.09%	6
Lack of Competence of Project Participants	T310C22	3.056	61.11%	8	3.063	61.25%	6	3.214	64.29%	9	3.104	62.08%	7
Changes by Client	T310C21	3.053	61.05%	10	3.059	61.18%	7	3.231	64.62%	7	3.102	62.04%	8
Poor Management By One or More Project Participan	T310C29	3.053	61.05%	10	3.059	61.18%	7	3.200	64.00%	12	3.098	61.96%	9
Inadequate/ Inaccurate Design Information	T310C01	3.053	61.05%	10	3.000	60.00%	11	3.273	65.45%	6	3.085	61.70%	10
Unclear Risk Allocation	T310C12	3.056	61.11%	8	3.059	61.18%	7	3.143	62.86%	16	3.082	61.63%	11
Inadequate contract documentation	T310C08	3.053	61.05%	10	3.000	60.00%	11	3.200	64.00%	12	3.080	61.60%	12
Personality Clashes Among Project Participants	T310C28	3.053	61.05%	10	3.000	60.00%	11	3.200	64.00%	12	3.080	61.60%	12
Inadequate Brief	T310C03	3.000	60.00%	16	3.000	60.00%	11	3.214	64.29%	9	3.065	61.30%	14
Lack of Team Spirit Among Participants	T310C27	3.000	60.00%	16	3.000	60.00%	11	3.077	61.54%	18	3.021	60.43%	15
Inadequate Design Documentation	T310C02	3.000	60.00%	16	3.000	60.00%	11	3.071	61.43%	19	3.021	60.42%	16
Inadequate Contract administration	T310C07	3.000	60.00%	16	2.941	58.82%	18	3.067	61.33%	20	3.000	60.00%	17
Unrealistic Client Expectations	T310C25	3.000	60.00%	16	2.000	40.00%	21	3.214	64.29%	9	2.729	54.58%	18
Inappropriate/ Unexpected Cost Control (Target)	T310C16	3.444	68.89%	5	1.529	30.59%	27	3.143	62.86%	16	2.694	53.88%	19
Incomplete Tender Information	T310C09	1.722	34.44%	24	3.059	61.18%	7	3.231	64.62%	8	2.604	52.08%	20
Unrealistic Information Expectations (By the Contract)	T310C26	3.053	61.05%	10	1.750	35.00%	24	1.615	32.31%	27	2.229	44.58%	21
Inadequate Site Investigation	T310C24	1.438	28.75%	27	2.933	58.67%	20	1.714	34.29%	23	2.022	40.44%	22
Adversarial (industry) Culture Among Project Participi	T310C30	1.421	28.42%	28	2.938	58.75%	19	1.667	33.33%	26	2.000	40.00%	23
Inappropriate Contract Type (Strategy)	T310C05	2.158	43.16%	21	1.765	35.29%	22	1.714	34.29%	23	1.900	38.00%	24
Inappropriate Contract Form	T310C06	1.667	33.33%	25	1.765	35.29%	22	1.786	35.71%	21	1.735	34.69%	25
Inappropriate/ Unexpected Quality Control (Target)	T310C17	1.737	34.74%	23	1.563	31.25%	26	1.786	35.71%	21	1.694	33.88%	26
Inappropriate Contractor Selection	T310C10	1.316	26.32%	30	1.667	33.33%	25	1.692	33.85%	25	1.532	30.64%	27
Poor Workmanship	T310C23	1.316	26.32%	30	1.529	30.59%	27	1.333	26.67%	28	1.392	27.84%	28
Inappropriate Document Control	T310C14	1.778	35.56%	22	1.250	25.00%	30	1.067	21.33%	32	1.388	27.76%	29
Inappropriate Payment Method	T310C13	1.375	27.50%	29	1.471	29.41%	29	1.200	24.00%	30	1.354	27.08%	30
Unrealistic Tender Pricing	T310C11	1.526	30.53%	26	1.188	23.75%	32	1.154	23.08%	31	1.313	26.25%	31
Exaggerated Claims	T310C32	1.235	24.71%	32	1.235	24.71%	31	1.214	24.29%	29	1.229	24.58%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.563	28.52%	71.48%
Clients & Contractors	4.781	29.88%	70.12%
Consultants & Contractors	3.594	22.46%	77.54%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.656	16.60%	83.40%
Consultants & Over All	2.469	15.43%	84.57%
Contractors & Over All	3.125	19.53%	80.47%

Y.3.1.32 CAUSE SIGNIFICANCE ASSESSMENT: (T32 C01) – (T32 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Lack of Information for Decision Making;(Decisive)	T320C19	3.889	77.78%	1	3.941	78.82%	2	3.800	76.00%	5	3.880	77.60%	1
Poor Communications Among Project Participants	T320C18	3.737	74.74%	2	3.941	78.82%	2	3.857	77.14%	4	3.840	76.80%	2
Slow Client Response	T320C20	3.667	73.33%	3	3.875	77.50%	4	4.000	80.00%	1	3.833	76.67%	3
Uncontrollable External Events	T320C31	3.111	62.22%	6	4.000	80.00%	1	3.929	78.57%	2	3.646	72.92%	4
Inappropriate/ Unexpected Time Control (Target)	T320C15	3.611	72.22%	4	3.765	75.29%	5	3.200	64.00%	12	3.540	70.80%	5
Unclear & Inadequate Specifications	T320C04	3.105	62.11%	7	3.000	60.00%	11	3.929	78.57%	2	3.300	66.00%	6
Changes by Client	T320C21	3.053	61.05%	12	3.059	61.18%	8	3.267	65.33%	7	3.118	62.35%	7
Lack of Competence of Project Participants	T320C22	3.059	61.18%	9	3.063	61.25%	6	3.214	64.29%	9	3.106	62.13%	8
Inadequate/ Inaccurate Design Information	T320C01	3.056	61.11%	10	3.000	60.00%	11	3.286	65.71%	6	3.104	62.08%	9
Poor Management By One or More Project Participan	T320C29	3.056	61.11%	10	3.059	61.18%	8	3.200	64.00%	12	3.100	62.00%	10
Unclear Risk Allocation	T320C12	3.105	62.11%	7	3.063	61.25%	6	3.077	61.54%	17	3.083	61.67%	11
Inadequate Brief	T320C03	3.000	60.00%	15	3.000	60.00%	11	3.214	64.29%	9	3.060	61.20%	12
Inadequate contract documentation	T320C08	3.000	60.00%	15	3.000	60.00%	11	3.200	64.00%	12	3.060	61.20%	12
Personality Clashes Among Project Participants	T320C28	3.053	61.05%	12	2.941	58.82%	17	3.167	63.33%	15	3.042	60.83%	14
Inadequate Design Documentation	T320C02	3.000	60.00%	15	3.000	60.00%	11	3.067	61.33%	18	3.021	60.42%	15
Lack of Team Spirit Among Participants	T320C27	3.000	60.00%	15	3.000	60.00%	11	3.067	61.33%	18	3.020	60.39%	16
Inadequate Contract administration	T320C07	3.000	60.00%	15	2.933	58.67%	18	3.067	61.33%	18	3.000	60.00%	17
Unrealistic Client Expectations	T320C25	3.000	60.00%	15	1.941	38.82%	21	3.214	64.29%	9	2.700	54.00%	18
Inappropriate/ Unexpected Cost Control (Target)	T320C16	3.444	68.89%	5	1.529	30.59%	27	3.154	63.08%	16	2.688	53.75%	19
Incomplete Tender Information	T320C09	1.667	33.33%	24	3.059	61.18%	8	3.267	65.33%	7	2.620	52.40%	20
Unrealistic Information Expectations (By the Contrac	T320C26	3.053	61.05%	12	1.706	34.12%	24	1.643	32.86%	27	2.200	44.00%	21
Inadequate Site Investigation	T320C24	1.500	30.00%	26	2.875	57.50%	20	1.692	33.85%	24	2.021	40.43%	22
Adversarial (industry) Culture Among Project Participi	T320C30	1.471	29.41%	28	2.929	58.57%	19	1.667	33.33%	25	1.978	39.57%	23
Inappropriate Contract Type (Strategy)	T320C05	2.158	43.16%	21	1.765	35.29%	22	1.714	34.29%	22	1.900	38.00%	24
Inappropriate/ Unexpected Quality Control (Target)	T320C17	1.737	34.74%	23	1.667	33.33%	26	1.733	34.67%	21	1.714	34.29%	25
Inappropriate Contract Form	T320C06	1.647	32.94%	25	1.765	35.29%	22	1.714	34.29%	22	1.708	34.17%	26
Inappropriate Contractor Selection	T320C10	1.333	26.67%	30	1.688	33.75%	25	1.667	33.33%	25	1.551	31.02%	27
Poor Workmanship	T320C23	1.316	26.32%	31	1.500	30.00%	28	1.385	27.69%	28	1.391	27.83%	28
Inappropriate Payment Method	T320C13	1.421	28.42%	29	1.500	30.00%	28	1.214	24.29%	29	1.383	27.66%	29
Inappropriate Document Control	T320C14	1.765	35.29%	22	1.235	24.71%	30	1.071	21.43%	32	1.375	27.50%	30
Unrealistic Tender Pricing	T320C11	1.500	30.00%	26	1.188	23.75%	32	1.214	24.29%	29	1.304	26.09%	31
Exaggerated Claims	T320C32	1.294	25.88%	32	1.200	24.00%	31	1.214	24.29%	29	1.239	24.78%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.656	29.10%	70.90%
Clients & Contractors	4.719	29.49%	70.51%
Consultants & Contractors	3.688	23.05%	76.95%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.813	17.58%	82.42%
Consultants & Over All	2.531	15.82%	84.18%
Contractors & Over All	3.031	18.95%	81.05%

Y.3.1.33 CAUSE SIGNIFICANCE ASSESSMENT: (T33 C01) – (T33 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T330C01	3.824	76.47%	1	3.941	78.82%	2	3.929	78.57%	3	3.896	77.92%	1
Slow Client Response	T330C20	3.684	73.68%	4	3.941	78.82%	2	3.933	78.67%	1	3.843	76.86%	2
Inadequate Design Documentation	T330C02	3.579	71.58%	6	4.063	81.25%	1	3.929	78.57%	3	3.837	76.73%	3
Inappropriate/ Unexpected Time Control (Target)	T330C15	3.737	74.74%	3	3.882	77.65%	6	3.867	77.33%	5	3.824	76.47%	4
Changes by Client	T330C21	3.438	68.75%	8	3.938	78.75%	5	3.933	78.67%	1	3.766	75.32%	5
Inappropriate/ Unexpected Quality Control (Target)	T330C17	3.667	73.33%	5	3.765	75.29%	8	3.867	77.33%	5	3.760	75.20%	6
Inappropriate/ Unexpected Cost Control (Target)	T330C16	3.474	69.47%	7	3.824	76.47%	7	3.867	77.33%	5	3.706	74.12%	7
Lack of Competence of Project Participants	T330C22	3.111	62.22%	10	3.941	78.82%	2	3.846	76.92%	8	3.604	72.08%	8
Poor Communications Among Project Participants	T330C18	3.778	75.56%	2	3.059	61.18%	13	3.200	64.00%	11	3.360	67.20%	9
Inadequate Brief	T330C03	3.118	62.35%	9	3.063	61.25%	9	3.200	64.00%	11	3.125	62.50%	10
Unrealistic Client Expectations	T330C25	3.059	61.18%	12	3.063	61.25%	9	3.200	64.00%	11	3.104	62.08%	11
Poor Management By One or More Project Participant	T330C29	3.053	61.05%	15	3.063	61.25%	9	3.200	64.00%	11	3.100	62.00%	12
Unclear Risk Allocation	T330C12	3.000	60.00%	17	3.059	61.18%	13	3.200	64.00%	11	3.080	61.60%	13
Inadequate contract documentation	T330C08	3.000	60.00%	17	3.000	60.00%	17	3.231	64.62%	10	3.063	61.25%	14
Uncontrollable External Events	T330C31	3.053	61.05%	15	3.063	61.25%	9	3.077	61.54%	19	3.063	61.25%	14
Inadequate Contract administration	T330C07	3.000	60.00%	17	3.000	60.00%	17	3.200	64.00%	11	3.060	61.20%	16
Incomplete Tender Information	T330C09	2.176	43.53%	20	3.000	60.00%	17	3.200	64.00%	11	2.771	55.42%	17
Lack of Information for Decision Making;(Decisiveness)	T330C19	1.778	35.56%	21	3.059	61.18%	13	3.200	64.00%	11	2.640	52.80%	18
Unclear & Inadequate Specifications	T330C04	1.737	34.74%	23	3.059	61.18%	13	3.286	65.71%	9	2.620	52.40%	19
Inappropriate Contractor Selection	T330C10	3.105	62.11%	11	1.471	29.41%	28	1.214	24.29%	28	2.020	40.40%	20
Poor Workmanship	T330C23	3.059	61.18%	12	1.250	25.00%	30	1.357	27.14%	26	1.936	38.72%	21
Unrealistic Information Expectations (By the Contractor)	T330C26	3.059	61.18%	12	1.200	24.00%	31	1.357	27.14%	26	1.935	38.70%	22
Lack of Team Spirit Among Participants	T330C27	1.778	35.56%	21	1.867	37.33%	21	1.667	33.33%	23	1.771	35.42%	23
Inappropriate Contract Type (Strategy)	T330C05	1.737	34.74%	23	1.765	35.29%	24	1.714	34.29%	22	1.740	34.80%	24
Inappropriate Contract Form	T330C06	1.579	31.58%	25	1.813	36.25%	23	1.786	35.71%	20	1.714	34.29%	25
Personality Clashes Among Project Participants	T330C28	1.579	31.58%	25	1.824	36.47%	22	1.733	34.67%	21	1.706	34.12%	26
Adversarial (industry) Culture Among Project Participants	T330C30	1.389	27.78%	28	2.000	40.00%	20	1.667	33.33%	23	1.680	33.60%	27
Inadequate Site Investigation	T330C24	1.333	26.67%	30	1.688	33.75%	25	1.667	33.33%	23	1.551	31.02%	28
Exaggerated Claims	T330C32	1.444	28.89%	27	1.667	33.33%	26	1.214	24.29%	28	1.447	28.94%	29
Unrealistic Tender Pricing	T330C11	1.353	27.06%	29	1.500	30.00%	27	1.200	24.00%	31	1.354	27.08%	30
Inappropriate Document Control	T330C14	1.278	25.56%	32	1.353	27.06%	29	1.071	21.43%	32	1.245	24.90%	31
Inappropriate Payment Method	T330C13	1.316	26.32%	31	1.176	23.53%	32	1.214	24.29%	28	1.240	24.80%	32

Agreement Amongst Groups

Groups	Groups	RAF	PD	PA
Clients & Consultants	Clients & Consultants	4.875	30.47%	69.53%
Clients & Contractors	Clients & Contractors	5.25	32.81%	67.19%
Consultants & Contractors	Consultants & Contractors	3.125	19.53%	80.47%

Agreement of Each Group With Over All Groups

Groups	RAF	RAF	PD	PA
Clients & Over All	2.59375	2.594	16.21%	83.79%
Consultants & Over All	2.96875	2.969	18.55%	81.45%
Contractors & Over All	3.094	3.094	19.34%	80.66%

Y.3.1.34 CAUSE SIGNIFICANCE ASSESSMENT: (T34 C01) – (T34 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inappropriate/ Unexpected Cost Control (Target)	T340C16	4.176	83.53%	1	4.059	81.18%	2	3.867	77.33%	3	4.041	80.82%	1
Slow Client Response	T340C20	3.611	72.22%	3	4.133	82.67%	1	3.929	78.57%	1	3.872	77.45%	2
Changes by Client	T340C21	3.500	70.00%	4	3.867	77.33%	3	3.929	78.57%	1	3.745	74.89%	3
Poor Management By One or More Project Participan	T340C29	3.947	78.95%	2	3.529	70.59%	4	3.308	66.15%	5	3.633	72.65%	4
Uncontrollable External Events	T340C31	3.059	61.18%	7	3.471	69.41%	5	3.154	63.08%	13	3.234	64.68%	5
Personality Clashes Among Project Participants	T340C28	3.444	68.89%	5	3.000	60.00%	7	3.231	64.62%	7	3.229	64.58%	6
Inappropriate Payment Method	T340C13	3.000	60.00%	9	3.059	61.18%	6	3.538	70.77%	4	3.170	63.40%	7
Poor Communications Among Project Participants	T340C18	3.105	62.11%	6	3.000	60.00%	7	3.200	64.00%	9	3.098	61.96%	8
Lack of Information for Decision Making;(Decisiven	T340C19	3.056	61.11%	7	2.938	58.75%	12	3.286	65.71%	6	3.083	61.67%	9
Lack of Competence of Project Participants	T340C22	3.000	60.00%	9	3.000	60.00%	7	3.214	64.29%	8	3.064	61.28%	10
Lack of Team Spirit Among Participants	T340C27	3.000	60.00%	9	3.000	60.00%	7	3.200	64.00%	9	3.061	61.22%	11
Inappropriate Document Control	T340C14	2.294	45.88%	14	2.933	58.67%	13	3.200	64.00%	9	2.787	55.74%	12
Unrealistic Client Expectations	T340C25	1.412	28.24%	18	3.000	60.00%	7	3.200	64.00%	9	2.500	50.00%	13
Poor Workmanship	T340C23	2.947	58.95%	13	1.733	34.67%	16	1.385	27.69%	17	2.128	42.55%	14
Unrealistic Information Expectations (By the Contrac	T340C26	3.000	60.00%	9	1.471	29.41%	18	1.357	27.14%	18	1.979	39.58%	15
Inappropriate/ Unexpected Time Control (Target)	T340C15	1.706	34.12%	16	2.000	40.00%	14	1.643	32.86%	15	1.792	35.83%	16
Adversarial (industry) Culture Among Project Participi	T340C30	1.778	35.56%	15	1.765	35.29%	15	1.615	32.31%	16	1.729	34.58%	17
Inadequate Site Investigation	T340C24	1.579	31.58%	17	1.706	34.12%	17	1.714	34.29%	14	1.660	33.20%	18
Exaggerated Claims	T340C32	1.389	27.78%	19	1.412	28.24%	20	1.200	24.00%	26	1.340	26.80%	19
Unclear Risk Allocation	T340C12	1.333	26.67%	23	1.375	27.50%	21	1.286	25.71%	20	1.333	26.67%	20
Inappropriate Contractor Selection	T340C10	1.333	26.67%	23	1.471	29.41%	18	1.143	22.86%	31	1.327	26.53%	21
Inadequate Brief	T340C03	1.353	27.06%	22	1.313	26.25%	23	1.250	25.00%	22	1.311	26.22%	22
Inadequate contract documentation	T340C08	1.389	27.78%	19	1.235	24.71%	27	1.267	25.33%	24	1.300	26.00%	23
Unrealistic Tender Pricing	T340C11	1.389	27.78%	19	1.176	23.53%	31	1.333	26.67%	19	1.300	26.00%	23
Inadequate/ Inaccurate Design Information	T340C01	1.316	26.32%	25	1.353	27.06%	22	1.200	24.00%	26	1.294	25.88%	25
Inadequate Design Documentation	T340C02	1.316	26.32%	25	1.313	26.25%	23	1.200	24.00%	26	1.280	25.60%	26
Unclear & Inadequate Specifications	T340C04	1.316	26.32%	27	1.267	25.33%	25	1.231	24.62%	23	1.277	25.53%	27
Inappropriate Contract Form	T340C06	1.278	25.56%	28	1.267	25.33%	25	1.200	24.00%	26	1.250	25.00%	28
Inadequate Contract administration	T340C07	1.278	25.56%	28	1.235	24.71%	27	1.214	24.29%	24	1.245	24.90%	29
Incomplete Tender Information	T340C09	1.278	25.56%	28	1.235	24.71%	27	1.214	24.29%	24	1.245	24.90%	29
Inappropriate/ Unexpected Quality Control (Target)	T340C17	1.211	24.21%	31	1.133	22.67%	32	1.200	24.00%	26	1.184	23.67%	31
Inappropriate Contract Type (Strategy)	T340C05	1.176	23.53%	32	1.235	24.71%	27	1.067	21.33%	32	1.163	23.27%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3	18.75%	81.25%
Clients & Contractors	3.156	19.73%	80.27%
Consultants & Contractors	3.219	20.12%	79.88%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	1.531	9.57%	90.43%
Consultants & Over All	2.219	13.87%	86.13%
Contractors & Over All	2.813	17.58%	82.42%

Y.3.1.35 CAUSE SIGNIFICANCE ASSESSMENT: (T35 C01) – (T35 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T350C01	4.000	80.00%	2	4.067	81.33%	4	3.929	78.57%	3	4.000	80.00%	1
Poor Communications Among Project Participants	T350C18	4.053	81.05%	1	4.000	80.00%	6	3.867	77.33%	5	3.980	79.61%	2
Inadequate Design Documentation	T350C02	4.000	80.00%	2	4.063	81.25%	5	3.857	77.14%	7	3.979	79.58%	3
Inadequate Contract administration	T350C07	4.000	80.00%	2	4.000	80.00%	6	3.857	77.14%	7	3.959	79.18%	4
Changes by Client	T350C21	3.611	72.22%	8	4.118	82.35%	1	4.000	80.00%	1	3.900	78.00%	5
Inappropriate/ Unexpected Time Control (Target)	T350C15	3.632	72.63%	6	4.000	80.00%	6	3.923	78.46%	4	3.830	76.60%	6
Inappropriate Contractor Selection	T350C10	3.944	78.89%	5	4.118	82.35%	1	3.333	66.67%	16	3.820	76.40%	7
Uncontrollable External Events	T350C31	3.526	70.53%	11	4.118	82.35%	1	3.857	77.14%	7	3.820	76.40%	7
Lack of Information for Decision Making;(Decisiveness)	T350C19	3.625	72.50%	7	3.882	77.65%	9	3.867	77.33%	5	3.792	75.83%	9
Slow Client Response	T350C20	3.611	72.22%	8	3.688	73.75%	10	3.933	78.67%	2	3.735	74.69%	10
Inadequate Brief	T350C03	3.421	68.42%	14	3.625	72.50%	11	3.600	72.00%	10	3.540	70.80%	11
Lack of Competence of Project Participants	T350C22	3.500	70.00%	12	3.588	71.76%	12	3.500	70.00%	13	3.532	70.64%	12
Unclear & Inadequate Specifications	T350C04	3.611	72.22%	8	3.588	71.76%	12	3.357	67.14%	15	3.531	70.61%	13
Poor Management By One or More Project Participant	T350C29	3.444	68.89%	13	3.529	70.59%	14	3.400	68.00%	14	3.460	69.20%	14
Inadequate contract documentation	T350C08	3.316	66.32%	15	3.412	68.24%	16	3.571	71.43%	11	3.420	68.40%	15
Incomplete Tender Information	T350C09	3.125	62.50%	16	3.438	68.75%	15	3.571	71.43%	11	3.370	67.39%	16
Inappropriate Contract Type (Strategy)	T350C05	3.111	62.22%	20	3.059	61.18%	17	3.231	64.62%	18	3.125	62.50%	17
Inappropriate Contract Form	T350C06	3.118	62.35%	17	3.059	61.18%	17	3.214	64.29%	19	3.125	62.50%	17
Unclear Risk Allocation	T350C12	3.118	62.35%	17	3.059	61.18%	17	3.200	64.00%	21	3.122	62.45%	19
Unrealistic Client Expectations	T350C25	3.118	62.35%	17	3.000	60.00%	22	3.214	64.29%	19	3.106	62.13%	20
Poor Workmanship	T350C23	3.053	61.05%	23	3.059	61.18%	17	3.200	64.00%	21	3.098	61.96%	21
Unrealistic Information Expectations (By the Contractor)	T350C26	3.111	62.22%	20	3.000	60.00%	22	3.143	62.86%	26	3.082	61.63%	22
Personality Clashes Among Project Participants	T350C28	3.000	60.00%	24	3.000	60.00%	22	3.286	65.71%	17	3.082	61.63%	22
Inadequate Site Investigation	T350C24	3.000	60.00%	24	3.059	61.18%	17	3.200	64.00%	21	3.080	61.60%	24
Lack of Team Spirit Among Participants	T350C27	3.000	60.00%	24	3.000	60.00%	22	3.200	64.00%	21	3.061	61.22%	25
Adversarial (industry) Culture Among Project Participants	T350C30	3.000	60.00%	24	3.000	60.00%	22	1.615	32.31%	30	2.609	52.17%	26
Unrealistic Tender Pricing	T350C11	3.105	62.11%	22	1.765	35.29%	28	3.000	60.00%	27	2.604	52.08%	27
Inappropriate Document Control	T350C14	1.667	33.33%	29	2.933	58.67%	27	1.733	34.67%	28	2.083	41.67%	28
Inappropriate Payment Method	T350C13	1.316	26.32%	32	1.438	28.75%	32	3.200	64.00%	21	1.920	38.40%	29
Inappropriate/ Unexpected Cost Control (Target)	T350C16	1.474	29.47%	30	1.667	33.33%	29	1.667	33.33%	29	1.592	31.84%	30
Inappropriate/ Unexpected Quality Control (Target)	T350C17	1.765	35.29%	28	1.500	30.00%	30	1.333	26.67%	31	1.542	30.83%	31
Exaggerated Claims	T350C32	1.421	28.42%	31	1.471	29.41%	31	1.267	25.33%	32	1.392	27.84%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.781	17.38%	82.62%
Clients & Contractors	4	25.00%	75.00%
Consultants & Contractors	3.281	20.51%	79.49%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	1.781	11.13%	88.87%
Consultants & Over All	1.875	11.72%	88.28%
Contractors & Over All	2.719	16.99%	83.01%

Y.3.1.36 CAUSE SIGNIFICANCE ASSESSMENT: (T36 C01) – (T36 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Slow Client Response	T360C20	4.000	80.00%	1	3.647	72.94%	2	3.571	71.43%	3	3.760	75.20%	1
Inappropriate/ Unexpected Cost Control (Target)	T360C16	3.588	71.76%	2	4.118	82.35%	1	3.385	67.69%	5	3.723	74.47%	2
Lack of Competence of Project Participants	T360C22	3.500	70.00%	5	3.563	71.25%	4	3.857	77.14%	1	3.625	72.50%	3
Changes by Client	T360C21	3.588	71.76%	2	3.533	70.67%	5	3.615	72.31%	2	3.578	71.56%	4
Inappropriate Payment Method	T360C13	3.500	70.00%	5	3.588	71.76%	3	3.571	71.43%	3	3.551	71.02%	5
Inadequate Contract administration	T360C07	3.556	71.11%	4	3.529	70.59%	6	3.286	65.71%	10	3.469	69.39%	6
Uncontrollable External Events	T360C31	3.444	68.89%	8	3.118	62.35%	10	3.333	66.67%	6	3.300	66.00%	7
Poor Management By One or More Project Participan	T360C29	3.474	69.47%	7	3.500	70.00%	7	1.200	24.00%	22	2.800	56.00%	8
Poor Communications Among Project Participants	T360C18	3.421	68.42%	9	3.438	68.75%	8	1.200	24.00%	22	2.760	55.20%	9
Lack of Information for Decision Making;(Decisiven	T360C19	3.158	63.16%	10	3.400	68.00%	9	1.154	23.08%	30	2.681	53.62%	10
Unrealistic Client Expectations	T360C25	3.000	60.00%	11	3.000	60.00%	11	1.214	24.29%	19	2.490	49.80%	11
Adversarial (industry) Culture Among Project Particip	T360C30	2.944	58.89%	12	3.000	60.00%	11	1.200	24.00%	22	2.417	48.33%	12
Unclear & Inadequate Specifications	T360C04	1.389	27.78%	16	1.333	26.67%	20	3.333	66.67%	6	1.979	39.58%	13
Inappropriate Contract Type (Strategy)	T360C05	1.389	27.78%	16	1.176	23.53%	32	3.333	66.67%	6	1.900	38.00%	14
Incomplete Tender Information	T360C09	1.368	27.37%	19	1.294	25.88%	22	3.200	64.00%	12	1.882	37.65%	15
Inappropriate Contract Form	T360C06	1.389	27.78%	16	1.235	24.71%	28	3.308	66.15%	9	1.854	37.08%	16
Inadequate contract documentation	T360C08	1.368	27.37%	19	1.313	26.25%	21	3.231	64.62%	11	1.854	37.08%	16
Inadequate/ Inaccurate Design Information	T360C01	2.278	45.56%	13	1.235	24.71%	28	1.333	26.67%	16	1.640	32.80%	18
Poor Workmanship	T360C23	1.333	26.67%	23	2.000	40.00%	13	1.286	25.71%	18	1.551	31.02%	19
Inadequate Brief	T360C03	1.412	28.24%	15	1.357	27.14%	19	1.643	32.86%	14	1.467	29.33%	20
Unclear Risk Allocation	T360C12	1.368	27.37%	19	1.294	25.88%	22	1.733	34.67%	13	1.451	29.02%	21
Inadequate Design Documentation	T360C02	1.471	29.41%	14	1.500	30.00%	15	1.333	26.67%	16	1.438	28.75%	22
Inadequate Site Investigation	T360C24	1.263	25.26%	32	1.647	32.94%	14	1.071	21.43%	32	1.340	26.80%	23
Exaggerated Claims	T360C32	1.316	26.32%	27	1.500	30.00%	15	1.200	24.00%	22	1.340	26.80%	23
Unrealistic Information Expectations (By the Contrac	T360C26	1.333	26.67%	23	1.412	28.24%	17	1.214	24.29%	19	1.327	26.53%	25
Inappropriate Document Control	T360C14	1.368	27.37%	19	1.235	24.71%	28	1.357	27.14%	15	1.320	26.40%	26
Lack of Team Spirit Among Participants	T360C27	1.333	26.67%	23	1.375	27.50%	18	1.214	24.29%	19	1.313	26.25%	27
Inappropriate Contractor Selection	T360C10	1.316	26.32%	27	1.294	25.88%	22	1.200	24.00%	22	1.275	25.49%	28
Unrealistic Tender Pricing	T360C11	1.316	26.32%	27	1.294	25.88%	22	1.200	24.00%	22	1.275	25.49%	28
Personality Clashes Among Project Participants	T360C28	1.333	26.67%	23	1.250	25.00%	26	1.154	23.08%	30	1.255	25.11%	30
Inappropriate/ Unexpected Time Control (Target)	T360C15	1.294	25.88%	30	1.250	25.00%	26	1.200	24.00%	22	1.250	25.00%	31
Inappropriate/ Unexpected Quality Control (Target)	T360C17	1.278	25.56%	31	1.235	24.71%	28	1.200	24.00%	22	1.240	24.80%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.844	30.27%	69.73%
Clients & Contractors	6.094	38.09%	61.91%
Consultants & Contractors	7.938	49.61%	50.39%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.531	15.82%	84.18%
Consultants & Over All	4.625	28.91%	71.09%
Contractors & Over All	6.25	39.06%	60.94%

Y.3.1.37 CAUSE SIGNIFICANCE ASSESSMENT: (T37 C01) – (T37 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Slow Client Response	T370C20	3.611	72.22%	1	3.625	72.50%	2	3.571	71.43%	1	3.604	72.08%	1
Inappropriate/ Unexpected Cost Control (Target)	T370C16	3.526	70.53%	2	3.647	72.94%	1	3.533	70.67%	4	3.569	71.37%	2
Lack of Competence of Project Participants	T370C22	3.526	70.53%	2	3.588	71.76%	3	3.571	71.43%	1	3.560	71.20%	3
Changes by Client	T370C21	3.526	70.53%	2	3.563	71.25%	5	3.571	71.43%	1	3.551	71.02%	4
Inappropriate Payment Method	T370C13	3.526	70.53%	2	3.588	71.76%	3	3.533	70.67%	4	3.549	70.98%	5
Inadequate Contract administration	T370C07	3.526	70.53%	2	3.500	70.00%	6	3.286	65.71%	9	3.449	68.98%	6
Uncontrollable External Events	T370C31	3.471	69.41%	7	3.412	68.24%	10	3.357	67.14%	6	3.417	68.33%	7
Poor Management By One or More Project Participan	T370C29	3.474	69.47%	7	3.471	69.41%	7	1.214	24.29%	21	2.840	56.80%	8
Poor Communications Among Project Participants	T370C18	3.421	68.42%	9	3.467	69.33%	8	1.214	24.29%	21	2.792	55.83%	9
Lack of Information for Decision Making;(Decisivene	T370C19	3.421	68.42%	9	3.438	68.75%	9	1.143	22.86%	30	2.776	55.51%	10
Unrealistic Client Expectations	T370C25	3.167	63.33%	11	3.118	62.35%	11	1.267	25.33%	19	2.580	51.60%	11
Adversarial (industry) Culture Among Project Particip	T370C30	3.000	60.00%	12	3.000	60.00%	12	1.214	24.29%	21	2.500	50.00%	12
Unclear & Inadequate Specifications	T370C04	1.471	29.41%	16	1.412	28.24%	19	3.333	66.67%	7	2.020	40.41%	13
Inappropriate Contract Type (Strategy)	T370C05	1.389	27.78%	17	1.176	23.53%	32	3.333	66.67%	7	1.900	38.00%	14
Unclear Risk Allocation	T370C12	1.368	27.37%	19	1.294	25.88%	24	3.200	64.00%	13	1.882	37.65%	15
Inappropriate Contract Form	T370C06	1.389	27.78%	17	1.235	24.71%	27	3.286	65.71%	9	1.878	37.55%	16
Poor Workmanship	T370C23	1.333	26.67%	23	3.000	60.00%	12	1.333	26.67%	16	1.878	37.55%	16
Inadequate/ Inaccurate Design Information	T370C01	3.000	60.00%	12	1.235	24.71%	27	1.333	26.67%	16	1.854	37.08%	18
Inadequate contract documentation	T370C08	1.368	27.37%	19	1.313	26.25%	21	3.231	64.62%	11	1.854	37.08%	18
Incomplete Tender Information	T370C09	1.368	27.37%	19	1.313	26.25%	21	3.231	64.62%	11	1.854	37.08%	18
Inadequate Design Documentation	T370C02	2.211	44.21%	14	1.529	30.59%	16	1.333	26.67%	16	1.725	34.51%	21
Inadequate Brief	T370C03	1.526	30.53%	15	1.412	28.24%	19	1.733	34.67%	14	1.549	30.98%	22
Inadequate Site Investigation	T370C24	1.263	25.26%	32	2.000	40.00%	14	1.077	21.54%	32	1.469	29.39%	23
Inappropriate Document Control	T370C14	1.368	27.37%	19	1.235	24.71%	27	1.667	33.33%	15	1.412	28.24%	24
Exaggerated Claims	T370C32	1.333	26.67%	23	1.647	32.94%	15	1.200	24.00%	25	1.400	28.00%	25
Unrealistic Information Expectations (By the Contrac	T370C26	1.333	26.67%	23	1.471	29.41%	17	1.250	25.00%	20	1.362	27.23%	26
Lack of Team Spirit Among Participants	T370C27	1.333	26.67%	23	1.438	28.75%	18	1.214	24.29%	21	1.333	26.67%	27
Inappropriate Contractor Selection	T370C10	1.316	26.32%	28	1.313	26.25%	21	1.200	24.00%	25	1.280	25.60%	28
Unrealistic Tender Pricing	T370C11	1.316	26.32%	28	1.294	25.88%	24	1.200	24.00%	25	1.275	25.49%	29
Inappropriate/ Unexpected Time Control (Target)	T370C15	1.316	26.32%	28	1.294	25.88%	24	1.200	24.00%	25	1.275	25.49%	29
Personality Clashes Among Project Participants	T370C28	1.333	26.67%	23	1.235	24.71%	27	1.143	22.86%	30	1.245	24.90%	31
Inappropriate/ Unexpected Quality Control (Target)	T370C17	1.278	25.56%	31	1.188	23.75%	31	1.200	24.00%	25	1.224	24.49%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.625	28.91%	71.09%
Clients & Contractors	5.438	33.98%	66.02%
Consultants & Contractors	7.813	48.83%	51.17%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.688	16.80%	83.20%
Consultants & Over All	4.5	28.13%	71.88%
Contractors & Over All	5.438	33.98%	66.02%

Y.3.1.38 CAUSE SIGNIFICANCE ASSESSMENT: (T38 C01) – (T38 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Slow Client Response	T380C20	3.556	71.11%	1	3.588	71.76%	1	3.500	70.00%	3	3.551	71.02%	1
Lack of Competence of Project Participants	T380C22	3.474	69.47%	6	3.563	71.25%	4	3.571	71.43%	1	3.531	70.61%	2
Inappropriate Payment Method	T380C13	3.526	70.53%	2	3.588	71.76%	1	3.429	68.57%	4	3.520	70.40%	3
Inappropriate/ Unexpected Cost Control (Target)	T380C16	3.526	70.53%	2	3.588	71.76%	1	3.357	67.14%	5	3.500	70.00%	4
Changes by Client	T380C21	3.526	70.53%	2	3.438	68.75%	5	3.533	70.67%	2	3.500	70.00%	4
Inadequate Contract administration	T380C07	3.526	70.53%	2	3.412	68.24%	6	3.200	64.00%	10	3.392	67.84%	6
Uncontrollable External Events	T380C31	3.111	62.22%	8	3.000	60.00%	9	3.333	66.67%	6	3.146	62.92%	7
Poor Management By One or More Project Participan	T380C29	3.421	68.42%	7	3.400	68.00%	7	1.214	24.29%	22	2.771	55.42%	8
Poor Communications Among Project Participants	T380C18	3.105	62.11%	9	3.059	61.18%	8	1.214	24.29%	22	2.560	51.20%	9
Unrealistic Client Expectations	T380C25	3.000	60.00%	10	3.000	60.00%	9	1.231	24.62%	19	2.477	49.55%	10
Lack of Information for Decision Making;(Decisiven	T380C19	3.000	60.00%	10	3.000	60.00%	9	1.067	21.33%	31	2.420	48.40%	11
Unclear & Inadequate Specifications	T380C04	1.389	27.78%	15	1.313	26.25%	19	3.333	66.67%	6	1.959	39.18%	12
Inadequate contract documentation	T380C08	1.368	27.37%	17	1.313	26.25%	19	3.200	64.00%	10	1.900	38.00%	13
Inappropriate Contract Form	T380C06	1.368	27.37%	17	1.235	24.71%	26	3.231	64.62%	8	1.816	36.33%	14
Inappropriate Contract Type (Strategy)	T380C05	1.368	27.37%	17	1.176	23.53%	32	3.231	64.62%	8	1.796	35.92%	15
Adversarial (industry) Culture Among Project Particip	T380C30	1.737	34.74%	12	1.765	35.29%	12	1.200	24.00%	24	1.588	31.76%	16
Poor Workmanship	T380C23	1.368	27.37%	17	1.706	34.12%	13	1.267	25.33%	18	1.451	29.02%	17
Incomplete Tender Information	T380C09	1.368	27.37%	17	1.294	25.88%	22	1.667	33.33%	12	1.431	28.63%	18
Inadequate Design Documentation	T380C02	1.444	28.89%	14	1.467	29.33%	16	1.333	26.67%	16	1.417	28.33%	19
Unclear Risk Allocation	T380C12	1.368	27.37%	17	1.250	25.00%	25	1.643	32.86%	13	1.408	28.16%	20
Inadequate/ Inaccurate Design Information	T380C01	1.579	31.58%	13	1.235	24.71%	26	1.286	25.71%	17	1.380	27.60%	21
Inadequate Brief	T380C03	1.389	27.78%	15	1.313	26.25%	19	1.385	27.69%	14	1.362	27.23%	22
Unrealistic Information Expectations (By the Contrac	T380C26	1.353	27.06%	24	1.412	28.24%	17	1.231	24.62%	19	1.340	26.81%	23
Exaggerated Claims	T380C32	1.316	26.32%	27	1.471	29.41%	14	1.200	24.00%	24	1.333	26.67%	24
Inappropriate Document Control	T380C14	1.368	27.37%	17	1.235	24.71%	26	1.357	27.14%	15	1.320	26.40%	25
Lack of Team Spirit Among Participants	T380C27	1.333	26.67%	25	1.353	27.06%	18	1.231	24.62%	19	1.313	26.25%	26
Inappropriate Contractor Selection	T380C10	1.316	26.32%	27	1.294	25.88%	22	1.200	24.00%	24	1.275	25.49%	27
Unrealistic Tender Pricing	T380C11	1.316	26.32%	27	1.294	25.88%	22	1.200	24.00%	24	1.275	25.49%	27
Inadequate Site Investigation	T380C24	1.235	24.71%	32	1.471	29.41%	14	1.067	21.33%	31	1.265	25.31%	29
Personality Clashes Among Project Participants	T380C28	1.333	26.67%	25	1.235	24.71%	26	1.200	24.00%	24	1.260	25.20%	30
Inappropriate/ Unexpected Time Control (Target)	T380C15	1.263	25.26%	30	1.235	24.71%	26	1.200	24.00%	24	1.235	24.71%	31
Inappropriate/ Unexpected Quality Control (Target)	T380C17	1.263	25.26%	30	1.200	24.00%	31	1.200	24.00%	24	1.224	24.49%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.719	29.49%	70.51%
Clients & Contractors	5.594	34.96%	65.04%
Consultants & Contractors	8	50.00%	50.00%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.5	15.63%	84.38%
Consultants & Over All	4.531	28.32%	71.68%
Contractors & Over All	5.531	34.57%	65.43%

Y.3.1.39 CAUSE SIGNIFICANCE ASSESSMENT: (T39 C01) – (T39 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inappropriate/ Unexpected Cost Control (Target)	T390C16	3.294	65.88%	1	3.688	73.75%	1	3.571	71.43%	1	3.511	70.21%	1
Inappropriate/ Unexpected Time Control (Target)	T390C15	2.944	58.89%	3	3.143	62.86%	2	3.333	66.67%	2	3.128	62.55%	2
Inappropriate Payment Method	T390C13	3.222	64.44%	2	2.867	57.33%	3	3.267	65.33%	3	3.125	62.50%	3
Inappropriate Contract Type (Strategy)	T390C05	2.765	55.29%	5	2.813	56.25%	4	2.692	53.85%	15	2.761	55.22%	4
Inadequate contract documentation	T390C08	2.667	53.33%	8	2.733	54.67%	7	2.857	57.14%	8	2.745	54.89%	5
Unrealistic Client Expectations	T390C25	2.684	53.68%	7	2.750	55.00%	6	2.800	56.00%	13	2.740	54.80%	6
Unrealistic Tender Pricing	T390C11	2.579	51.58%	16	2.688	53.75%	10	3.000	60.00%	4	2.729	54.58%	7
Inappropriate Contractor Selection	T390C10	2.737	54.74%	6	2.765	55.29%	5	2.643	52.86%	19	2.720	54.40%	8
Inadequate Contract administration	T390C07	2.579	51.58%	16	2.688	53.75%	10	2.929	58.57%	5	2.714	54.29%	9
Changes by Client	T390C21	2.647	52.94%	14	2.600	52.00%	12	2.867	57.33%	7	2.702	54.04%	10
Personality Clashes Among Project Participants	T390C28	2.667	53.33%	8	2.733	54.67%	7	2.714	54.29%	14	2.702	54.04%	10
Adversarial (industry) Culture Among Project Particip	T390C30	2.667	53.33%	8	2.706	54.12%	9	2.667	53.33%	16	2.681	53.62%	12
Lack of Competence of Project Participants	T390C22	2.588	51.76%	15	2.588	51.76%	13	2.857	57.14%	8	2.667	53.33%	13
Inappropriate Contract Form	T390C06	2.563	51.25%	19	2.588	51.76%	13	2.857	57.14%	8	2.660	53.19%	14
Poor Communications Among Project Participants	T390C18	2.833	56.67%	4	2.563	51.25%	17	2.538	50.77%	24	2.660	53.19%	14
Unrealistic Information Expectations (By the Contract	T390C26	2.556	51.11%	20	2.471	49.41%	22	2.857	57.14%	8	2.612	52.24%	16
Unclear Risk Allocation	T390C12	2.556	51.11%	20	2.563	51.25%	17	2.667	53.33%	16	2.592	51.84%	17
Poor Workmanship	T390C23	2.667	53.33%	8	2.588	51.76%	13	2.500	50.00%	27	2.592	51.84%	17
Inadequate Site Investigation	T390C24	2.444	48.89%	25	2.500	50.00%	20	2.857	57.14%	8	2.583	51.67%	19
Incomplete Tender Information	T390C09	2.500	50.00%	24	2.588	51.76%	13	2.667	53.33%	16	2.574	51.49%	20
Unclear & Inadequate Specifications	T390C04	2.579	51.58%	16	2.500	50.00%	20	2.643	52.86%	19	2.571	51.43%	21
Inappropriate/ Unexpected Quality Control (Target)	T390C17	2.400	48.00%	29	2.438	48.75%	24	2.923	58.46%	6	2.568	51.36%	22
Lack of Information for Decision Making;(Decisiveness)	T390C19	2.667	53.33%	8	2.438	48.75%	24	2.500	50.00%	27	2.542	50.83%	23
Lack of Team Spirit Among Participants	T390C27	2.529	50.59%	22	2.471	49.41%	22	2.643	52.86%	19	2.542	50.83%	23
Inadequate/ Inaccurate Design Information	T390C01	2.529	50.59%	22	2.412	48.24%	26	2.538	50.77%	24	2.489	49.79%	25
Inadequate Brief	T390C03	2.667	53.33%	8	2.529	50.59%	19	2.154	43.08%	30	2.479	49.58%	26
Poor Management By One or More Project Participants	T390C29	2.444	48.89%	25	2.412	48.24%	26	2.571	51.43%	23	2.469	49.39%	27
Uncontrollable External Events	T390C31	2.389	47.78%	30	2.375	47.50%	28	2.643	52.86%	19	2.458	49.17%	28
Slow Client Response	T390C20	2.444	48.89%	25	2.375	47.50%	28	2.533	50.67%	26	2.449	48.98%	29
Inadequate Design Documentation	T390C02	2.421	48.42%	28	2.375	47.50%	28	2.400	48.00%	29	2.400	48.00%	30
Inappropriate Document Control	T390C14	2.105	42.11%	31	1.875	37.50%	31	1.692	33.85%	31	1.917	38.33%	31
Exaggerated Claims	T390C32	1.176	23.53%	32	1.471	29.41%	32	1.467	29.33%	32	1.367	27.35%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.594	22.46%	77.54%
Clients & Contractors	8.125	50.78%	49.22%
Consultants & Contractors	5.531	34.57%	65.43%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	4.281	26.76%	73.24%
Consultants & Over All	1.75	10.94%	89.06%
Contractors & Over All	4.781	29.88%	70.12%

Y.3.1.40 CAUSE SIGNIFICANCE ASSESSMENT: (T40 C01) – (T40 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inappropriate/ Unexpected Cost Control (Target)	T400C16	3.444	68.89%	1	3.625	72.50%	1	3.538	70.77%	1	3.532	70.64%	1
Inappropriate/ Unexpected Time Control (Target)	T400C15	2.947	58.95%	3	3.118	62.35%	2	3.385	67.69%	2	3.122	62.45%	2
Inappropriate Payment Method	T400C13	3.111	62.22%	2	3.000	60.00%	3	3.231	64.62%	3	3.106	62.13%	3
Inappropriate Contract Type (Strategy)	T400C05	2.737	54.74%	4	2.875	57.50%	4	2.714	54.29%	15	2.776	55.51%	4
Unrealistic Client Expectations	T400C25	2.688	53.75%	7	2.765	55.29%	6	2.769	55.38%	13	2.739	54.78%	5
Inappropriate Contractor Selection	T400C10	2.706	54.12%	6	2.813	56.25%	5	2.667	53.33%	17	2.729	54.58%	6
Inadequate contract documentation	T400C08	2.684	53.68%	8	2.706	54.12%	7	2.786	55.71%	11	2.720	54.40%	7
Personality Clashes Among Project Participants	T400C28	2.684	53.68%	8	2.706	54.12%	7	2.769	55.38%	13	2.714	54.29%	8
Inadequate Contract administration	T400C07	2.611	52.22%	14	2.647	52.94%	9	2.867	57.33%	4	2.700	54.00%	9
Unrealistic Tender Pricing	T400C11	2.588	51.76%	18	2.625	52.50%	11	2.867	57.33%	4	2.688	53.75%	10
Changes by Client	T400C21	2.611	52.22%	14	2.625	52.50%	11	2.857	57.14%	7	2.688	53.75%	10
Lack of Competence of Project Participants	T400C22	2.611	52.22%	14	2.600	52.00%	13	2.857	57.14%	7	2.681	53.62%	12
Adversarial (industry) Culture Among Project Participi	T400C30	2.667	53.33%	11	2.647	52.94%	9	2.667	53.33%	17	2.660	53.20%	13
Inappropriate Contract Form	T400C06	2.579	51.58%	19	2.588	51.76%	15	2.800	56.00%	10	2.647	52.94%	14
Poor Communications Among Project Participants	T400C18	2.737	54.74%	4	2.563	51.25%	17	2.571	51.43%	24	2.633	52.65%	15
Unrealistic Information Expectations (By the Contract	T400C26	2.579	51.58%	19	2.471	49.41%	21	2.846	56.92%	9	2.612	52.24%	16
Poor Workmanship	T400C23	2.667	53.33%	11	2.600	52.00%	13	2.533	50.67%	27	2.604	52.08%	17
Unclear Risk Allocation	T400C12	2.579	51.58%	19	2.563	51.25%	17	2.667	53.33%	17	2.600	52.00%	18
Incomplete Tender Information	T400C09	2.526	50.53%	24	2.588	51.76%	15	2.692	53.85%	16	2.592	51.84%	19
Unclear & Inadequate Specifications	T400C04	2.611	52.22%	14	2.500	50.00%	20	2.667	53.33%	17	2.587	51.74%	20
Inadequate Site Investigation	T400C24	2.500	50.00%	25	2.471	49.41%	21	2.786	55.71%	11	2.571	51.43%	21
Inappropriate/ Unexpected Quality Control (Target)	T400C17	2.412	48.24%	28	2.438	48.75%	24	2.867	57.33%	4	2.563	51.25%	22
Lack of Team Spirit Among Participants	T400C27	2.556	51.11%	22	2.471	49.41%	21	2.643	52.86%	22	2.551	51.02%	23
Lack of Information for Decision Making;(Decisiveness)	T400C19	2.647	52.94%	13	2.429	48.57%	25	2.500	50.00%	28	2.533	50.67%	24
Inadequate Brief	T400C03	2.684	53.68%	8	2.529	50.59%	19	2.154	43.08%	30	2.490	49.80%	25
Poor Management By One or More Project Participan	T400C29	2.474	49.47%	26	2.412	48.24%	26	2.615	52.31%	23	2.490	49.80%	25
Inadequate/ Inaccurate Design Information	T400C01	2.529	50.59%	23	2.375	47.50%	27	2.571	51.43%	24	2.489	49.79%	27
Uncontrollable External Events	T400C31	2.389	47.78%	30	2.333	46.67%	30	2.667	53.33%	17	2.458	49.17%	28
Slow Client Response	T400C20	2.421	48.42%	27	2.375	47.50%	27	2.538	50.77%	26	2.438	48.75%	29
Inadequate Design Documentation	T400C02	2.412	48.24%	28	2.375	47.50%	27	2.357	47.14%	29	2.383	47.66%	30
Inappropriate Document Control	T400C14	2.111	42.22%	31	1.941	38.82%	31	1.667	33.33%	31	1.920	38.40%	31
Exaggerated Claims	T400C32	1.211	24.21%	32	1.438	28.75%	32	1.429	28.57%	32	1.347	26.94%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.094	19.34%	80.66%
Clients & Contractors	7.625	47.66%	52.34%
Consultants & Contractors	5.594	34.96%	65.04%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.531	22.07%	77.93%
Consultants & Over All	1.438	8.98%	91.02%
Contractors & Over All	4.906	30.66%	69.34%

Y.3.1.41 CAUSE SIGNIFICANCE ASSESSMENT: (T41 C01) – (T41 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inappropriate/ Unexpected Cost Control (Target)	T410C16	3.944	78.89%	1	4.059	81.18%	1	3.867	77.33%	1	3.960	79.20%	1
Changes by Client	T410C21	3.444	68.89%	5	3.438	68.75%	4	3.615	72.31%	2	3.489	69.79%	2
Slow Client Response	T410C20	3.353	67.06%	8	3.563	71.25%	2	3.500	70.00%	4	3.468	69.36%	3
Inappropriate Payment Method	T410C13	3.421	68.42%	7	3.563	71.25%	2	3.333	66.67%	5	3.440	68.80%	4
Inadequate Contract administration	T410C07	3.500	70.00%	2	3.438	68.75%	4	3.333	66.67%	5	3.429	68.57%	5
Lack of Competence of Project Participants	T410C22	3.333	66.67%	9	3.438	68.75%	4	3.533	70.67%	3	3.429	68.57%	5
Poor Communications Among Project Participants	T410C18	3.474	69.47%	3	3.438	68.75%	4	3.308	66.15%	8	3.417	68.33%	7
Lack of Information for Decision Making;(Decisiveness)	T410C19	3.474	69.47%	3	3.438	68.75%	4	3.286	65.71%	9	3.408	68.16%	8
Poor Management By One or More Project Participant	T410C29	3.444	68.89%	5	3.412	68.24%	9	3.333	66.67%	5	3.400	68.00%	9
Uncontrollable External Events	T410C31	3.056	61.11%	10	3.000	60.00%	10	3.154	63.08%	12	3.063	61.25%	10
Adversarial (industry) Culture Among Project Participants	T410C30	2.947	58.95%	11	2.929	58.57%	12	3.200	64.00%	11	3.021	60.42%	11
Unrealistic Client Expectations	T410C25	2.947	58.95%	11	2.938	58.75%	11	3.214	64.29%	10	3.020	60.41%	12
Poor Workmanship	T410C23	2.158	43.16%	13	1.938	38.75%	13	1.308	26.15%	15	1.854	37.08%	13
Inadequate Site Investigation	T410C24	1.500	30.00%	14	1.688	33.75%	14	1.714	34.29%	14	1.625	32.50%	14
Exaggerated Claims	T410C32	1.222	24.44%	15	1.500	30.00%	15	1.733	34.67%	13	1.469	29.39%	15
Unrealistic Tender Pricing	T410C11	1.368	27.37%	16	1.375	27.50%	18	1.286	25.71%	16	1.347	26.94%	16
Inadequate Design Documentation	T410C02	1.333	26.67%	18	1.438	28.75%	16	1.200	24.00%	21	1.327	26.53%	17
Inappropriate Contractor Selection	T410C10	1.316	26.32%	21	1.400	28.00%	17	1.200	24.00%	21	1.306	26.12%	18
Lack of Team Spirit Among Participants	T410C27	1.368	27.37%	16	1.235	24.71%	21	1.286	25.71%	16	1.300	26.00%	19
Inadequate contract documentation	T410C08	1.375	27.50%	15	1.235	24.71%	21	1.267	25.33%	18	1.292	25.83%	20
Inappropriate/ Unexpected Time Control (Target)	T410C15	1.294	25.88%	26	1.353	27.06%	19	1.143	22.86%	30	1.271	25.42%	21
Inadequate Brief	T410C03	1.333	26.67%	18	1.235	24.71%	21	1.214	24.29%	19	1.265	25.31%	22
Unclear & Inadequate Specifications	T410C04	1.316	26.32%	21	1.235	24.71%	21	1.214	24.29%	19	1.260	25.20%	23
Inadequate/ Inaccurate Design Information	T410C01	1.333	26.67%	18	1.214	24.29%	29	1.200	24.00%	21	1.255	25.11%	24
Incomplete Tender Information	T410C09	1.316	26.32%	21	1.235	24.71%	21	1.200	24.00%	21	1.255	25.10%	25
Unclear Risk Allocation	T410C12	1.316	26.32%	21	1.235	24.71%	21	1.200	24.00%	21	1.255	25.10%	25
Inappropriate/ Unexpected Quality Control (Target)	T410C17	1.278	25.56%	28	1.235	24.71%	21	1.200	24.00%	21	1.240	24.80%	27
Inappropriate Contract Form	T410C06	1.316	26.32%	21	1.176	23.53%	30	1.200	24.00%	21	1.235	24.71%	28
Personality Clashes Among Project Participants	T410C28	1.263	25.26%	29	1.235	24.71%	21	1.200	24.00%	21	1.235	24.71%	28
Inappropriate Document Control	T410C14	1.294	25.88%	26	1.176	23.53%	30	1.154	23.08%	29	1.213	24.26%	30
Unrealistic Information Expectations (By the Contractor)	T410C26	1.263	25.26%	29	1.250	25.00%	20	1.077	21.54%	31	1.208	24.17%	31
Inappropriate Contract Type (Strategy)	T410C05	1.211	24.21%	32	1.133	22.67%	32	1.067	21.33%	32	1.143	22.86%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	3.719	23.24%	76.76%
Clients & Contractors	2.75	17.19%	82.81%
Consultants & Contractors	2.906	18.16%	81.84%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.125	19.53%	80.47%
Consultants & Over All	2.094	13.09%	86.91%
Contractors & Over All	2.438	15.23%	84.77%

Y.3.1.42 CAUSE SIGNIFICANCE ASSESSMENT: (T42 C01) – (T42 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T420C01	4.000	80.00%	2	4.063	81.25%	4	3.867	77.33%	3	3.980	79.60%	1
Changes by Client	T420C21	3.632	72.63%	8	4.188	83.75%	2	4.000	80.00%	1	3.920	78.40%	2
Slow Client Response	T420C20	3.632	72.63%	8	4.267	85.33%	1	3.933	78.67%	2	3.918	78.37%	3
Inadequate Design Documentation	T420C02	3.947	78.95%	3	4.000	80.00%	5	3.733	74.67%	7	3.902	78.04%	4
Poor Communications Among Project Participants	T420C18	4.056	81.11%	1	3.824	76.47%	8	3.769	75.38%	6	3.896	77.92%	5
Inadequate Contract administration	T420C07	3.944	78.89%	4	3.941	78.82%	6	3.714	74.29%	8	3.878	77.55%	6
Inappropriate/ Unexpected Time Control (Target)	T420C15	3.684	73.68%	5	3.938	78.75%	7	3.800	76.00%	4	3.800	76.00%	7
Inappropriate Contractor Selection	T420C10	3.684	73.68%	5	4.118	82.35%	3	3.357	67.14%	16	3.740	74.80%	8
Lack of Information for Decision Making;(Decisiveness)	T420C19	3.684	73.68%	5	3.706	74.12%	9	3.786	75.71%	5	3.720	74.40%	9
Uncontrollable External Events	T420C31	3.579	71.58%	11	3.706	74.12%	9	3.643	72.86%	9	3.640	72.80%	10
Inadequate Brief	T420C03	3.368	67.37%	14	3.688	73.75%	11	3.615	72.31%	10	3.542	70.83%	11
Unclear & Inadequate Specifications	T420C04	3.588	71.76%	10	3.588	71.76%	12	3.385	67.69%	15	3.532	70.64%	12
Lack of Competence of Project Participants	T420C22	3.526	70.53%	12	3.412	68.24%	13	3.500	70.00%	13	3.480	69.60%	13
Poor Management By One or More Project Participant	T420C29	3.421	68.42%	13	3.353	67.06%	14	3.500	70.00%	13	3.420	68.40%	14
Inadequate contract documentation	T420C08	3.278	65.56%	15	3.353	67.06%	14	3.600	72.00%	11	3.400	68.00%	15
Incomplete Tender Information	T420C09	3.263	65.26%	16	3.353	67.06%	14	3.600	72.00%	11	3.392	67.84%	16
Inappropriate Contract Form	T420C06	3.188	63.75%	17	3.188	63.75%	18	3.200	64.00%	19	3.191	63.83%	17
Unclear Risk Allocation	T420C12	3.158	63.16%	18	3.176	63.53%	19	3.200	64.00%	19	3.176	63.53%	18
Inappropriate Contract Type (Strategy)	T420C05	3.000	60.00%	20	3.200	64.00%	17	3.231	64.62%	18	3.133	62.67%	19
Unrealistic Client Expectations	T420C25	3.056	61.11%	19	3.118	62.35%	22	3.200	64.00%	19	3.120	62.40%	20
Poor Workmanship	T420C23	3.000	60.00%	20	3.176	63.53%	19	3.143	62.86%	24	3.102	62.04%	21
Inadequate Site Investigation	T420C24	3.000	60.00%	20	3.125	62.50%	21	3.143	62.86%	24	3.083	61.67%	22
Lack of Team Spirit Among Participants	T420C27	3.000	60.00%	20	3.063	61.25%	24	3.200	64.00%	19	3.082	61.63%	23
Personality Clashes Among Project Participants	T420C28	2.947	58.95%	26	3.000	60.00%	25	3.357	67.14%	16	3.082	61.63%	23
Unrealistic Information Expectations (By the Contractor)	T420C26	3.000	60.00%	20	3.071	61.43%	23	3.067	61.33%	26	3.043	60.85%	25
Unrealistic Tender Pricing	T420C11	3.000	60.00%	20	2.125	42.50%	28	3.000	60.00%	27	2.682	53.64%	26
Adversarial (industry) Culture Among Project Participants	T420C30	2.944	58.89%	27	3.000	60.00%	25	1.692	33.85%	30	2.617	52.34%	27
Inappropriate Document Control	T420C14	1.882	37.65%	29	3.000	60.00%	25	2.143	42.86%	28	2.354	47.08%	28
Inappropriate Payment Method	T420C13	1.368	27.37%	32	1.353	27.06%	32	3.154	63.08%	23	1.837	36.73%	29
Inappropriate/ Unexpected Cost Control (Target)	T420C16	1.737	34.74%	30	1.941	38.82%	29	1.800	36.00%	29	1.824	36.47%	30
Inappropriate/ Unexpected Quality Control (Target)	T420C17	2.000	40.00%	28	1.765	35.29%	30	1.400	28.00%	31	1.745	34.90%	31
Exaggerated Claims	T420C32	1.667	33.33%	31	1.529	30.59%	31	1.267	25.33%	32	1.500	30.00%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.531	15.82%	84.18%
Clients & Contractors	3.594	22.46%	77.54%
Consultants & Contractors	2.813	17.58%	82.42%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.063	12.89%	87.11%
Consultants & Over All	1.406	8.79%	91.21%
Contractors & Over All	2.281	14.26%	85.74%

Y.3.1.43 CAUSE SIGNIFICANCE ASSESSMENT: (T43 C01) – (T43 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Lack of Information for Decision Making;(Decisiven	T430C19	4.000	80.00%	1	4.000	80.00%	3	3.769	75.38%	4	3.936	78.72%	1
Slow Client Response	T430C20	3.737	74.74%	3	4.188	83.75%	1	3.857	77.14%	2	3.918	78.37%	2
Changes by Client	T430C21	3.526	70.53%	7	4.188	83.75%	1	3.867	77.33%	1	3.840	76.80%	3
Poor Communications Among Project Participants	T430C18	3.833	76.67%	2	3.438	68.75%	11	3.533	70.67%	8	3.612	72.24%	4
Inappropriate/ Unexpected Time Control (Target)	T430C15	3.632	72.63%	4	3.125	62.50%	13	3.800	76.00%	3	3.520	70.40%	5
Poor Management By One or More Project Participan	T430C29	3.474	69.47%	9	3.733	74.67%	6	3.154	63.08%	20	3.468	69.36%	6
Inappropriate/ Unexpected Cost Control (Target)	T430C16	3.579	71.58%	5	3.118	62.35%	14	3.692	73.85%	6	3.449	68.98%	7
Inappropriate/ Unexpected Quality Control (Target)	T430C17	3.529	70.59%	6	3.118	62.35%	14	3.667	73.33%	7	3.429	68.57%	8
Lack of Competence of Project Participants	T430C22	3.105	62.11%	12	3.938	78.75%	4	3.214	64.29%	14	3.408	68.16%	9
Unclear & Inadequate Specifications	T430C04	3.526	70.53%	7	3.412	68.24%	12	3.214	64.29%	14	3.400	68.00%	10
Inadequate Design Documentation	T430C02	3.000	60.00%	15	3.647	72.94%	7	3.500	70.00%	9	3.375	67.50%	11
Inadequate contract documentation	T430C08	3.000	60.00%	15	3.882	77.65%	5	3.200	64.00%	17	3.367	67.35%	12
Inadequate Brief	T430C03	3.059	61.18%	13	3.625	72.50%	8	3.400	68.00%	10	3.354	67.08%	13
Inadequate/ Inaccurate Design Information	T430C01	3.056	61.11%	14	3.588	71.76%	9	3.400	68.00%	10	3.340	66.80%	14
Lack of Team Spirit Among Participants	T430C27	3.474	69.47%	9	3.118	62.35%	14	3.286	65.71%	13	3.300	66.00%	15
Inadequate Contract administration	T430C07	3.000	60.00%	15	3.529	70.59%	10	3.200	64.00%	17	3.235	64.71%	16
Unrealistic Client Expectations	T430C25	2.944	58.89%	19	3.063	61.25%	17	3.769	75.38%	4	3.213	64.26%	17
Inappropriate Document Control	T430C14	2.778	55.56%	22	3.000	60.00%	18	3.357	67.14%	12	3.020	60.41%	18
Inappropriate Contract Type (Strategy)	T430C05	2.833	56.67%	21	3.000	60.00%	18	3.214	64.29%	14	3.000	60.00%	19
Personality Clashes Among Project Participants	T430C28	3.000	60.00%	15	2.938	58.75%	24	3.077	61.54%	22	3.000	60.00%	19
Incomplete Tender Information	T430C09	2.625	52.50%	24	3.000	60.00%	18	3.200	64.00%	17	2.936	58.72%	21
Inappropriate Contract Form	T430C06	2.235	44.71%	25	2.941	58.82%	23	3.154	63.08%	20	2.745	54.89%	22
Unclear Risk Allocation	T430C12	2.667	53.33%	23	2.235	44.71%	25	3.077	61.54%	22	2.625	52.50%	23
Poor Workmanship	T430C23	1.375	27.50%	31	3.000	60.00%	18	3.000	60.00%	24	2.447	48.94%	24
Unrealistic Information Expectations (By the Contrac	T430C26	3.294	65.88%	11	1.563	31.25%	29	1.800	36.00%	26	2.250	45.00%	25
Uncontrollable External Events	T430C31	2.889	57.78%	20	2.059	41.18%	26	1.643	32.86%	29	2.245	44.90%	26
Inadequate Site Investigation	T430C24	1.625	32.50%	27	3.000	60.00%	18	1.667	33.33%	28	2.125	42.50%	27
Unrealistic Tender Pricing	T430C11	2.222	44.44%	26	1.688	33.75%	27	1.733	34.67%	27	1.898	37.96%	28
Adversarial (industry) Culture Among Project Participi	T430C30	1.579	31.58%	28	1.471	29.41%	31	2.071	41.43%	25	1.680	33.60%	29
Exaggerated Claims	T430C32	1.333	26.67%	32	1.688	33.75%	27	1.400	28.00%	30	1.469	29.39%	30
Inappropriate Payment Method	T430C13	1.529	30.59%	29	1.375	27.50%	32	1.286	25.71%	31	1.404	28.09%	31
Inappropriate Contractor Selection	T430C10	1.412	28.24%	30	1.529	30.59%	30	1.214	24.29%	32	1.396	27.92%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	5.781	36.13%	63.87%
Clients & Contractors	4.813	30.08%	69.92%
Consultants & Contractors	4.594	28.71%	71.29%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.781	17.38%	82.62%
Consultants & Over All	3.375	21.09%	78.91%
Contractors & Over All	3.031	18.95%	81.05%

Y.3.1.44 CAUSE SIGNIFICANCE ASSESSMENT: (T44 C01) – (T44 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Inadequate/ Inaccurate Design Information	T440C01	4.000	80.00%	1	4.059	81.18%	2	3.786	75.71%	4	3.959	79.18%	1
Inadequate Design Documentation	T440C02	3.944	78.89%	2	4.118	82.35%	1	3.786	75.71%	4	3.959	79.18%	1
Inadequate contract documentation	T440C08	3.526	70.53%	4	4.000	80.00%	3	4.071	81.43%	2	3.837	76.73%	3
Incomplete Tender Information	T440C09	3.278	65.56%	7	4.000	80.00%	3	3.933	78.67%	3	3.720	74.40%	4
Inadequate Brief	T440C03	3.684	73.68%	3	3.533	70.67%	6	3.533	70.67%	9	3.592	71.84%	5
Changes by Client	T440C21	3.000	60.00%	13	3.706	74.12%	5	4.077	81.54%	1	3.553	71.06%	6
Unclear & Inadequate Specifications	T440C04	3.500	70.00%	5	3.412	68.24%	7	3.429	68.57%	10	3.449	68.98%	7
Lack of Competence of Project Participants	T440C22	3.222	64.44%	8	3.313	66.25%	9	3.643	72.86%	7	3.375	67.50%	8
Poor Management By One or More Project Participan	T440C29	3.167	63.33%	10	3.063	61.25%	12	3.692	73.85%	6	3.277	65.53%	9
Inappropriate/ Unexpected Cost Control (Target)	T440C16	3.000	60.00%	13	3.313	66.25%	9	3.538	70.77%	8	3.255	65.11%	10
Inappropriate/ Unexpected Time Control (Target)	T440C15	3.056	61.11%	12	3.412	68.24%	7	3.231	64.62%	14	3.229	64.58%	11
Inadequate Contract administration	T440C07	3.474	69.47%	6	2.941	58.82%	14	2.857	57.14%	19	3.120	62.40%	12
Slow Client Response	T440C20	3.211	64.21%	9	2.688	53.75%	20	3.429	68.57%	10	3.102	62.04%	13
Inappropriate Contract Form	T440C06	2.789	55.79%	20	2.941	58.82%	14	3.385	67.69%	12	3.000	60.00%	14
Unclear Risk Allocation	T440C12	2.895	57.89%	17	2.882	57.65%	17	3.200	64.00%	16	2.980	59.61%	15
Inappropriate/ Unexpected Quality Control (Target)	T440C17	2.947	58.95%	16	2.765	55.29%	18	3.154	63.08%	17	2.939	58.78%	16
Lack of Information for Decision Making;(Decisiven	T440C19	3.000	60.00%	13	2.733	54.67%	19	2.933	58.67%	18	2.896	57.92%	17
Unrealistic Client Expectations	T440C25	1.526	30.53%	27	3.200	64.00%	11	3.214	64.29%	15	2.542	50.83%	18
Inappropriate Contractor Selection	T440C10	2.895	57.89%	17	2.938	58.75%	16	1.667	33.33%	27	2.540	50.80%	19
Poor Communications Among Project Participants	T440C18	2.889	57.78%	19	1.750	35.00%	24	2.833	56.67%	22	2.478	49.57%	20
Inappropriate Contract Type (Strategy)	T440C05	1.526	30.53%	27	3.000	60.00%	13	2.846	56.92%	21	2.375	47.50%	21
Uncontrollable External Events	T440C31	1.833	36.67%	23	2.563	51.25%	22	2.857	57.14%	19	2.375	47.50%	21
Poor Workmanship	T440C23	1.316	26.32%	31	2.647	52.94%	21	3.385	67.69%	12	2.327	46.53%	23
Unrealistic Information Expectations (By the Contrac	T440C26	3.105	62.11%	11	1.625	32.50%	26	1.714	34.29%	24	2.224	44.49%	24
Exaggerated Claims	T440C32	2.778	55.56%	21	1.294	25.88%	32	1.692	33.85%	26	1.958	39.17%	25
Inappropriate Document Control	T440C14	2.765	55.29%	22	1.333	26.67%	31	1.200	24.00%	32	1.809	36.17%	26
Inadequate Site Investigation	T440C24	1.611	32.22%	26	1.733	34.67%	25	1.800	36.00%	23	1.708	34.17%	27
Unrealistic Tender Pricing	T440C11	1.526	30.53%	27	1.800	36.00%	23	1.400	28.00%	28	1.571	31.43%	28
Lack of Team Spirit Among Participants	T440C27	1.706	34.12%	25	1.625	32.50%	26	1.286	25.71%	29	1.553	31.06%	29
Personality Clashes Among Project Participants	T440C28	1.778	35.56%	24	1.533	30.67%	28	1.286	25.71%	29	1.553	31.06%	29
Adversarial (industry) Culture Among Project Participi	T440C30	1.500	30.00%	30	1.471	29.41%	29	1.714	34.29%	24	1.553	31.06%	29
Inappropriate Payment Method	T440C13	1.263	25.26%	32	1.400	28.00%	30	1.214	24.29%	31	1.292	25.83%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	5	31.25%	68.75%
Clients & Contractors	5.531	34.57%	65.43%
Consultants & Contractors	3.594	22.46%	77.54%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	3.25	20.31%	79.69%
Consultants & Over All	2.5	15.63%	84.38%
Contractors & Over All	2.719	16.99%	83.01%

Y.3.1.45 CAUSE SIGNIFICANCE ASSESSMENT: (T45 C01) – (T45 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Unclear Risk Allocation	T450C12	3.474	69.47%	1	3.563	71.25%	2	2.833	56.67%	3	3.340	66.81%	1
Uncontrollable External Events	T450C31	1.947	38.95%	7	3.647	72.94%	1	3.077	61.54%	2	2.837	56.73%	2
Poor Management By One or More Project Participan	T450C29	2.000	40.00%	6	2.313	46.25%	5	3.154	63.08%	1	2.417	48.33%	3
Lack of Competence of Project Participants	T450C22	3.056	61.11%	3	2.235	44.71%	6	1.357	27.14%	10	2.286	45.71%	4
Changes by Client	T450C21	3.474	69.47%	1	1.706	34.12%	8	1.357	27.14%	10	2.280	45.60%	5
Inappropriate/ Unexpected Time Control (Target)	T450C15	2.167	43.33%	4	2.118	42.35%	7	1.929	38.57%	5	2.082	41.63%	6
Poor Communications Among Project Participants	T450C18	1.000	20.00%	16	3.176	63.53%	3	1.929	38.57%	5	2.000	40.00%	7
Slow Client Response	T450C20	1.263	25.26%	12	2.353	47.06%	4	1.400	28.00%	8	1.667	33.33%	8
Inappropriate Contractor Selection	T450C10	2.118	42.35%	5	1.529	30.59%	11	1.143	22.86%	14	1.625	32.50%	9
Lack of Team Spirit Among Participants	T450C27	1.579	31.58%	8	1.625	32.50%	9	1.286	25.71%	12	1.510	30.20%	10
Inappropriate Payment Method	T450C13	1.294	25.88%	11	1.412	28.24%	13	1.733	34.67%	7	1.469	29.39%	11
Personality Clashes Among Project Participants	T450C28	1.368	27.37%	9	1.563	31.25%	10	1.200	24.00%	13	1.380	27.60%	12
Unrealistic Client Expectations	T450C25	1.158	23.16%	15	1.000	20.00%	16	1.933	38.67%	4	1.333	26.67%	13
Inappropriate/ Unexpected Cost Control (Target)	T450C16	1.000	20.00%	16	1.529	30.59%	11	1.400	28.00%	8	1.294	25.88%	14
Unrealistic Information Expectations (By the Contrac	T450C26	1.353	27.06%	10	1.412	28.24%	13	1.000	20.00%	16	1.277	25.53%	15
Unclear & Inadequate Specifications	T450C04	1.235	24.71%	13	1.294	25.88%	15	1.000	20.00%	16	1.184	23.67%	16
Adversarial (industry) Culture Among Project Participi	T450C30	1.211	24.21%	14	1.000	20.00%	16	1.000	20.00%	16	1.080	21.60%	17
Inappropriate/ Unexpected Quality Control (Target)	T450C17	1.000	20.00%	16	1.000	20.00%	16	1.071	21.43%	15	1.021	20.42%	18
Inadequate/ Inaccurate Design Information	T450C01	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inadequate Design Documentation	T450C02	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inadequate Brief	T450C03	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inappropriate Contract Type (Strategy)	T450C05	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inappropriate Contract Form	T450C06	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inadequate Contract administration	T450C07	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inadequate contract documentation	T450C08	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Incomplete Tender Information	T450C09	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Unrealistic Tender Pricing	T450C11	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inappropriate Document Control	T450C14	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Lack of Information for Decision Making;(Decisivene	T450C19	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Poor Workmanship	T450C23	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Inadequate Site Investigation	T450C24	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19
Exaggerated Claims	T450C32	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	19

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.031	12.70%	87.30%
Clients & Contractors	3	18.75%	81.25%
Consultants & Contractors	1.719	10.74%	89.26%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	3	18.75%	81.25%
Consultants & Over All	2.469	15.43%	84.57%
Contractors & Over All	2.875	17.97%	82.03%

Y.3.1.46 CAUSE SIGNIFICANCE ASSESSMENT: (T46 C01) – (T46 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Lack of Information for Decision Making;(Decisive)	T460C19	3.474	69.47%	1	3.500	70.00%	2	2.733	54.67%	5	3.260	65.20%	1
Poor Communications Among Project Participants	T460C18	3.211	64.21%	2	3.333	66.67%	3	2.857	57.14%	4	3.146	62.92%	2
Uncontrollable External Events	T460C31	2.632	52.63%	6	3.647	72.94%	1	3.067	61.33%	2	3.098	61.96%	3
Slow Client Response	T460C20	3.000	60.00%	3	3.188	63.75%	4	3.071	61.43%	1	3.082	61.63%	4
Inappropriate/ Unexpected Time Control (Target)	T460C15	2.944	58.89%	4	3.118	62.35%	5	1.286	25.71%	13	2.531	50.61%	5
Lack of Competence of Project Participants	T460C22	2.167	43.33%	9	3.059	61.18%	6	1.533	30.67%	10	2.280	45.60%	6
Unclear & Inadequate Specifications	T460C04	2.474	49.47%	7	1.500	30.00%	15	2.923	58.46%	3	2.271	45.42%	7
Inadequate/ Inaccurate Design Information	T460C01	2.053	41.05%	10	1.647	32.94%	12	2.400	48.00%	6	2.020	40.39%	8
Changes by Client	T460C21	1.722	34.44%	12	2.294	45.88%	8	1.933	38.67%	7	1.980	39.60%	9
Unclear Risk Allocation	T460C12	2.211	44.21%	8	2.353	47.06%	7	1.200	24.00%	16	1.961	39.22%	10
Inappropriate/ Unexpected Cost Control (Target)	T460C16	2.944	58.89%	4	1.063	21.25%	27	1.200	24.00%	16	1.796	35.92%	11
Poor Management By One or More Project Participan	T460C29	1.833	36.67%	11	2.063	41.25%	10	1.429	28.57%	11	1.792	35.83%	12
Incomplete Tender Information	T460C09	1.316	26.32%	24	2.133	42.67%	9	1.929	38.57%	8	1.750	35.00%	13
Inadequate contract documentation	T460C08	1.588	31.76%	15	1.813	36.25%	11	1.267	25.33%	14	1.563	31.25%	14
Inadequate Brief	T460C03	1.500	30.00%	18	1.533	30.67%	14	1.429	28.57%	11	1.489	29.79%	15
Personality Clashes Among Project Participants	T460C28	1.611	32.22%	14	1.471	29.41%	17	1.214	24.29%	15	1.449	28.98%	16
Inadequate Design Documentation	T460C02	1.563	31.25%	17	1.625	32.50%	13	1.133	22.67%	19	1.447	28.94%	17
Unrealistic Client Expectations	T460C25	1.368	27.37%	20	1.133	22.67%	21	1.857	37.14%	9	1.438	28.75%	18
Lack of Team Spirit Among Participants	T460C27	1.579	31.58%	16	1.500	30.00%	15	1.143	22.86%	18	1.429	28.57%	19
Inadequate Contract administration	T460C07	1.412	28.24%	19	1.412	28.24%	18	1.071	21.43%	20	1.313	26.25%	20
Unrealistic Information Expectations (By the Contract)	T460C26	1.632	32.63%	13	1.125	22.50%	22	1.000	20.00%	21	1.286	25.71%	21
Adversarial (industry) Culture Among Project Participi	T460C30	1.158	23.16%	28	1.353	27.06%	19	1.000	20.00%	21	1.180	23.60%	22
Inappropriate Contract Type (Strategy)	T460C05	1.353	27.06%	21	1.125	22.50%	22	1.000	20.00%	21	1.170	23.40%	23
Inadequate Site Investigation	T460C24	1.167	23.33%	26	1.313	26.25%	20	1.000	20.00%	21	1.167	23.33%	24
Inappropriate/ Unexpected Quality Control (Target)	T460C17	1.333	26.67%	22	1.118	22.35%	25	1.000	20.00%	21	1.163	23.27%	25
Inappropriate Contract Form	T460C06	1.316	26.32%	24	1.125	22.50%	22	1.000	20.00%	21	1.160	23.20%	26
Inappropriate Document Control	T460C14	1.333	26.67%	22	1.000	20.00%	30	1.000	20.00%	21	1.122	22.45%	27
Unrealistic Tender Pricing	T460C11	1.167	23.33%	26	1.000	20.00%	30	1.000	20.00%	21	1.061	21.22%	28
Inappropriate Payment Method	T460C13	1.053	21.05%	29	1.059	21.18%	29	1.000	20.00%	21	1.041	20.82%	29
Inappropriate Contractor Selection	T460C10	1.000	20.00%	30	1.118	22.35%	25	1.000	20.00%	21	1.040	20.80%	30
Poor Workmanship	T460C23	1.000	20.00%	30	1.063	21.25%	27	1.000	20.00%	21	1.021	20.42%	31
Exaggerated Claims	T460C32	1.000	20.00%	30	1.000	20.00%	30	1.000	20.00%	21	1.000	20.00%	32

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	4.188	26.17%	73.83%
Clients & Contractors	5.031	31.45%	68.55%
Consultants & Contractors	4.594	28.71%	71.29%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	2.469	15.43%	84.57%
Consultants & Over All	2.781	17.38%	82.62%
Contractors & Over All	4.063	25.39%	74.61%

Y.3.1.47 CAUSE SIGNIFICANCE ASSESSMENT: (T47 C01) – (T47 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Unclear Risk Allocation	T470C12	3.444	68.89%	1	3.647	72.94%	1	3.077	61.54%	1	3.417	68.33%	1
Uncontrollable External Events	T470C31	3.056	61.11%	2	3.250	65.00%	2	1.000	20.00%	7	2.490	49.80%	2
Changes by Client	T470C21	1.000	20.00%	12	2.235	44.71%	3	2.846	56.92%	2	1.938	38.75%	3
Lack of Competence of Project Participants	T470C22	1.000	20.00%	12	2.176	43.53%	4	1.733	34.67%	3	1.608	32.16%	4
Inappropriate/ Unexpected Time Control (Target)	T470C15	2.067	41.33%	3	1.000	20.00%	12	1.714	34.29%	4	1.565	31.30%	5
Unrealistic Information Expectations (By the Contract)	T470C26	1.944	38.89%	4	1.294	25.88%	5	1.000	20.00%	7	1.449	28.98%	6
Inappropriate Payment Method	T470C13	1.263	25.26%	5	1.000	20.00%	12	1.133	22.67%	6	1.140	22.80%	7
Unrealistic Client Expectations	T470C25	1.000	20.00%	12	1.294	25.88%	5	1.000	20.00%	7	1.102	22.04%	8
Inappropriate Contractor Selection	T470C10	1.053	21.05%	9	1.000	20.00%	12	1.200	24.00%	5	1.078	21.57%	9
Adversarial (industry) Culture Among Project Participants	T470C30	1.111	22.22%	6	1.063	21.25%	7	1.000	20.00%	7	1.063	21.25%	10
Inadequate/ Inaccurate Design Information	T470C01	1.056	21.11%	7	1.063	21.25%	7	1.000	20.00%	7	1.043	20.85%	11
Inadequate Design Documentation	T470C02	1.056	21.11%	7	1.059	21.18%	10	1.000	20.00%	7	1.042	20.83%	12
Inadequate Brief	T470C03	1.000	20.00%	12	1.059	21.18%	10	1.000	20.00%	7	1.020	20.41%	13
Exaggerated Claims	T470C32	1.000	20.00%	12	1.063	21.25%	7	1.000	20.00%	7	1.020	20.41%	13
Unclear & Inadequate Specifications	T470C04	1.053	21.05%	9	1.000	20.00%	12	1.000	20.00%	7	1.020	20.40%	15
Inappropriate Contract Type (Strategy)	T470C05	1.053	21.05%	9	1.000	20.00%	12	1.000	20.00%	7	1.020	20.40%	15
Inappropriate Contract Form	T470C06	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Inadequate Contract administration	T470C07	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Inadequate contract documentation	T470C08	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Incomplete Tender Information	T470C09	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Unrealistic Tender Pricing	T470C11	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Inappropriate Document Control	T470C14	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Inappropriate/ Unexpected Cost Control (Target)	T470C16	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Inappropriate/ Unexpected Quality Control (Target)	T470C17	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Poor Communications Among Project Participants	T470C18	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Lack of Information for Decision Making;(Decisiveness)	T470C19	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Slow Client Response	T470C20	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Poor Workmanship	T470C23	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Inadequate Site Investigation	T470C24	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Lack of Team Spirit Among Participants	T470C27	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Personality Clashes Among Project Participants	T470C28	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17
Poor Management By One or More Project Participants	T470C29	1.000	20.00%	12	1.000	20.00%	12	1.000	20.00%	7	1.000	20.00%	17

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	1.906	11.91%	88.09%
Clients & Contractors	4.156	25.98%	74.02%
Consultants & Contractors	4	25.00%	75.00%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	4.188	26.17%	73.83%
Consultants & Over All	3.844	24.02%	75.98%
Contractors & Over All	6.719	41.99%	58.01%

Y.3.1.48 CAUSE SIGNIFICANCE ASSESSMENT: (T48 C01) – (T48 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Unclear Risk Allocation	T480C12	3.278	65.56%	1	3.500	70.00%	2	2.933	58.67%	3	3.245	64.90%	1
Uncontrollable External Events	T480C31	2.706	54.12%	7	3.588	71.76%	1	3.067	61.33%	2	3.122	62.45%	2
Poor Management By One or More Project Participan	T480C29	2.722	54.44%	6	3.125	62.50%	5	3.071	61.43%	1	2.958	59.17%	3
Inappropriate/ Unexpected Time Control (Target)	T480C15	3.222	64.44%	4	2.941	58.82%	7	2.429	48.57%	6	2.898	57.96%	4
Changes by Client	T480C21	3.278	65.56%	1	2.941	58.82%	7	2.308	46.15%	10	2.896	57.92%	5
Lack of Competence of Project Participants	T480C22	3.235	64.71%	3	3.000	60.00%	6	1.733	34.67%	11	2.694	53.88%	6
Slow Client Response	T480C20	1.882	37.65%	12	3.250	65.00%	4	2.400	48.00%	8	2.500	50.00%	7
Lack of Team Spirit Among Participants	T480C27	2.684	53.68%	8	2.938	58.75%	9	1.714	34.29%	12	2.490	49.80%	8
Poor Communications Among Project Participants	T480C18	1.000	20.00%	16	3.500	70.00%	2	2.867	57.33%	5	2.360	47.20%	9
Personality Clashes Among Project Participants	T480C28	2.647	52.94%	9	2.929	58.57%	10	1.200	24.00%	13	2.261	45.22%	10
Inappropriate Contractor Selection	T480C10	2.889	57.78%	5	2.250	45.00%	12	1.143	22.86%	14	2.167	43.33%	11
Inappropriate Payment Method	T480C13	2.263	45.26%	11	1.294	25.88%	14	2.429	48.57%	6	1.980	39.60%	12
Inappropriate/ Unexpected Cost Control (Target)	T480C16	1.000	20.00%	16	2.353	47.06%	11	2.400	48.00%	8	1.880	37.60%	13
Unrealistic Information Expectations (By the Contrac	T480C26	2.625	52.50%	10	1.375	27.50%	13	1.000	20.00%	15	1.711	34.22%	14
Unrealistic Client Expectations	T480C25	1.053	21.05%	15	1.000	20.00%	16	2.929	58.57%	4	1.571	31.43%	15
Unclear & Inadequate Specifications	T480C04	1.421	28.42%	13	1.059	21.18%	15	1.000	20.00%	15	1.176	23.53%	16
Adversarial (industry) Culture Among Project Participi	T480C30	1.158	23.16%	14	1.000	20.00%	16	1.000	20.00%	15	1.063	21.25%	17
Inadequate/ Inaccurate Design Information	T480C01	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inadequate Design Documentation	T480C02	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inadequate Brief	T480C03	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inappropriate Contract Type (Strategy)	T480C05	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inappropriate Contract Form	T480C06	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inadequate Contract administration	T480C07	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inadequate contract documentation	T480C08	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Incomplete Tender Information	T480C09	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Unrealistic Tender Pricing	T480C11	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inappropriate Document Control	T480C14	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inappropriate/ Unexpected Quality Control (Target)	T480C17	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Lack of Information for Decision Making;(Decisivene	T480C19	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Poor Workmanship	T480C23	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Inadequate Site Investigation	T480C24	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18
Exaggerated Claims	T480C32	1.000	20.00%	16	1.000	20.00%	16	1.000	20.00%	15	1.000	20.00%	18

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	2.094	13.09%	86.91%
Clients & Contractors	3.438	21.48%	78.52%
Consultants & Contractors	2.219	13.87%	86.13%

Agreement of Each Group With Over All Gro

Groups	RAF	PD	PA
Clients & Over All	2.438	15.23%	84.77%
Consultants & Over All	1.844	11.52%	88.48%
Contractors & Over All	3.188	19.92%	80.08%

Y.3.1.49 CAUSE SIGNIFICANCE ASSESSMENT: (T49 C01) – (T49 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Unclear Risk Allocation	T490C12	3.444	68.89%	1	3.588	71.76%	1	3.143	62.86%	1	3.408	68.16%	1
Uncontrollable External Events	T490C31	3.158	63.16%	2	3.235	64.71%	2	1.000	20.00%	7	2.549	50.98%	2
Changes by Client	T490C21	1.000	20.00%	8	2.250	45.00%	3	2.867	57.33%	2	1.980	39.59%	3
Lack of Competence of Project Participants	T490C22	1.000	20.00%	8	2.125	42.50%	4	1.786	35.71%	3	1.617	32.34%	4
Inappropriate/ Unexpected Time Control (Target)	T490C15	1.895	37.89%	3	1.000	20.00%	8	1.733	34.67%	4	1.549	30.98%	5
Unrealistic Information Expectations (By the Contract)	T490C26	1.833	36.67%	4	1.267	25.33%	6	1.000	20.00%	7	1.396	27.92%	6
Inappropriate Payment Method	T490C13	1.278	25.56%	5	1.000	20.00%	8	1.143	22.86%	5	1.146	22.92%	7
Unrealistic Client Expectations	T490C25	1.000	20.00%	8	1.313	26.25%	5	1.000	20.00%	7	1.104	22.08%	8
Adversarial (industry) Culture Among Project Participants	T490C30	1.167	23.33%	6	1.059	21.18%	7	1.000	20.00%	7	1.080	21.60%	9
Inappropriate Contractor Selection	T490C10	1.000	20.00%	8	1.000	20.00%	8	1.143	22.86%	5	1.040	20.80%	10
Inadequate/ Inaccurate Design Information	T490C01	1.053	21.05%	7	1.000	20.00%	8	1.000	20.00%	7	1.020	20.39%	11
Inadequate Design Documentation	T490C02	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Brief	T490C03	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Unclear & Inadequate Specifications	T490C04	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Contract Type (Strategy)	T490C05	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Contract Form	T490C06	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Contract administration	T490C07	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate contract documentation	T490C08	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Incomplete Tender Information	T490C09	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Unrealistic Tender Pricing	T490C11	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Document Control	T490C14	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate/ Unexpected Cost Control (Target)	T490C16	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate/ Unexpected Quality Control (Target)	T490C17	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Communications Among Project Participants	T490C18	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Lack of Information for Decision Making;(Decisiveness)	T490C19	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Slow Client Response	T490C20	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Workmanship	T490C23	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Site Investigation	T490C24	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Lack of Team Spirit Among Participants	T490C27	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Personality Clashes Among Project Participants	T490C28	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Management By One or More Project Participants	T490C29	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Exaggerated Claims	T490C32	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	0.75	4.69%	95.31%
Clients & Contractors	1.438	8.98%	91.02%
Consultants & Contractors	1.313	8.20%	91.80%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.375	21.09%	78.91%
Consultants & Over All	3.063	19.14%	80.86%
Contractors & Over All	4	25.00%	75.00%

Y.3.1.50 CAUSE SIGNIFICANCE ASSESSMENT: (T50 C01) – (T50 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Unclear Risk Allocation	T500C12	3.421	68.42%	1	3.588	71.76%	1	3.067	61.33%	1	3.373	67.45%	1
Uncontrollable External Events	T500C31	3.389	67.78%	2	3.353	67.06%	2	1.000	20.00%	7	2.660	53.20%	2
Changes by Client	T500C21	1.000	20.00%	8	1.400	28.00%	3	3.067	61.33%	1	1.787	35.74%	3
Inappropriate/ Unexpected Time Control (Target)	T500C15	1.353	27.06%	3	1.000	20.00%	8	1.214	24.29%	3	1.188	23.75%	4
Unrealistic Information Expectations (By the Contract)	T500C26	1.263	25.26%	4	1.250	25.00%	6	1.000	20.00%	7	1.180	23.60%	5
Lack of Competence of Project Participants	T500C22	1.000	20.00%	8	1.333	26.67%	4	1.214	24.29%	3	1.174	23.48%	6
Inappropriate Payment Method	T500C13	1.167	23.33%	5	1.000	20.00%	8	1.133	22.67%	6	1.100	22.00%	7
Unrealistic Client Expectations	T500C25	1.000	20.00%	8	1.313	26.25%	5	1.000	20.00%	7	1.100	22.00%	7
Inappropriate Contractor Selection	T500C10	1.000	20.00%	8	1.000	20.00%	8	1.214	24.29%	3	1.060	21.20%	9
Adversarial (industry) Culture Among Project Participants	T500C30	1.158	23.16%	6	1.059	21.18%	7	1.000	20.00%	7	1.080	21.60%	9
Inadequate/ Inaccurate Design Information	T500C01	1.053	21.05%	7	1.000	20.00%	8	1.000	20.00%	7	1.020	20.40%	11
Inadequate Design Documentation	T500C02	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Brief	T500C03	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Unclear & Inadequate Specifications	T500C04	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Contract Type (Strategy)	T500C05	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Contract Form	T500C06	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Contract administration	T500C07	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate contract documentation	T500C08	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Incomplete Tender Information	T500C09	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Unrealistic Tender Pricing	T500C11	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Document Control	T500C14	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate/ Unexpected Cost Control (Target)	T500C16	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate/ Unexpected Quality Control (Target)	T500C17	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Communications Among Project Participants	T500C18	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Lack of Information for Decision Making;(Decisiveness)	T500C19	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Slow Client Response	T500C20	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Workmanship	T500C23	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Site Investigation	T500C24	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Lack of Team Spirit Among Participants	T500C27	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Personality Clashes Among Project Participants	T500C28	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Management By One or More Project Participants	T500C29	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Exaggerated Claims	T500C32	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	0.75	4.69%	95.31%
Clients & Contractors	1.531	9.57%	90.43%
Consultants & Contractors	1.406	8.79%	91.21%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.25	20.31%	79.69%
Consultants & Over All	3.125	19.53%	80.47%
Contractors & Over All	4.094	25.59%	74.41%

Y.3.1.51 CAUSE SIGNIFICANCE ASSESSMENT: (T51 C01) – (T51 C32)

Type Description	Code	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank	Avg. Mean	Impo. Index	Rank
		Clients			Consultants			Contractors			Over All		
Unclear Risk Allocation	T510C12	3.500	70.00%	1	3.647	72.94%	1	3.143	62.86%	1	3.449	68.98%	1
Uncontrollable External Events	T510C31	3.500	70.00%	2	3.353	67.06%	2	1.000	20.00%	7	2.700	54.00%	2
Changes by Client	T510C21	1.000	20.00%	8	1.412	28.24%	3	3.071	61.43%	2	1.735	34.69%	3
Lack of Competence of Project Participants	T510C22	1.000	20.00%	8	1.294	25.88%	4	1.286	25.71%	3	1.196	23.91%	4
Inappropriate/ Unexpected Time Control (Target)	T510C15	1.294	25.88%	3	1.000	20.00%	8	1.214	24.29%	4	1.167	23.33%	5
Unrealistic Information Expectations (By the Contract)	T510C26	1.263	25.26%	4	1.200	24.00%	5	1.000	20.00%	7	1.163	23.27%	6
Inappropriate Payment Method	T510C13	1.176	23.53%	5	1.000	20.00%	8	1.071	21.43%	6	1.083	21.67%	7
Adversarial (industry) Culture Among Project Participants	T510C30	1.167	23.33%	6	1.059	21.18%	7	1.000	20.00%	7	1.080	21.60%	8
Unrealistic Client Expectations	T510C25	1.000	20.00%	8	1.200	24.00%	5	1.000	20.00%	7	1.064	21.28%	9
Inappropriate Contractor Selection	T510C10	1.000	20.00%	8	1.000	20.00%	8	1.200	24.00%	5	1.061	21.22%	10
Inadequate/ Inaccurate Design Information	T510C01	1.053	21.05%	7	1.000	20.00%	8	1.000	20.00%	7	1.020	20.39%	11
Inadequate Design Documentation	T510C02	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Brief	T510C03	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Unclear & Inadequate Specifications	T510C04	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Contract Type (Strategy)	T510C05	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Contract Form	T510C06	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Contract administration	T510C07	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate contract documentation	T510C08	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Incomplete Tender Information	T510C09	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Unrealistic Tender Pricing	T510C11	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate Document Control	T510C14	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate/ Unexpected Cost Control (Target)	T510C16	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inappropriate/ Unexpected Quality Control (Target)	T510C17	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Communications Among Project Participants	T510C18	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Lack of Information for Decision Making;(Decisiveness)	T510C19	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Slow Client Response	T510C20	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Workmanship	T510C23	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Inadequate Site Investigation	T510C24	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Lack of Team Spirit Among Participants	T510C27	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Personality Clashes Among Project Participants	T510C28	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Poor Management By One or More Project Participants	T510C29	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12
Exaggerated Claims	T510C32	1.000	20.00%	8	1.000	20.00%	8	1.000	20.00%	7	1.000	20.00%	12

Agreement Amongst Groups

Groups	RAF	PD	PA
Clients & Consultants	0.719	4.49%	95.51%
Clients & Contractors	1.469	9.18%	90.82%
Consultants & Contractors	1.313	8.20%	91.80%

Agreement of Each Group With Over All Groups

Groups	RAF	PD	PA
Clients & Over All	3.375	21.09%	78.91%
Consultants & Over All	3.094	19.34%	80.66%
Contractors & Over All	3.969	24.80%	75.20%

***Y.3 SIGNIFICANT CAUSES UNDER TYPES OF CLAIMS AND DISPUTES:
CAUSE SIGNIFICANCE ASSESSMENT (T01 C01-C32) – (T51 C01-
C32):***

Y.3.2 CAUSE SIGNIFICANCE BAR CHART:

Y.3.2.1 CAUSE SIGNIFICANCE ASSESSMENT: (T01 C01) – (T01 C32)

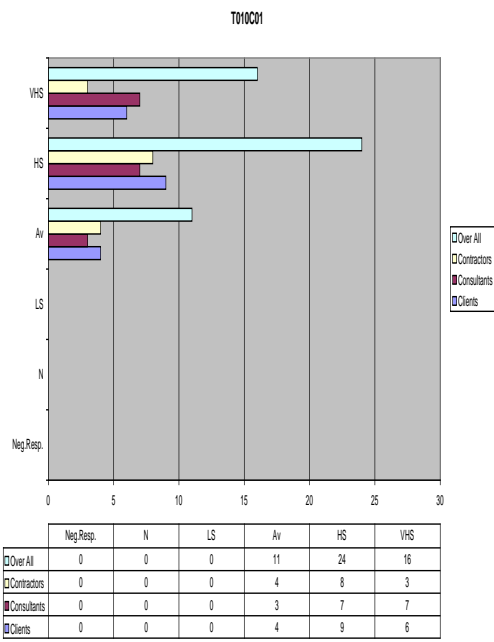


Figure 301 T010C01

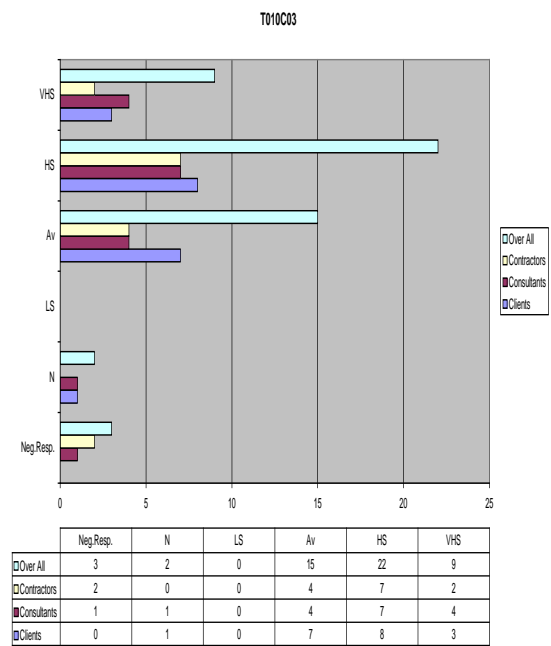


Figure 303 T010C03

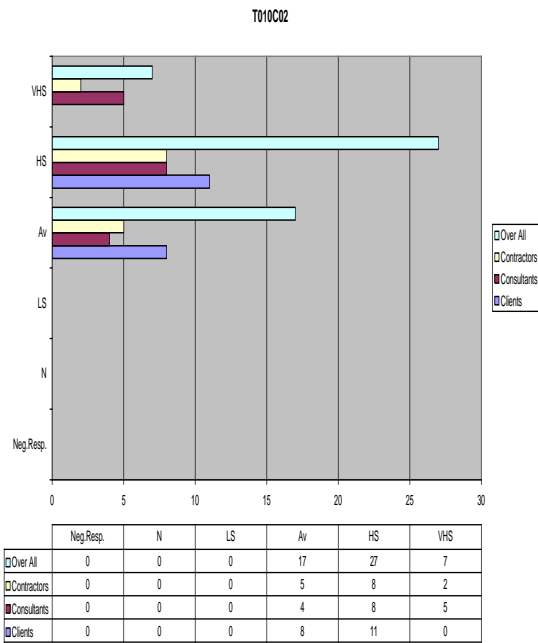


Figure 302 T010C02

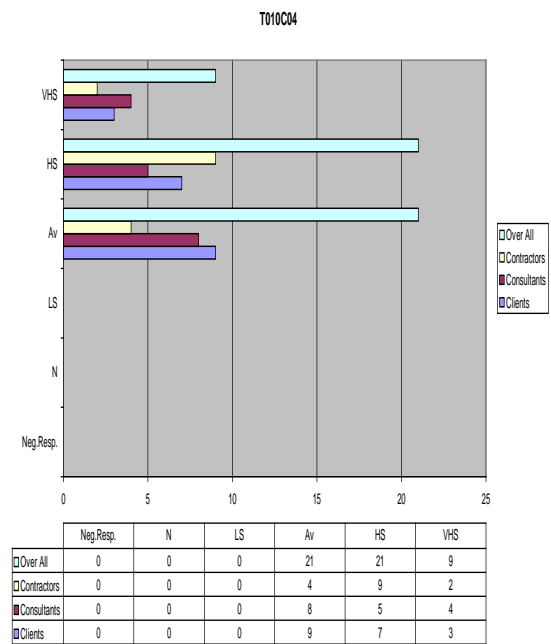


Figure 304 T010C04

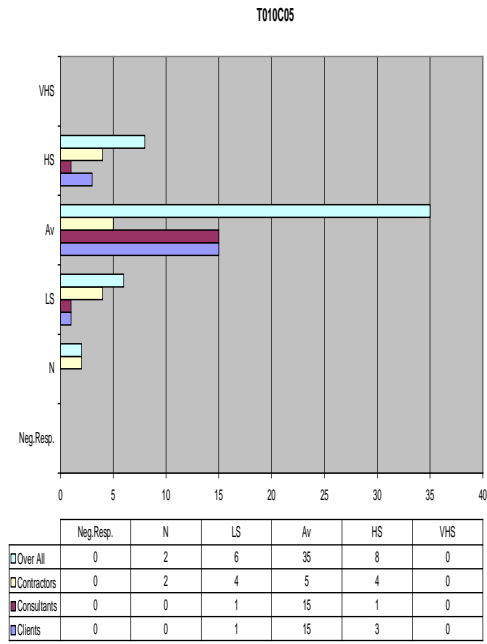


Figure 305 T010C05

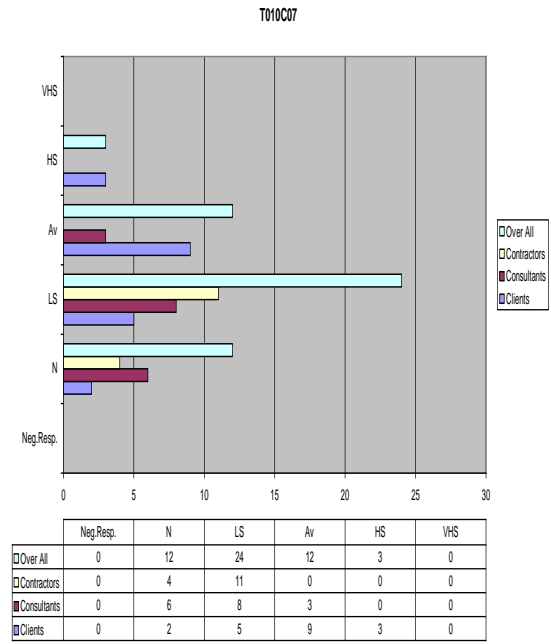


Figure 307 T010C07

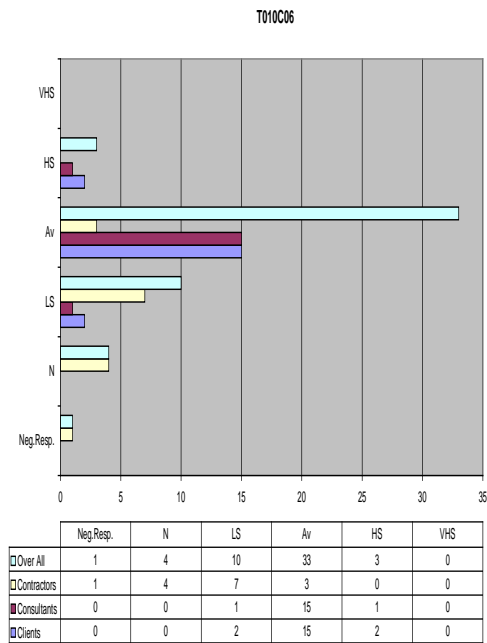


Figure 306 T010C06

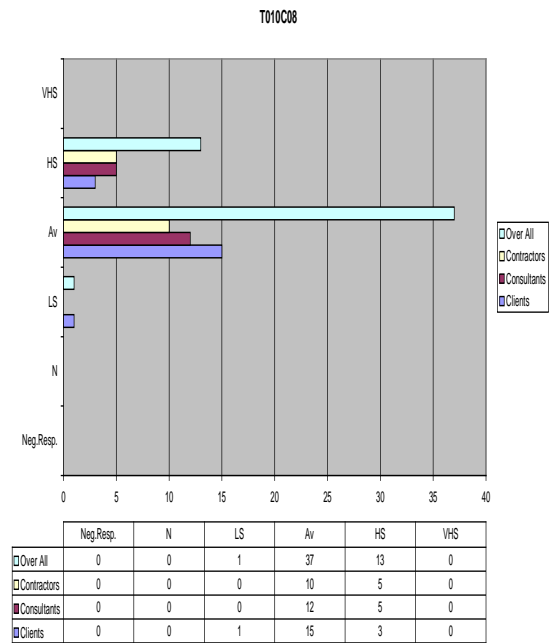


Figure 308 T010C08

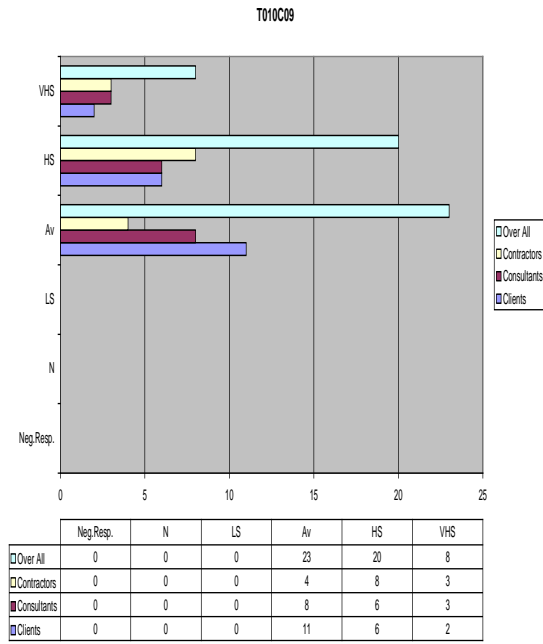


Figure 309 T010C09

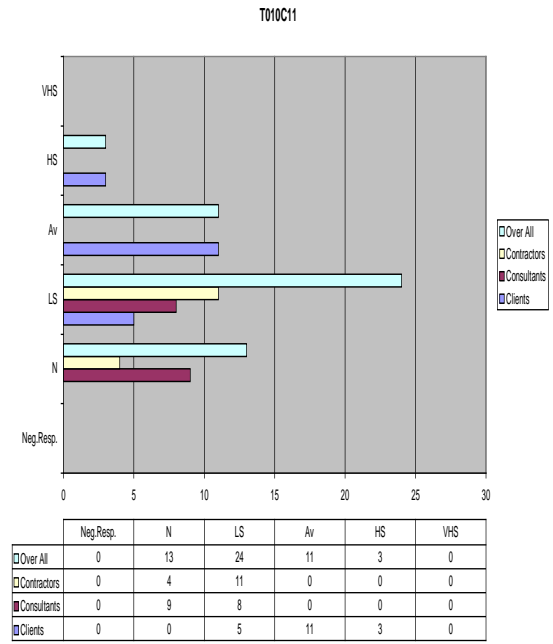


Figure 311 T010C11

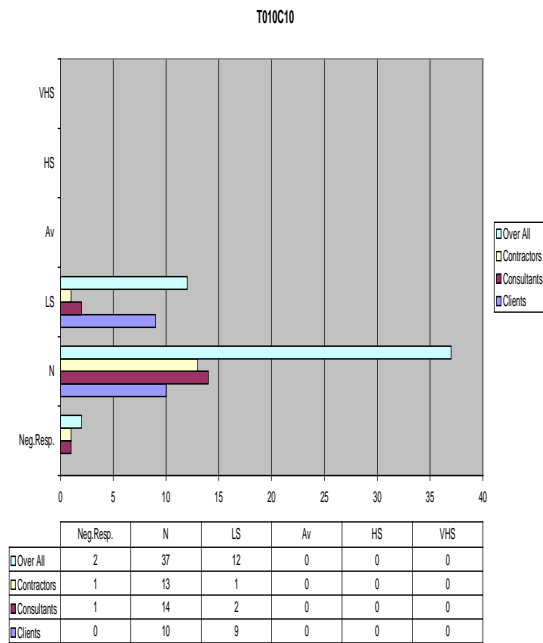


Figure 310 T010C10

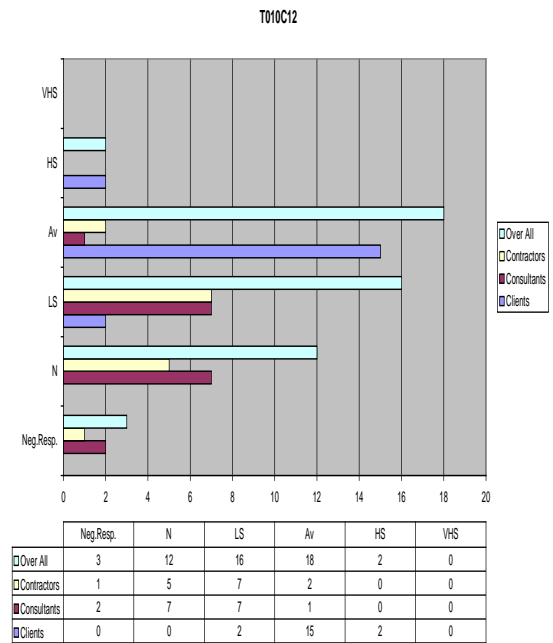


Figure 312 T010C12

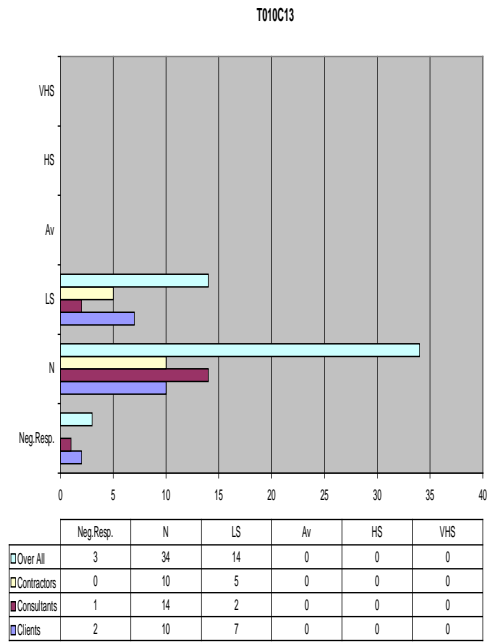


Figure 313 T010C13

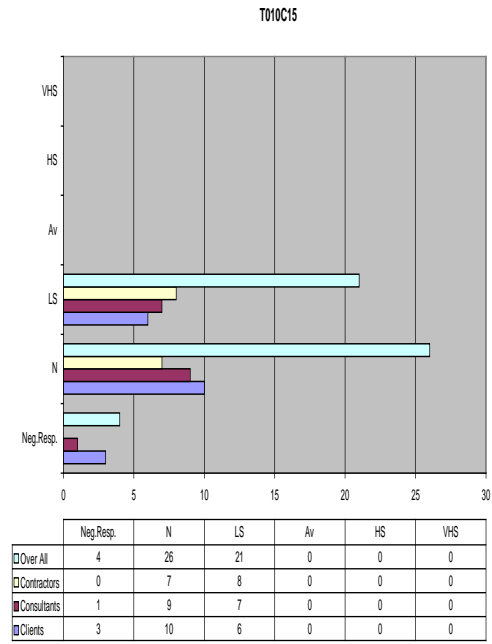


Figure 315 T010C15

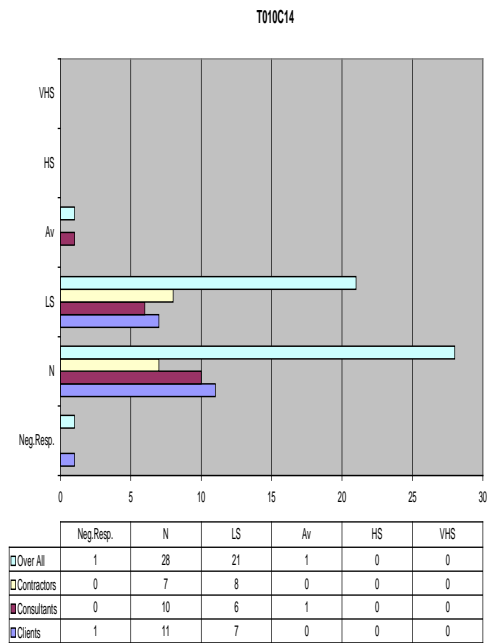


Figure 314 T010C14

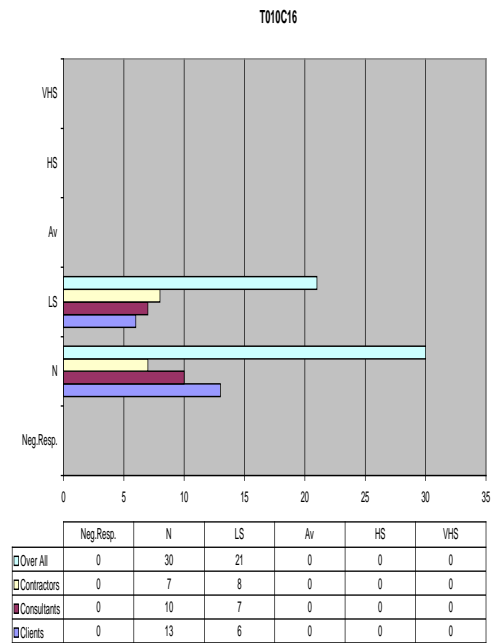


Figure 316 T010C16

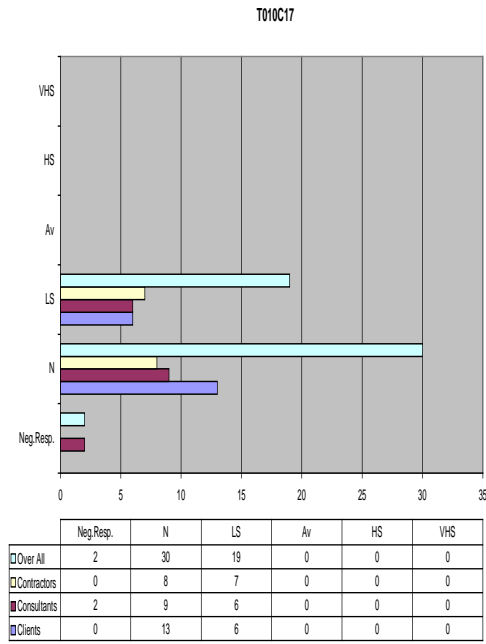


Figure 317 T010C17

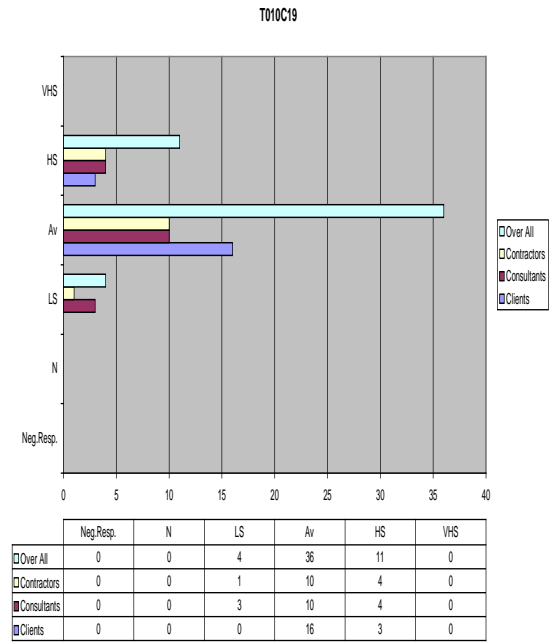


Figure 319 T010C19

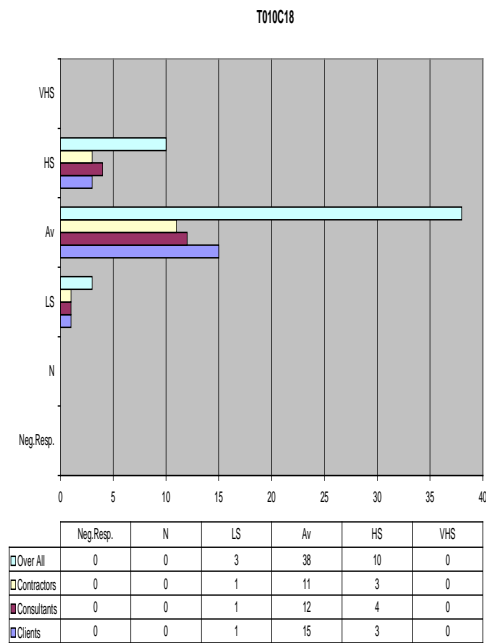


Figure 318 T010C18

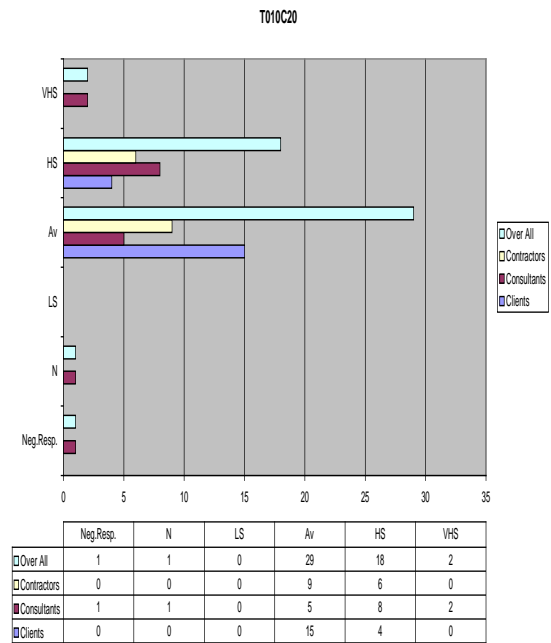


Figure 320 T010C20

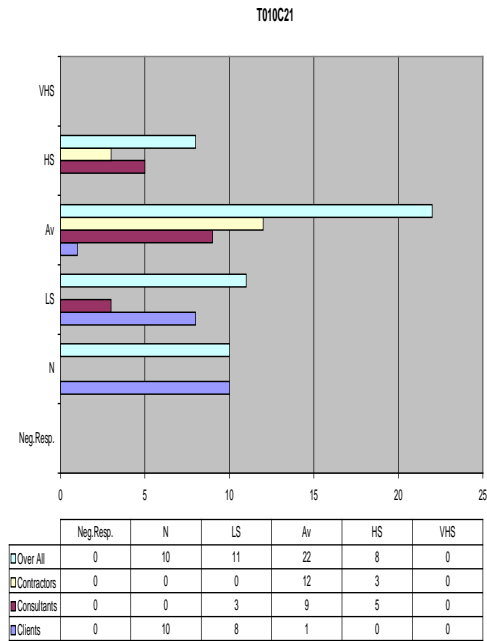


Figure 321 T010C21

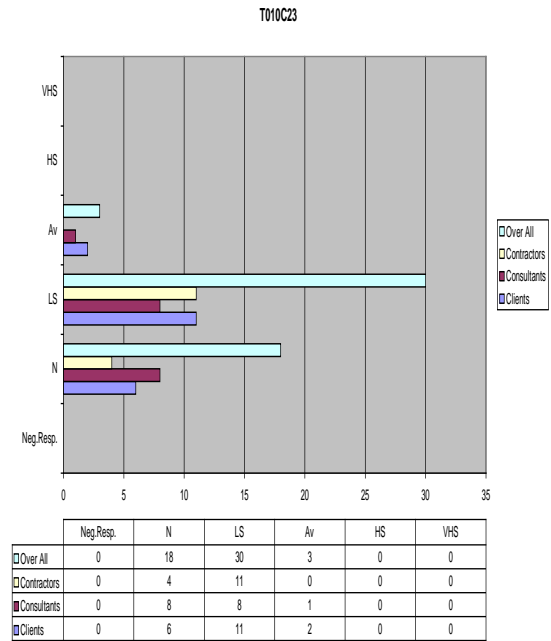


Figure 323 T010C23

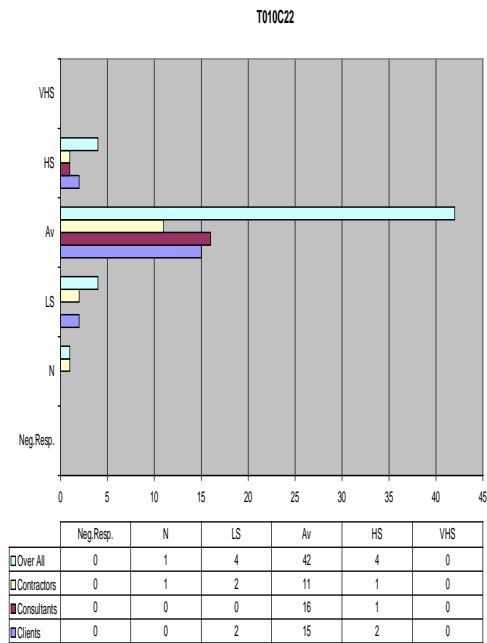


Figure 322 T010C22

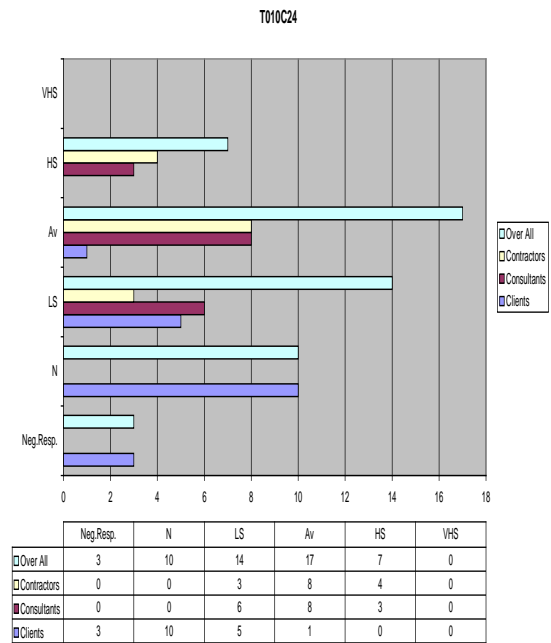


Figure 324 T010C24

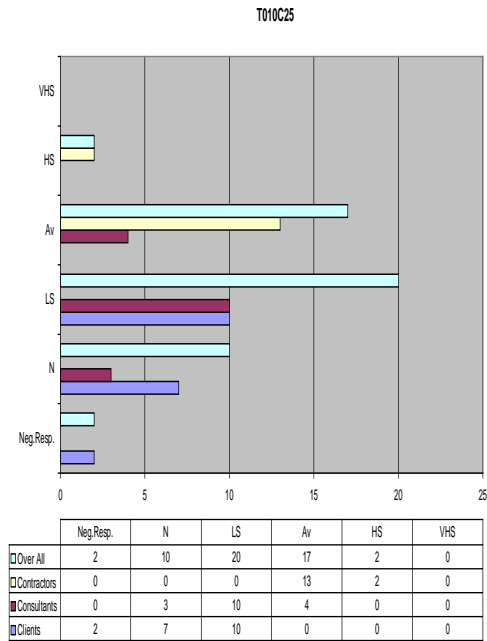


Figure 325 T010C25

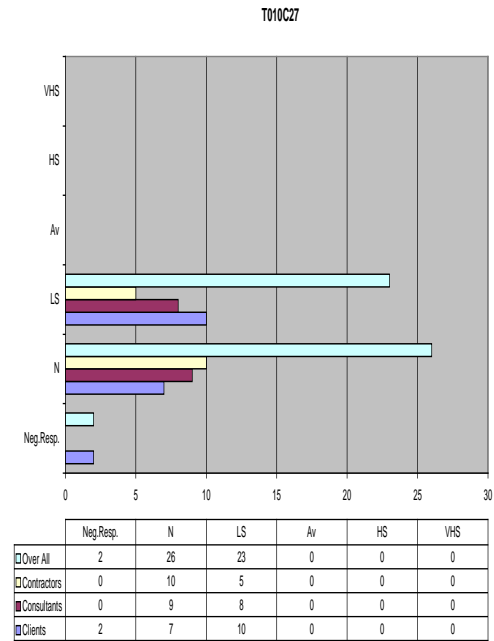


Figure 327 T010C27

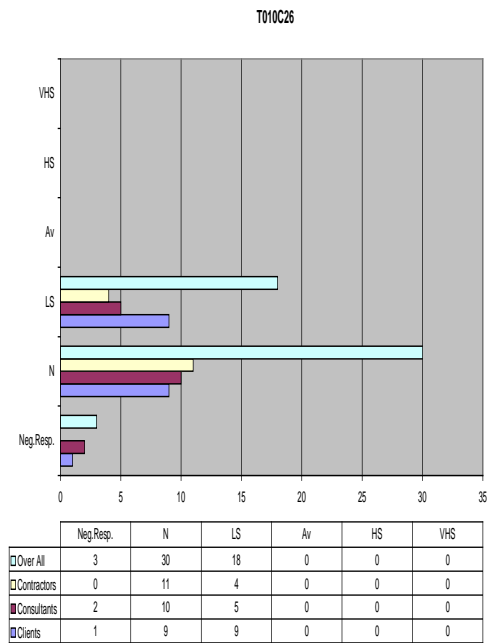


Figure 326 T010C26

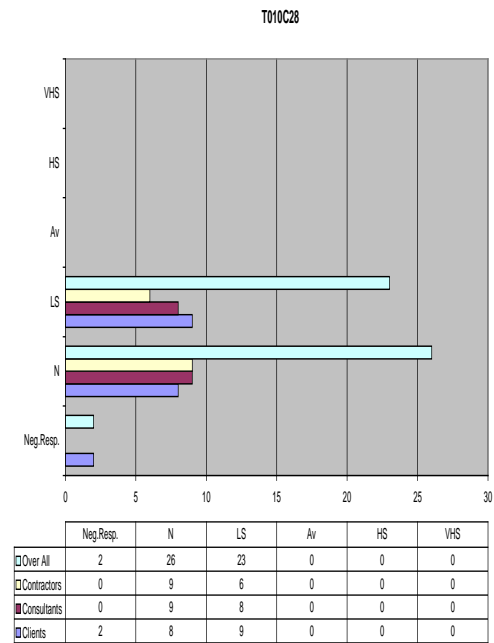


Figure 328 T010C28

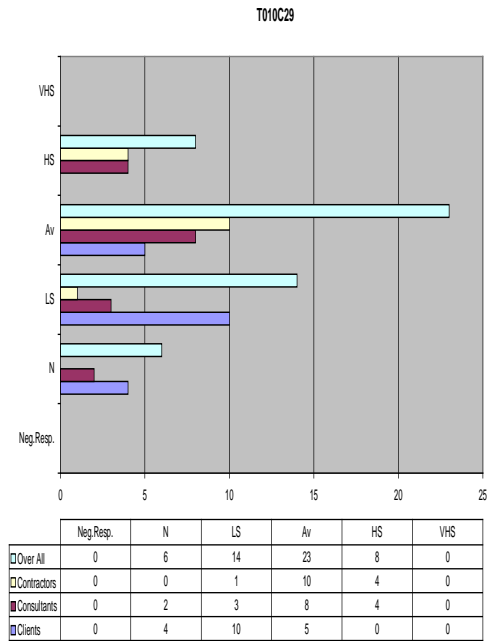


Figure 329 T010C29

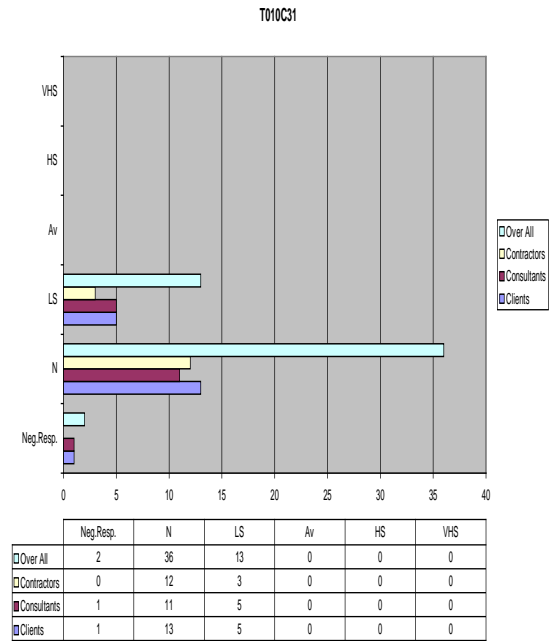


Figure 331 T010C31

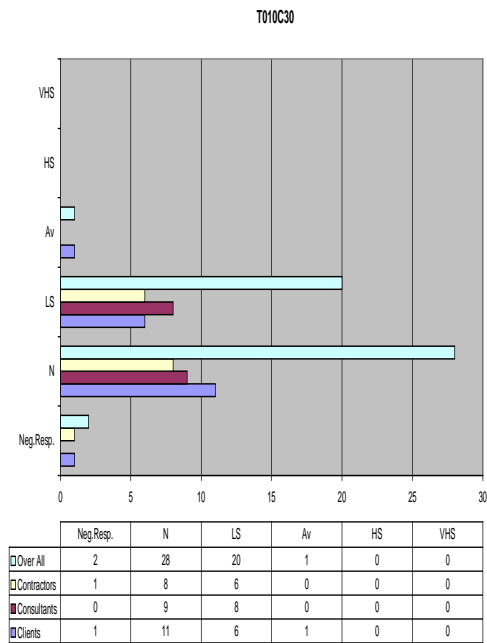


Figure 330 T010C30

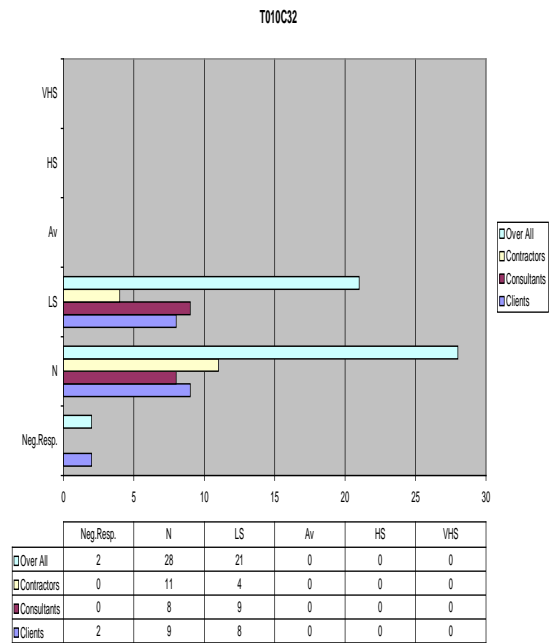


Figure 332 T010C32

Y.3.2.2 CAUSE SIGNIFICANCE ASSESSMENT: (T02 C01) – (T02 C32)

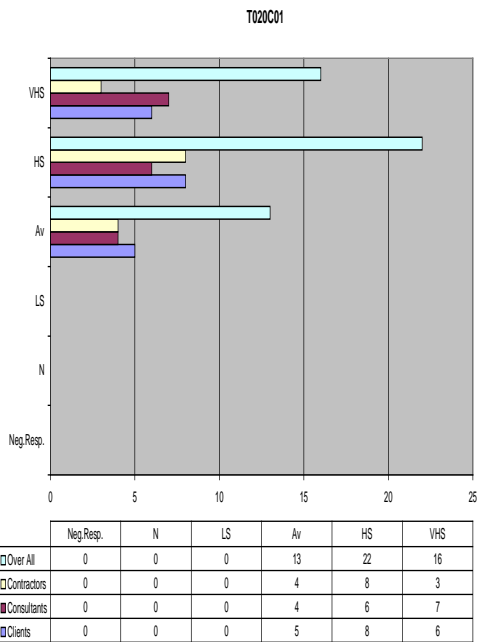


Figure 333 T020C01

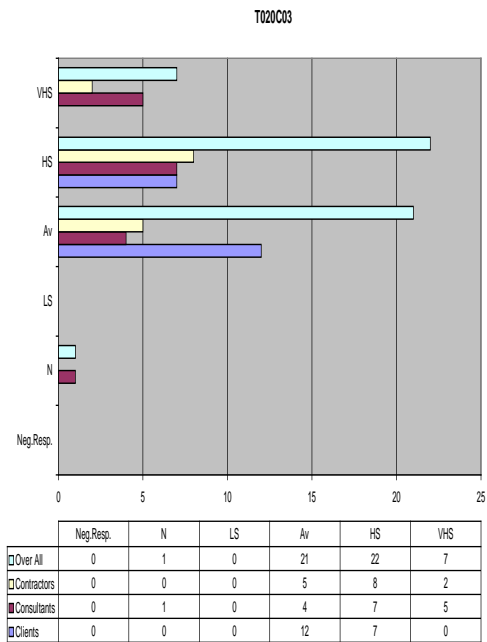


Figure 335 T020C03

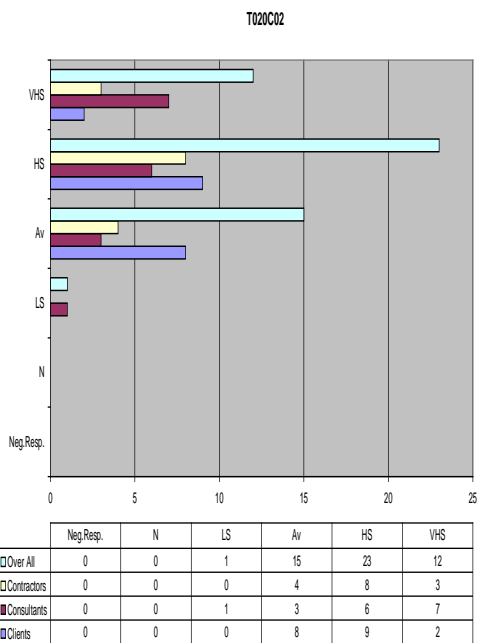


Figure 334 T020C02

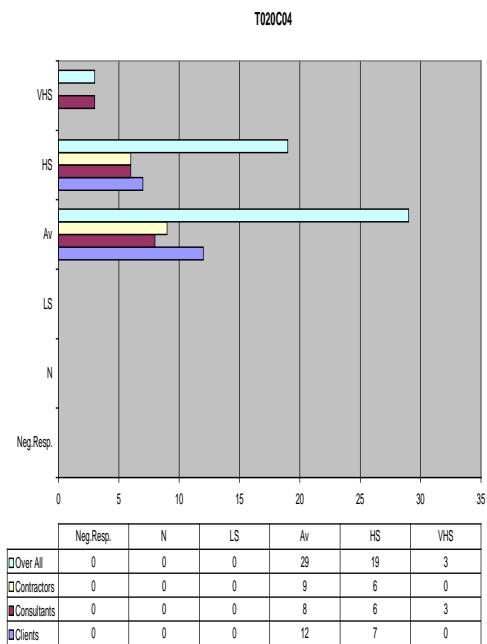


Figure 336 T020C04

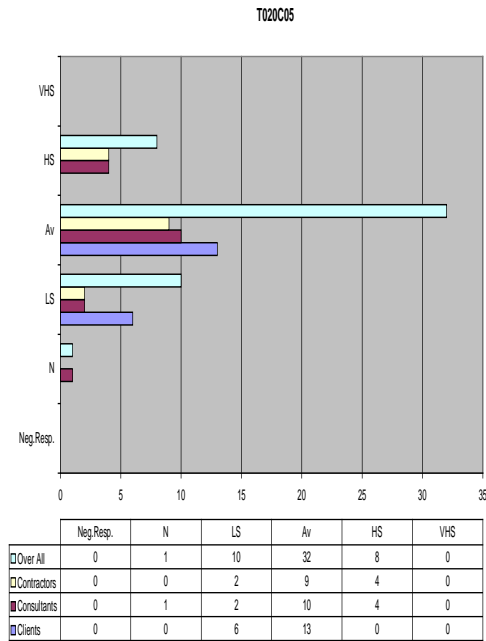


Figure 337 T020C05

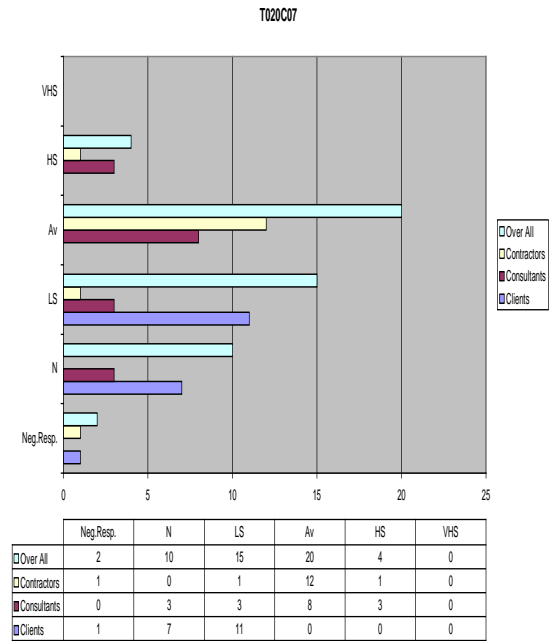


Figure 339 T020C07

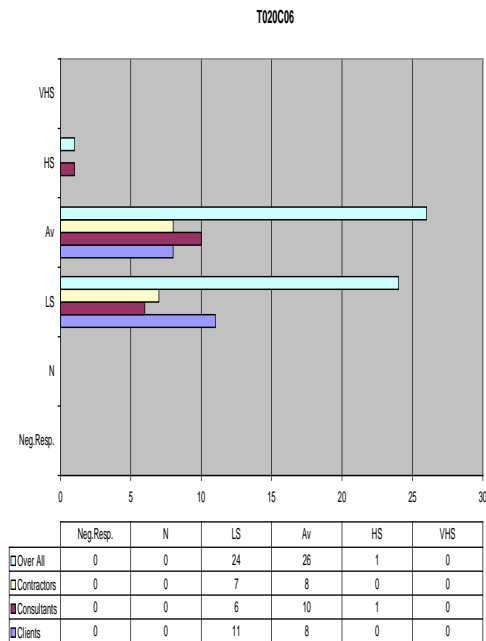


Figure 338 T020C06

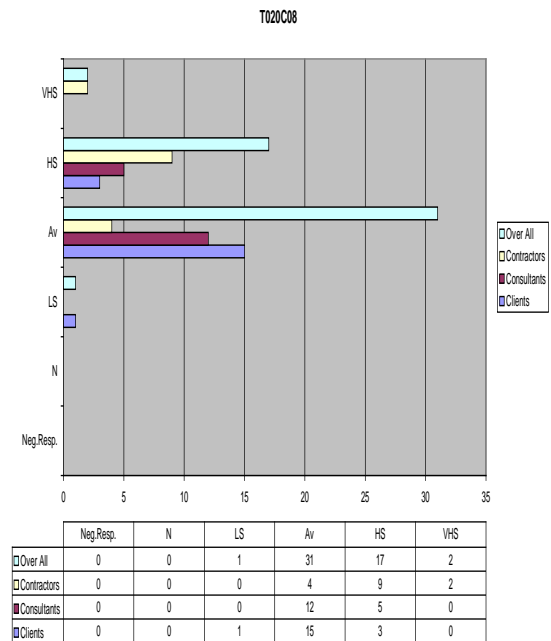


Figure 340 T020C08

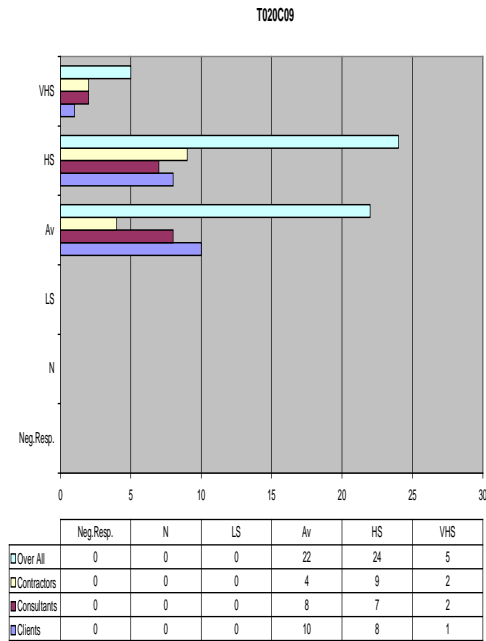


Figure 341 T020C09

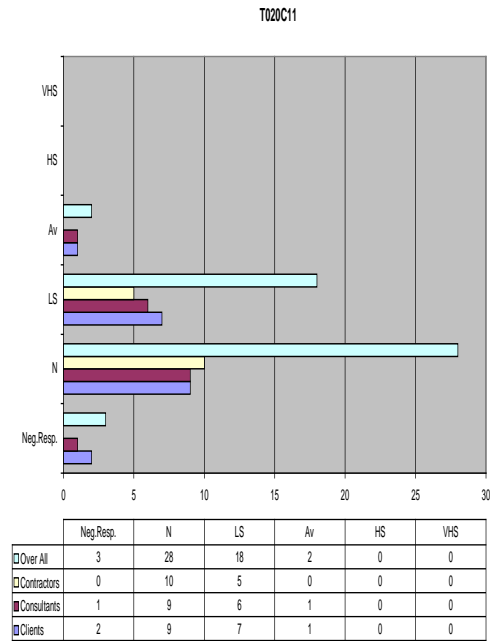


Figure 343 T020C11

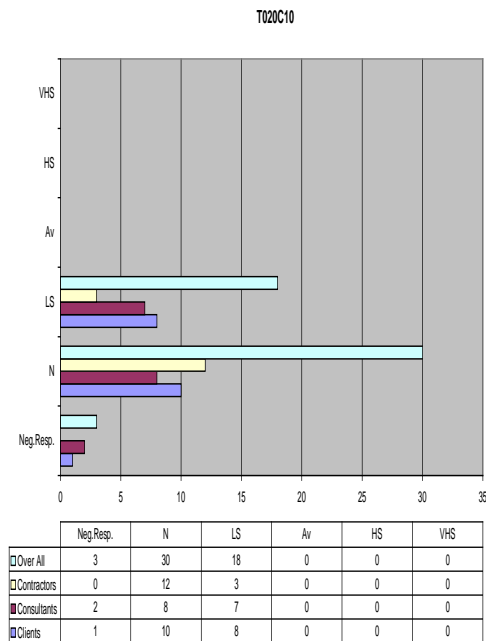


Figure 342 T020C10

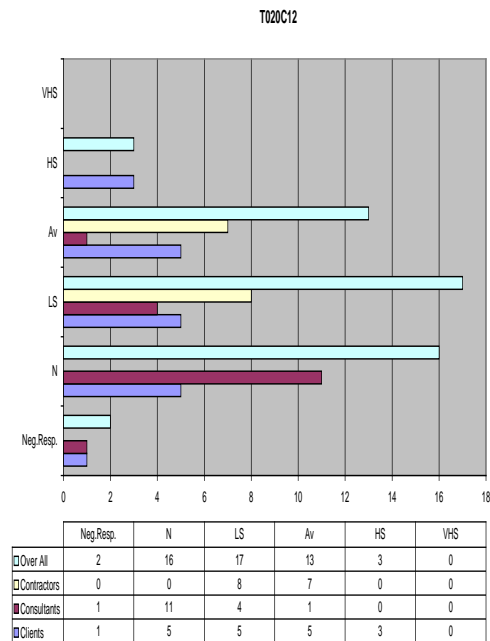


Figure 344 T020C12

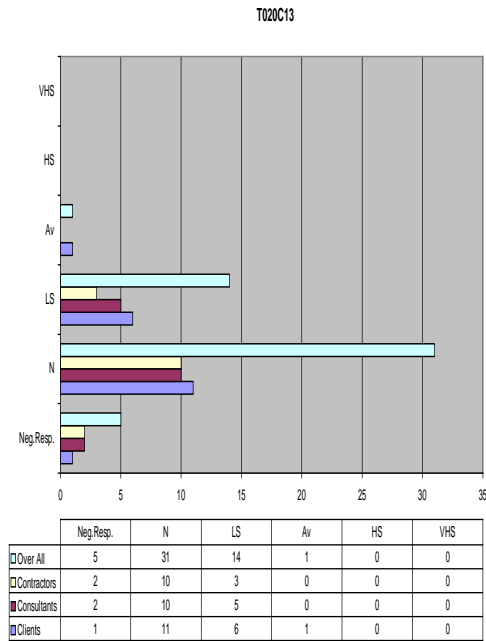


Figure 345 T020C13

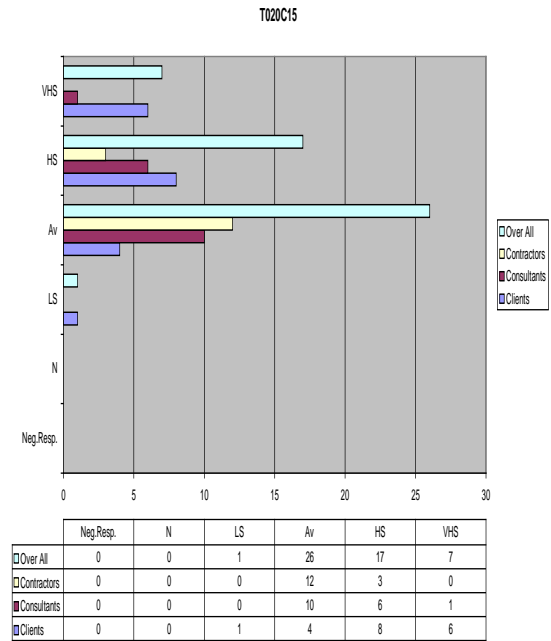


Figure 347 T020C15

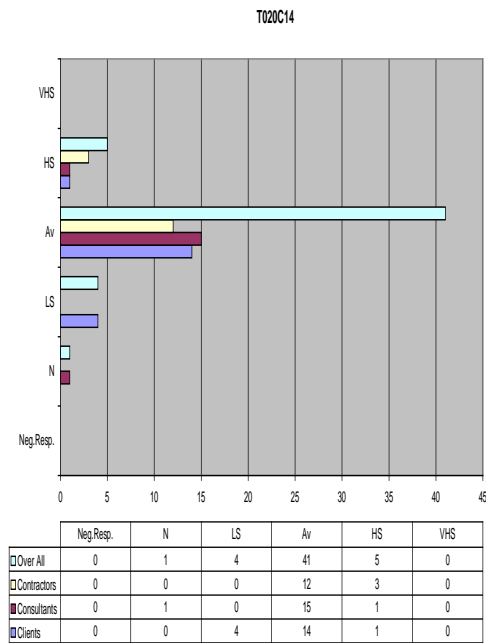


Figure 346 T020C14

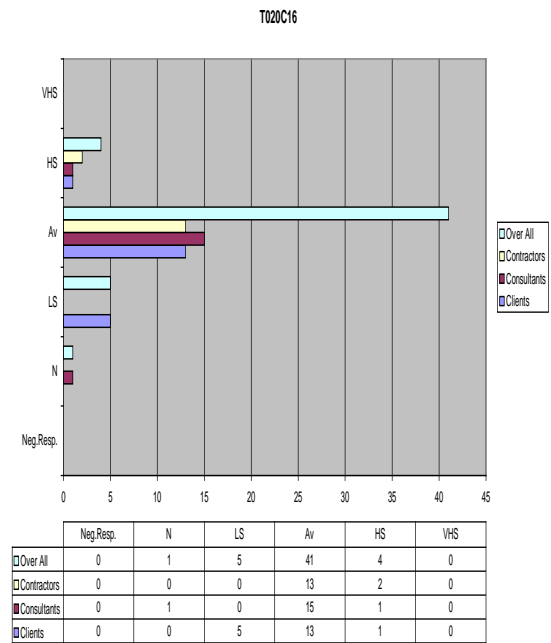


Figure 348 T020C16

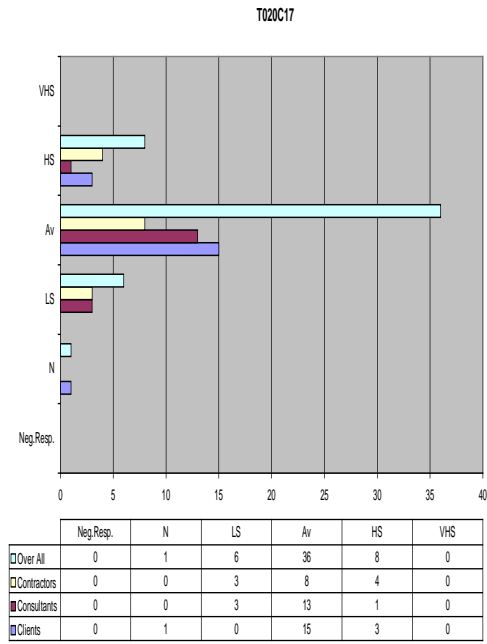


Figure 349 T020C17

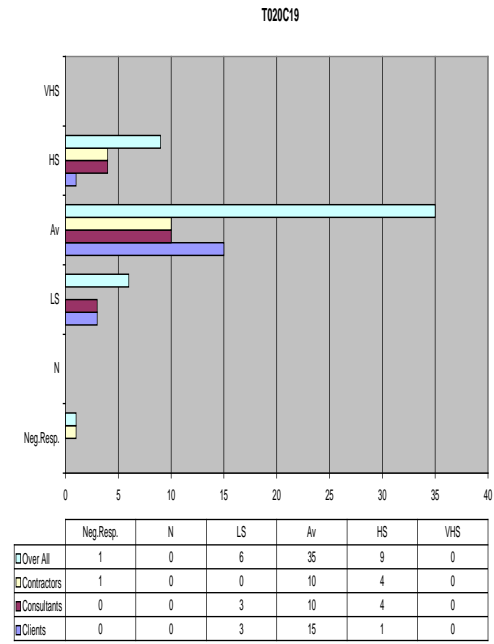


Figure 351 T020C19

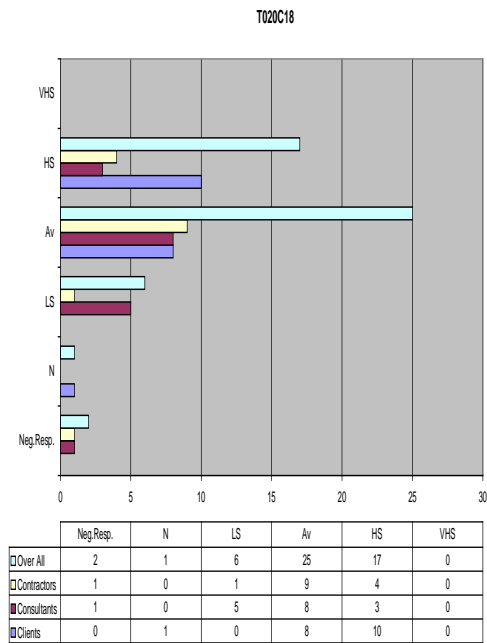


Figure 350 T020C18

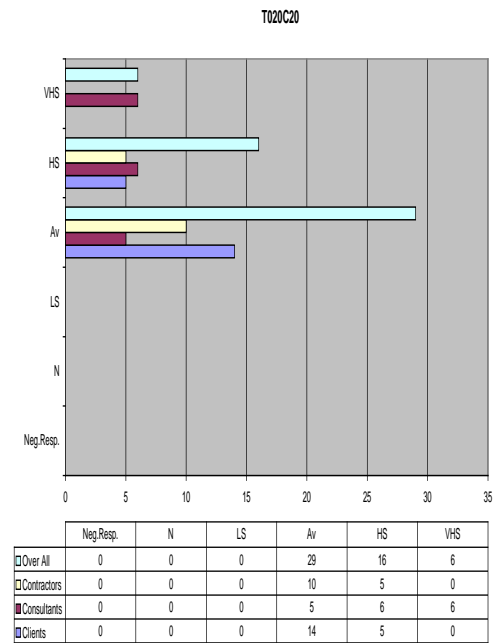


Figure 352 T020C20

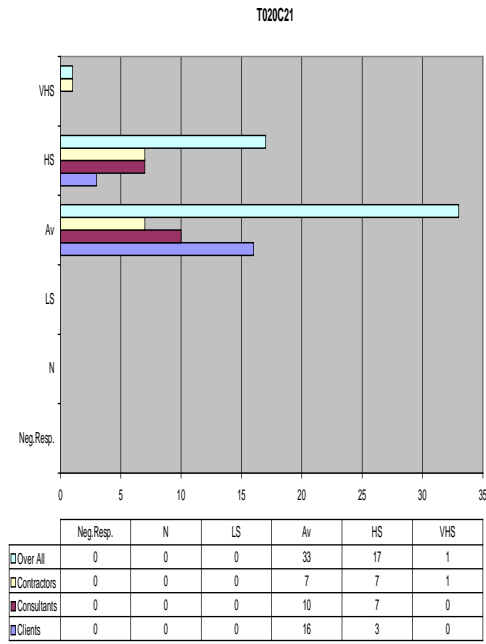


Figure 353 T020C21

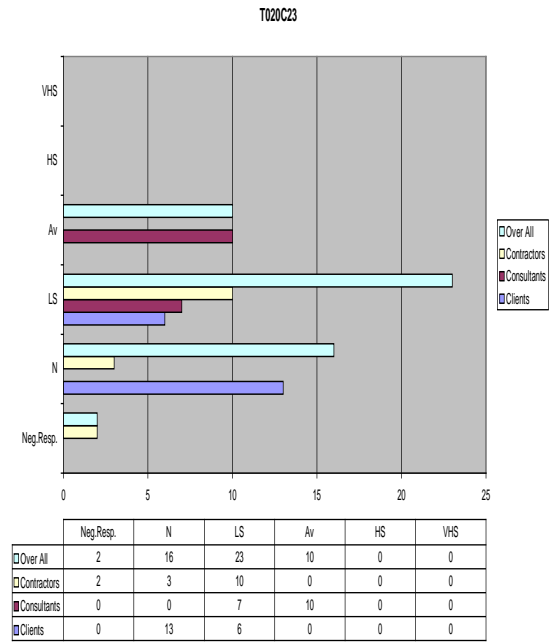


Figure 355 T020C23

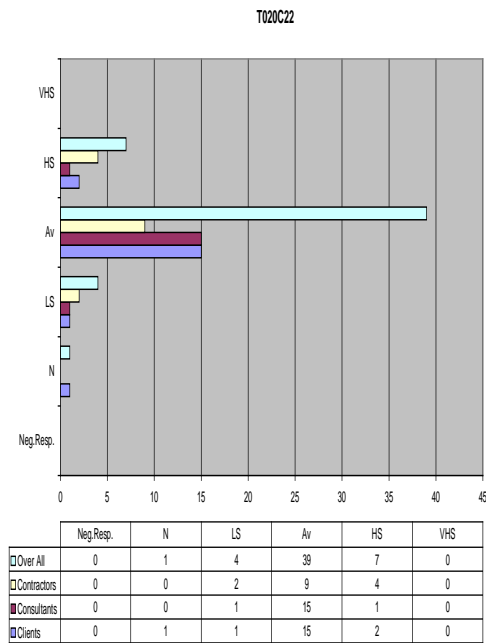


Figure 354 T020C22

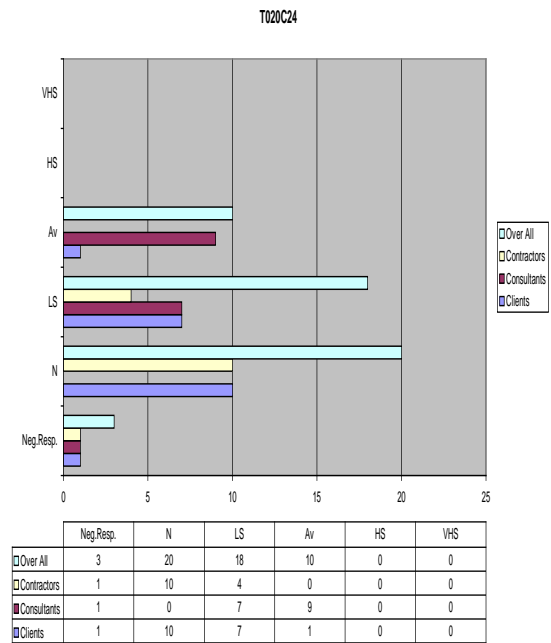


Figure 356 T020C24

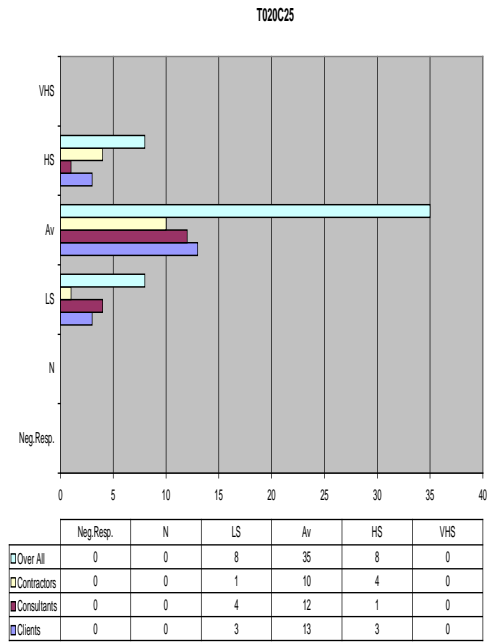


Figure 357 T020C25

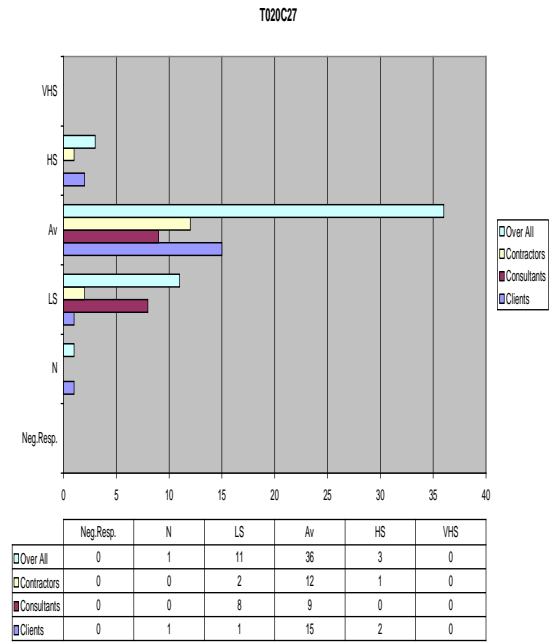


Figure 359 T020C27

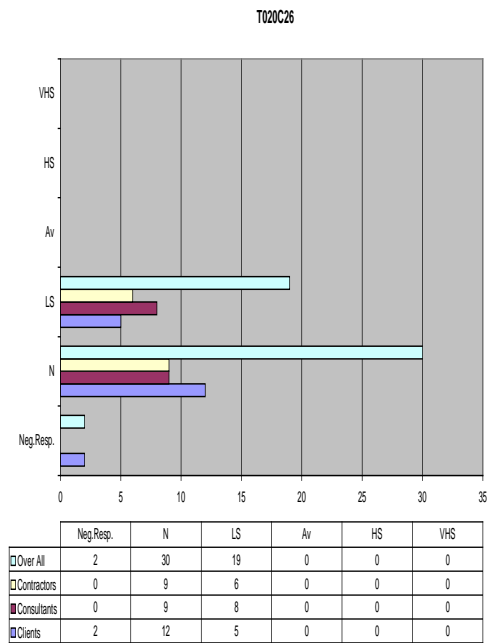


Figure 358 T020C26

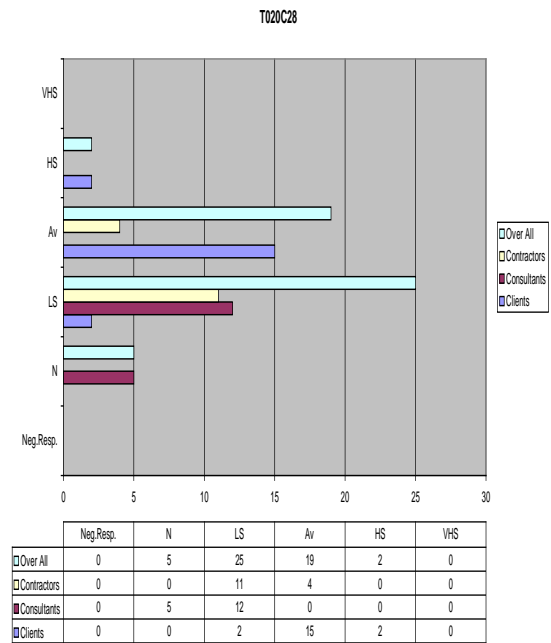


Figure 360 T020C28

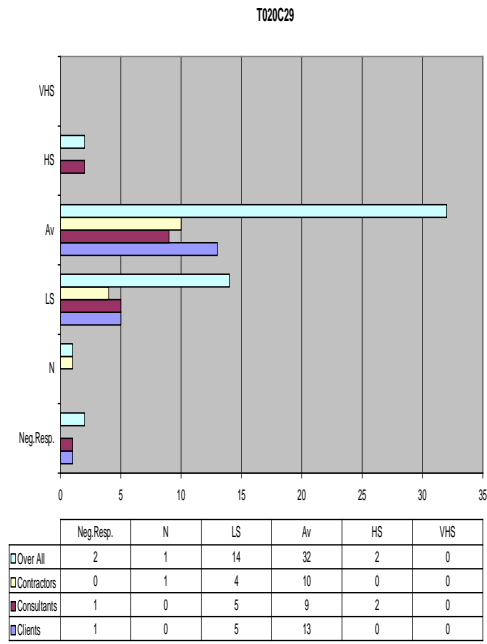


Figure 361 T020C29

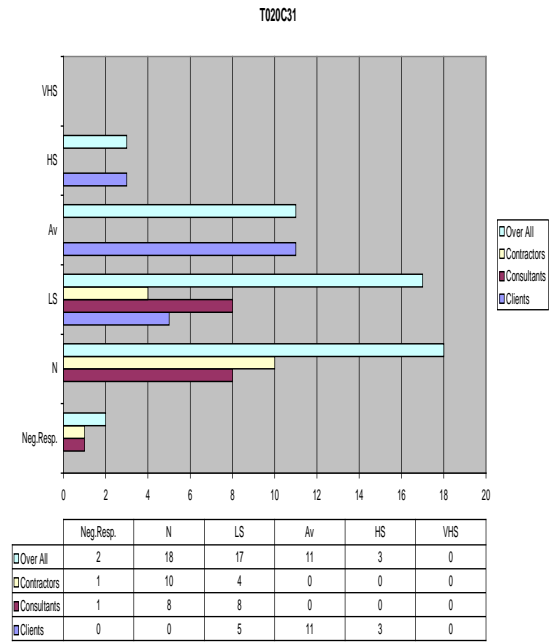


Figure 363 T020C31

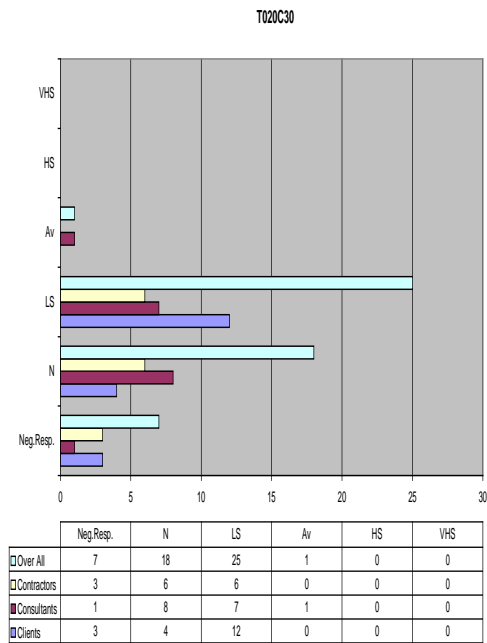


Figure 362 T020C30

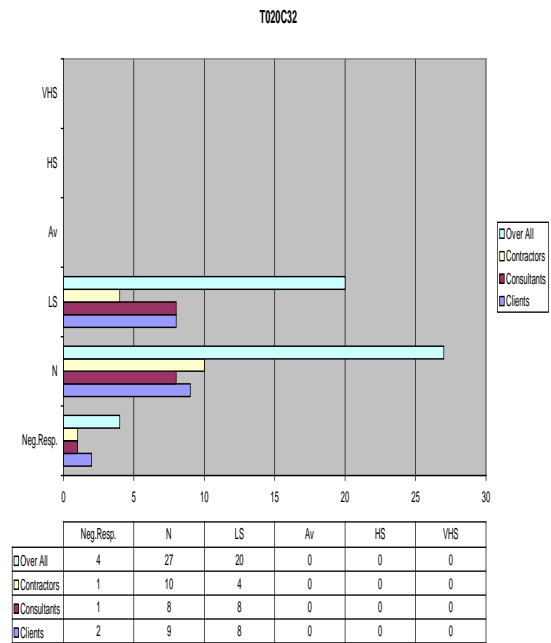


Figure 364 T020C32

Y.3.2.3 CAUSE SIGNIFICANCE ASSESSMENT: (T03 C01) – (T03 C32)

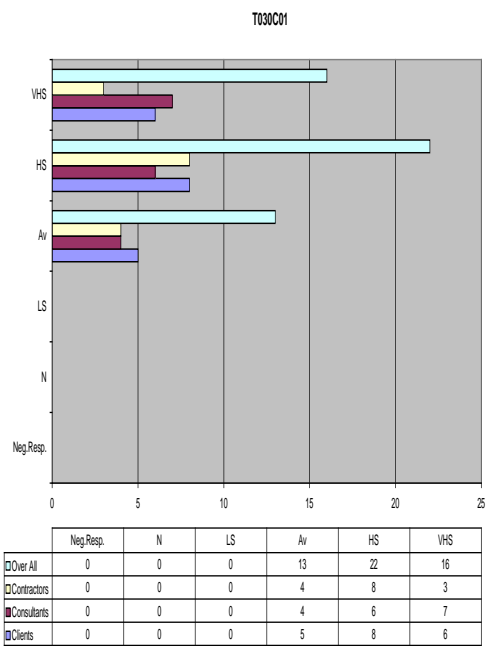


Figure 365 T030C01

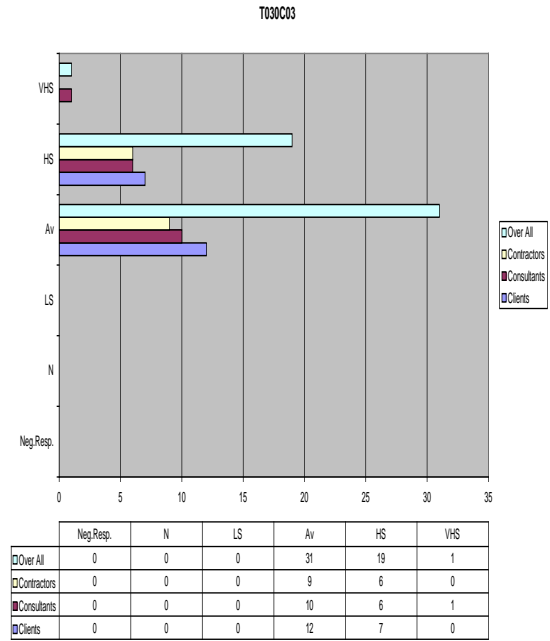


Figure 367 T030C03

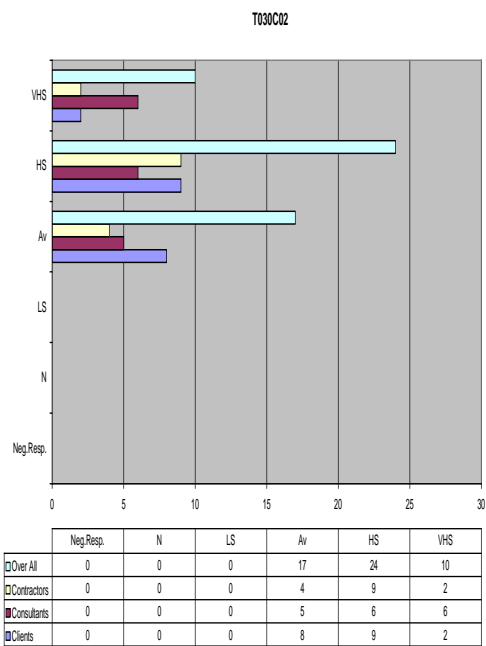


Figure 366 T030C02

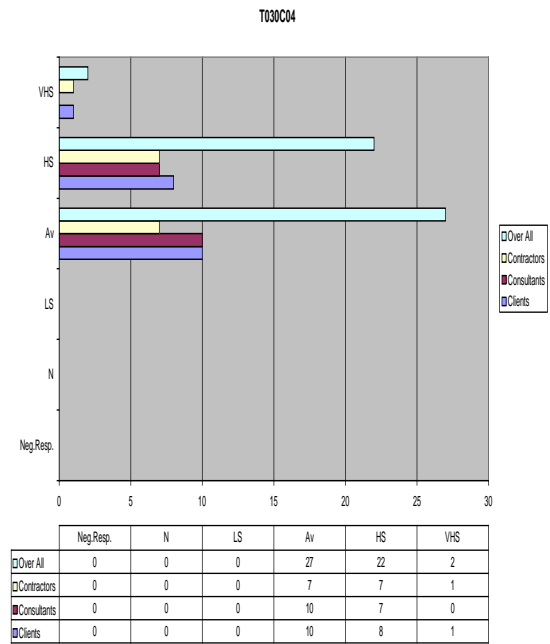


Figure 368 T030C04

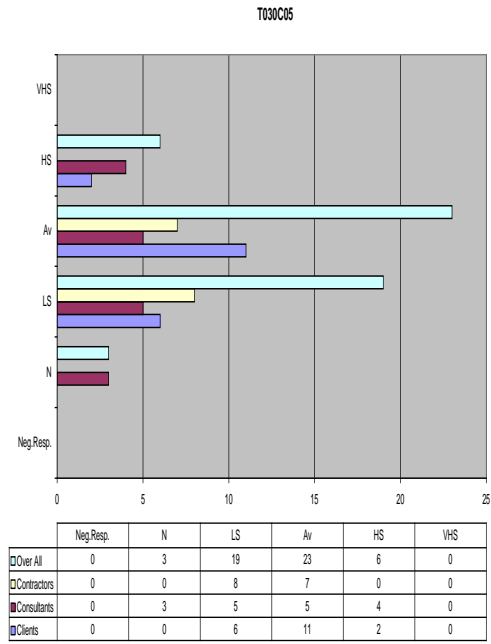


Figure 369 T030C05

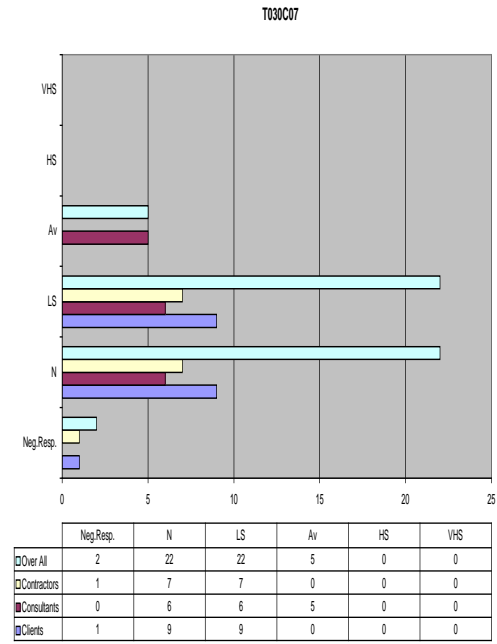


Figure 371 T030C07

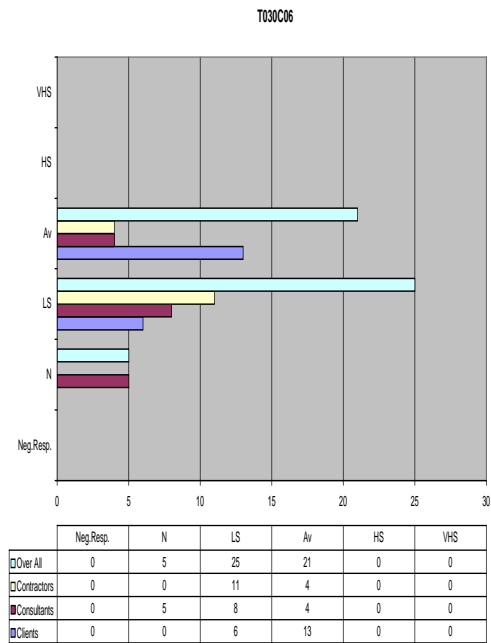


Figure 370 T030C06

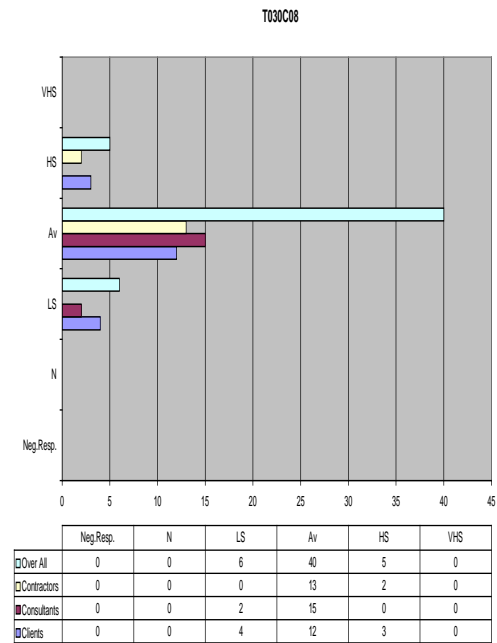


Figure 372 T030C08

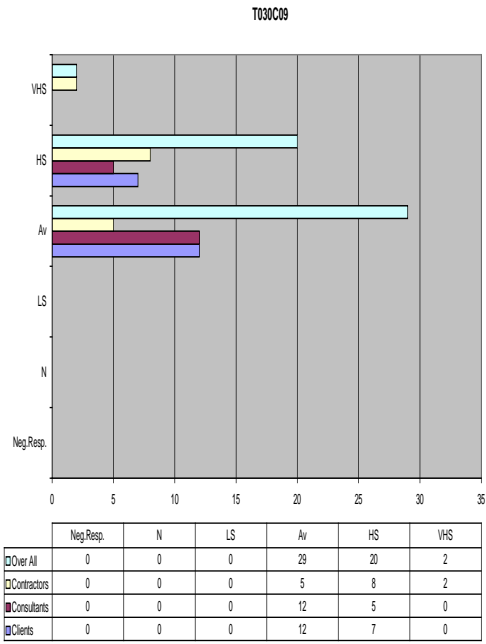


Figure 373 T030C09

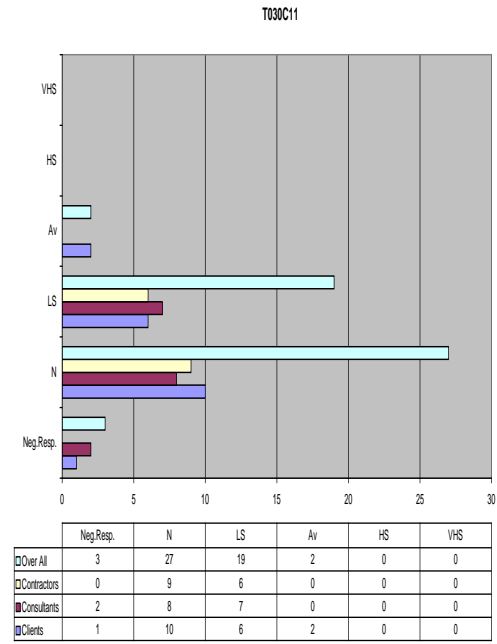


Figure 375 T030C11

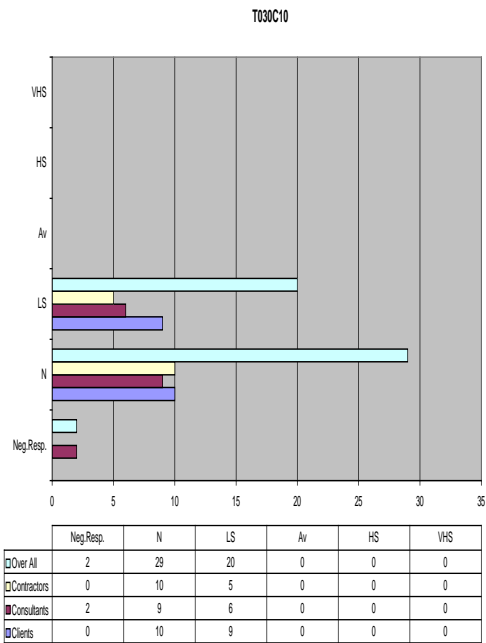


Figure 374 T030C10

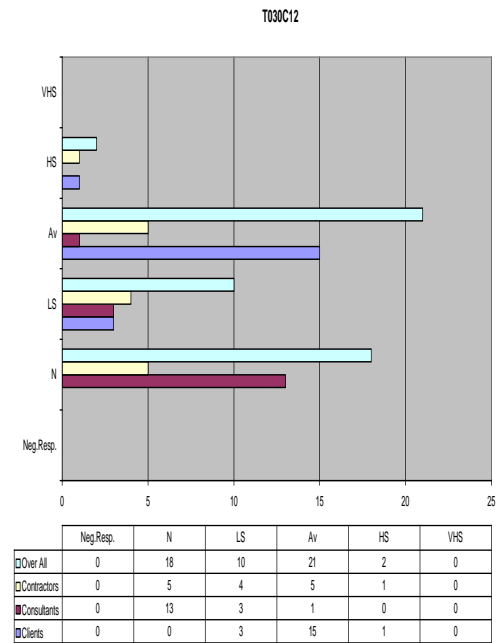


Figure 376 T030C12

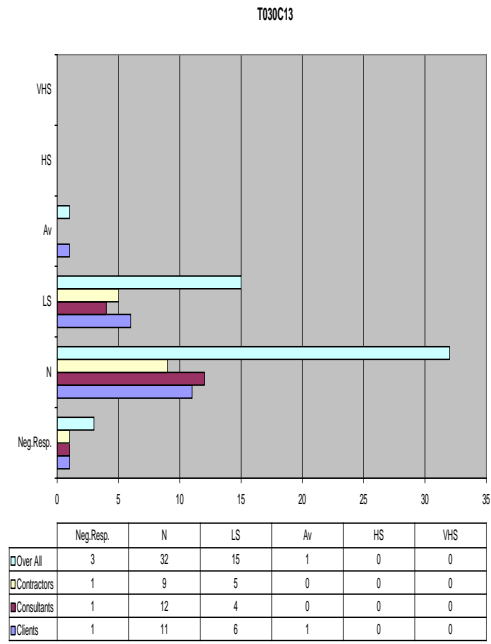


Figure 377 T030C13

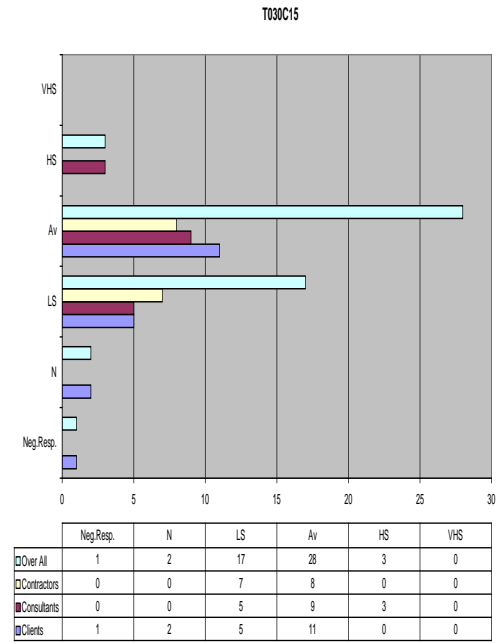


Figure 379 T030C15

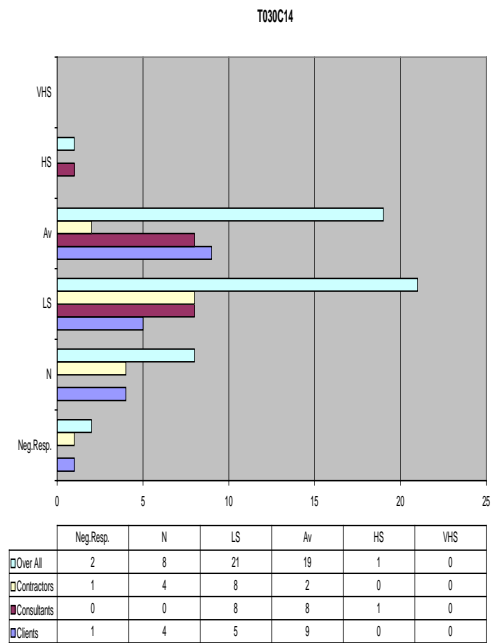


Figure 378 T030C14

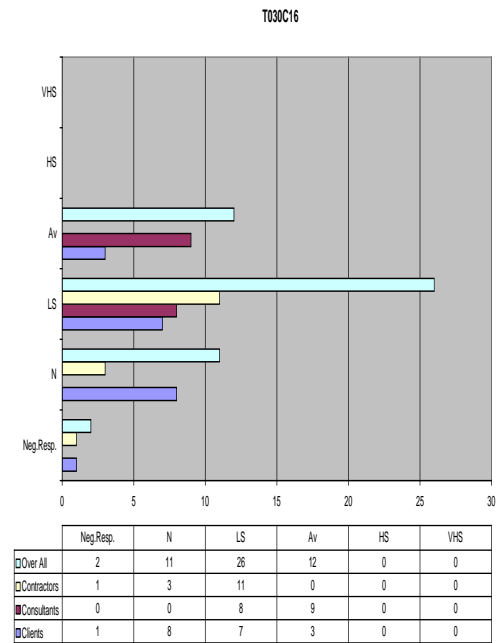


Figure 380 T030C16

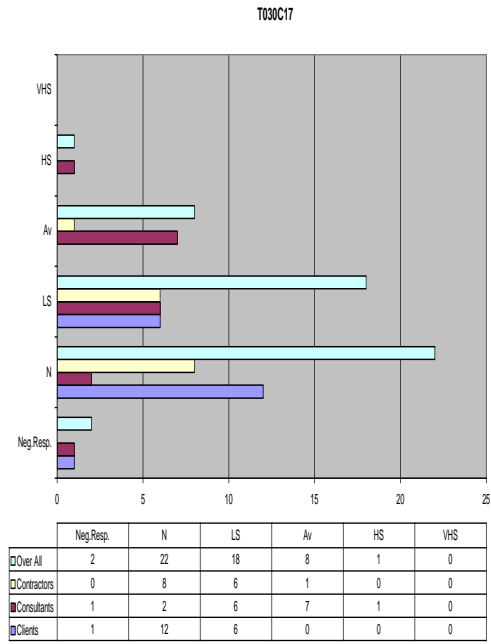


Figure 381 T030C17

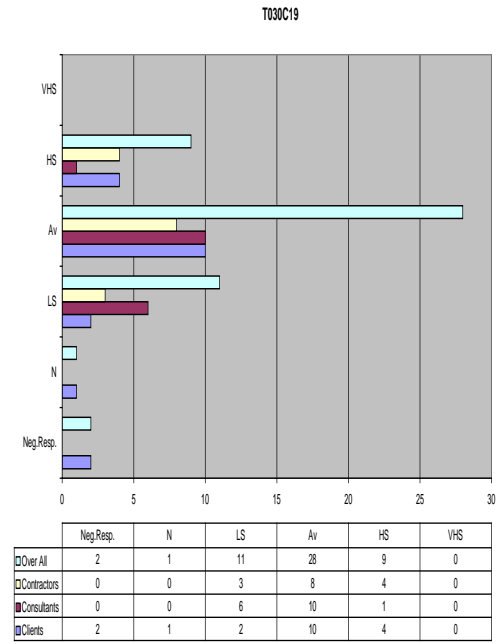


Figure 383 T030C19

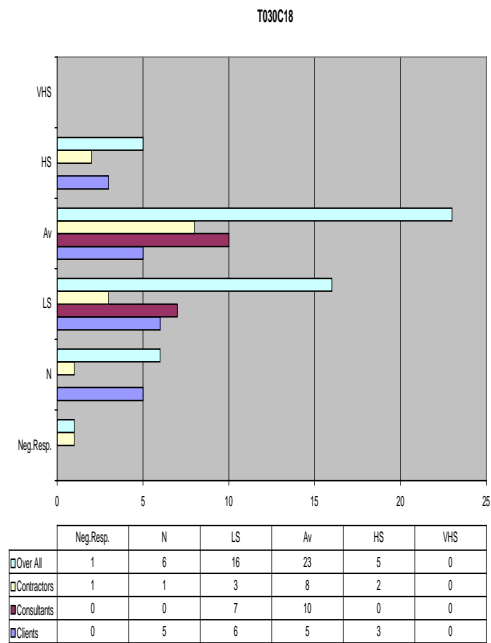


Figure 382 T030C18

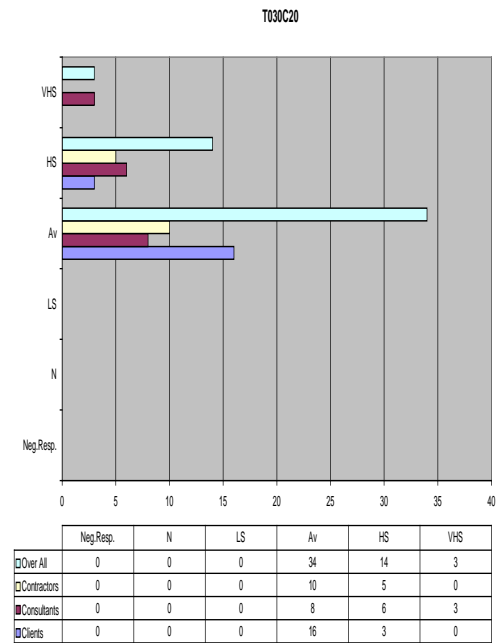


Figure 384 T030C20

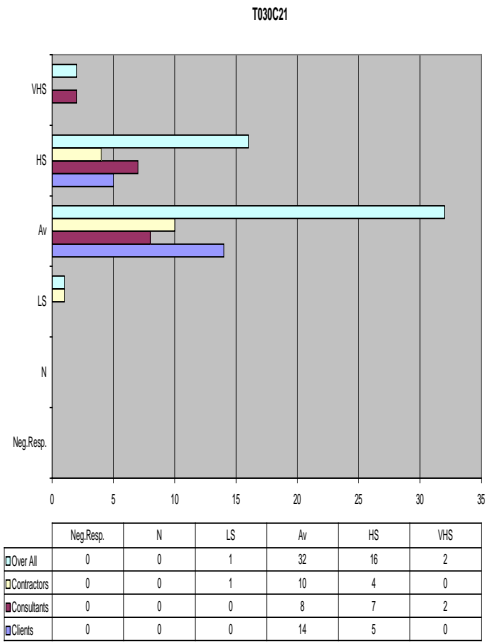


Figure 385 T030C21

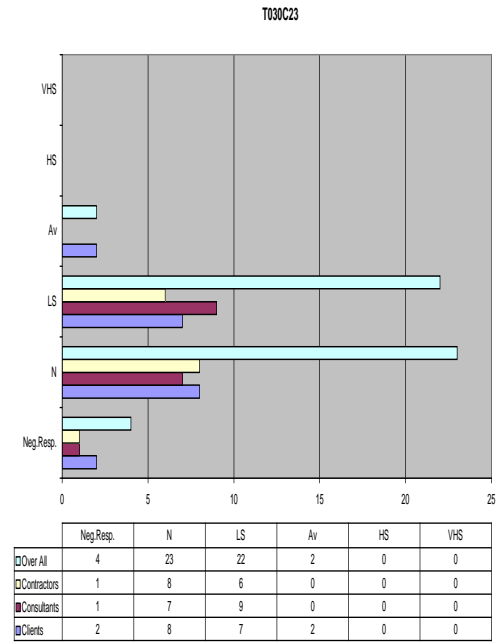


Figure 387 T030C23

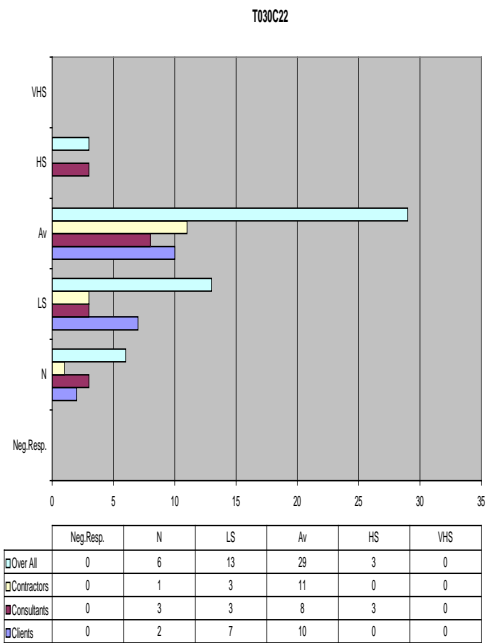


Figure 386 T030C22

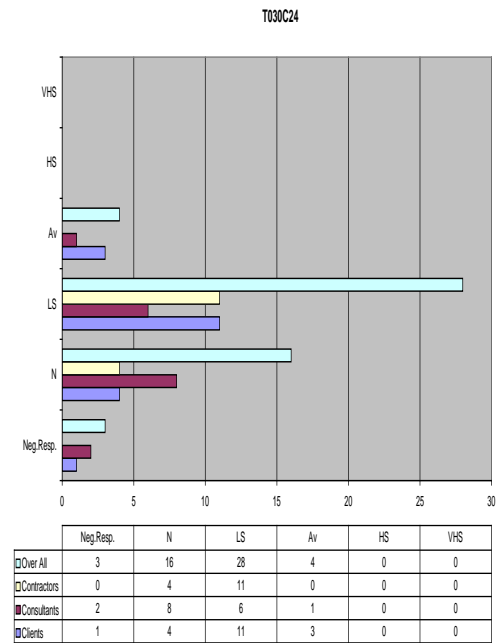


Figure 388 T030C24

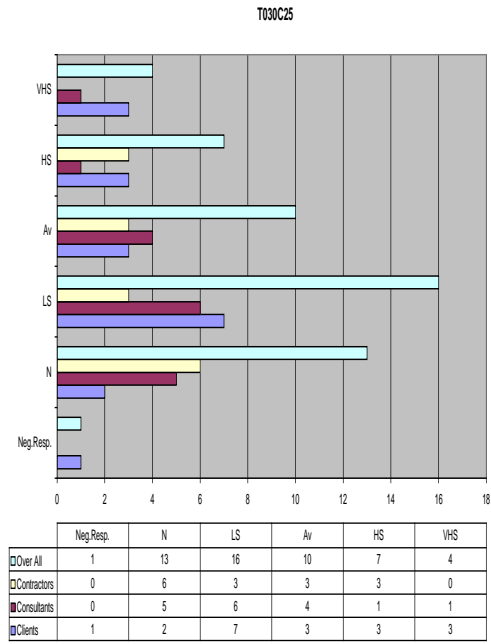


Figure 389 T030C25

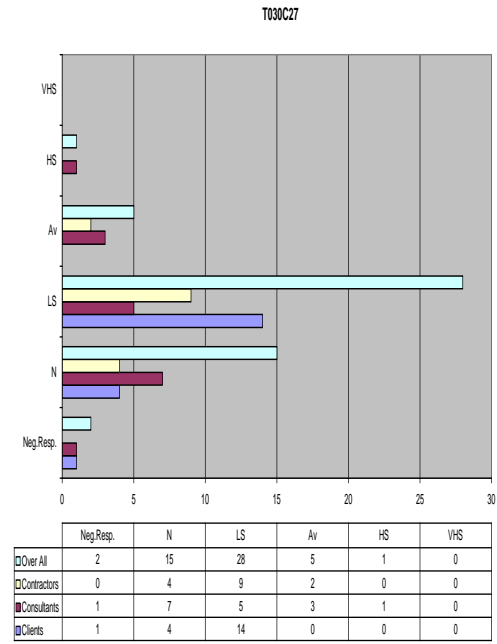


Figure 391 T030C27

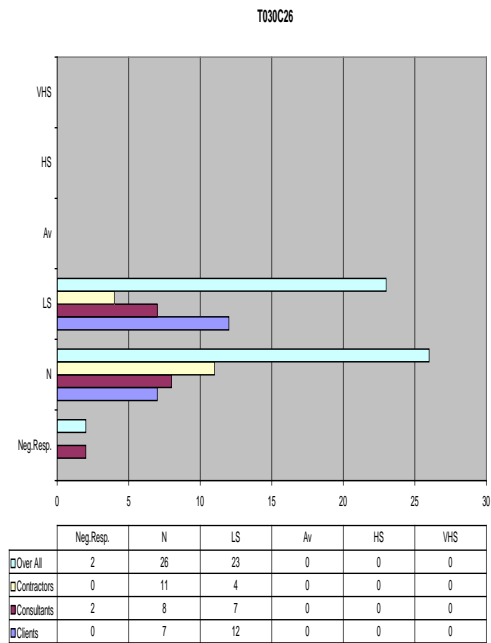


Figure 390 T030C26

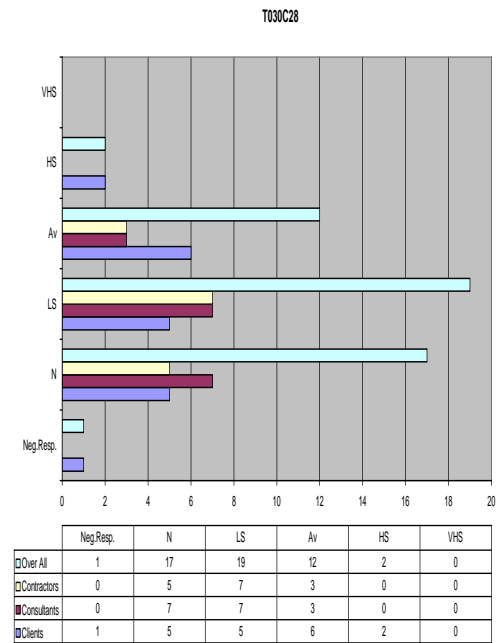


Figure 392 T030C28

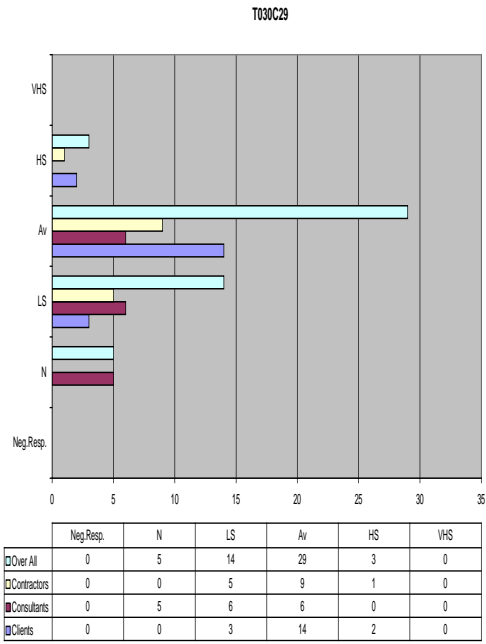


Figure 393 T030C29

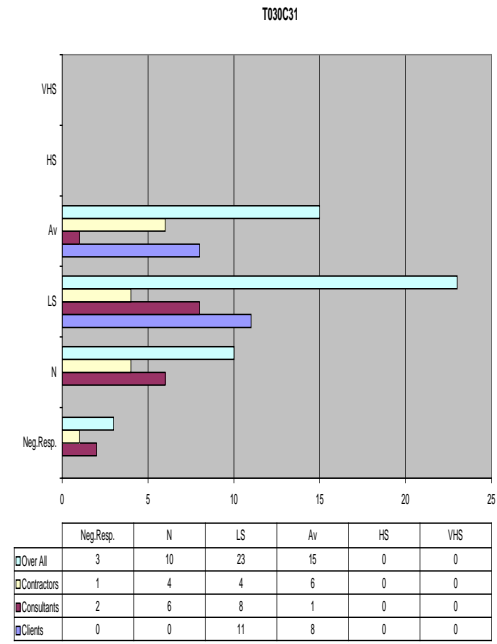


Figure 395 T030C31

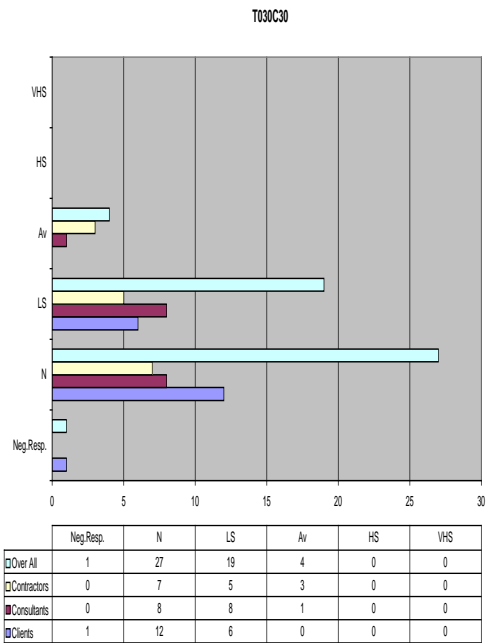


Figure 394 T030C30

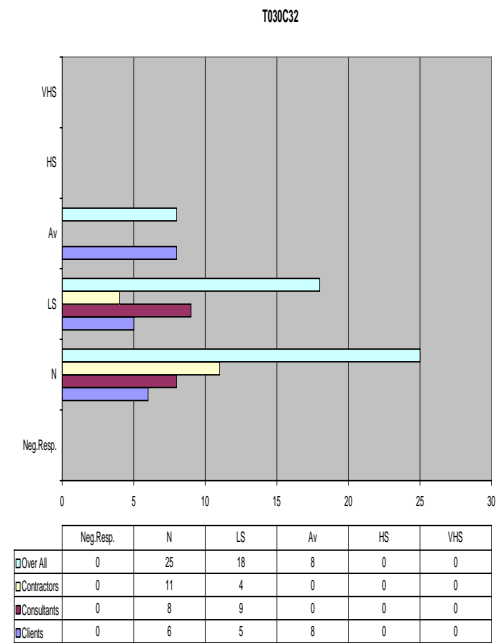


Figure 396 T030C32

Y.3.2.4 CAUSE SIGNIFICANCE ASSESSMENT: (T04 C01) – (T04 C32)

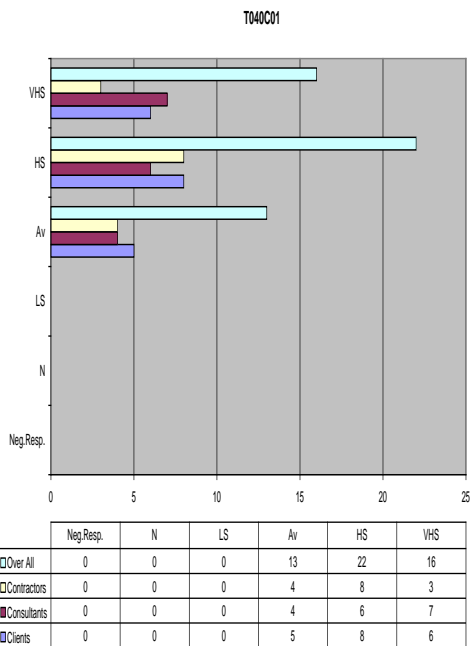


Figure 397 T040C01

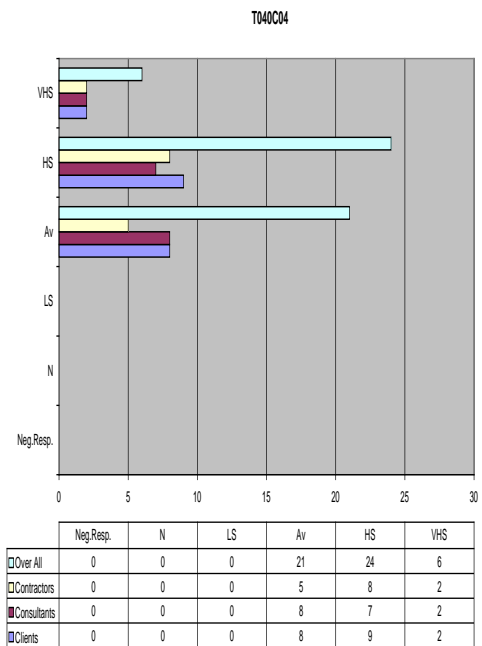


Figure 399 T040C04

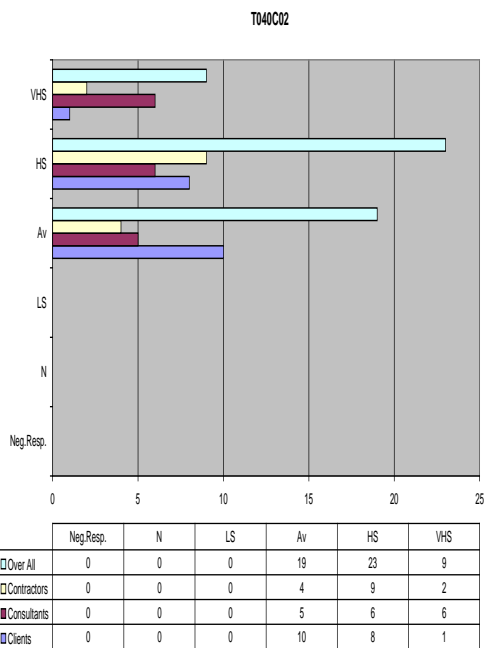


Figure 398 T040C02

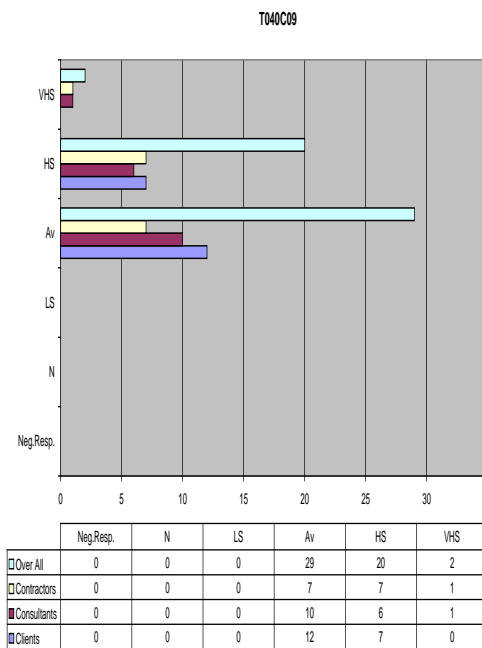


Figure 400 T040C09

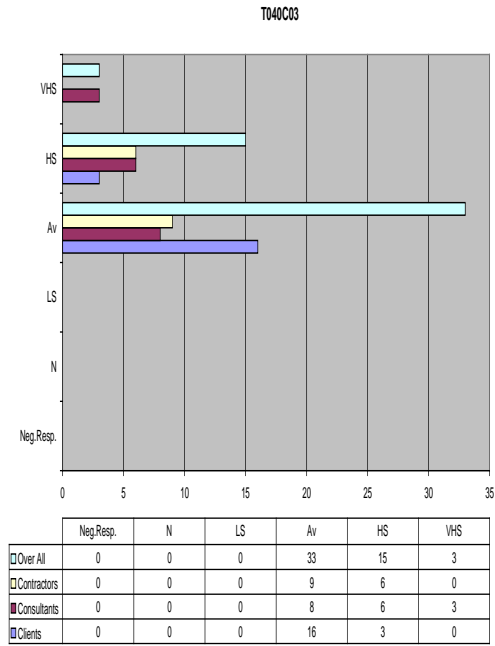


Figure 401 T040C03

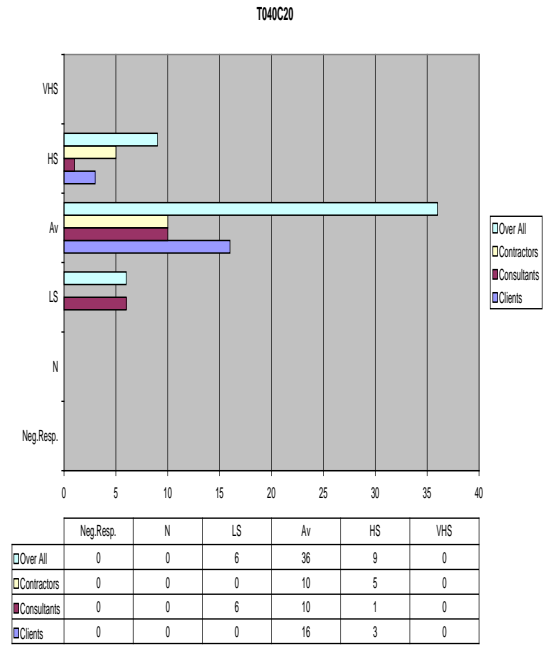


Figure 403 T040C20

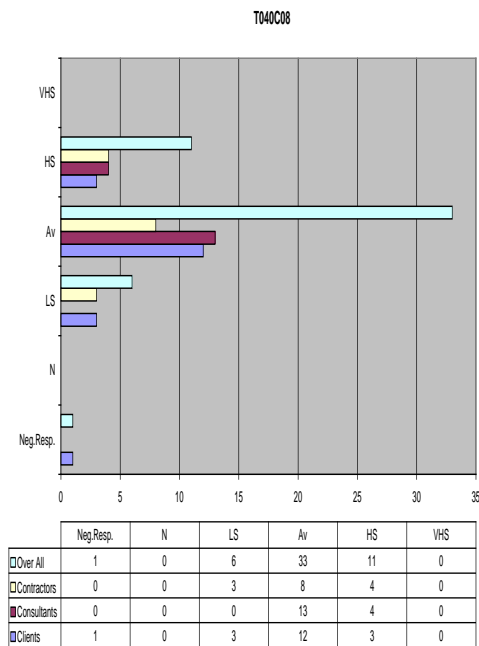


Figure 402 T040C08

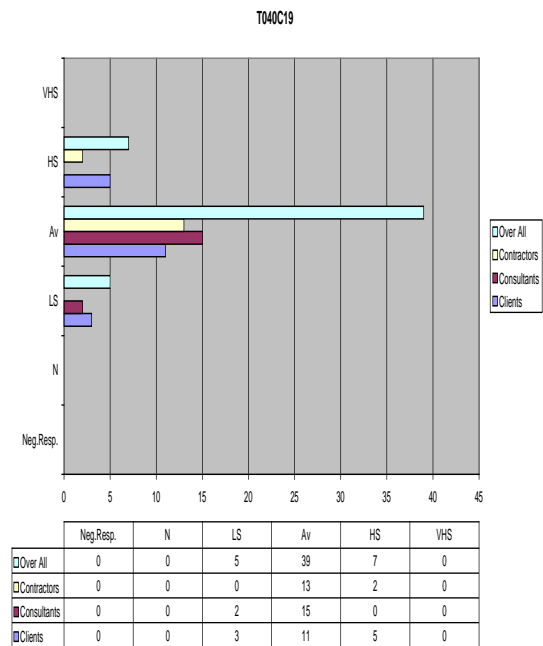


Figure 404 T040C19

Y.3.2.5 CAUSE SIGNIFICANCE ASSESSMENT: (T05 C01) – (T05 C32)

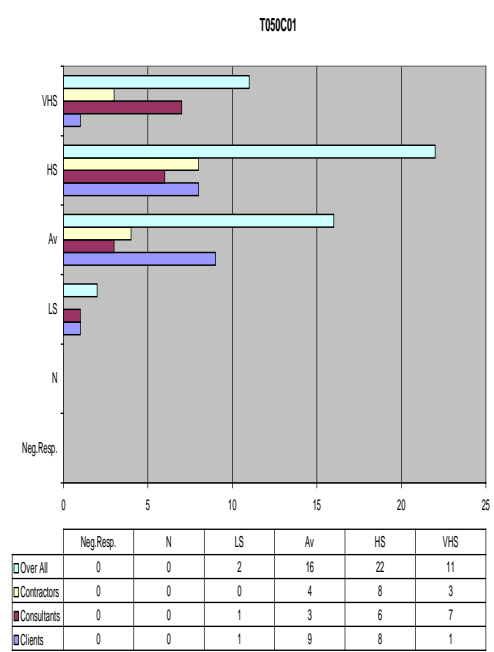


Figure 405 T050C01

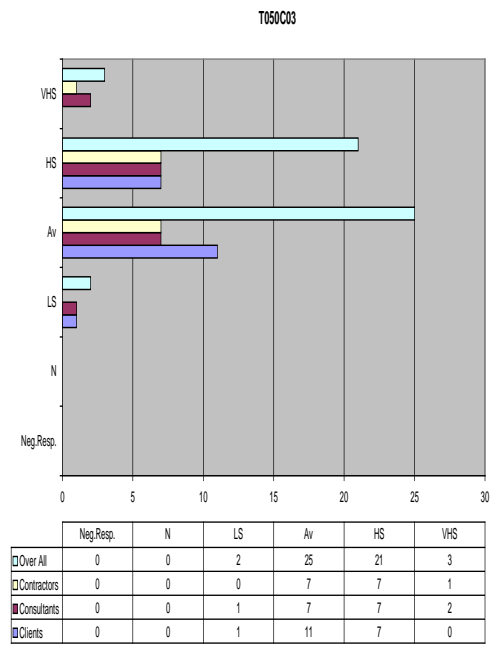


Figure 407 T050C03

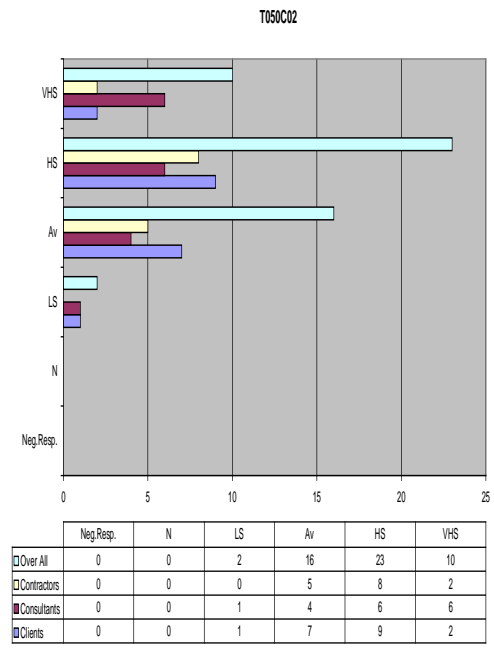


Figure 406 T050C02

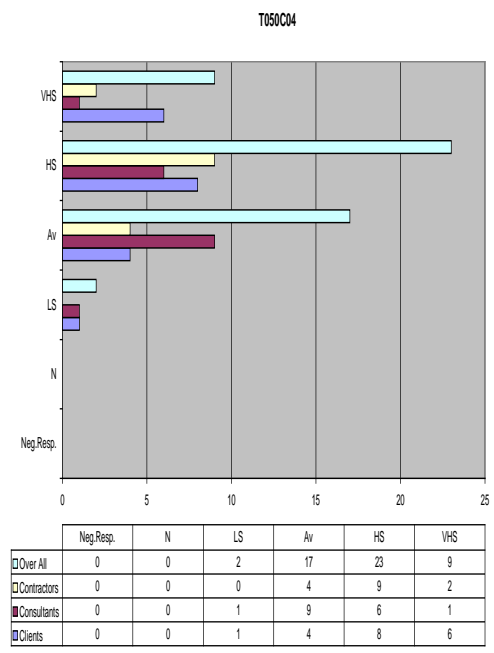


Figure 408 T050C04

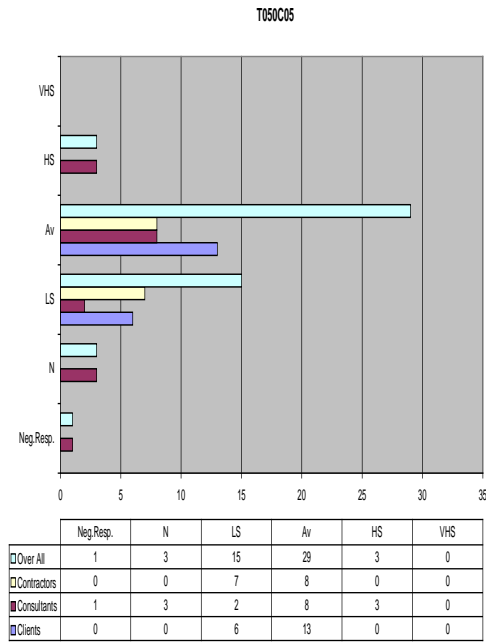


Figure 409 T050C05

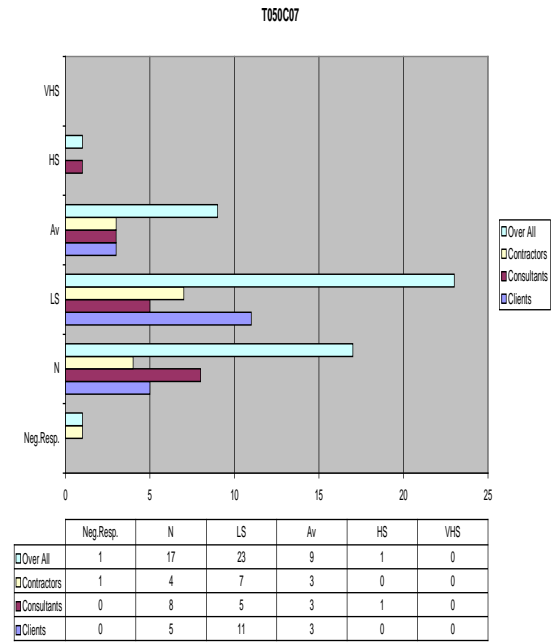


Figure 411 T050C07

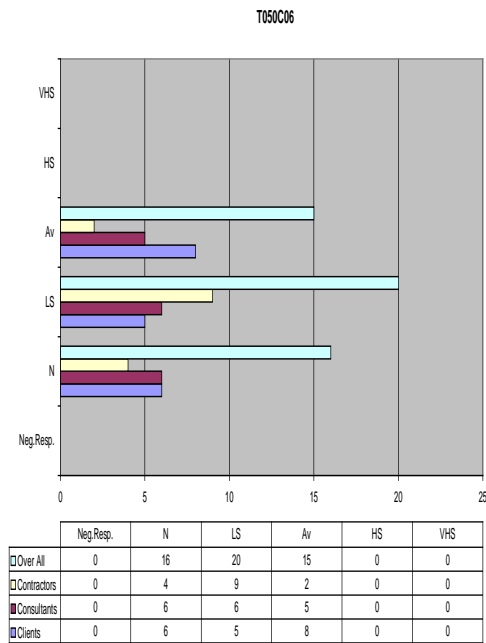


Figure 410 T050C06

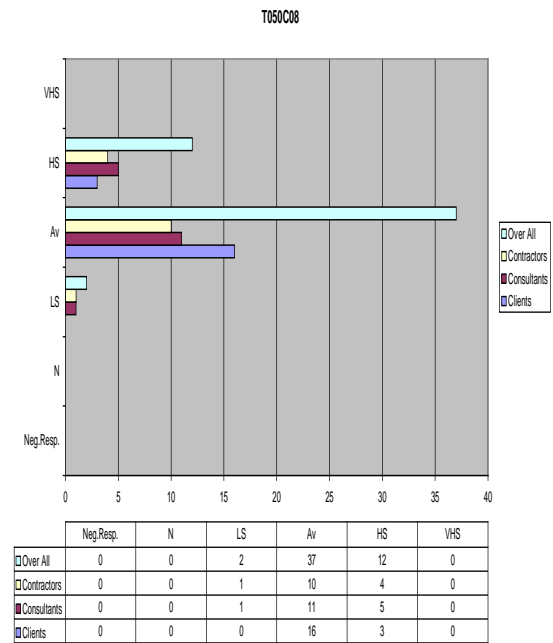


Figure 412 T050C08

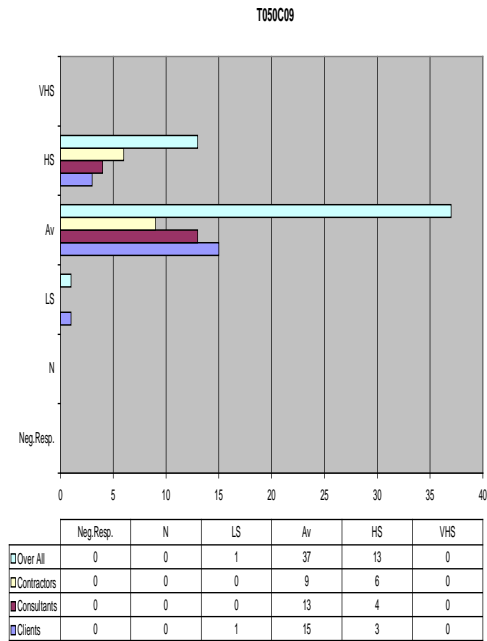


Figure 413 T050C09

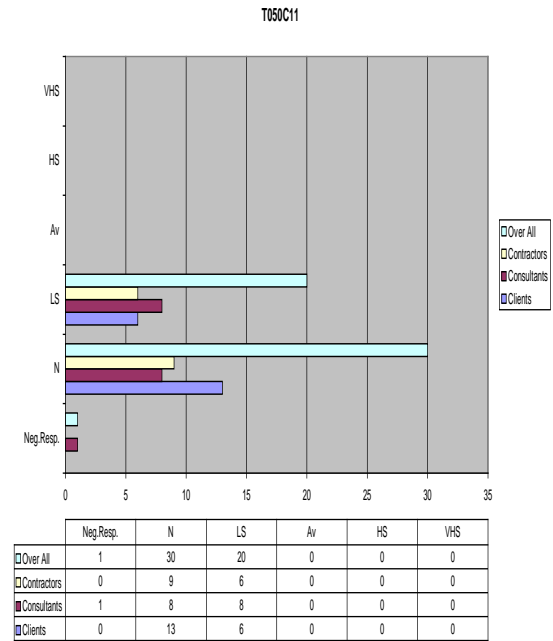


Figure 415 T050C11

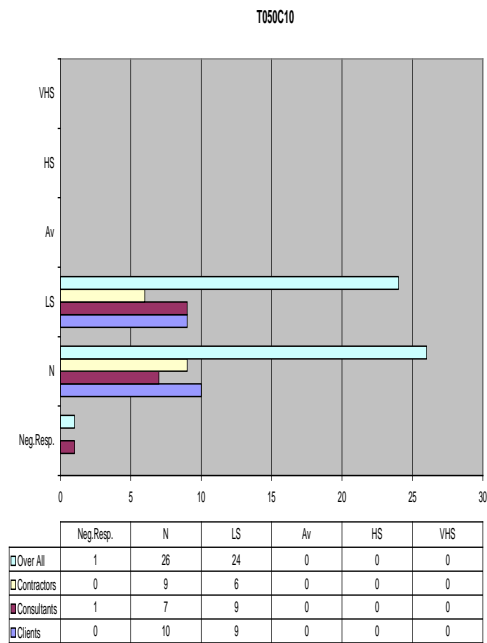


Figure 414 T050C10

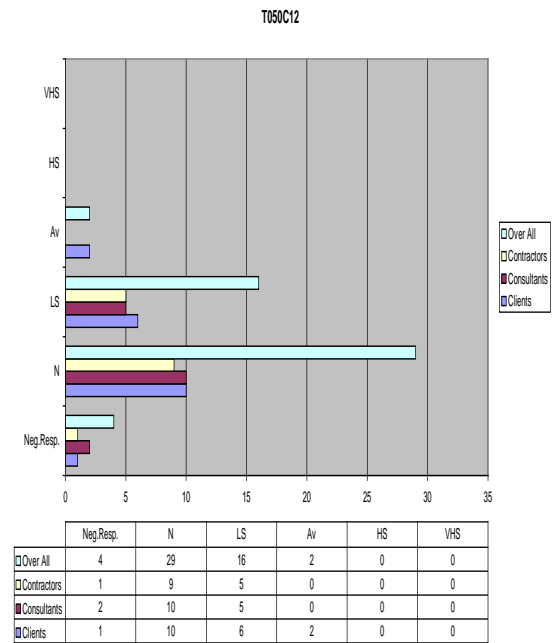


Figure 416 T050C12

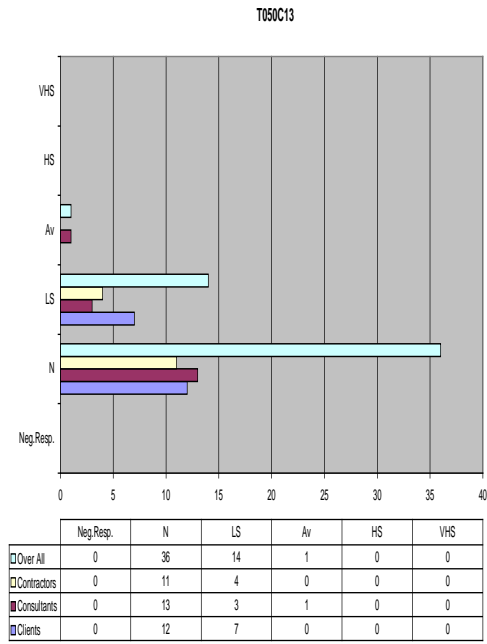


Figure 417 T050C13

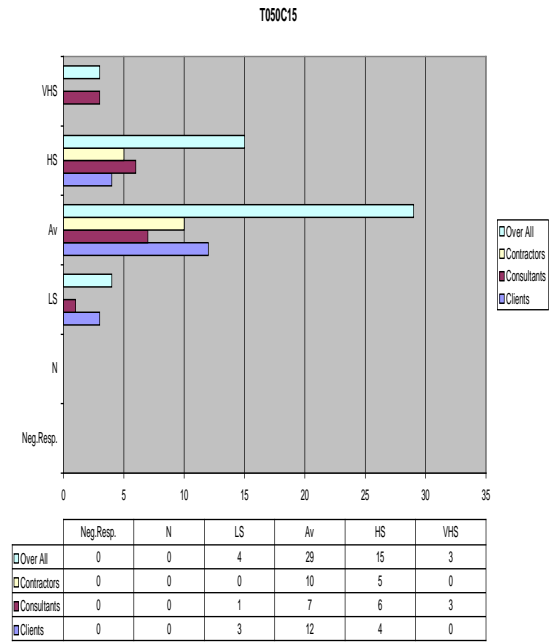


Figure 419 T050C15

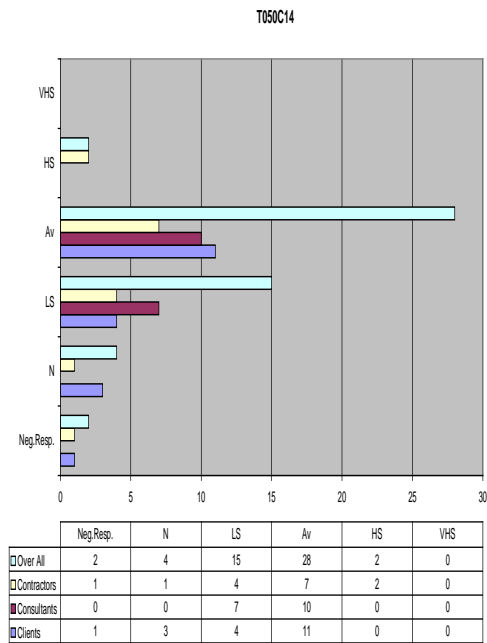


Figure 418 T050C14

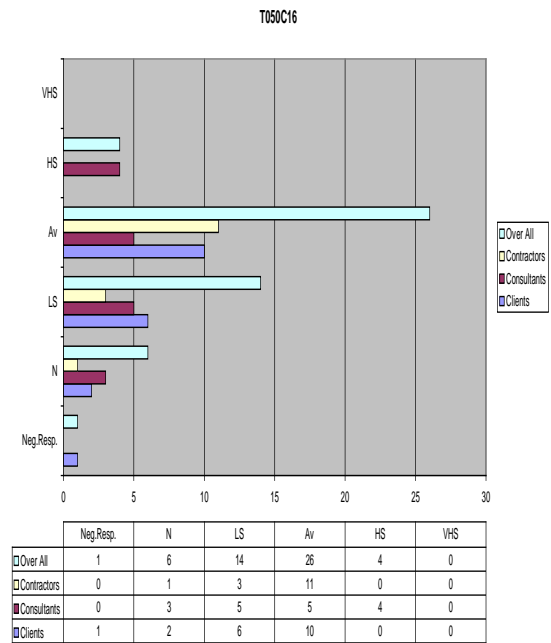


Figure 420 T050C16

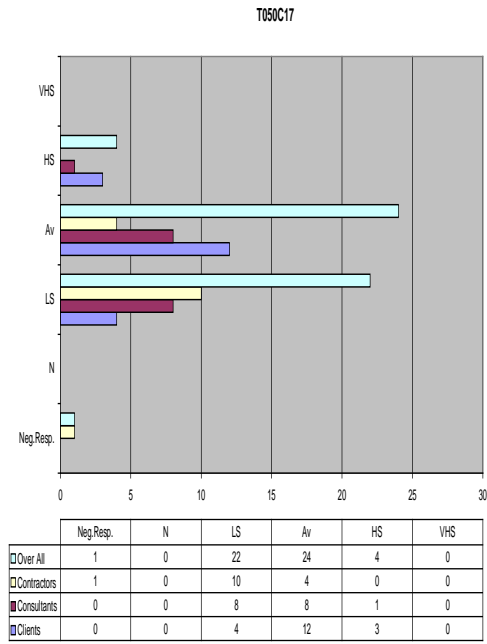


Figure 421 T050C17

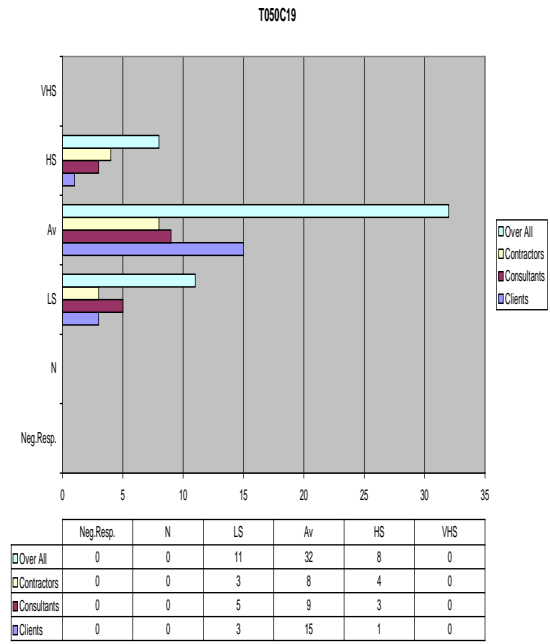


Figure 423 T050C19

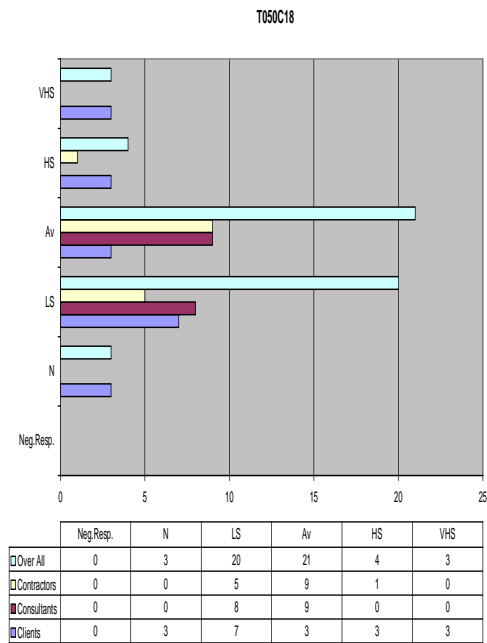


Figure 422 T050C18

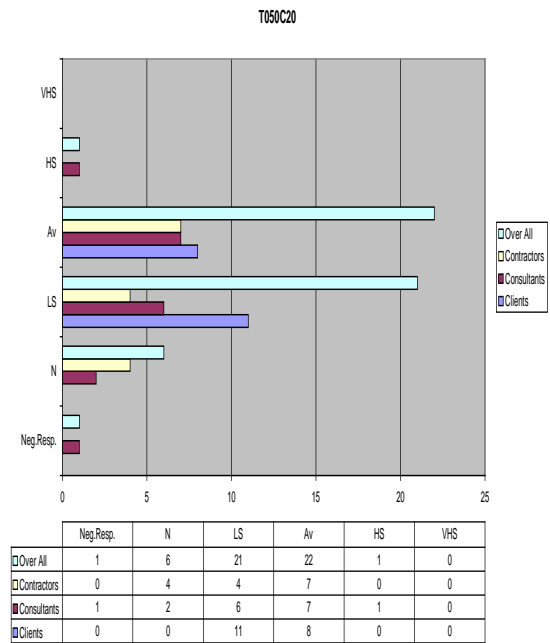


Figure 424 T050C20

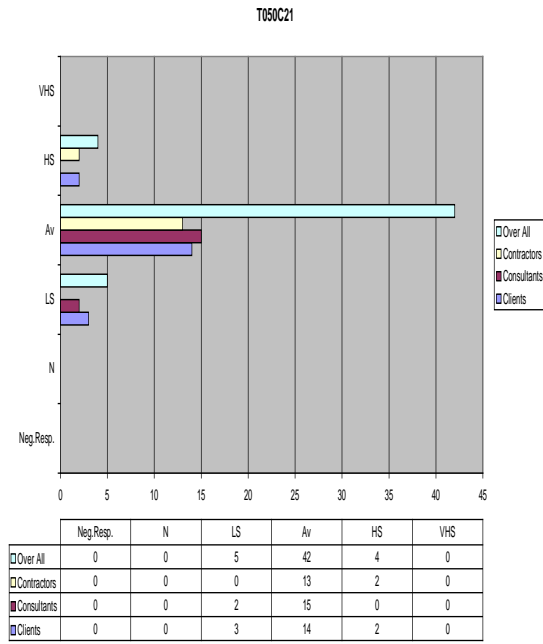


Figure 425 T050C21

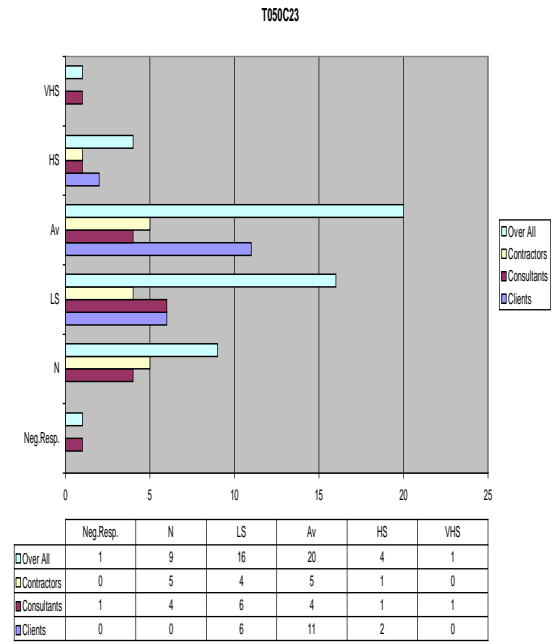


Figure 427 T050C23

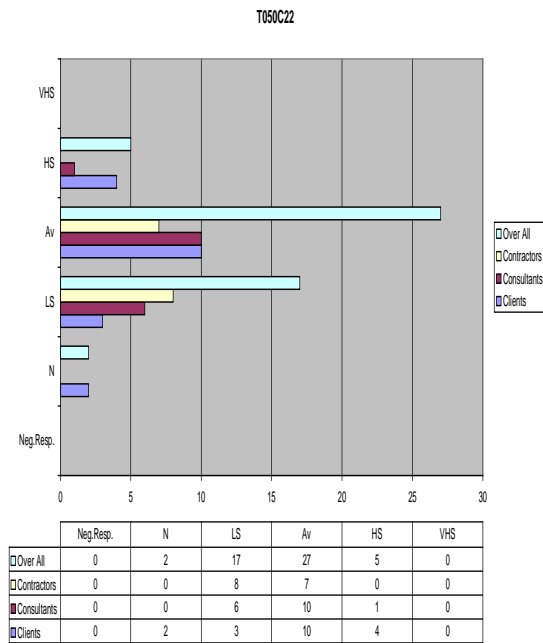


Figure 426 T050C22

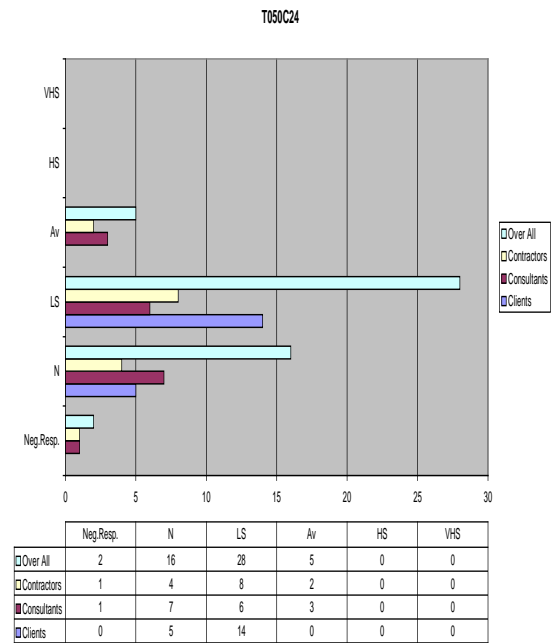


Figure 428 T050C24

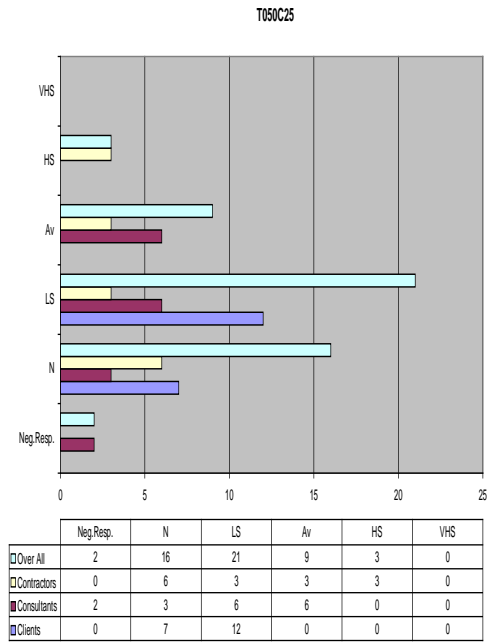


Figure 429 T050C25

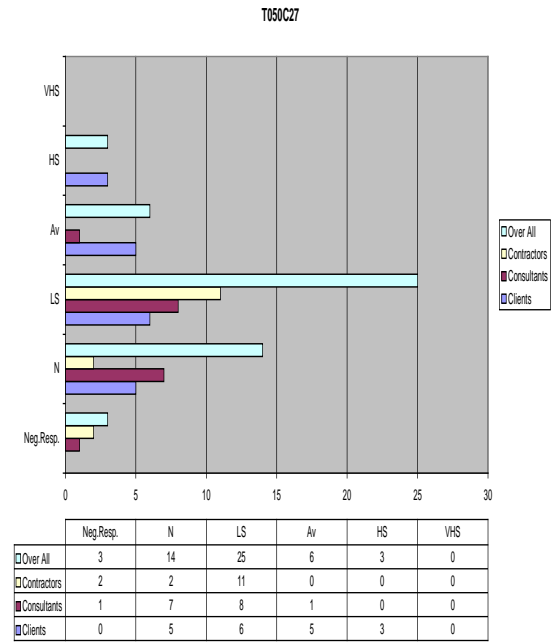


Figure 431 T050C27

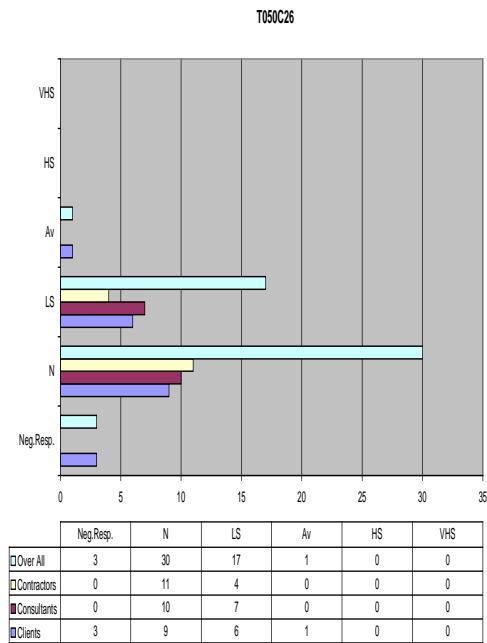


Figure 430 T050C26

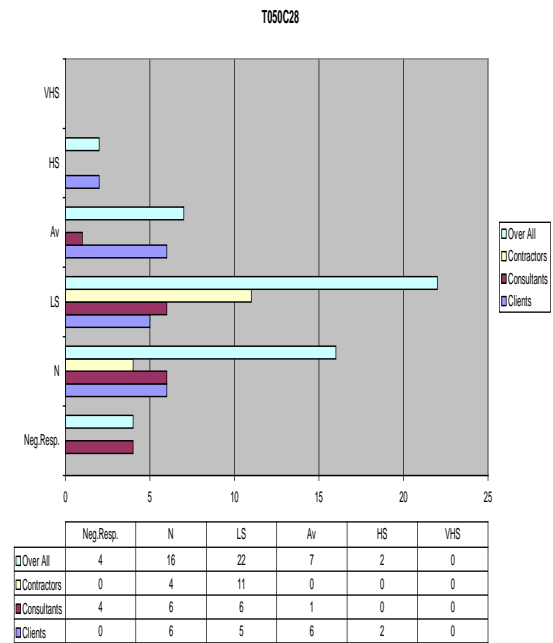


Figure 432 T050C28

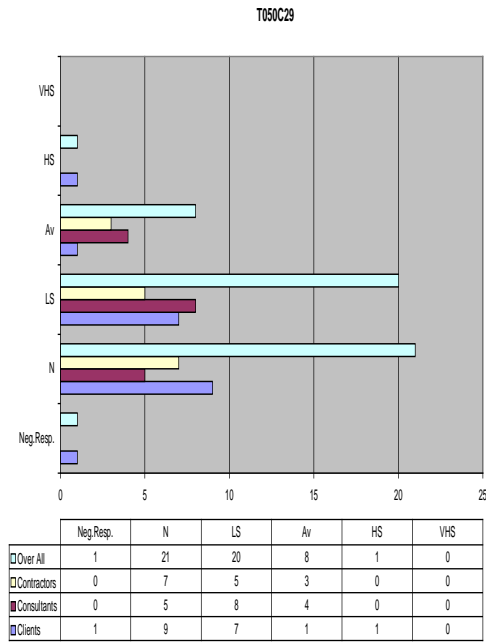


Figure 433 T050C29

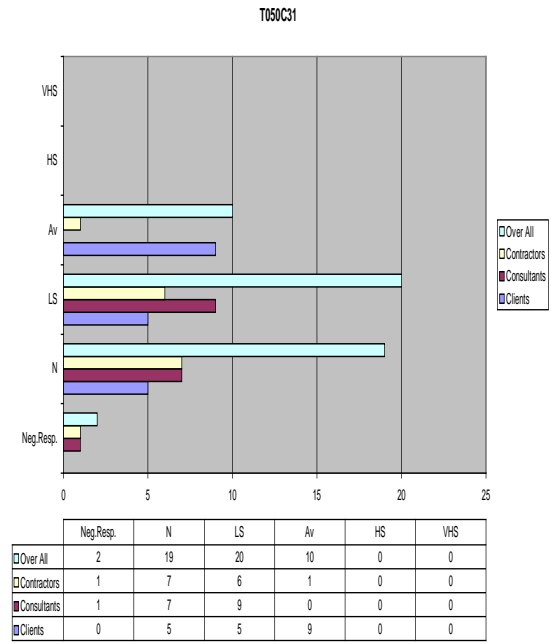


Figure 435 T050C31

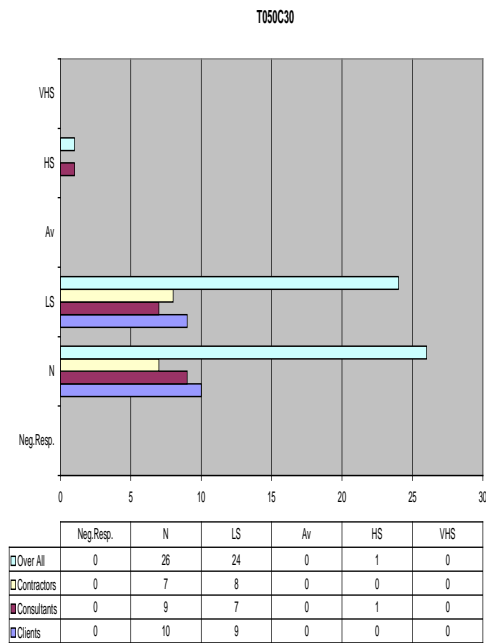


Figure 434 T050C30

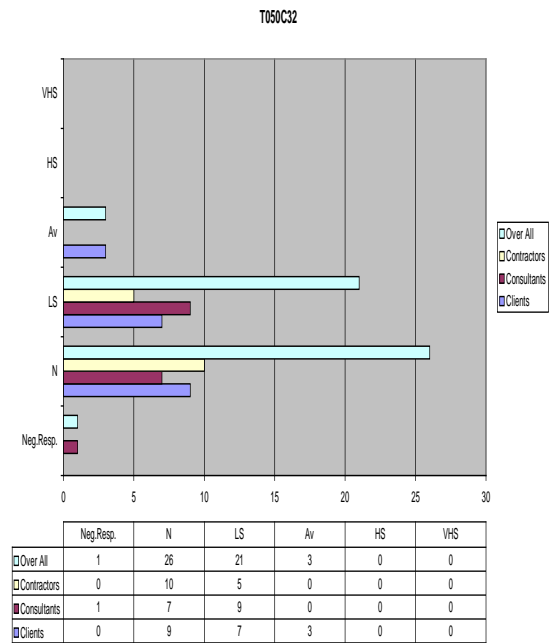


Figure 436 T050C32

Y.3.2.6 CAUSE SIGNIFICANCE ASSESSMENT: (T06 C01) – (T06 C32)

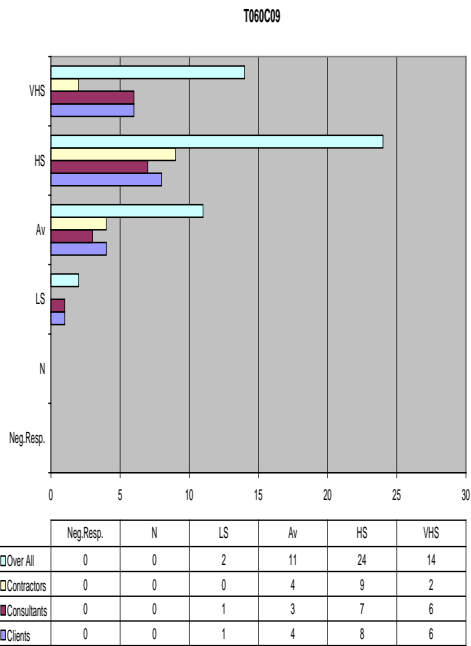


Figure 437 T060C09

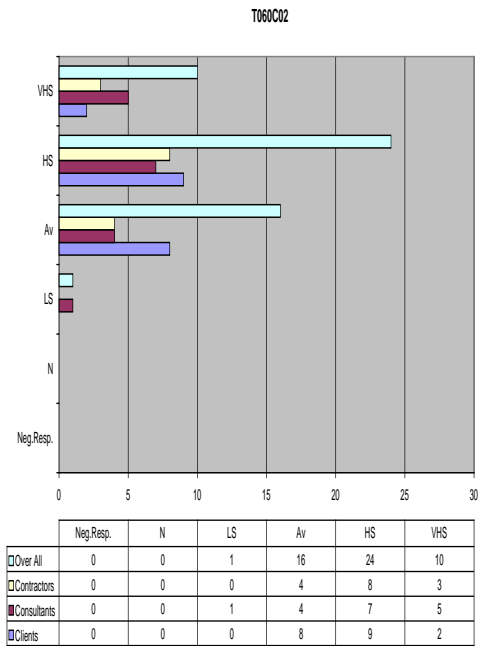


Figure 439 T060C02

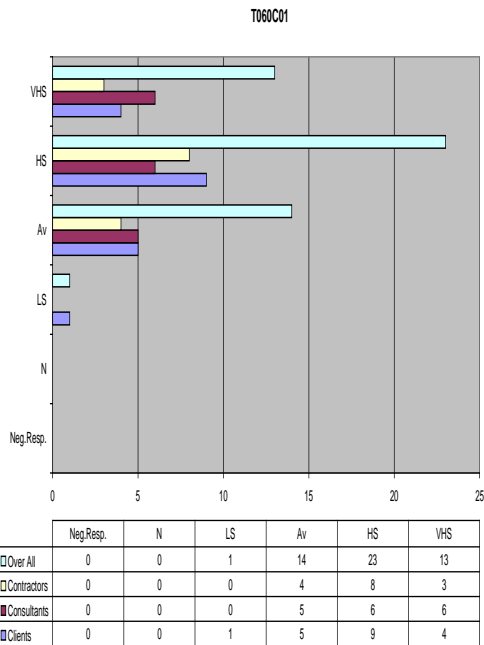


Figure 438 T060C01

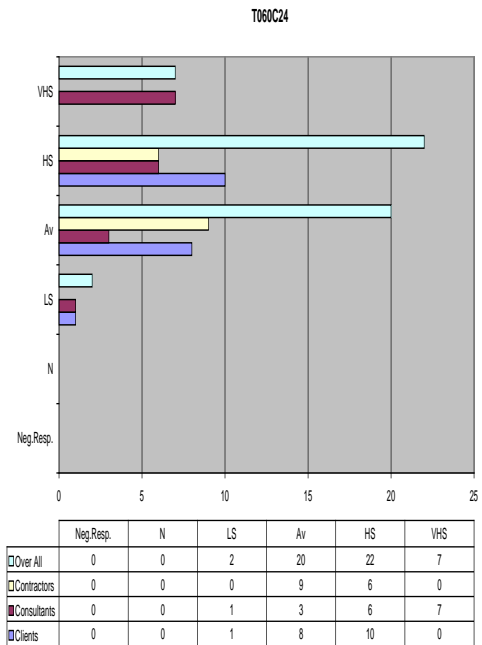


Figure 440 T060C24

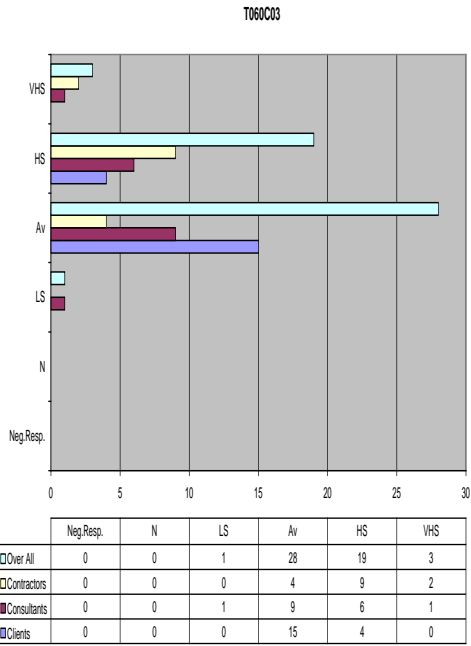


Figure 441 T060C03

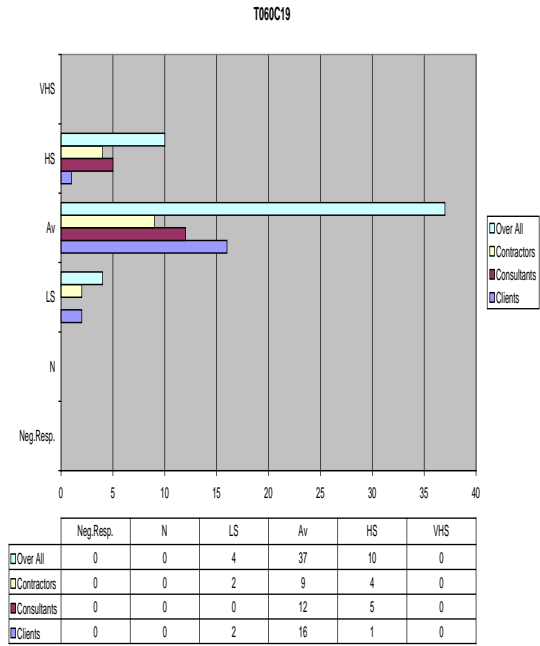


Figure 443 T060C19

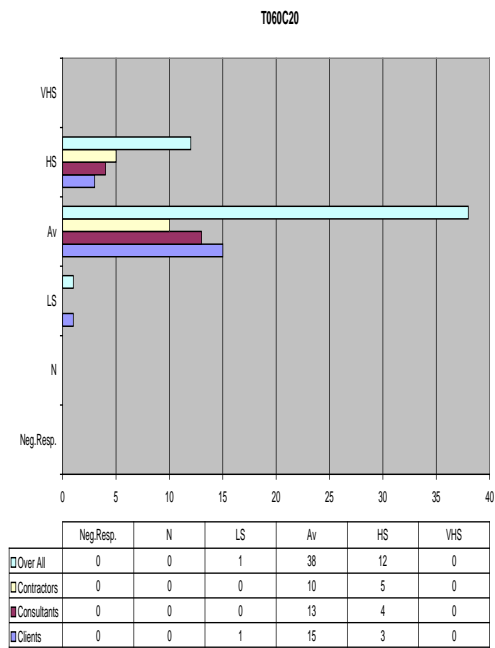


Figure 442 T060C20

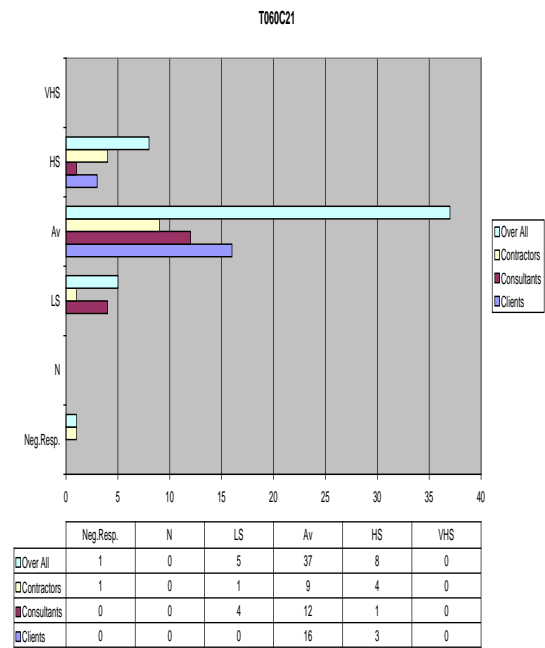


Figure 444 T060C21

Y.3.2.7 CAUSE SIGNIFICANCE ASSESSMENT: (T07 C01) – (T07 C32)

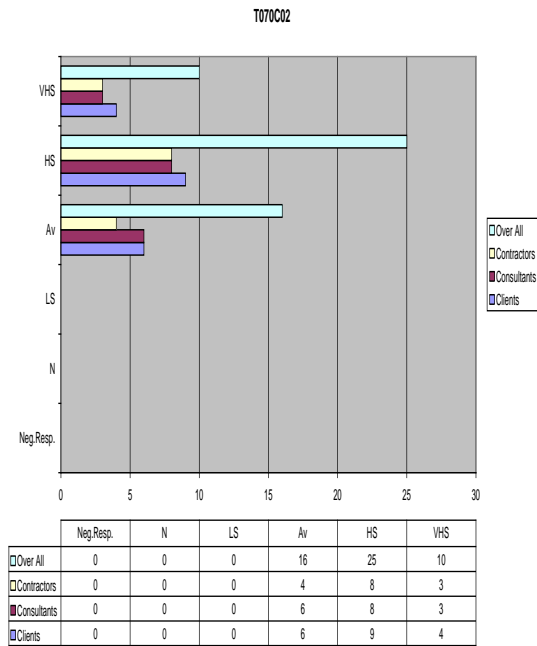


Figure 445 T07C02

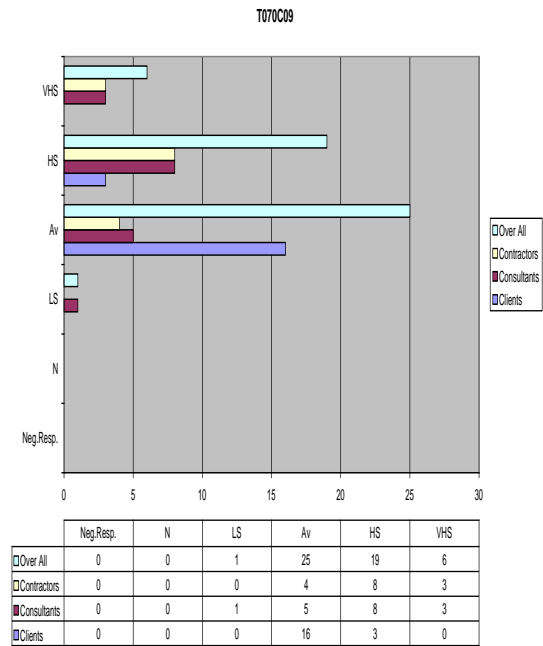


Figure 447 T07C09

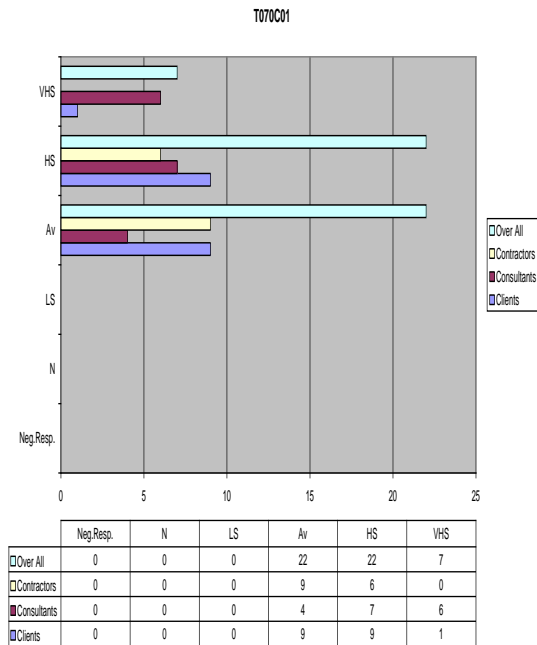


Figure 446 T07C01

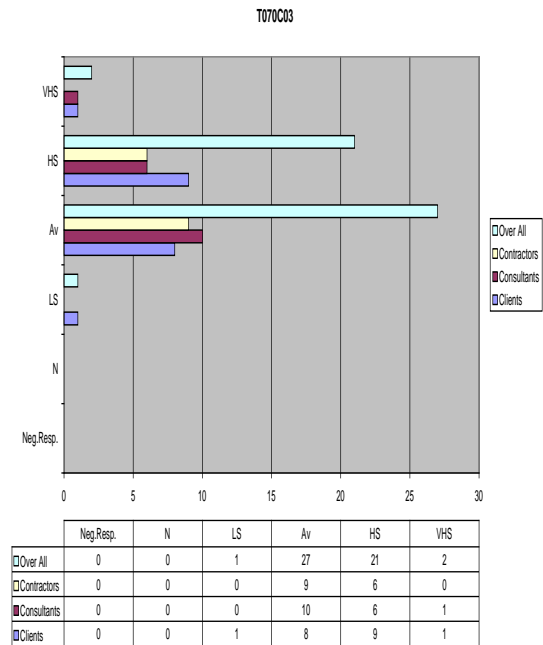


Figure 448 T07C03

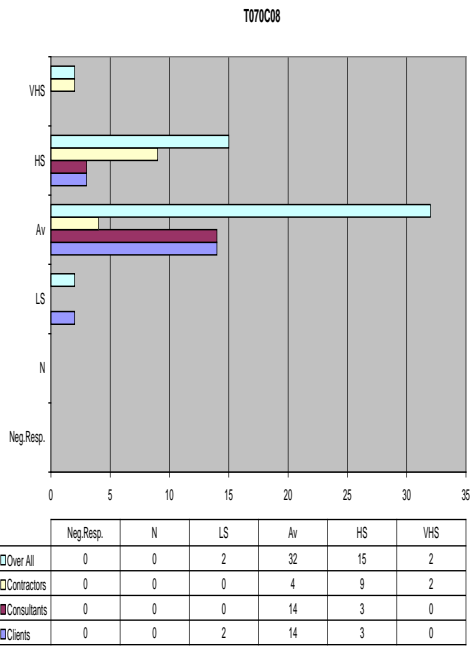


Figure 449 T070C08

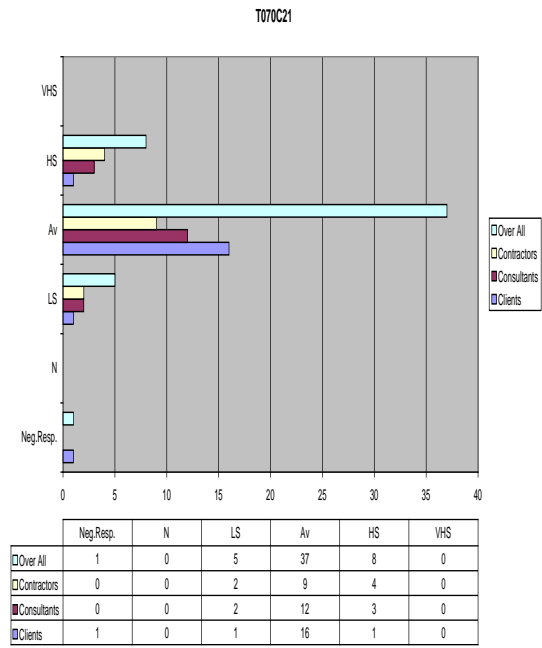


Figure 451 T070C21

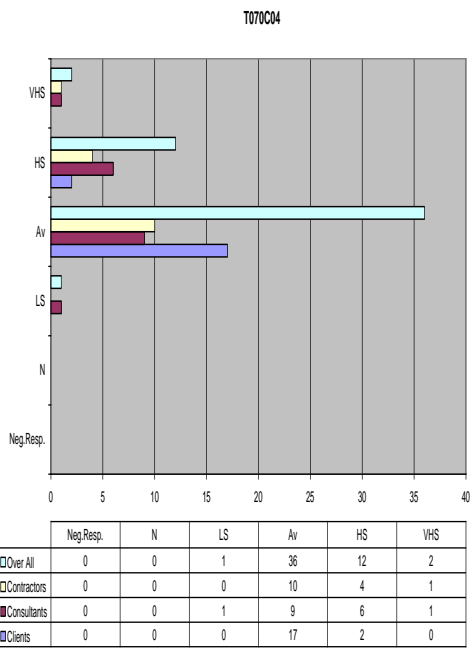


Figure 450 T070C04

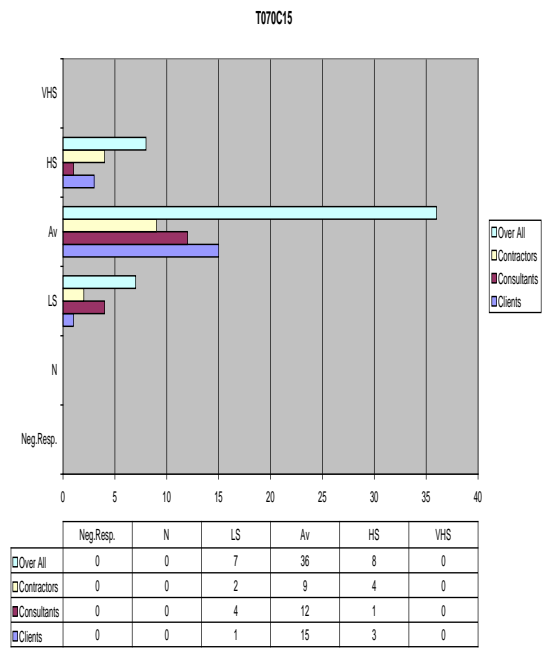


Figure 452 T070C15

Y.3.2.8 CAUSE SIGNIFICANCE ASSESSMENT: (T08C01) – (T08 C32)

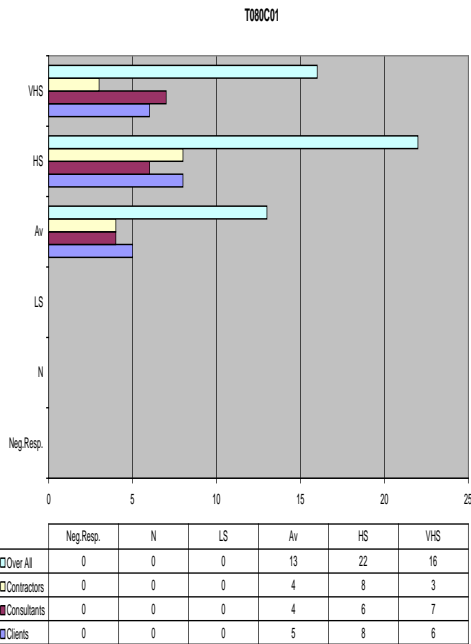


Figure 453 T08C01

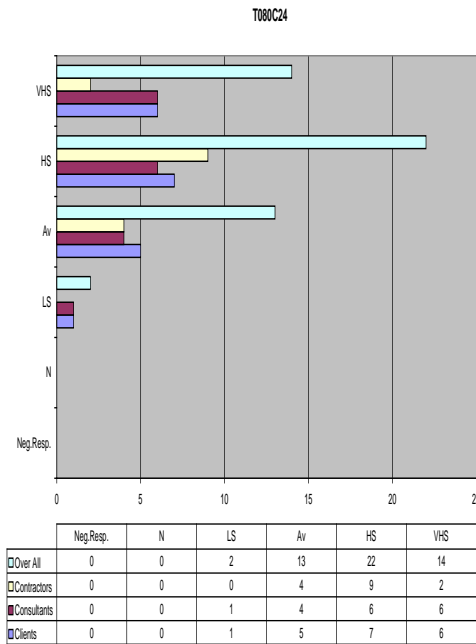


Figure 455 T08C24

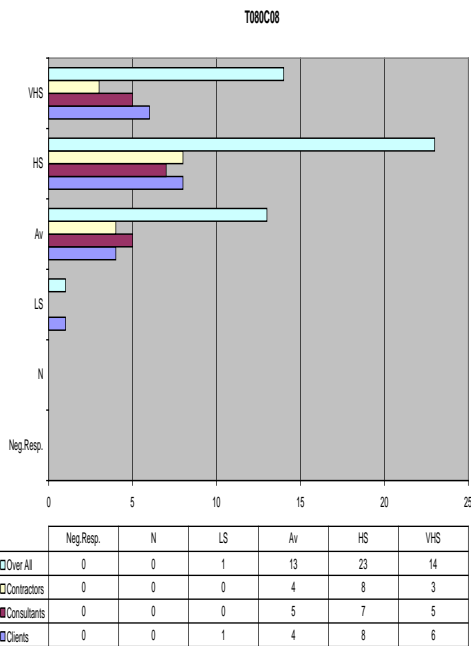


Figure 454 T08C08

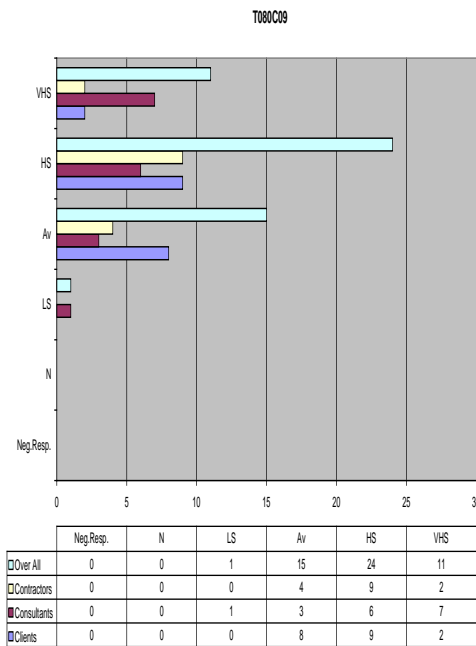


Figure 456 T08C09

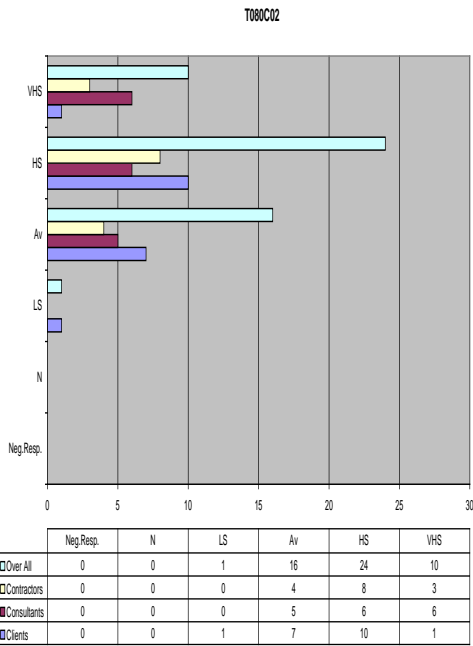


Figure 457 T080C02

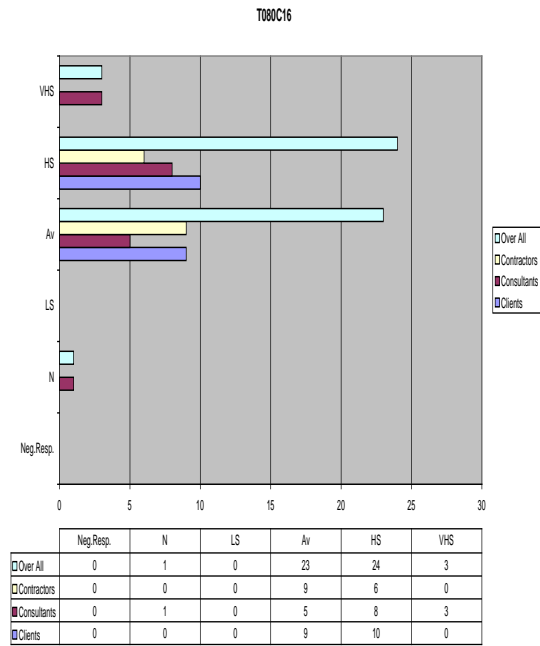


Figure 459 T080C16

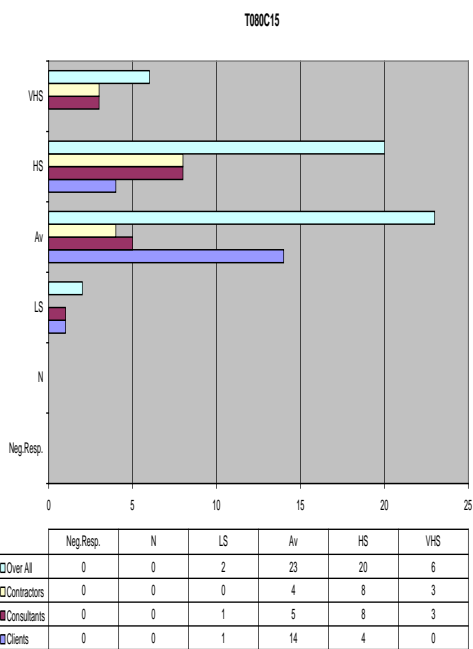


Figure 458 T080C15

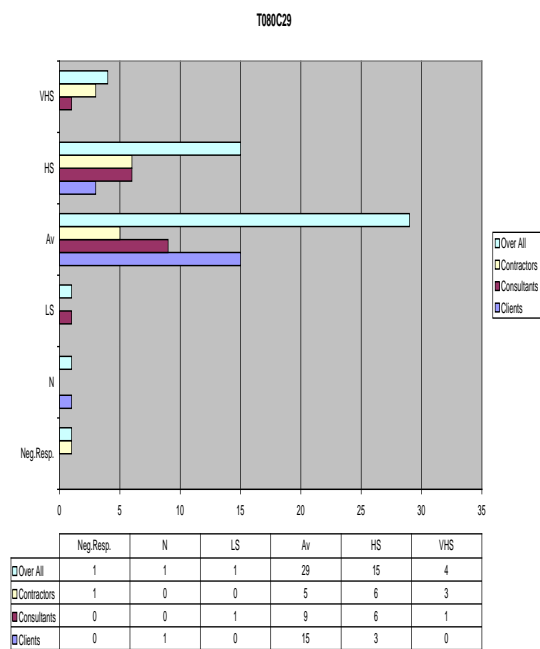


Figure 460 T080C29

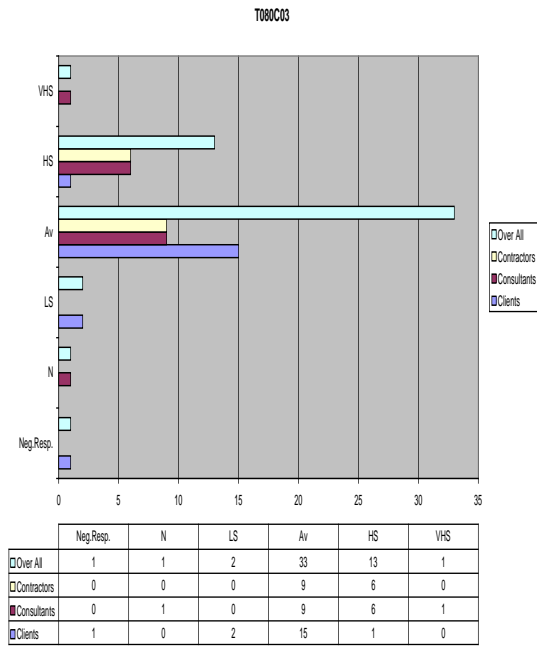


Figure 461 T080C03

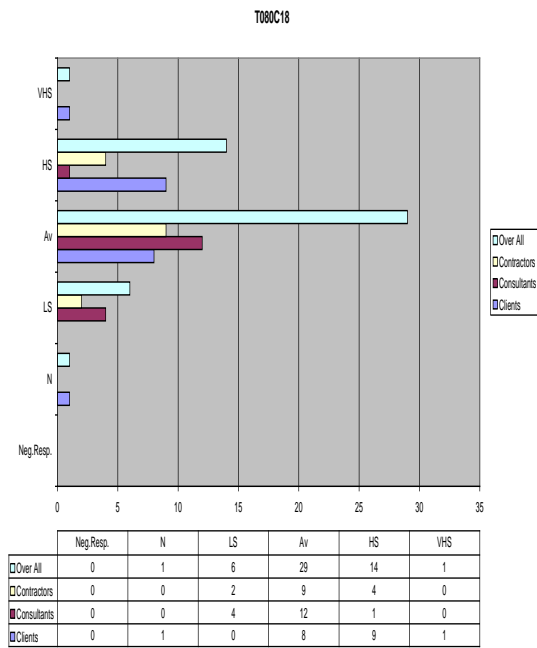


Figure 462 T080C18

Y.3.2.9 CAUSE SIGNIFICANCE ASSESSMENT: (T09 C01) – (T09 C32)

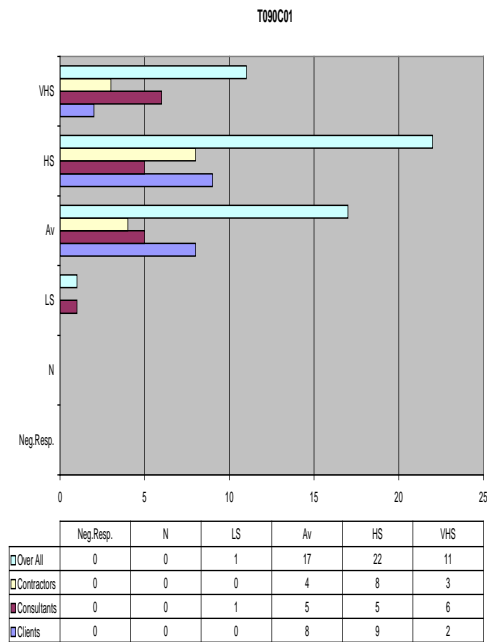


Figure 463 T09C01

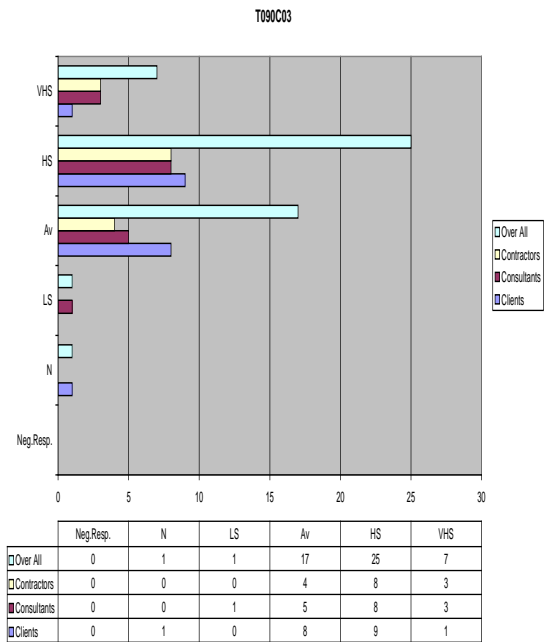


Figure 465 T09C03

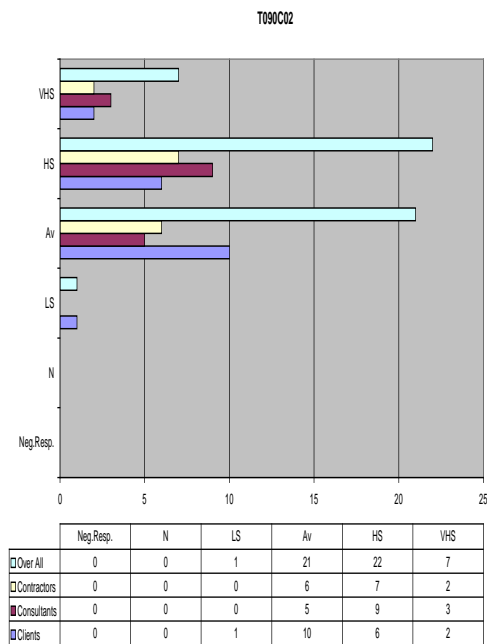


Figure 464 T09C02

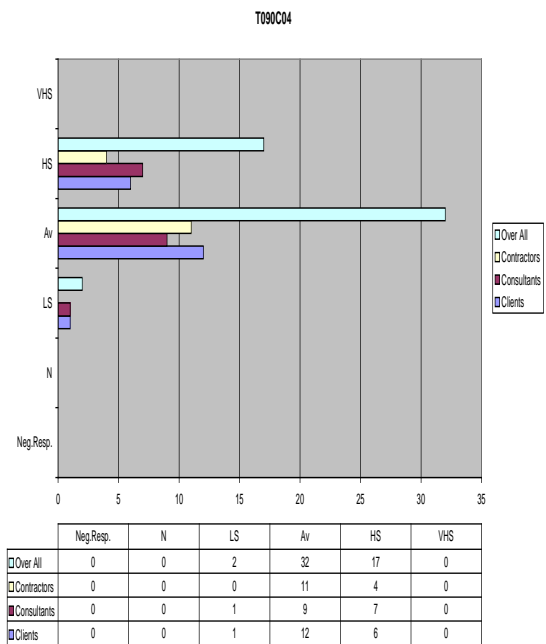


Figure 466 T09C04

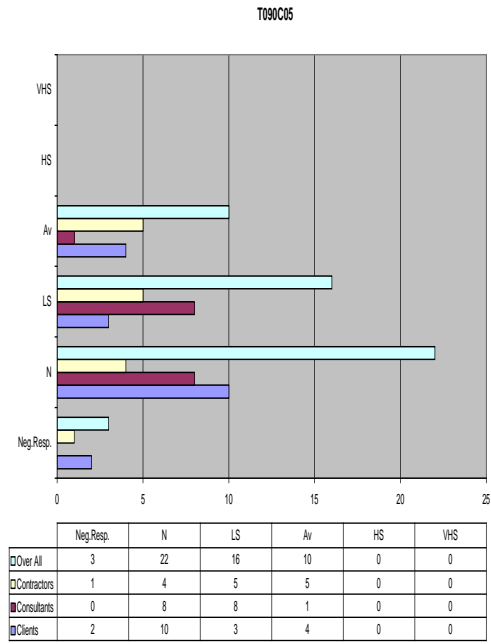


Figure 467 T090C05

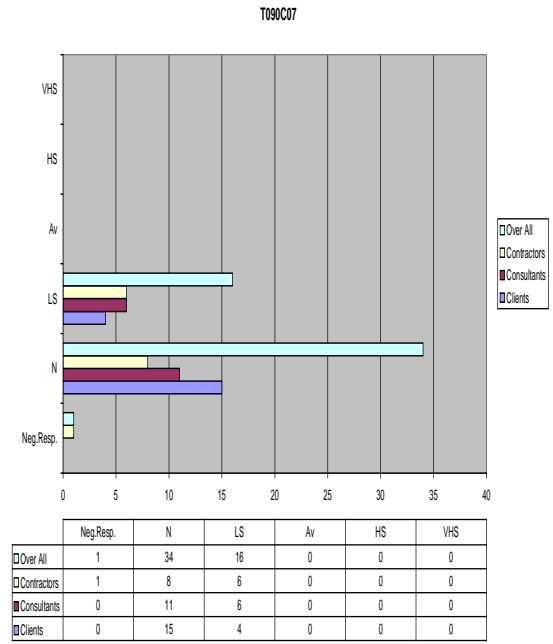


Figure 469 T090C07

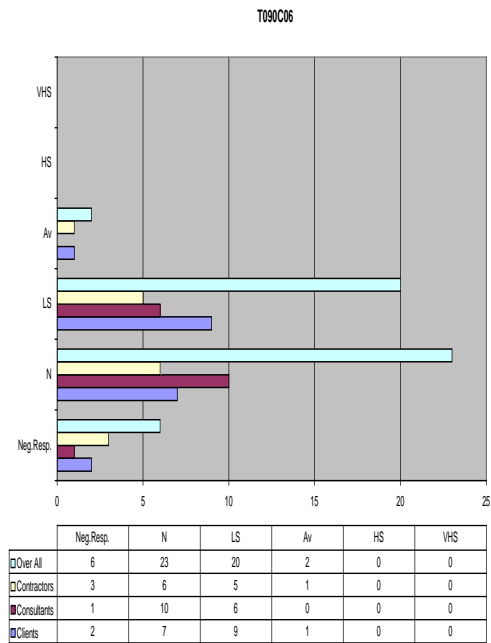


Figure 468 T090C06

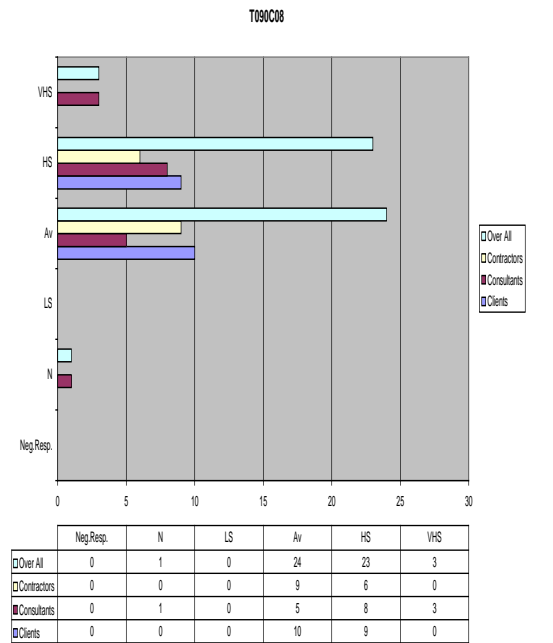


Figure 470 T090C08

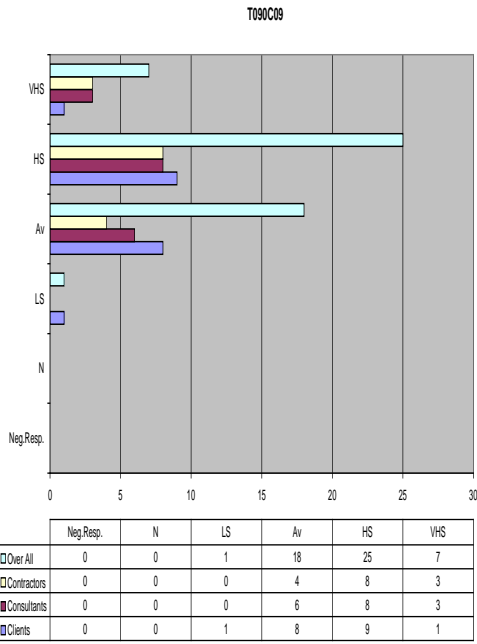


Figure 471 T090C09

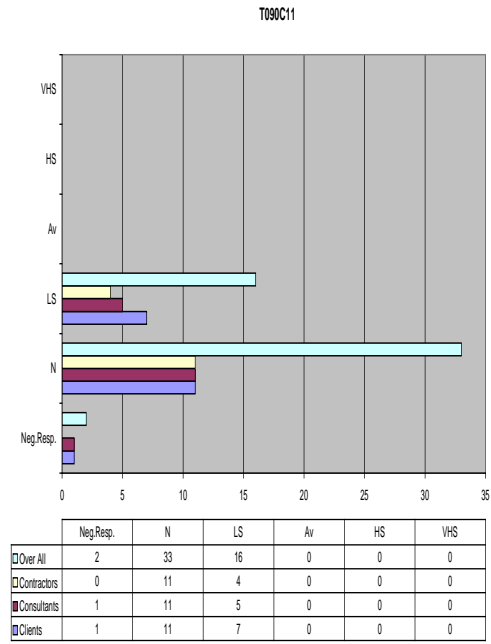


Figure 473 T090C11

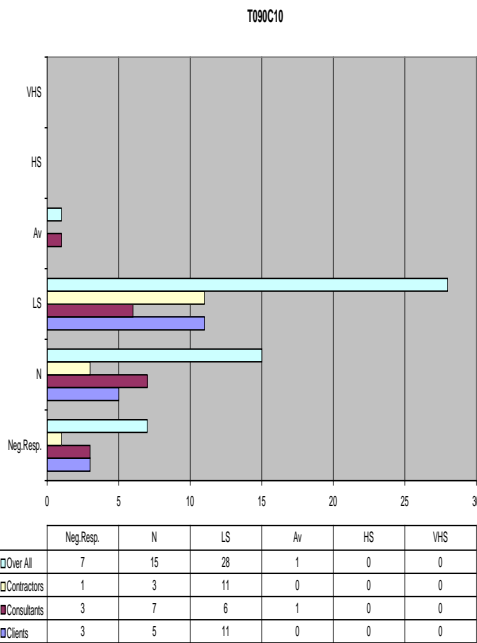


Figure 472 T090C10

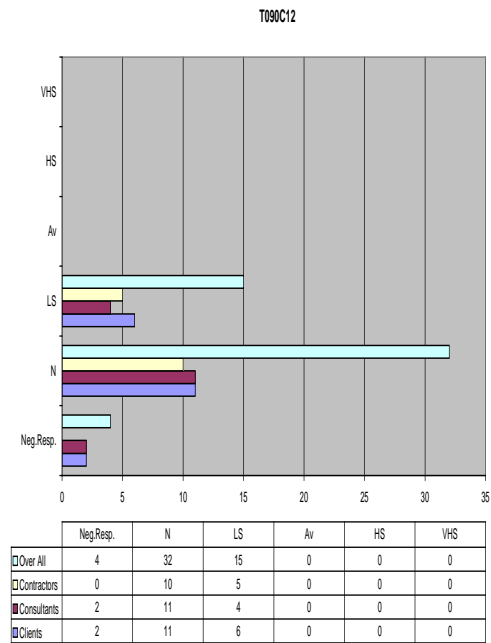


Figure 474 T090C12

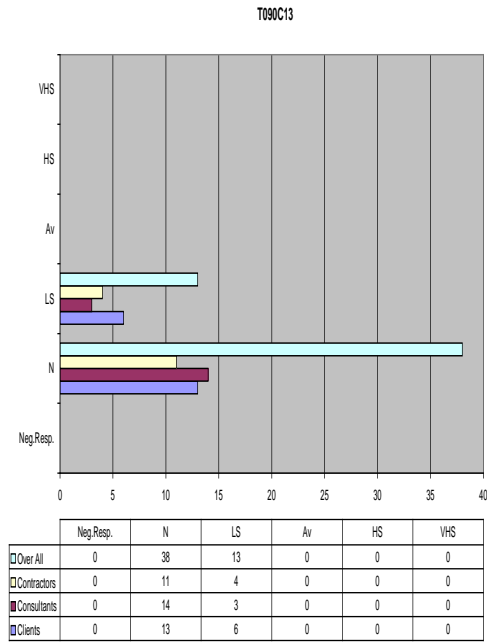


Figure 475 T090C13

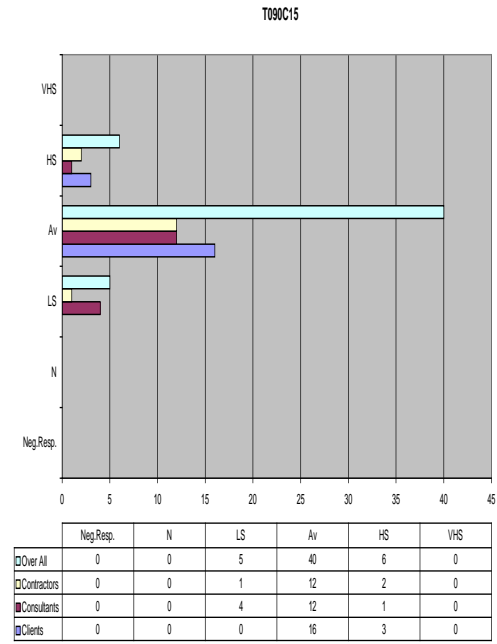


Figure 477 T090C15

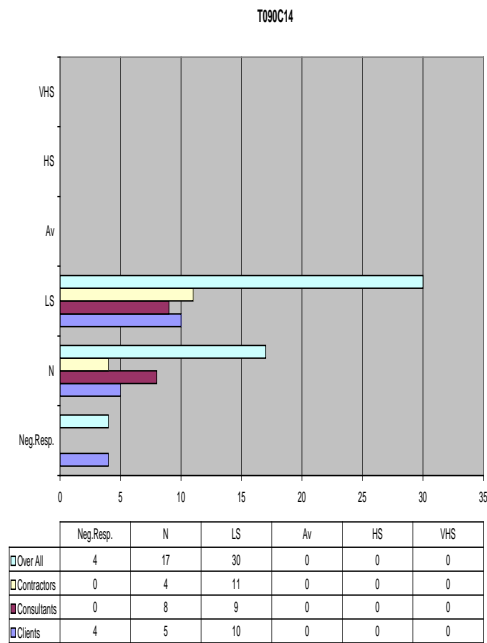


Figure 476 T090C14

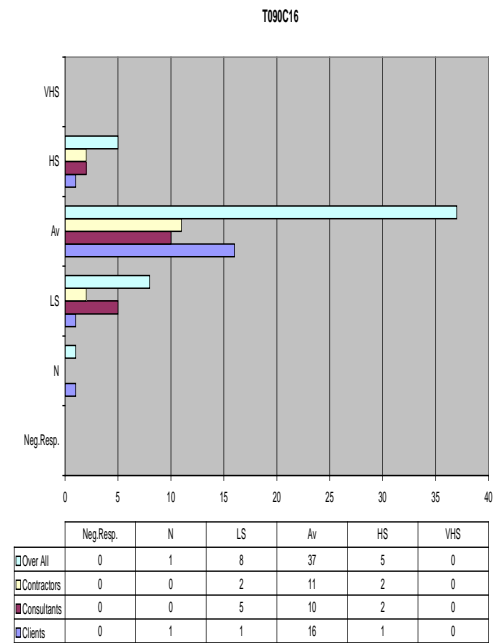


Figure 478 T090C16

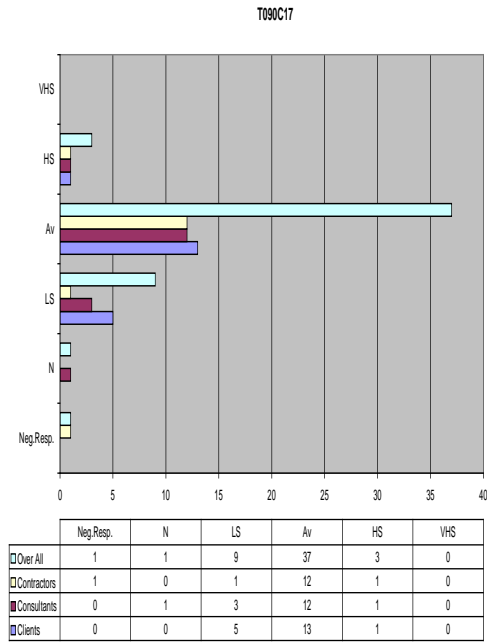


Figure 479 T090C17

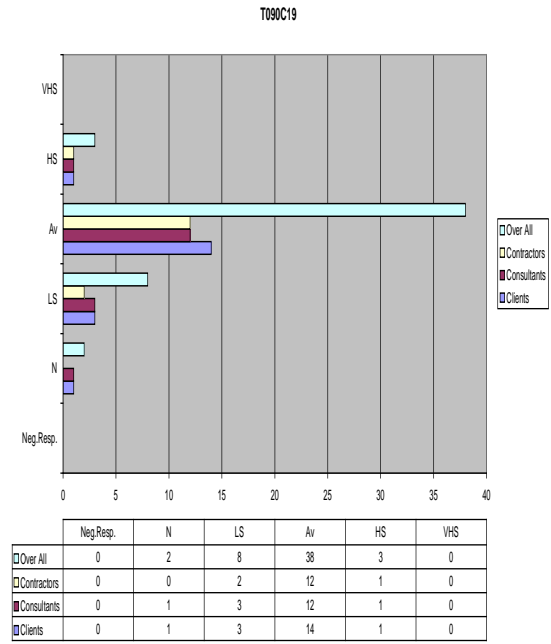


Figure 481 T090C19

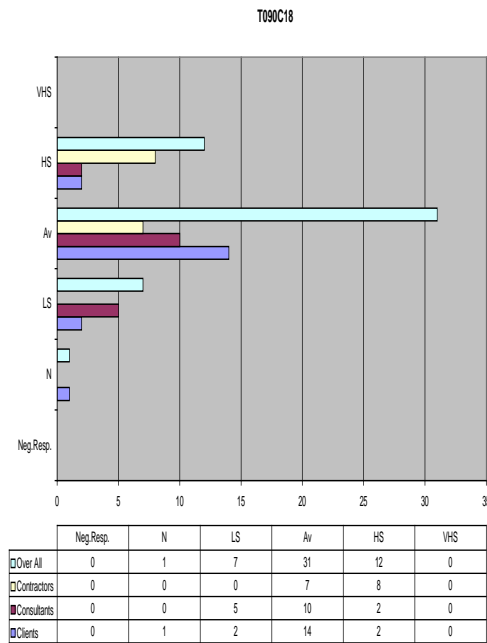


Figure 480 T090C18

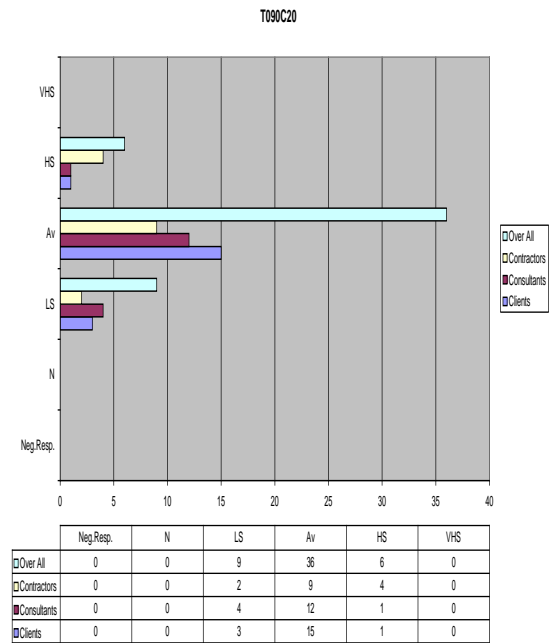


Figure 482 T090C20

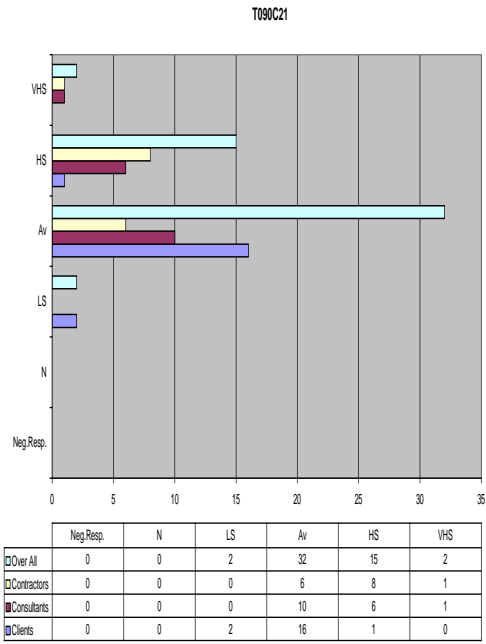


Figure 483 T090C21

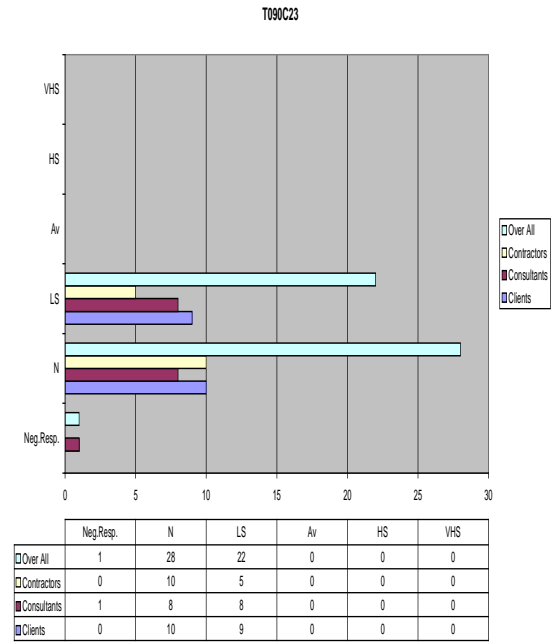


Figure 485 T090C23

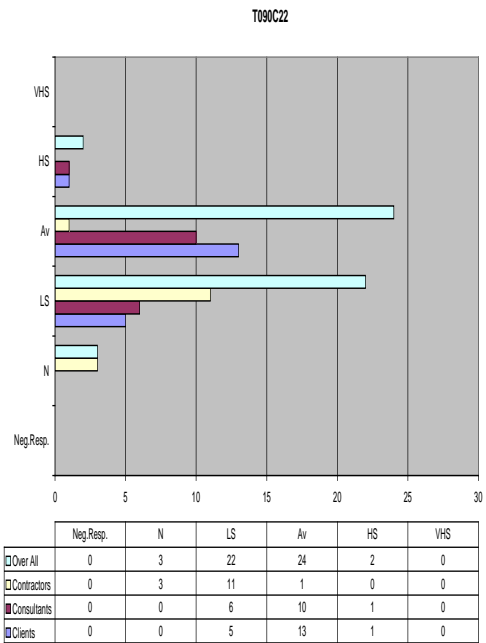


Figure 484 T090C22

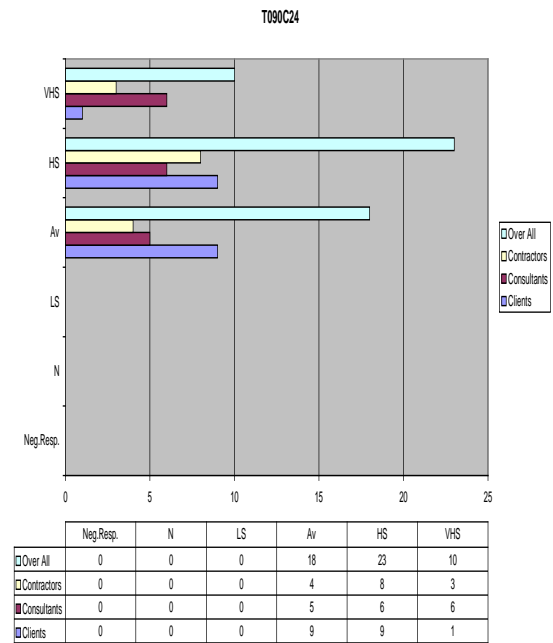


Figure 486 T090C24

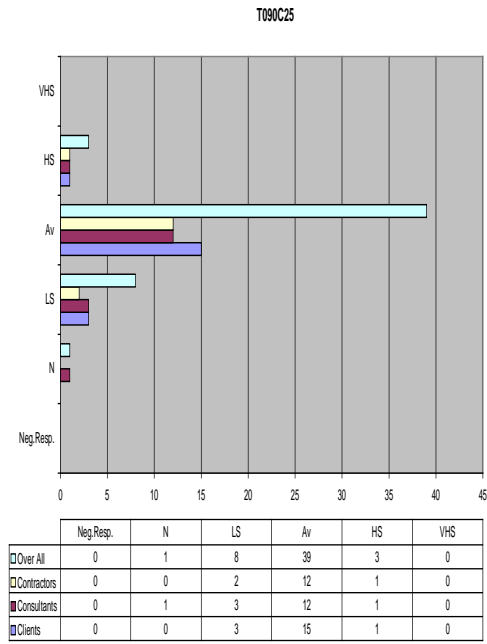


Figure 487 T090C25

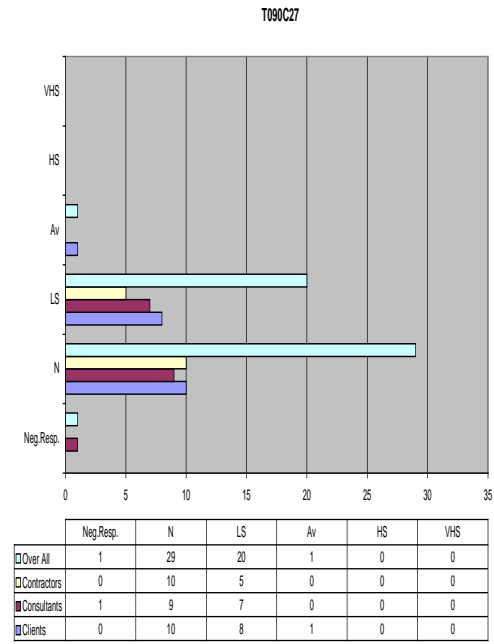


Figure 489 T090C27

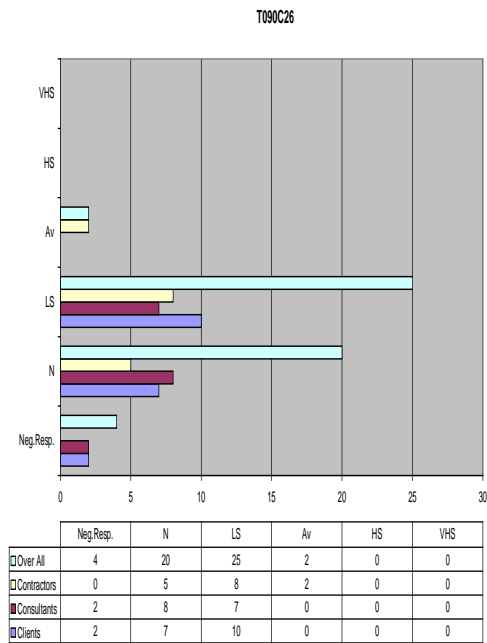


Figure 488 T090C26

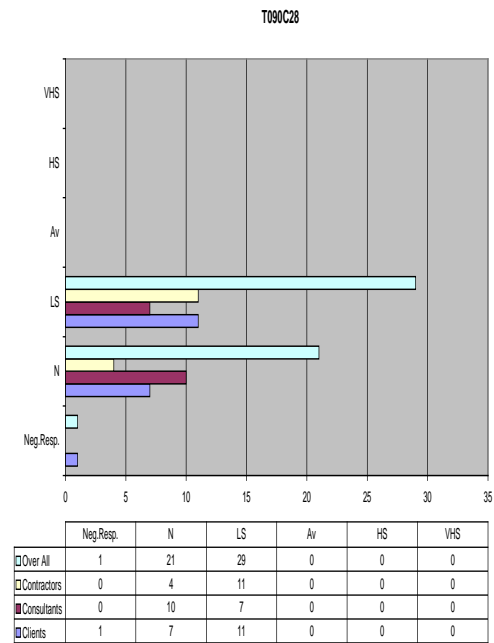


Figure 490 T090C28

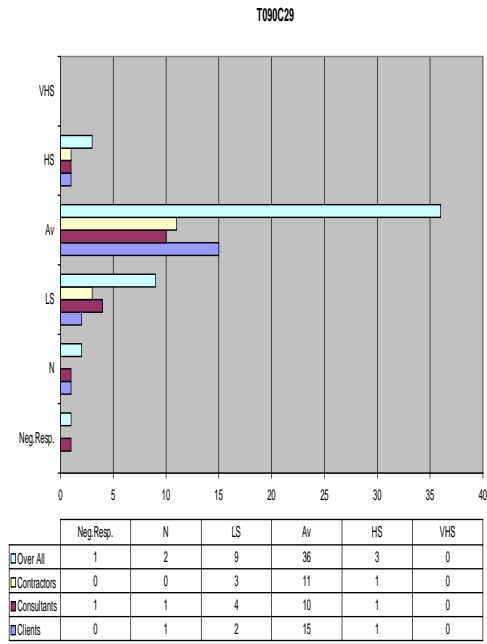


Figure 491 T090C29

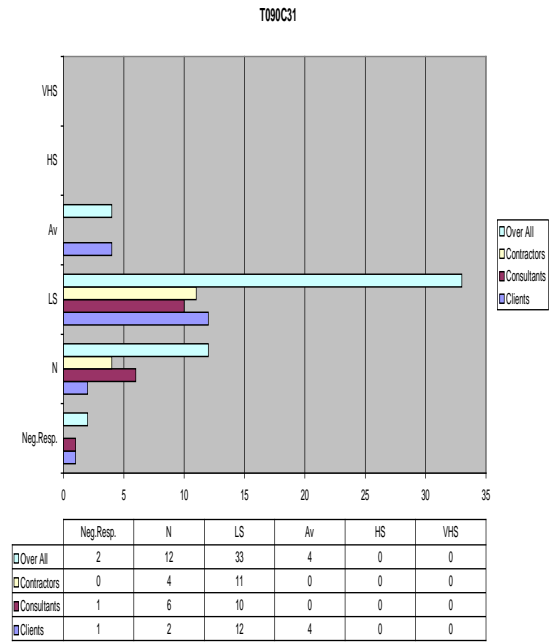


Figure 493 T090C31

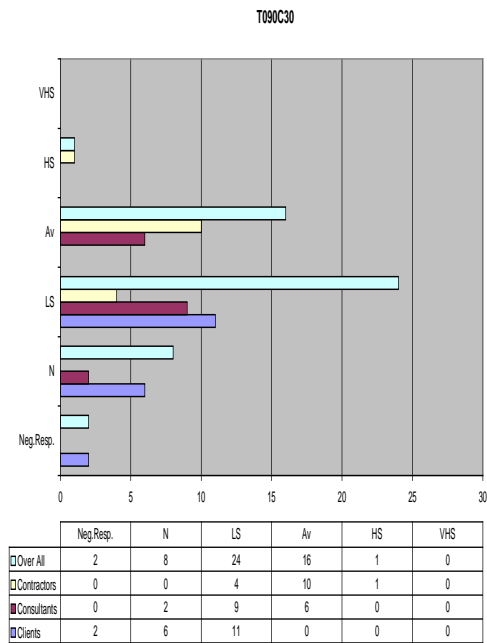


Figure 492 T090C30

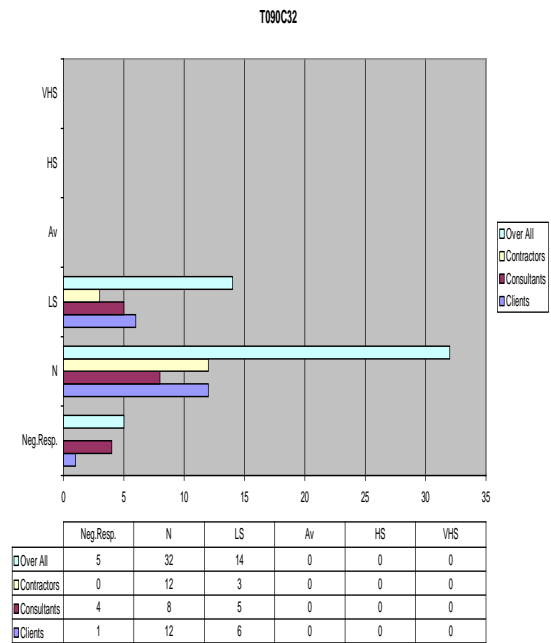


Figure 494 T090C32

Y.3.2.10 CAUSE SIGNIFICANCE ASSESSMENT: (T10 C01) – (T10 C32)

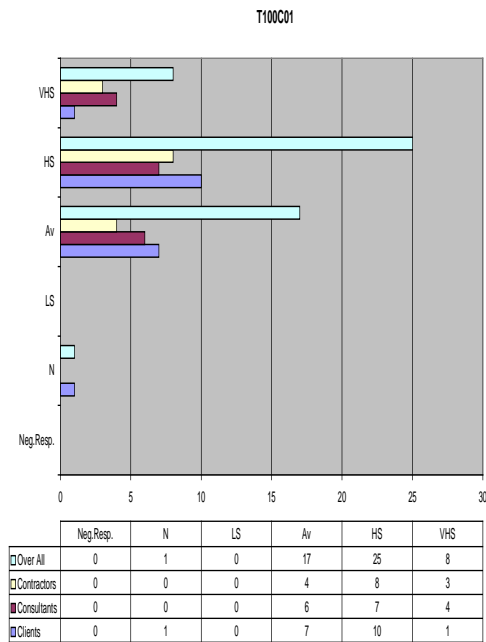


Figure 495 T100C01

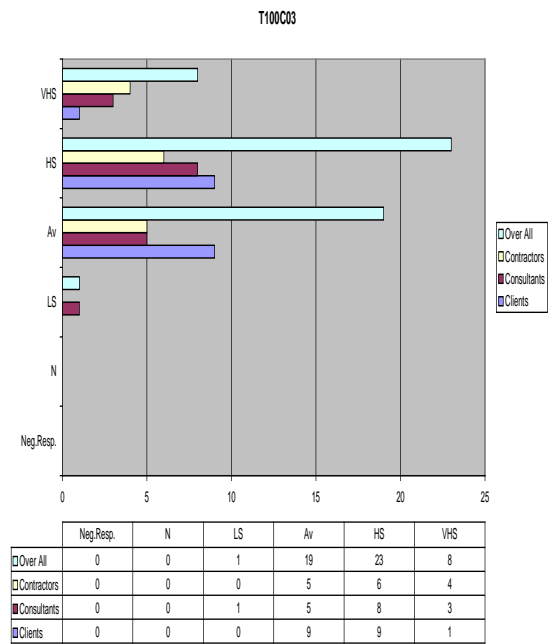


Figure 497 T100C03

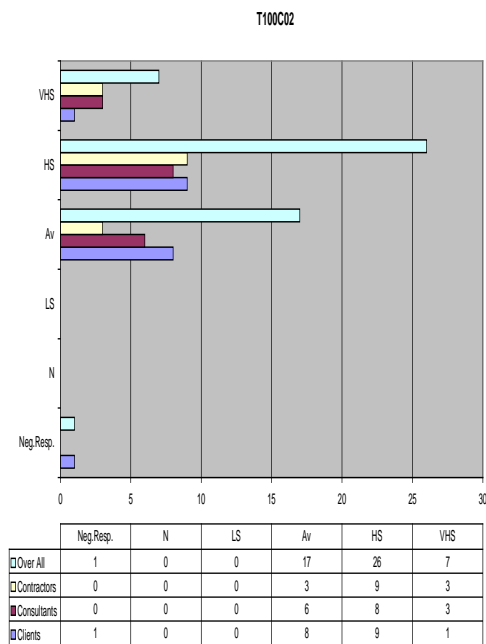


Figure 496 T100C02

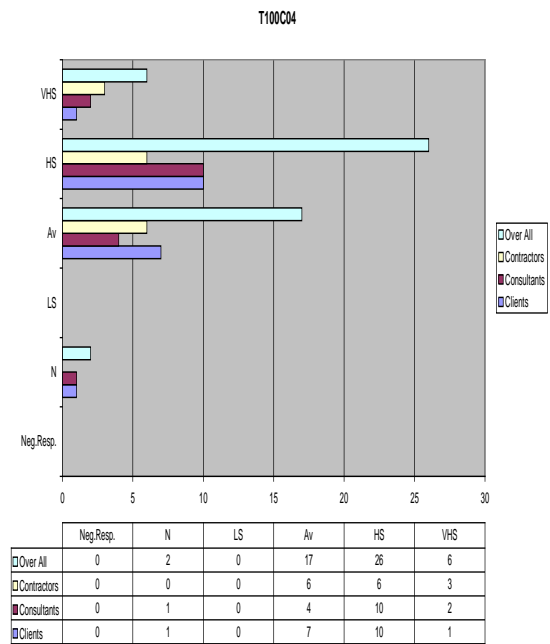


Figure 498 T100C04

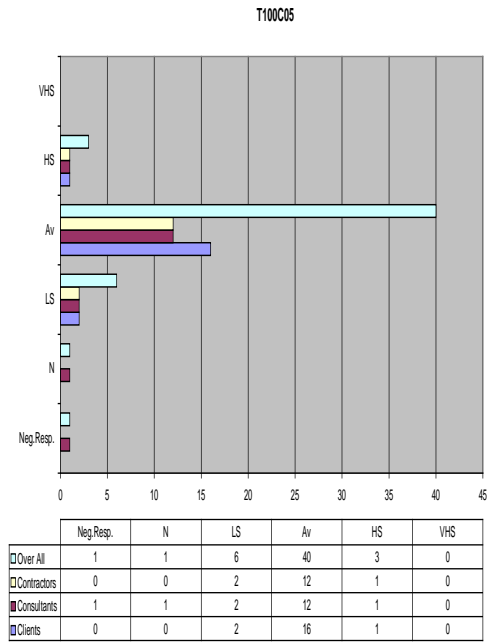


Figure 499 T100C05

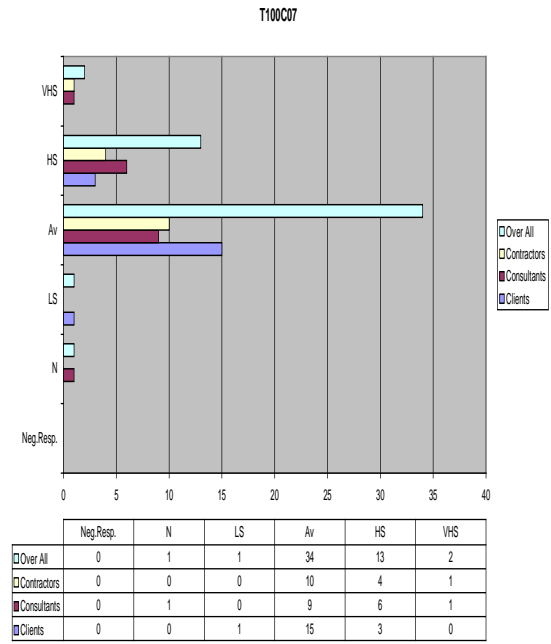


Figure 501 T100C07

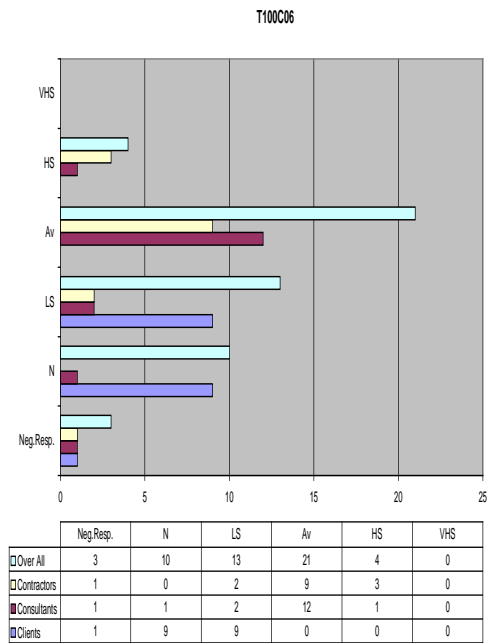


Figure 500 T100C06

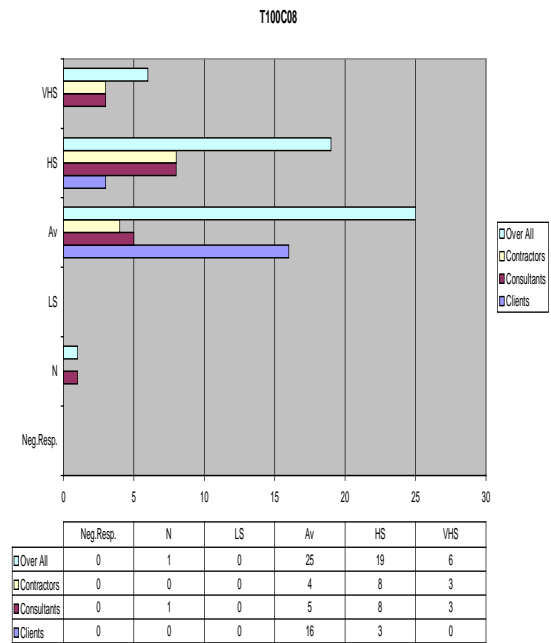


Figure 502 T100C08

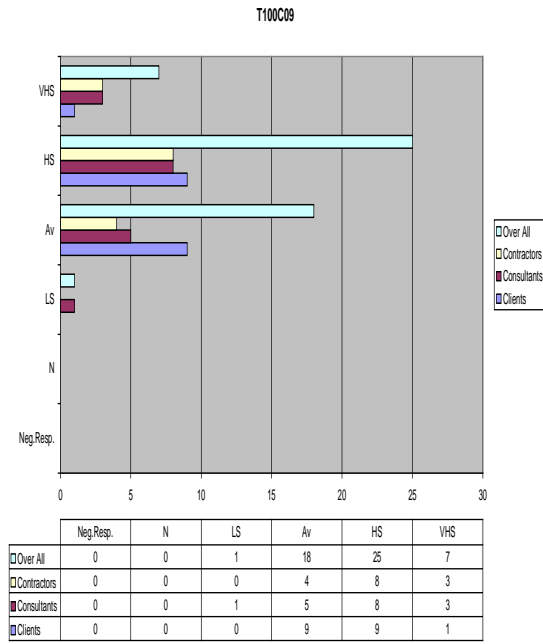


Figure 503 T100C09

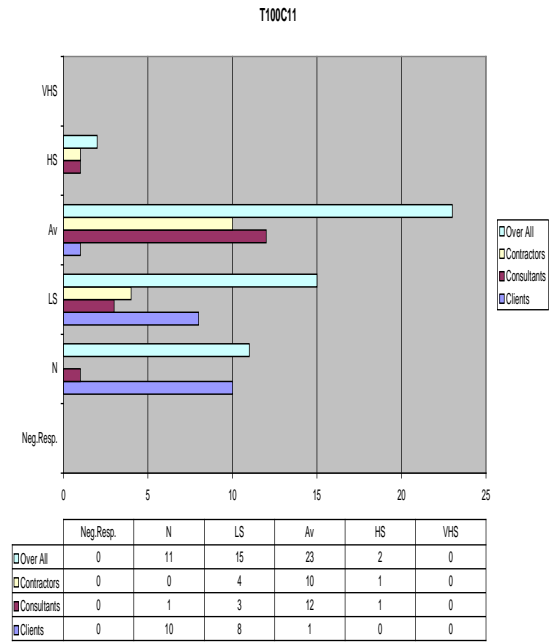


Figure 505 T100C11

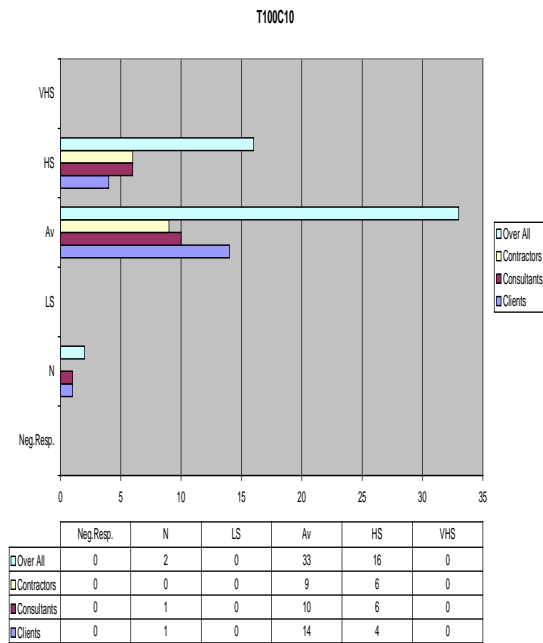


Figure 504 T100C10

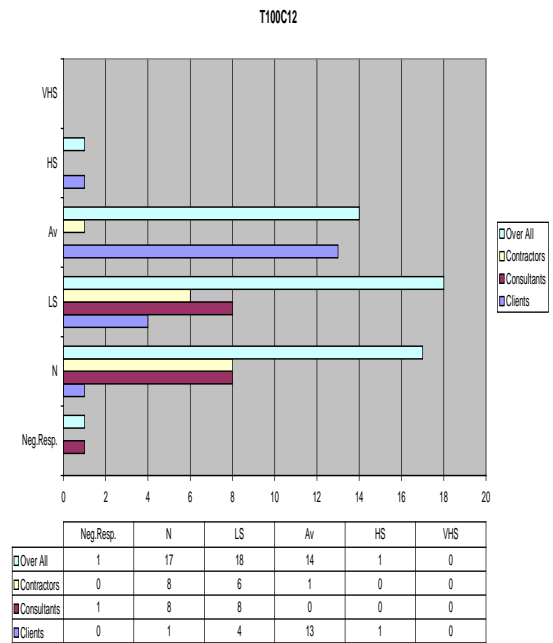


Figure 506 T100C12

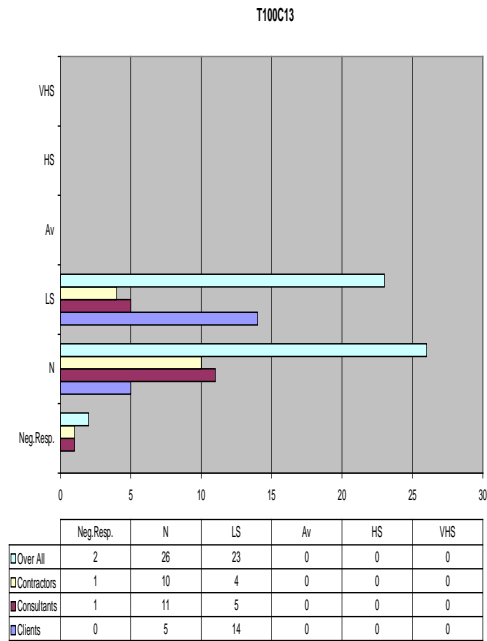


Figure 507 T100C13

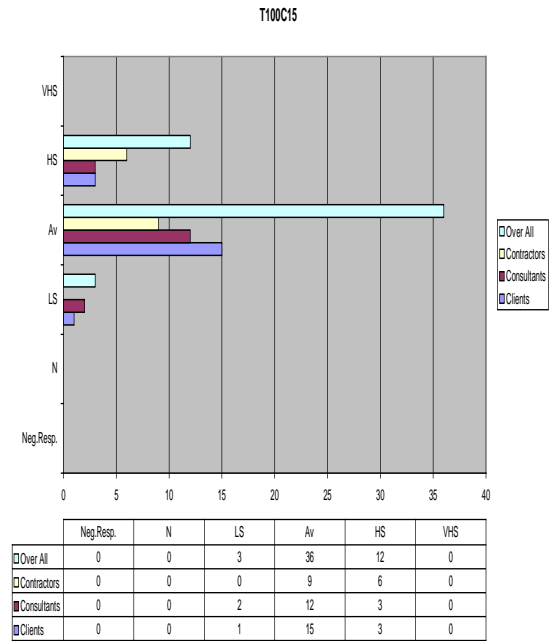


Figure 509 T100C15

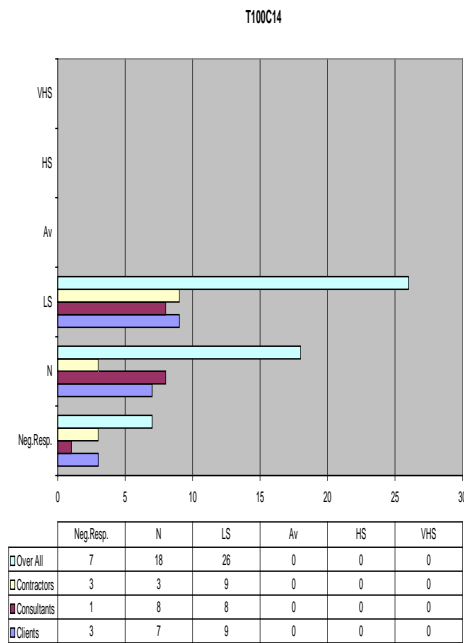


Figure 508 T100C14

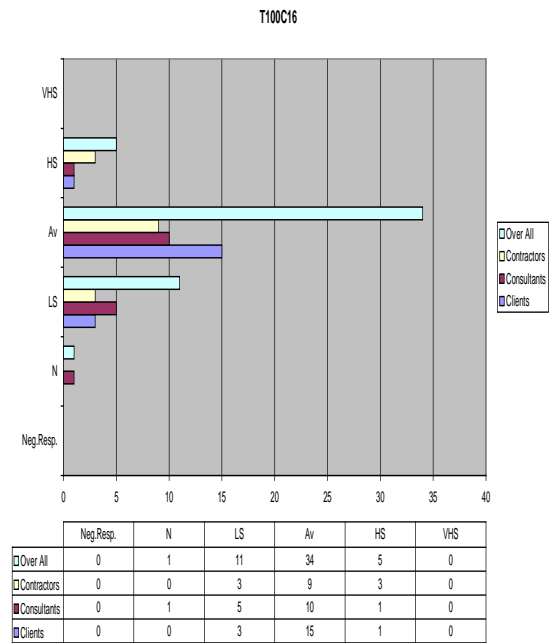


Figure 510 T100C16

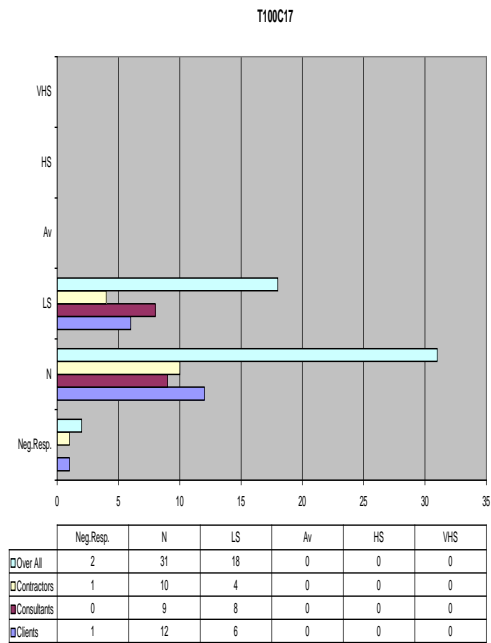


Figure 511 T100C17

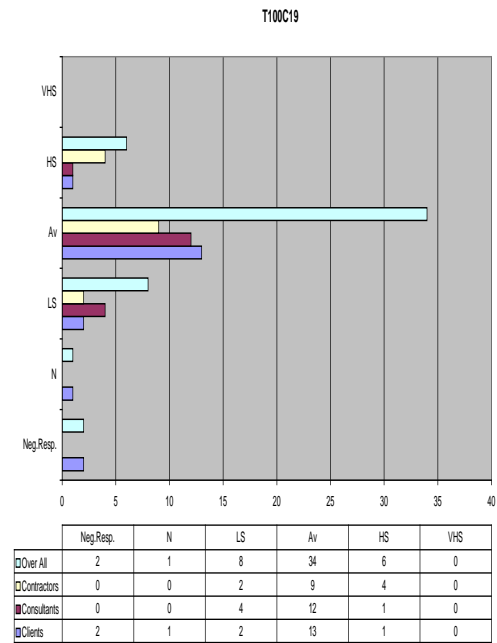


Figure 513 T100C19

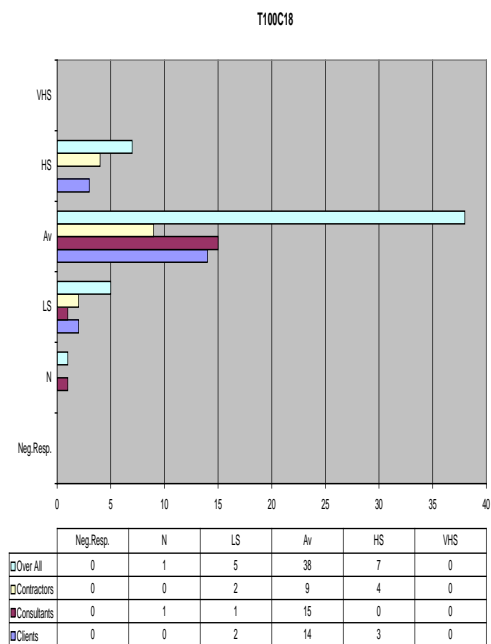


Figure 512 T100C18

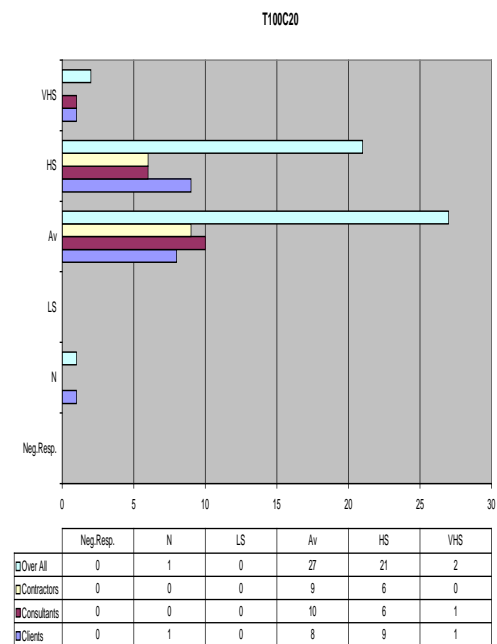


Figure 514 T100C20

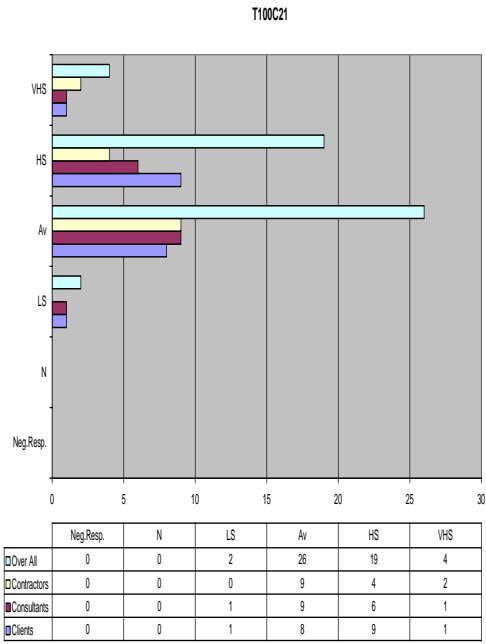


Figure 515 T100C21

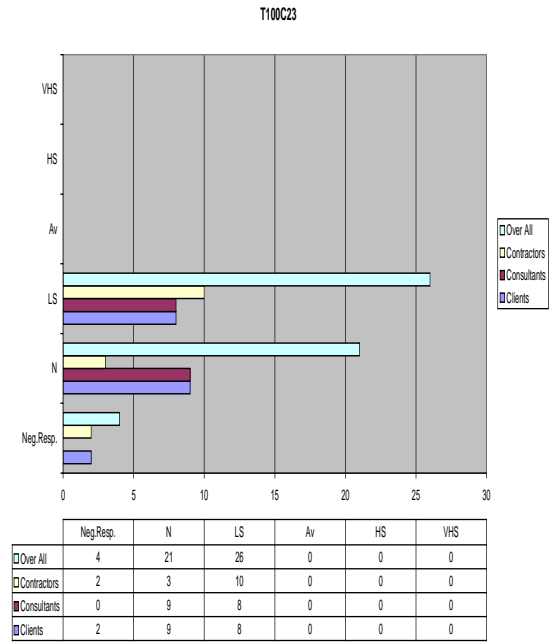


Figure 517 T100C23

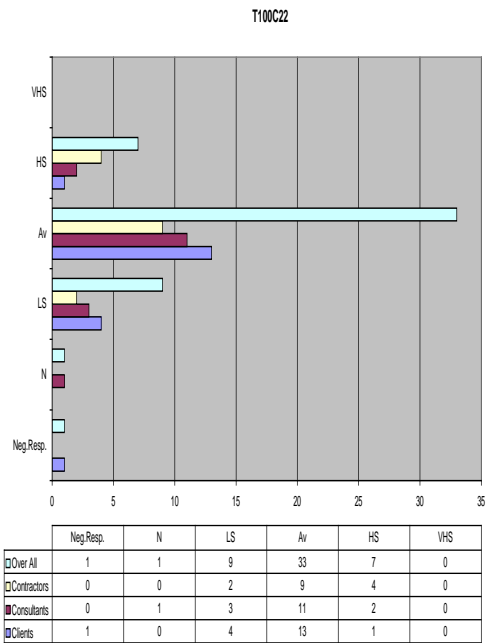


Figure 516 T100C22

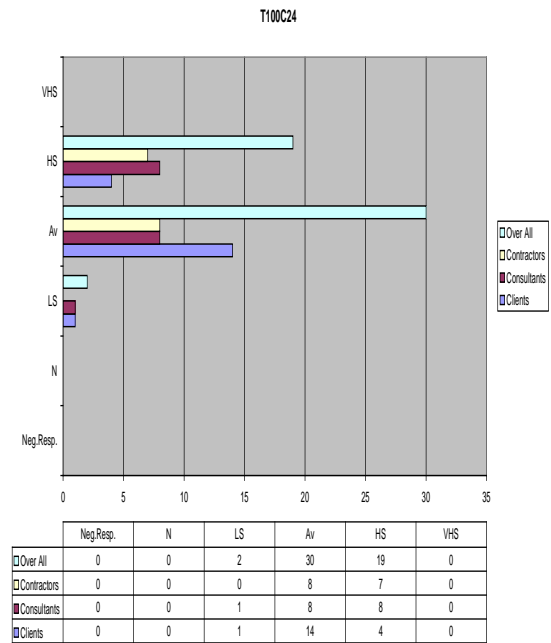


Figure 518 T100C24

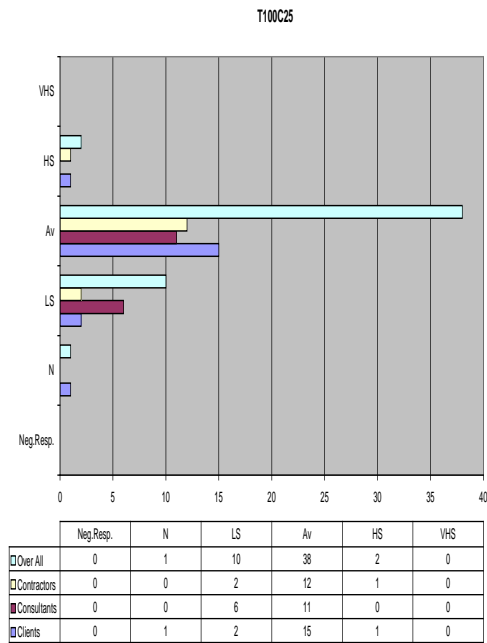


Figure 519 T100C25

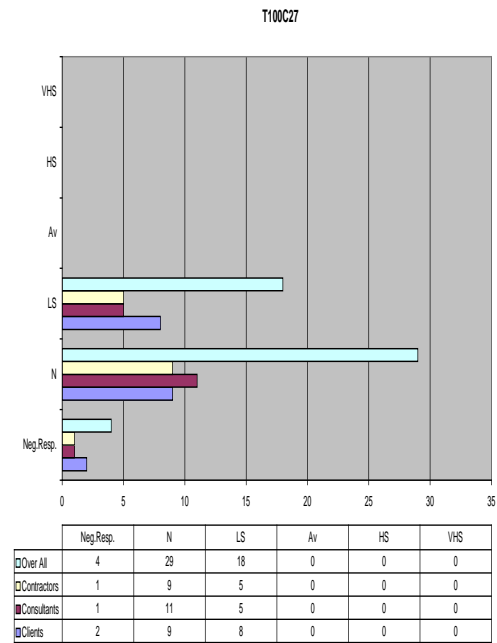


Figure 521 T100C27

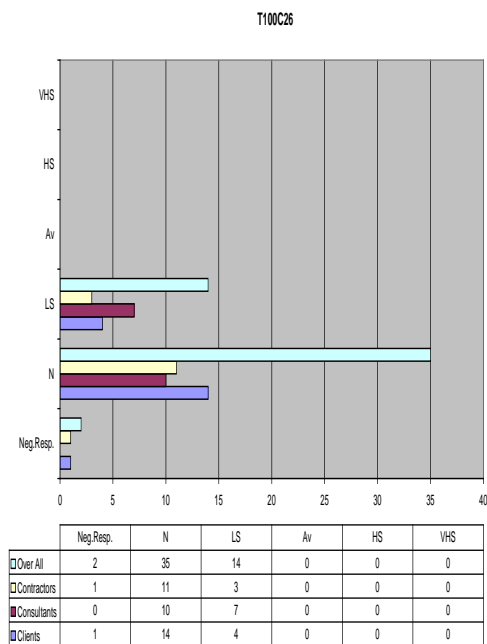


Figure 520 T100C26

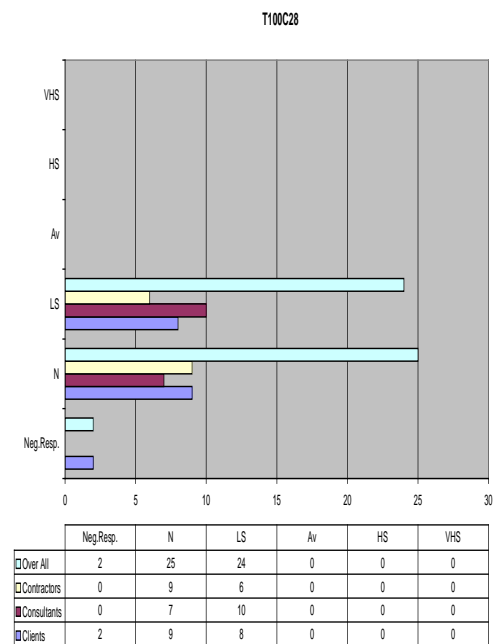


Figure 522 T100C28

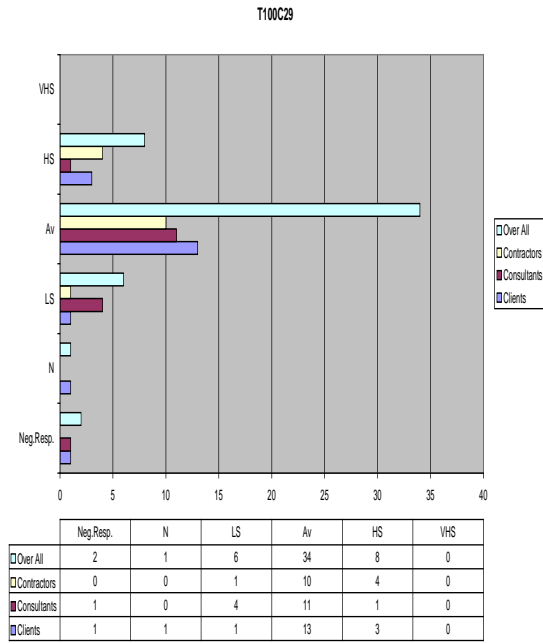


Figure 523 T100C29

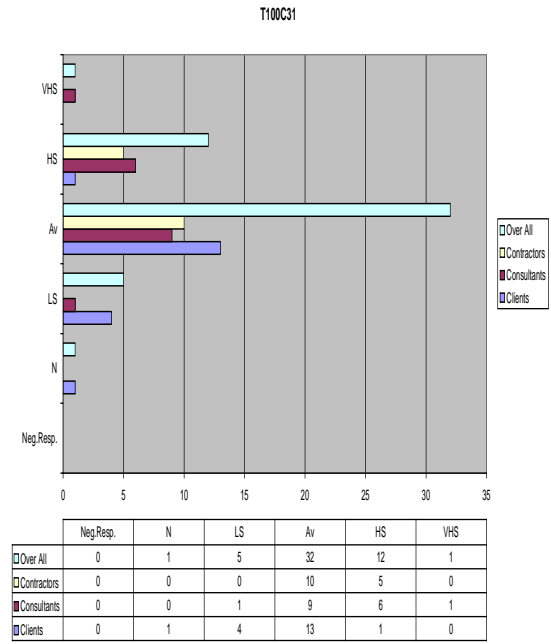


Figure 525 T100C31

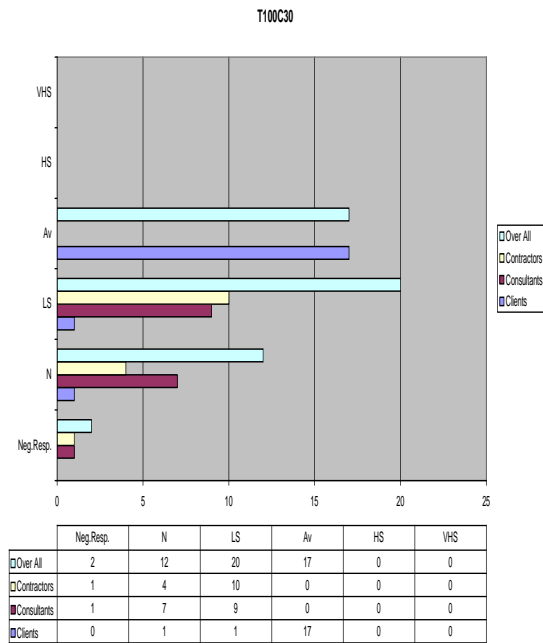


Figure 524 T100C30

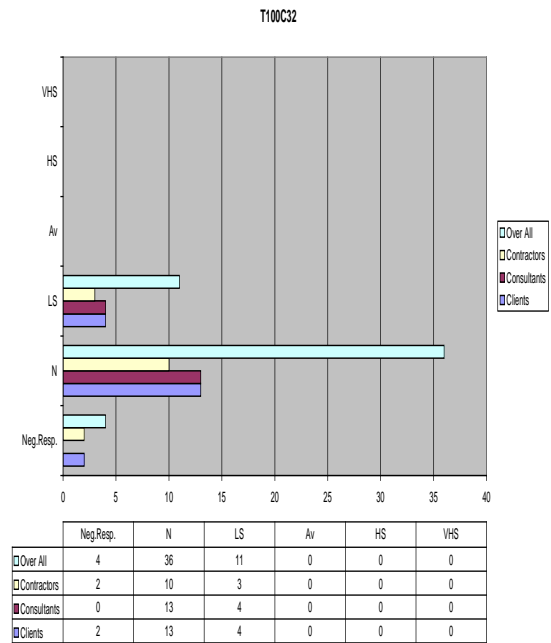


Figure 526 T100C32

Y.3.2.11 CAUSE SIGNIFICANCE ASSESSMENT: (T11 C01) – (T11 C32)

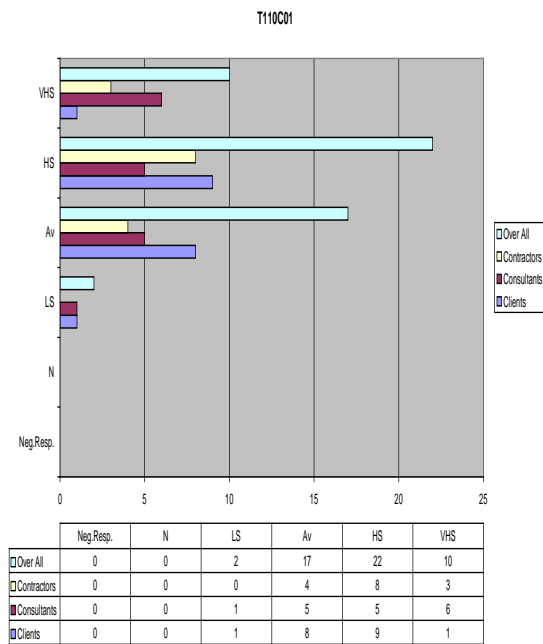


Figure 527 T110C01

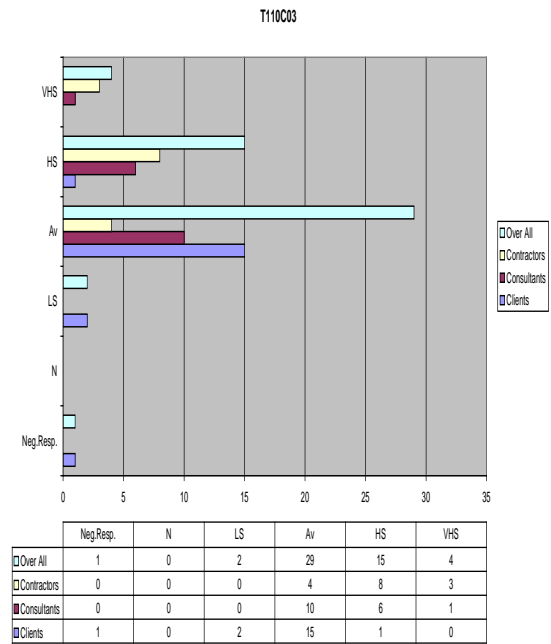


Figure 529 T110C03

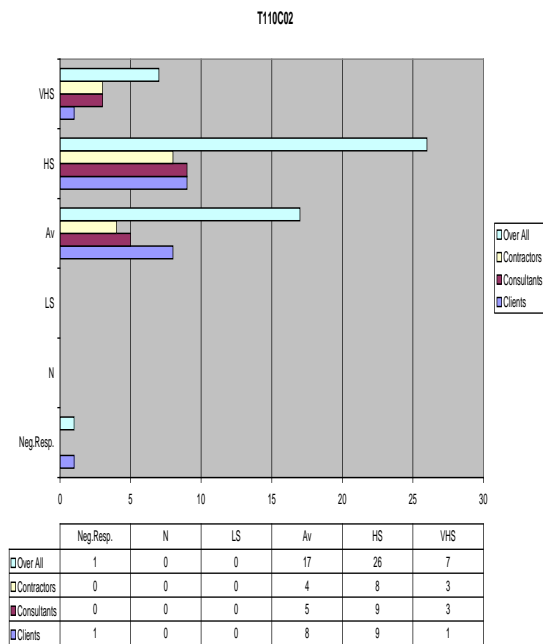


Figure 528 T110C02

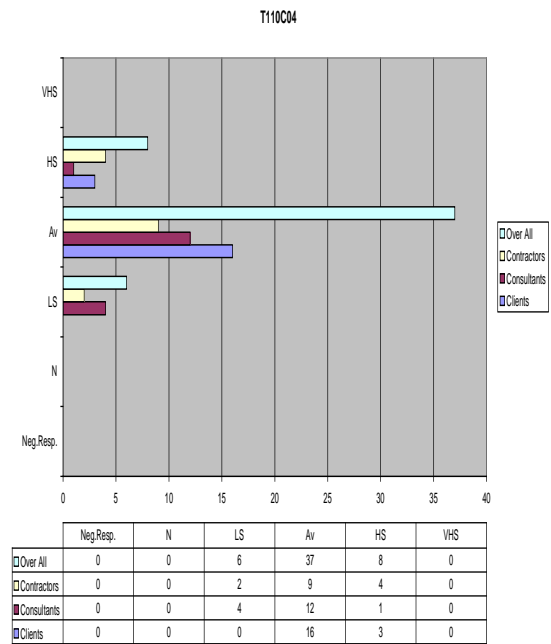


Figure 530 T110C04

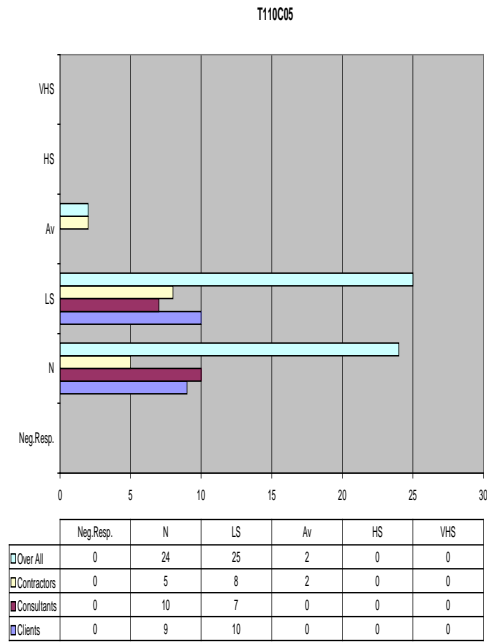


Figure 531 T110C05

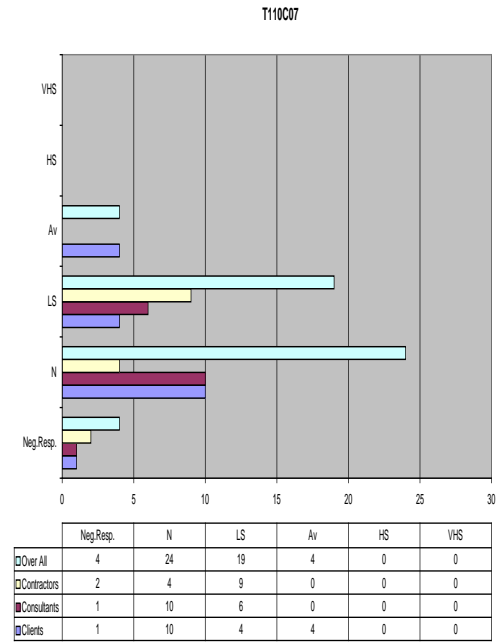


Figure 533 T110C07

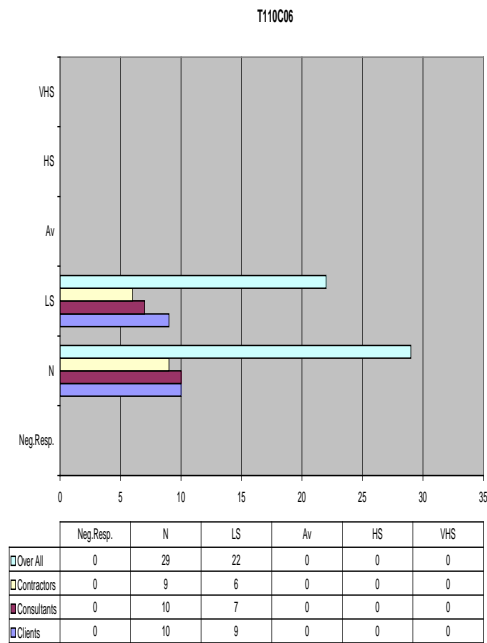


Figure 532 T110C06

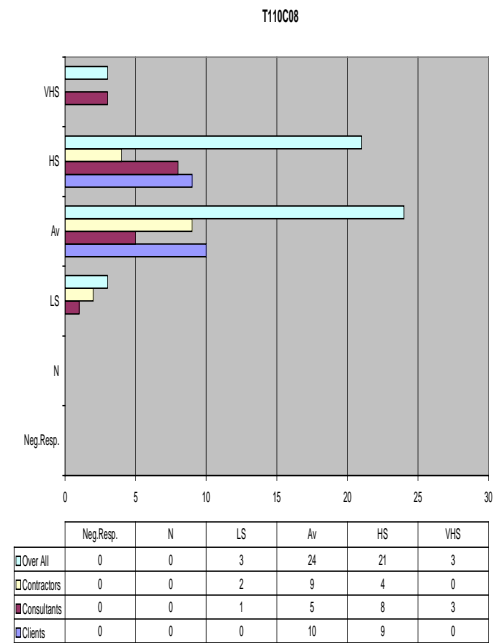


Figure 534 T110C08

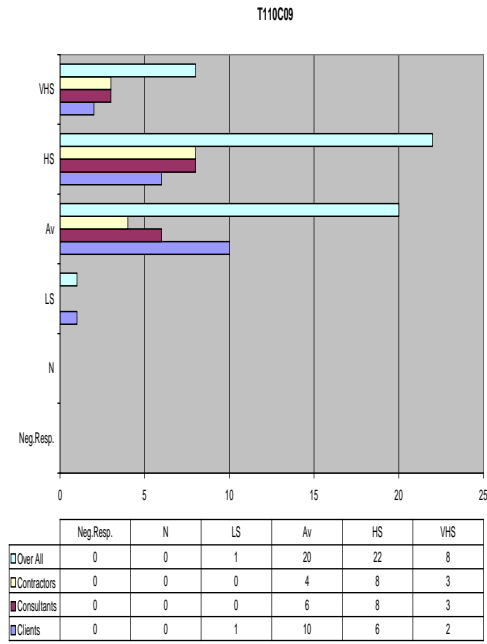


Figure 535 T110C09

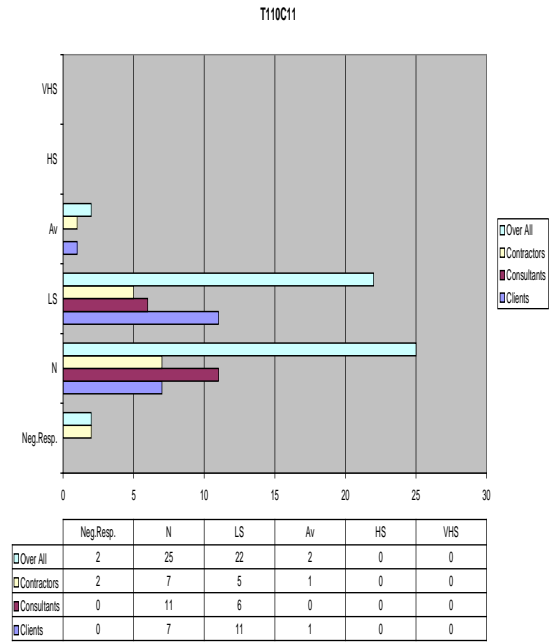


Figure 537 T110C11

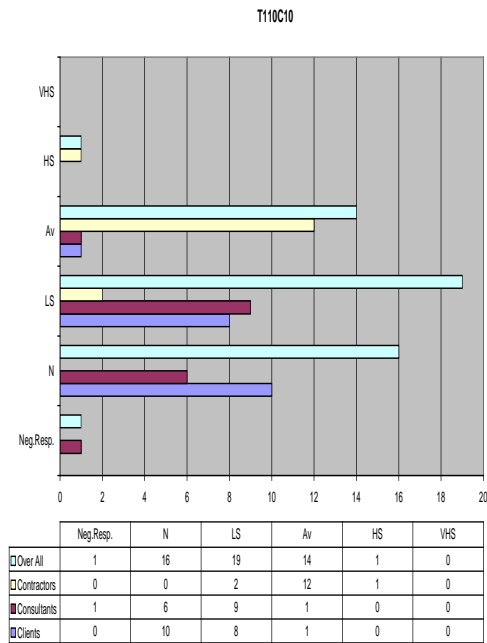


Figure 536 T110C10

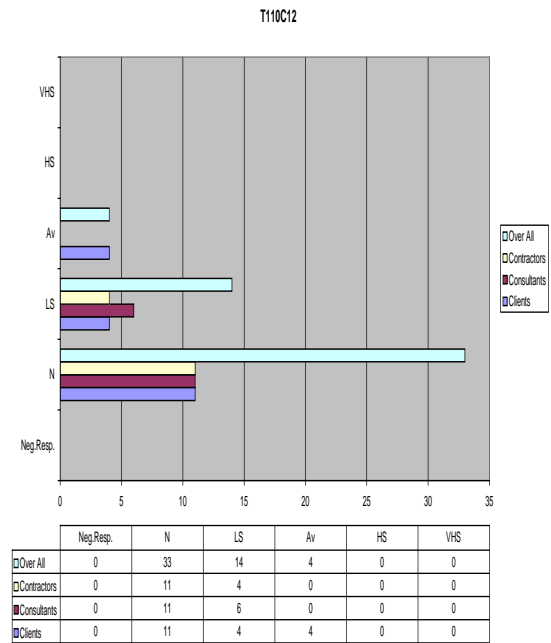


Figure 538 T110C12

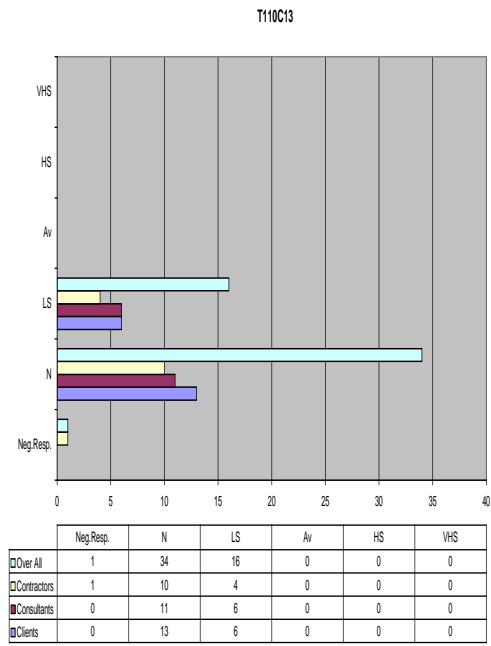


Figure 539 T110C13

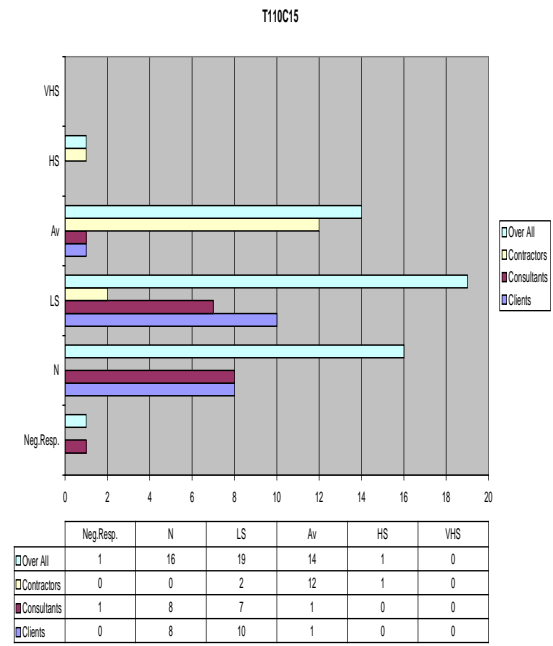


Figure 541 T110C15

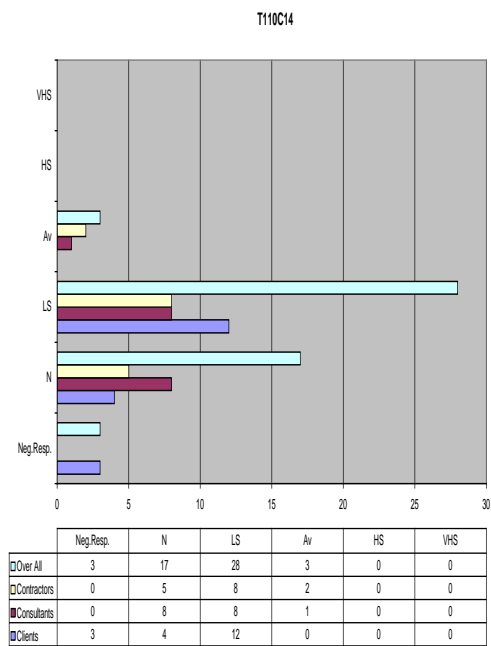


Figure 540 T110C14

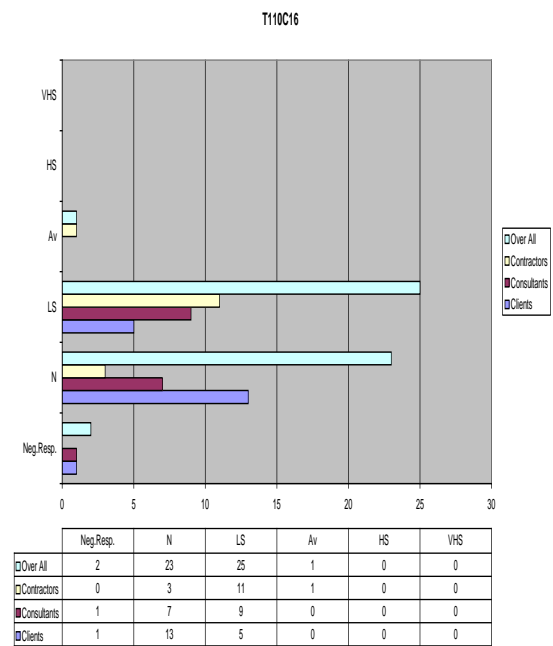


Figure 542 T110C16

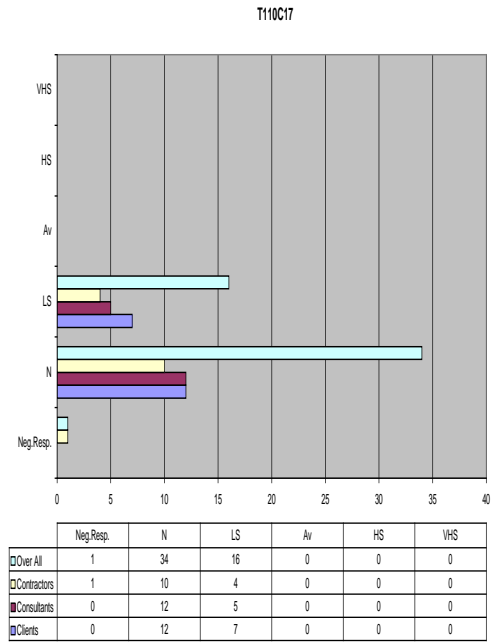


Figure 543 T110C17

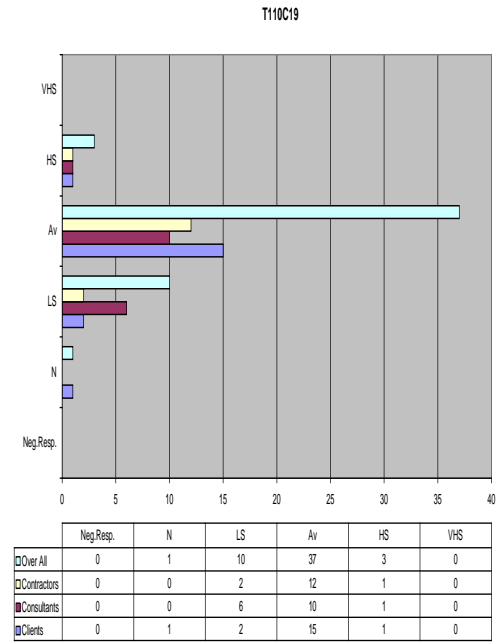


Figure 545 T110C19

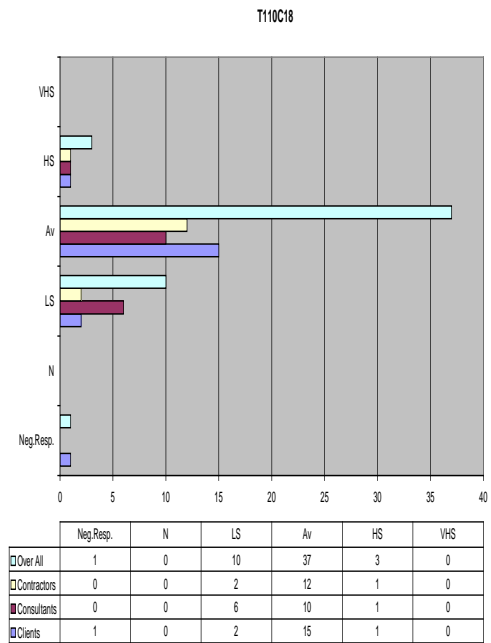


Figure 544 T110C18

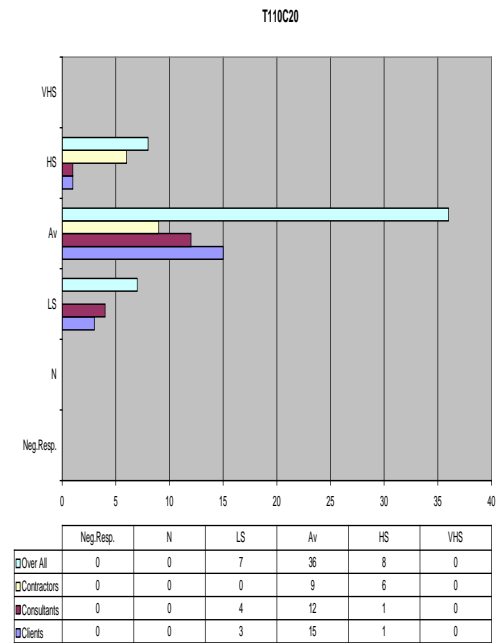


Figure 546 T110C20

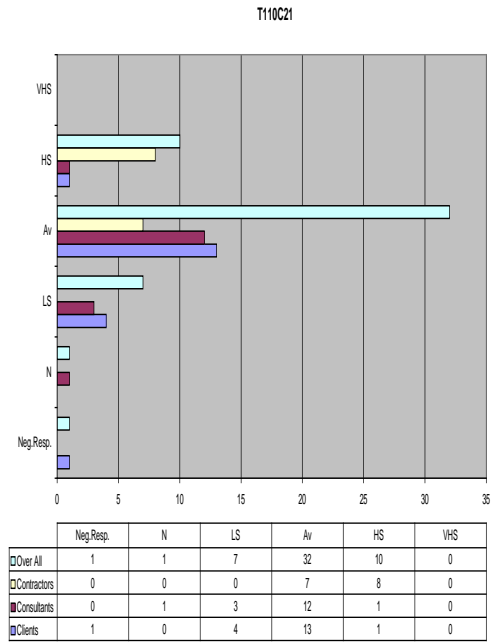


Figure 547 T110C21

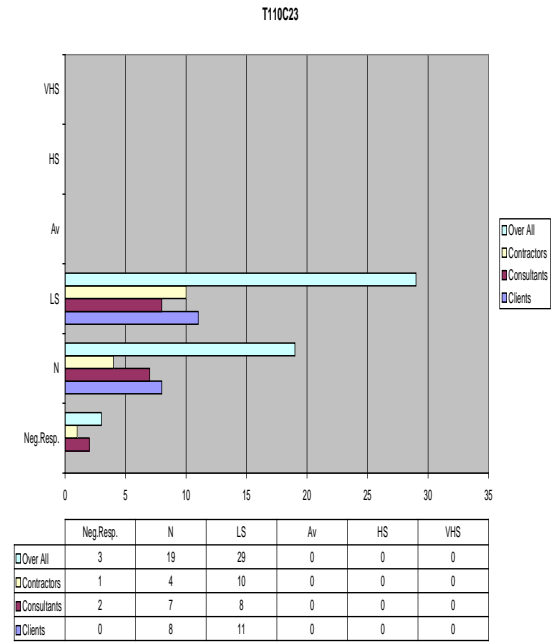


Figure 549 T110C23

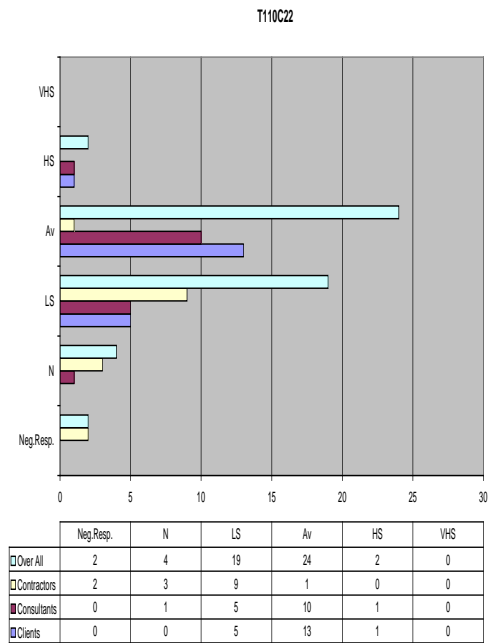


Figure 548 T110C22

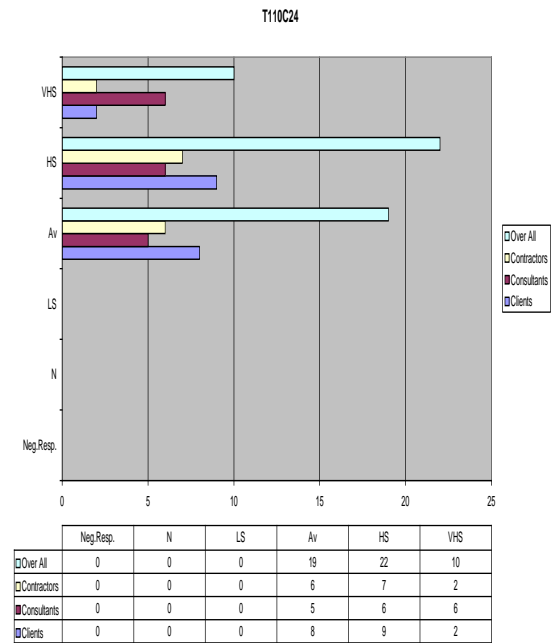


Figure 550 T110C24

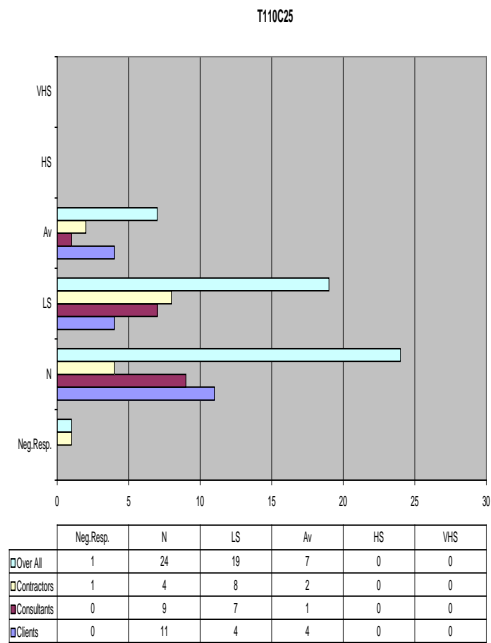


Figure 551 T110C25

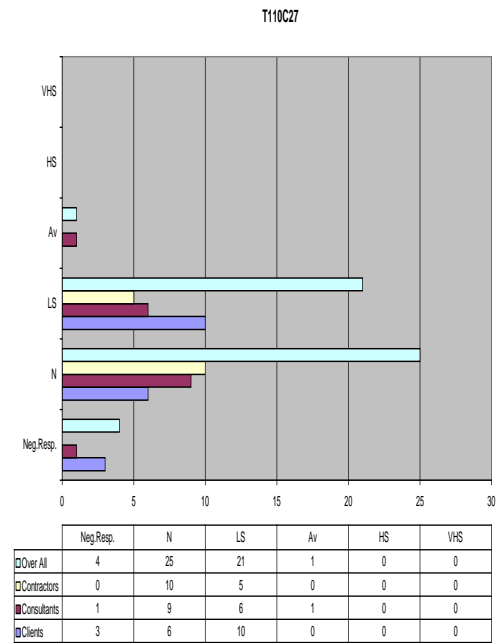


Figure 553 T110C27

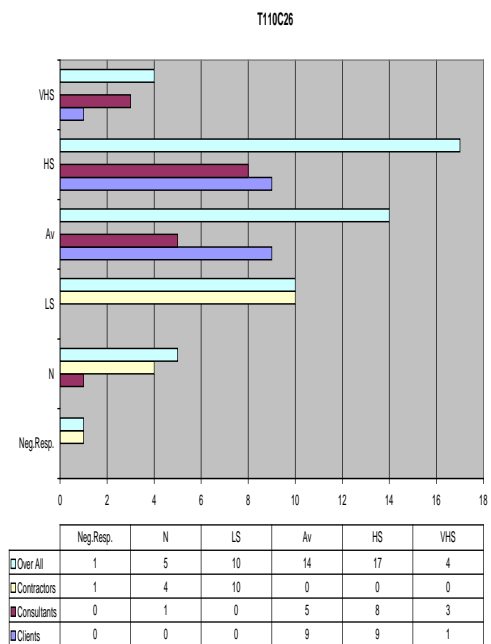


Figure 552 T110C26

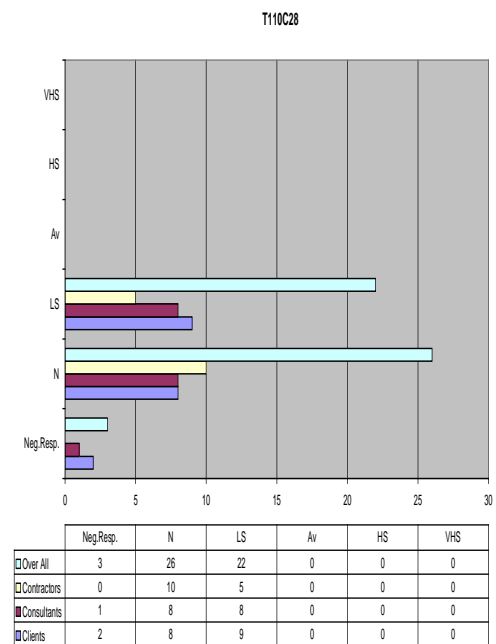


Figure 554 T110C28

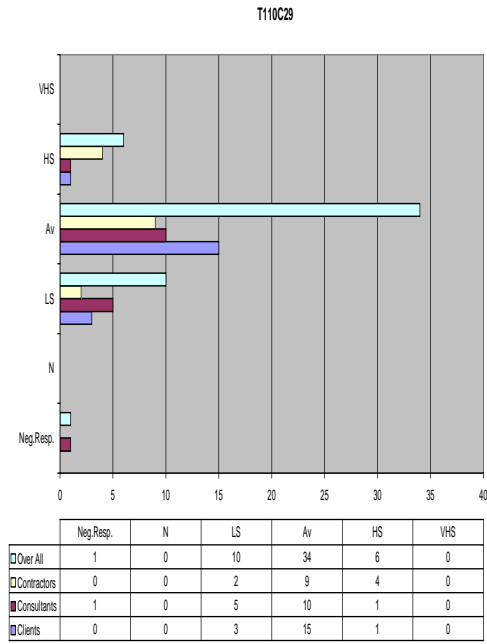


Figure 555 T110C29

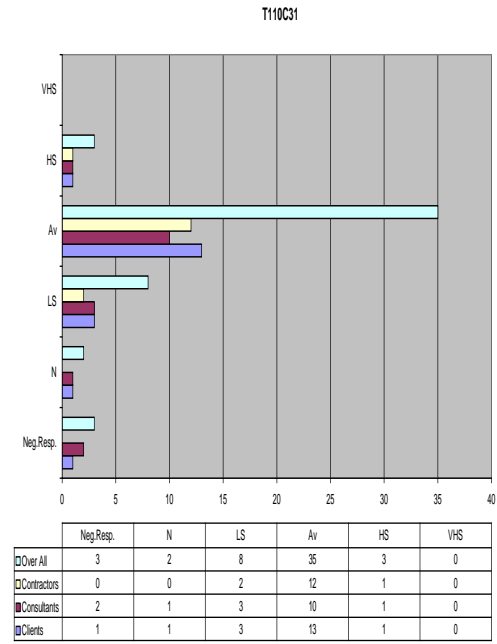


Figure 557 T110C31

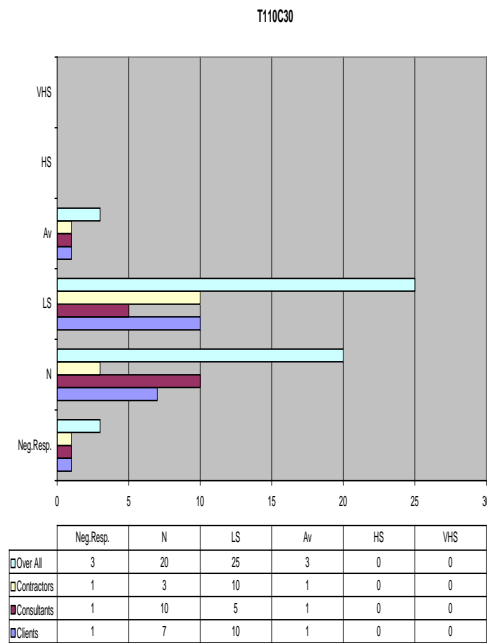


Figure 556 T110C30

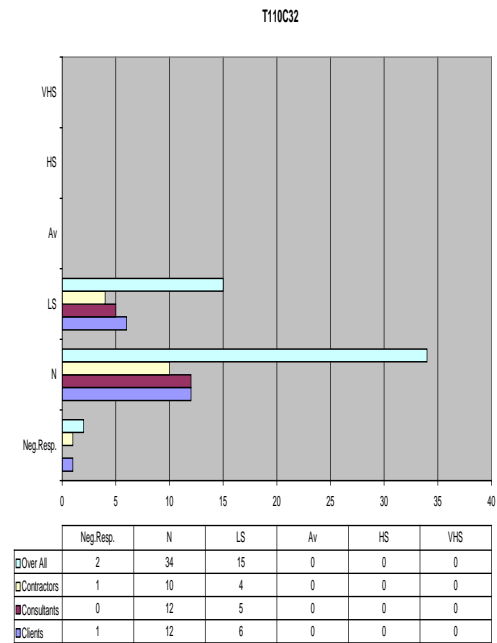


Figure 558 T110C32

Y.3.2.12 CAUSE SIGNIFICANCE ASSESSMENT: (T12 C01) – (T12 C32)

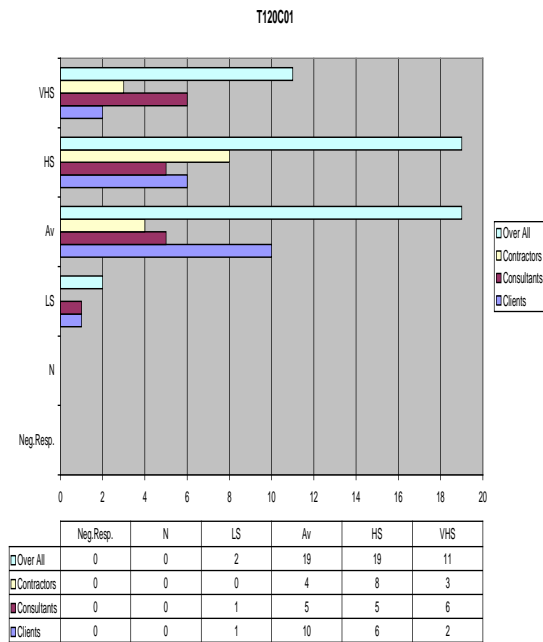


Figure 559 T120C01

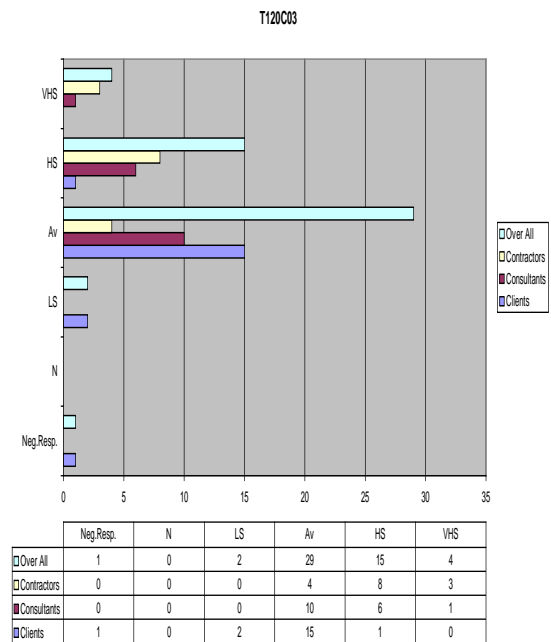


Figure 561 T120C03

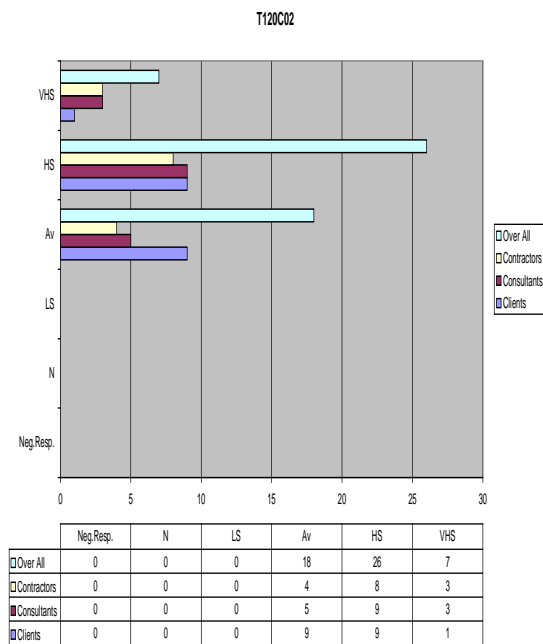


Figure 560 T120C02

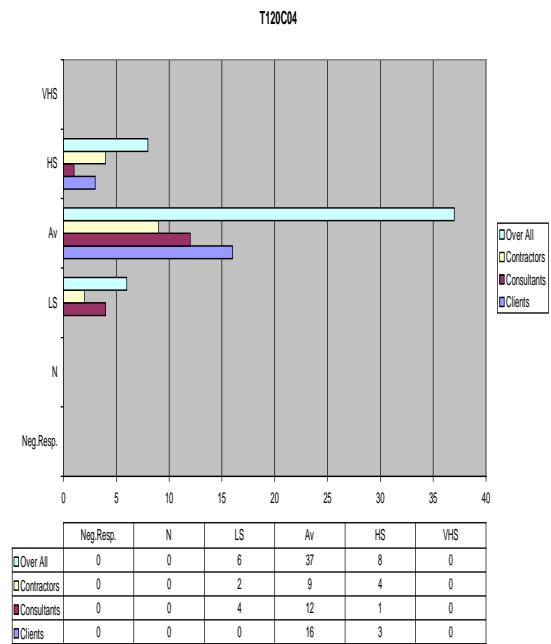


Figure 562 T120C04

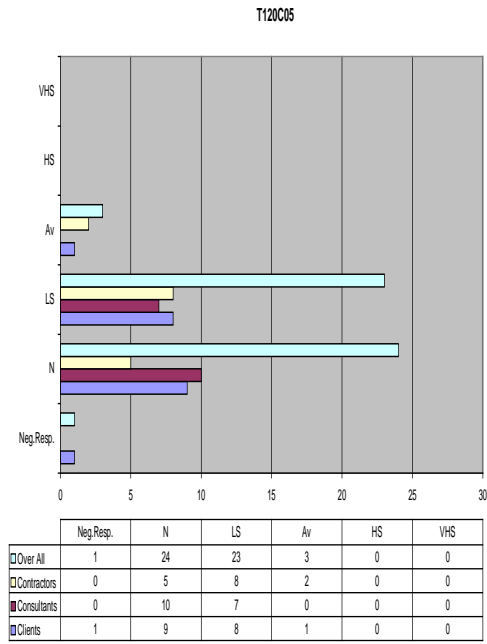


Figure 563 T120C05

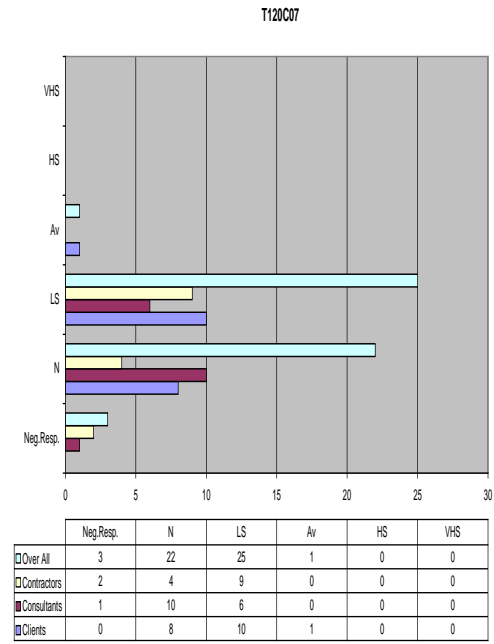


Figure 565 T120C07

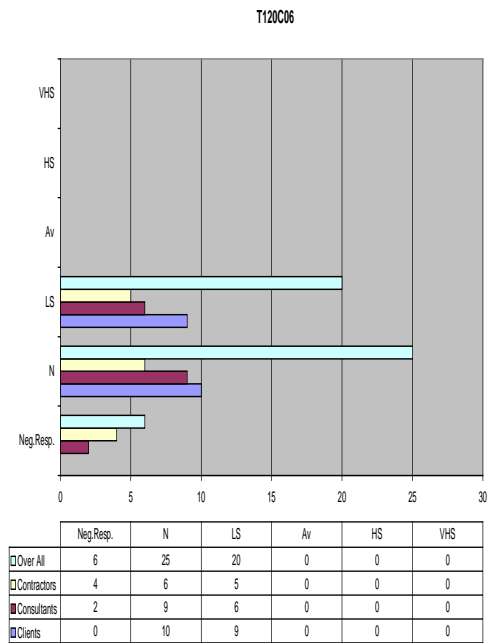


Figure 564 T120C06

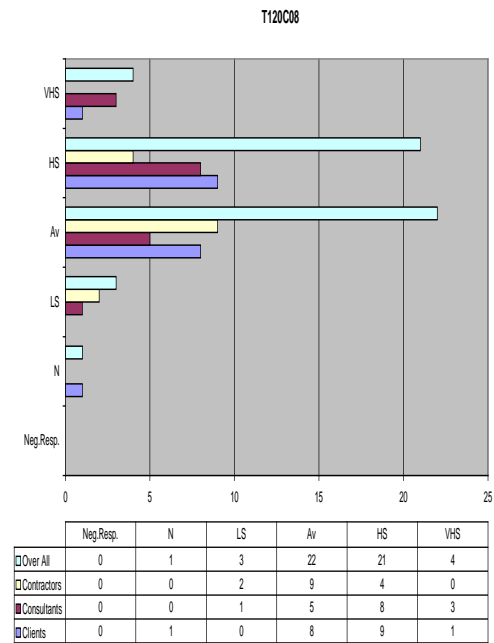


Figure 566 T120C08

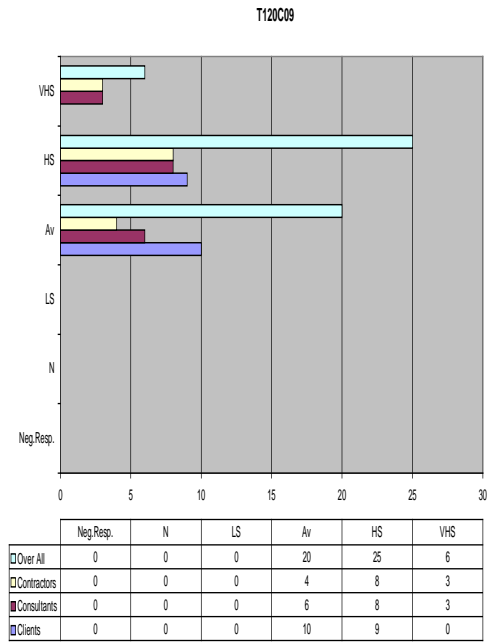


Figure 567 T120C09

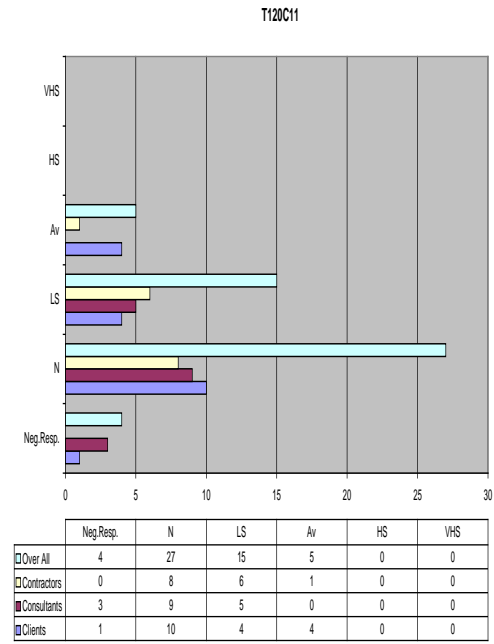


Figure 569 T120C11

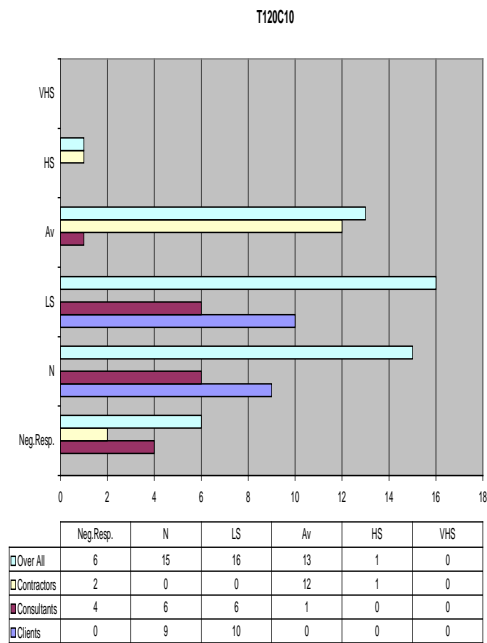


Figure 568 T120C10

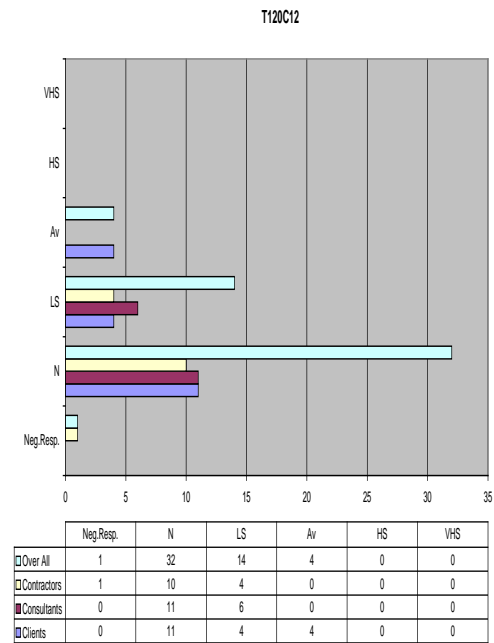


Figure 570 T120C12

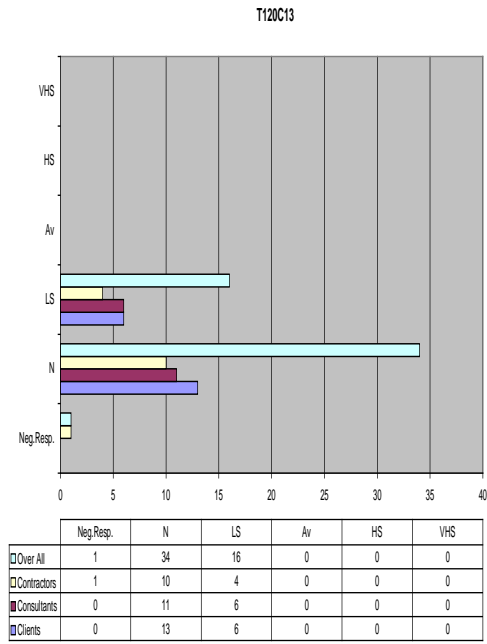


Figure 571 T120C13

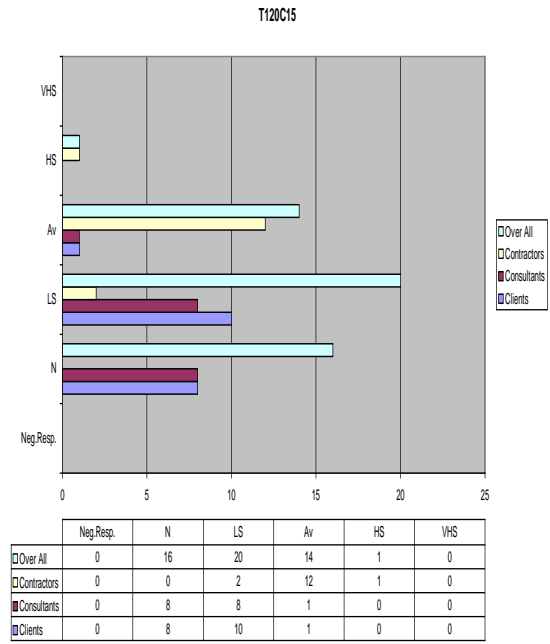


Figure 573 T120C15

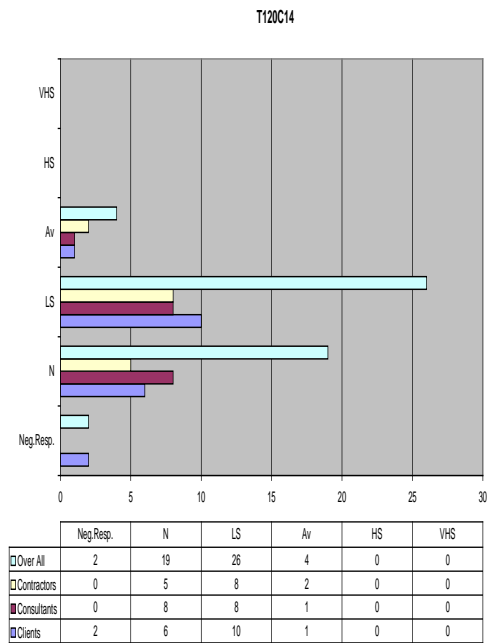


Figure 572 T120C14

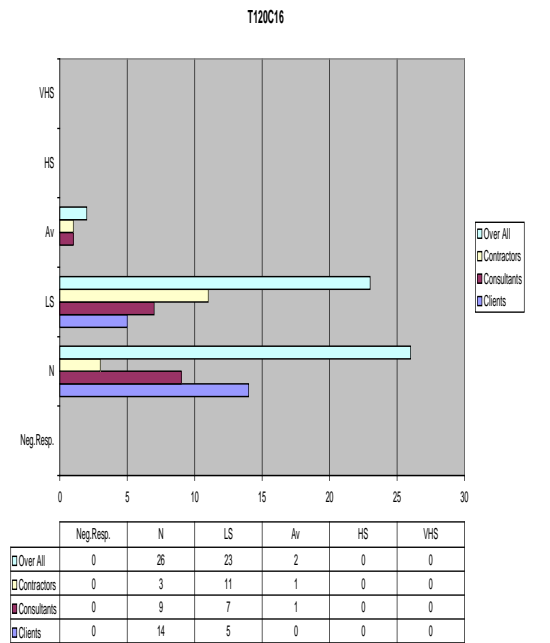


Figure 574 T120C16

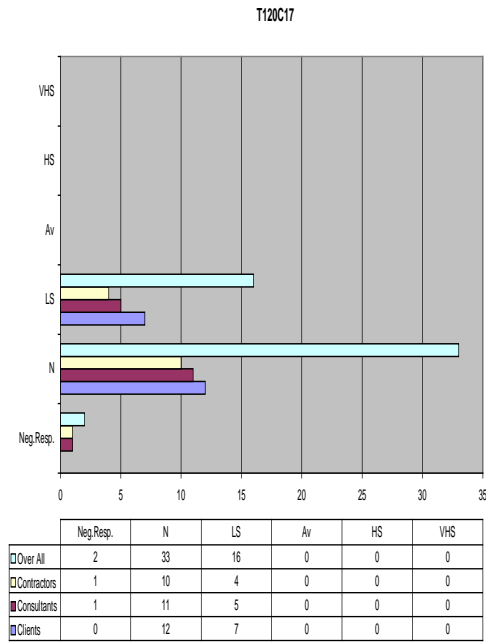


Figure 575 T120C17

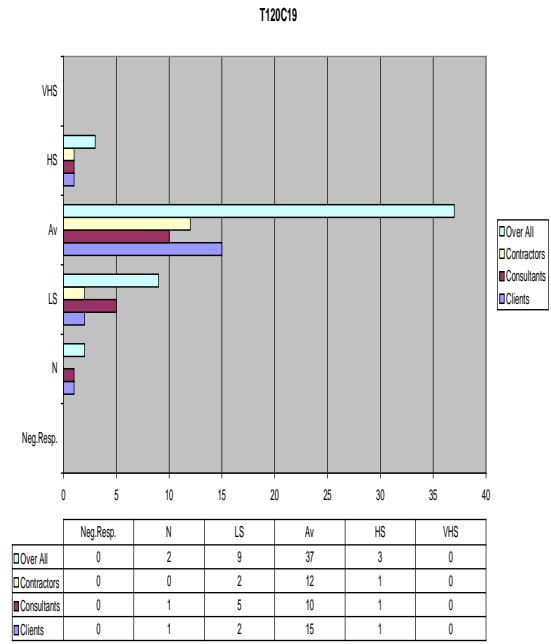


Figure 577 T120C19

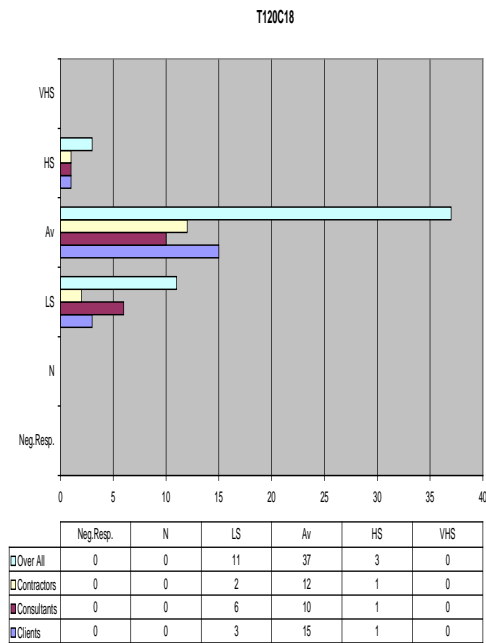


Figure 576 T120C18

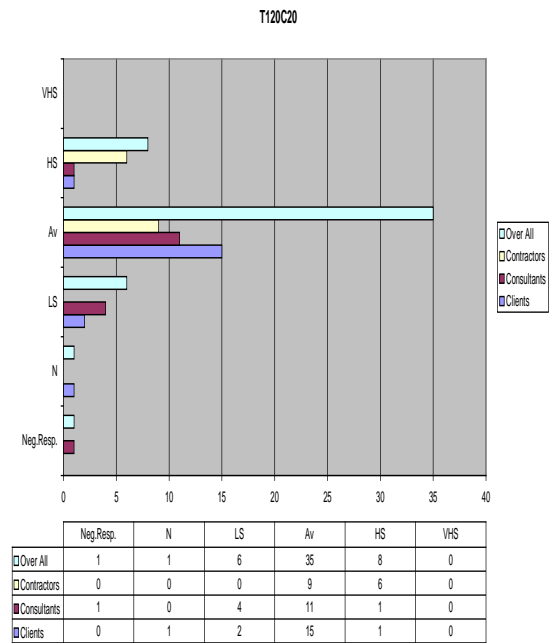


Figure 578 T120C20

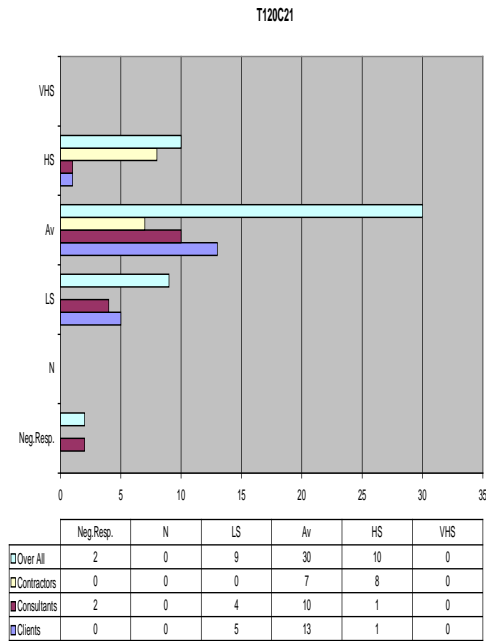


Figure 579 T120C21

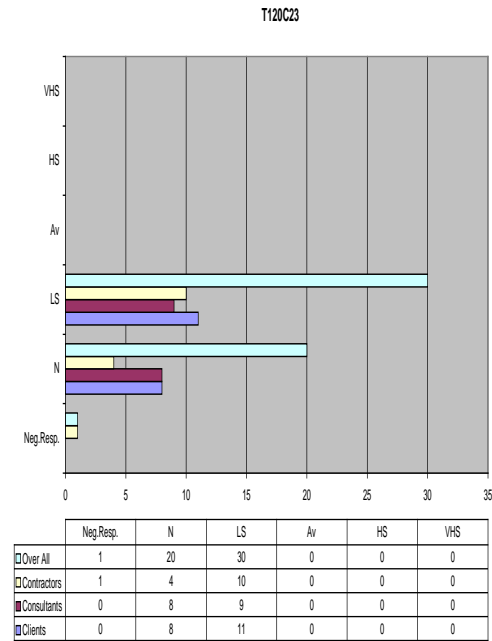


Figure 581 T120C23

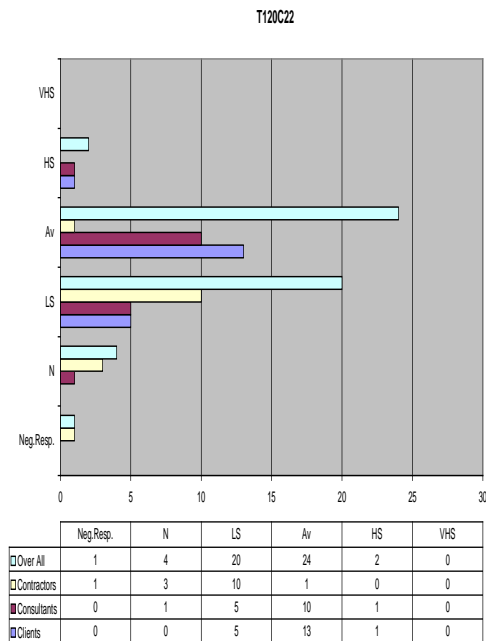


Figure 580 T120C22

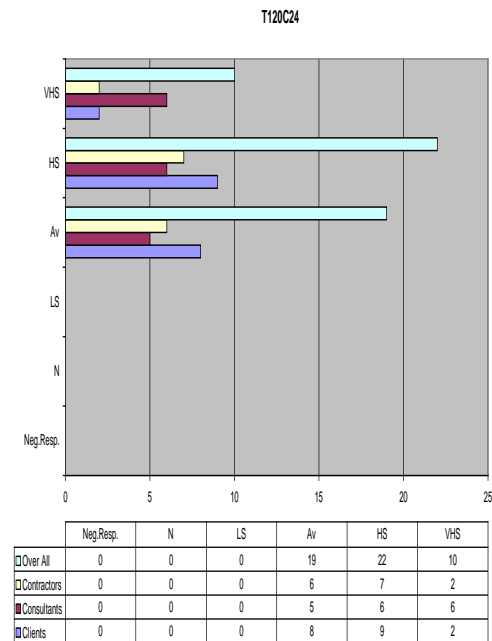


Figure 582 T120C24

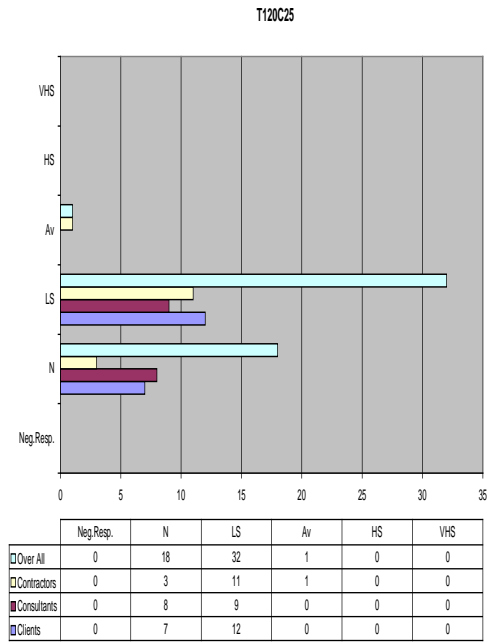


Figure 583 T120C25

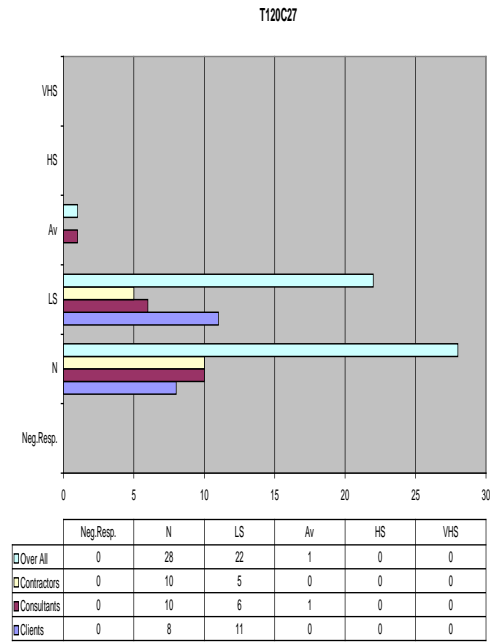


Figure 585 T120C27

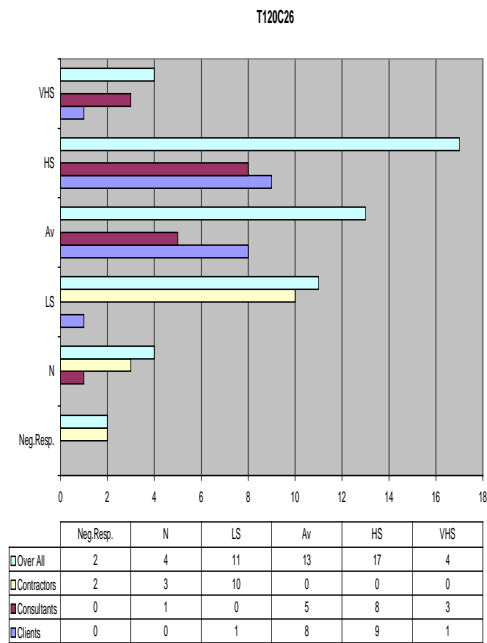


Figure 584 T120C26

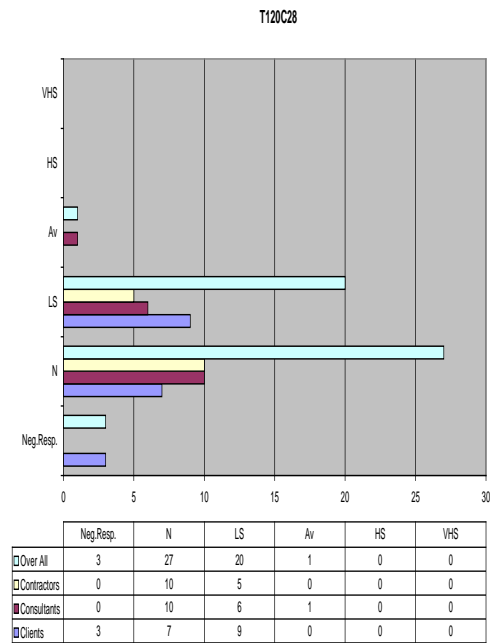


Figure 586 T120C28

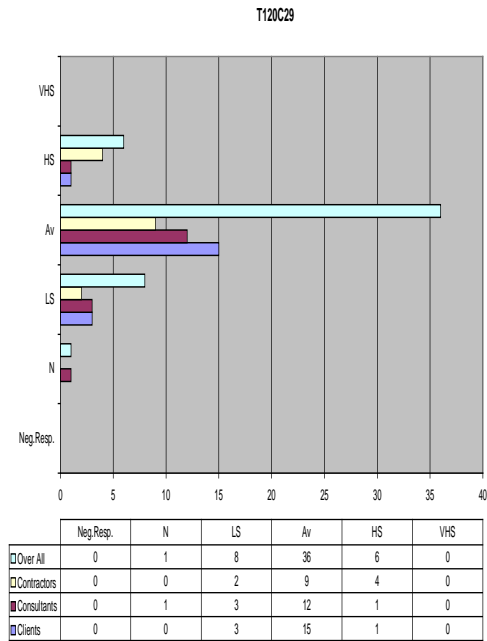


Figure 587 T120C29

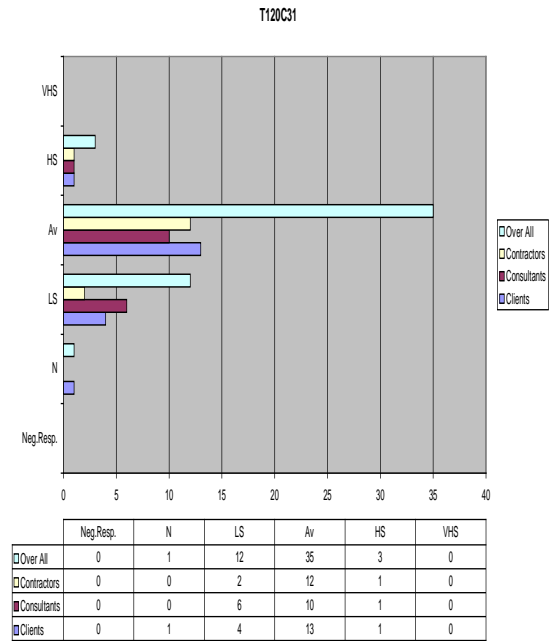


Figure 589 T120C31

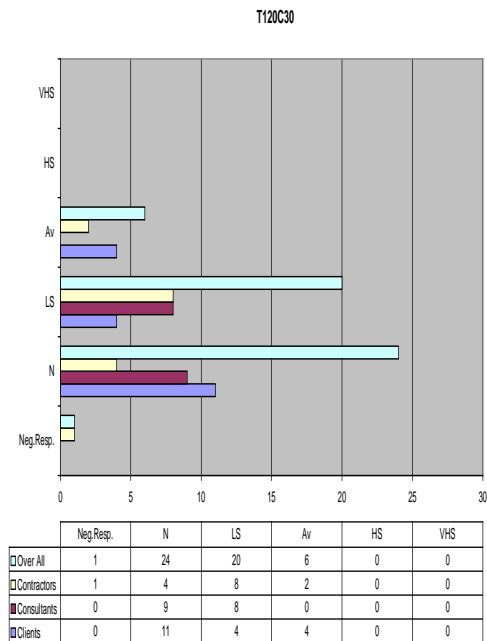


Figure 588 T120C30

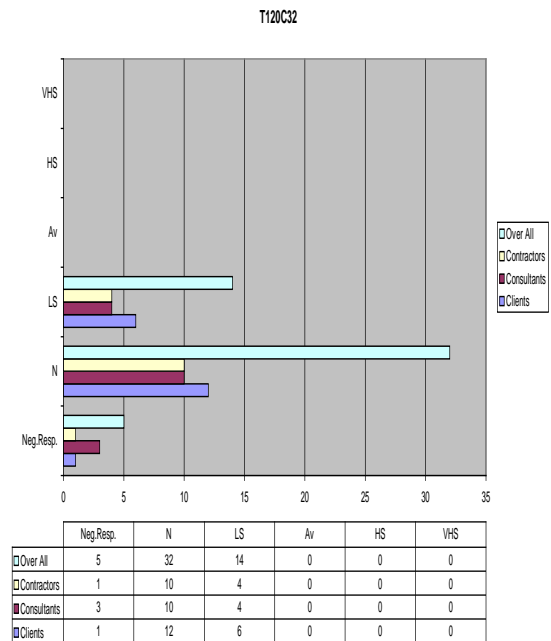


Figure 590 T120C32

Y.3.2.13 CAUSE SIGNIFICANCE ASSESSMENT: (T13 C01) – (T13 C32)

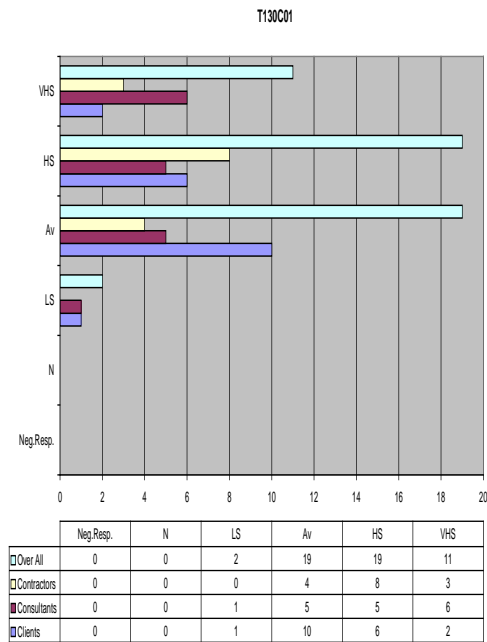


Figure 591 T130C01

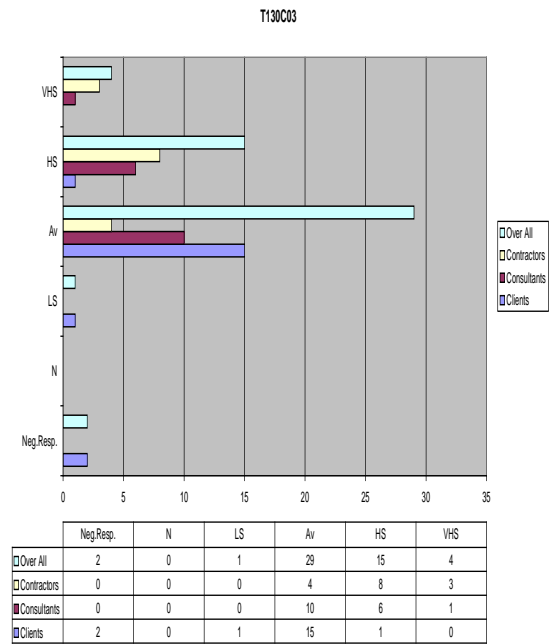


Figure 593 T130C03

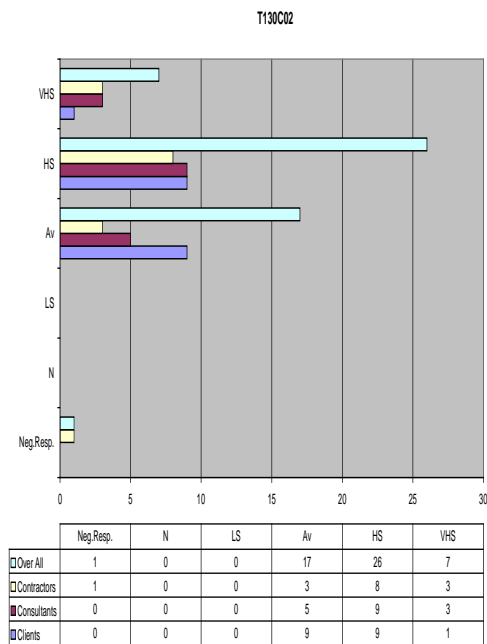


Figure 592 T130C02

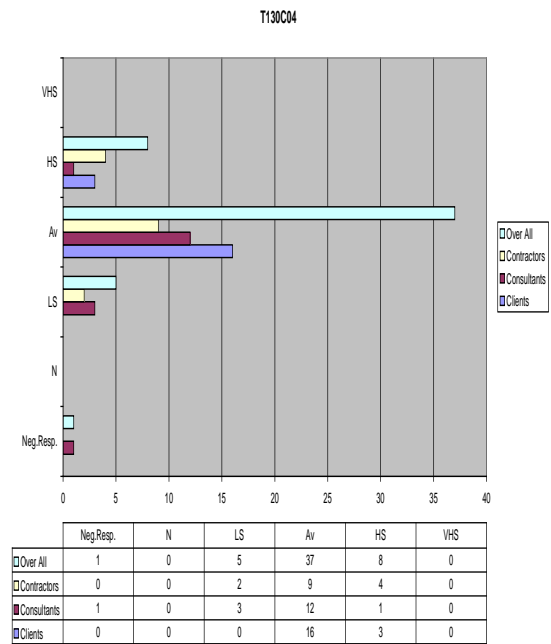


Figure 594 T130C04

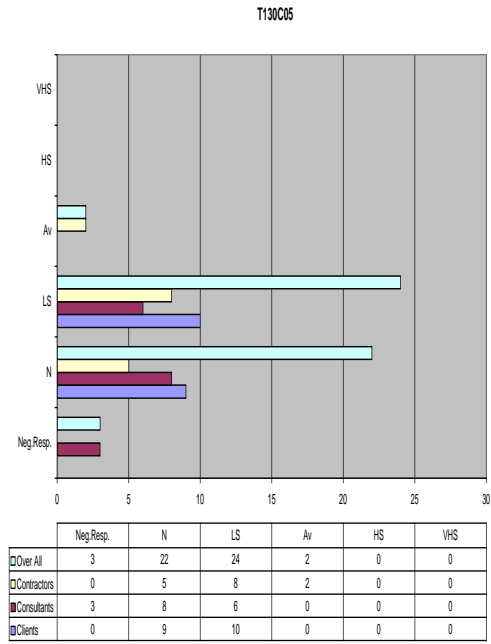


Figure 595 T130C05

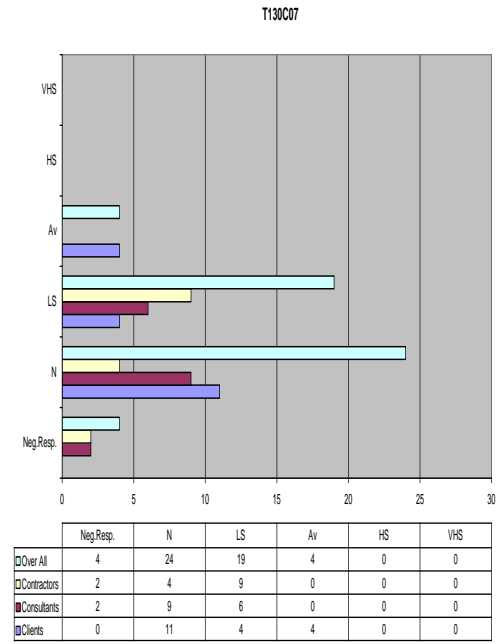


Figure 597 T130C07

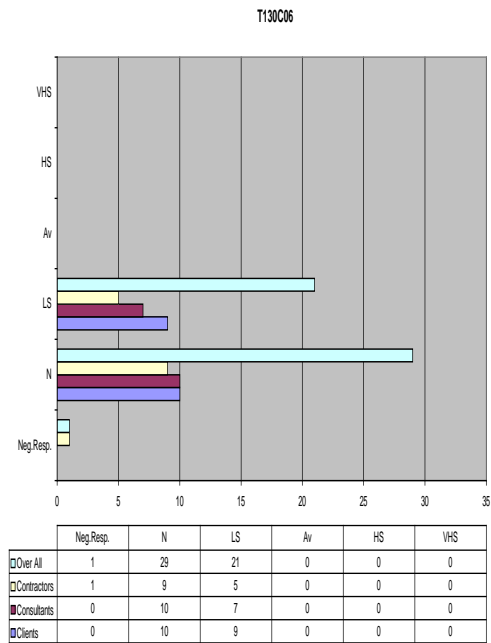


Figure 596 T130C06

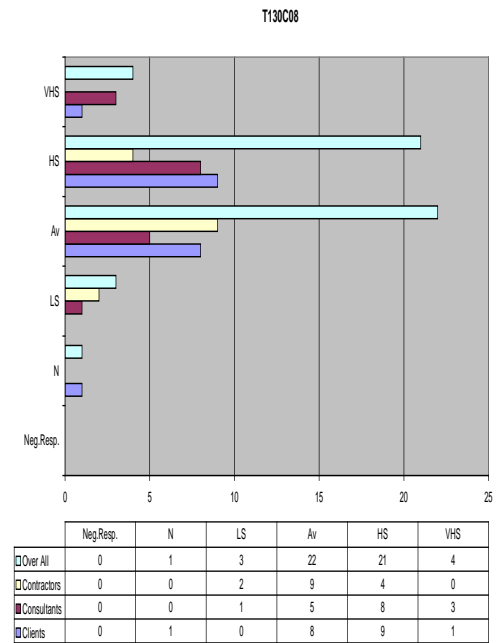


Figure 598 T130C08

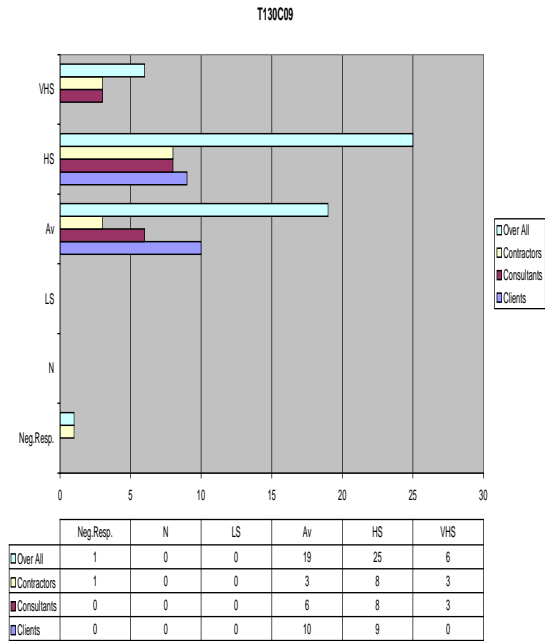


Figure 599 T130C09

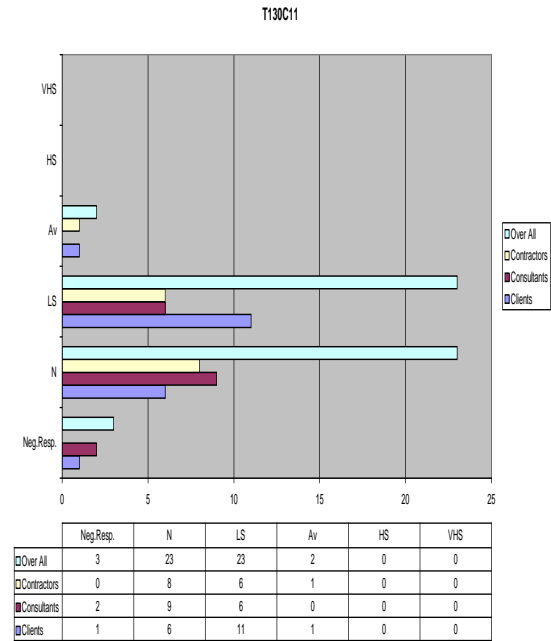


Figure 601 T130C11

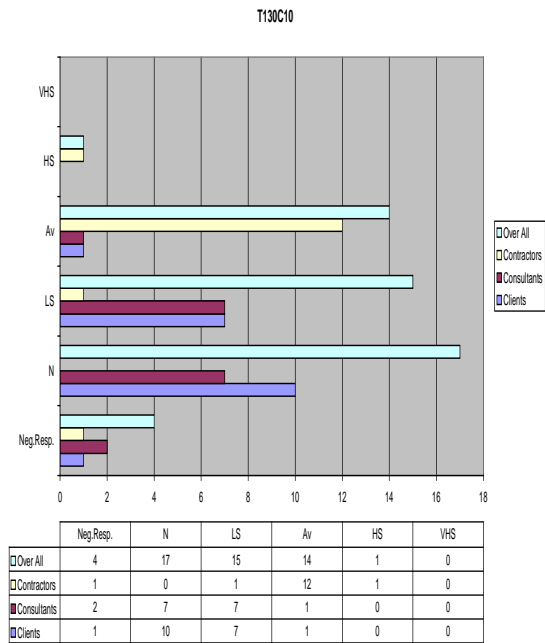


Figure 600 T130C10

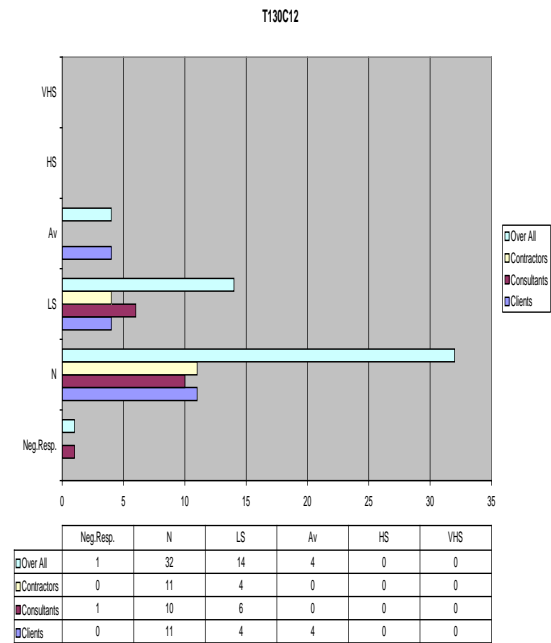


Figure 602 T130C12

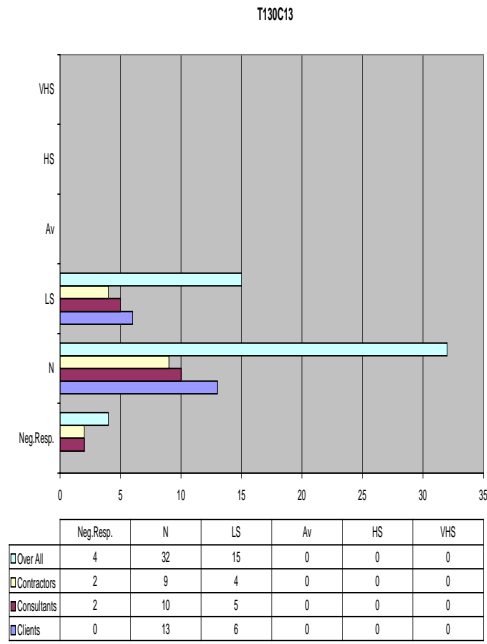


Figure 603 T130C13

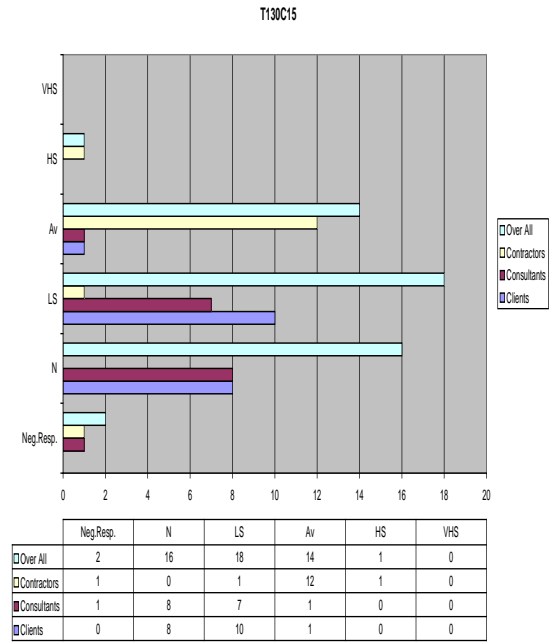


Figure 605 T130C15

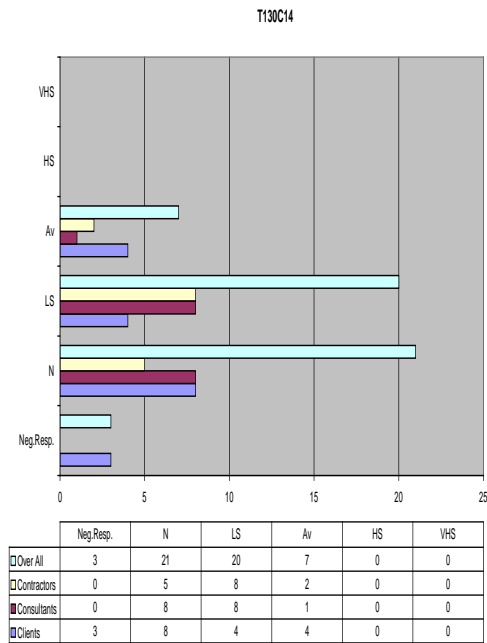


Figure 604 T130C14

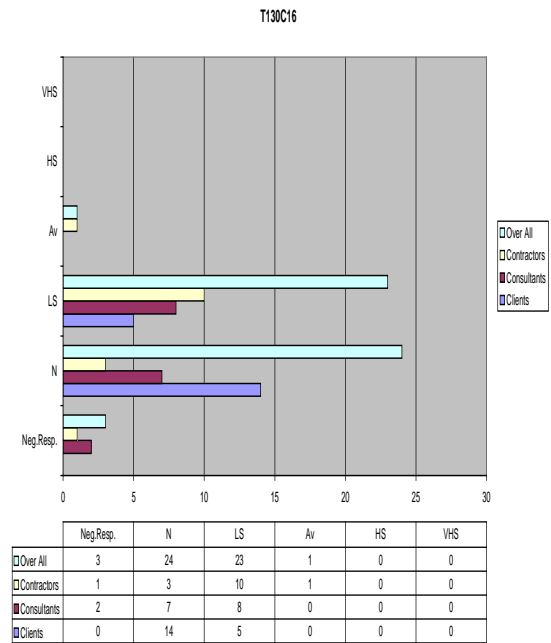


Figure 606 T130C16

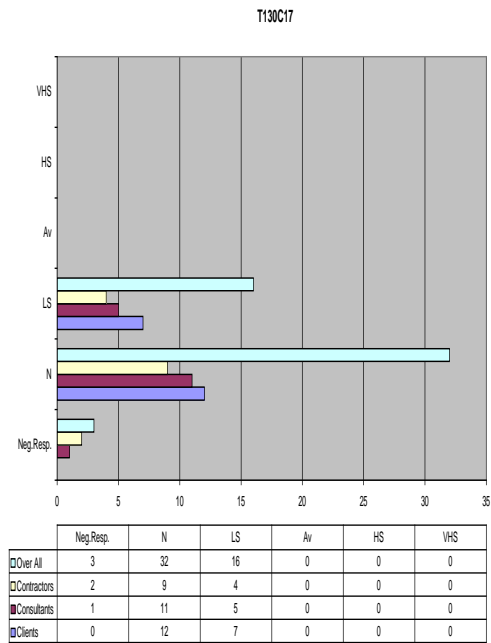


Figure 607 T130C17

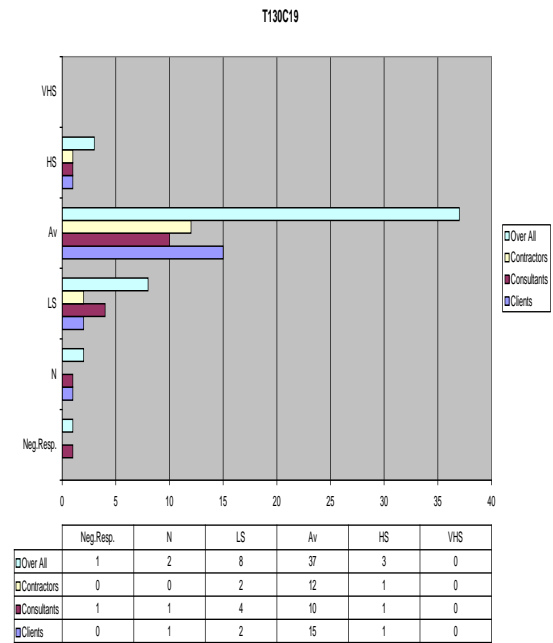


Figure 609 T130C19

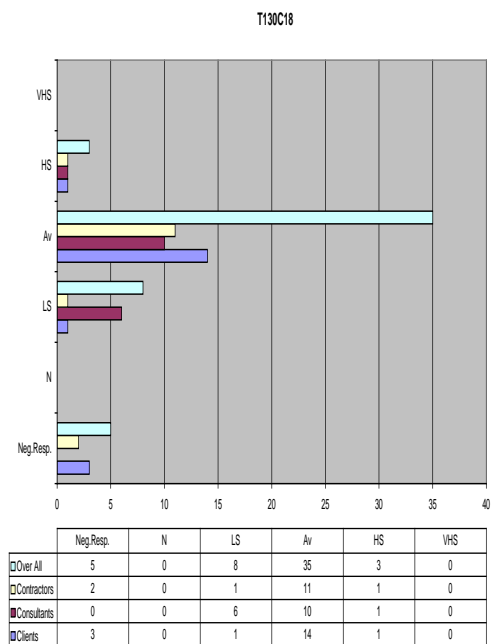


Figure 608 T130C18

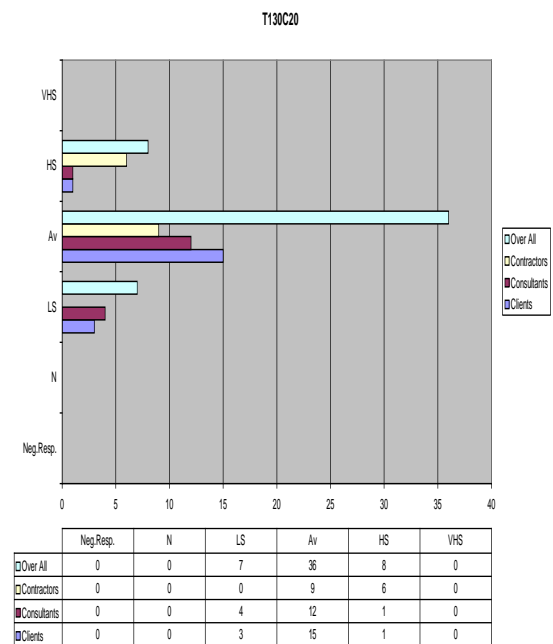


Figure 610 T130C20

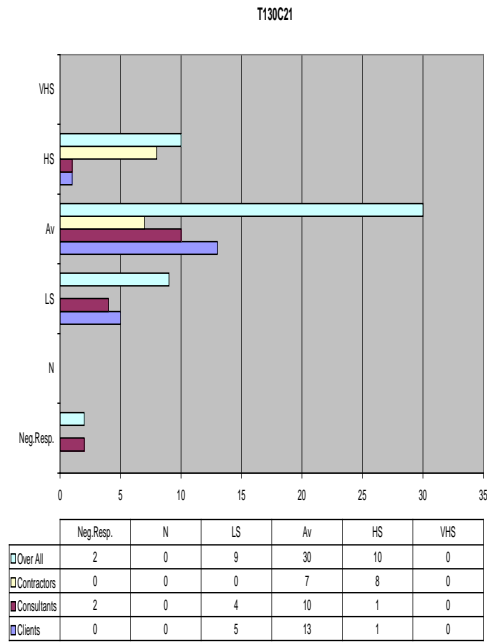


Figure 611 T130C21

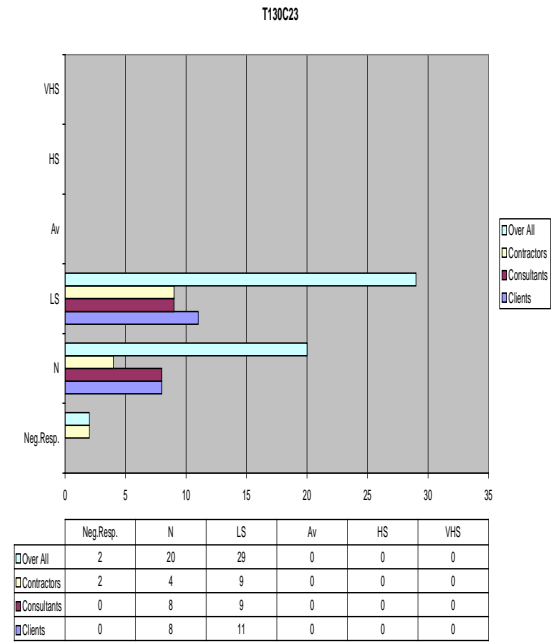


Figure 613 T130C23

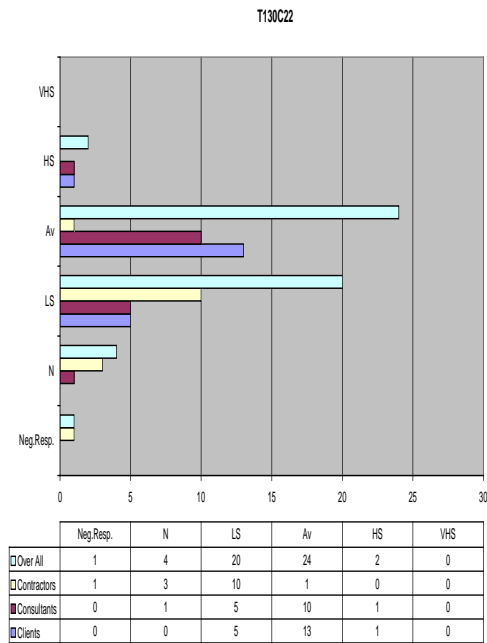


Figure 612 T130C22

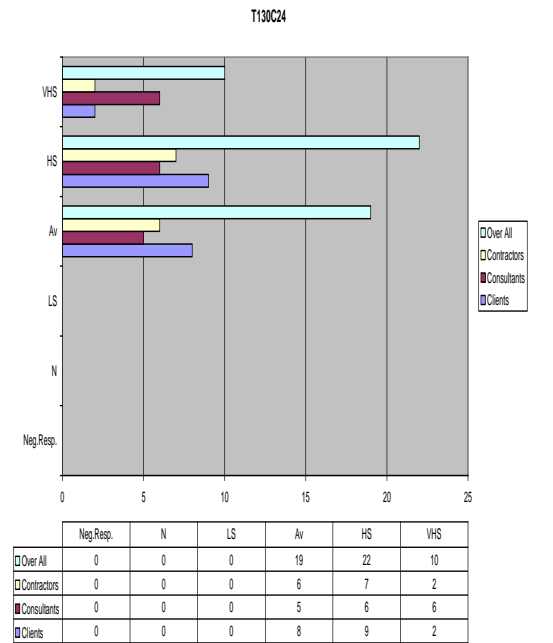


Figure 614 T130C24

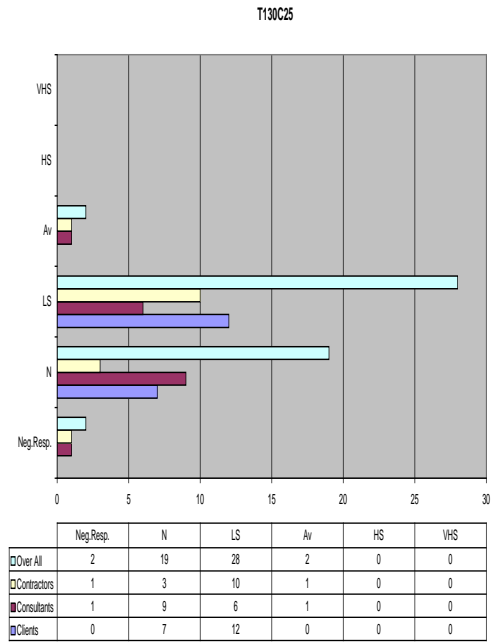


Figure 615 T130C25

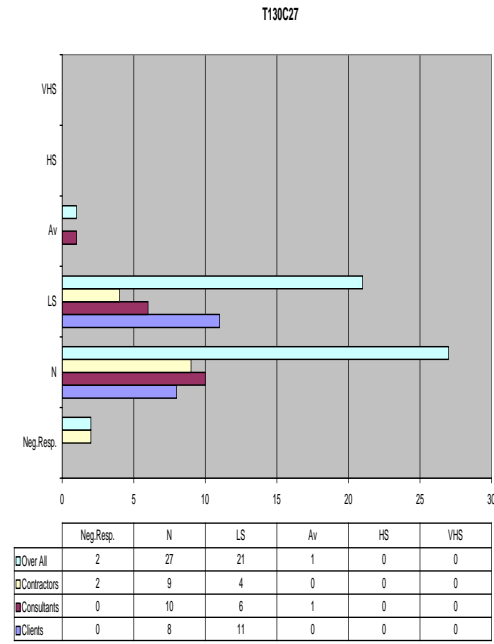


Figure 617 T130C27

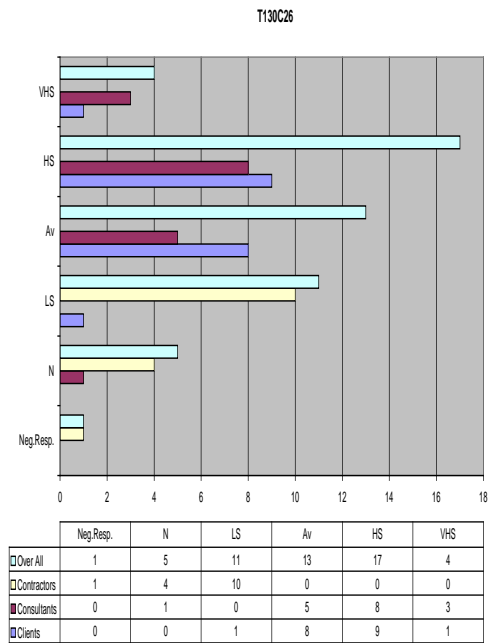


Figure 616 T130C26

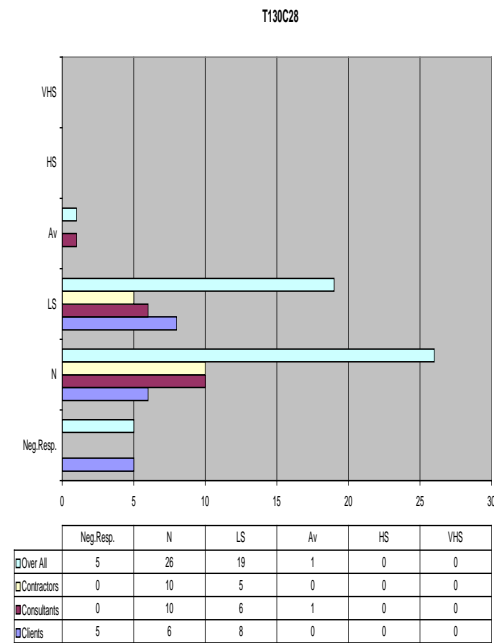


Figure 618 T130C28

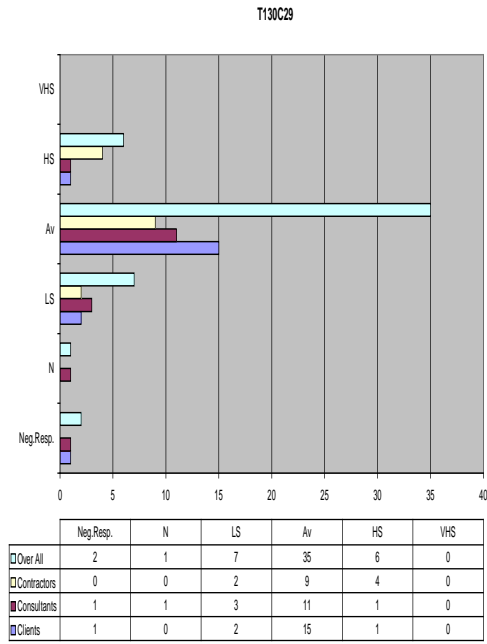


Figure 619 T130C29

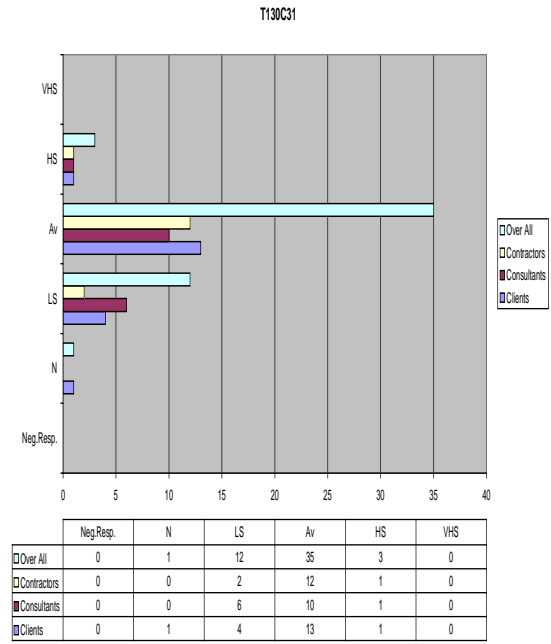


Figure 621 T130C31

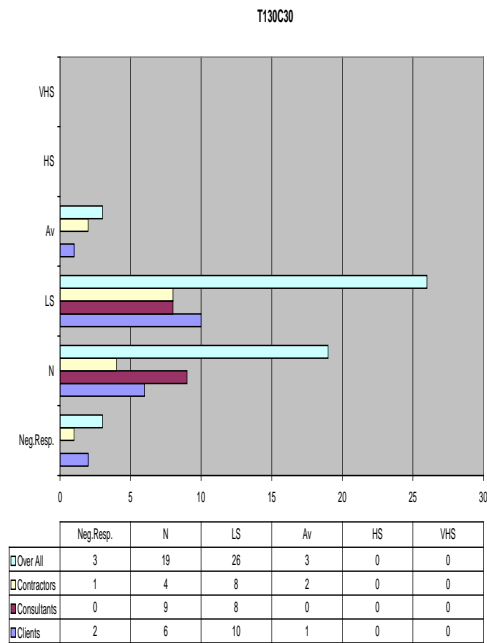


Figure 620 T130C30

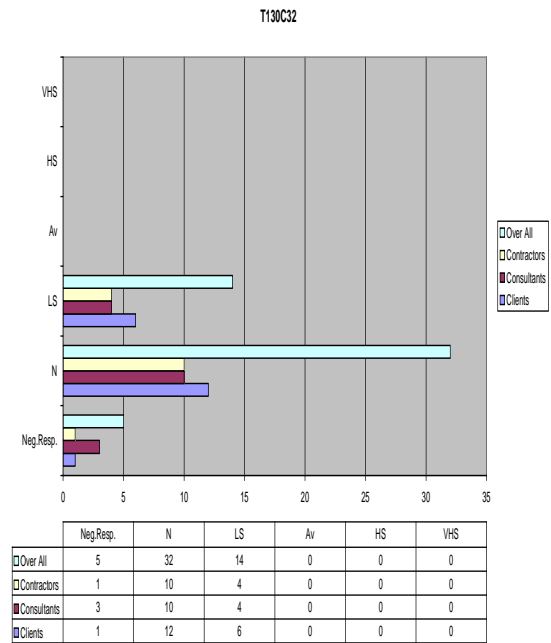


Figure 622 T130C32

Y.3.2.14 CAUSE SIGNIFICANCE ASSESSMENT: (T14 C01) – (T14 C32)

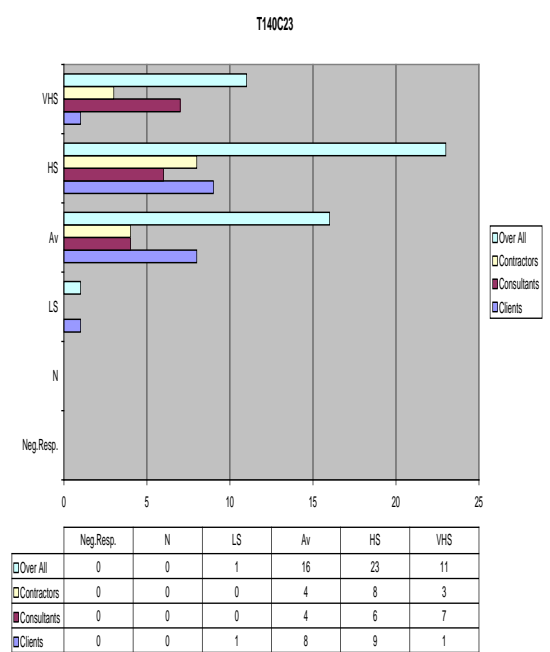


Figure 623 T140C23

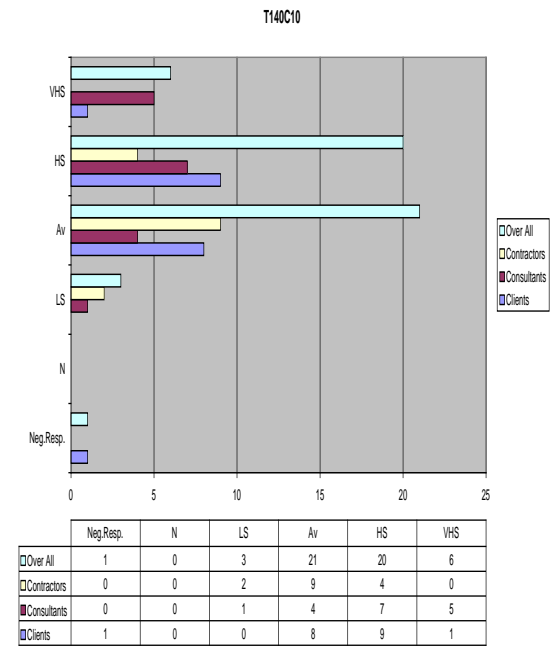


Figure 625 T140C10

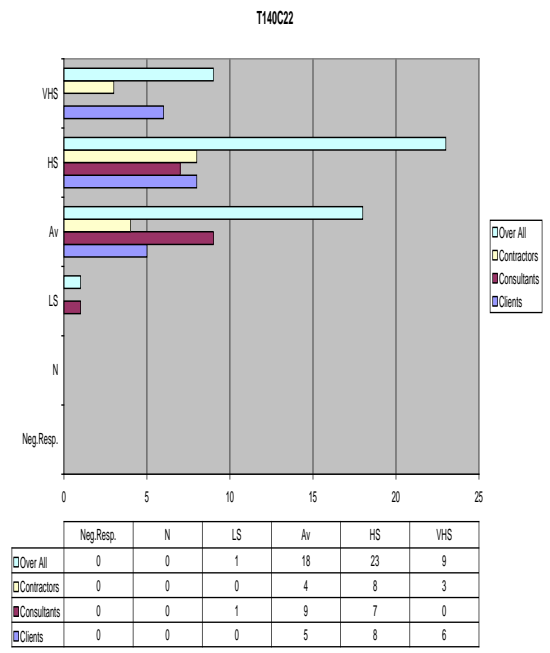


Figure 624 T140C22

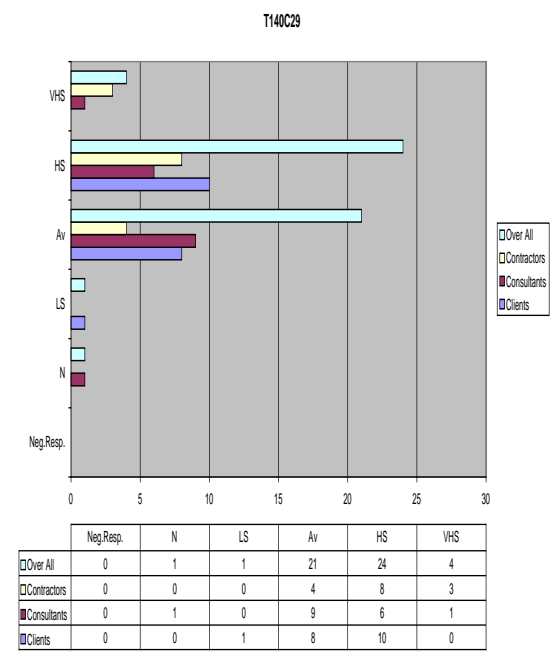


Figure 626 T140C29

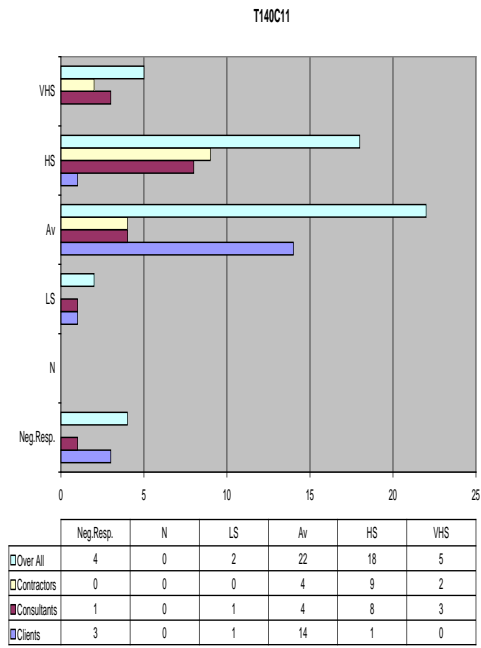


Figure 627 T140C11

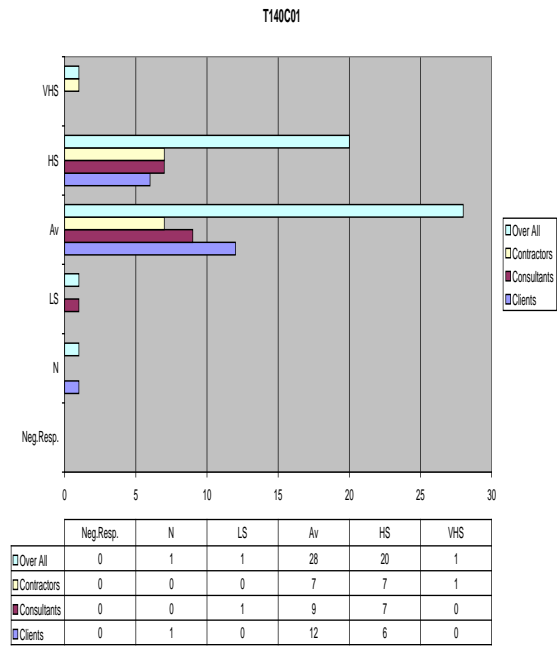


Figure 629 T140C01

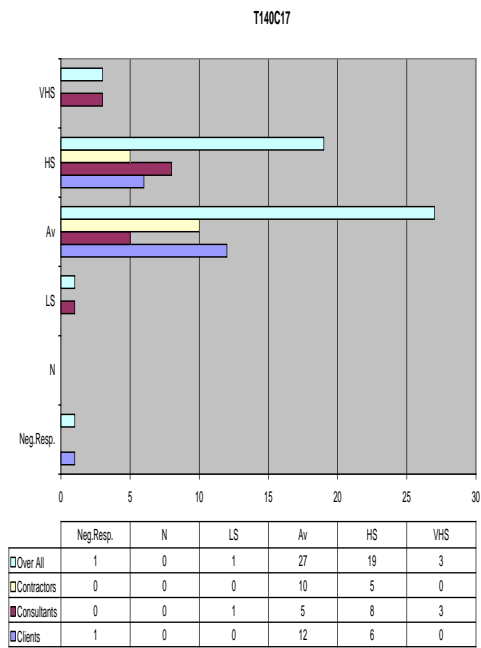


Figure 628 T140C17

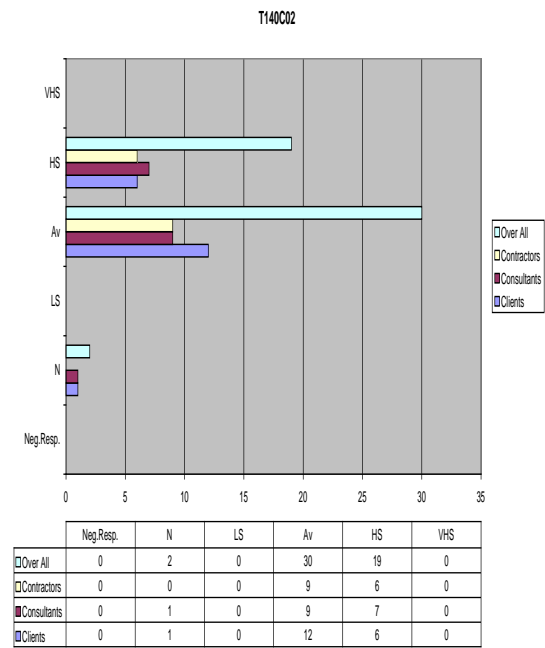


Figure 630 T140C02

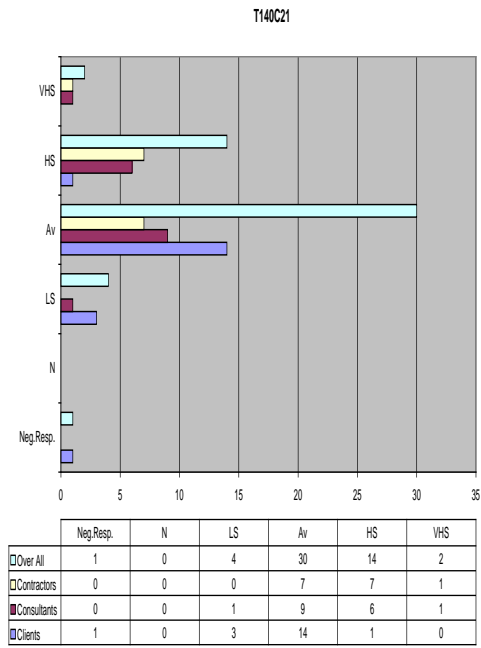


Figure 631 T140C21

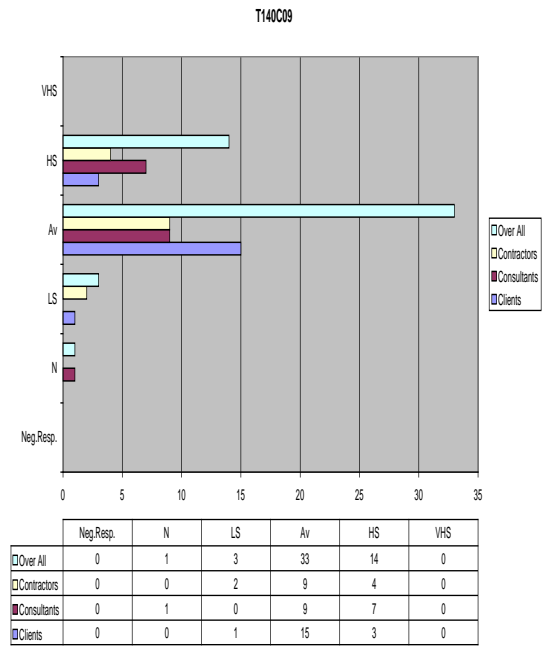


Figure 633 T140C09

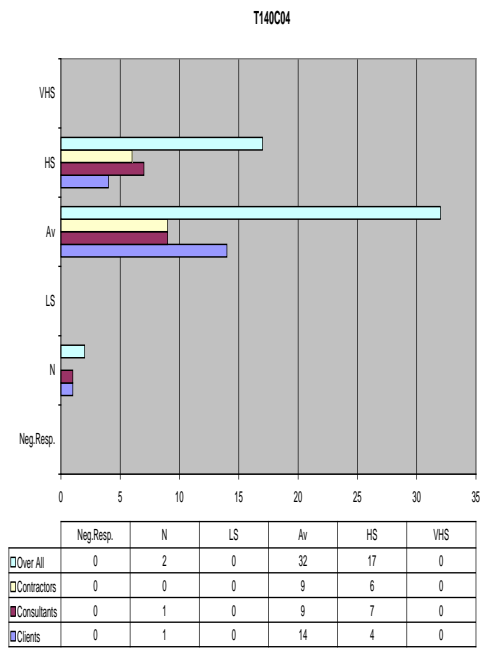


Figure 632 T140C04

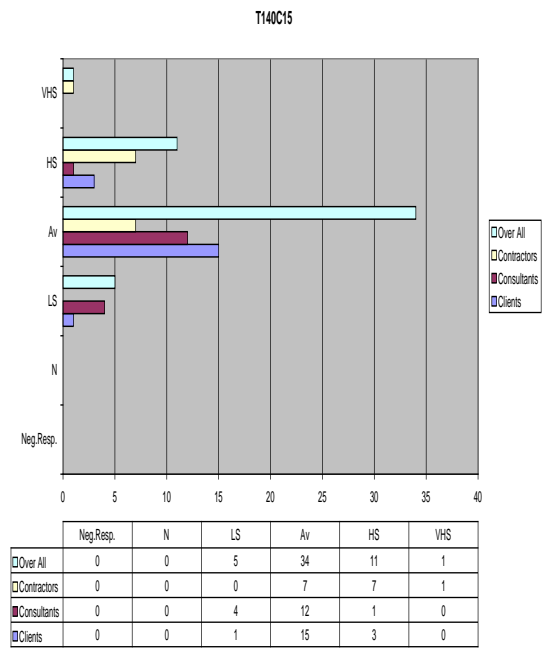


Figure 634 T140C15

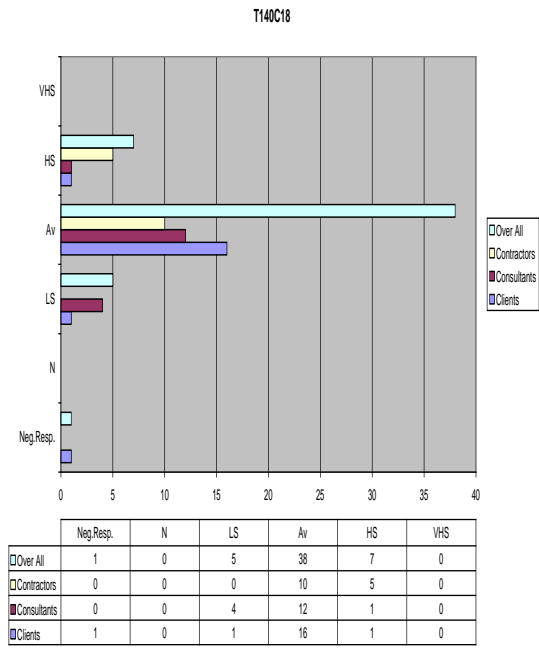


Figure 635 T140C18

Y.3.2.15 CAUSE SIGNIFICANCE ASSESSMENT: (T15 C01) – (T15 C32)

Y.3.2.16 CAUSE SIGNIFICANCE ASSESSMENT: (T16 C01) – (T16 C32)

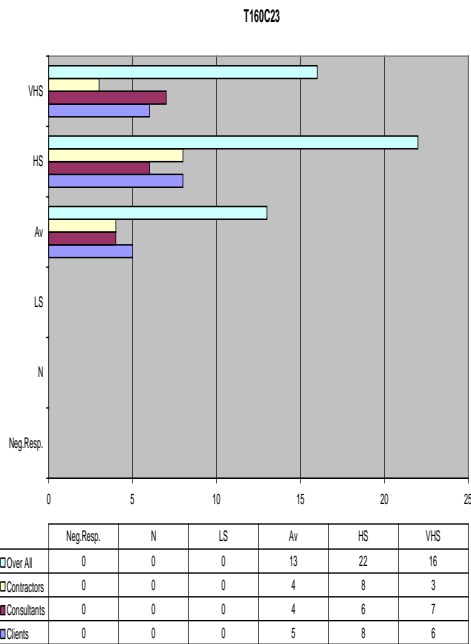


Figure 636 T160C23

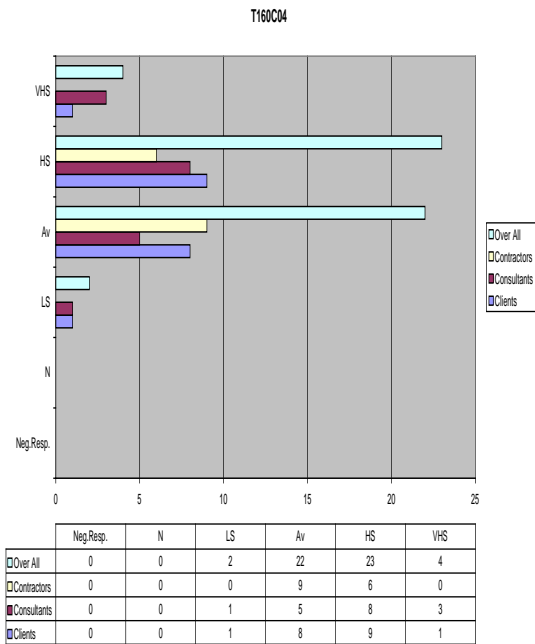


Figure 638 T160C04

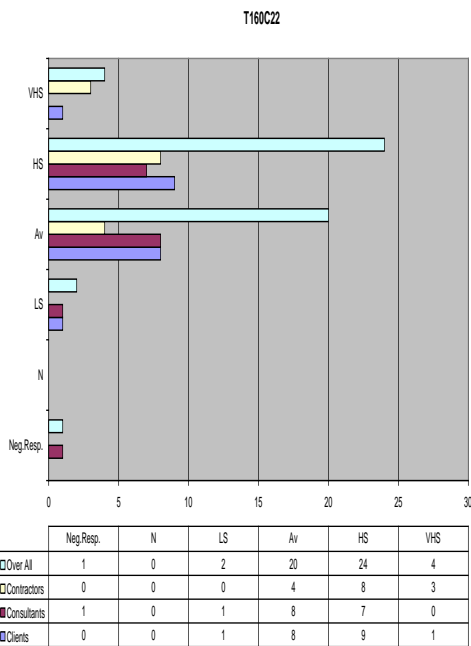


Figure 637 T160C22

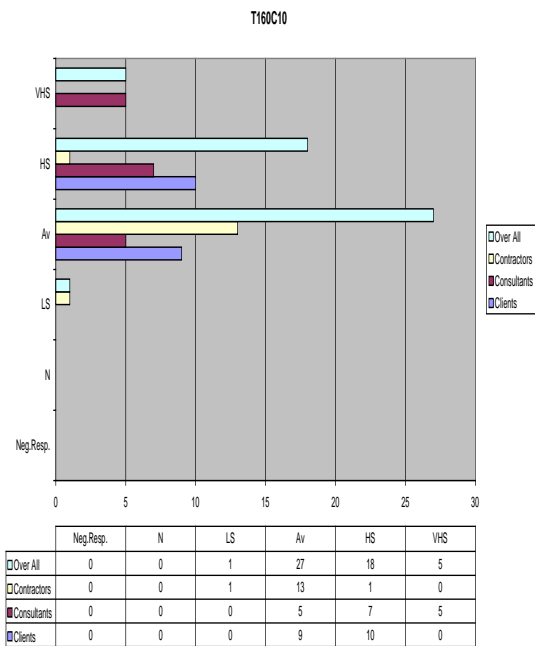


Figure 639 T160C10

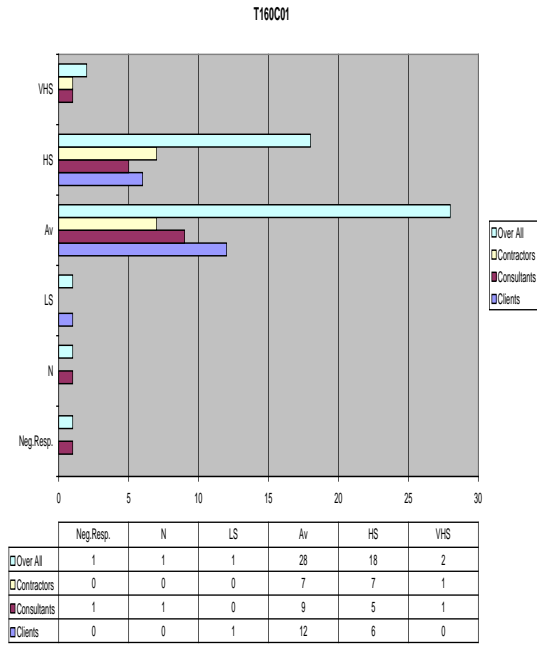


Figure 640 T160C01

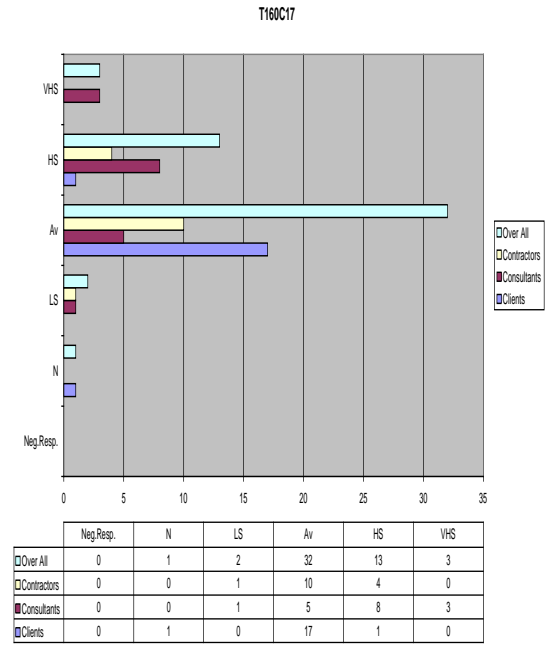


Figure 642 T160C17

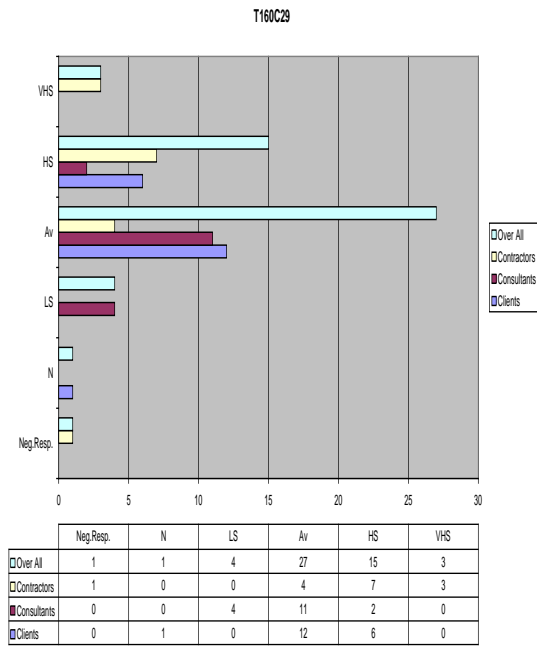


Figure 641 T160C29

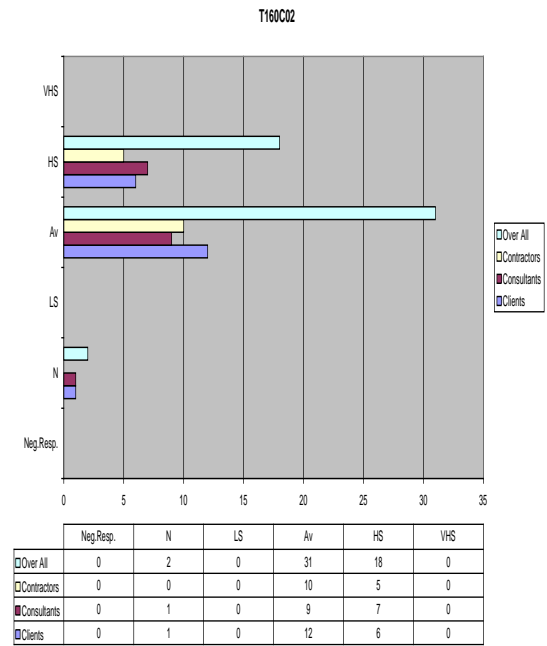


Figure 643 T160C02

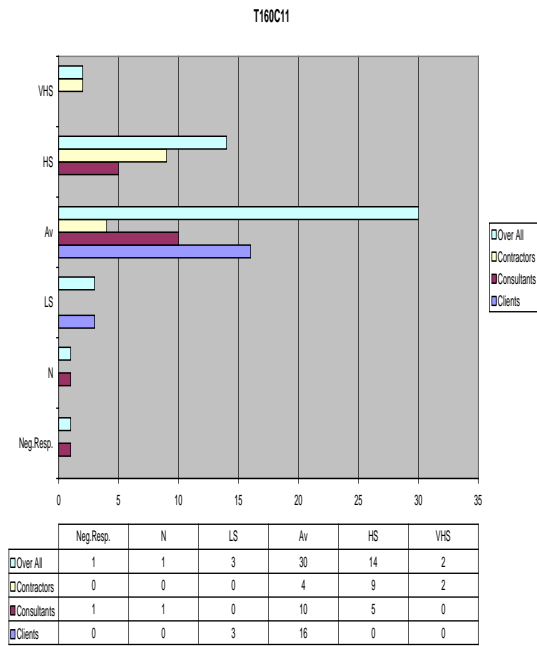


Figure 644 T160C11

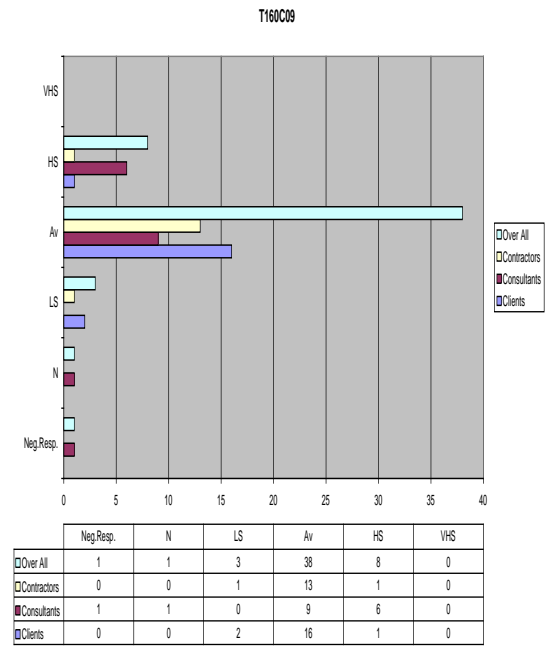


Figure 646 T160C09

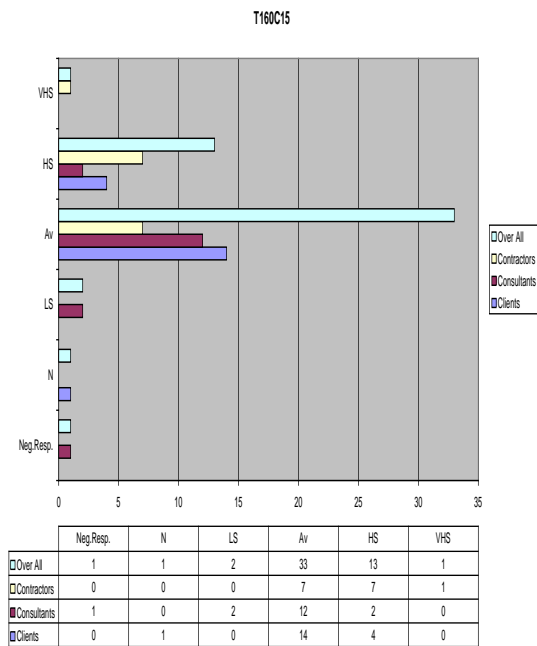


Figure 645 T160C15

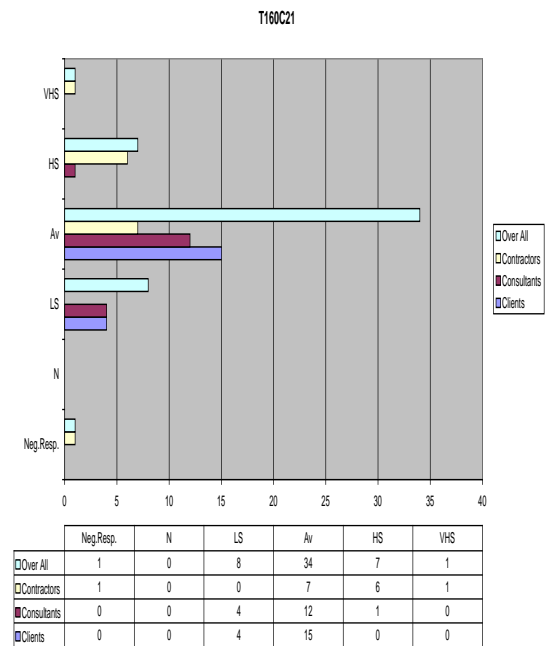


Figure 647 T160C21

Y.3.2.17 CAUSE SIGNIFICANCE ASSESSMENT: (T17 C01) – (T17 C32)

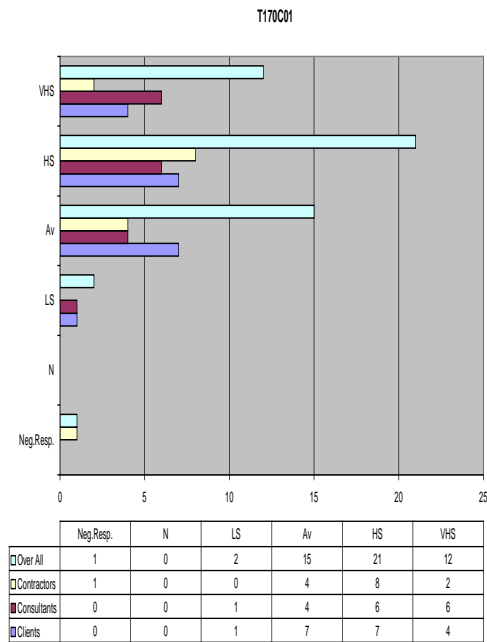


Figure 648 T17C01

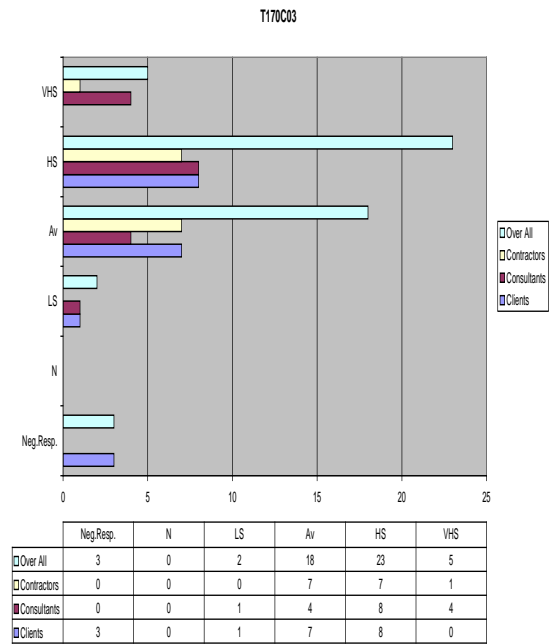


Figure 650 T17C03

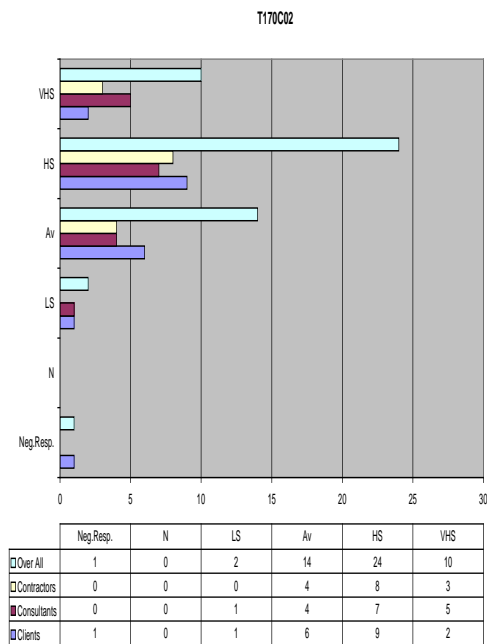


Figure 649 T17C02

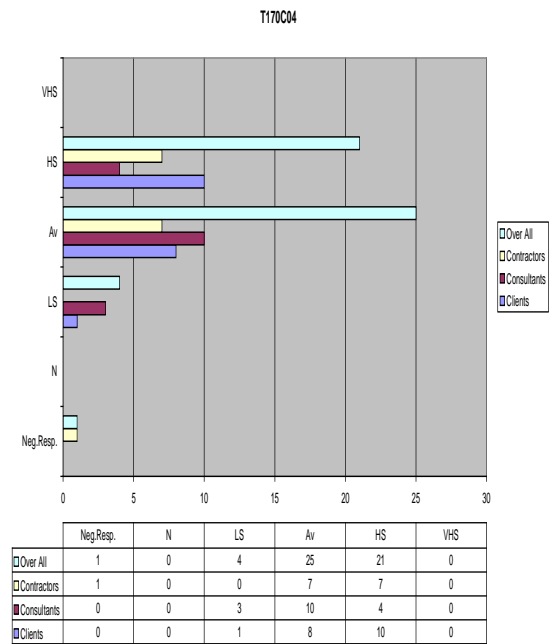


Figure 651 T17C04

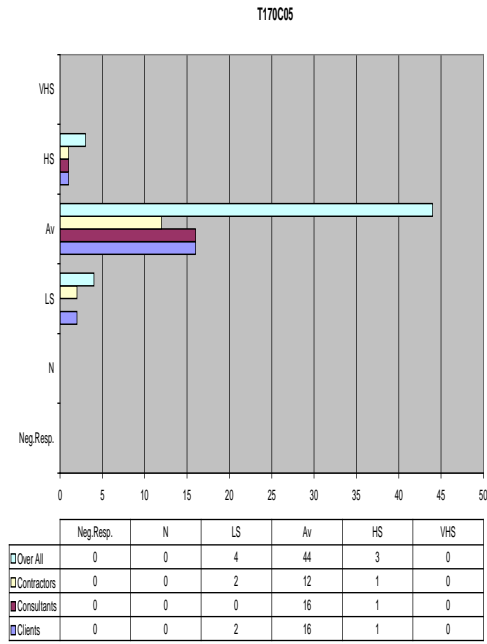


Figure 652 T170C05

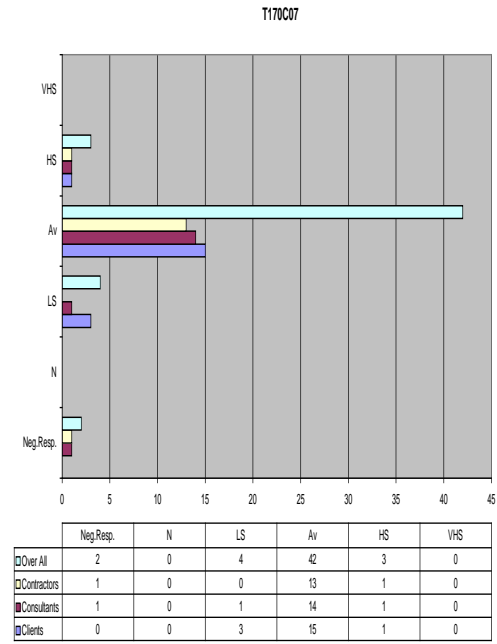


Figure 654 T170C07

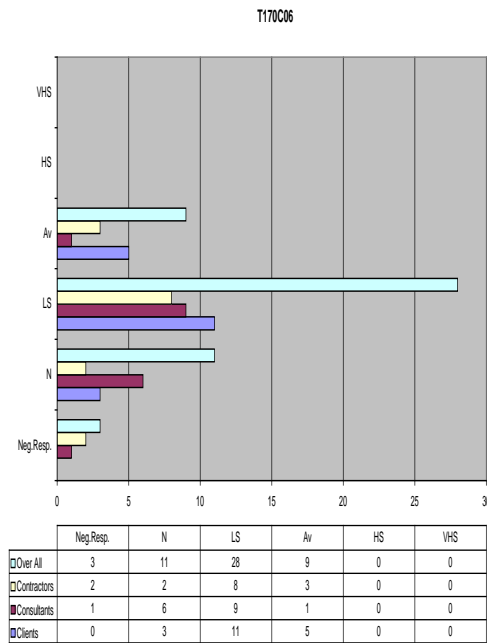


Figure 653 T170C06

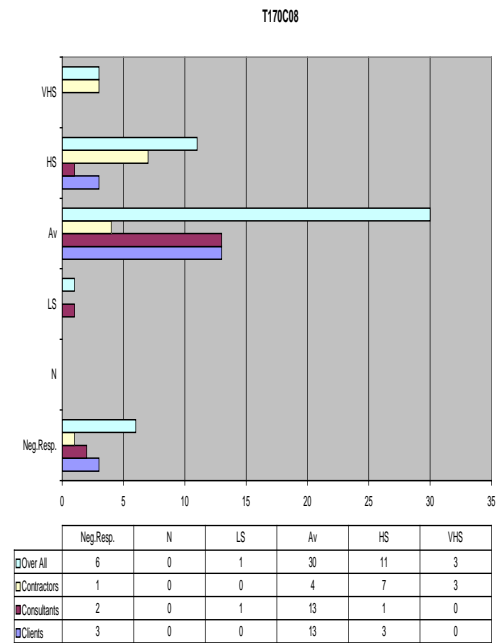


Figure 655 T170C08

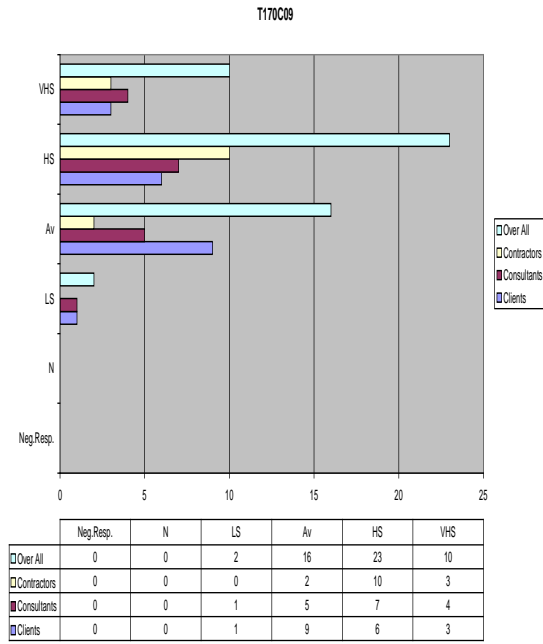


Figure 656 T170C09

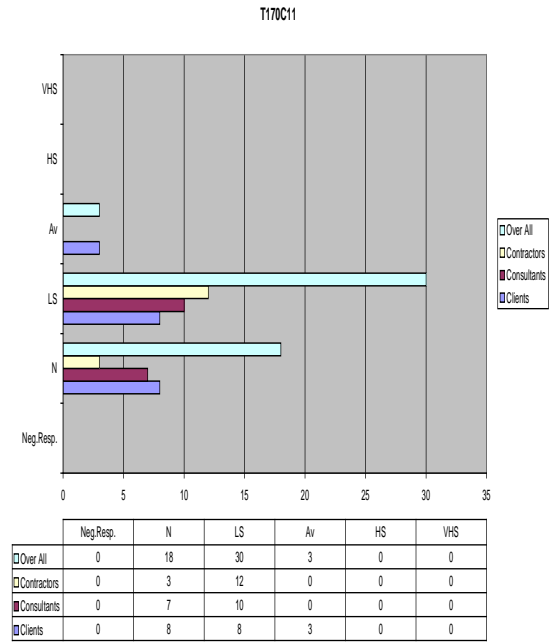


Figure 658 T170C11

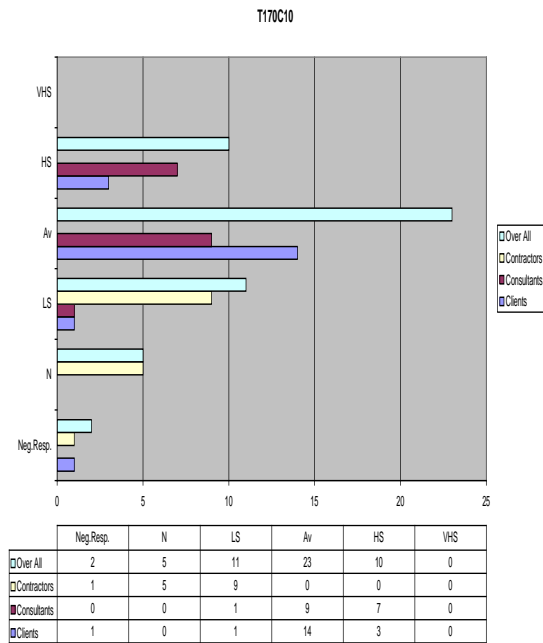


Figure 657 T170C10

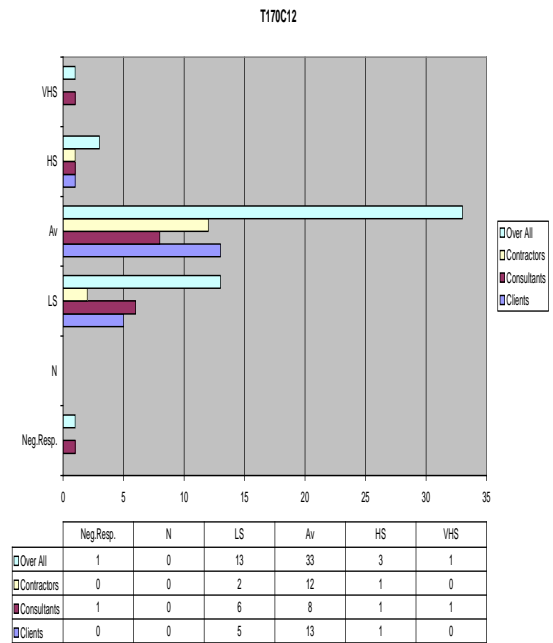


Figure 659 T170C12

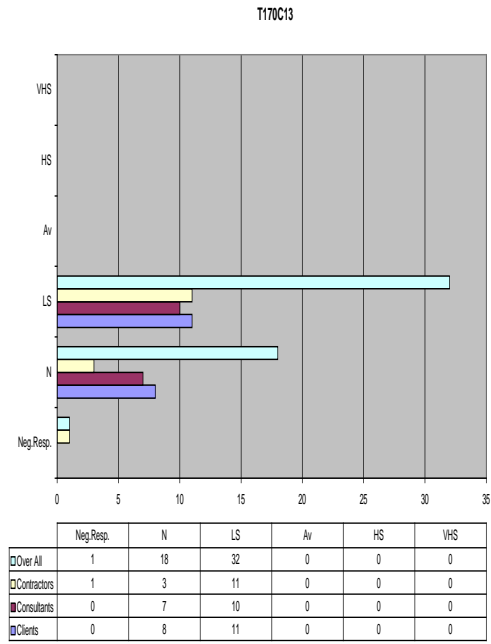


Figure 660 T170C13

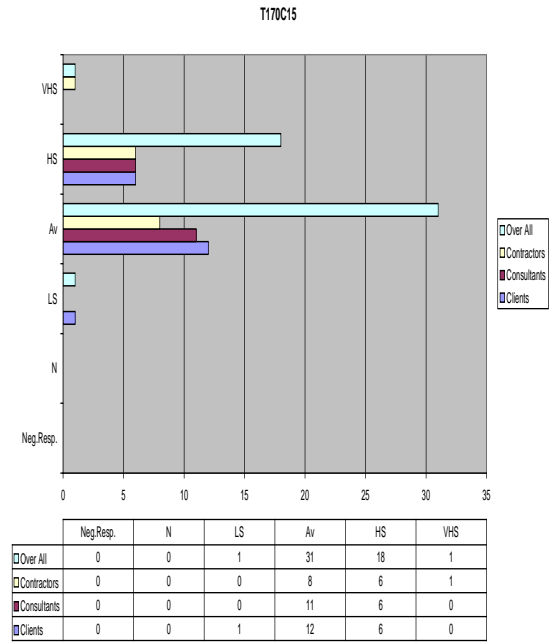


Figure 662 T170C15

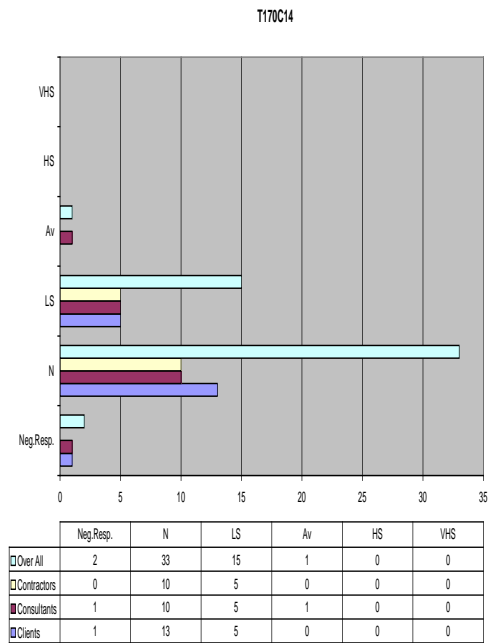


Figure 661 T170C14

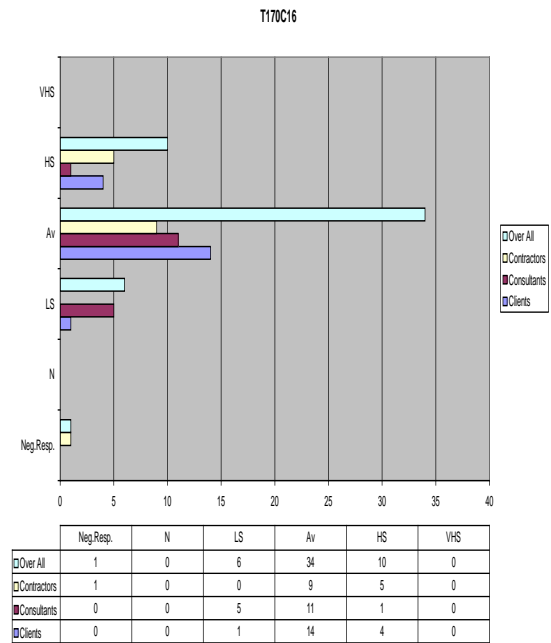


Figure 663 T170C16

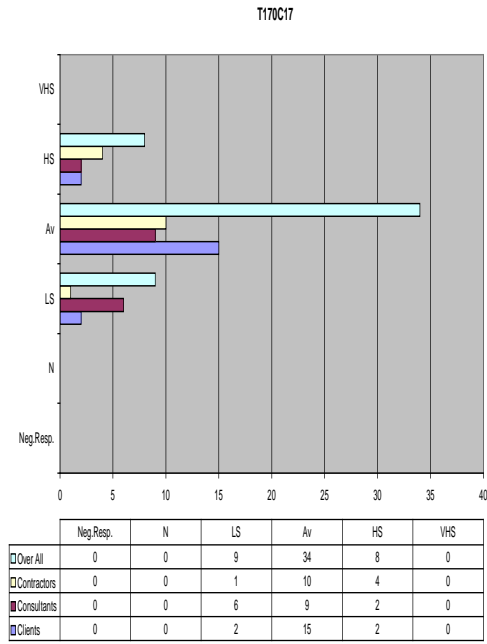


Figure 664 T170C17

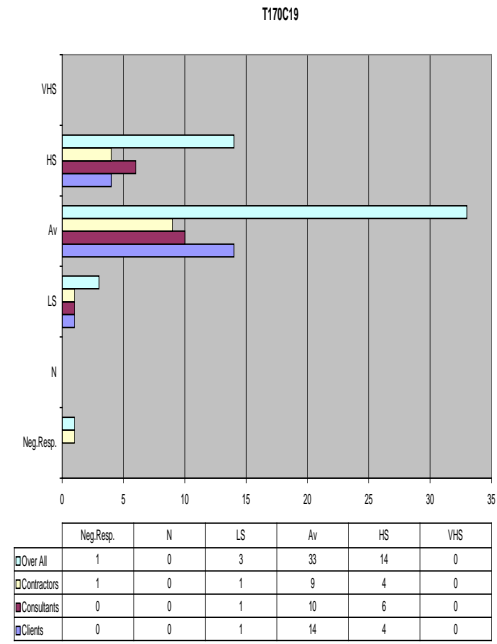


Figure 666 T170C19

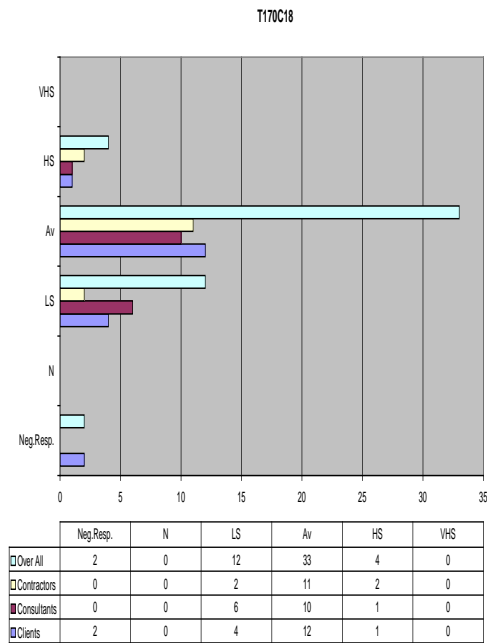


Figure 665 T170C18

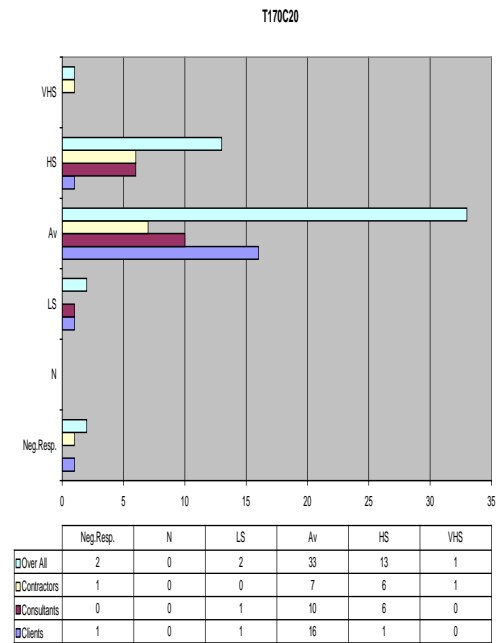


Figure 667 T170C20

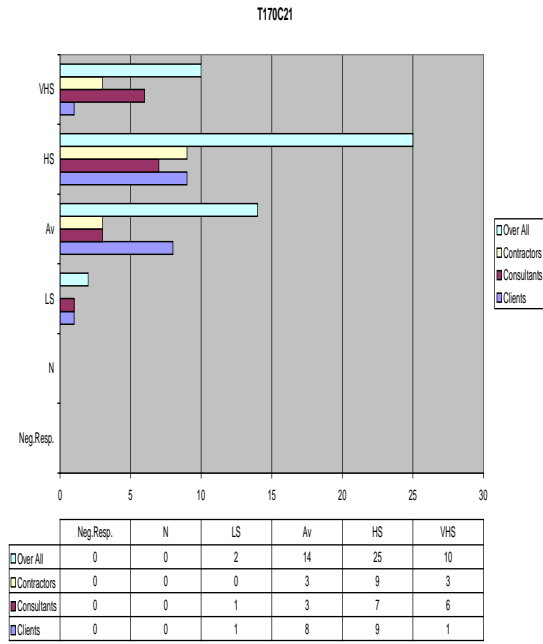


Figure 668 T170C21

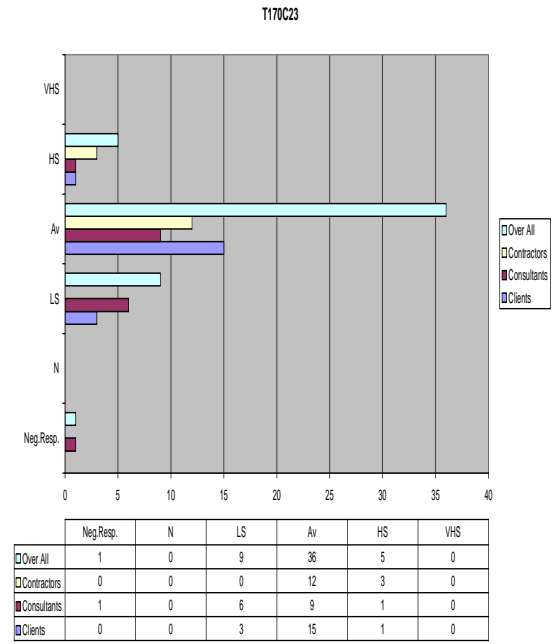


Figure 670 T170C23

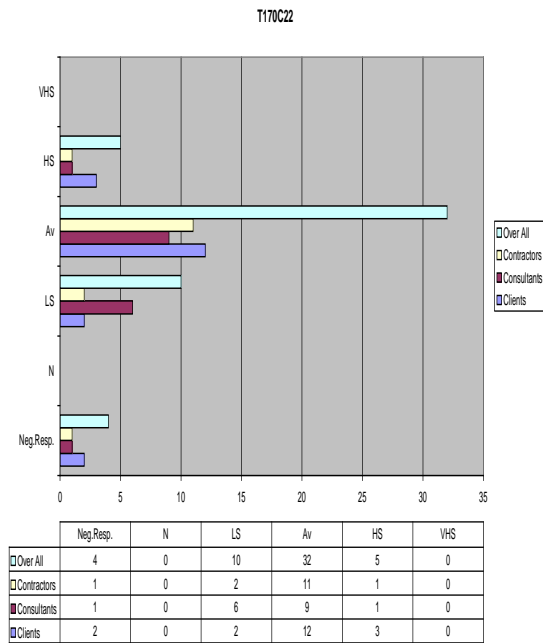


Figure 669 T170C22

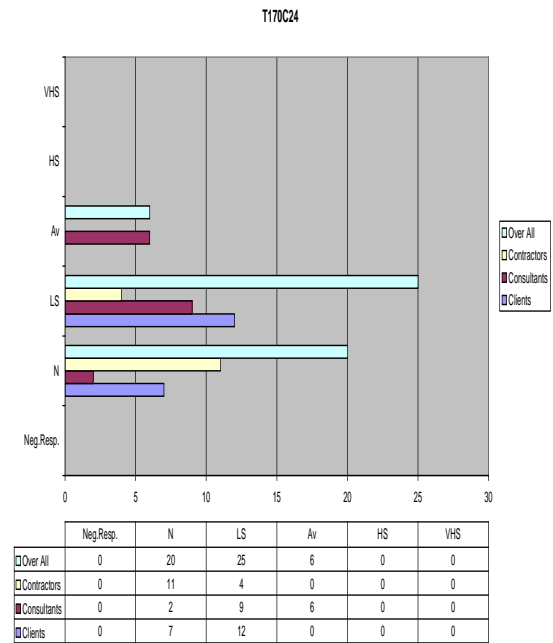


Figure 671 T170C24

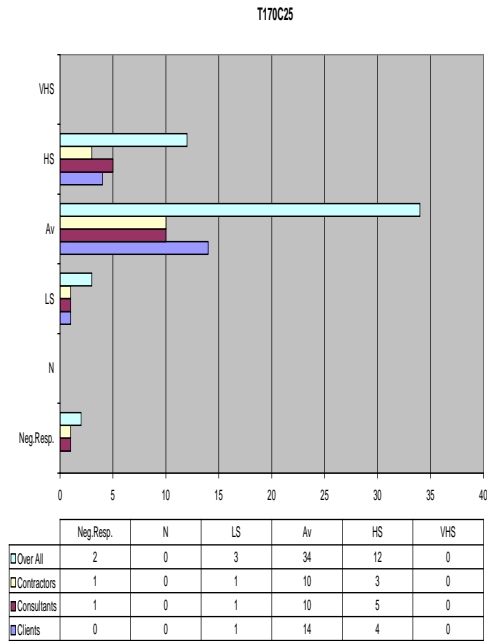


Figure 672 T170C25

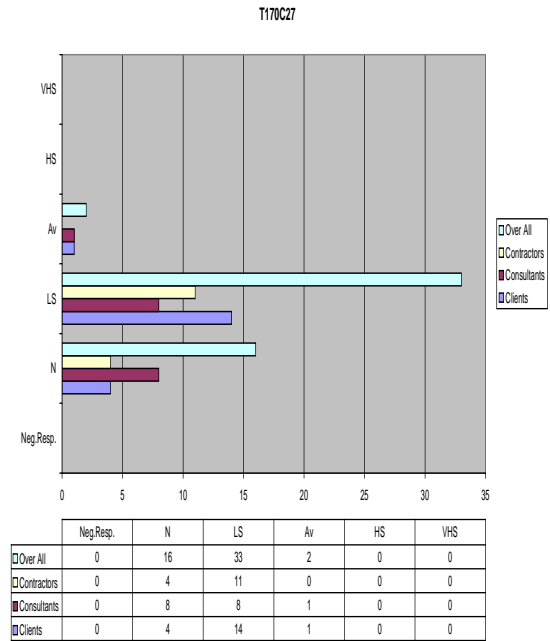


Figure 674 T170C27

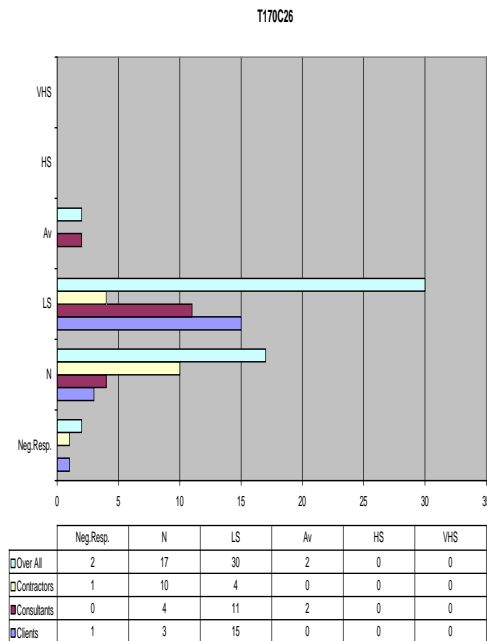


Figure 673 T170C26

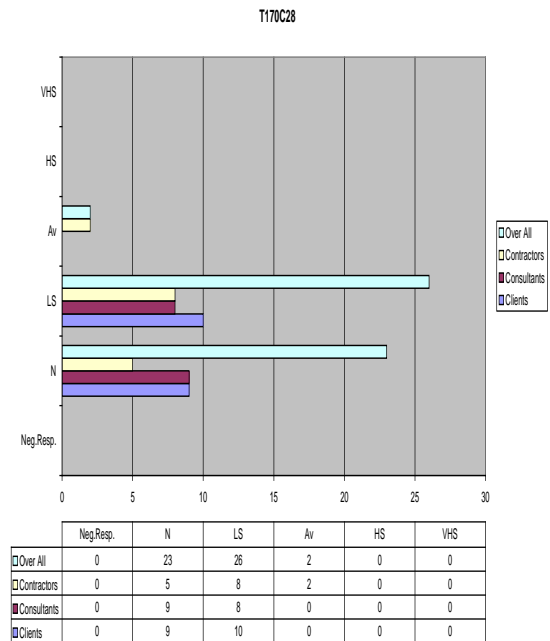


Figure 675 T170C28

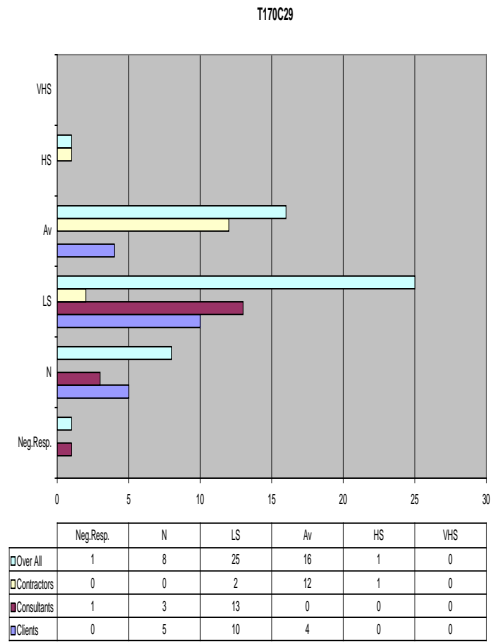


Figure 676 T170C29

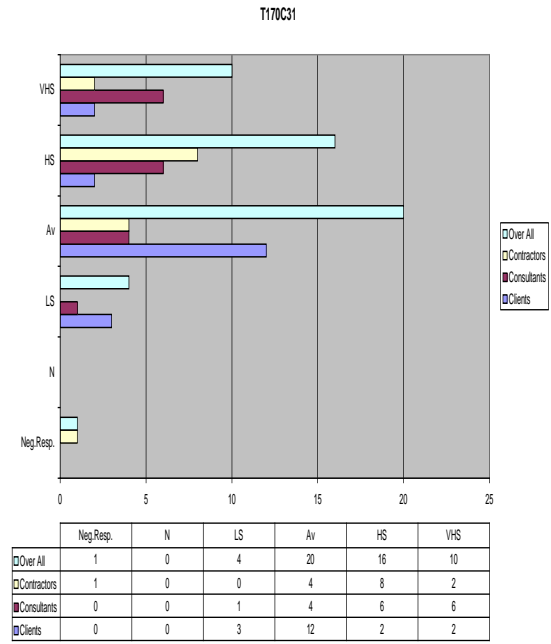


Figure 678 T170C31

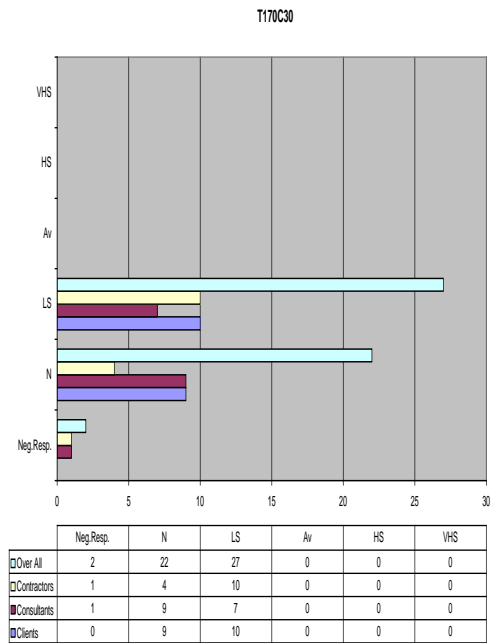


Figure 677 T170C30

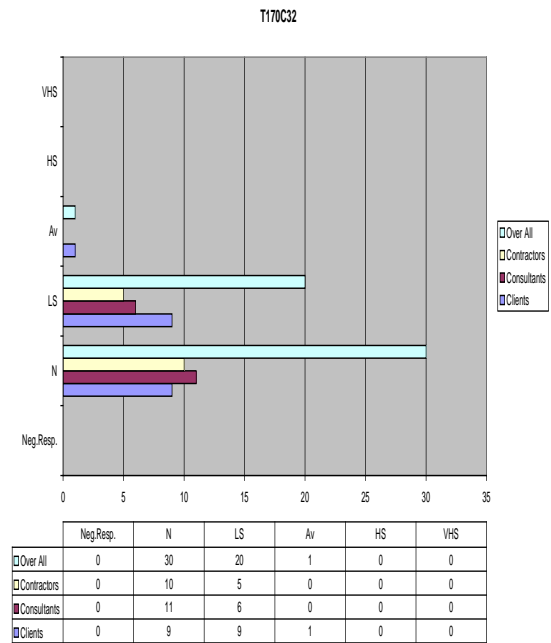


Figure 679 T170C32

Y.3.2.18 CAUSE SIGNIFICANCE ASSESSMENT: (T18 C01) – (T18 C32)

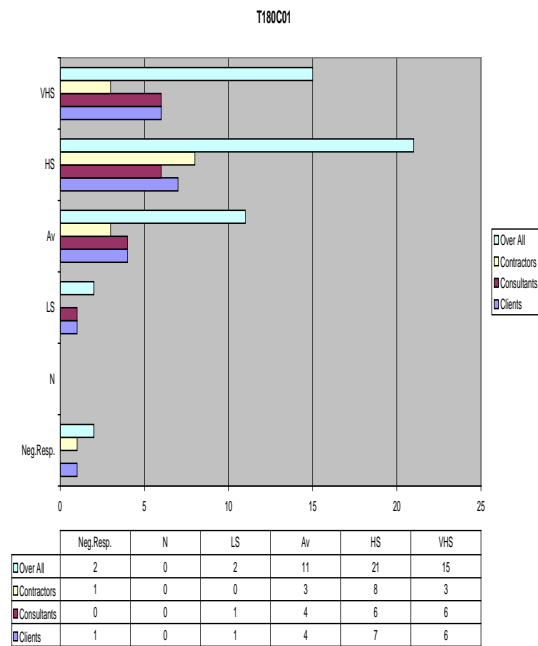


Figure 680 T180C01

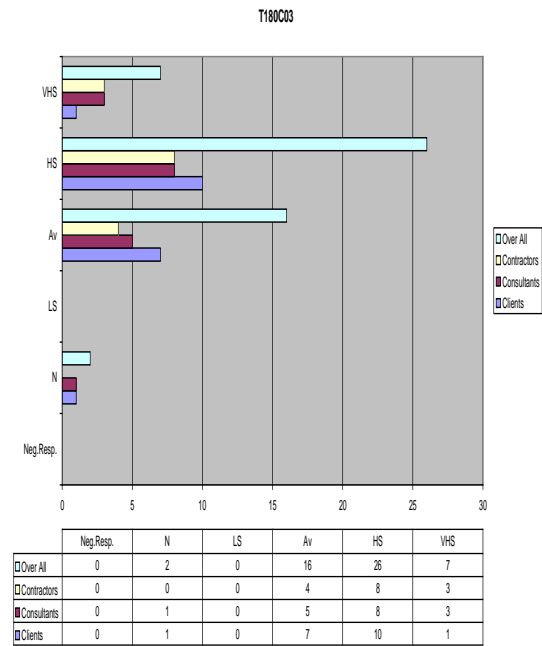


Figure 682 T180C03

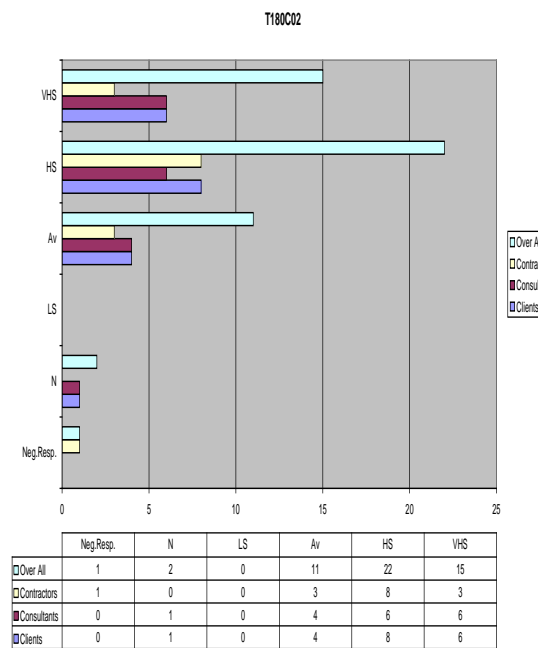


Figure 681 T180C02

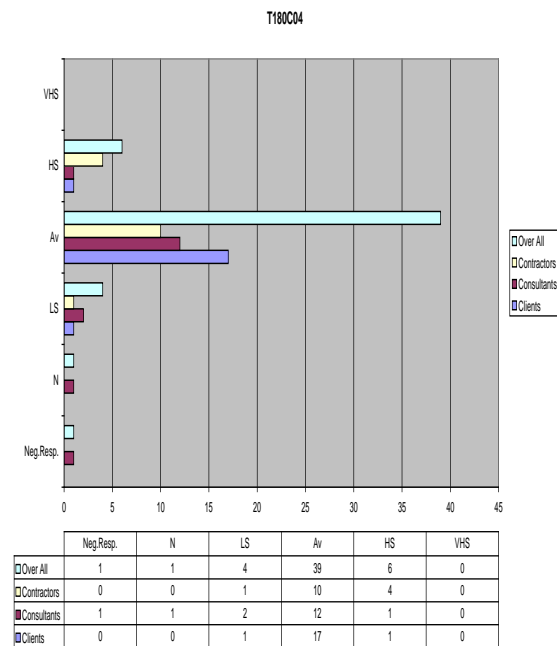


Figure 683 T180C04

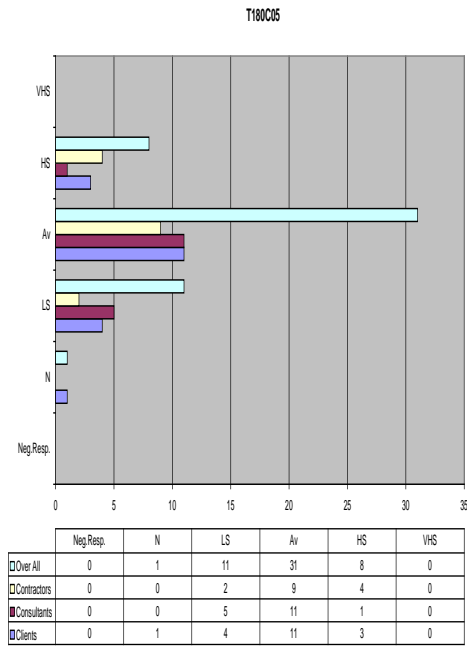


Figure 684 T180C05

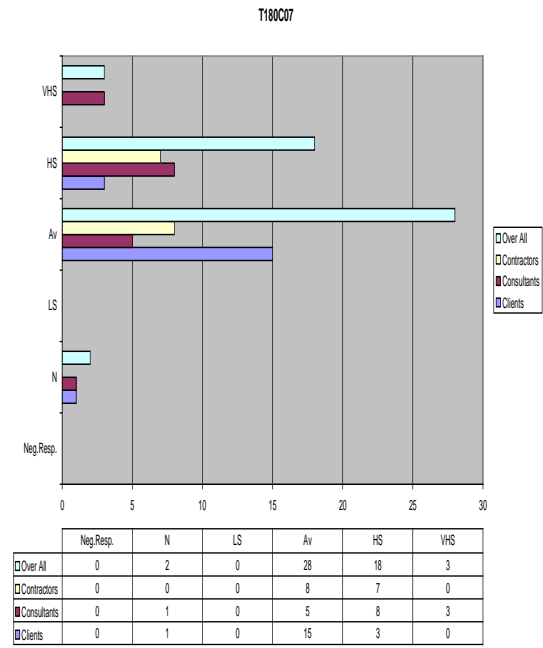


Figure 686 T180C07

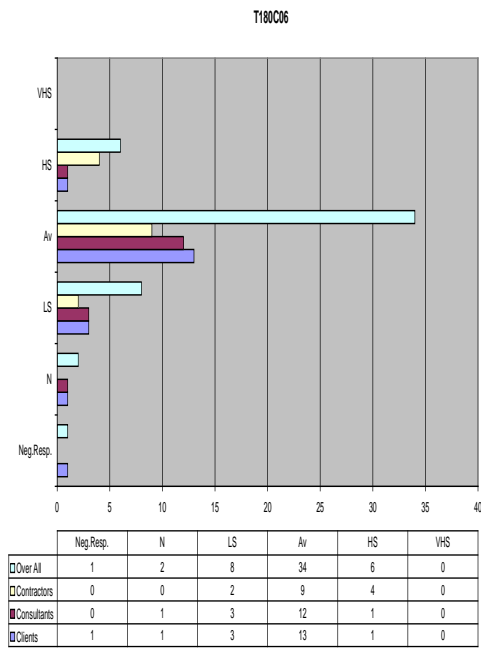


Figure 685 T180C06

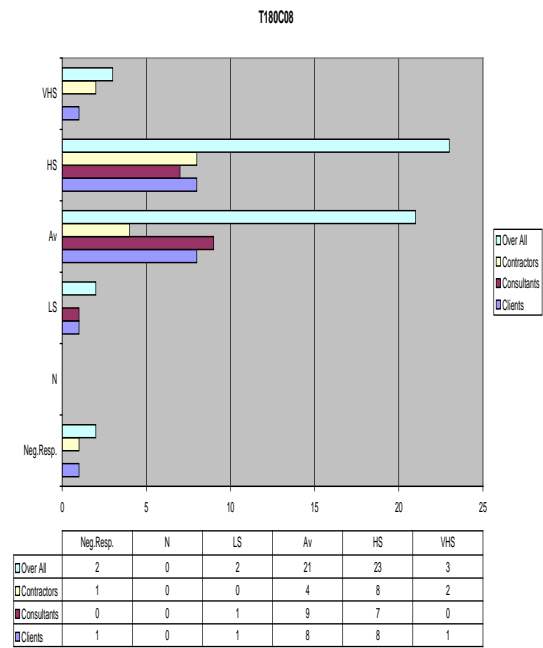


Figure 687 T180C08

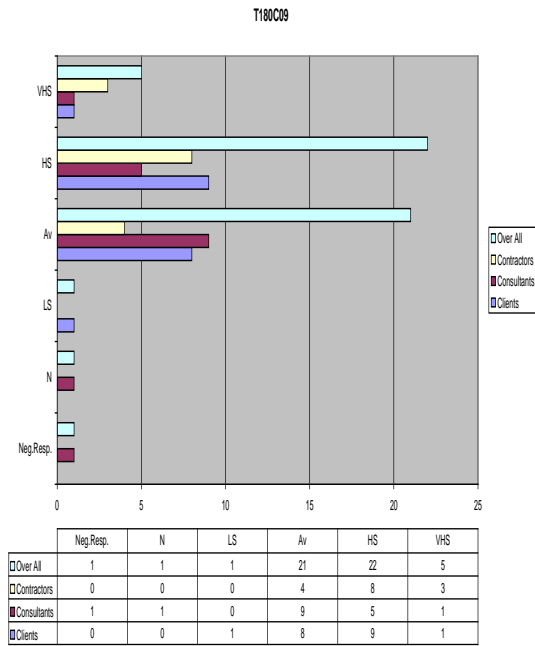


Figure 688 T180C09

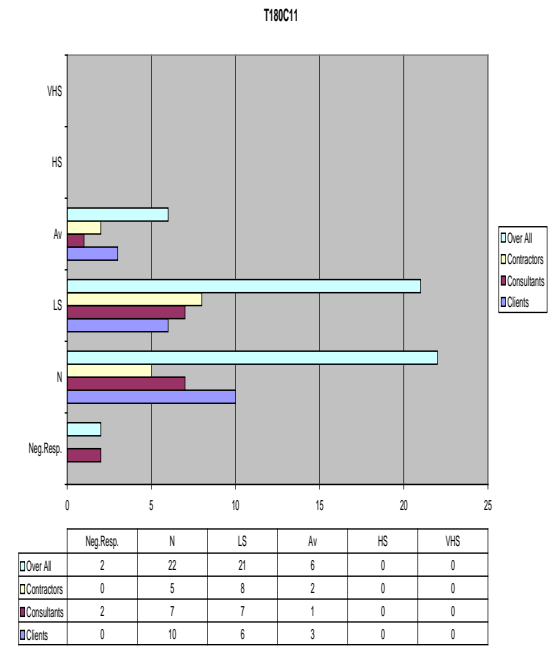


Figure 690 T180C11

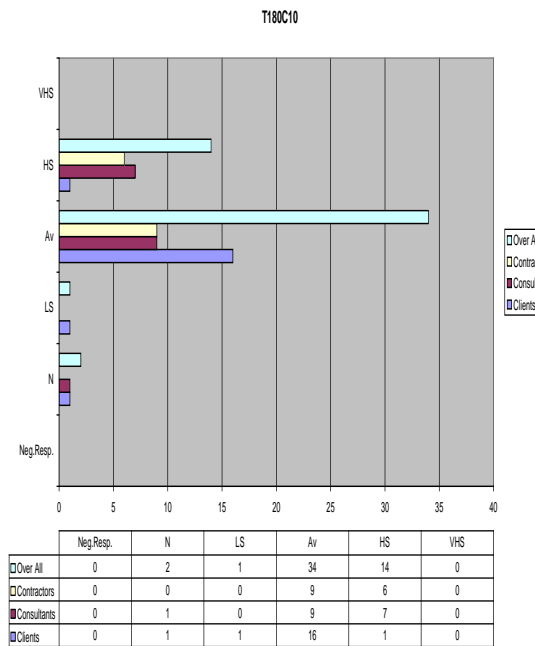


Figure 689 T180C10

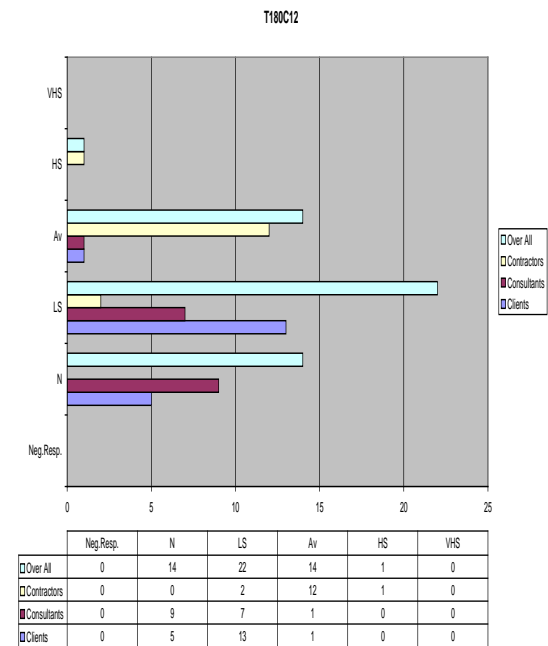


Figure 691 T180C12

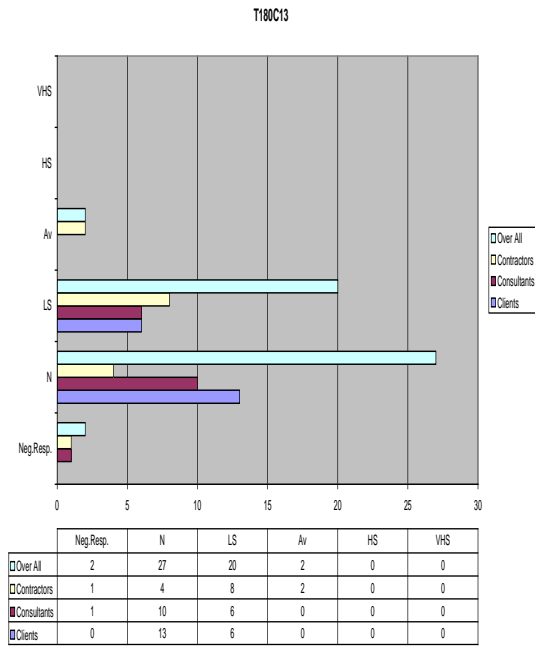


Figure 692 T180C13

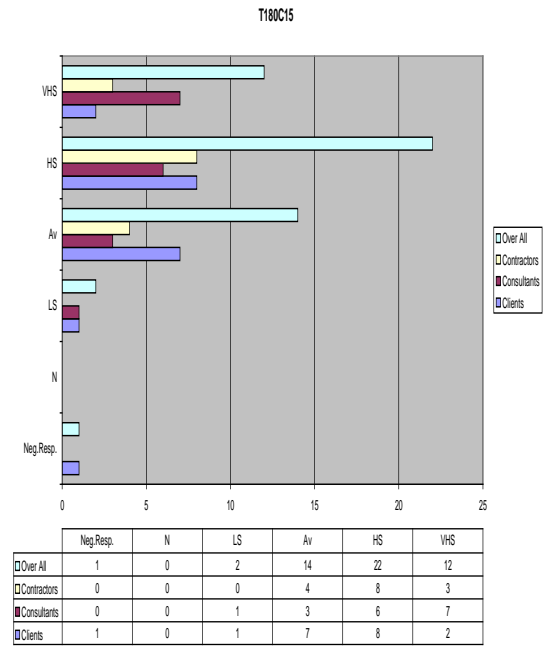


Figure 694 T180C15

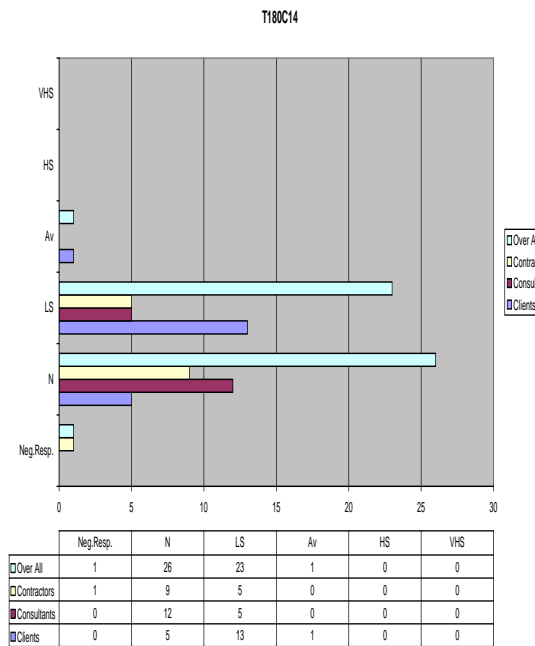


Figure 693 T180C14

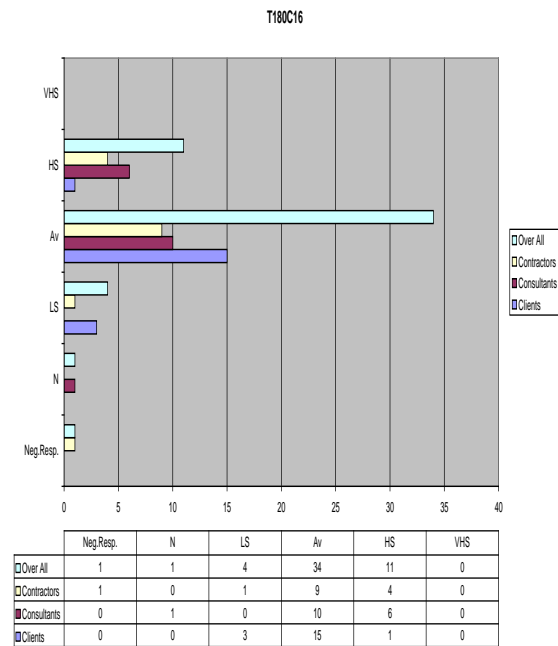


Figure 695 T180C16

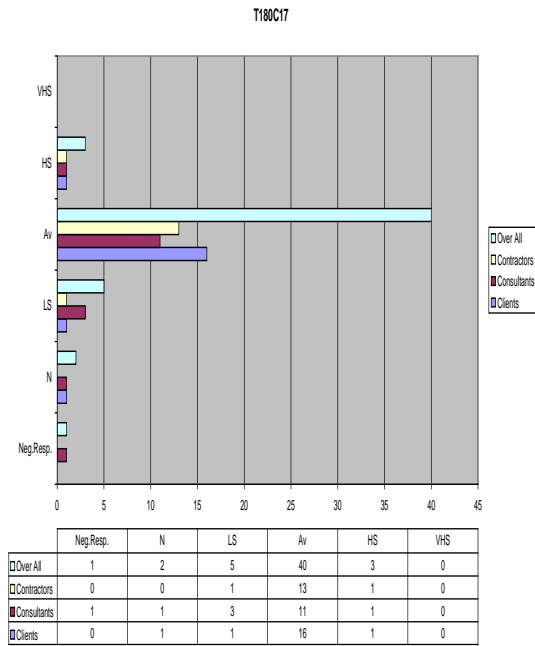


Figure 696 T180C17

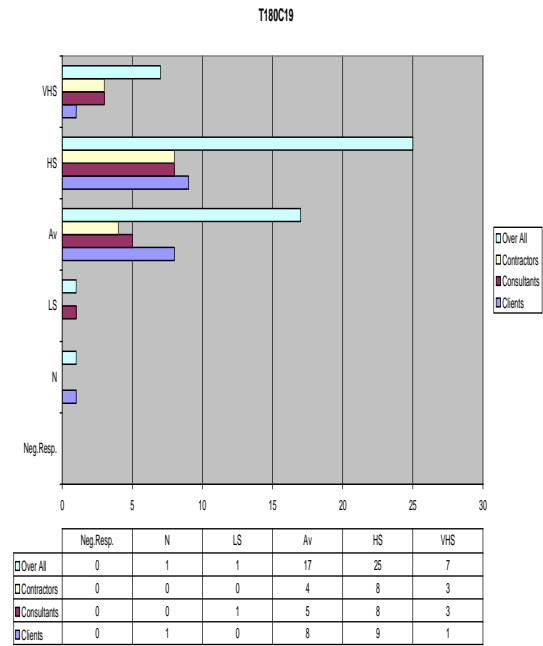


Figure 698 T180C19

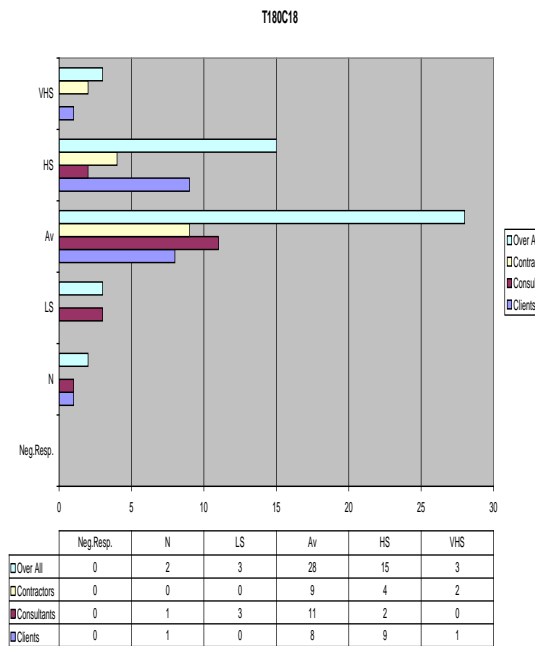


Figure 697 T180C18

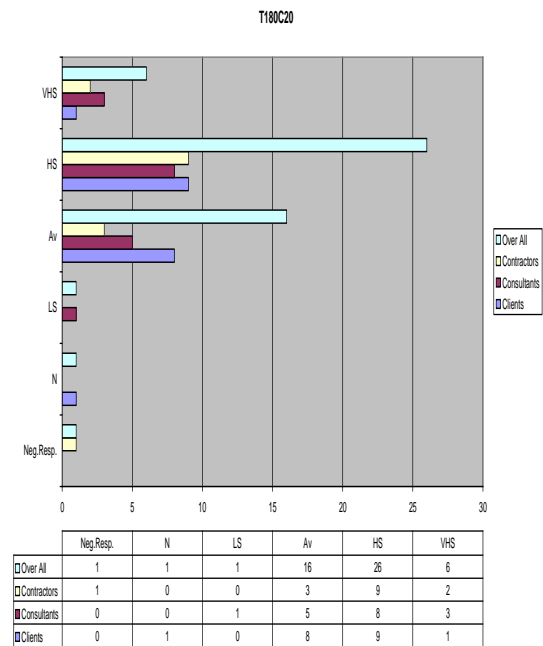


Figure 699 T180C20

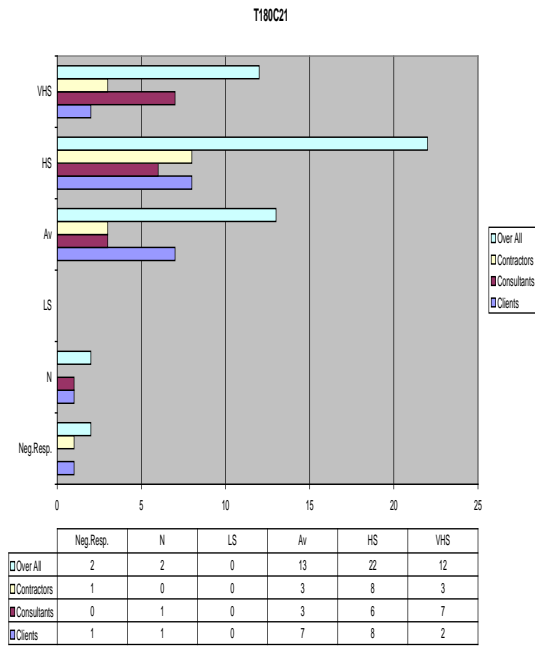


Figure 700 T180C21

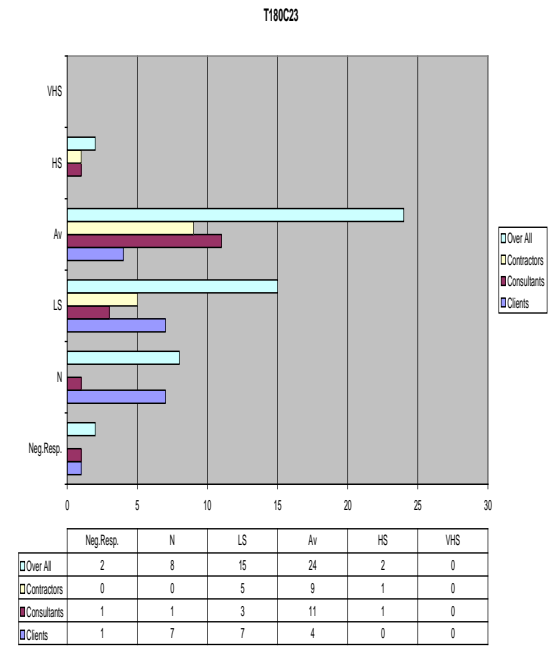


Figure 702 T180C23

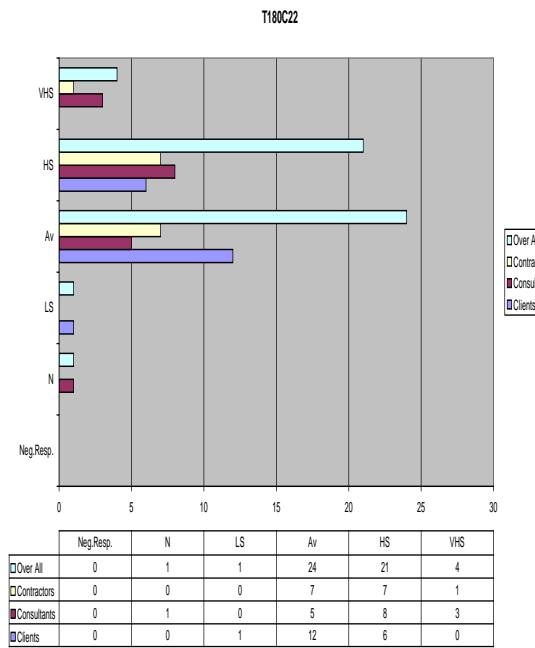


Figure 701 T180C22

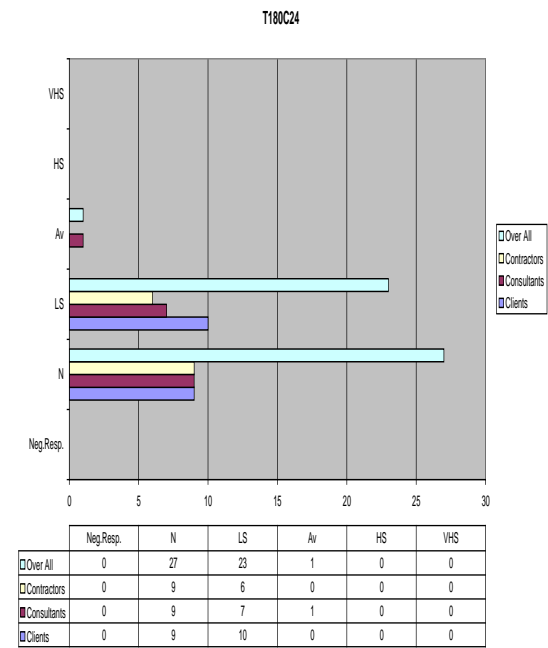


Figure 703 T180C24

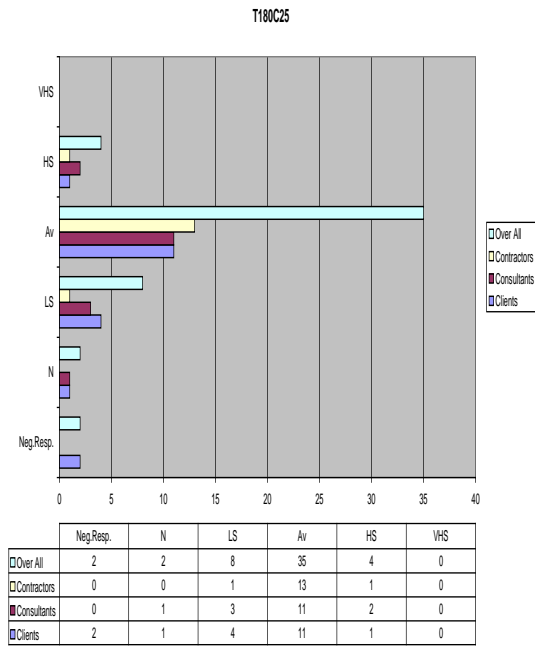


Figure 704 T180C25

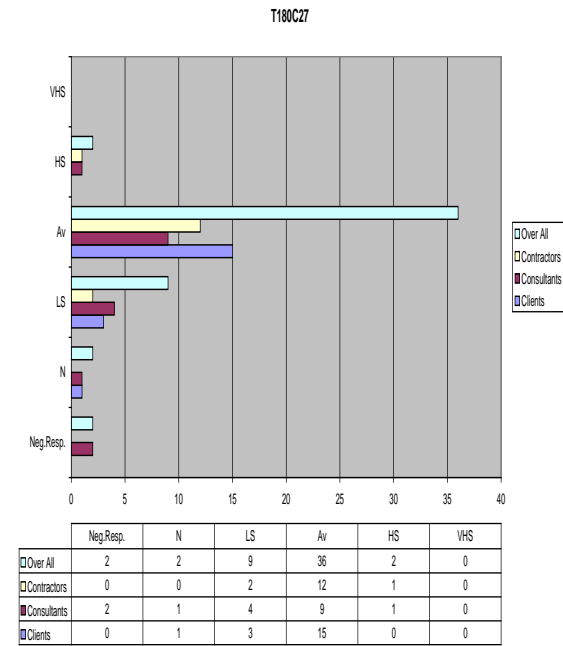


Figure 706 T180C27

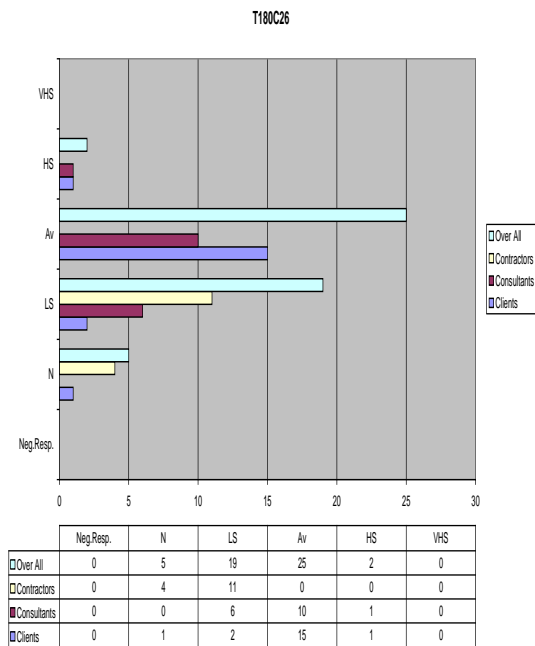


Figure 705 T180C26

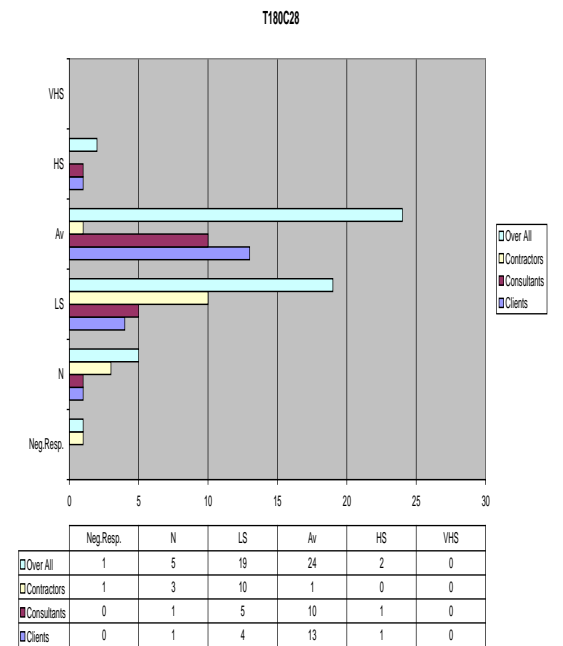


Figure 707 T180C28

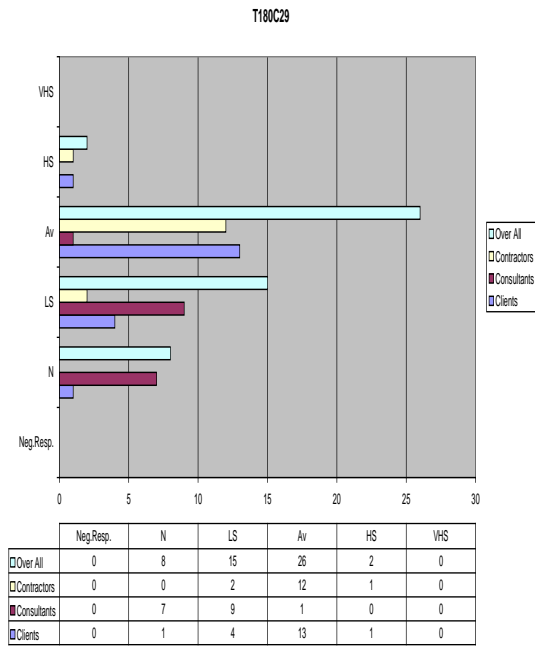


Figure 708 T180C29

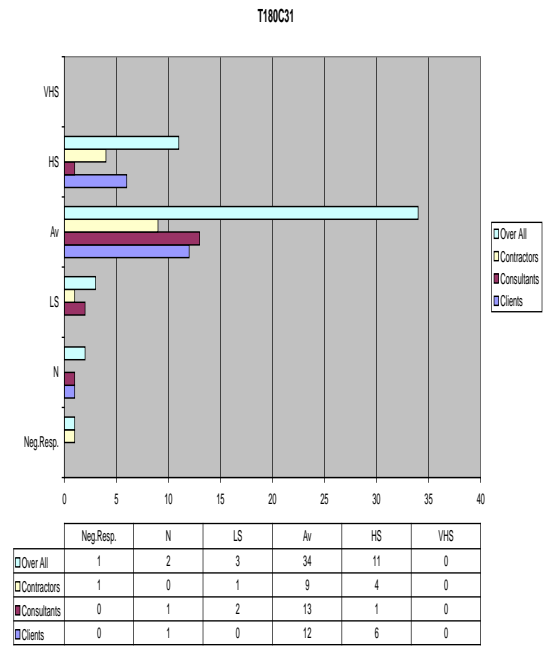


Figure 710 T180C31

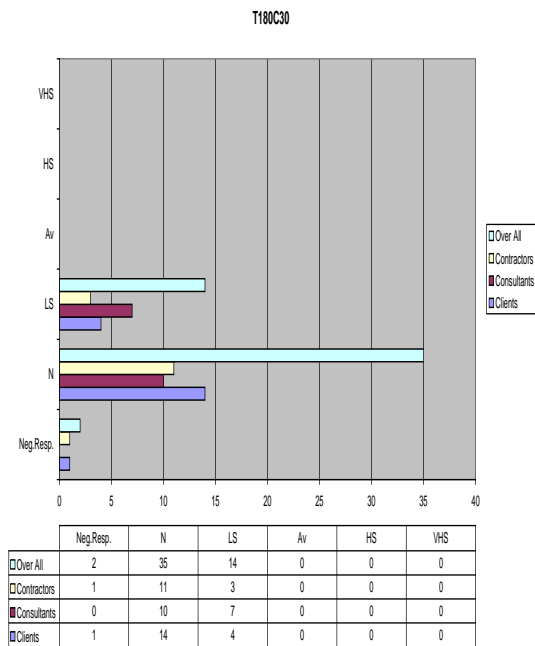


Figure 709 T180C30

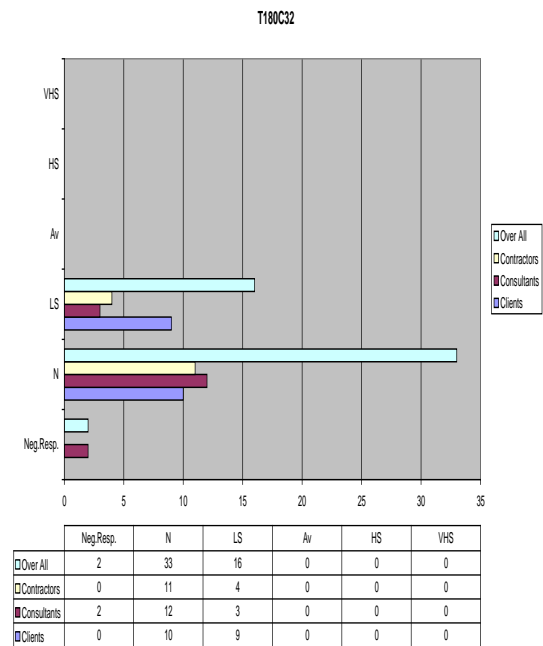


Figure 711 T180C32

Y.3.2.19 CAUSE SIGNIFICANCE ASSESSMENT: (T19 C01) – (T19 C32)

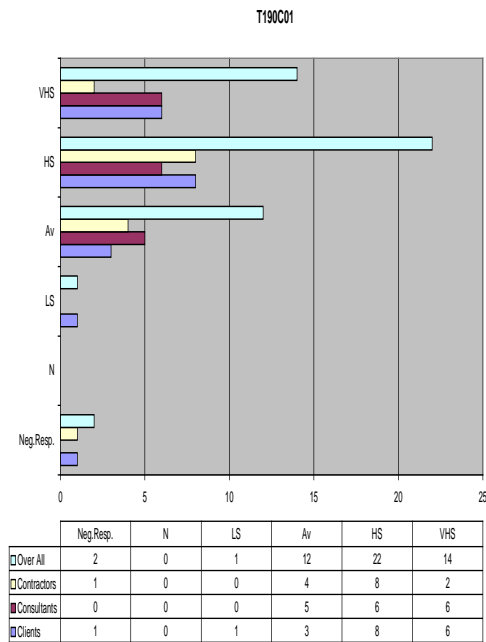


Figure 712 T190C01

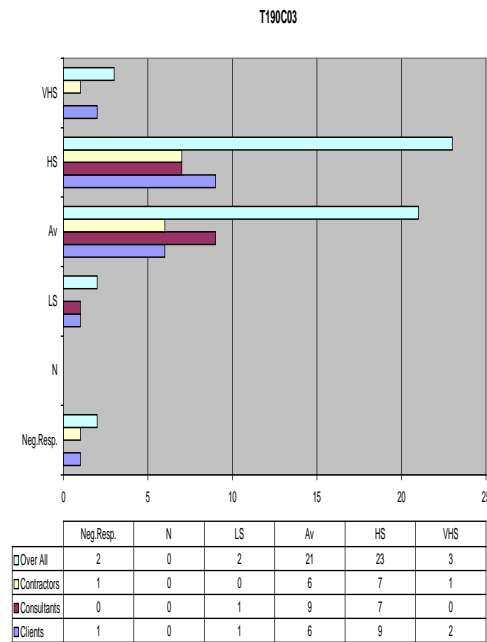


Figure 714 T190C03

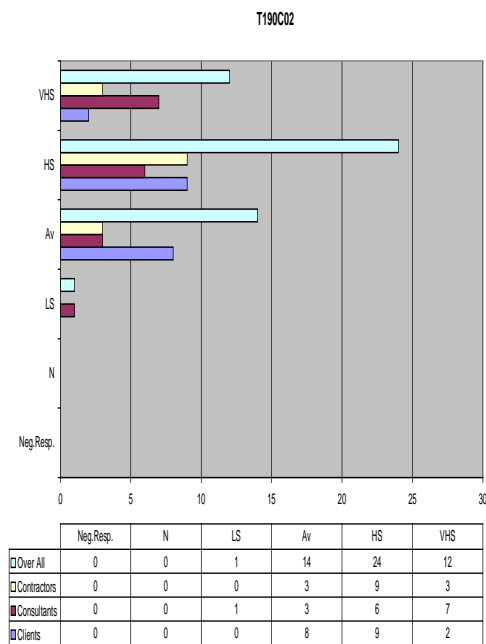


Figure 713 T190C02

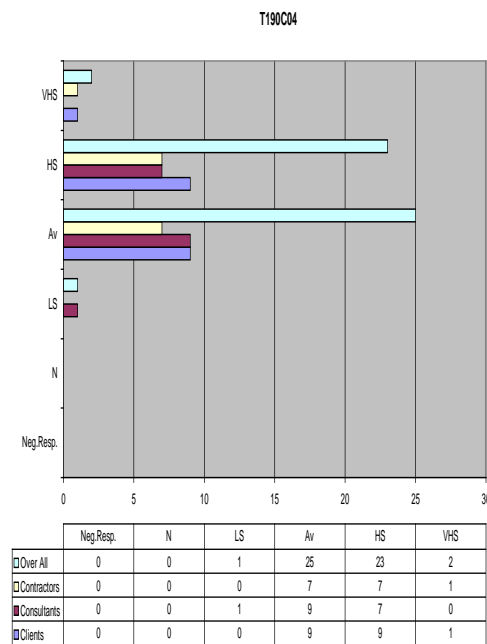


Figure 715 T190C04

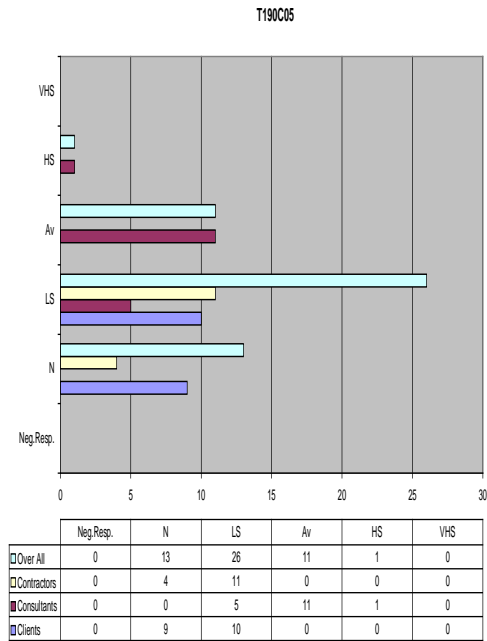


Figure 716 T190C05

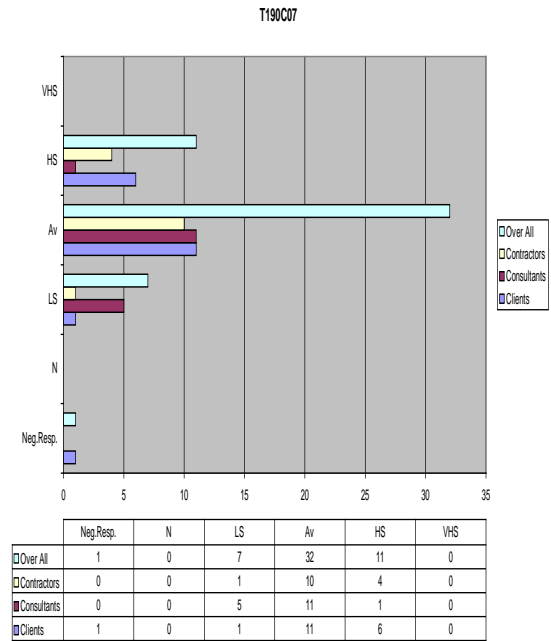


Figure 718 T190C07

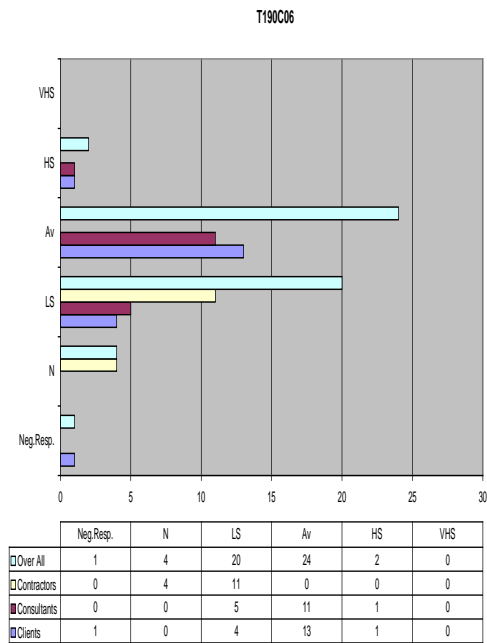


Figure 717 T190C06

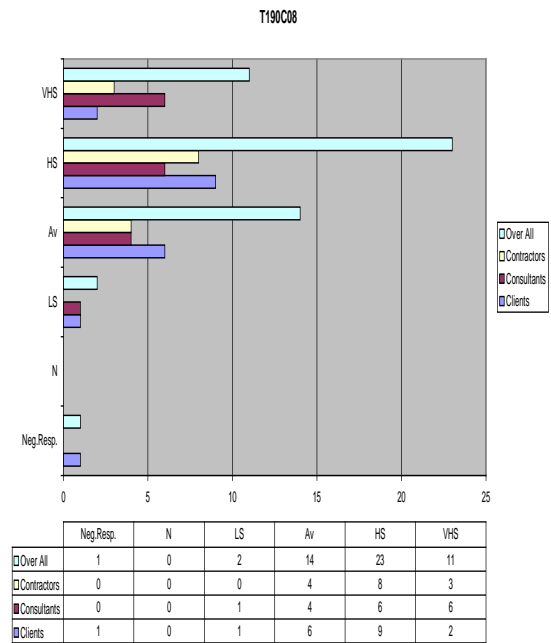


Figure 719 T190C08

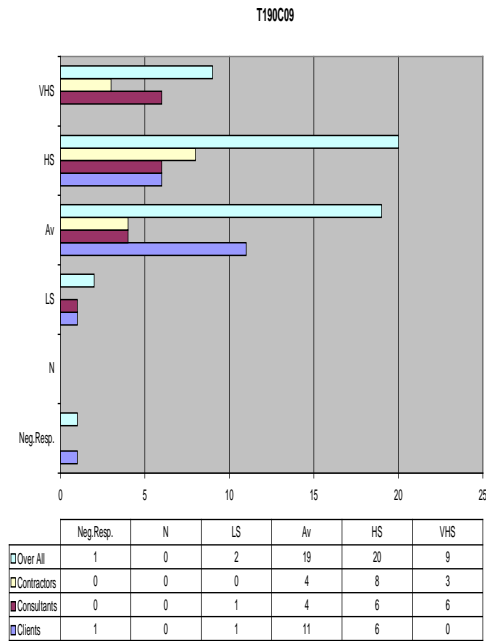


Figure 720 T190C09

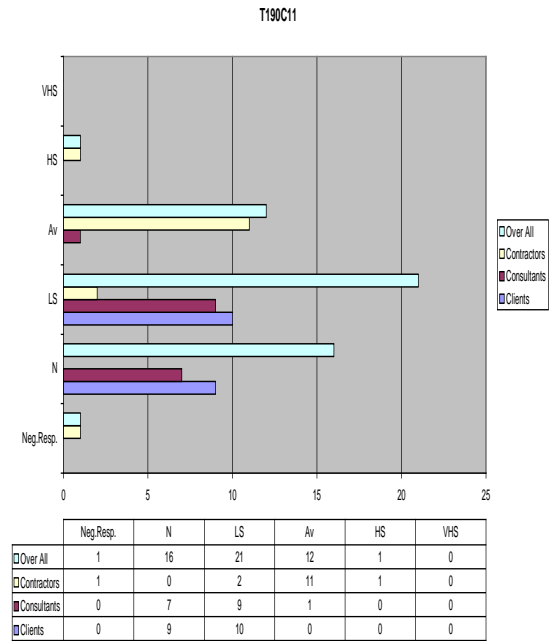


Figure 722 T190C11

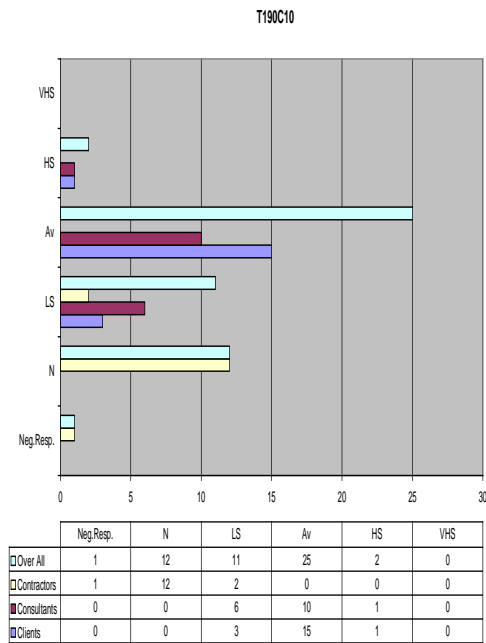


Figure 721 T190C10

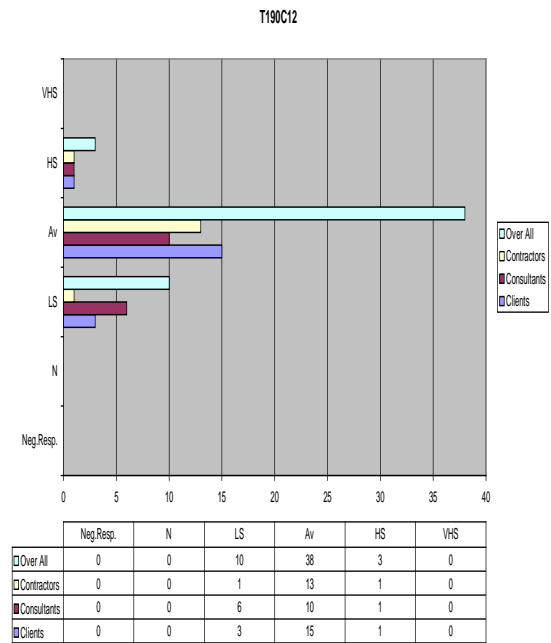


Figure 723 T190C12

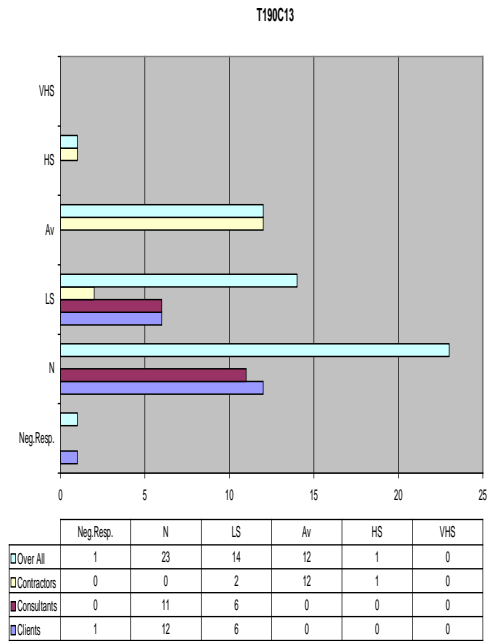


Figure 724 T190C13

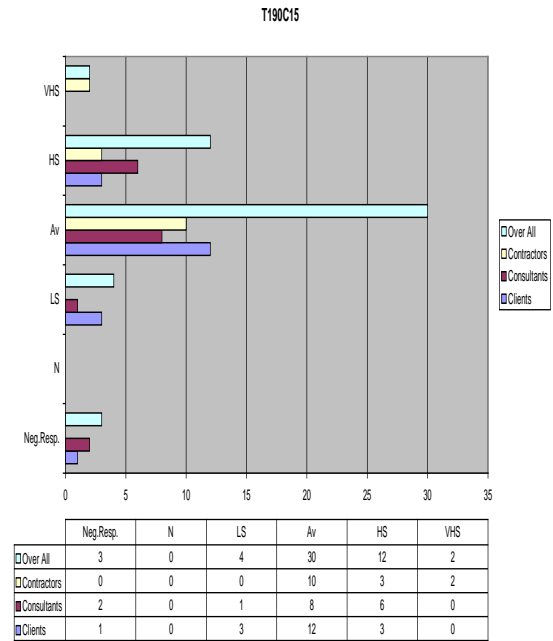


Figure 726 T190C15

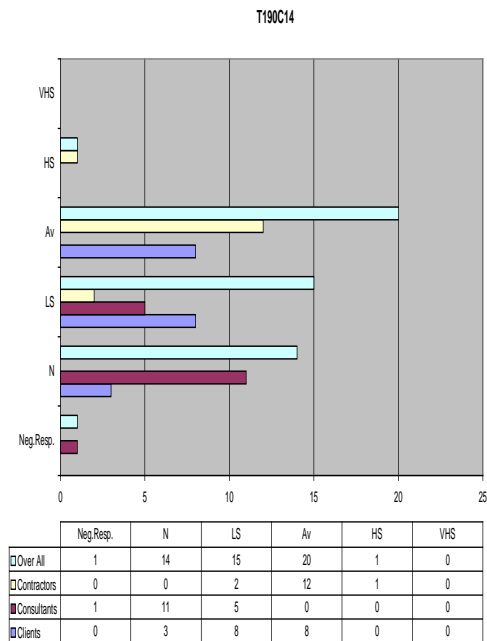


Figure 725 T190C14

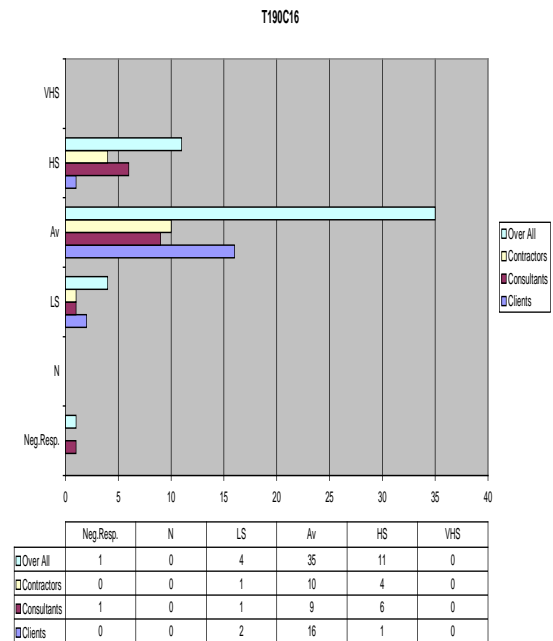


Figure 727 T190C16

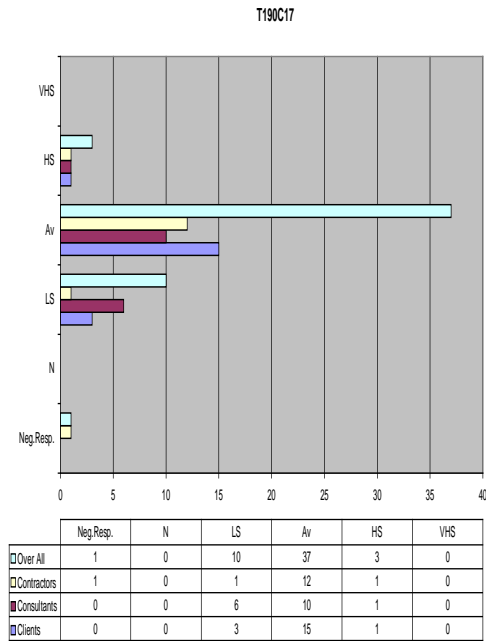


Figure 728 T190C17

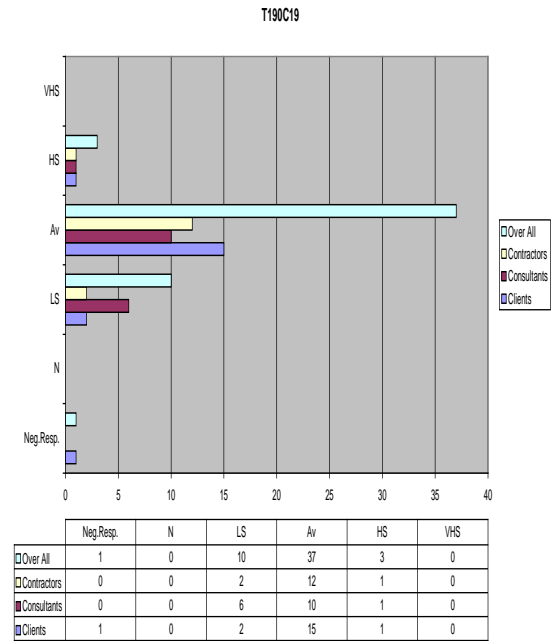


Figure 730 T190C19

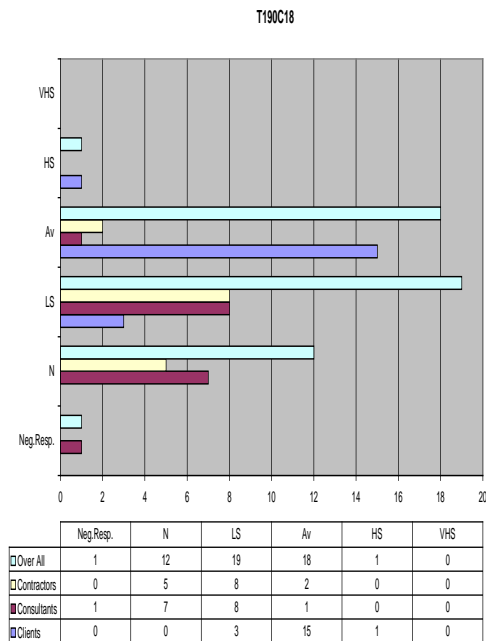


Figure 729 T190C18

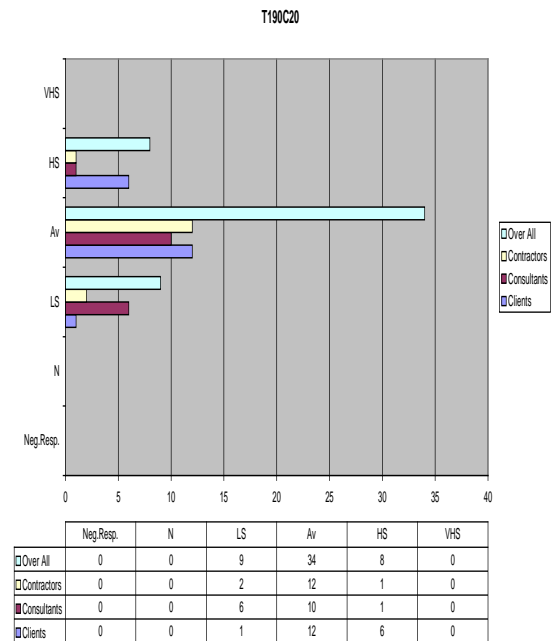


Figure 731 T190C20

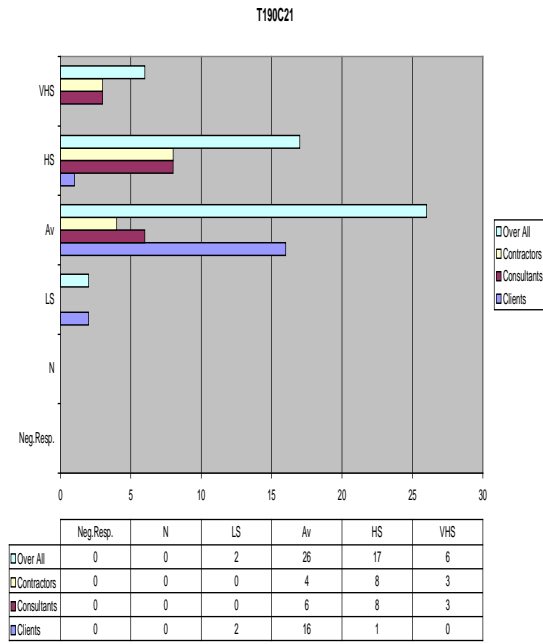


Figure 732 T190C21

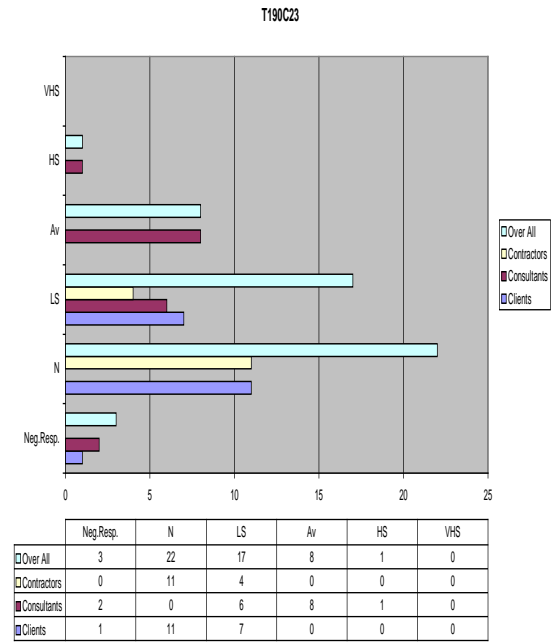


Figure 734 T190C23

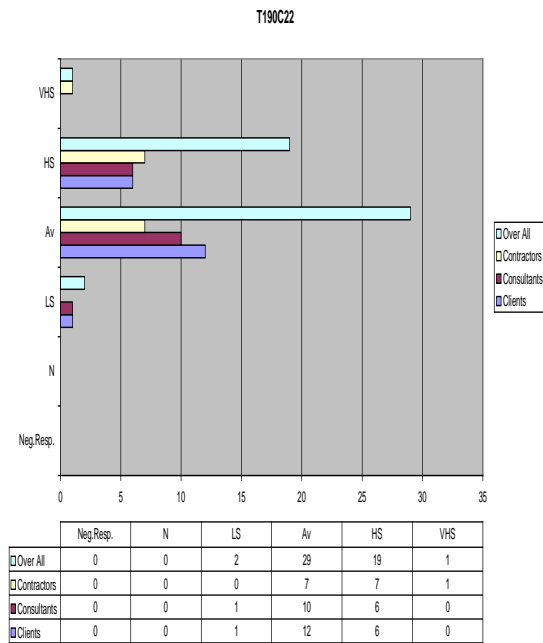


Figure 733 T190C22

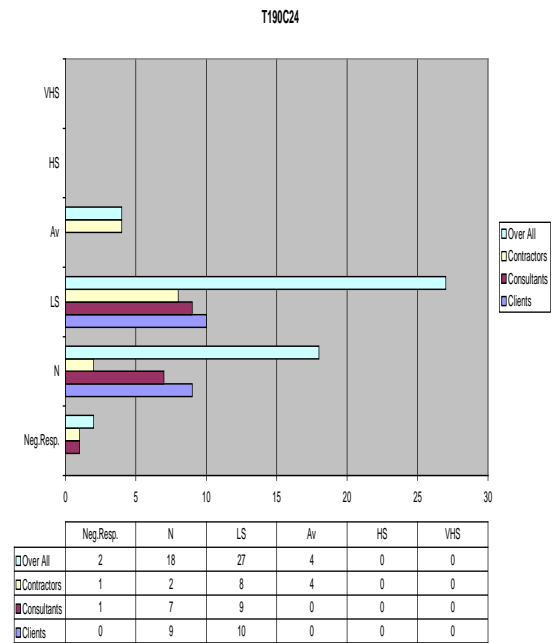


Figure 735 T190C24

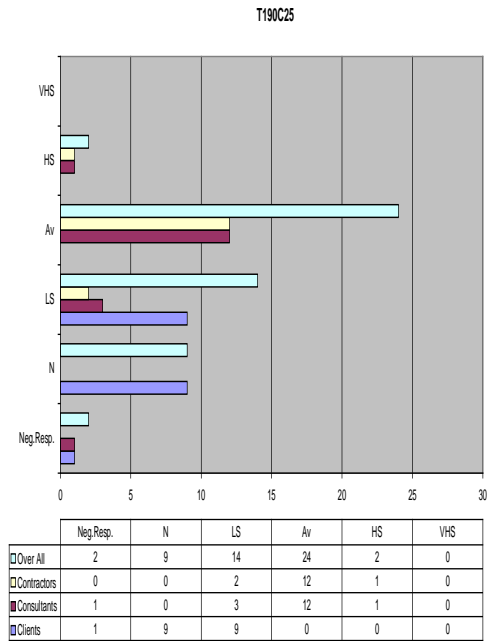


Figure 736 T190C25

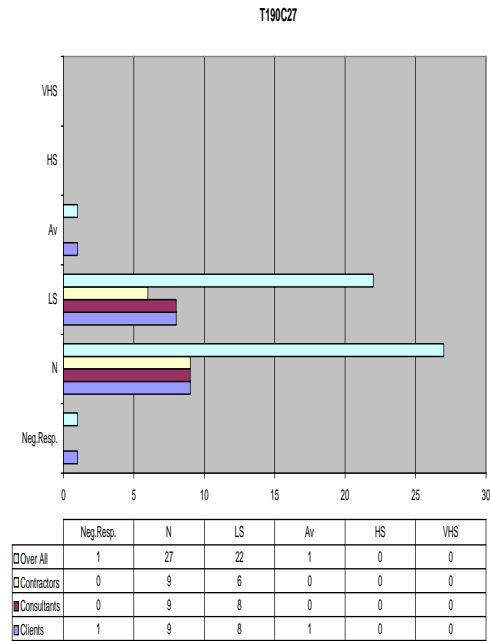


Figure 738 T190C27

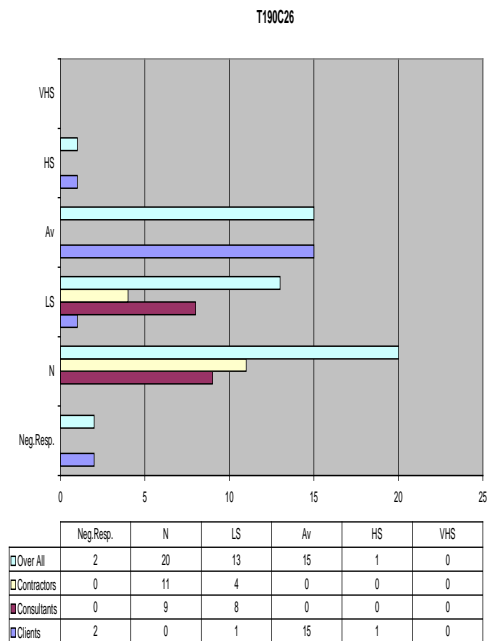


Figure 737 T190C26

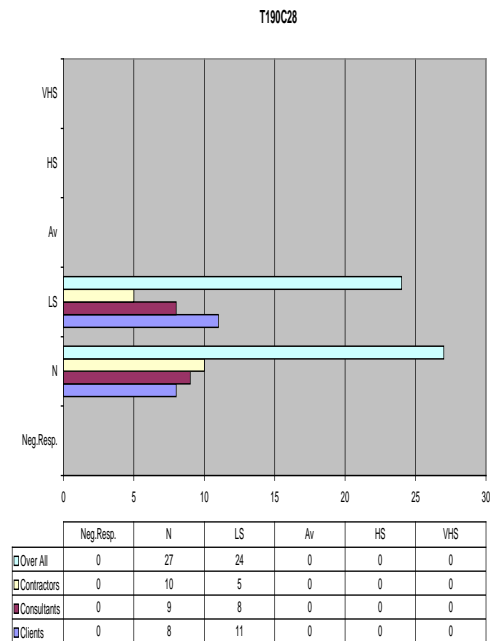


Figure 739 T190C28

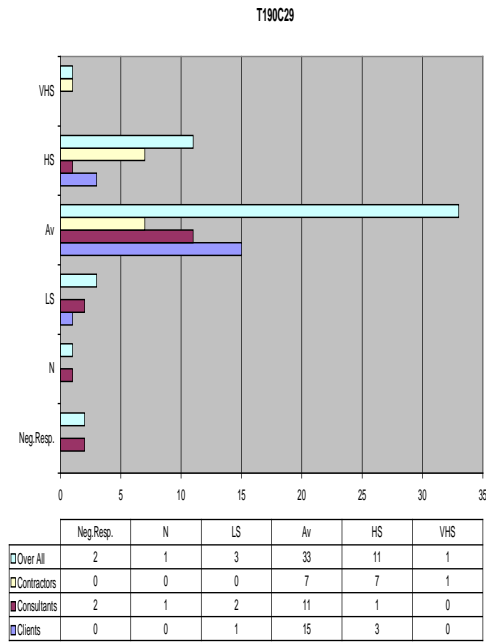


Figure 740 T190C29

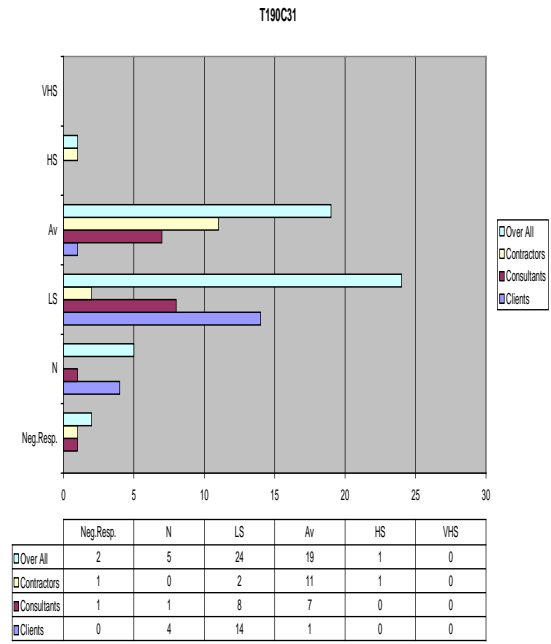


Figure 742 T190C31

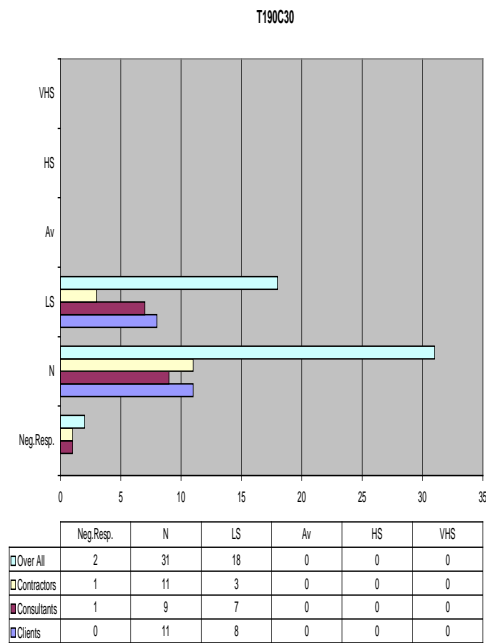


Figure 741 T190C30

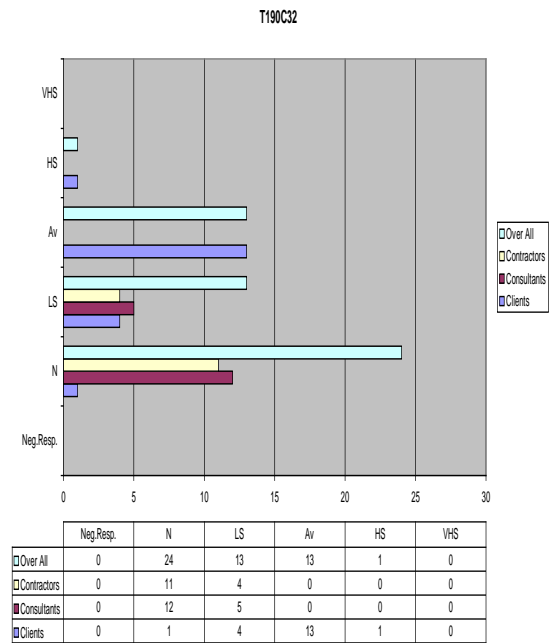


Figure 743 T190C32

Y.3.2.20 CAUSE SIGNIFICANCE ASSESSMENT: (T20 C01) – (T20 C32)

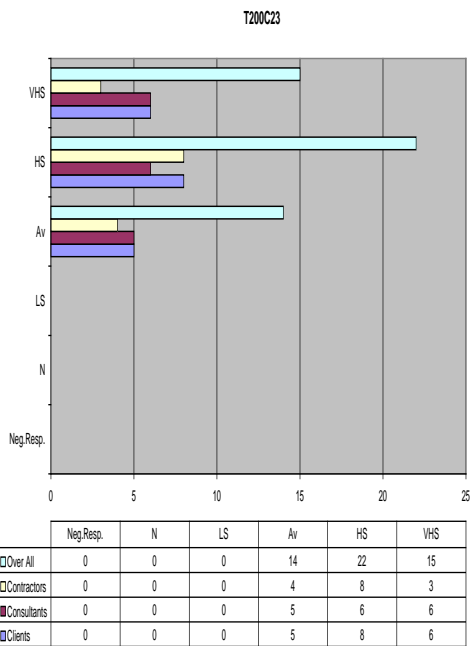


Figure 744 T200C23

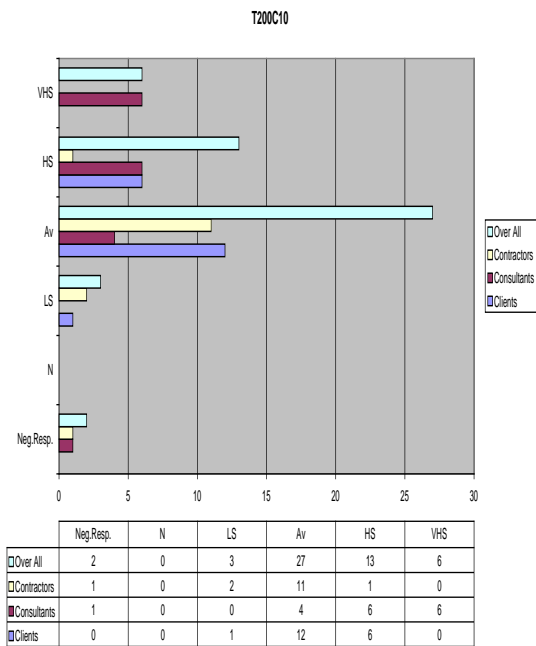


Figure 746 T200C10

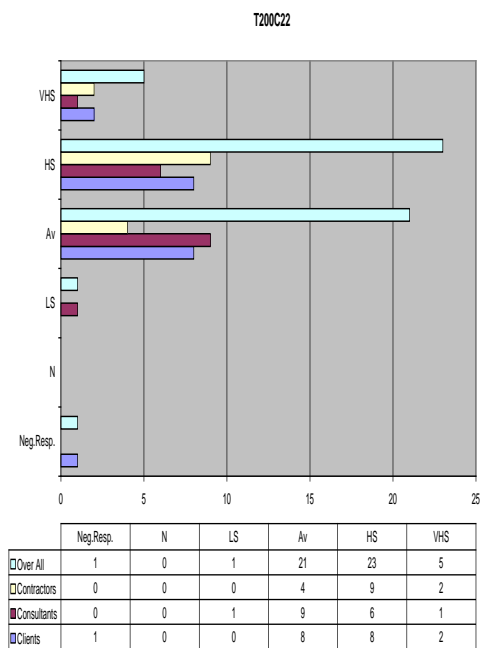


Figure 745 T200C22

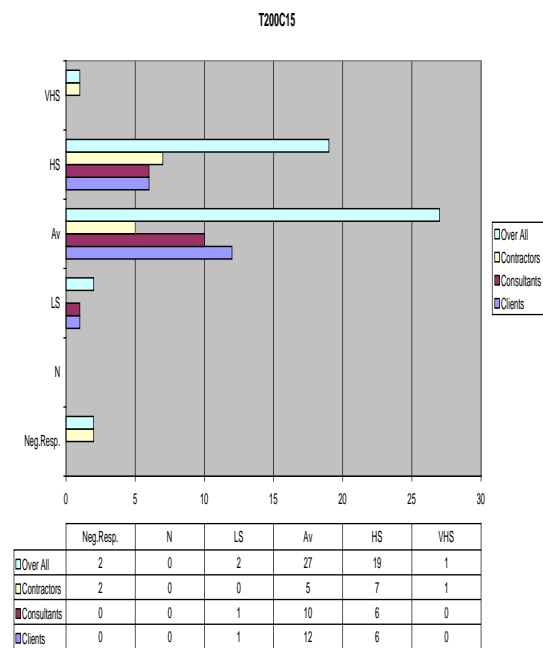


Figure 747 T200C15

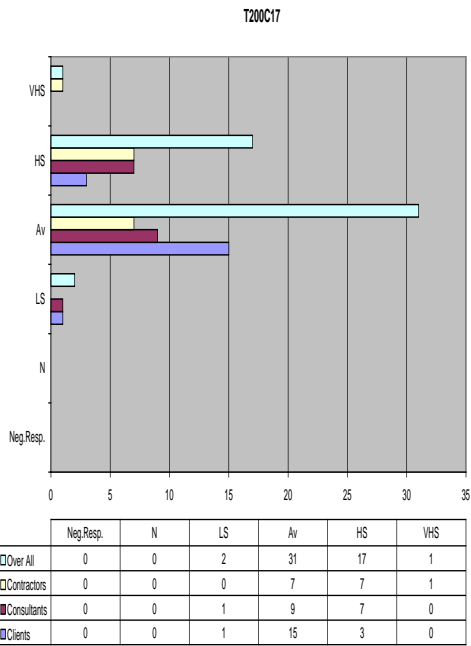


Figure 748 T200C17

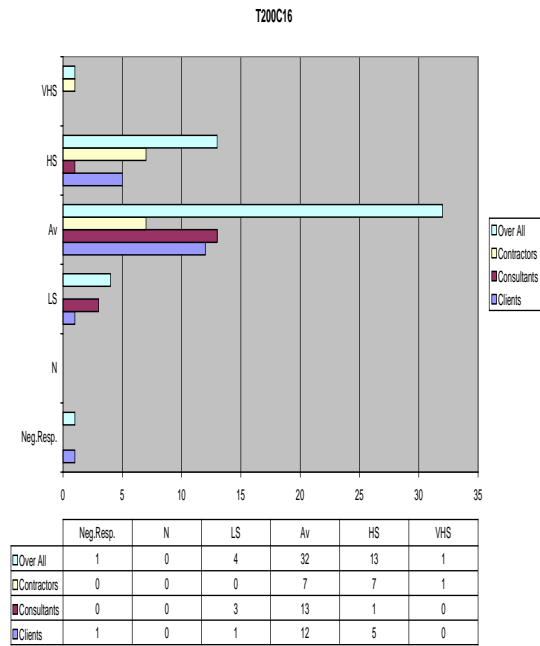


Figure 750 T200C16

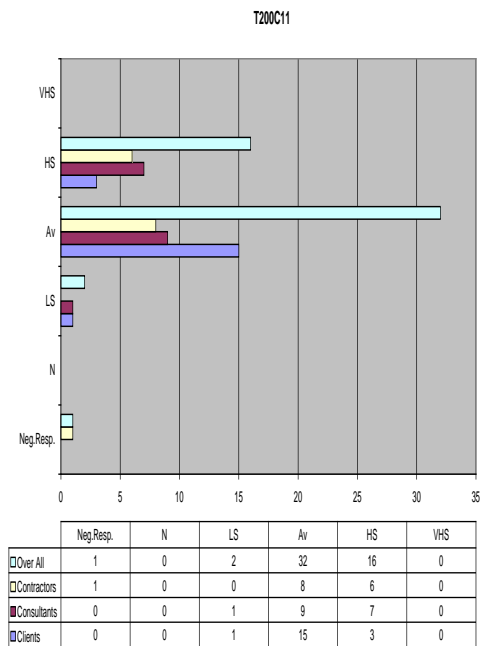


Figure 749 T200C11

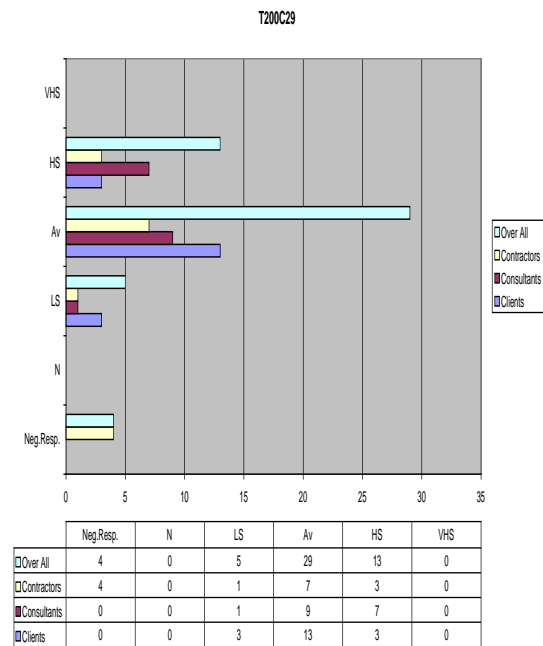


Figure 751 T200C29

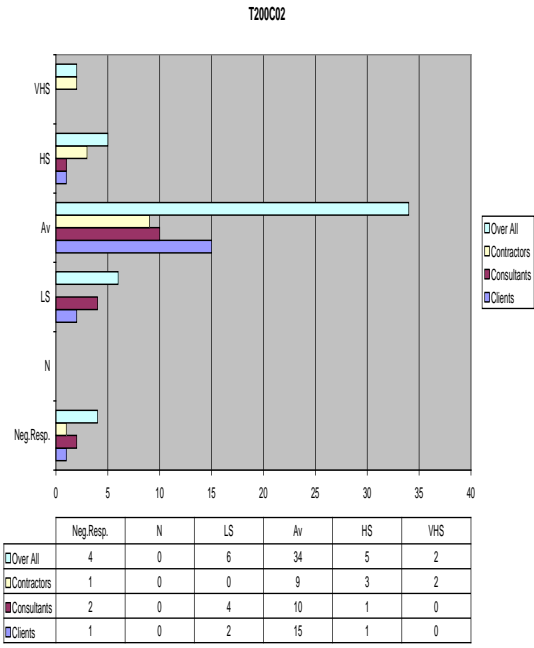


Figure 752 T200C02

Y.3.2.21 CAUSE SIGNIFICANCE ASSESSMENT: (T21 C01) – (T21 C32)

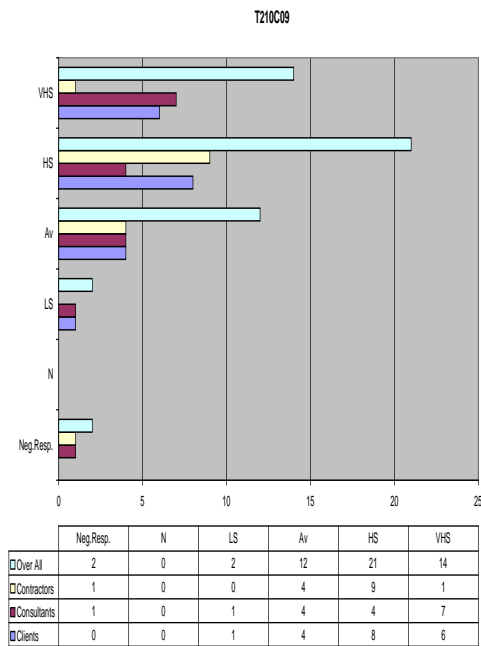


Figure 753 T210C09

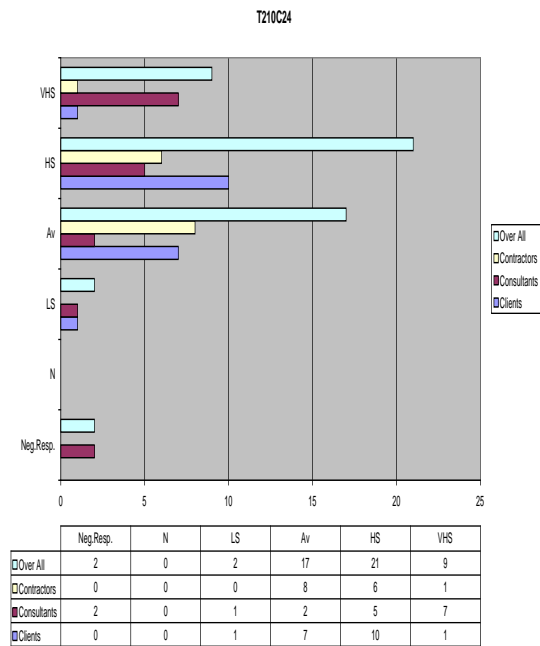


Figure 755 T210C24

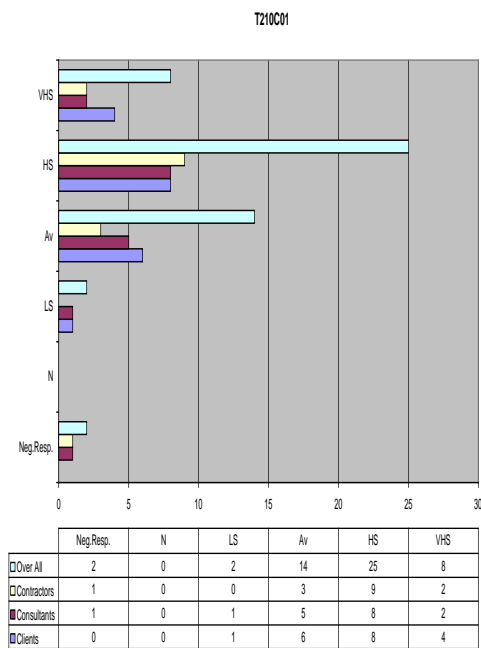


Figure 754 T210C01

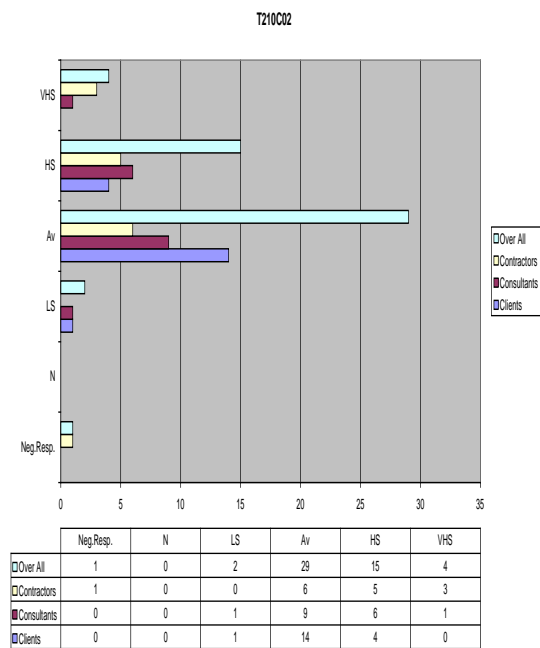


Figure 756 T210C02

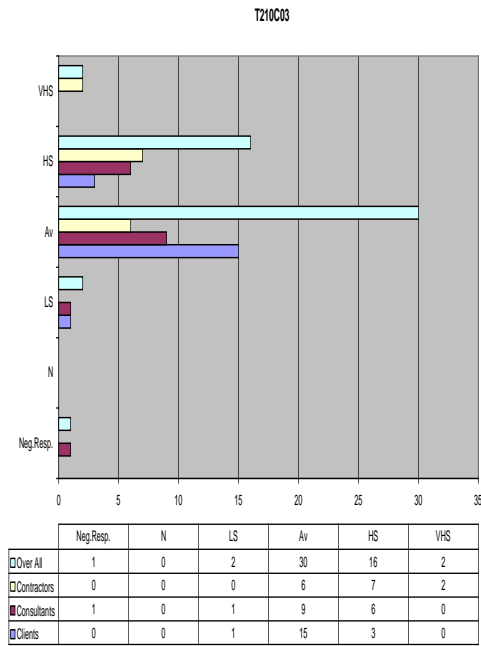


Figure 757 T210C03

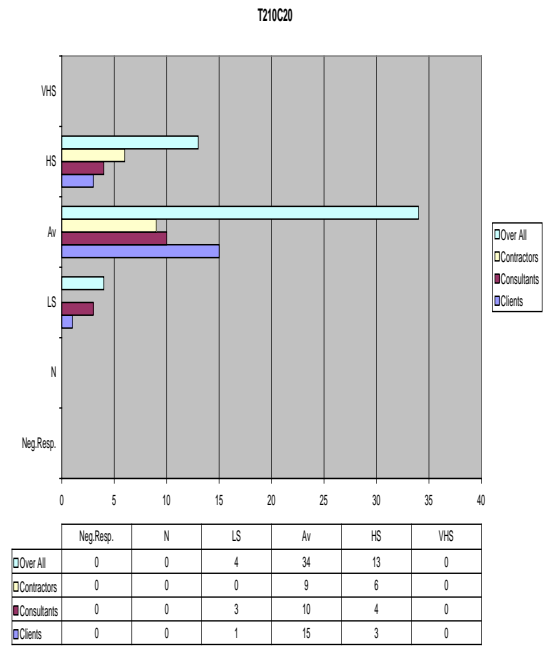


Figure 759 T210C20

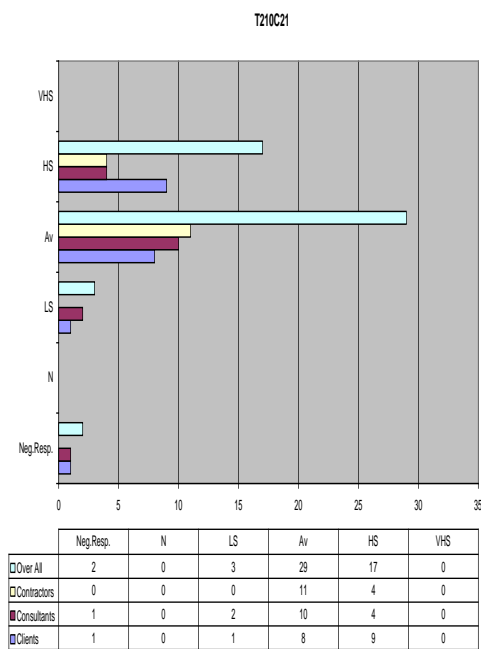


Figure 758 T210C21

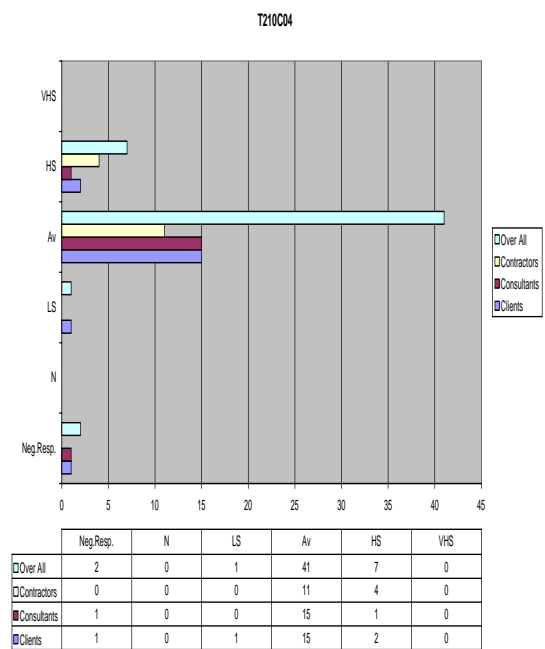


Figure 760 T210C04

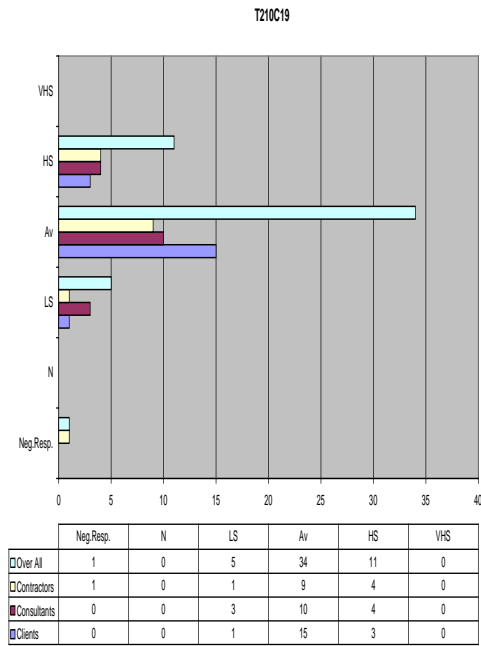


Figure 761 T210C19

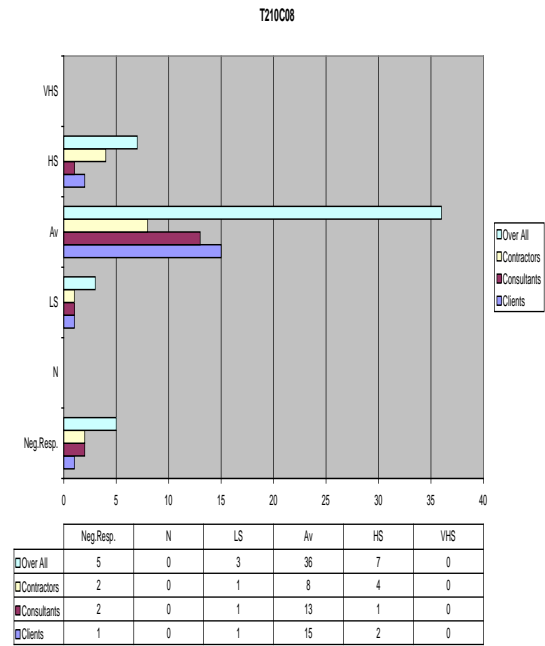


Figure 763 T210C08

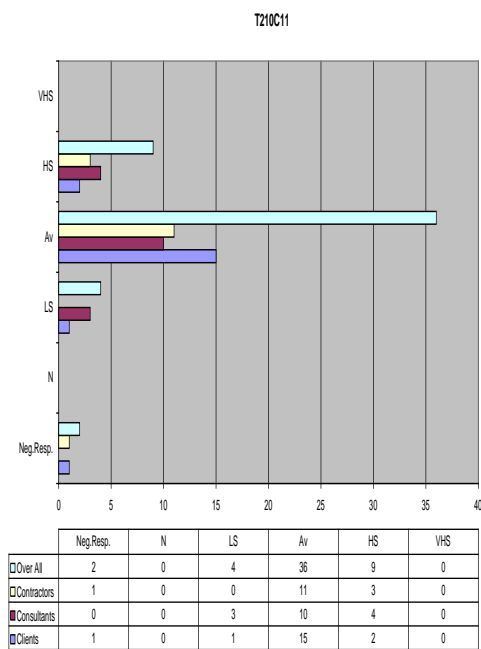


Figure 762 T210C11

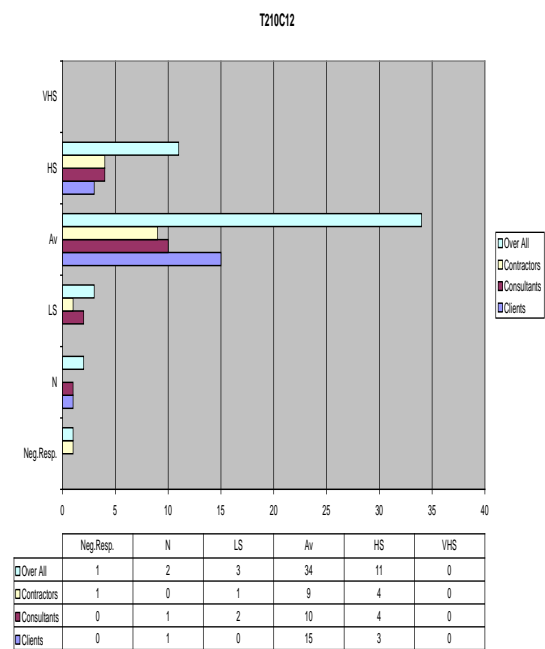


Figure 764 T210C12

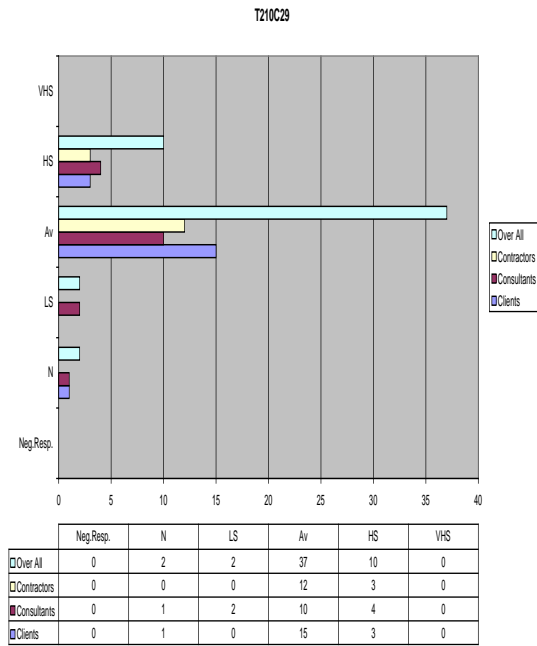


Figure 765 T210C29

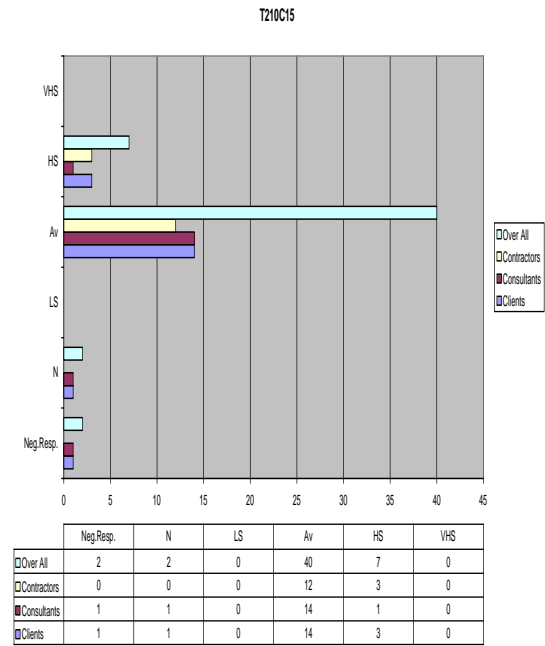


Figure 767 T210C15

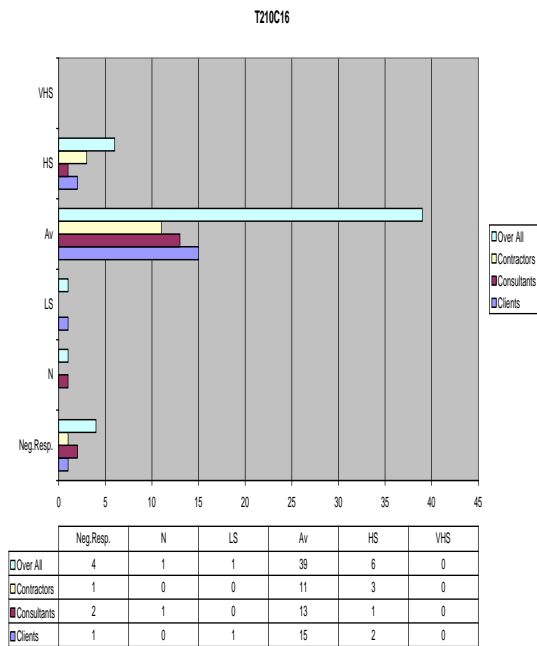


Figure 766 T210C16

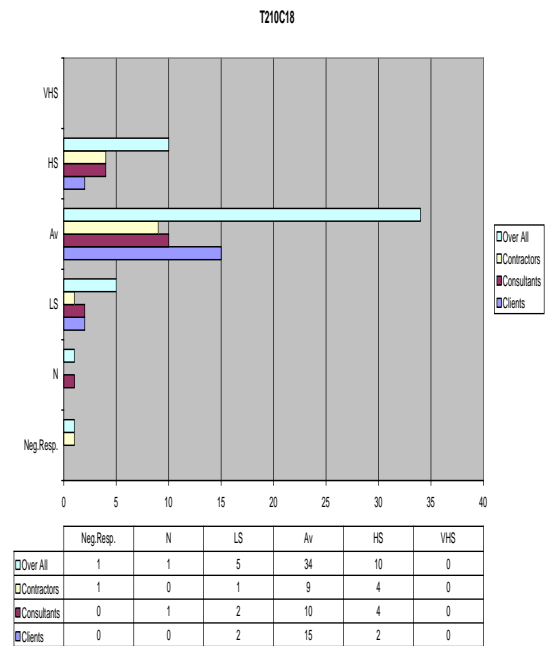


Figure 768 T210C18

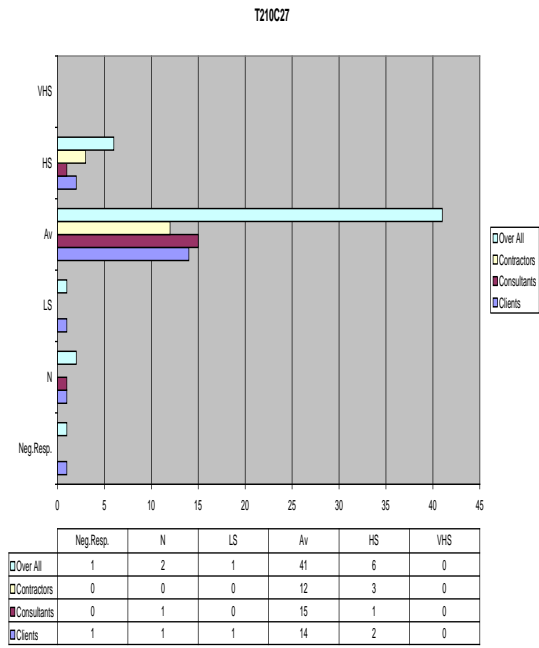


Figure 769 T210C27

Y.3.2.22 CAUSE SIGNIFICANCE ASSESSMENT: (T22 C01) – (T22 C32)

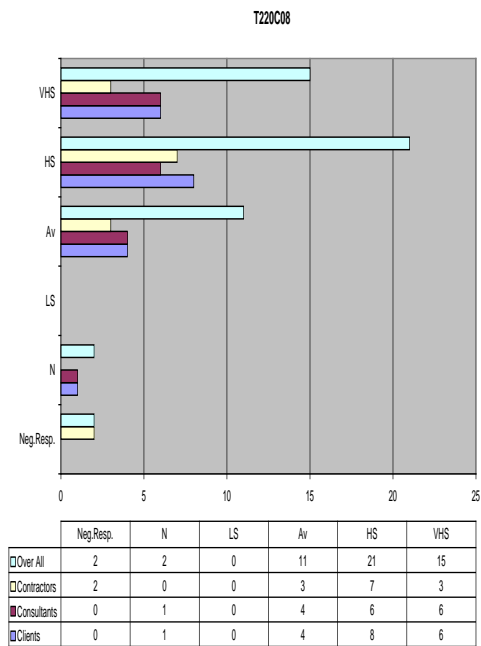


Figure 770 T22C08

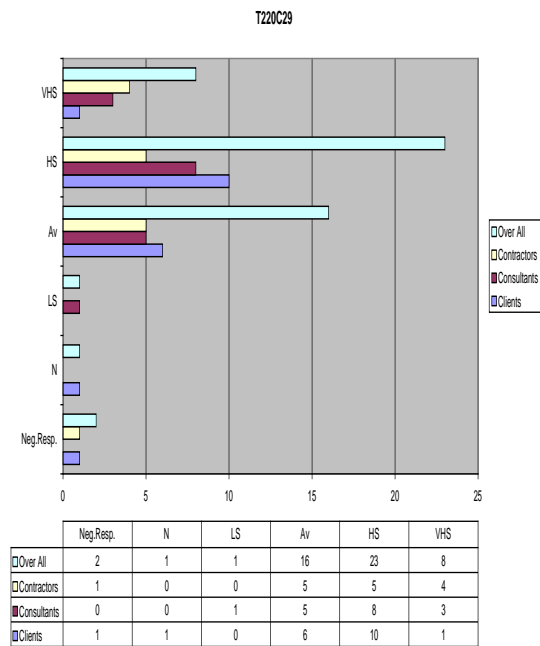


Figure 772 T22C29

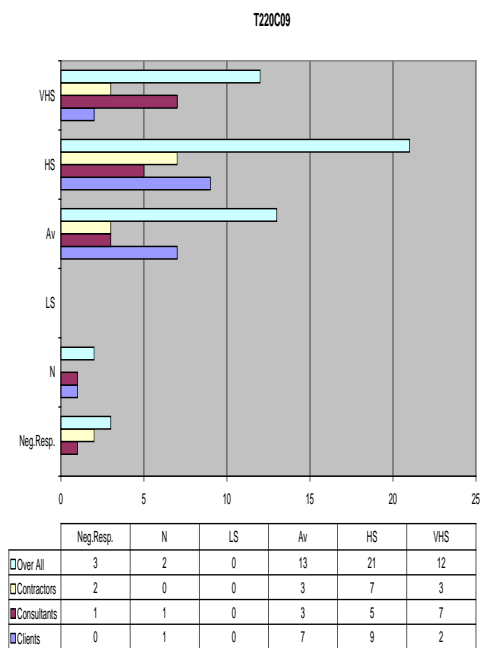


Figure 771 T22C09

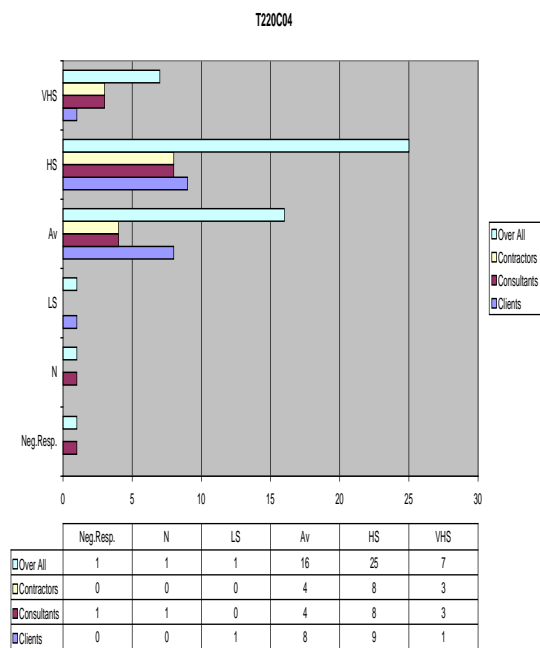


Figure 773 T22C04

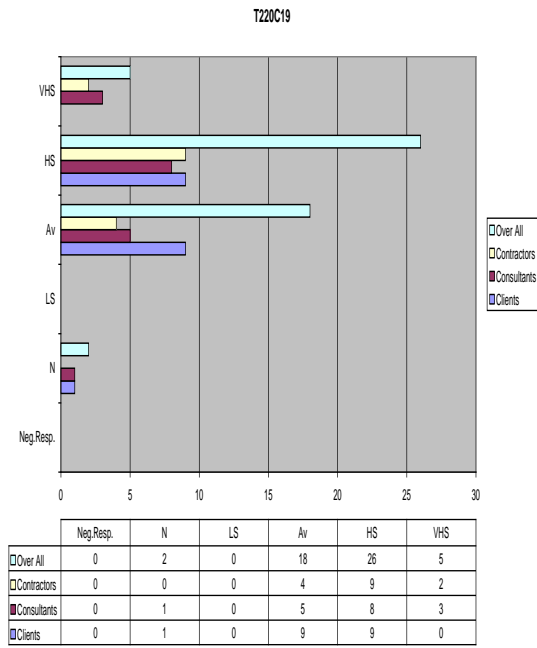


Figure 774 T220C19

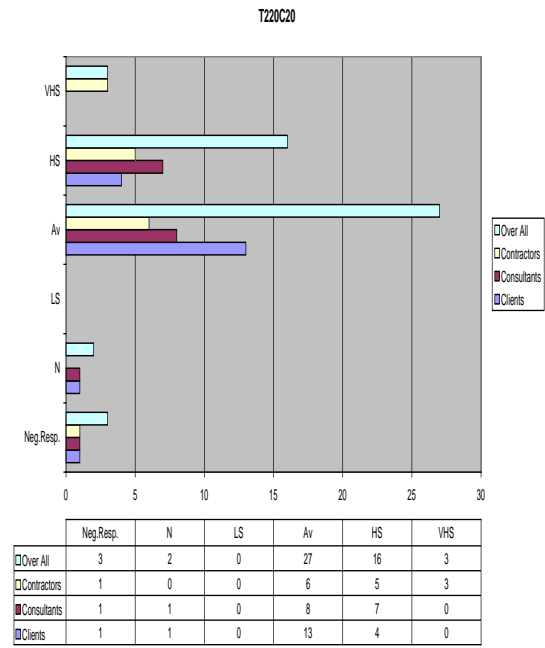


Figure 776 T220C20

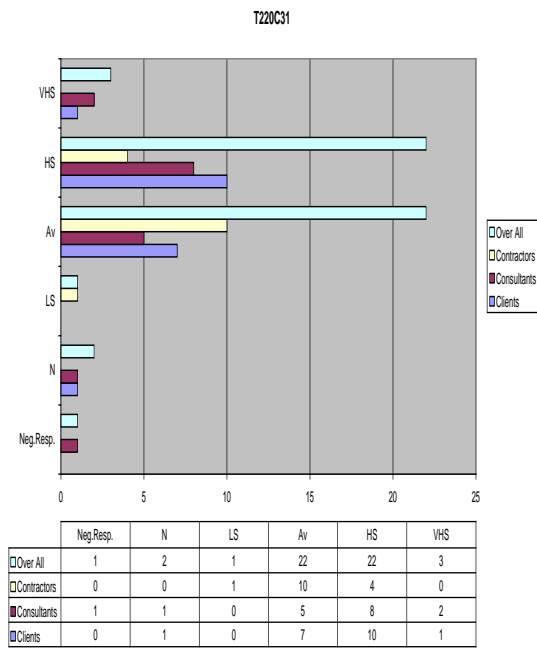


Figure 775 T220C31

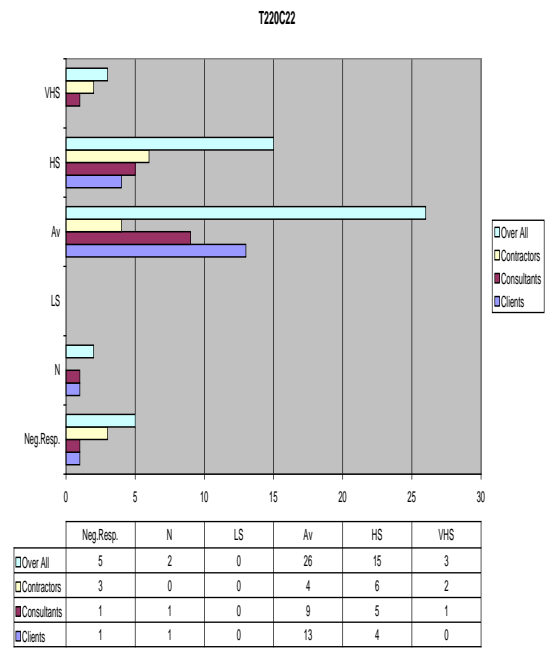


Figure 777 T220C22

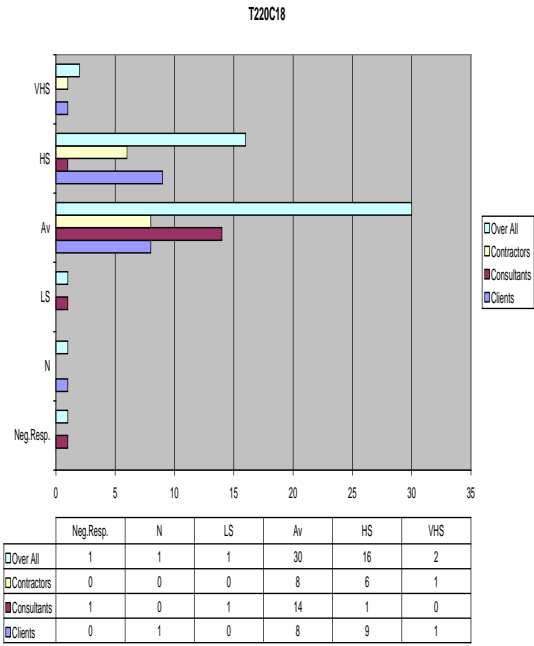


Figure 778 T220C18

Y.3.2.23 CAUSE SIGNIFICANCE ASSESSMENT: (T23 C01) – (T23 C32)

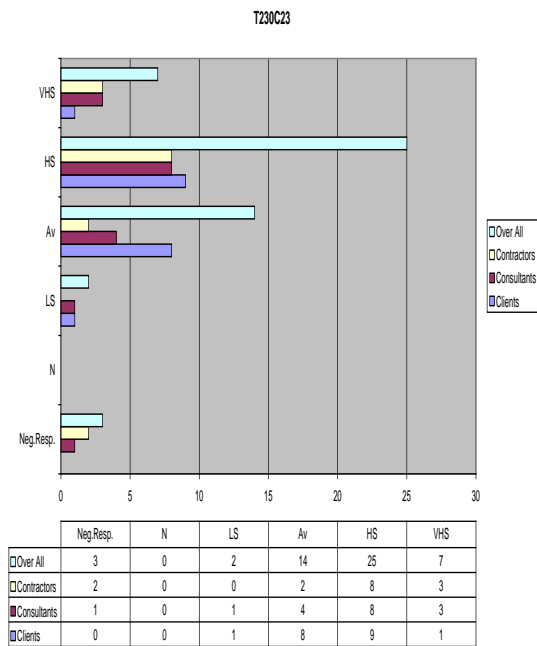


Figure 779 T230C23

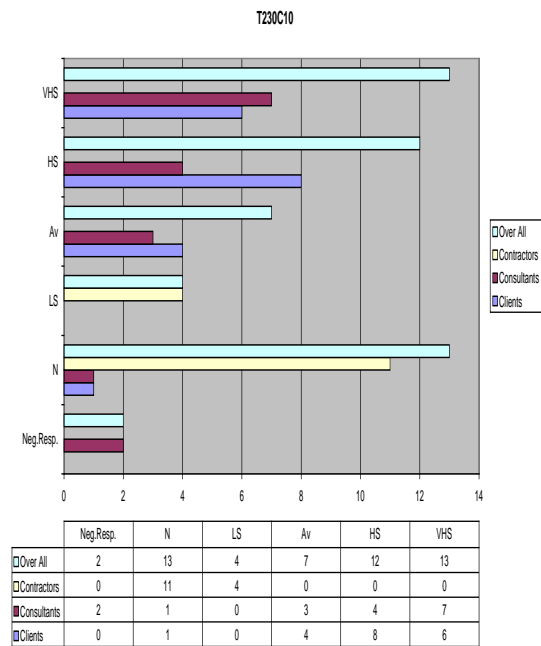


Figure 781 T230C10

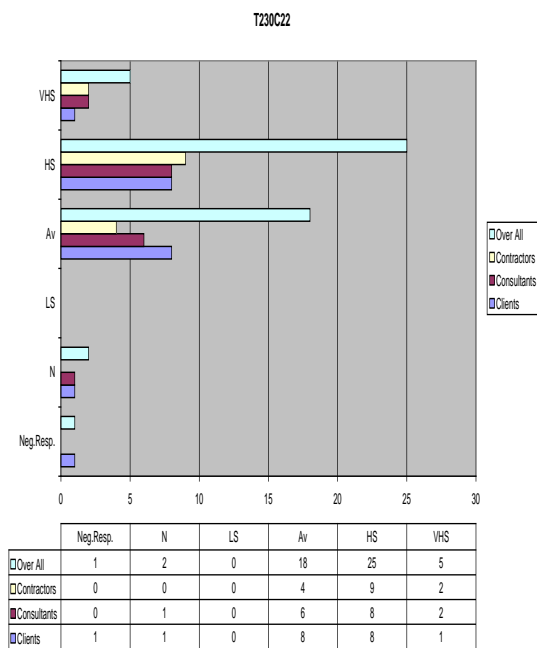


Figure 780 T230C22

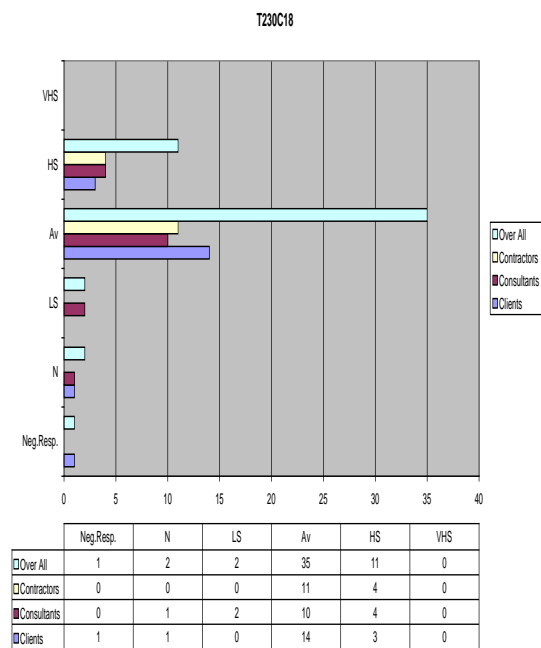


Figure 782 T230C18

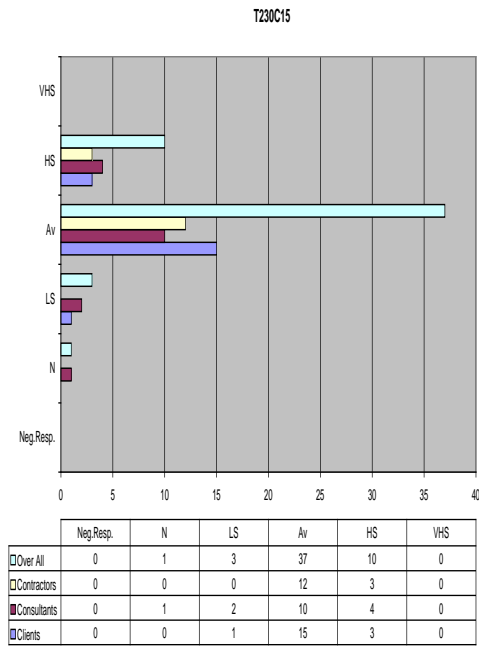


Figure 783 T230C15

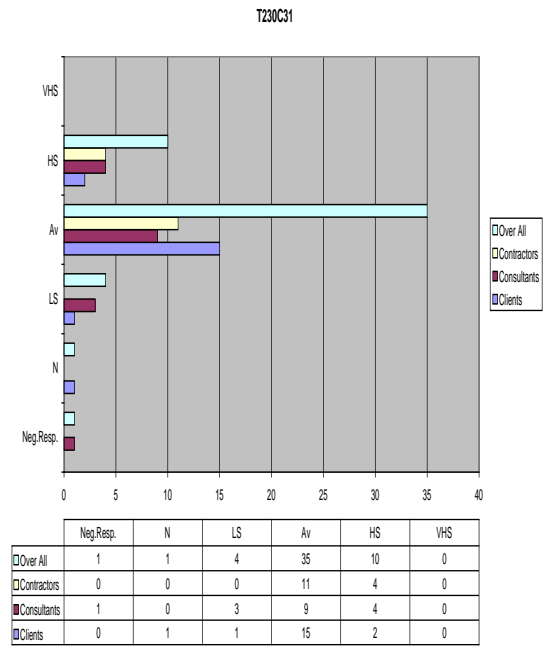


Figure 785 T230C31

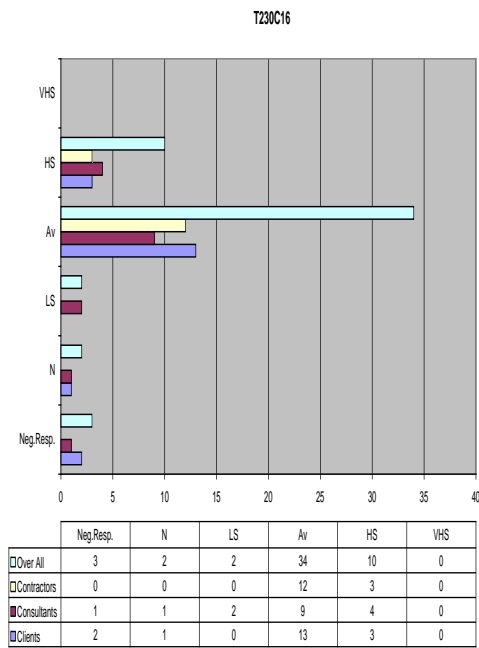


Figure 784 T230C16

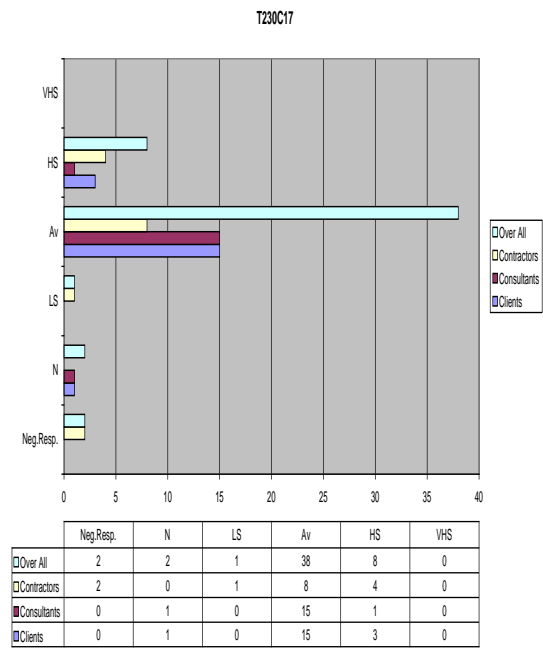


Figure 786 T230C17

Y.3.2.24 CAUSE SIGNIFICANCE ASSESSMENT: (T24 C01) – (T24 C32)

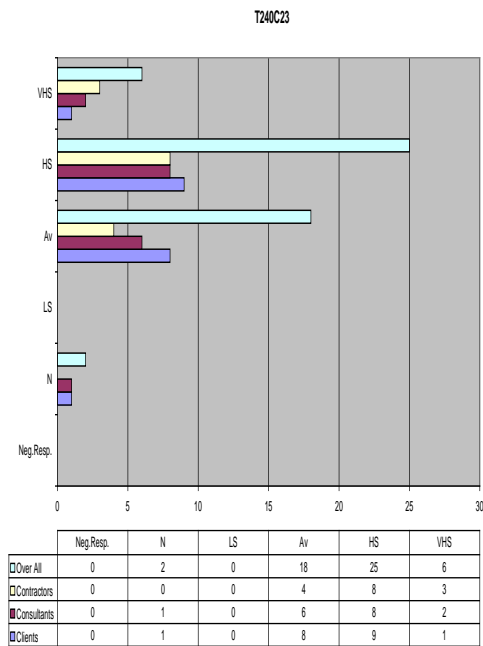


Figure 787 T240C23

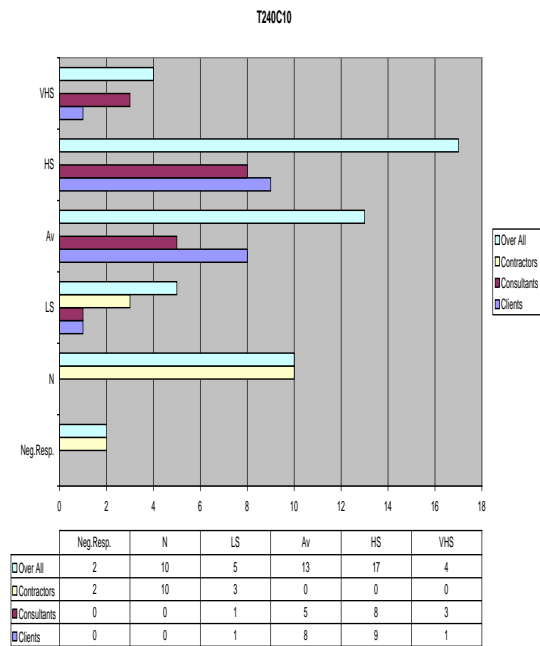


Figure 789 T240C10

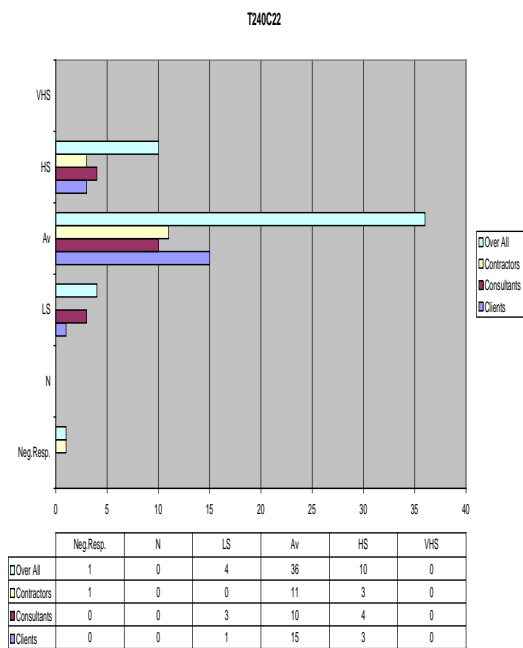


Figure 788 T240C22

Y.3.2.25 CAUSE SIGNIFICANCE ASSESSMENT: (T25 C01) – (T25 C32)

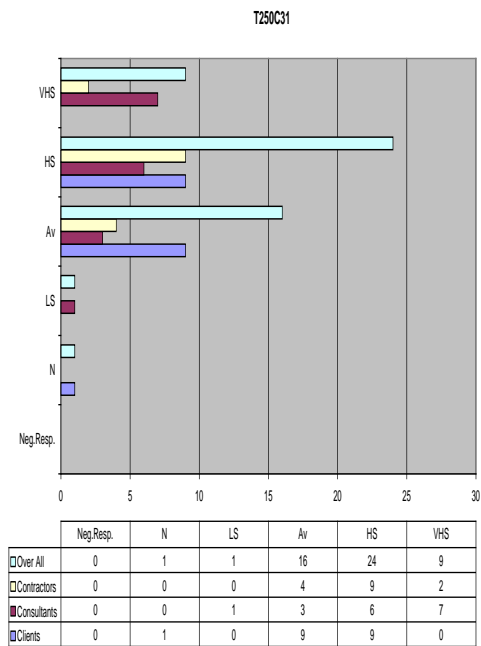


Figure 790 T250C31

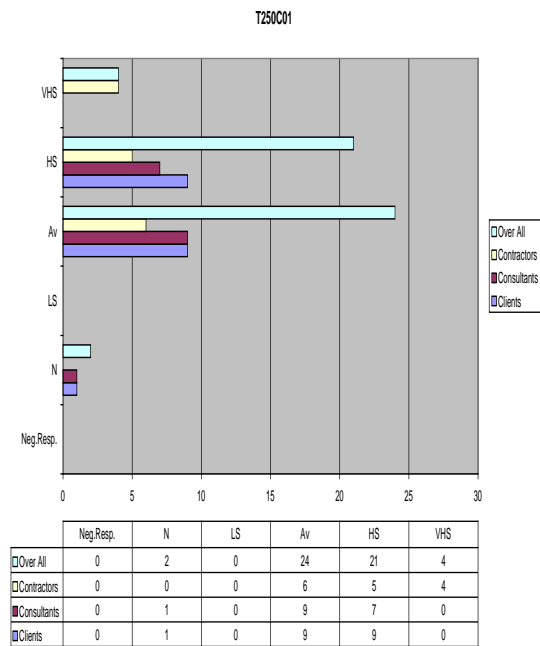


Figure 792 T250C01

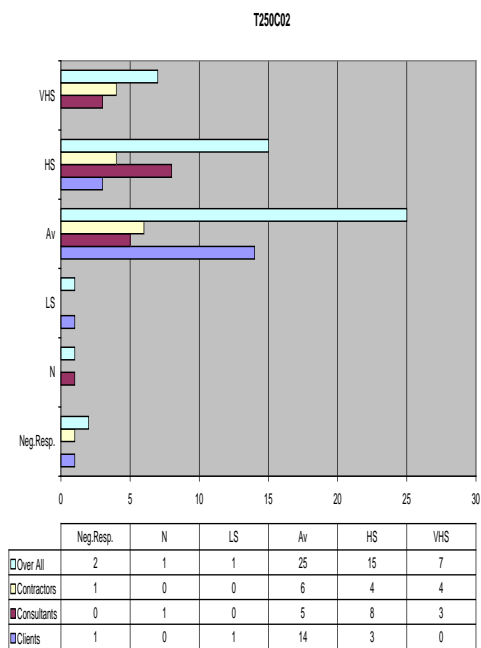


Figure 791 T250C02

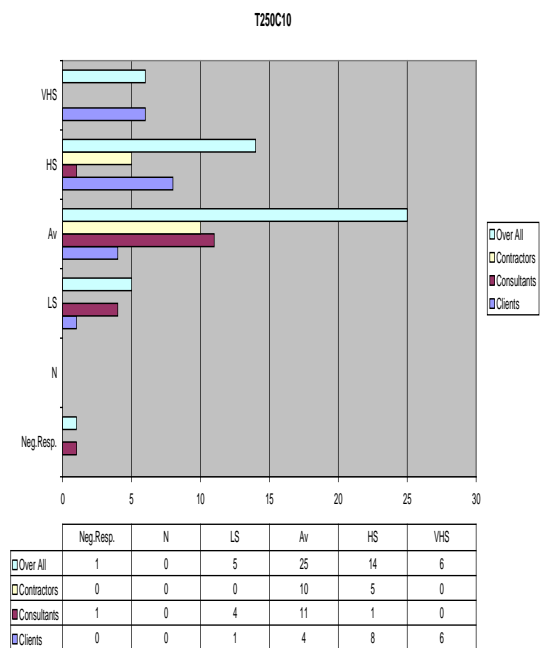


Figure 793 T250C10

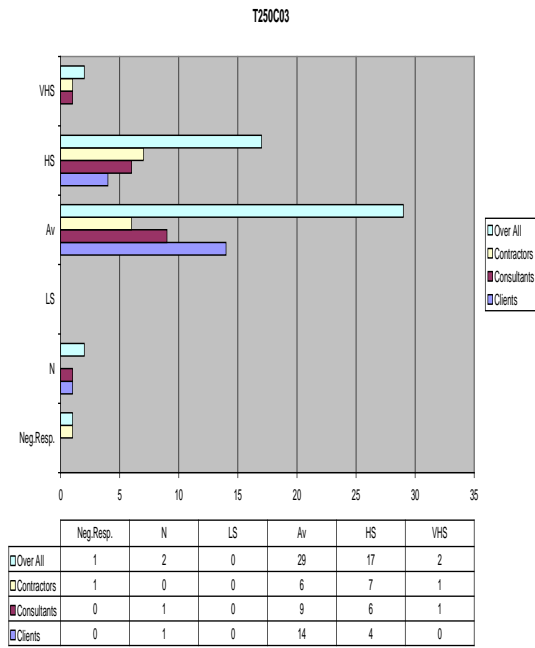


Figure 794 T250C03

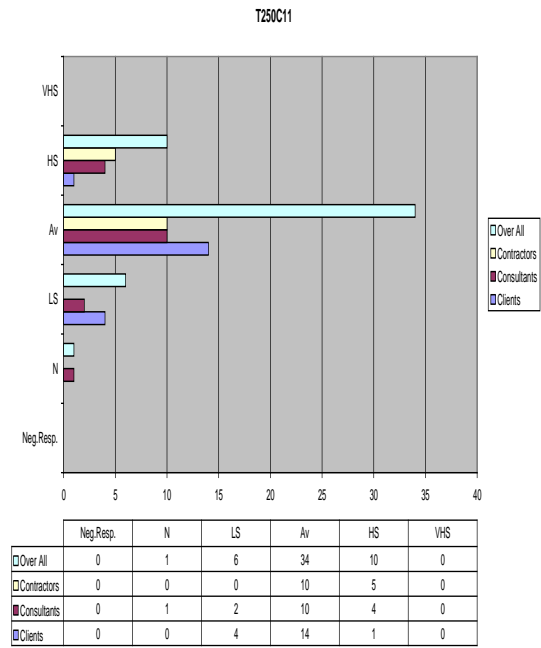


Figure 796 T250C11

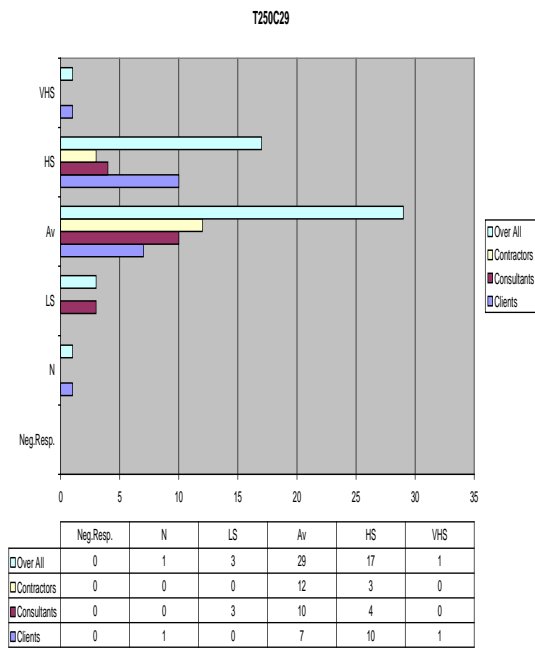


Figure 795 T250C29

Y.3.2.26 CAUSE SIGNIFICANCE ASSESSMENT: (T26 C01) – (T26 C32)

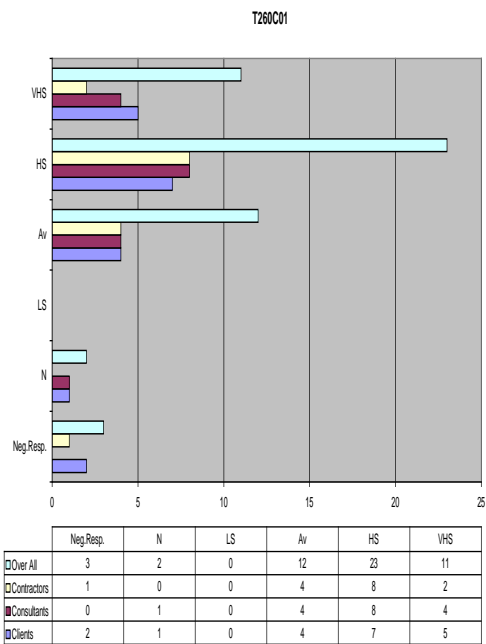


Figure 797 T260C01

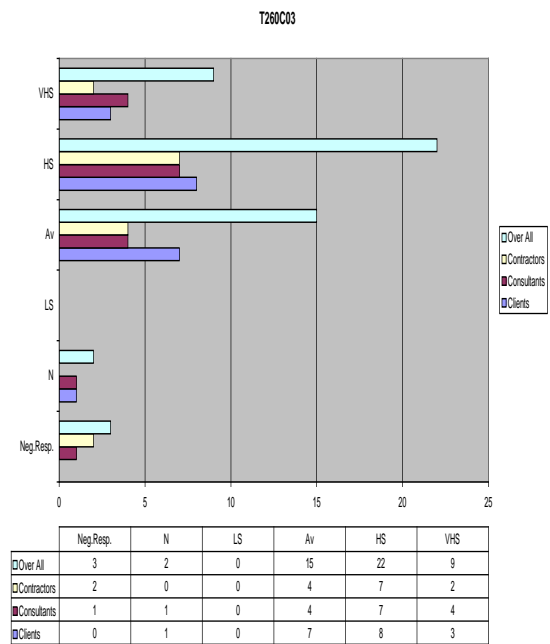


Figure 799 T260C03

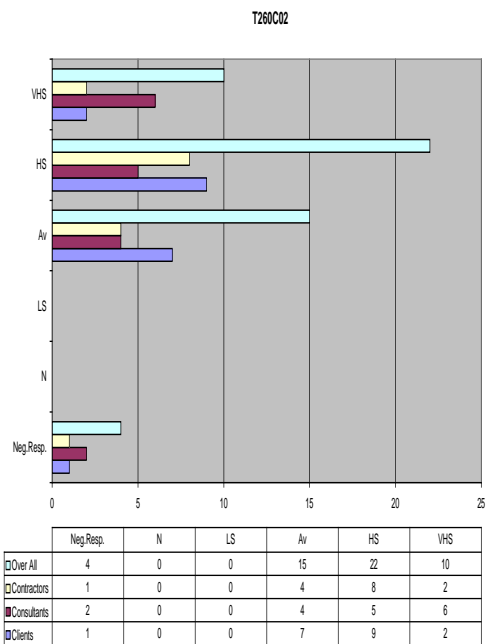


Figure 798 T260C02

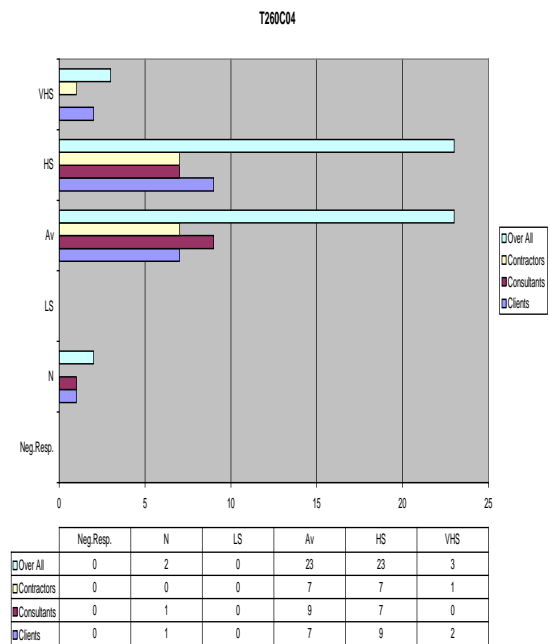


Figure 800 T260C04

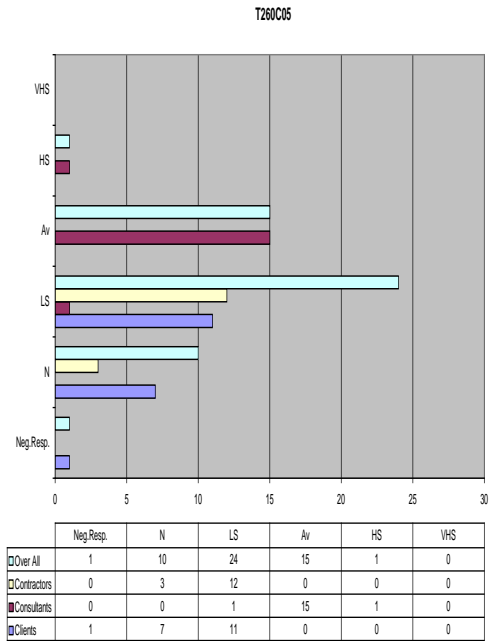


Figure 801 T260C05

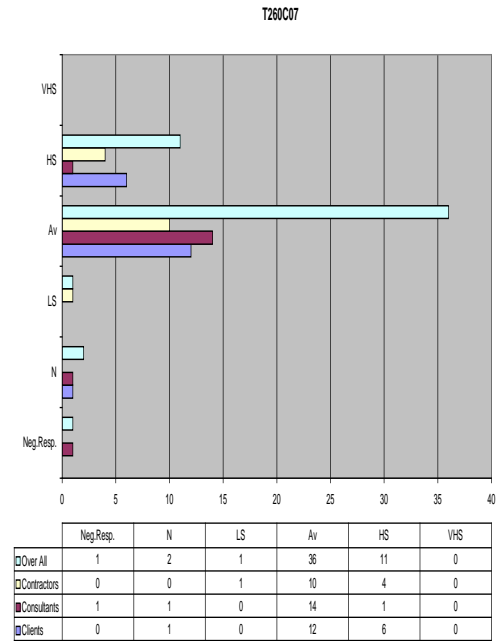


Figure 803 T260C07

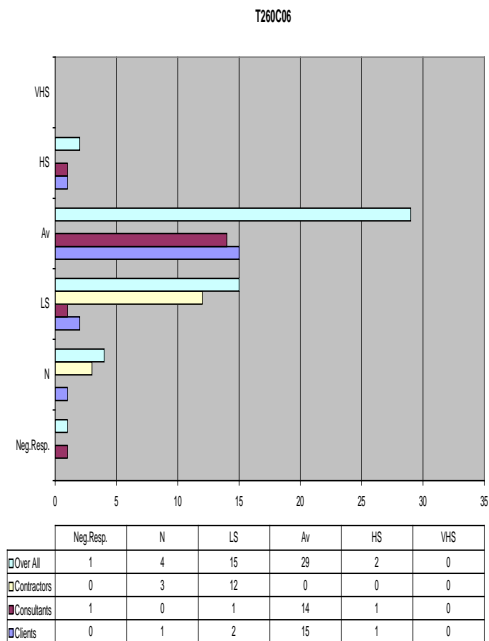


Figure 802 T260C06

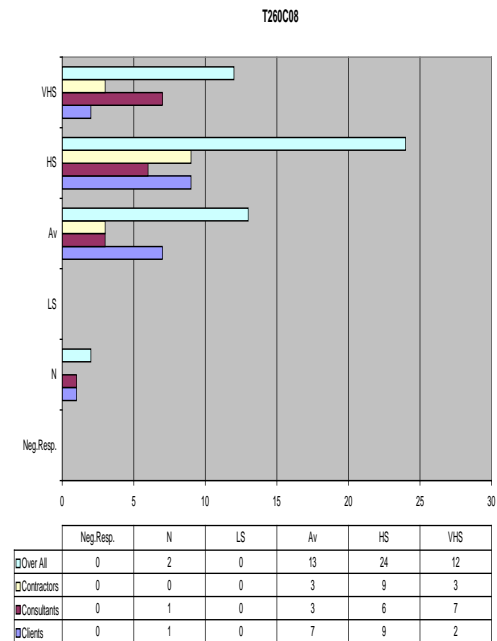


Figure 804 T260C08

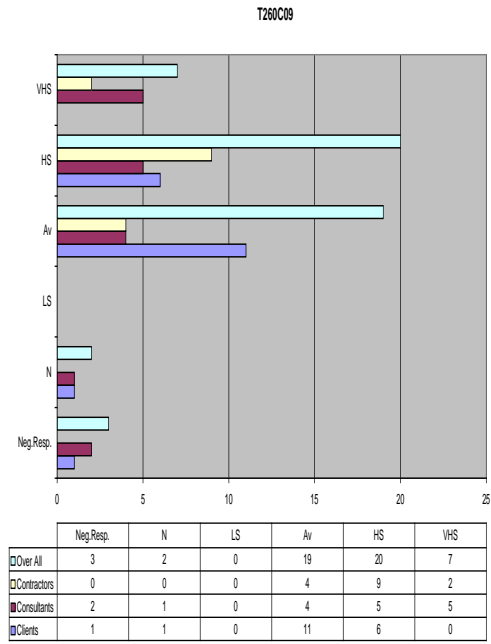


Figure 805 T260C09

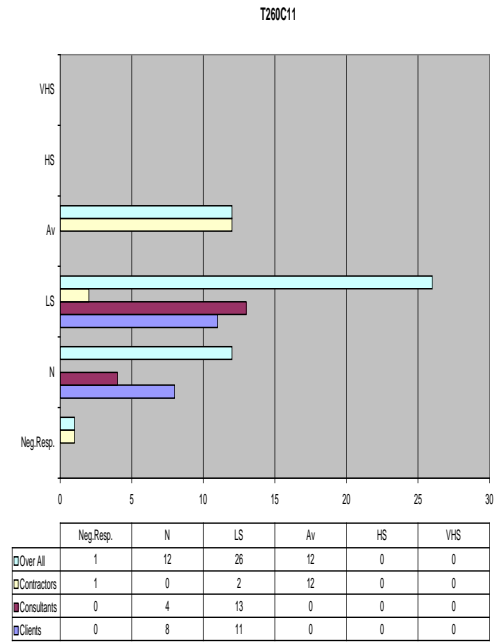


Figure 807 T260C11

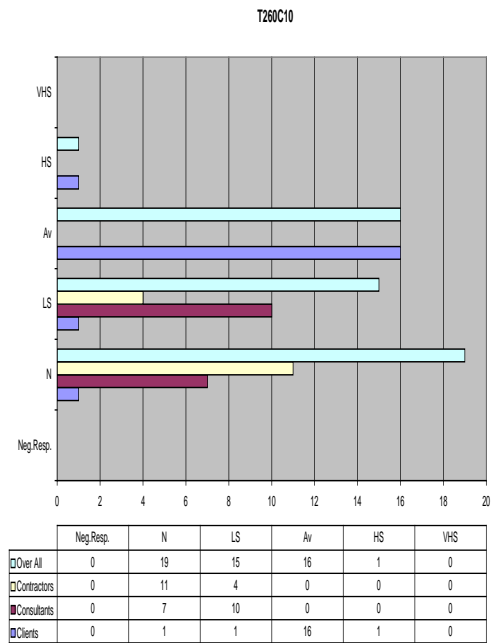


Figure 806 T260C10

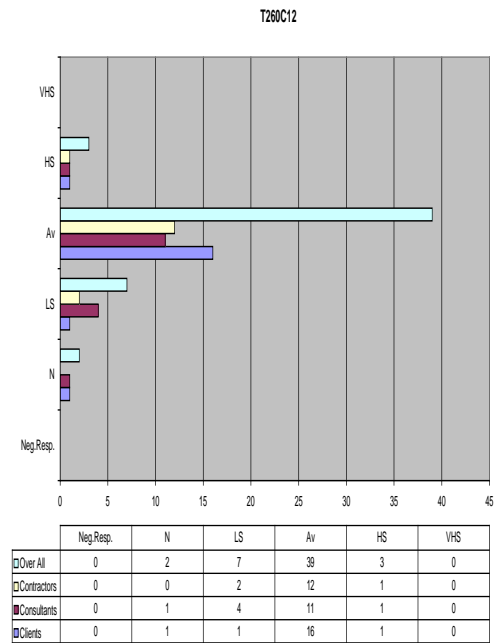


Figure 808 T260C12

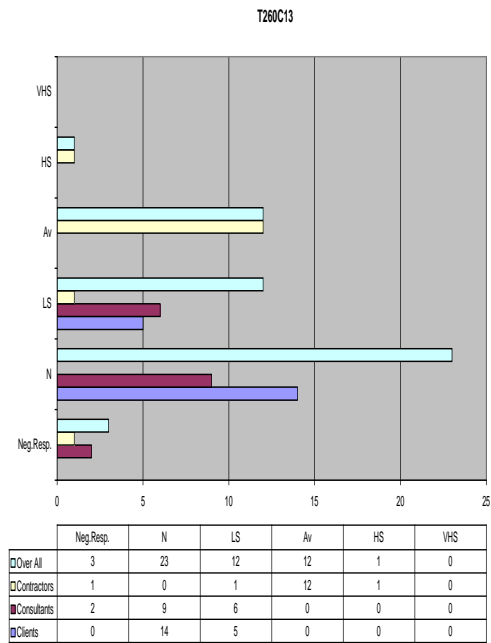


Figure 809 T260C13

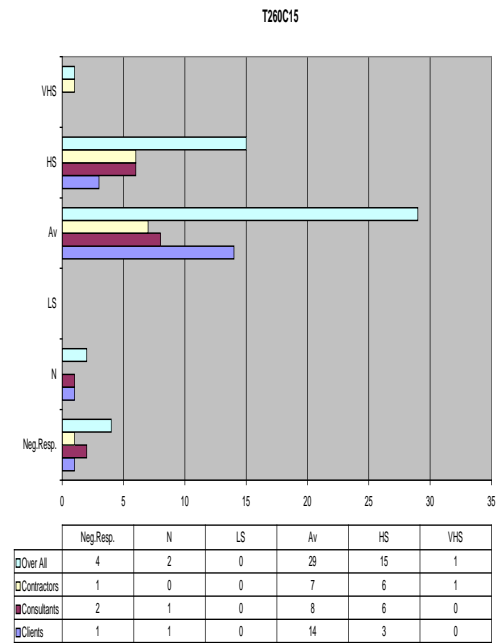


Figure 811 T260C15

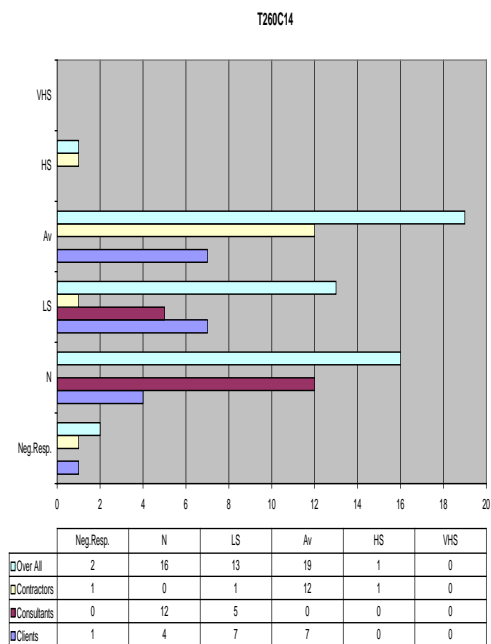


Figure 810 T260C14

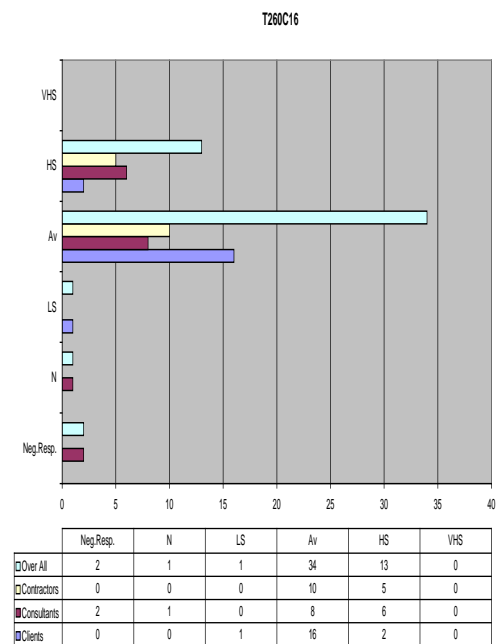


Figure 812 T260C16

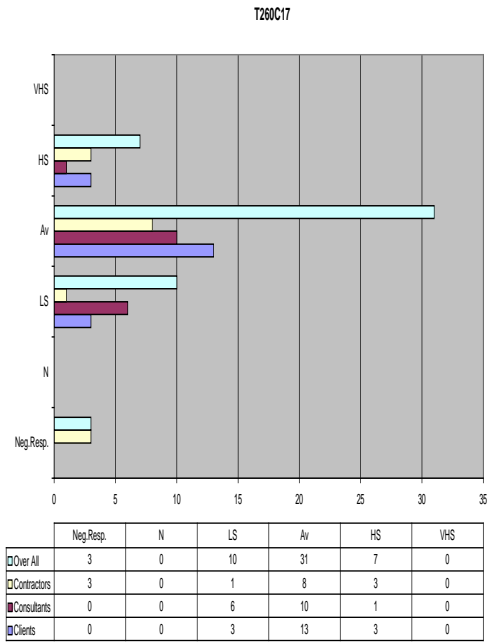


Figure 813 T260C17

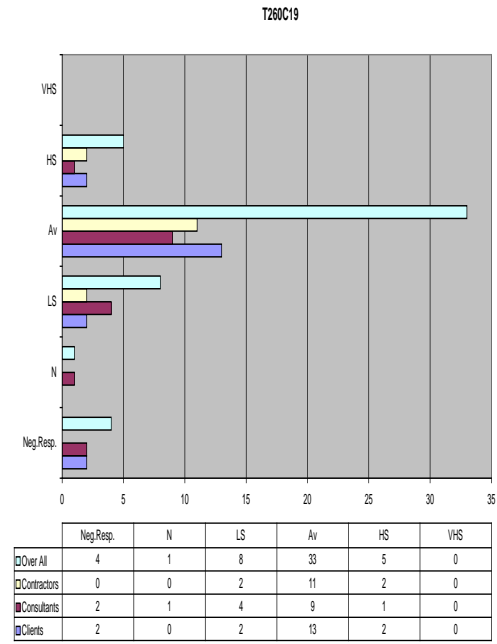


Figure 815 T260C19

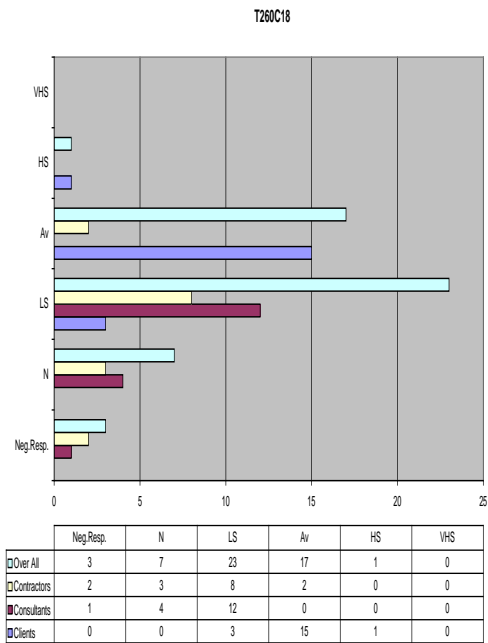


Figure 814 T260C18

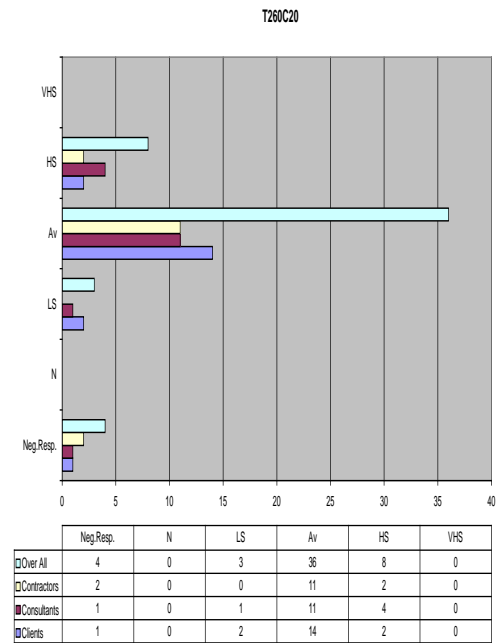


Figure 816 T260C20

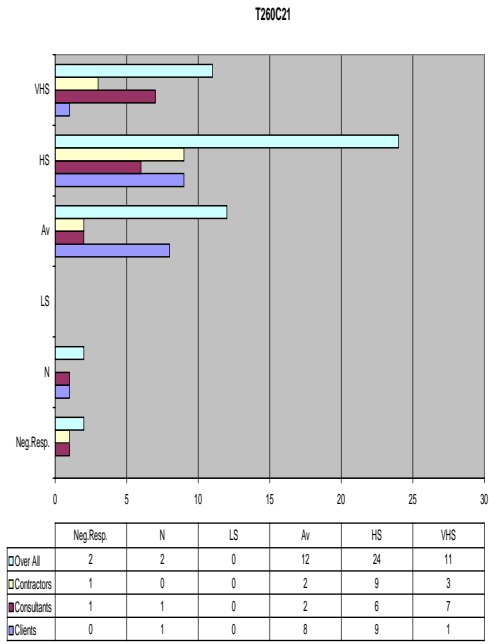


Figure 817 T260C21

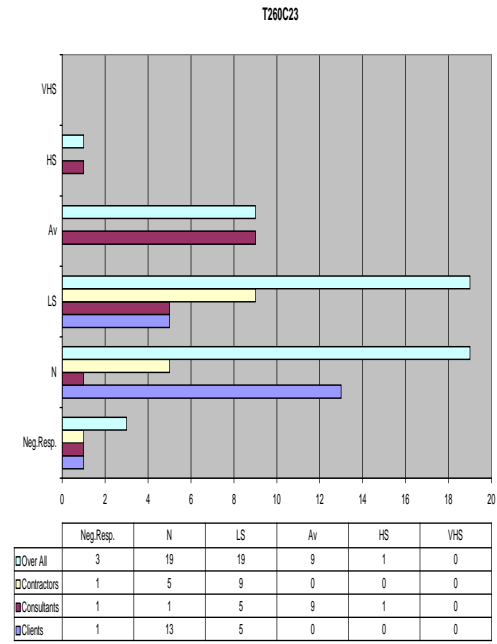


Figure 819 T260C23

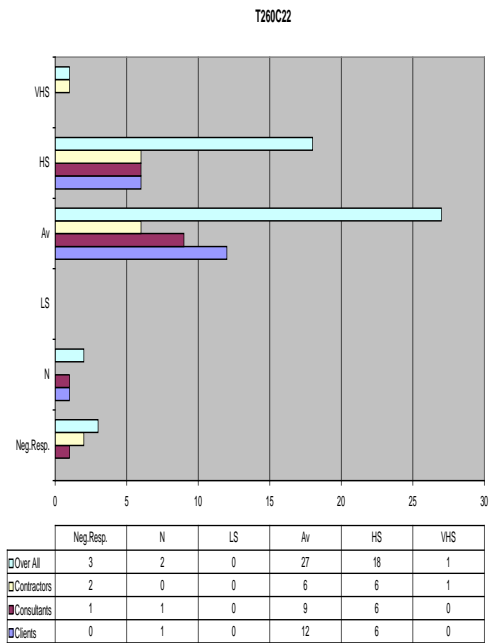


Figure 818 T260C22

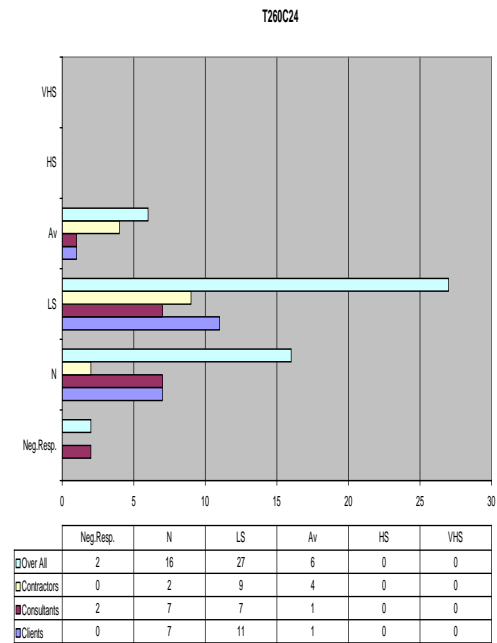


Figure 820 T260C24

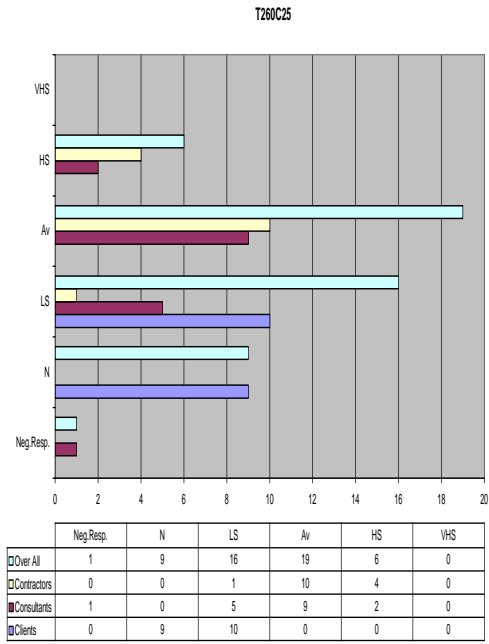


Figure 821 T260C25

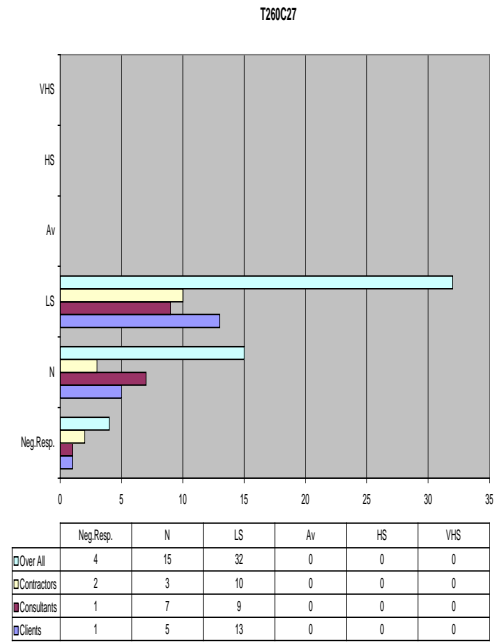


Figure 823 T260C27

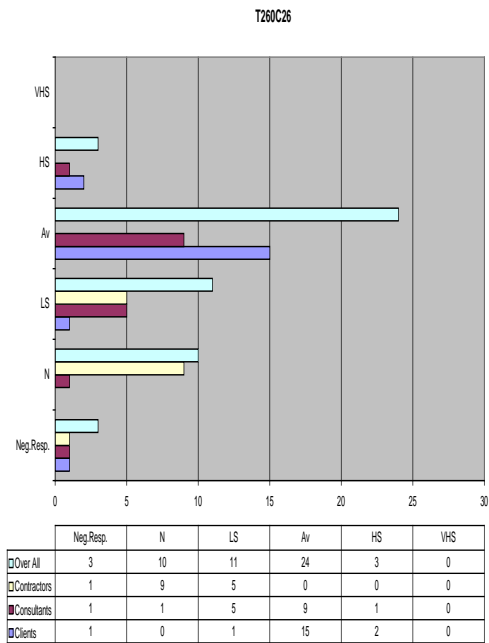


Figure 822 T260C26

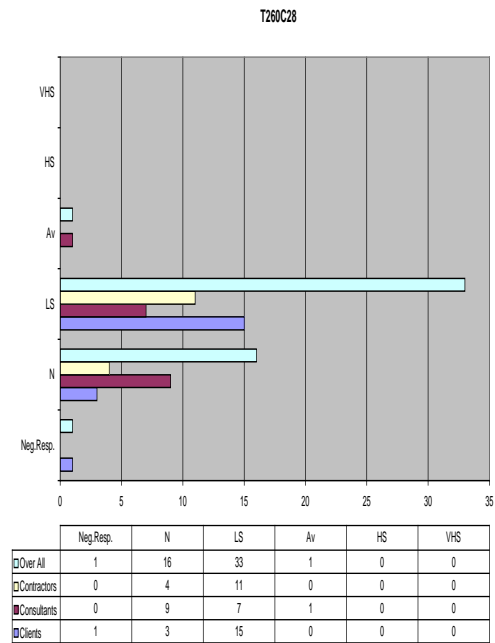


Figure 824 T260C28

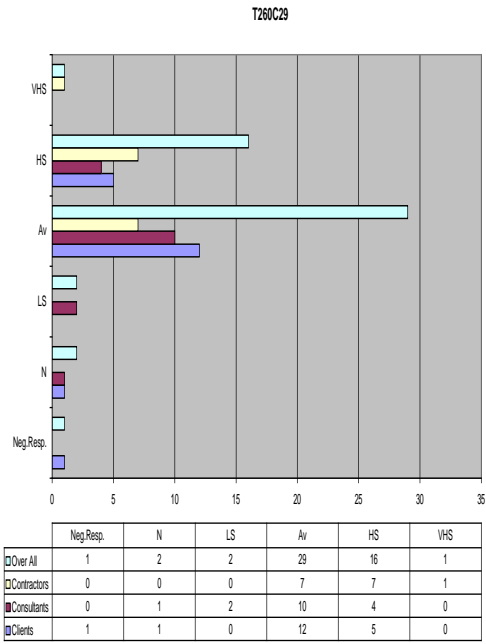


Figure 825 T260C29

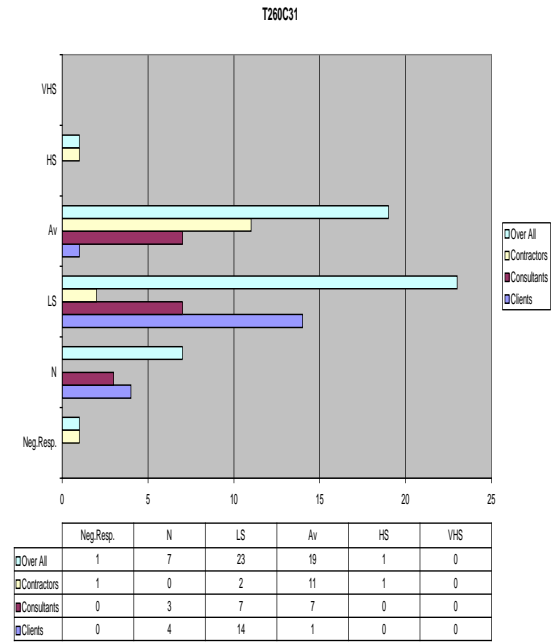


Figure 827 T260C31

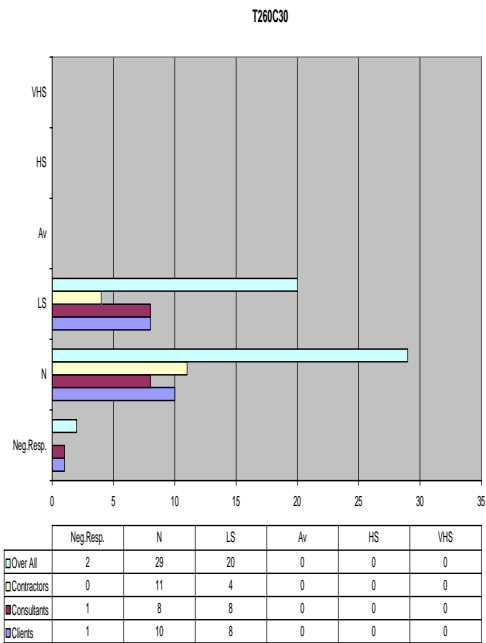


Figure 826 T260C30

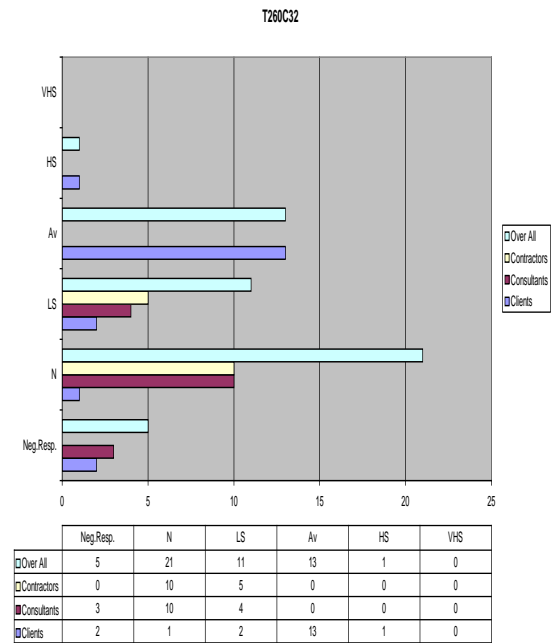


Figure 828 T260C32

Y.3.2.27 CAUSE SIGNIFICANCE ASSESSMENT: (T27 C01) – (T27 C32)

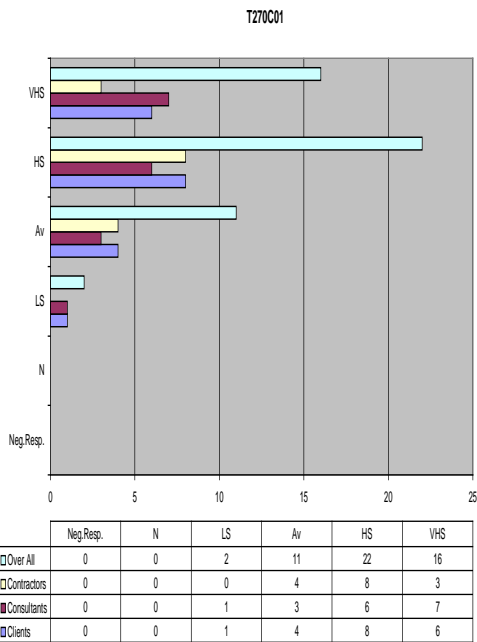


Figure 829 T270C01

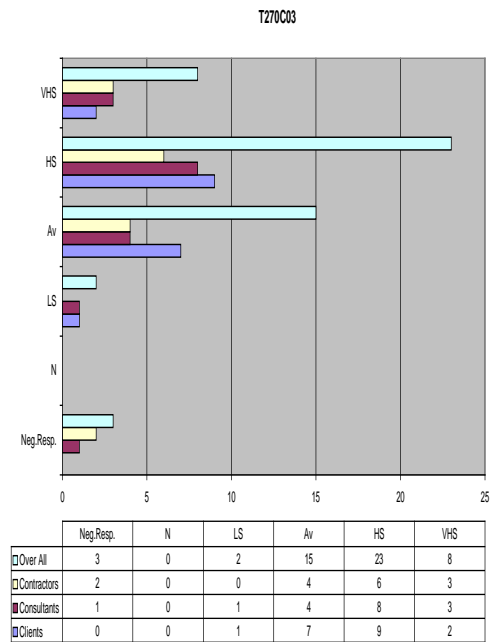


Figure 831 T270C03

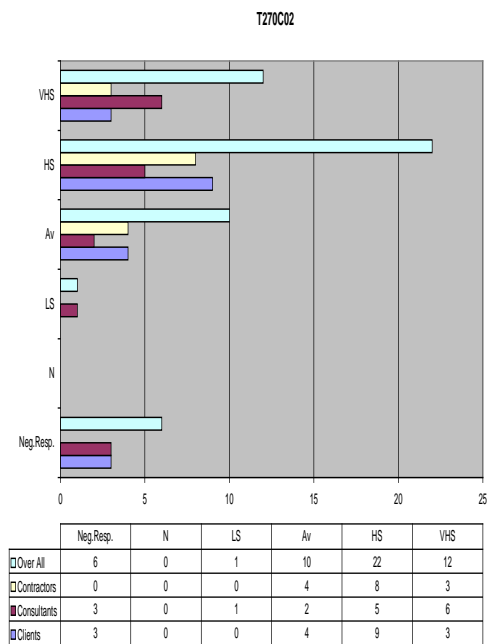


Figure 830 T270C02

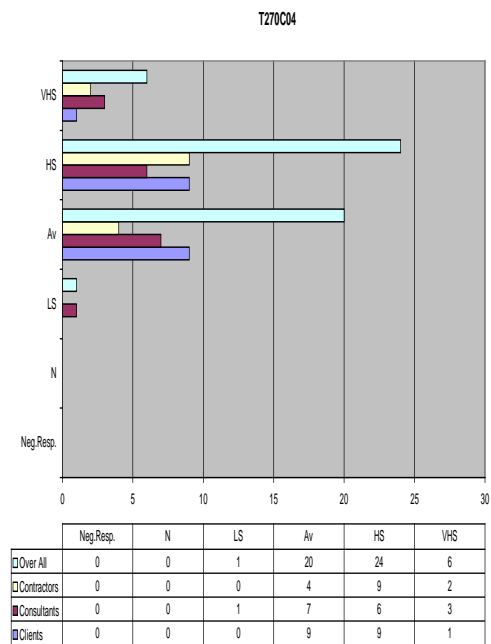


Figure 832 T270C04

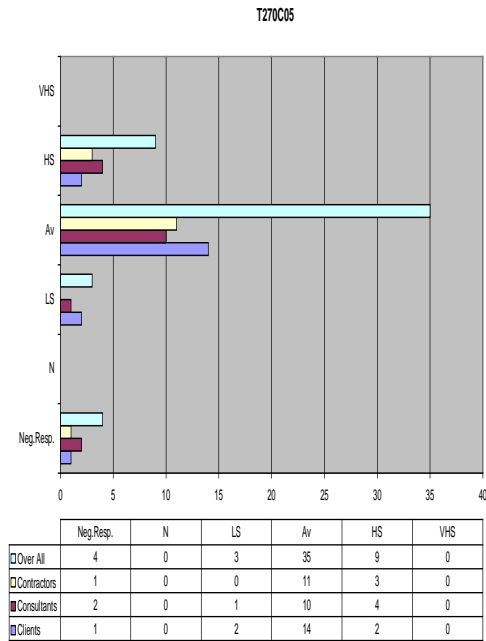


Figure 833 T270C05

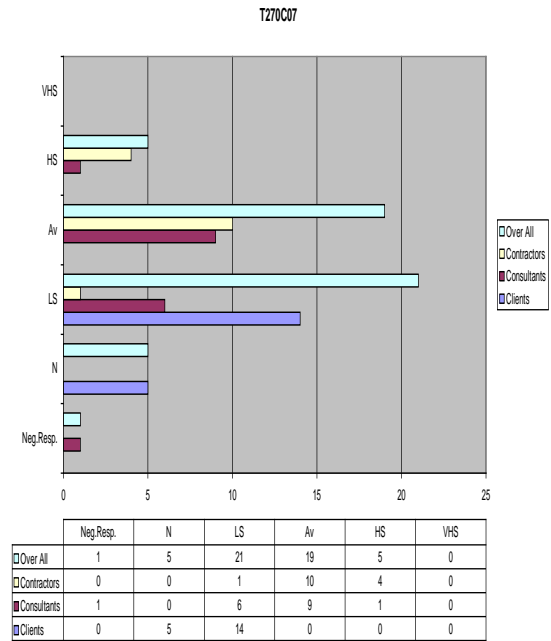


Figure 835 T270C07

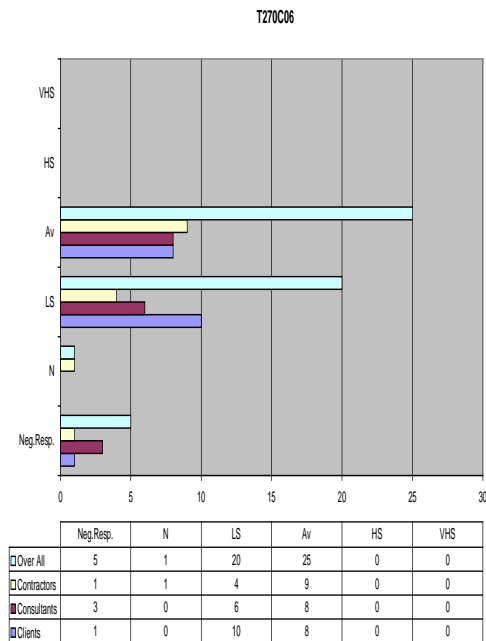


Figure 834 T270C06

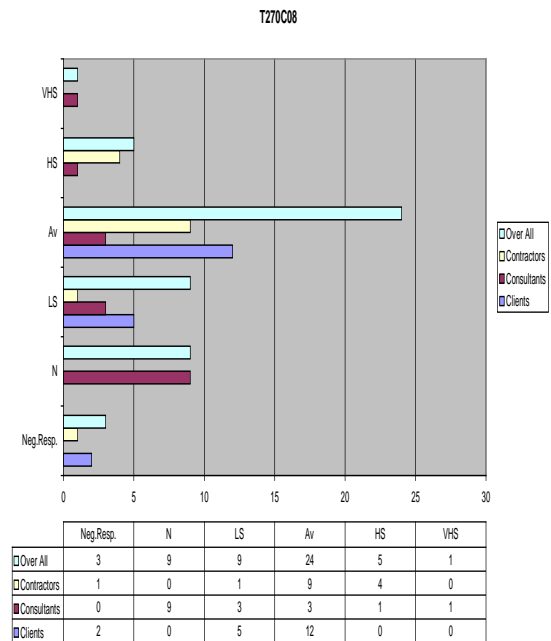


Figure 836 T270C08

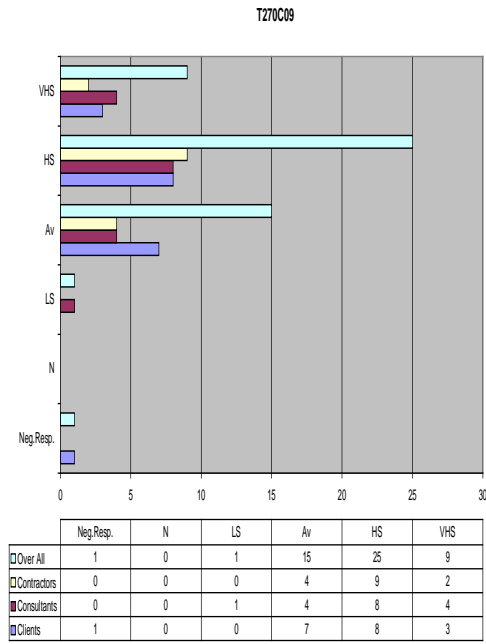


Figure 837 T270C09

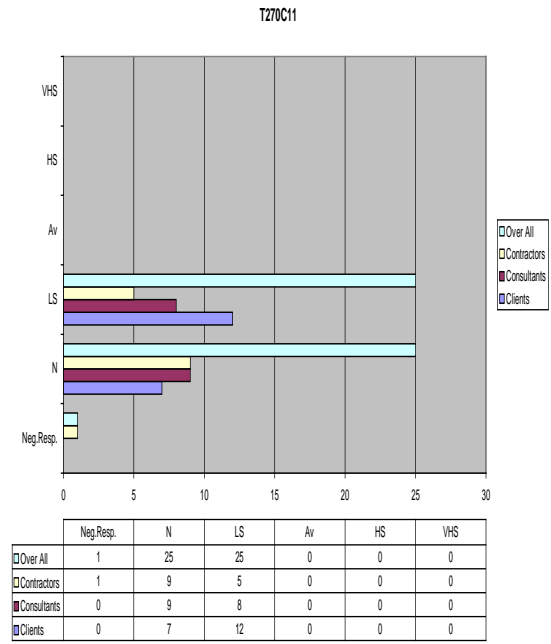


Figure 839 T270C11

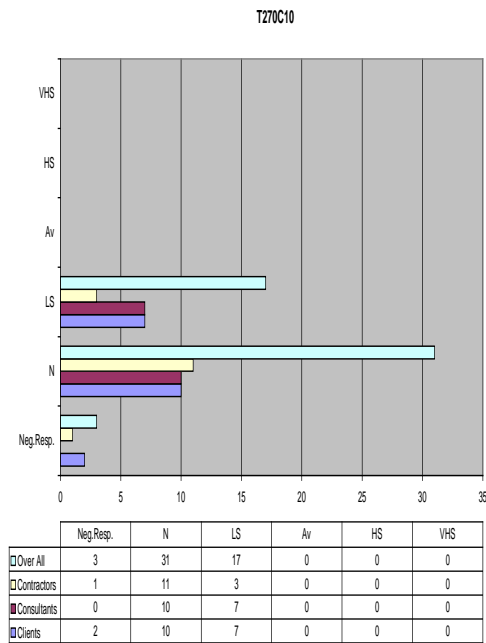


Figure 838 T270C10

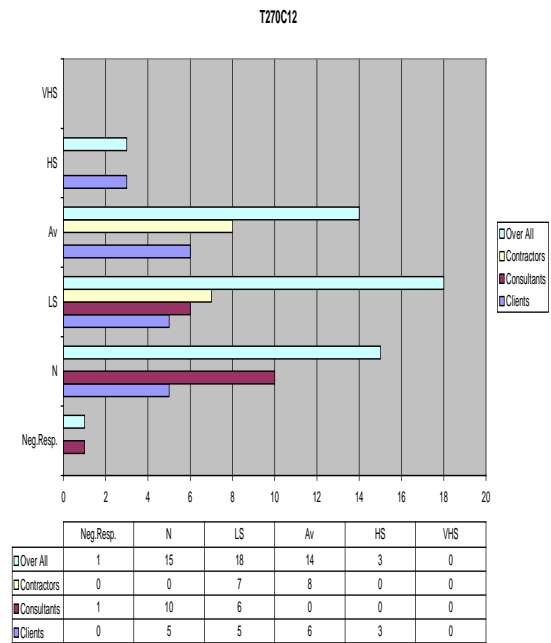


Figure 840 T270C12

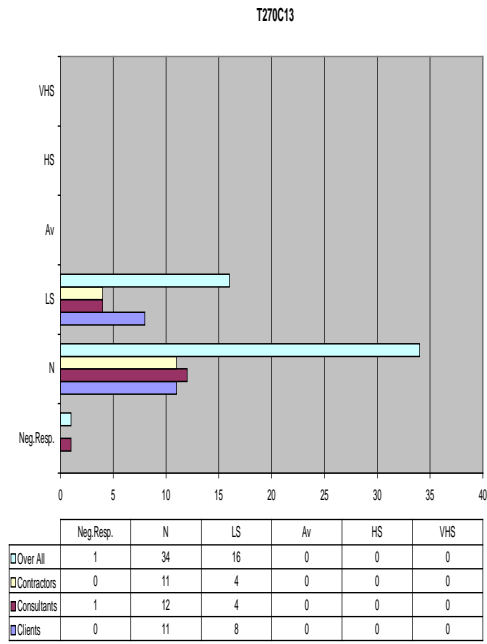


Figure 841 T270C13

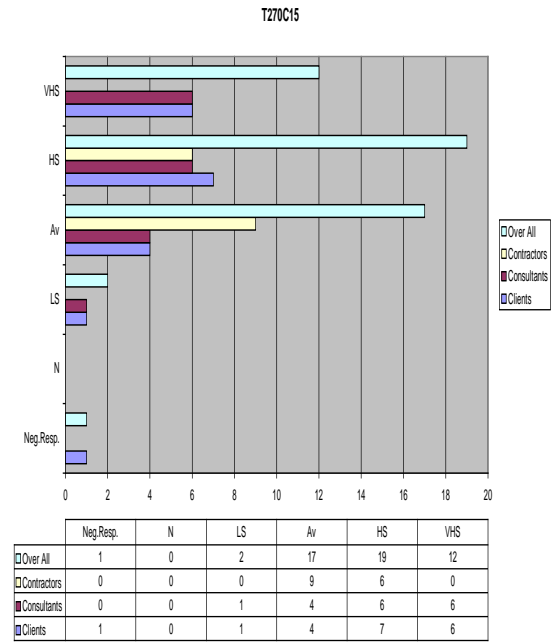


Figure 843 T270C15

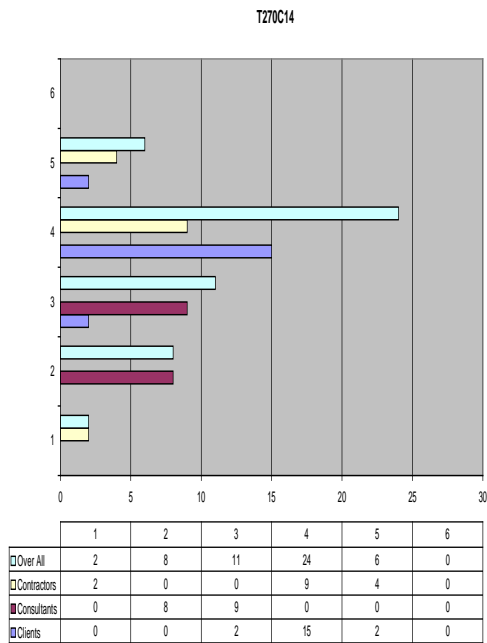


Figure 842 T270C14

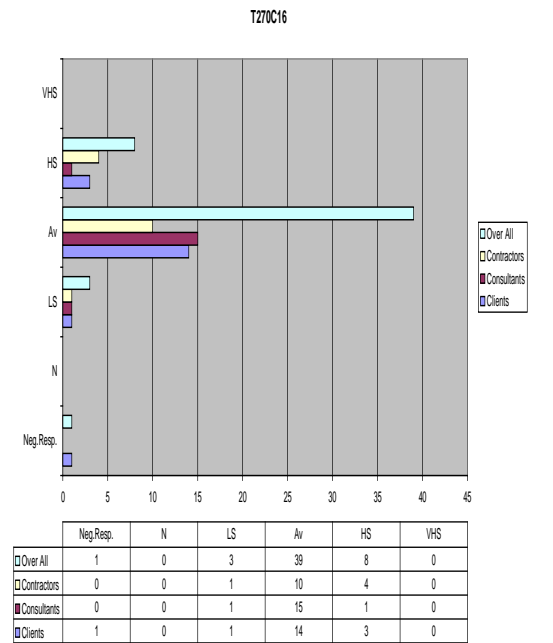


Figure 844 T270C16

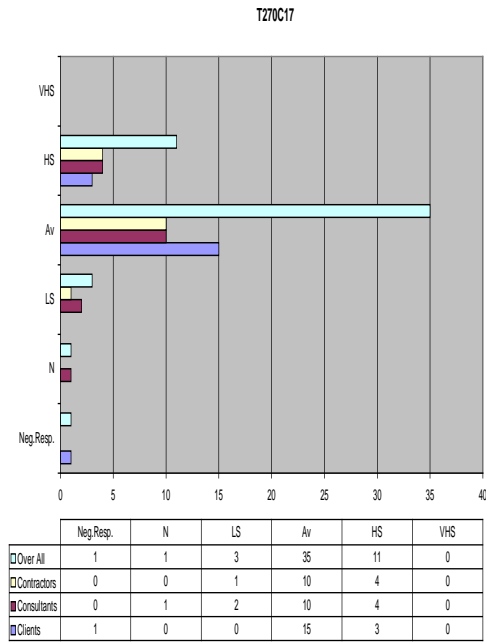


Figure 845 T270C17

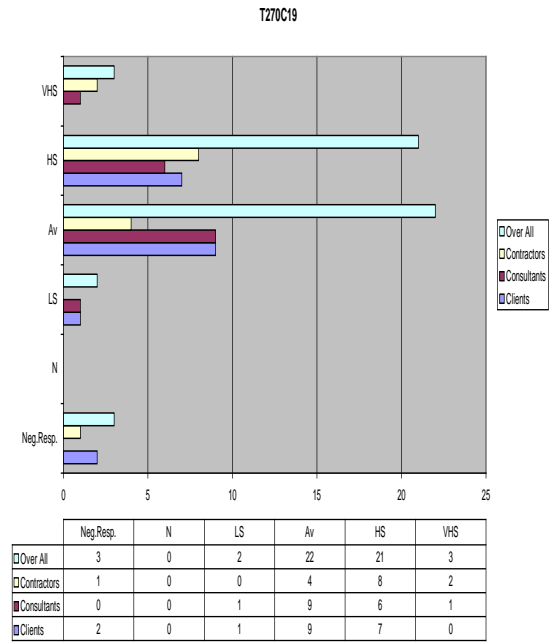


Figure 847 T270C19

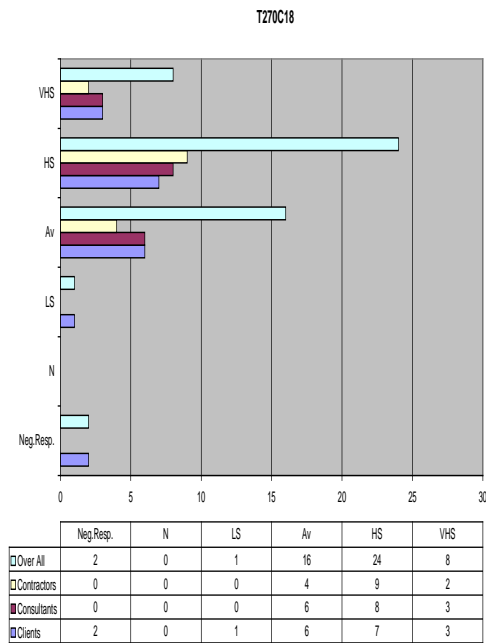


Figure 846 T270C18

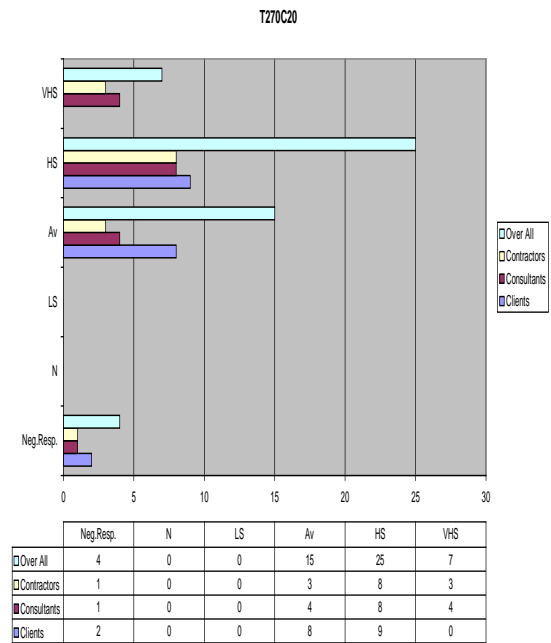


Figure 848 T270C20

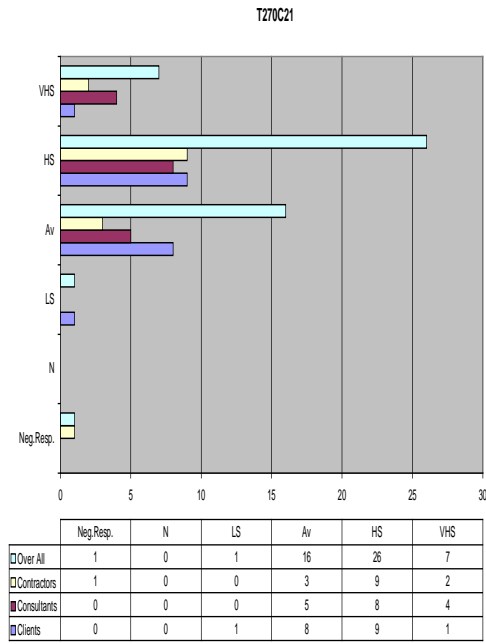


Figure 849 T270C21

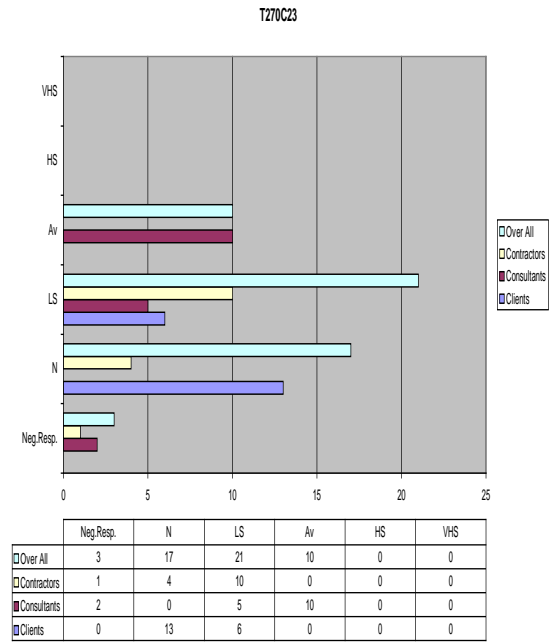


Figure 851 T270C23

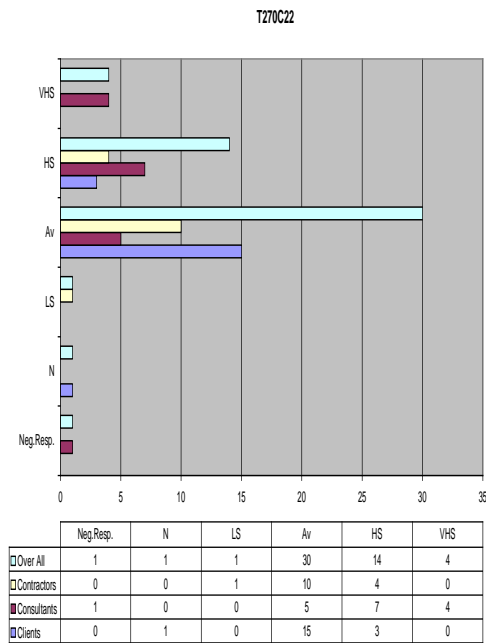


Figure 850 T270C22

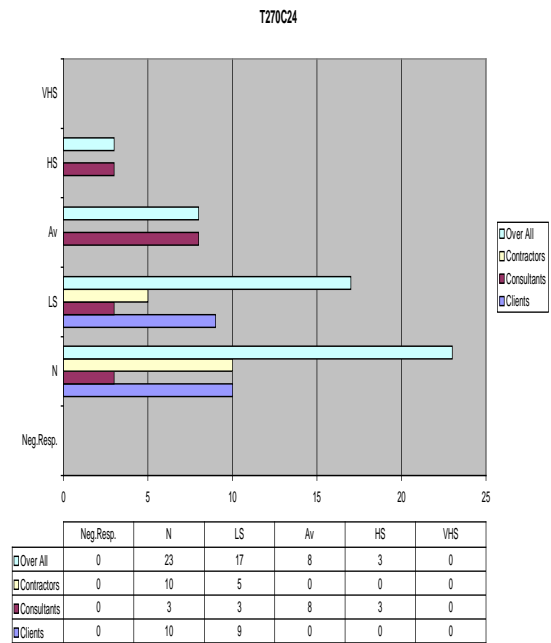


Figure 852 T270C24

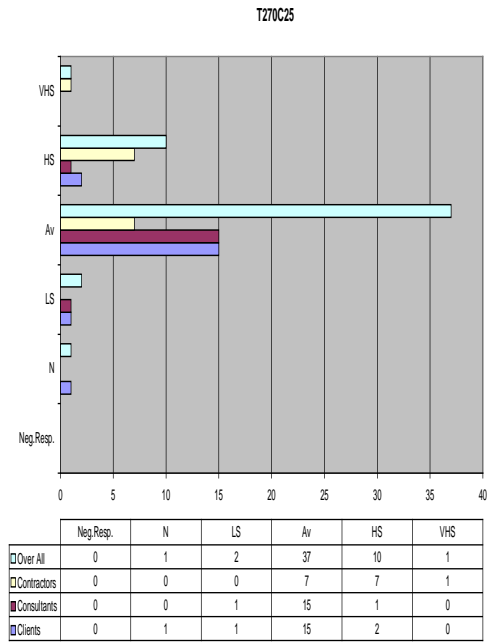


Figure 853 T270C25

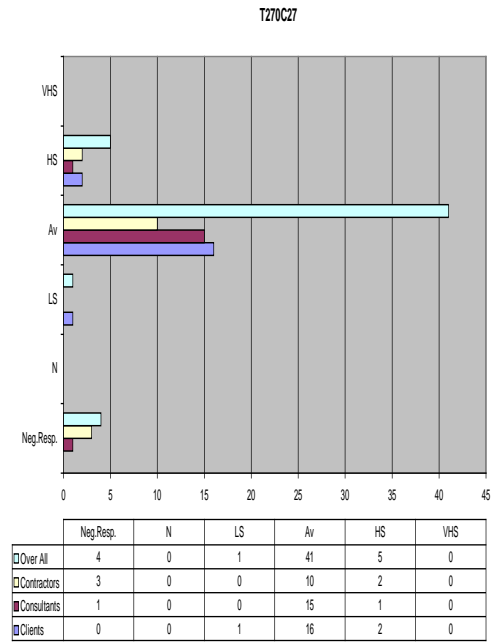


Figure 855 T270C27

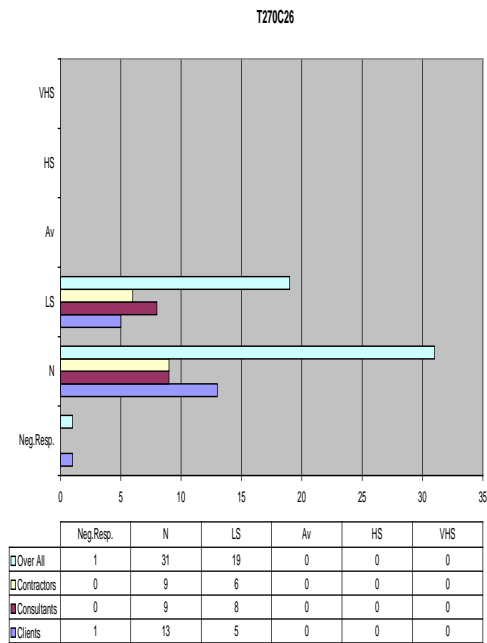


Figure 854 T270C26

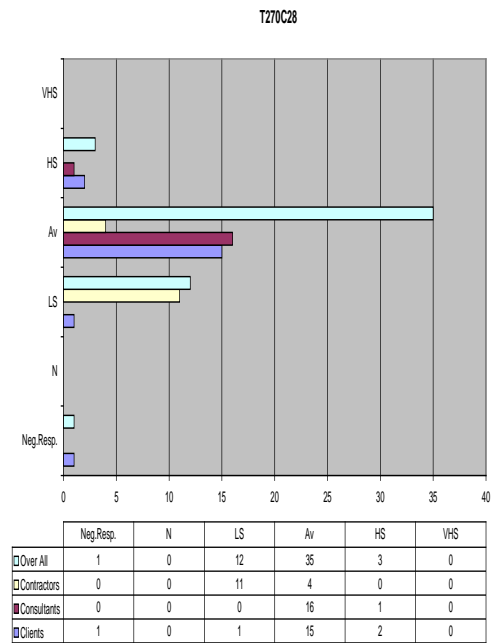


Figure 856 T270C28

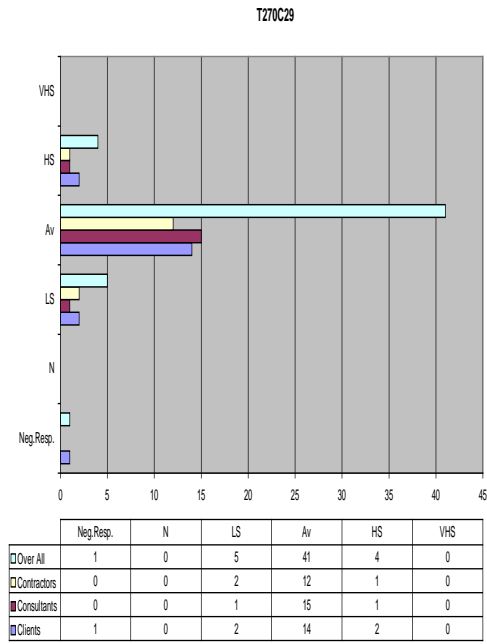


Figure 857 T270C29

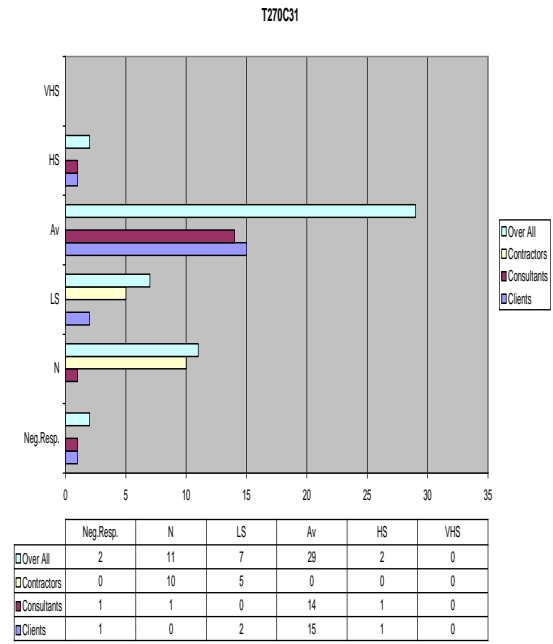


Figure 859 T270C31

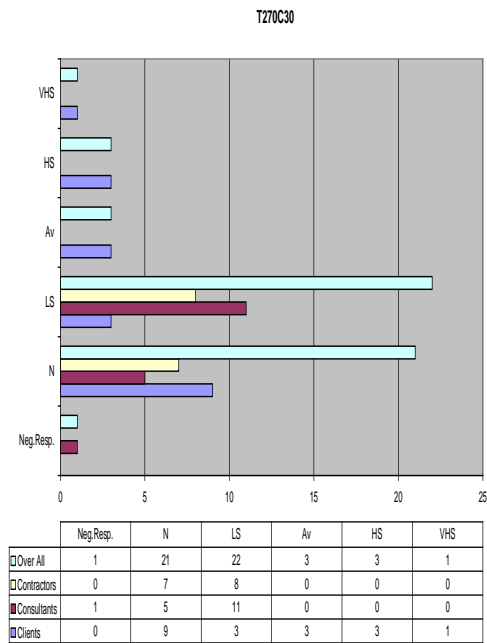


Figure 858 T270C30

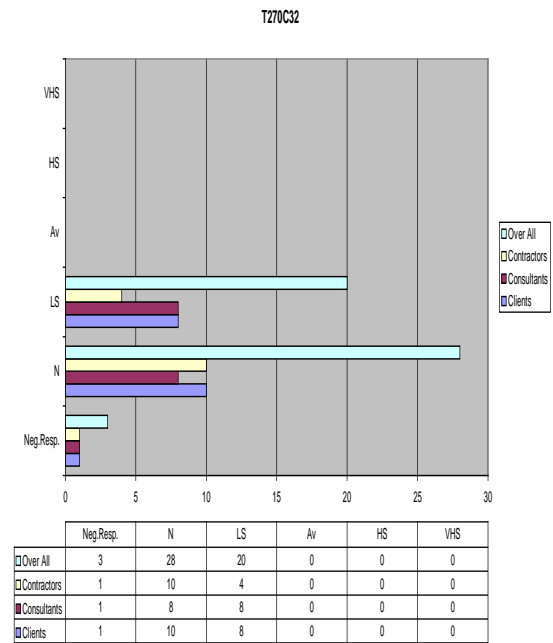


Figure 860 T270C32

Y.3.2.28 CAUSE SIGNIFICANCE ASSESSMENT: (T28 C01) – (T28 C32)

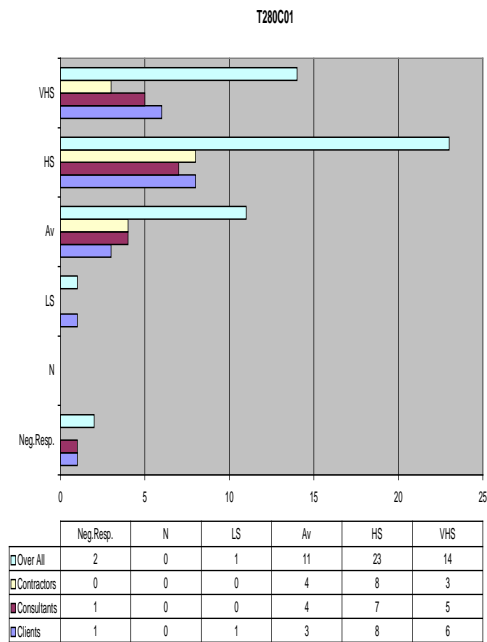


Figure 861 T280C01

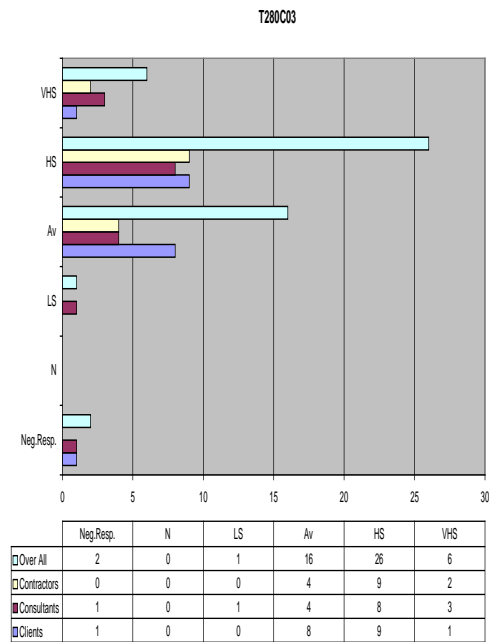


Figure 863 T280C03

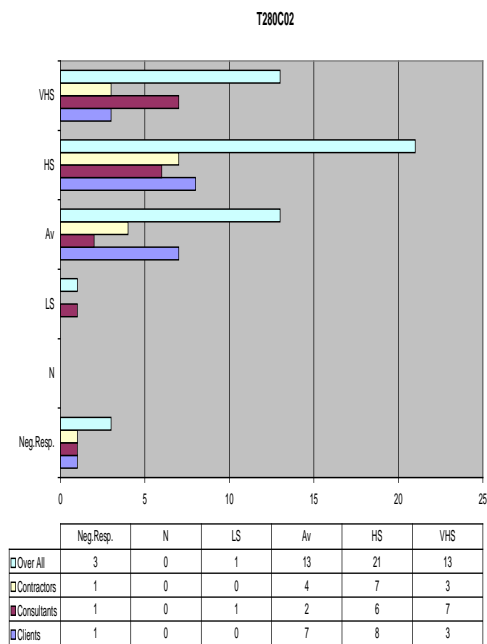


Figure 862 T280C02

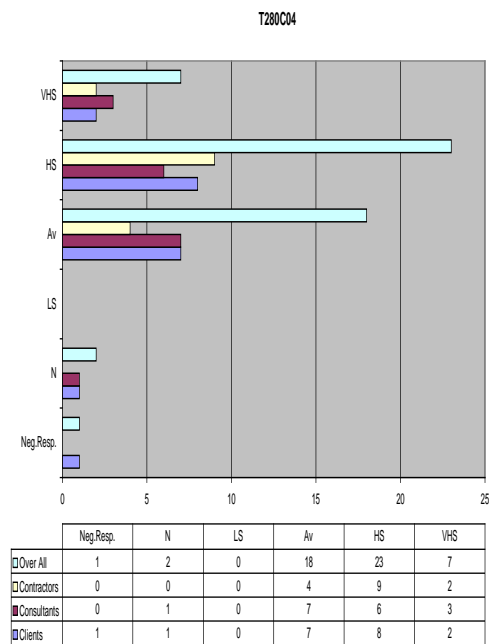


Figure 864 T280C04

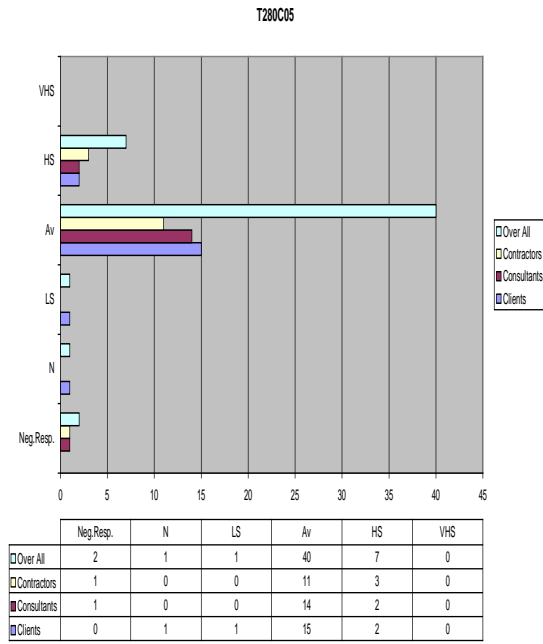


Figure 865 T280C05

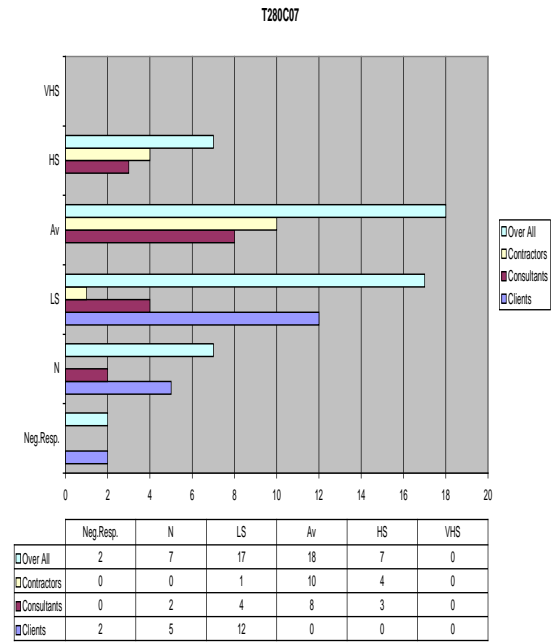


Figure 867 T280C07

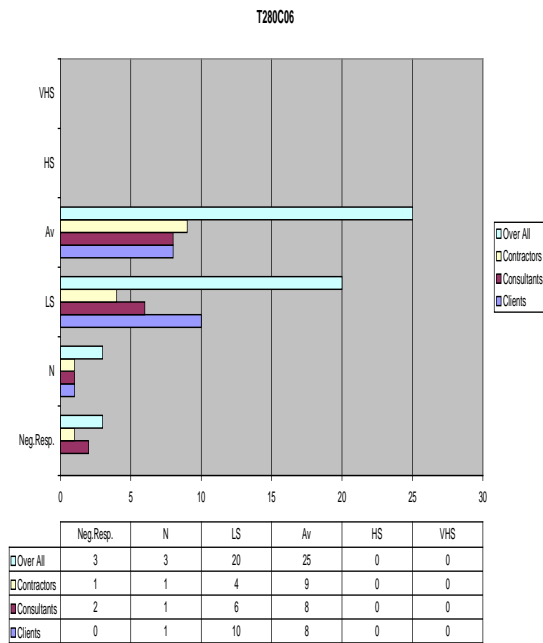


Figure 866 T280C06

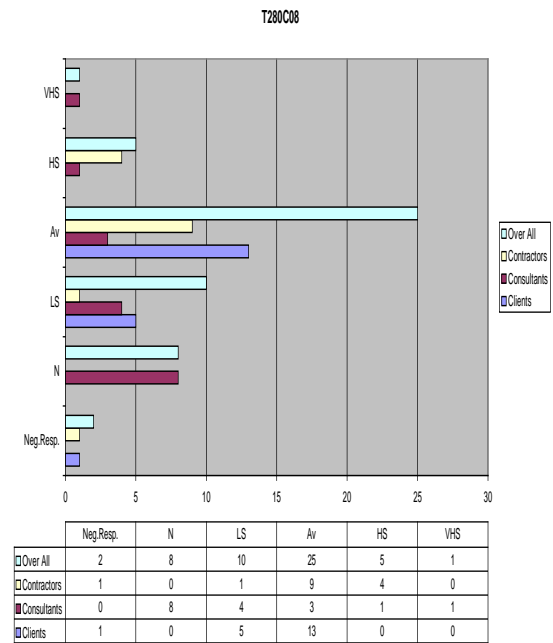


Figure 868 T280C08

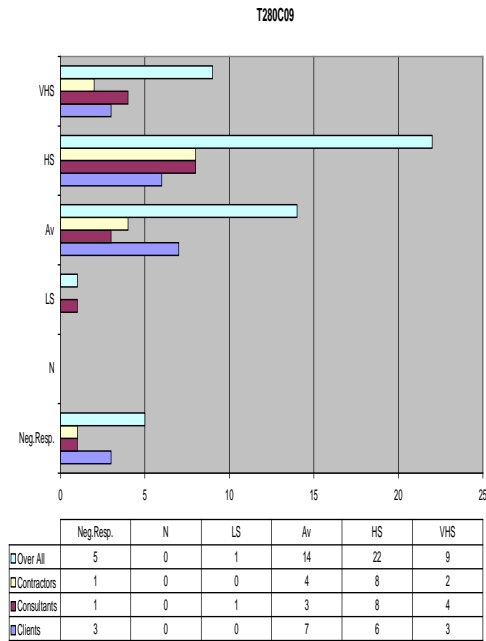


Figure 869 T280C09

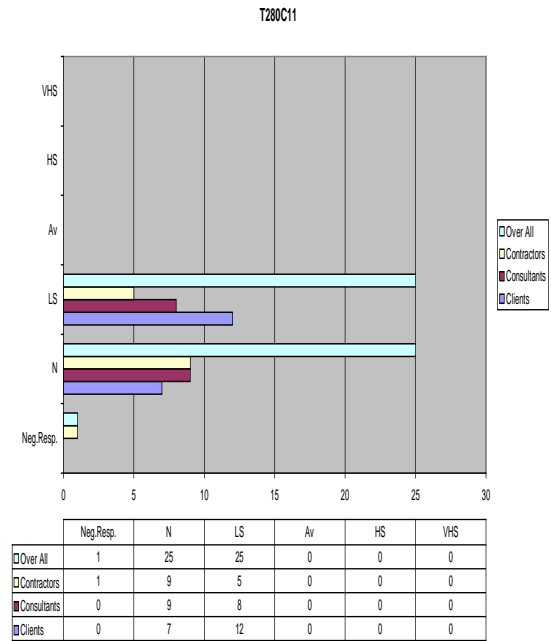


Figure 871 T280C11

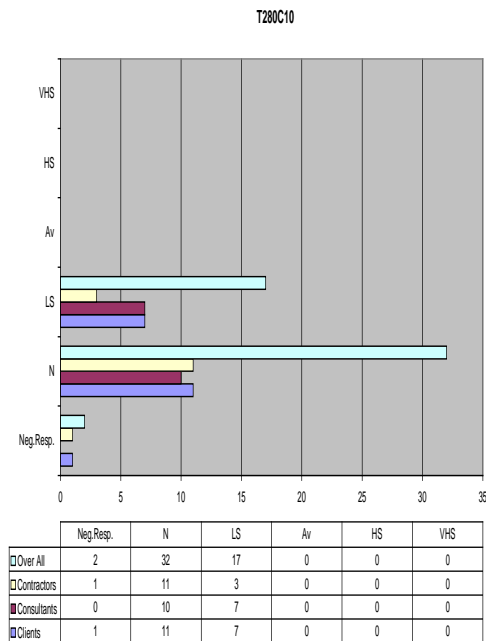


Figure 870 T280C10

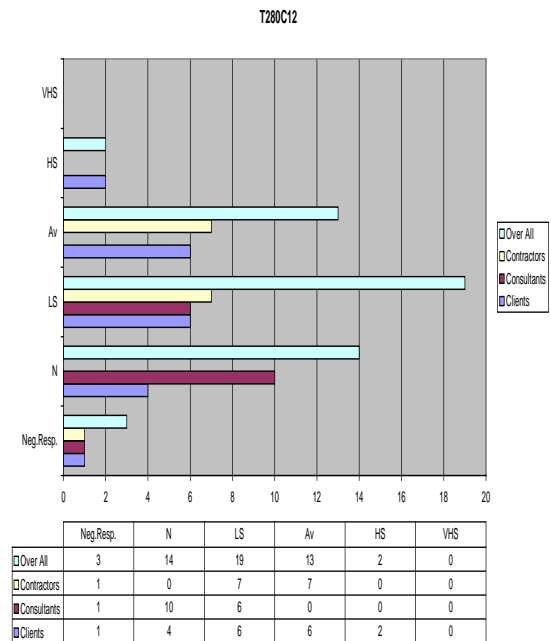


Figure 872 T280C12

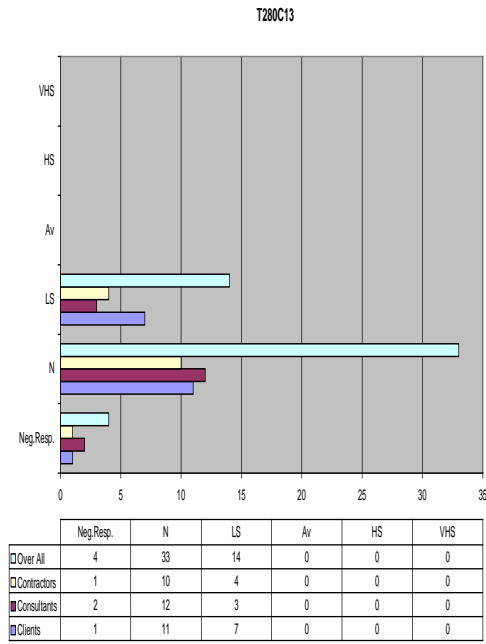


Figure 873 T280C13

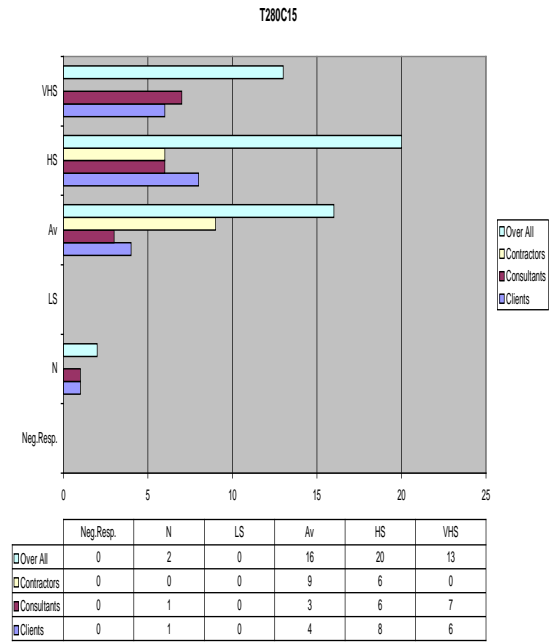


Figure 875 T280C15

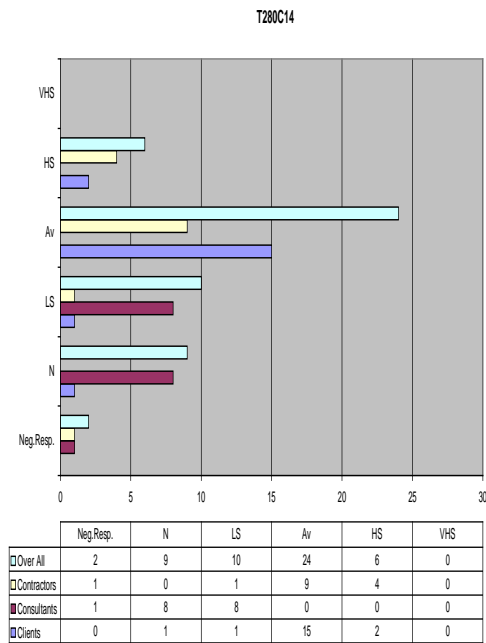


Figure 874 T280C14

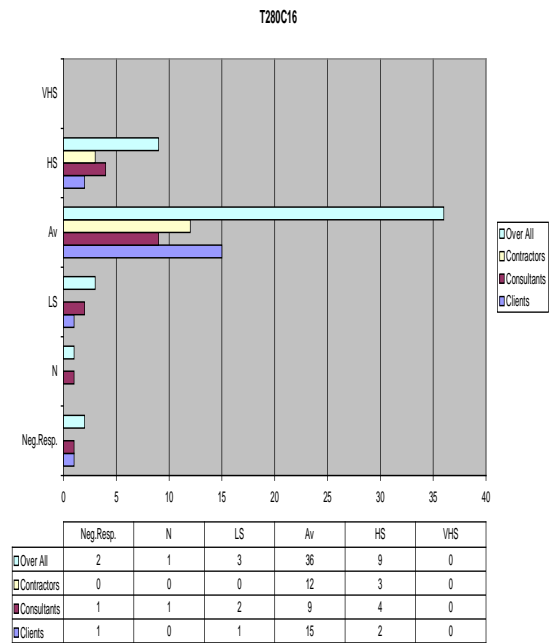


Figure 876 T280C16

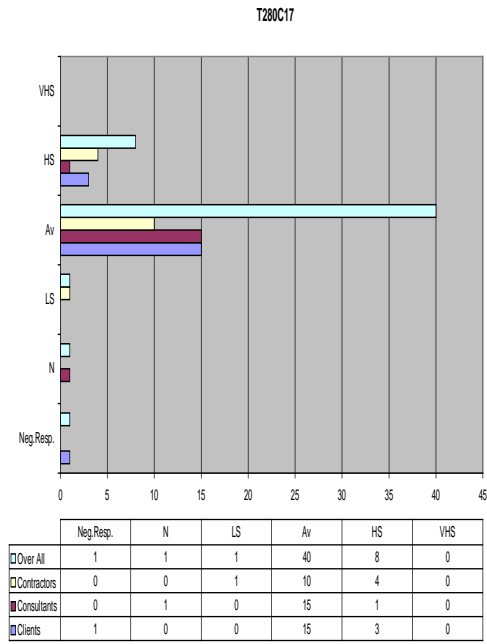


Figure 877 T280C17

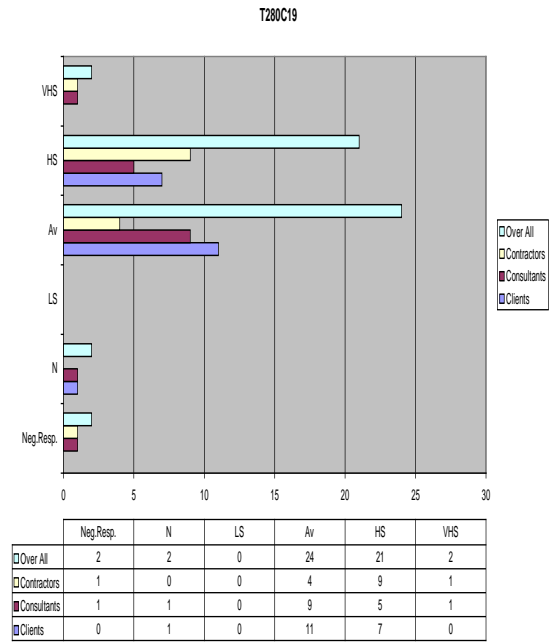


Figure 879 T280C19

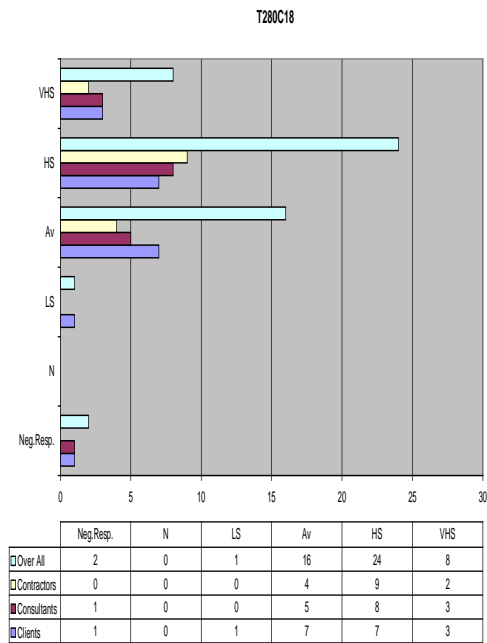


Figure 878 T280C18

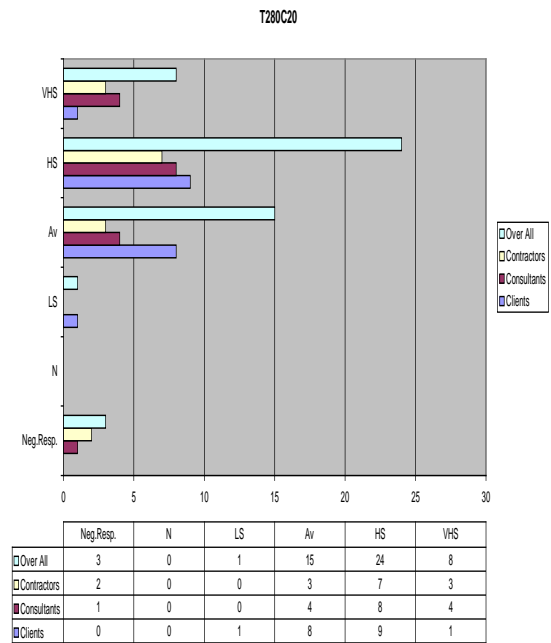


Figure 880 T280C20

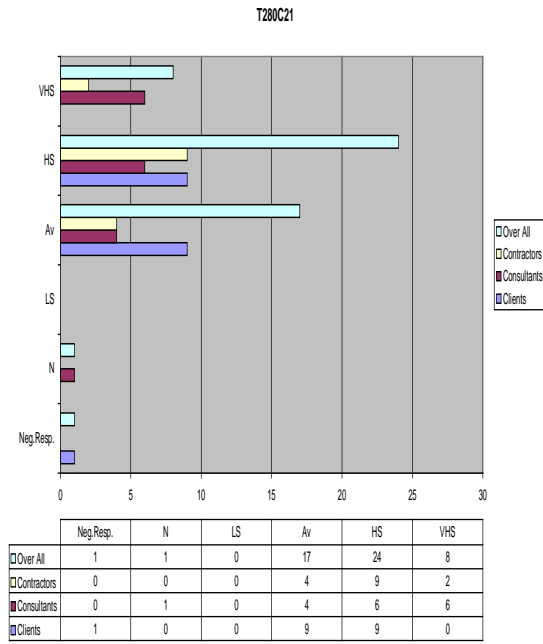


Figure 881 T280C21

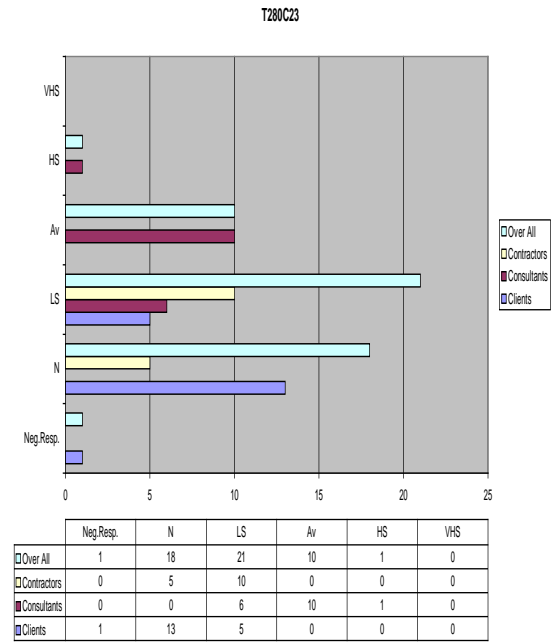


Figure 883 T280C23

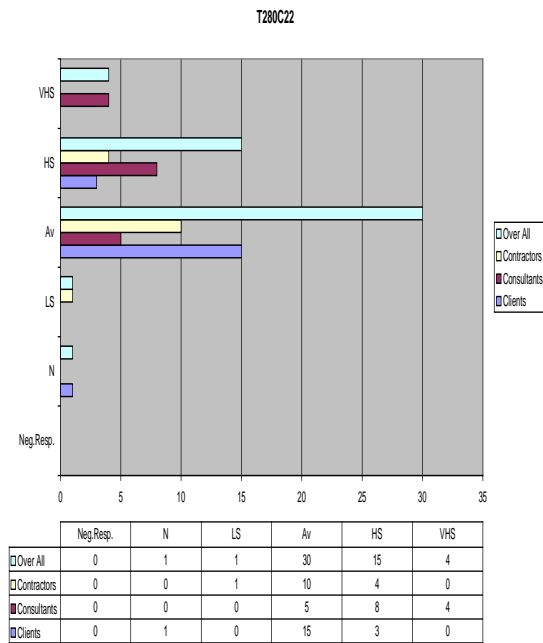


Figure 882 T280C22

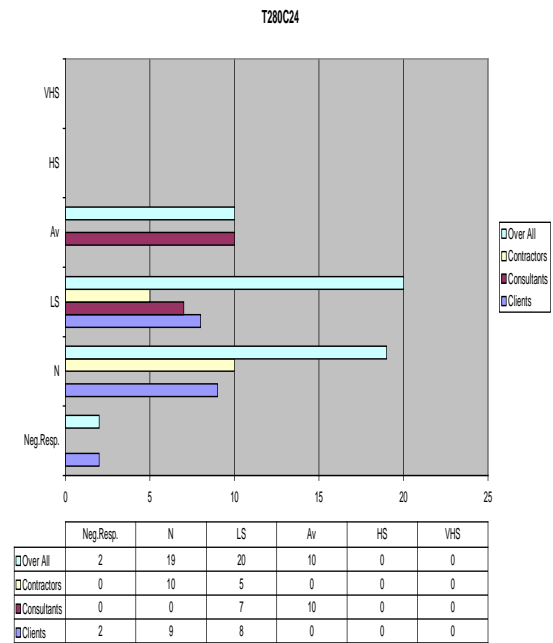


Figure 884 T280C24

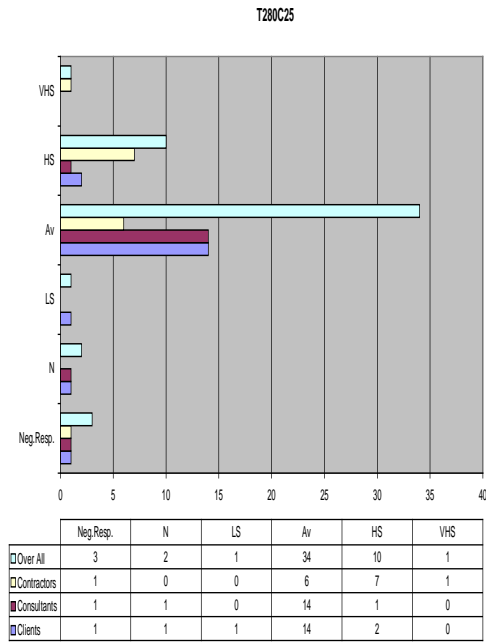


Figure 885 T280C25

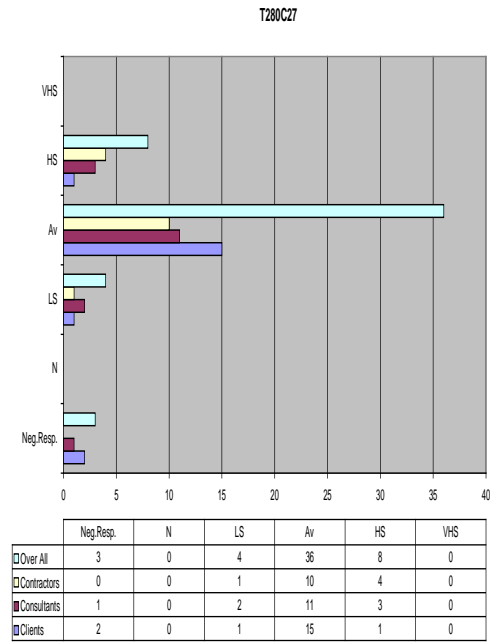


Figure 887 T280C27

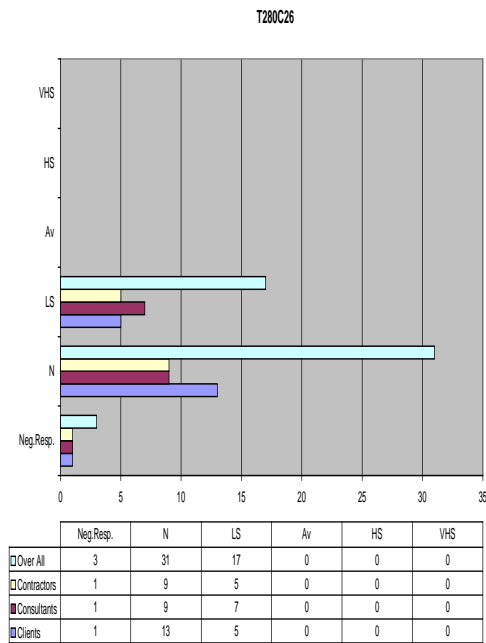


Figure 886 T280C26

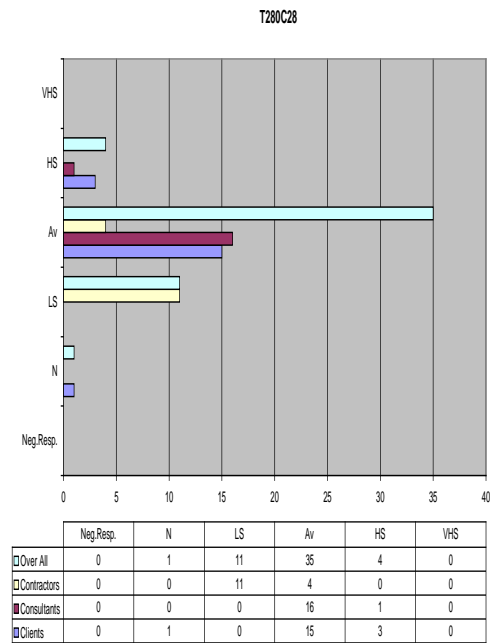


Figure 888 T280C28

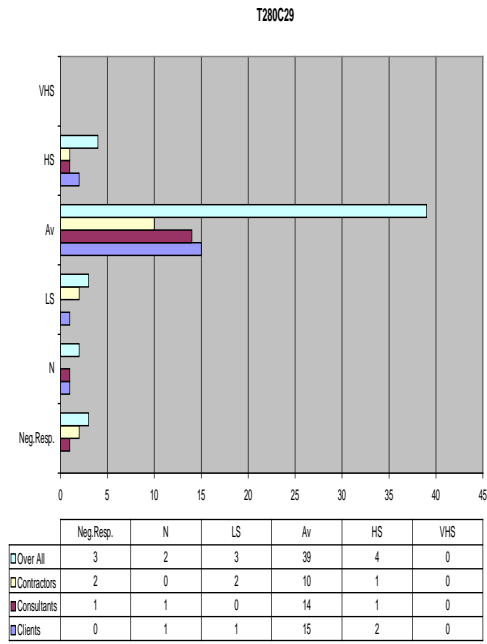


Figure 889 T280C29

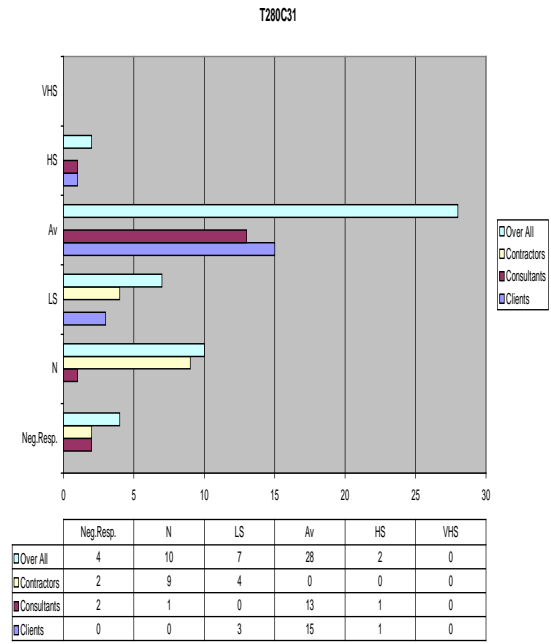


Figure 891 T280C31

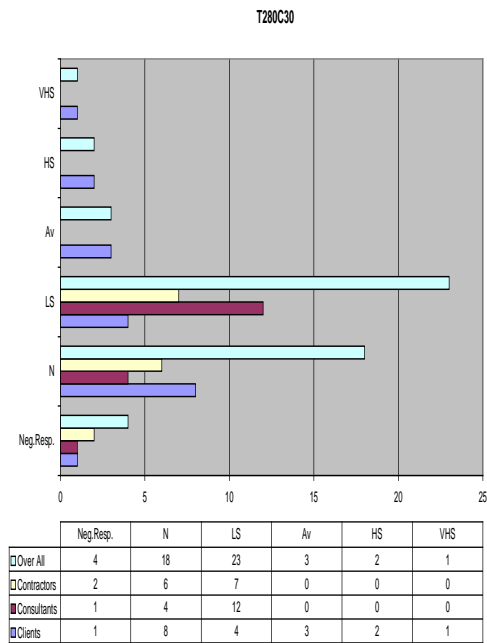


Figure 890 T280C30

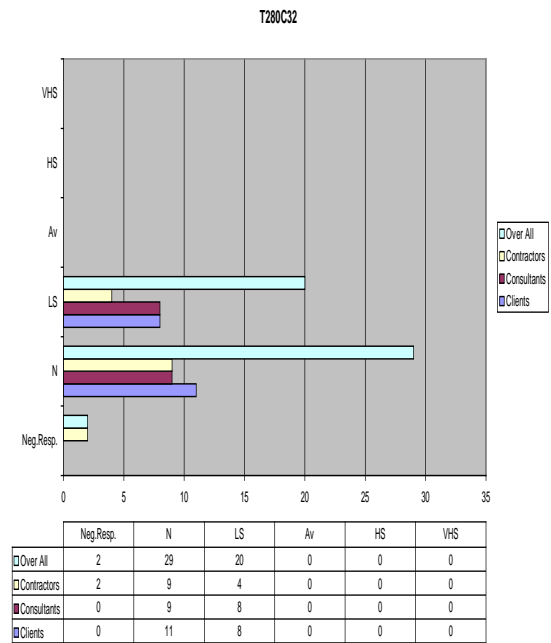


Figure 892 T280C32

Y.3.2.29 CAUSE SIGNIFICANCE ASSESSMENT: (T29 C01) – (T29 C32)

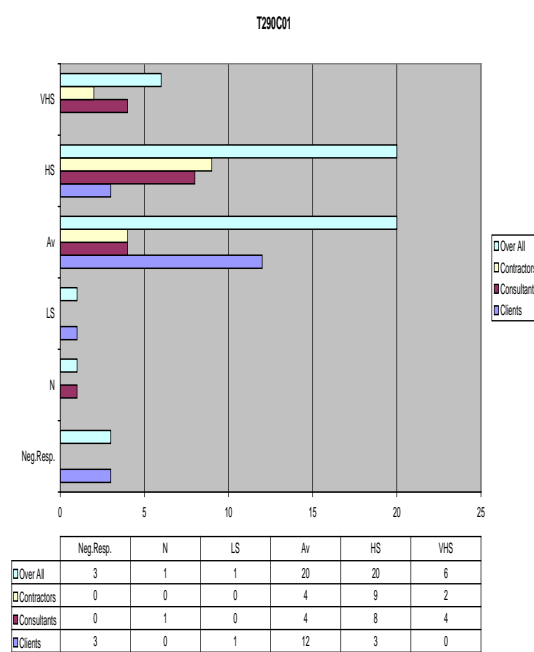


Figure 893 T29C01

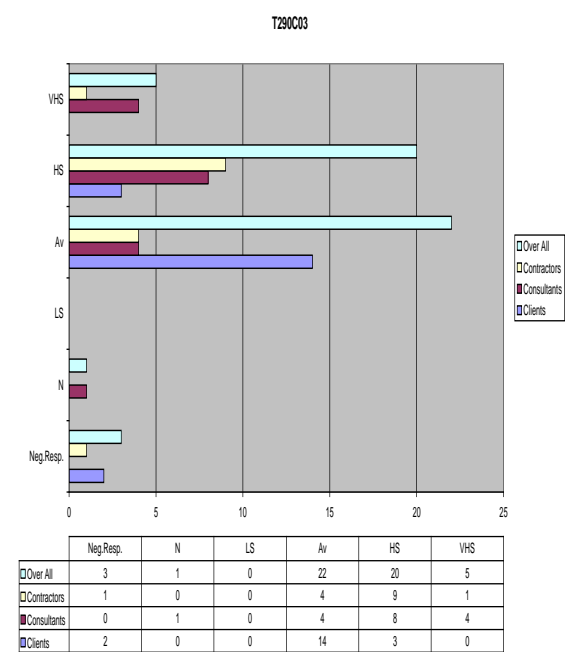


Figure 895 T29C03

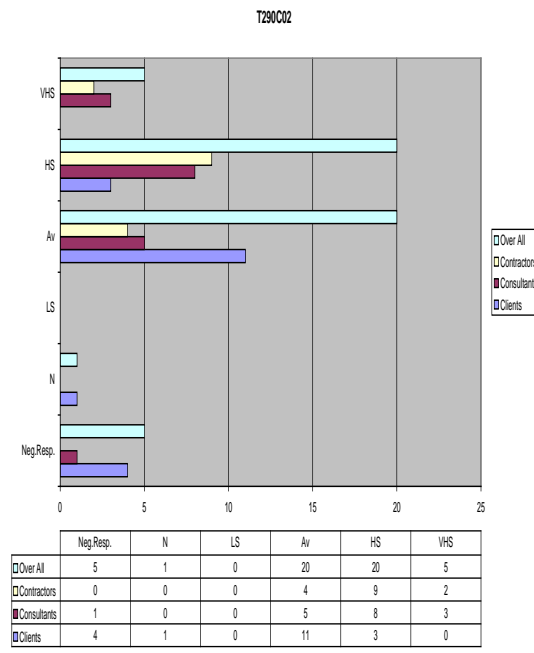


Figure 894 T29C02

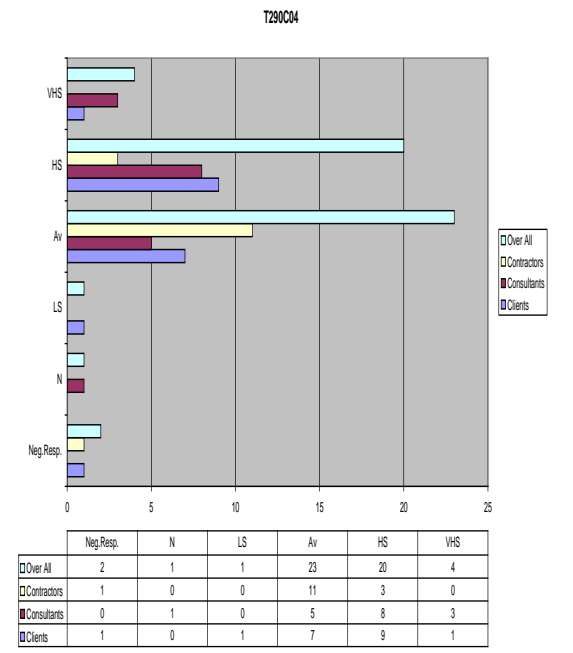


Figure 896 T29C04

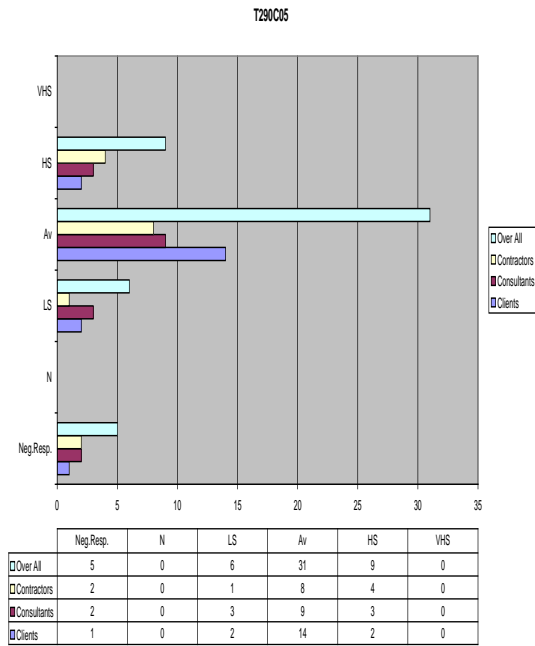


Figure 897 T290C05

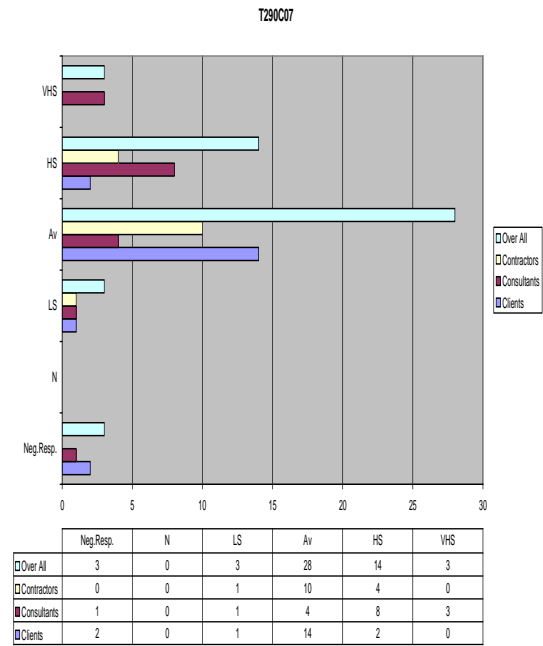


Figure 899 T290C07

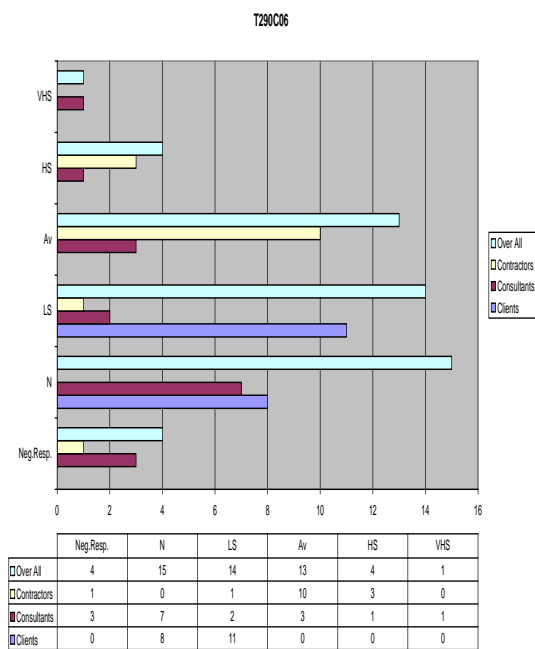


Figure 898 T290C06

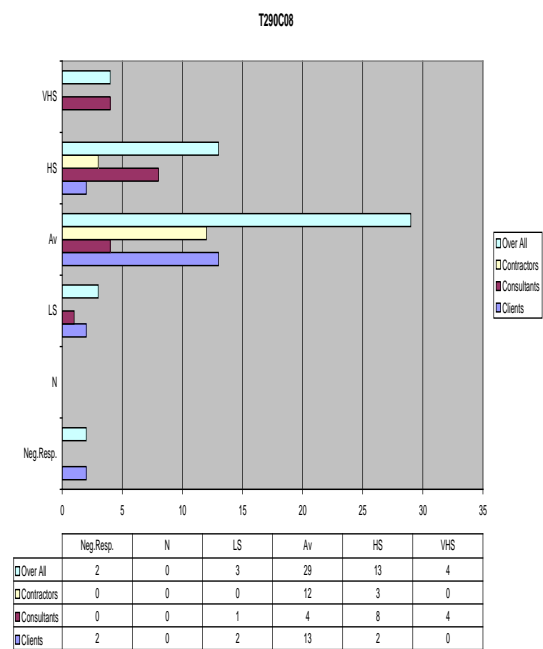


Figure 900 T290C08

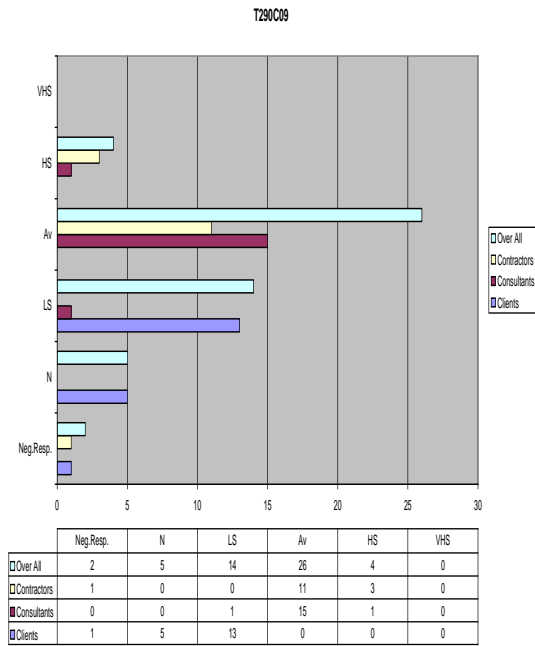


Figure 901 T290C09

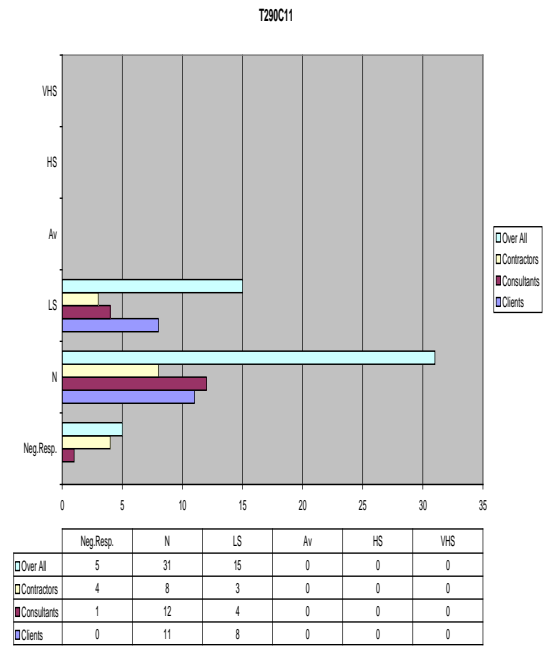


Figure 903 T290C11

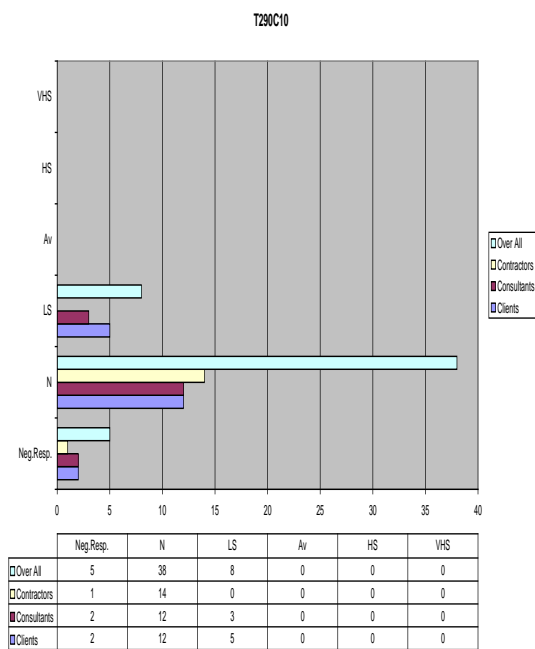


Figure 902 T290C10

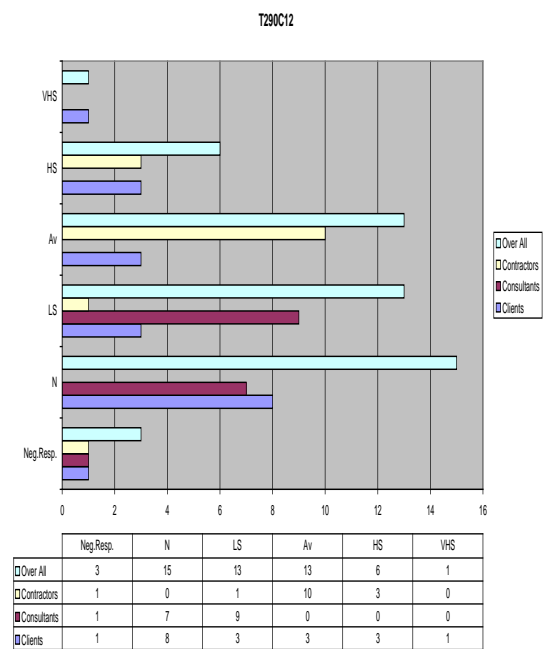


Figure 904 T290C12

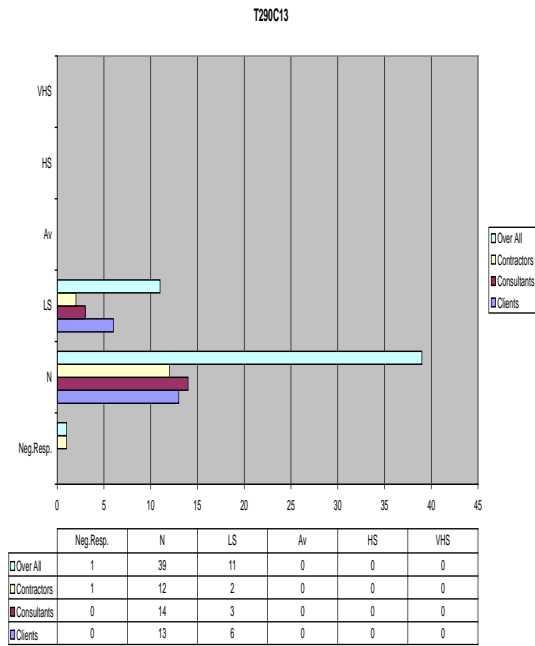


Figure 905 T290C13

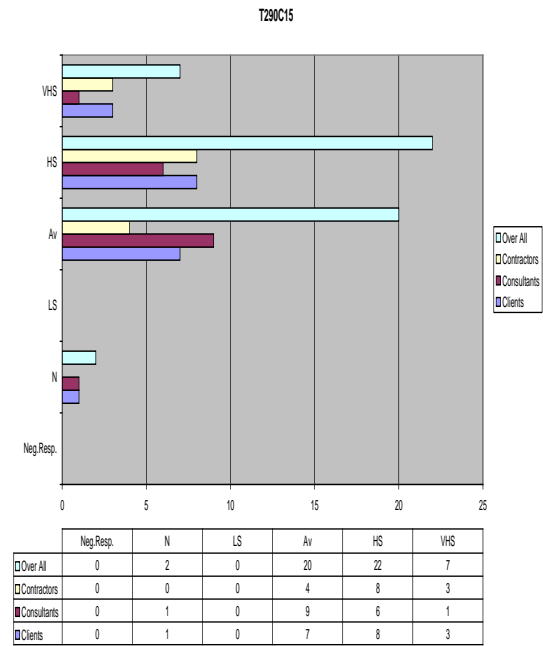


Figure 907 T290C15

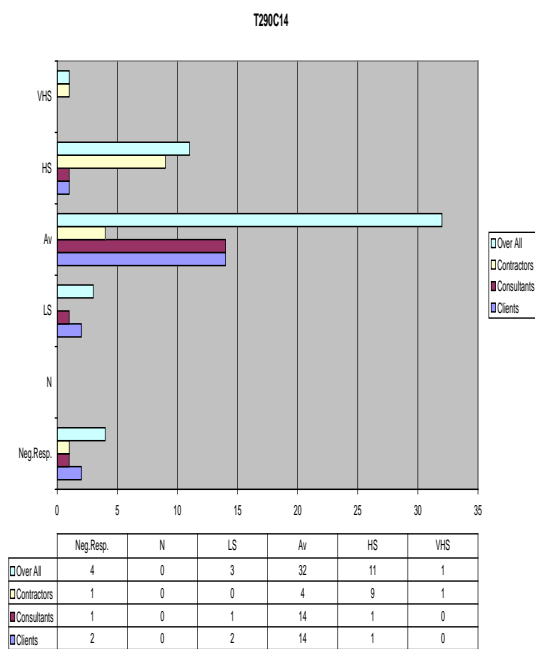


Figure 906 T290C14

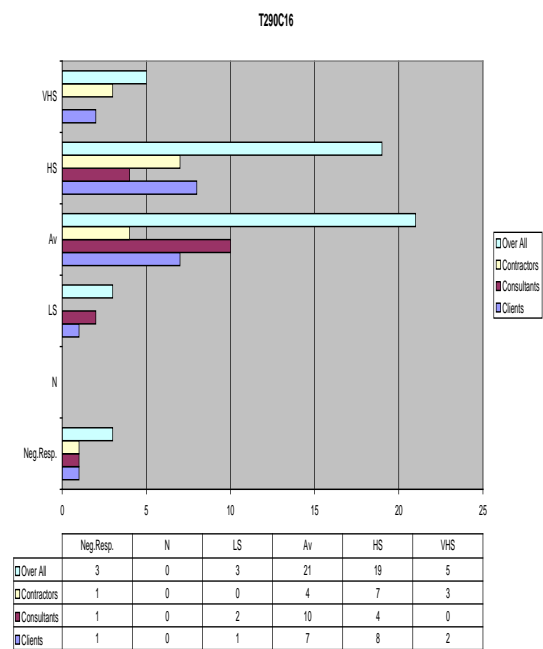


Figure 908 T290C16

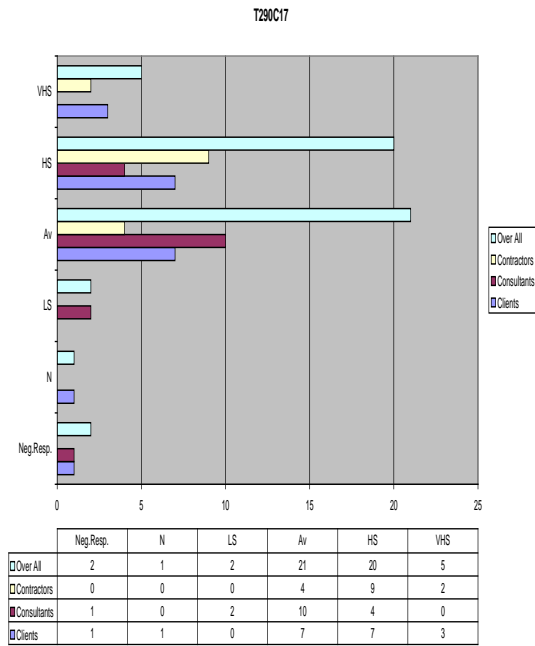


Figure 909 T290C17

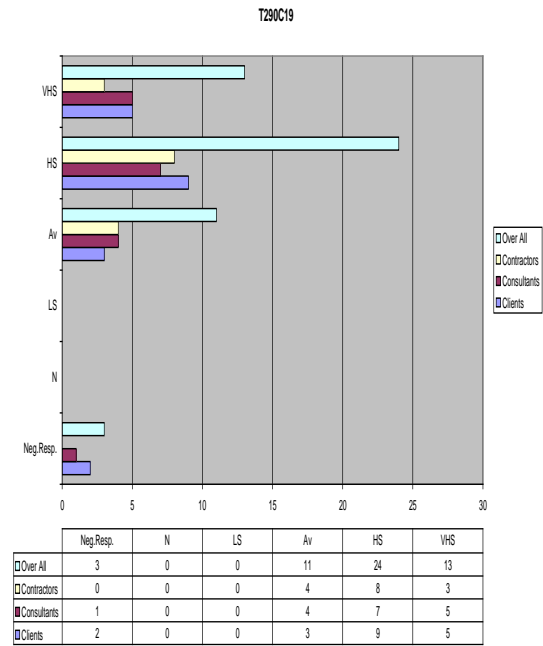


Figure 911 T290C19

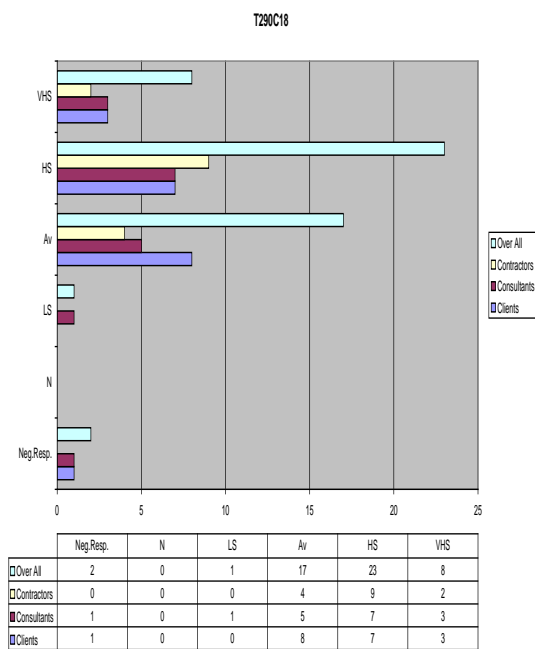


Figure 910 T290C18

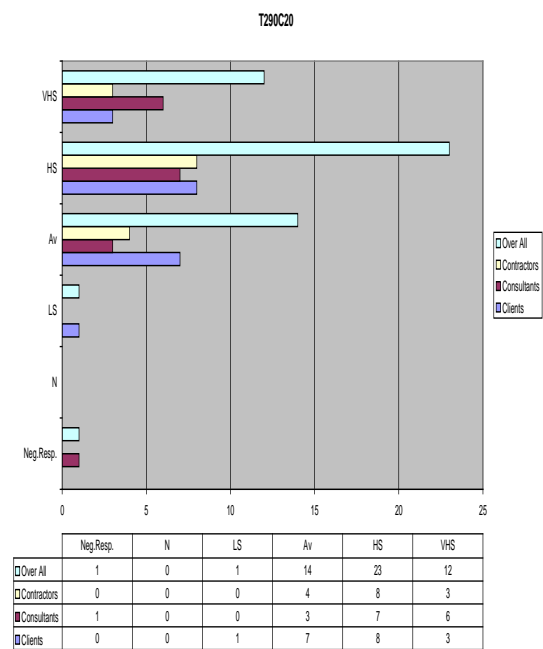


Figure 912 T290C20

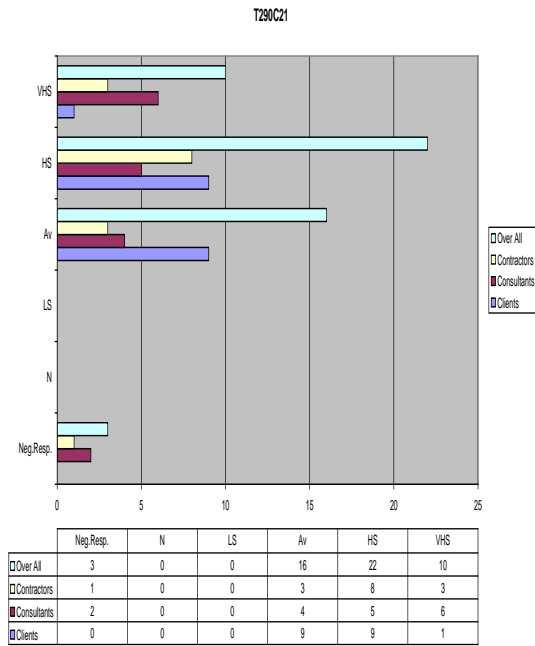


Figure 913 T290C21

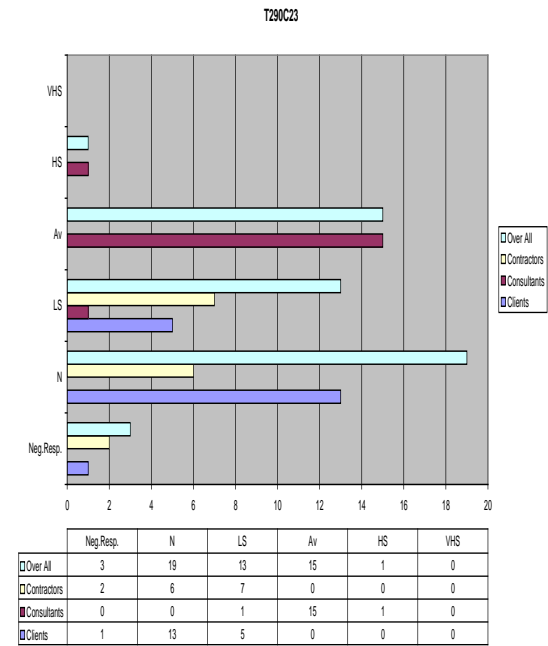


Figure 915 T290C23

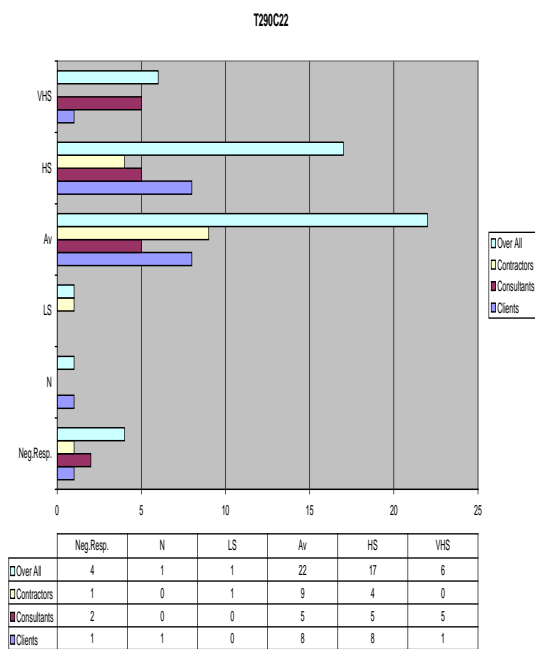


Figure 914 T290C22

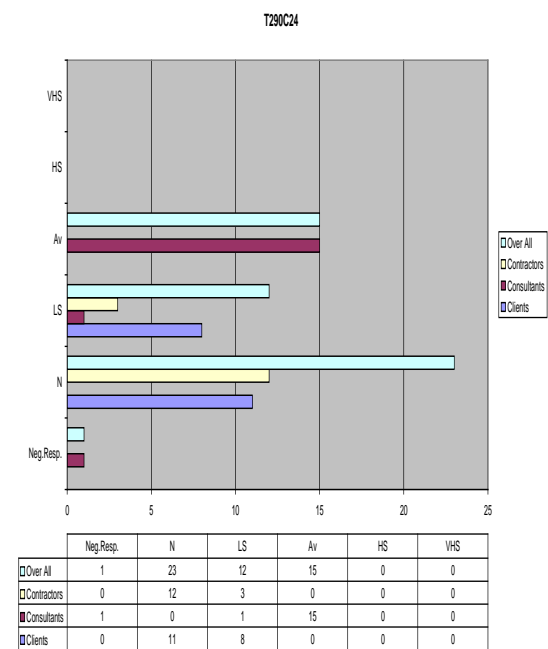


Figure 916 T290C24

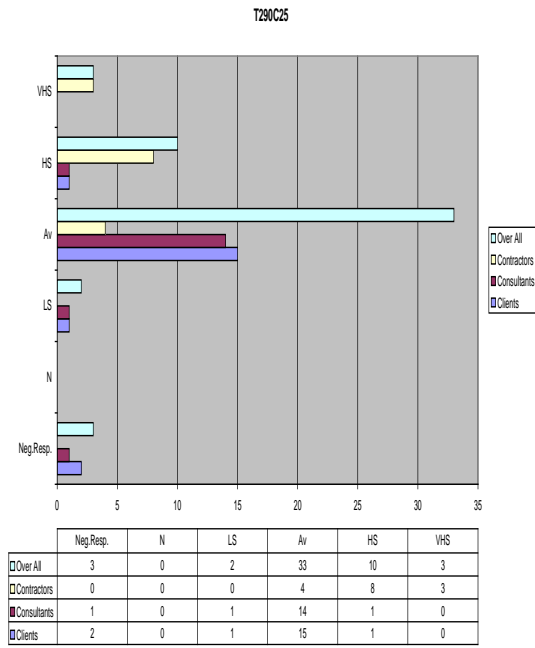


Figure 917 T290C25

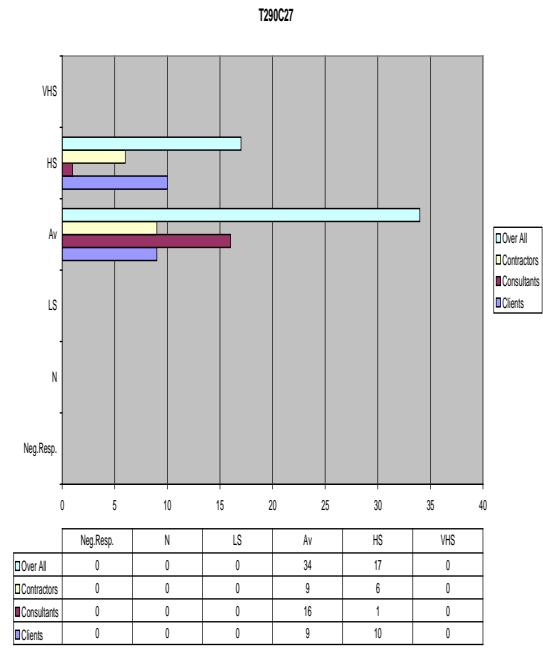


Figure 919 T290C27

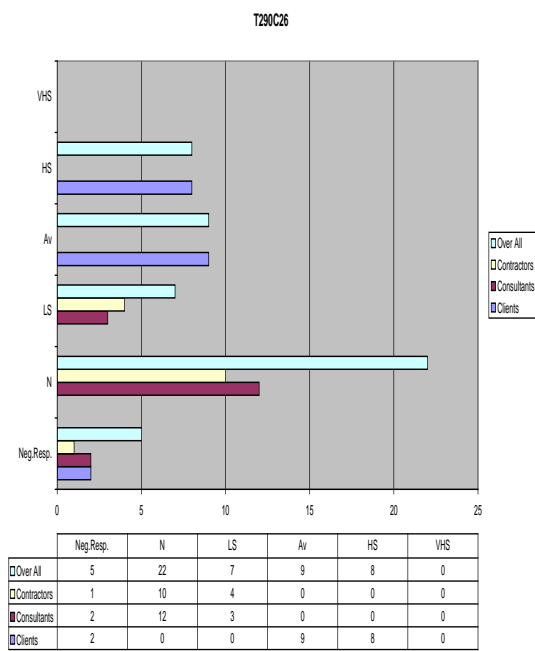


Figure 918 T290C26

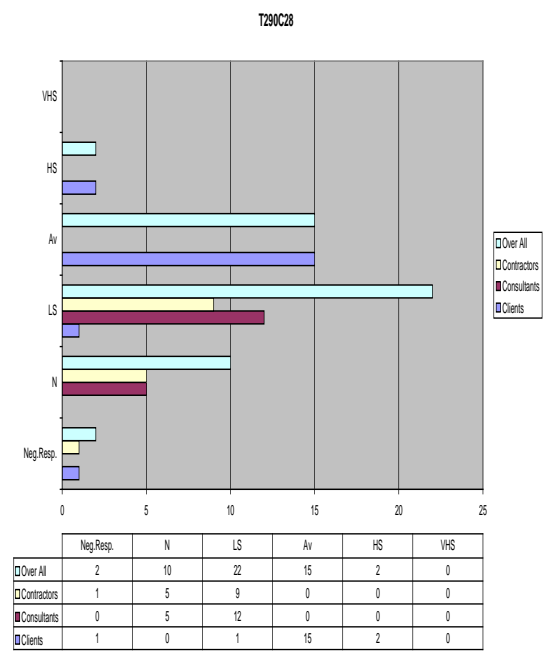


Figure 920 T290C28

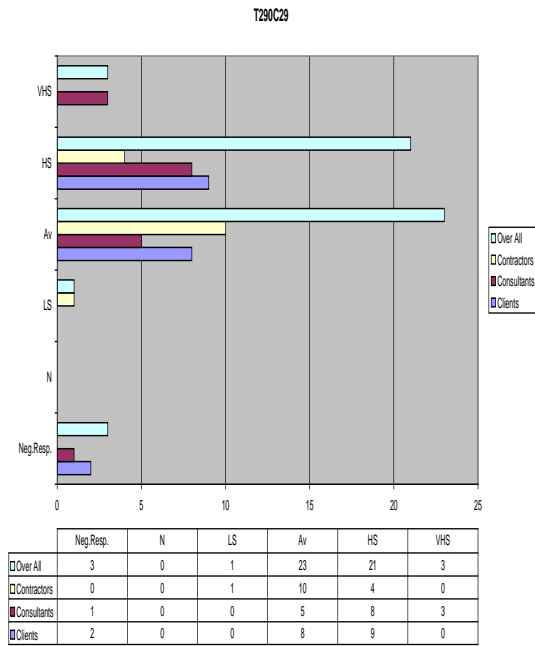


Figure 921 T290C29

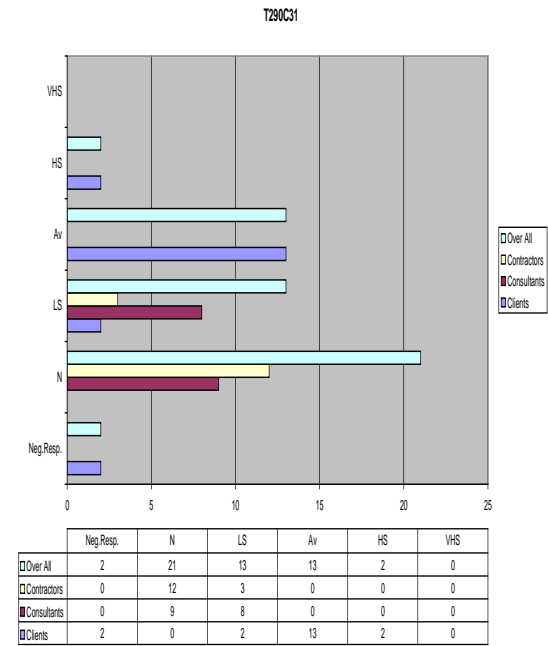


Figure 923 T290C31

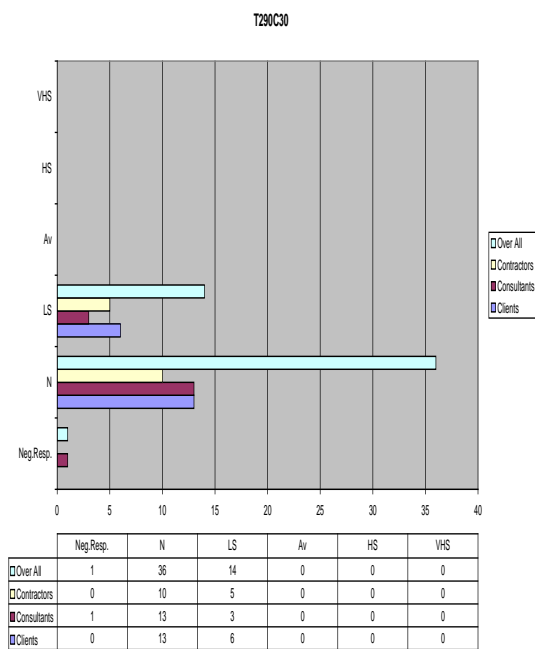


Figure 922 T290C30

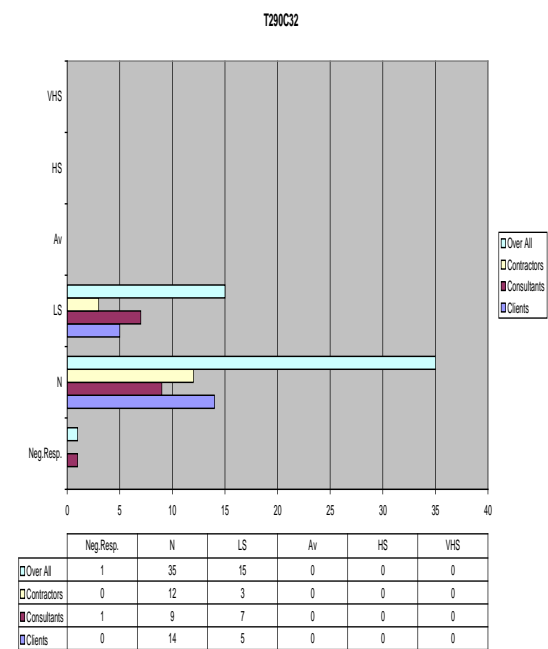


Figure 924 T290C32

Y.3.2.30 CAUSE SIGNIFICANCE ASSESSMENT: (T30 C01) – (T30 C32)

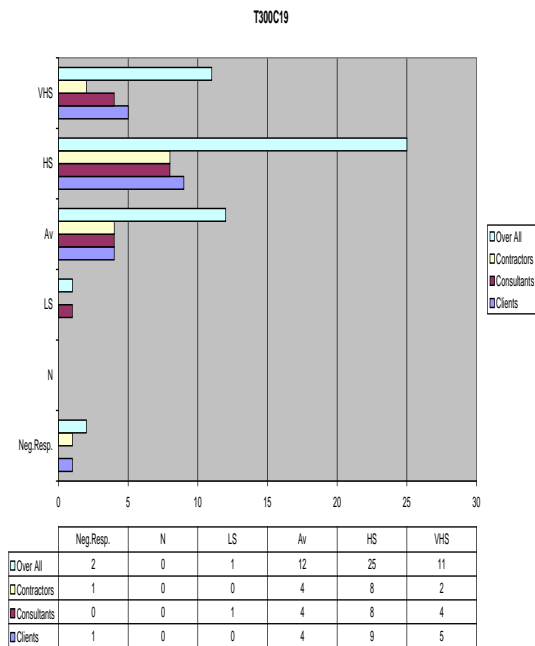


Figure 925 T300C19

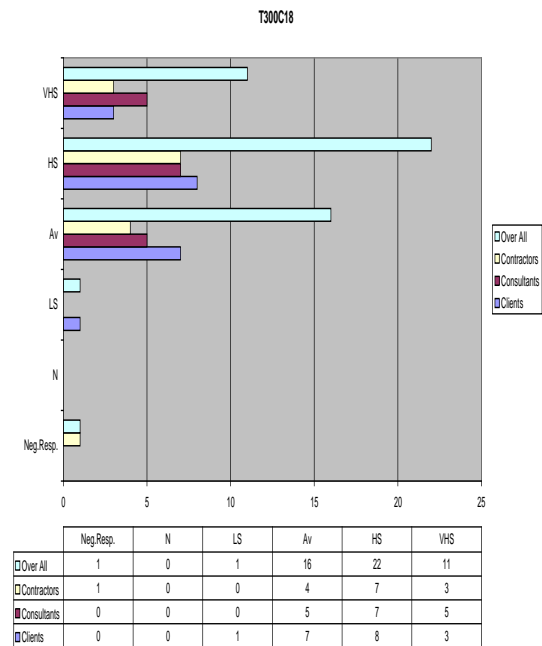


Figure 927 T300C18

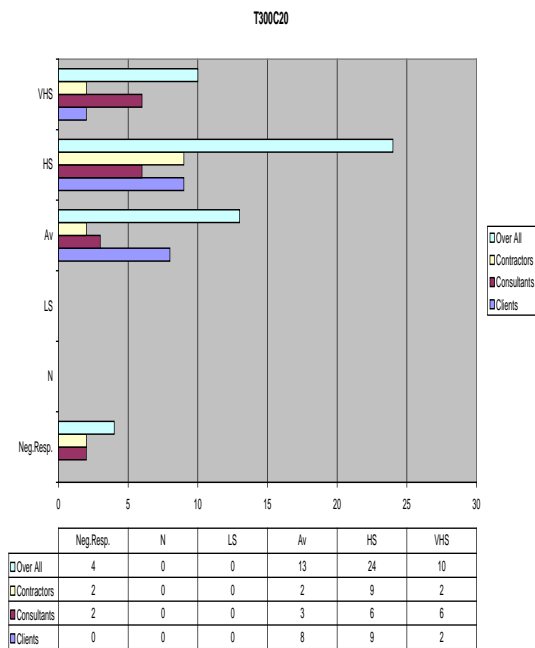


Figure 926 T300C20

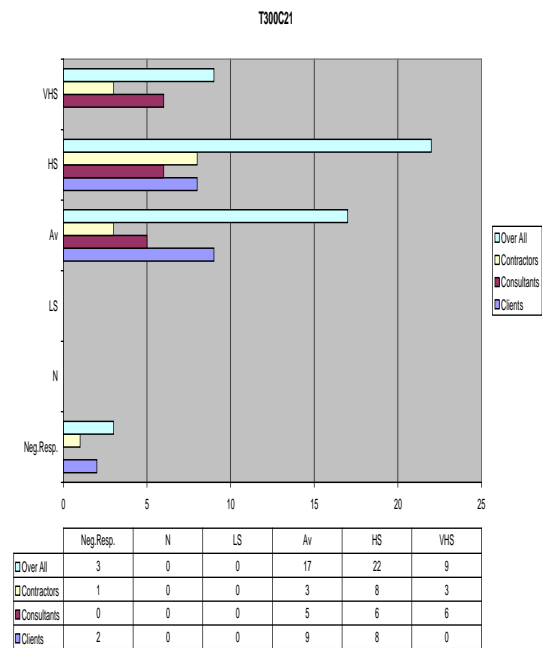


Figure 928 T300C21

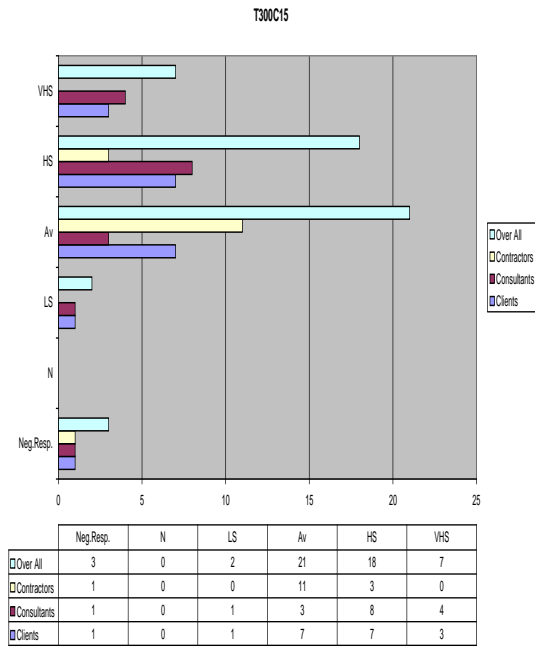


Figure 929 T300C15

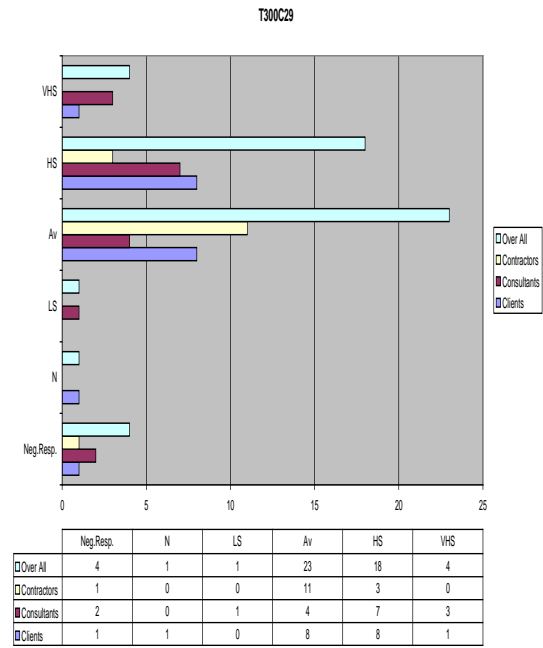


Figure 931 T300C29

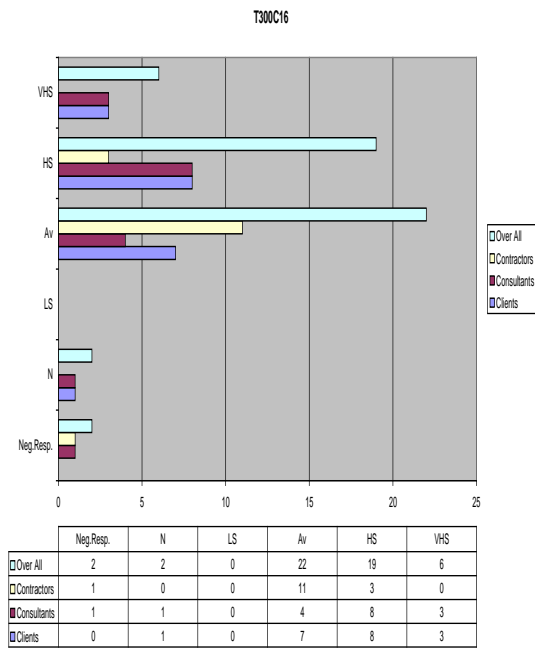


Figure 930 T300C16

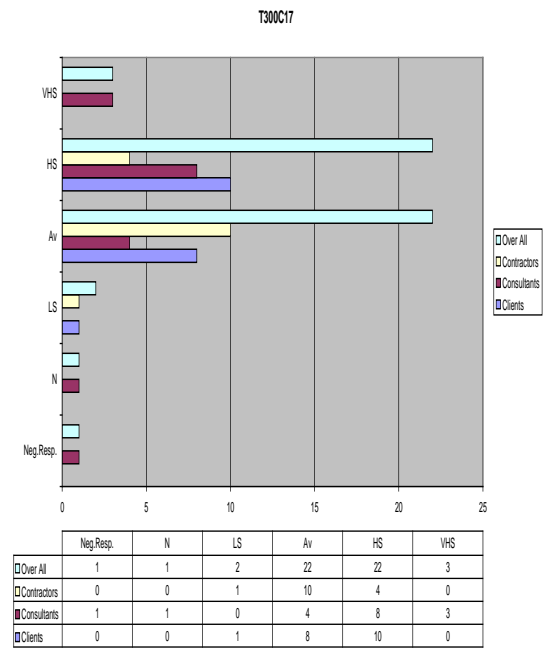


Figure 932 T300C17

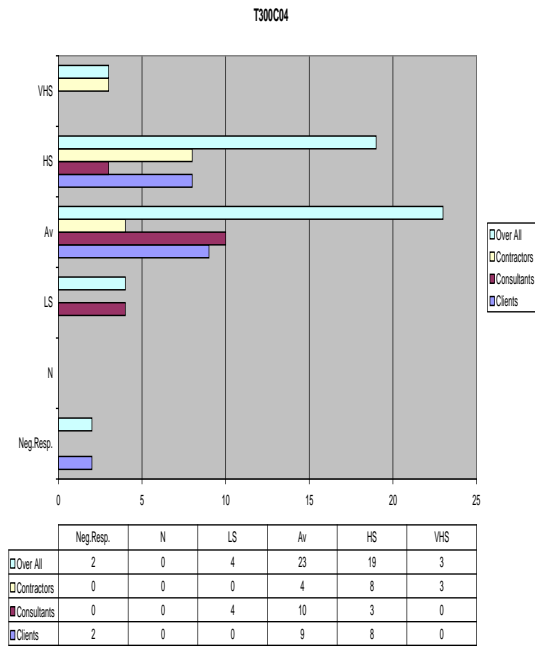


Figure 933 T300C04

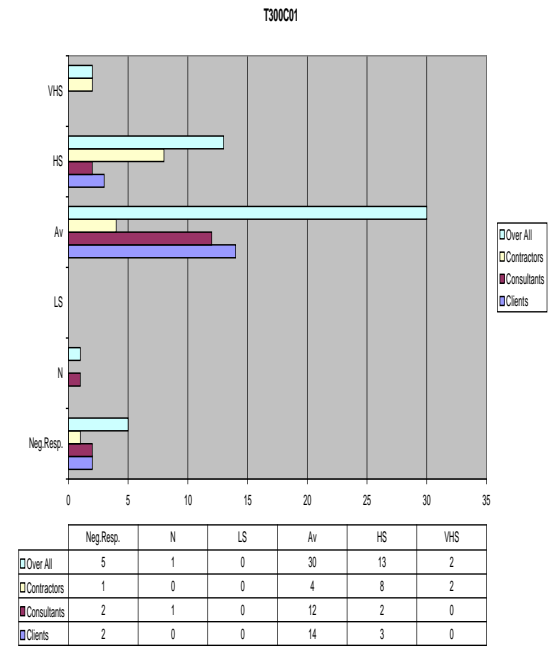


Figure 935 T300C01

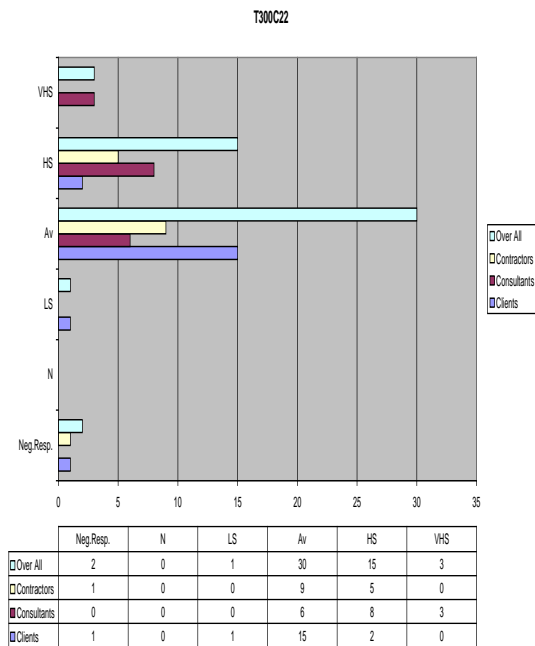


Figure 934 T300C22

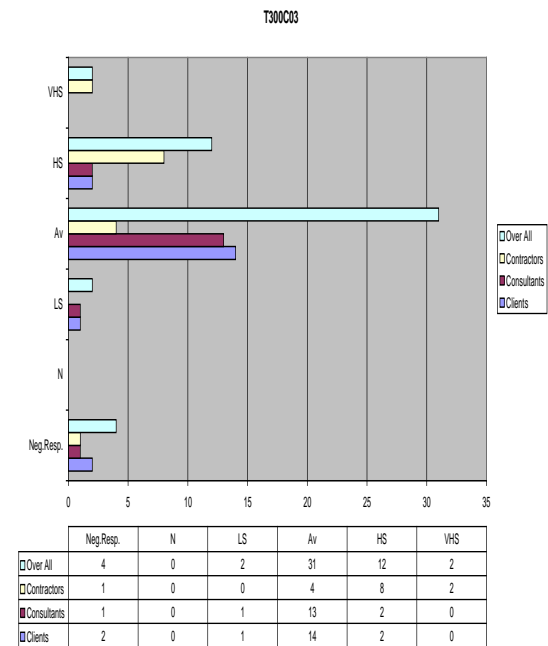


Figure 936 T300C03

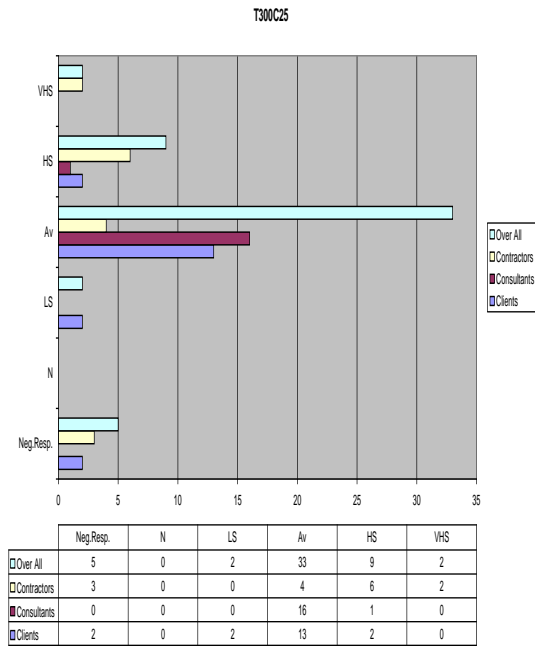


Figure 937 T300C25

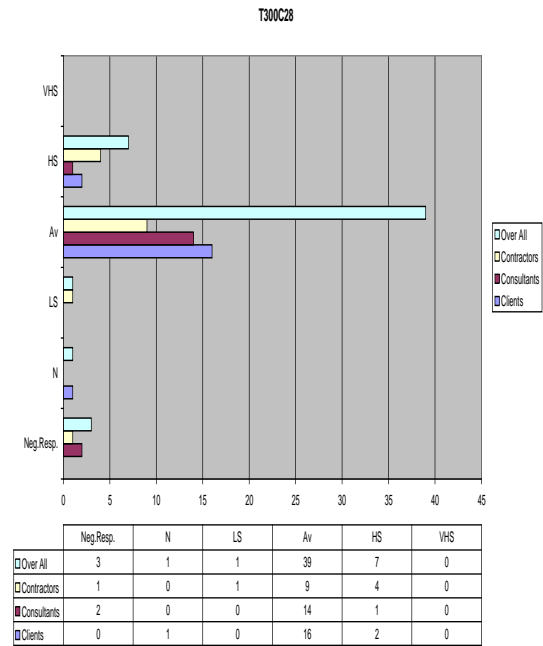


Figure 939 T300C28

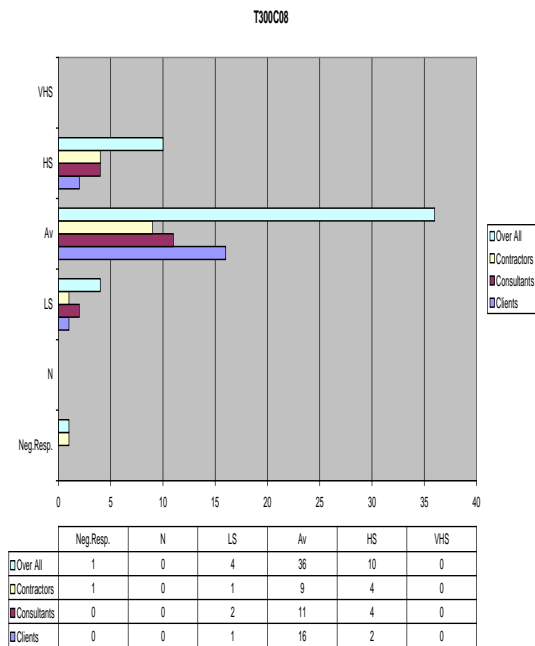


Figure 938 T300C08

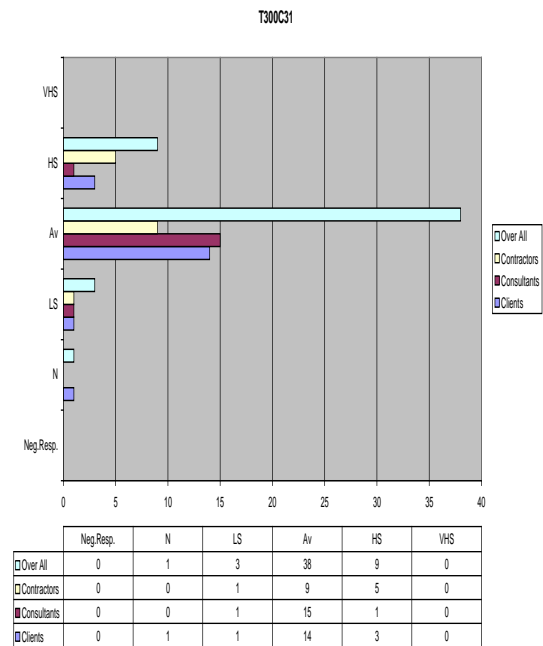


Figure 940 T300C31

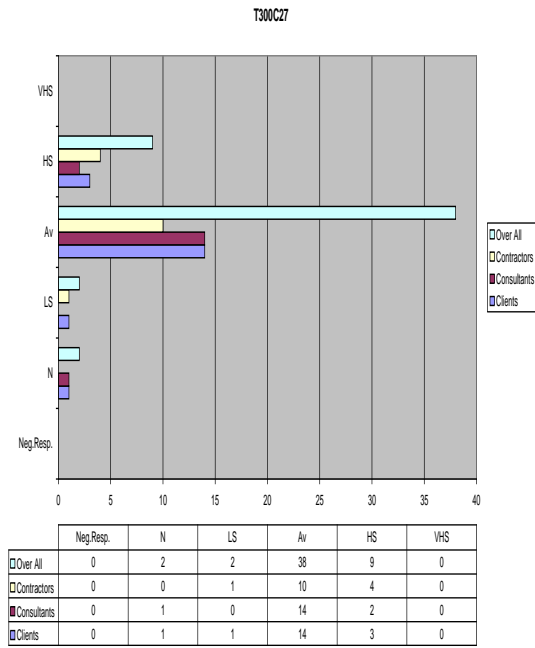


Figure 941 T300C27

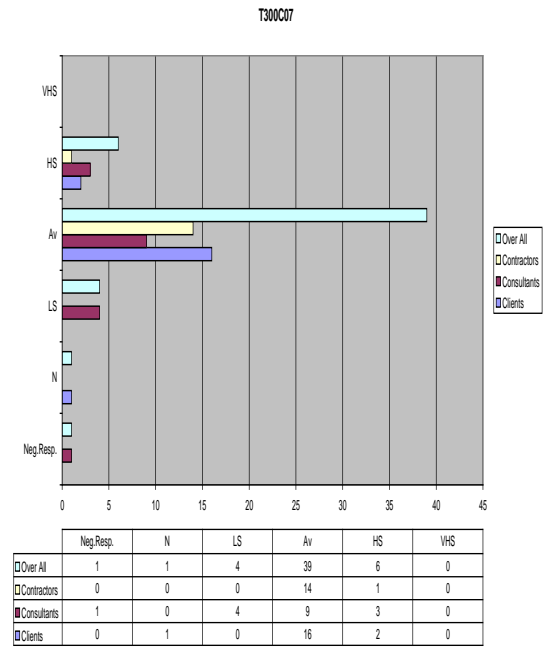


Figure 943 T300C07

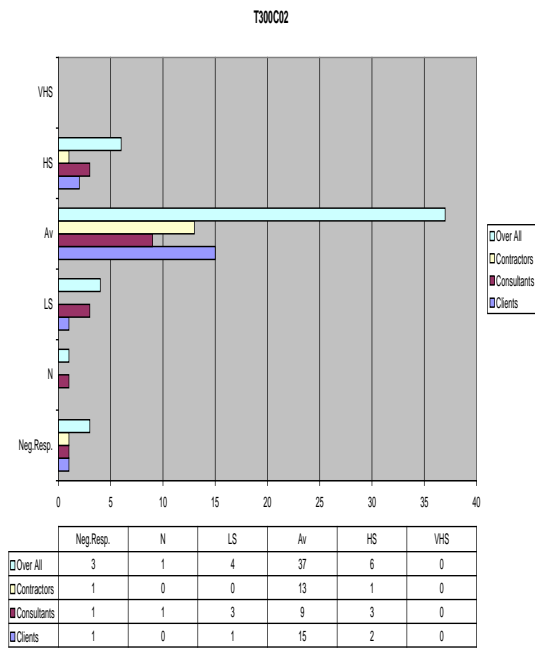


Figure 942 T300C02

Y.3.2.31 CAUSE SIGNIFICANCE ASSESSMENT: (T31 C01) – (T31 C32)

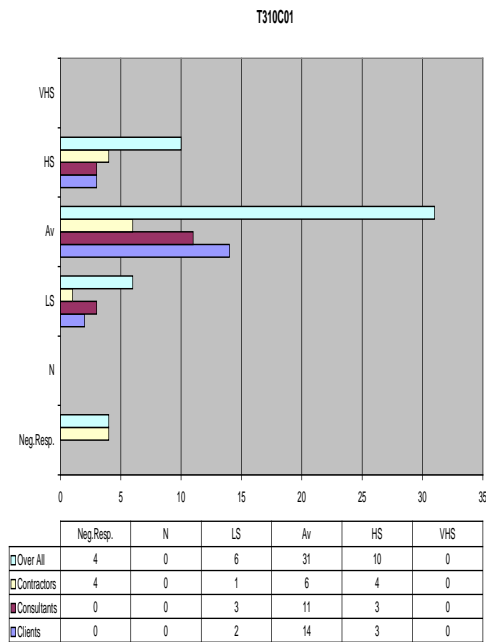


Figure 944 T310C01

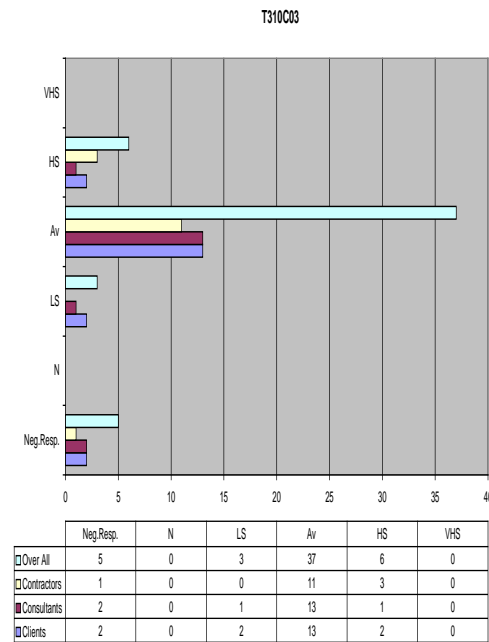


Figure 946 T310C03

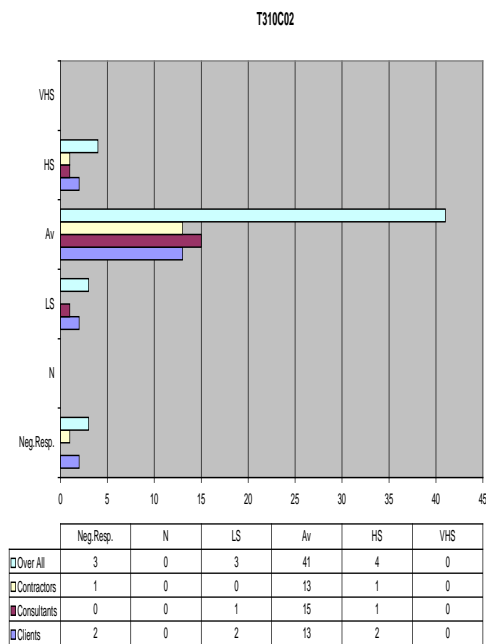


Figure 945 T310C02

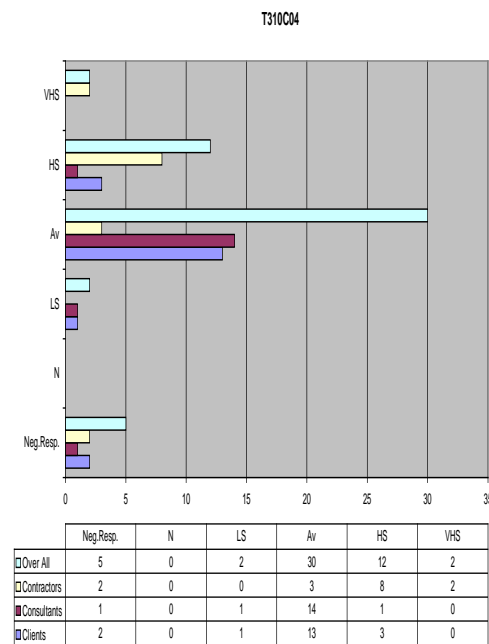


Figure 947 T310C04

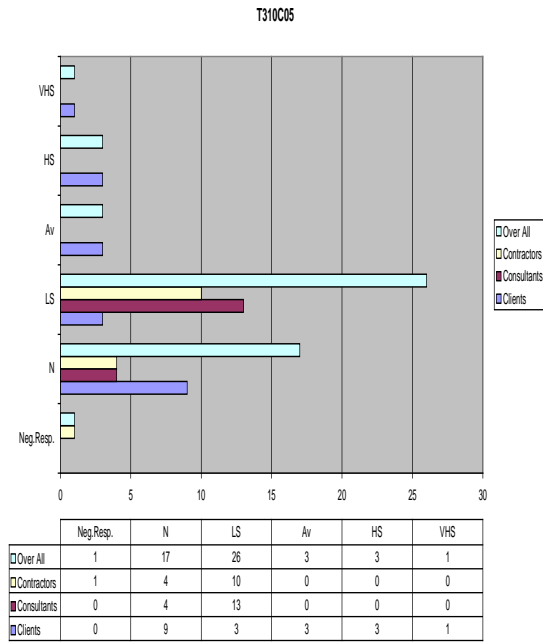


Figure 948 T310C05

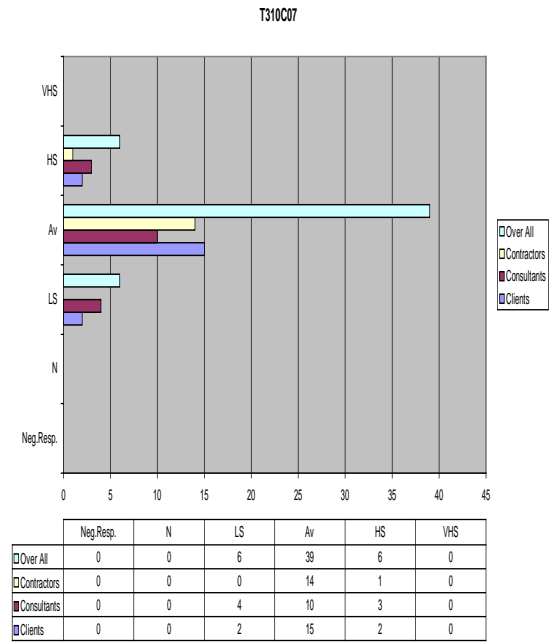


Figure 950 T310C07

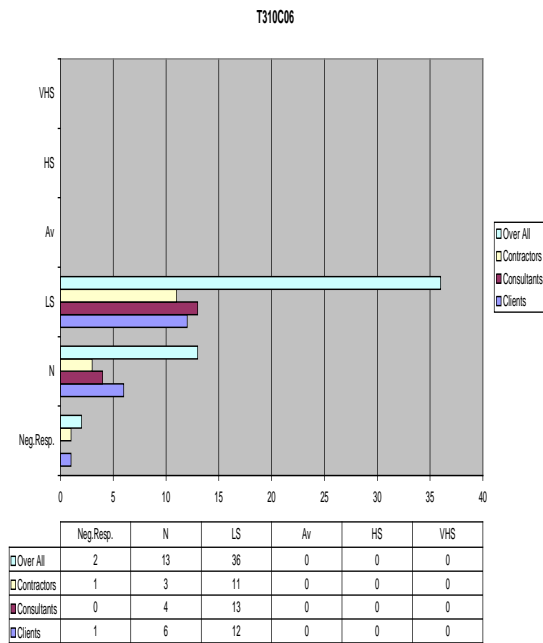


Figure 949 T310C06

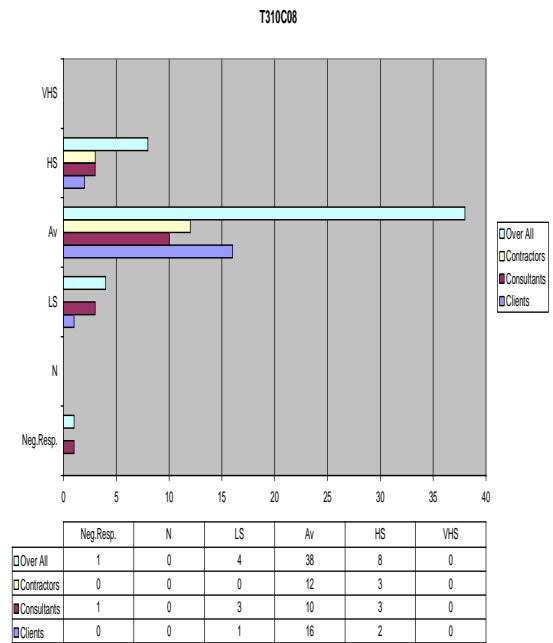


Figure 951 T310C08

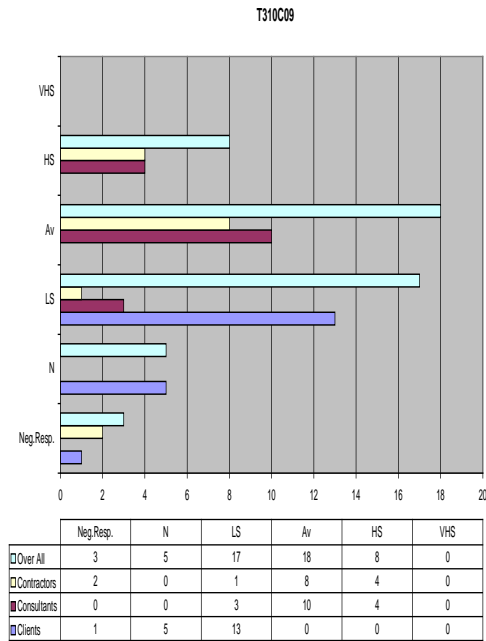


Figure 952 T310C09

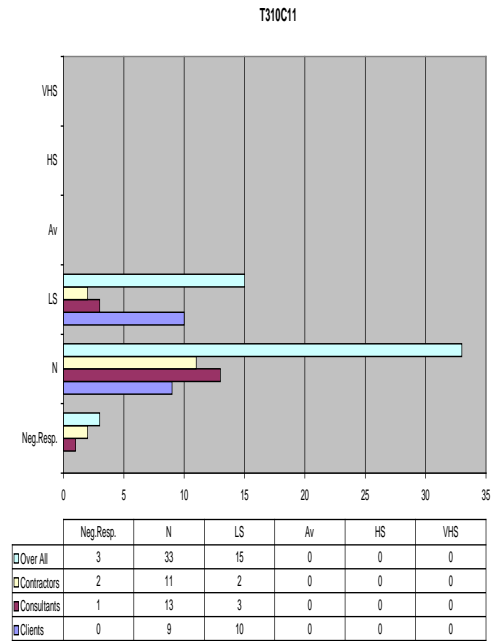


Figure 954 T310C11

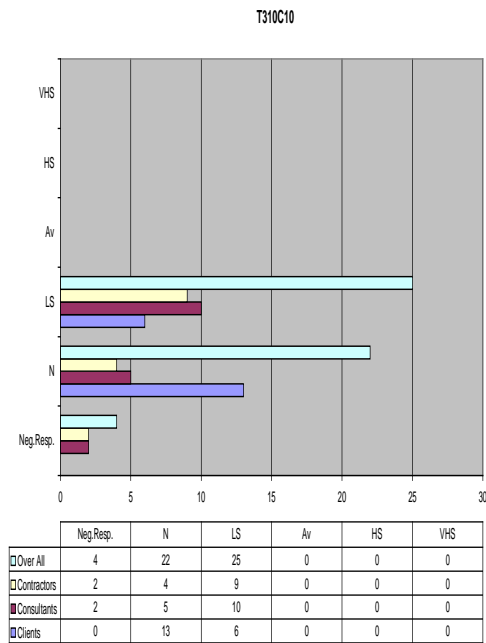


Figure 953 T310C10

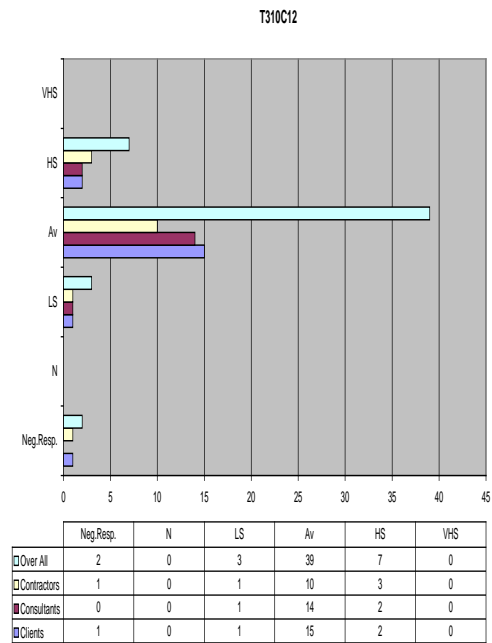


Figure 955 T310C12

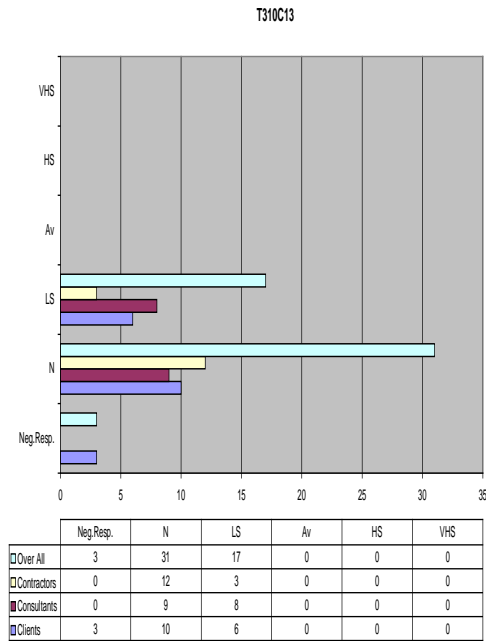


Figure 956 T310C13

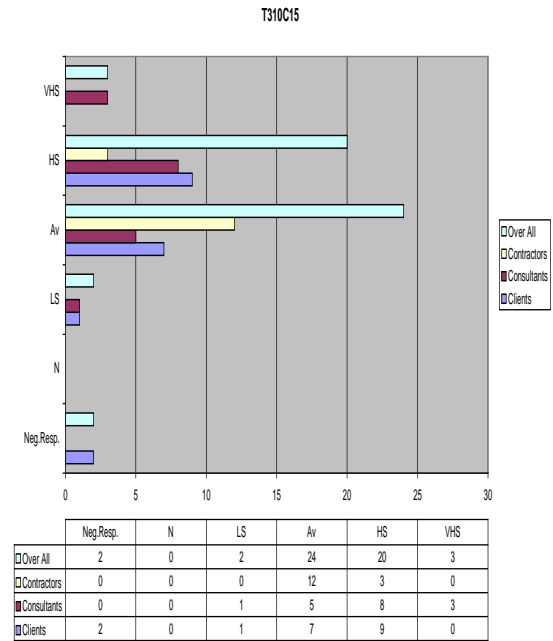


Figure 958 T310C15

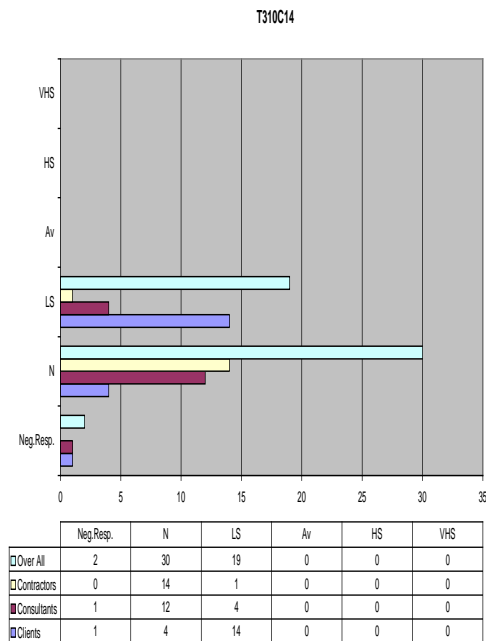


Figure 957 T310C14

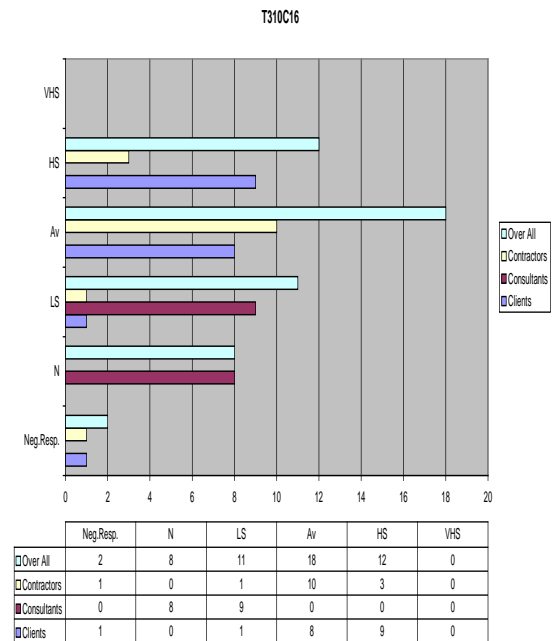


Figure 959 T310C16

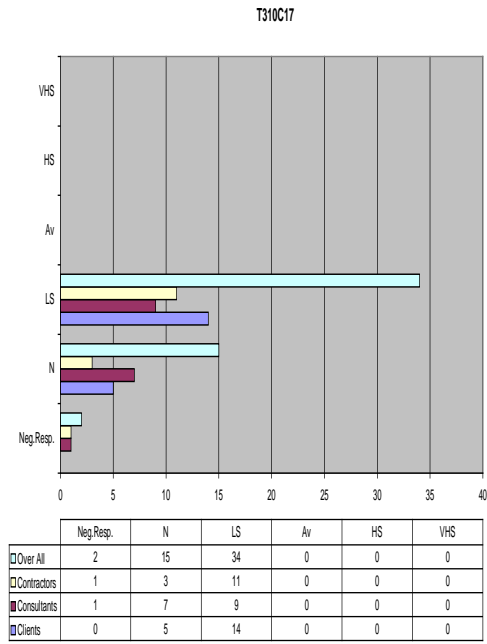


Figure 960 T310C17

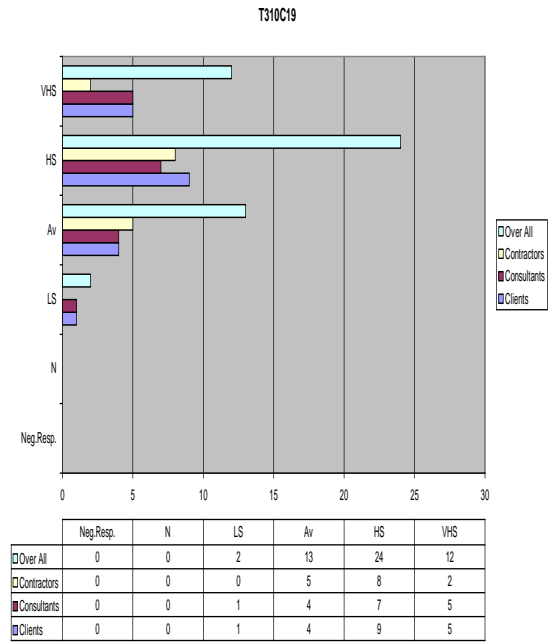


Figure 962 T310C19

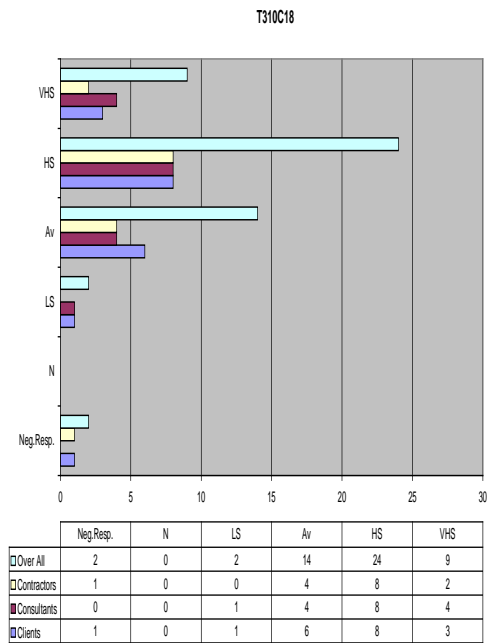


Figure 961 T310C18

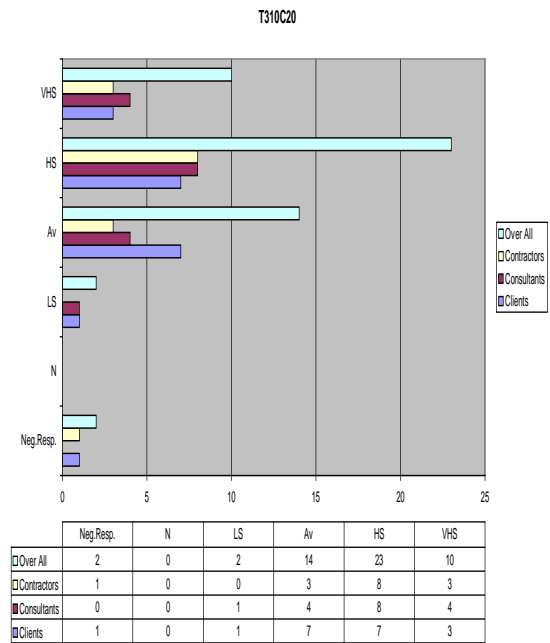


Figure 963 T310C20

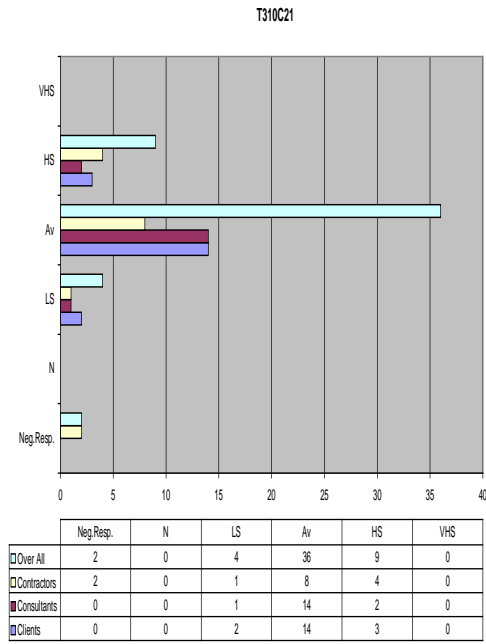


Figure 964 T310C21

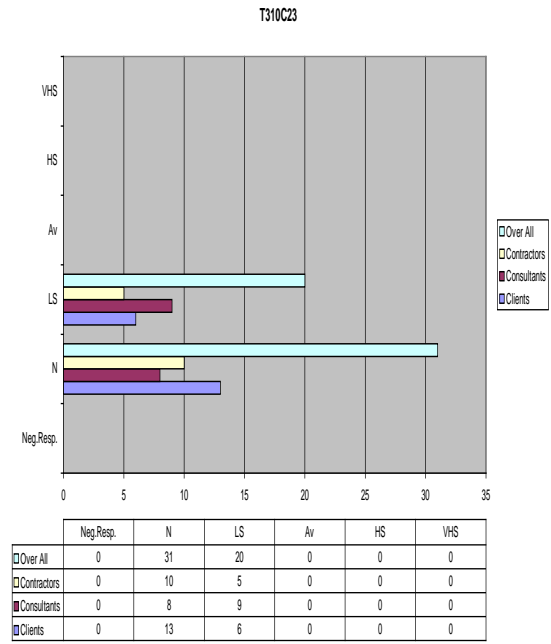


Figure 966 T310C23

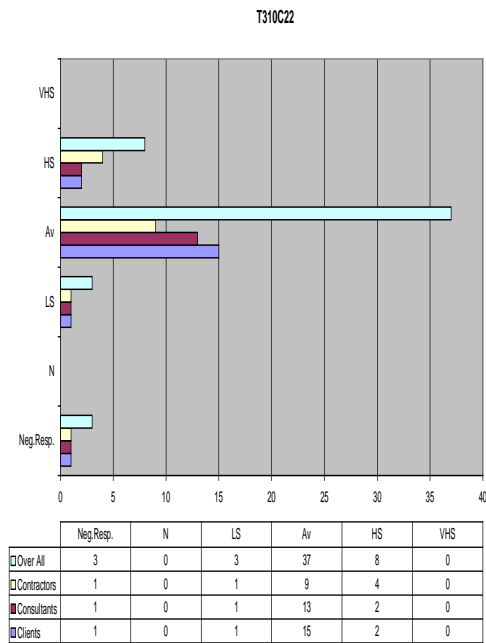


Figure 965 T310C22

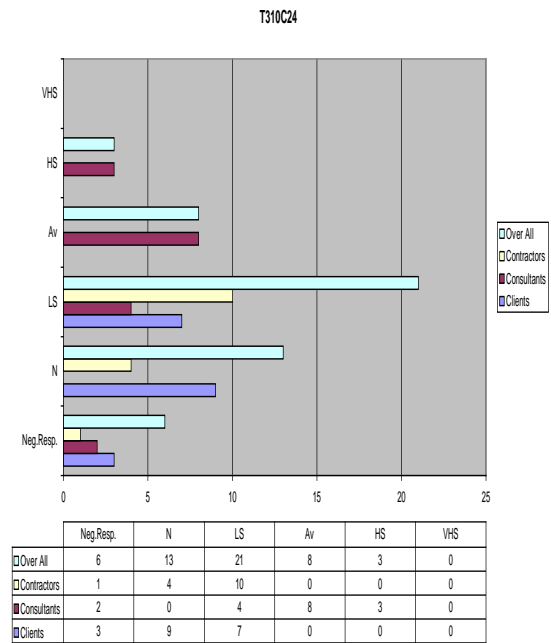


Figure 967 T310C24

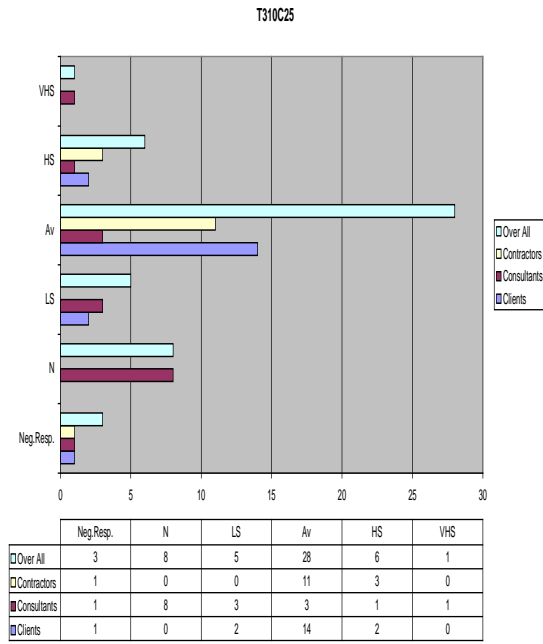


Figure 968 T310C25

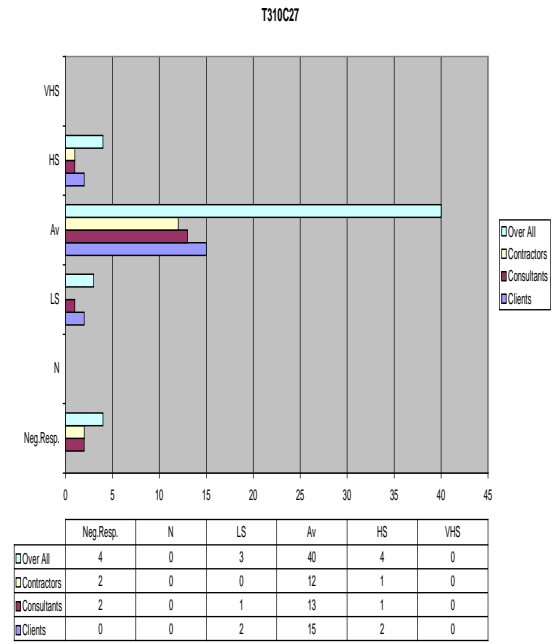


Figure 970 T310C27

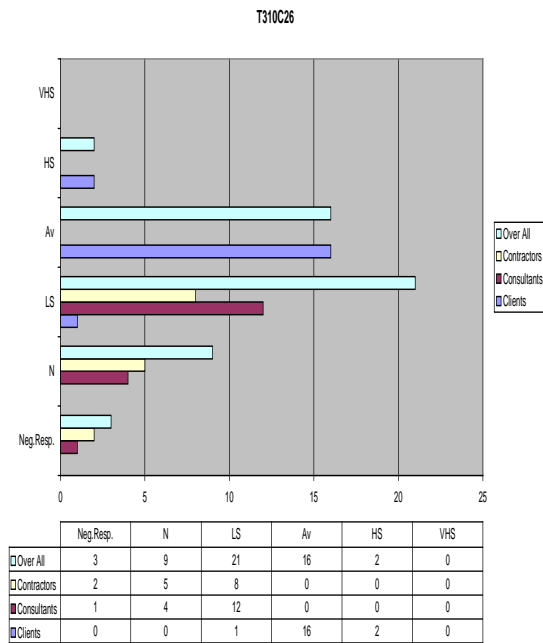


Figure 969 T310C26

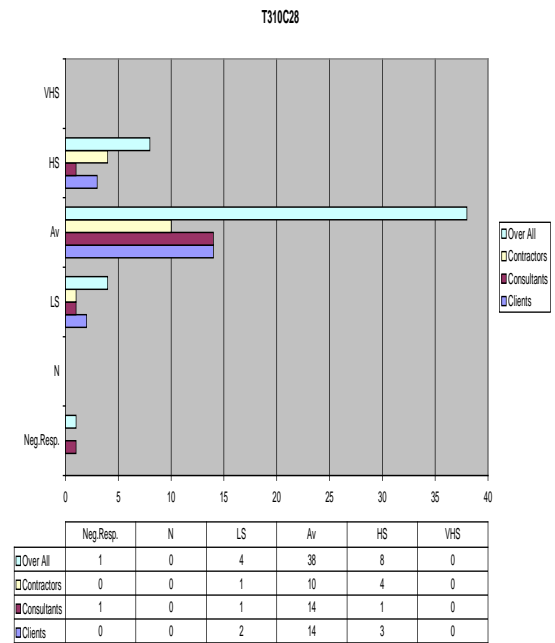


Figure 971 T310C28

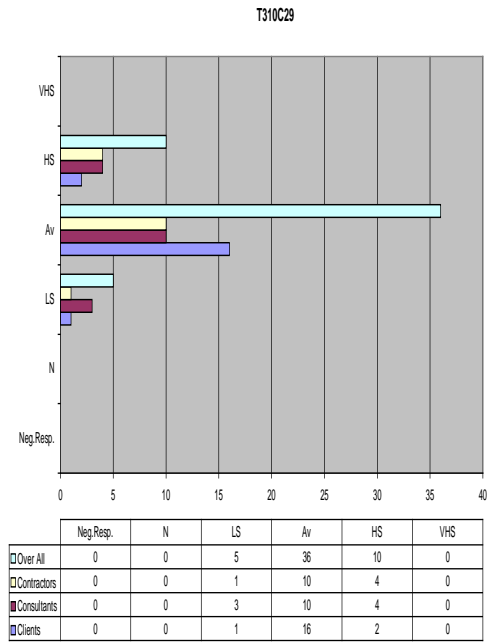


Figure 972 T310C29

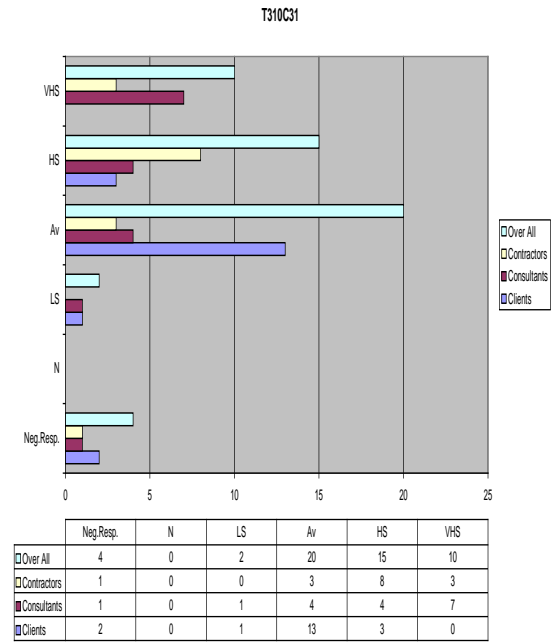


Figure 974 T310C31

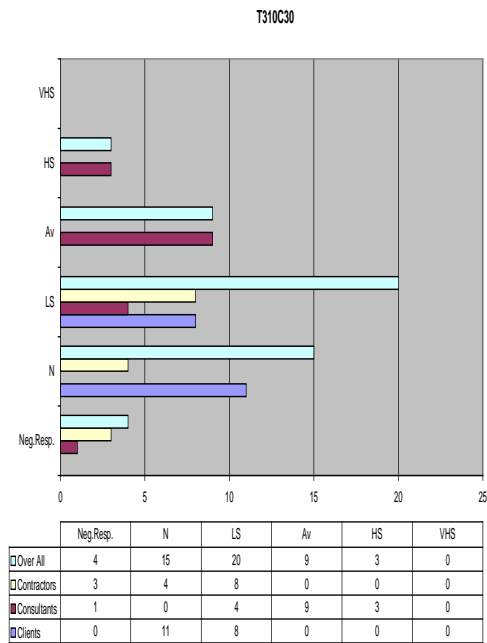


Figure 973 T310C30

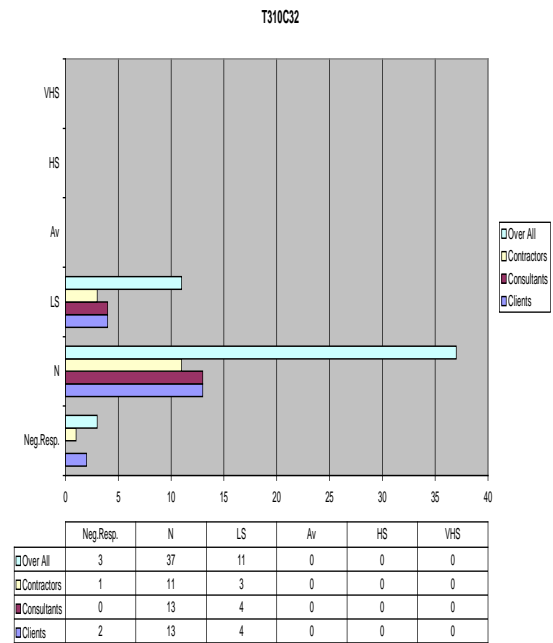


Figure 975 T310C32

Y.3.2.32 CAUSE SIGNIFICANCE ASSESSMENT: (T32 C01) – (T32 C32)

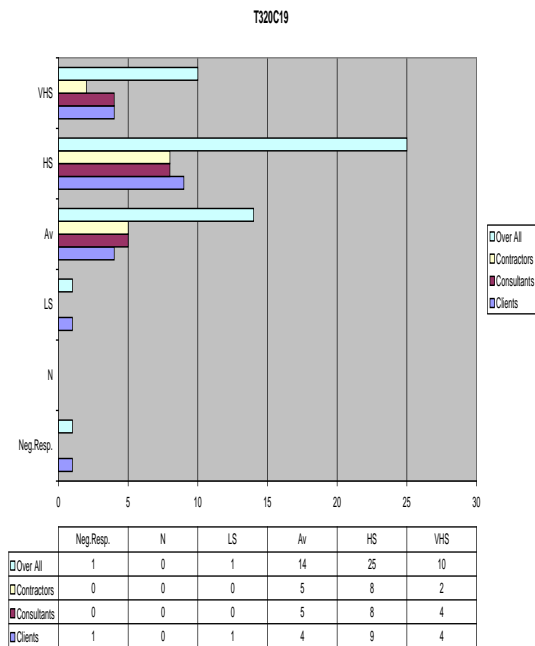


Figure 976 T320C19

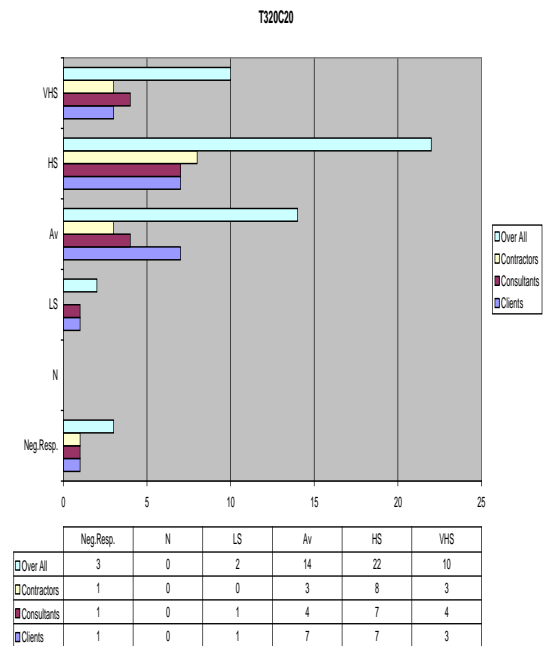


Figure 978 T320C20

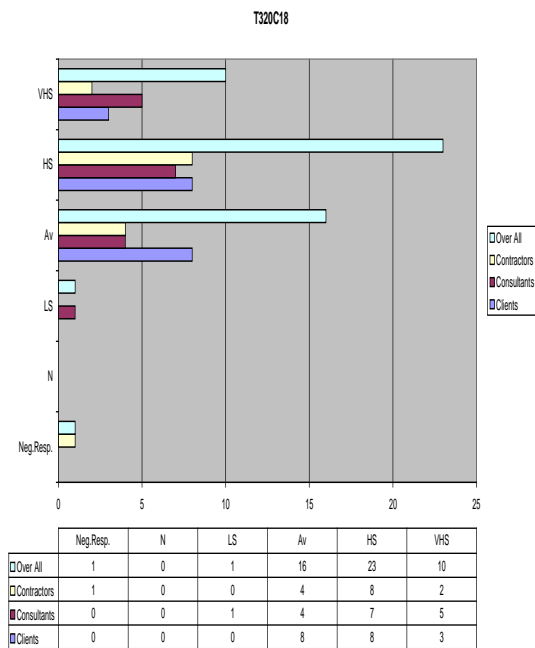


Figure 977 T320C18

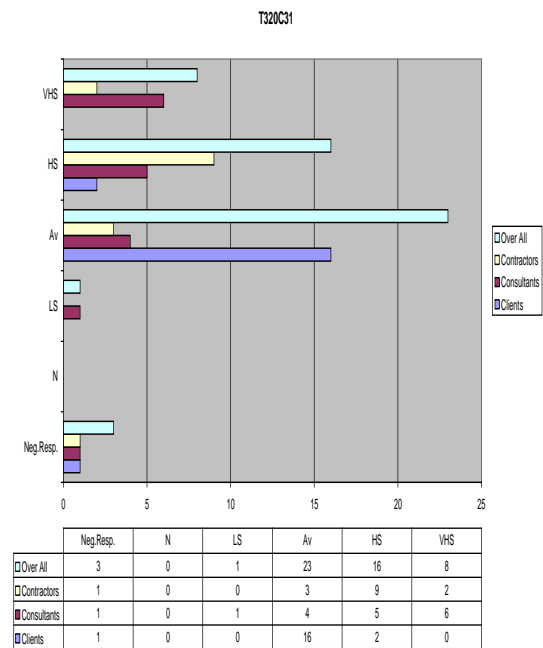


Figure 979 T320C31

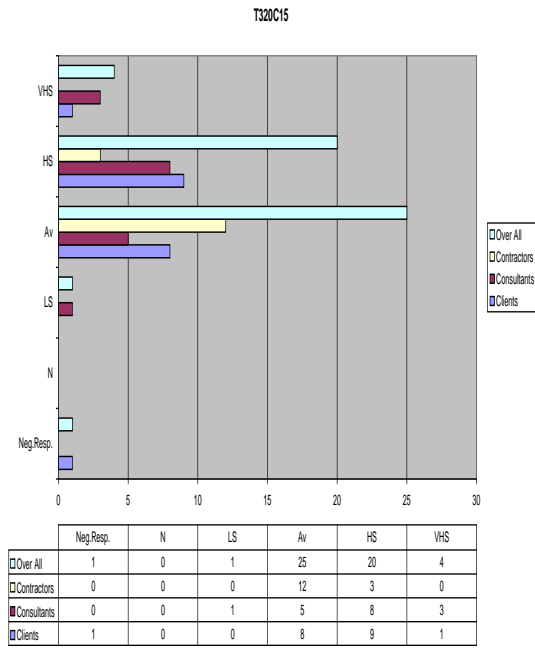


Figure 980 T320C15

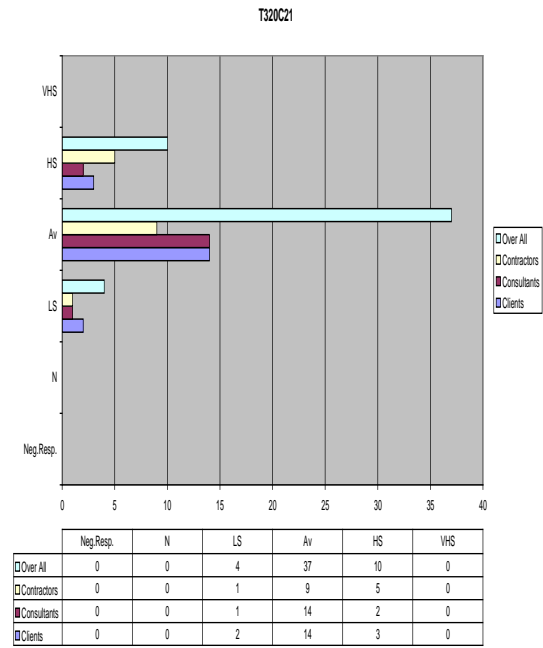


Figure 982 T320C21

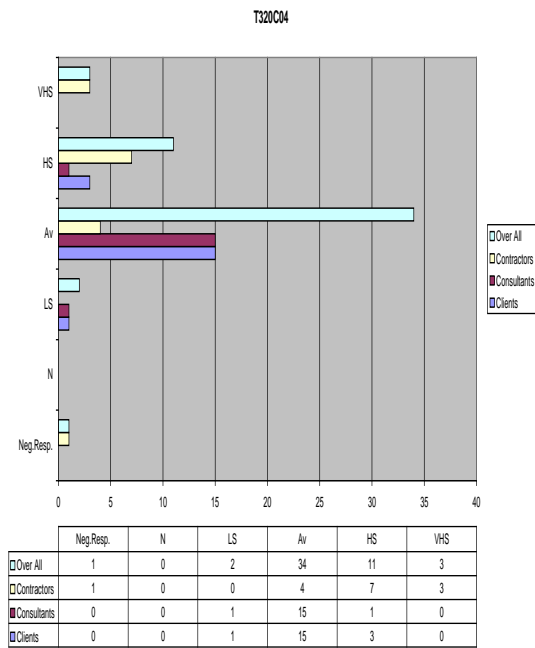


Figure 981 T320C04

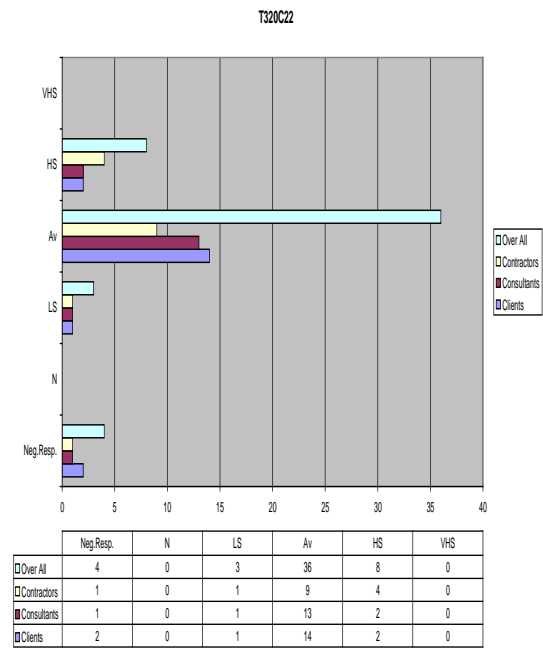


Figure 983 T320C22

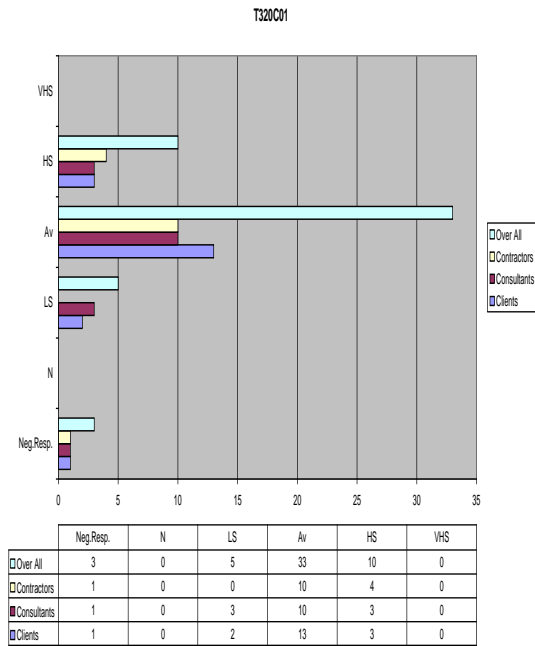


Figure 984 T320C01

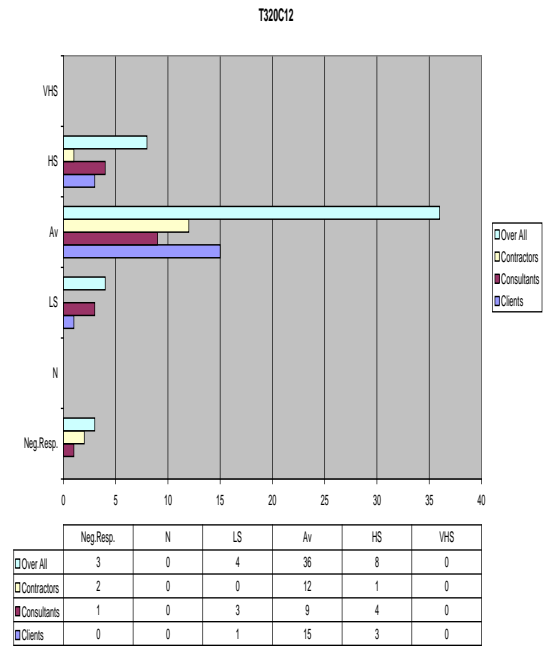


Figure 986 T320C12

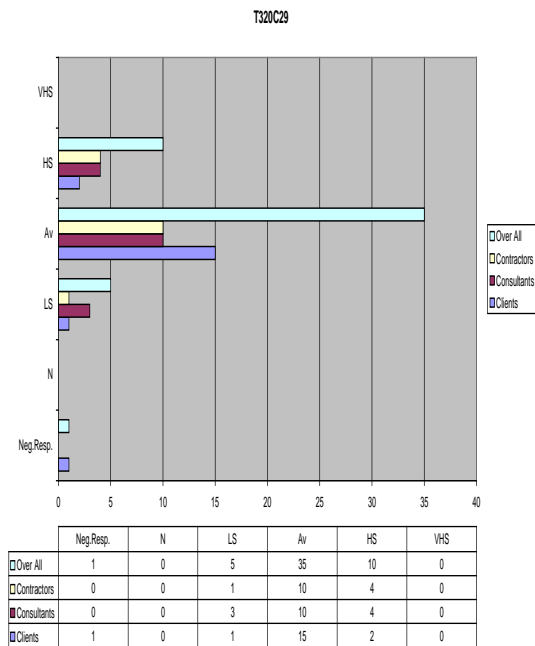


Figure 985 T320C29

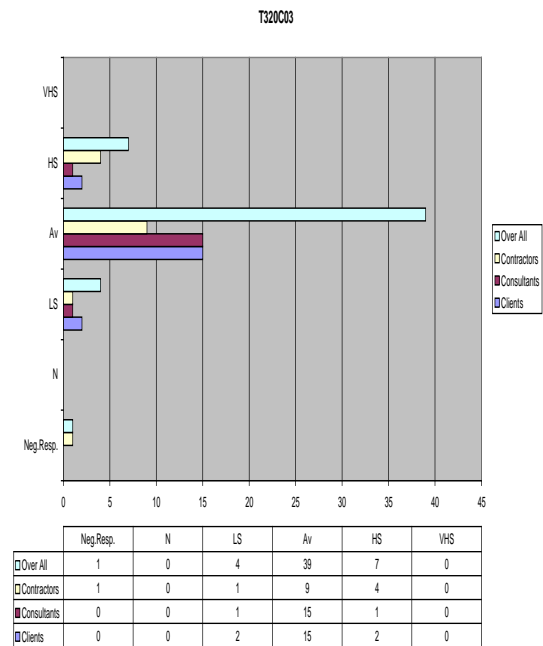


Figure 987 T320C03

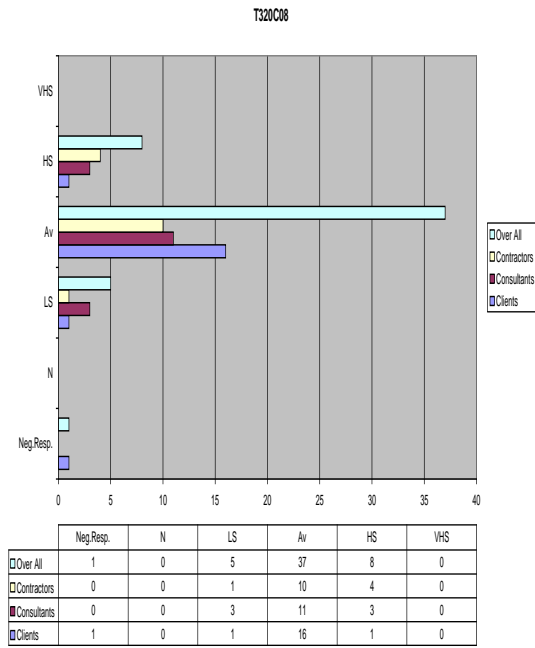


Figure 988 T320C08

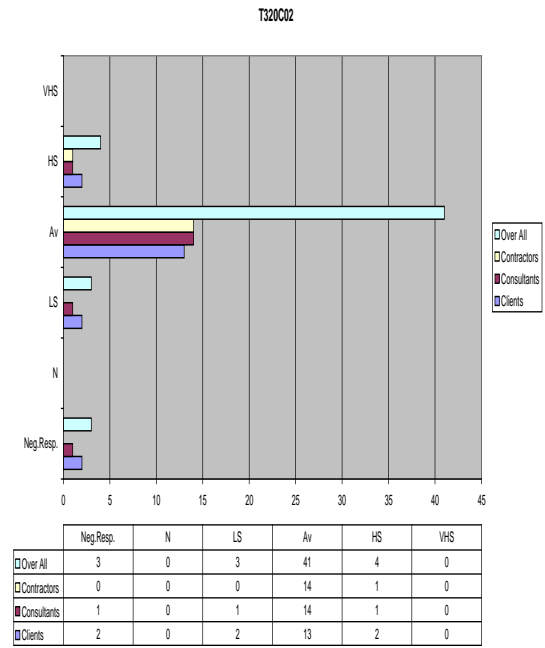


Figure 990 T320C02

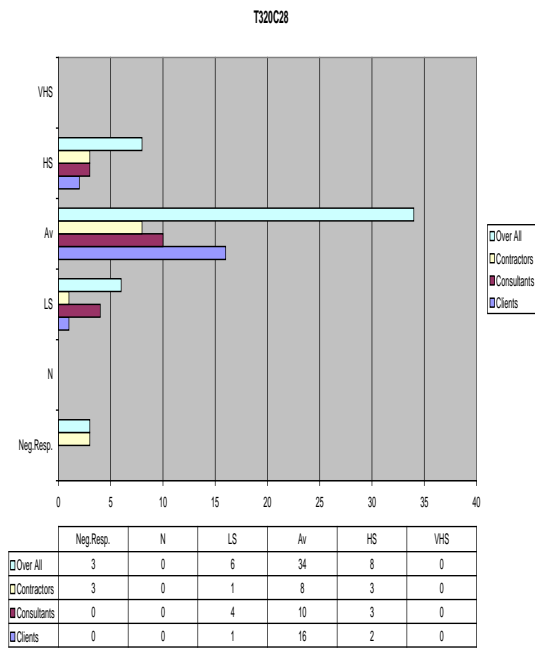


Figure 989 T320C28

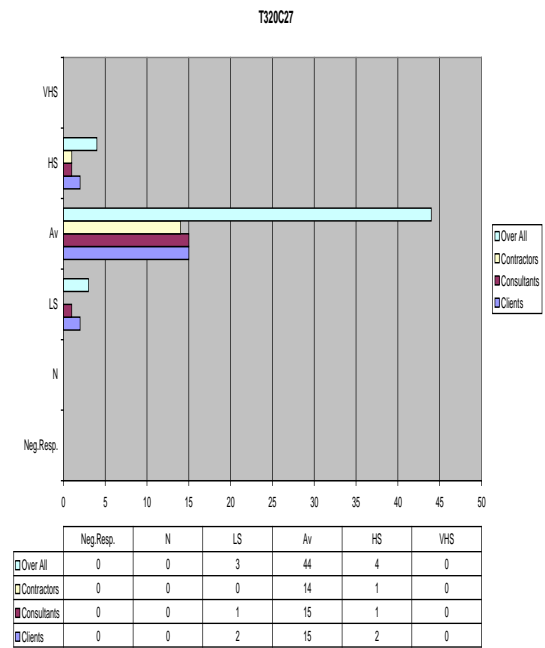


Figure 991 T320C27

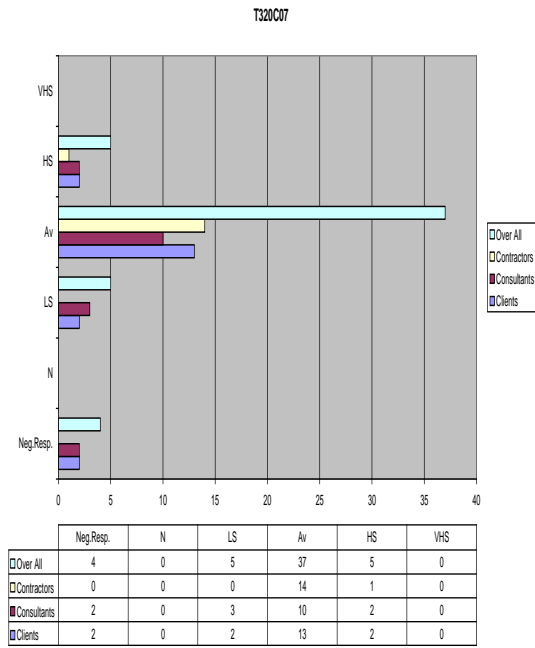


Figure 992 T320C07

Y.3.2.33 CAUSE SIGNIFICANCE ASSESSMENT: (T33 C01) – (T33 C32)

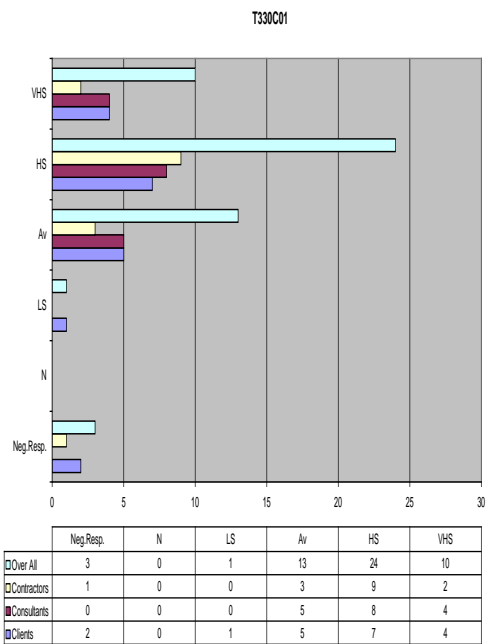


Figure 993 T330C01

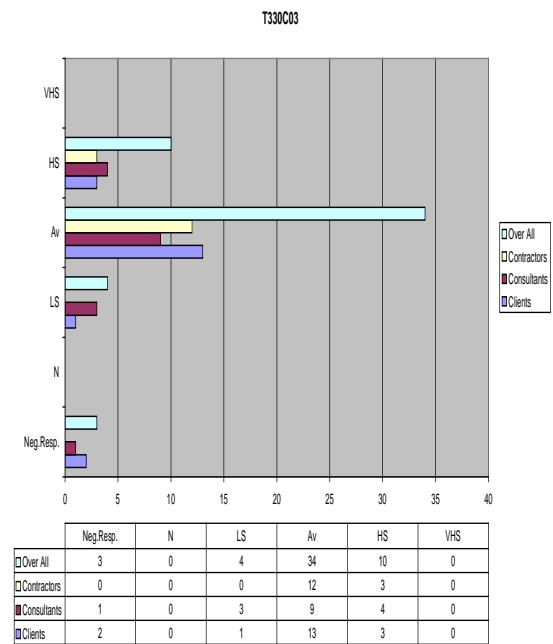


Figure 995 T330C03

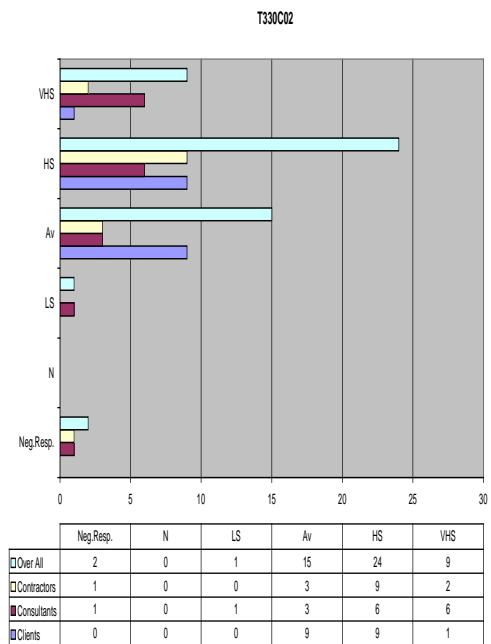


Figure 994 T330C02

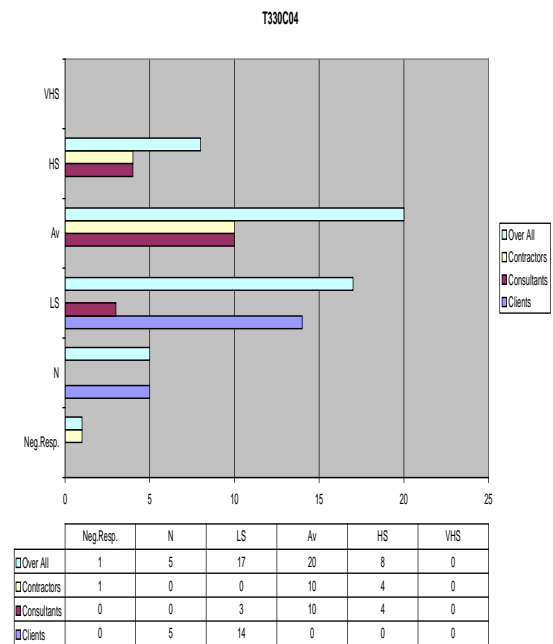


Figure 996 T330C04

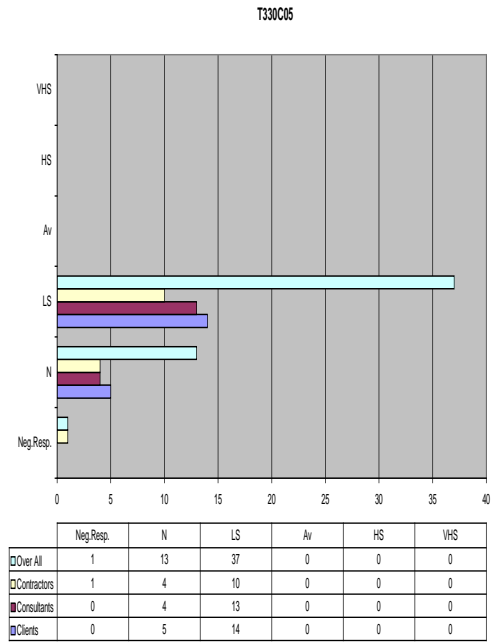


Figure 997 T330C05

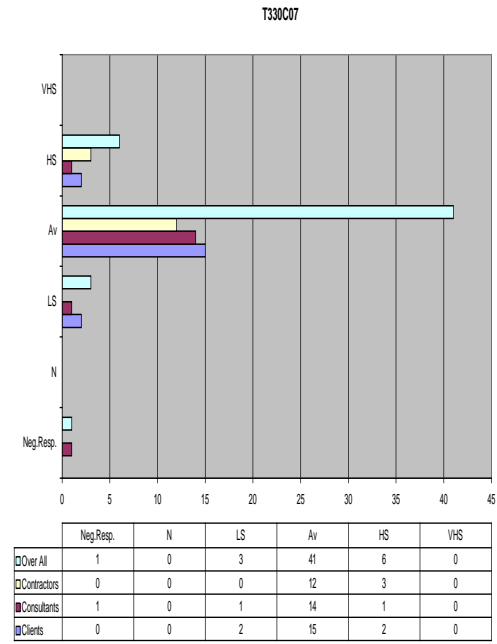


Figure 999 T330C07

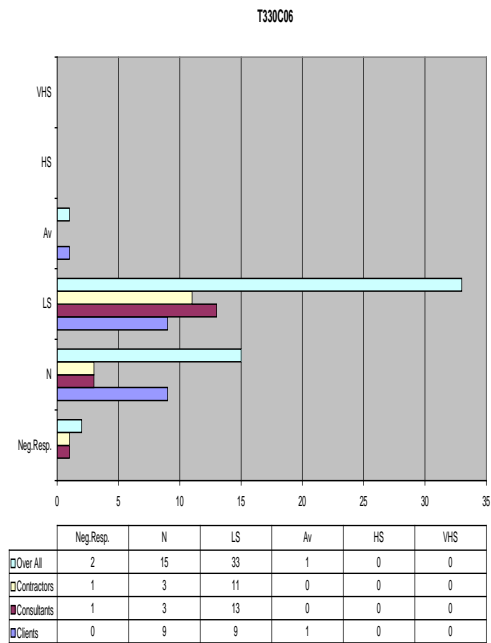


Figure 998 T330C06

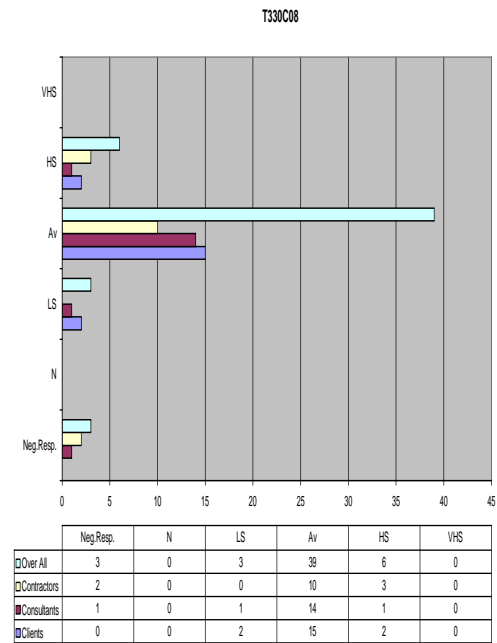


Figure 1000 T330C08

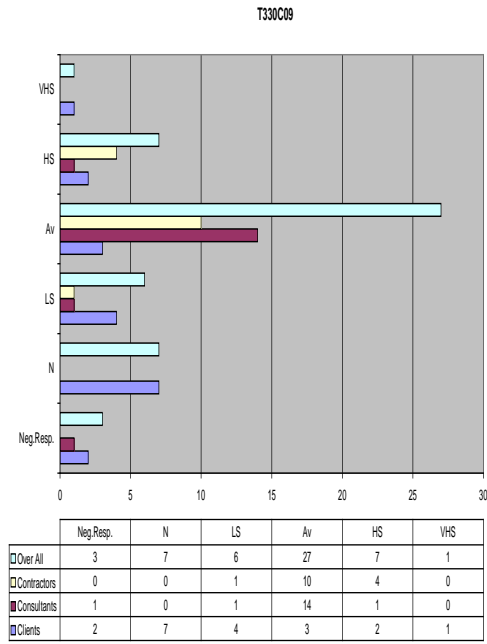


Figure 1001 T330C09

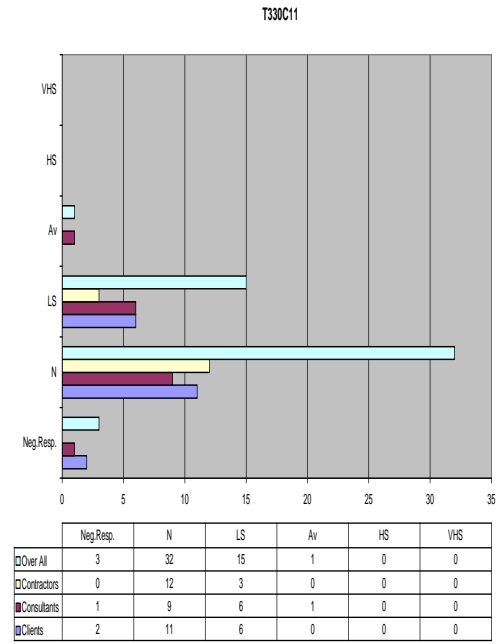


Figure 1003 T330C11

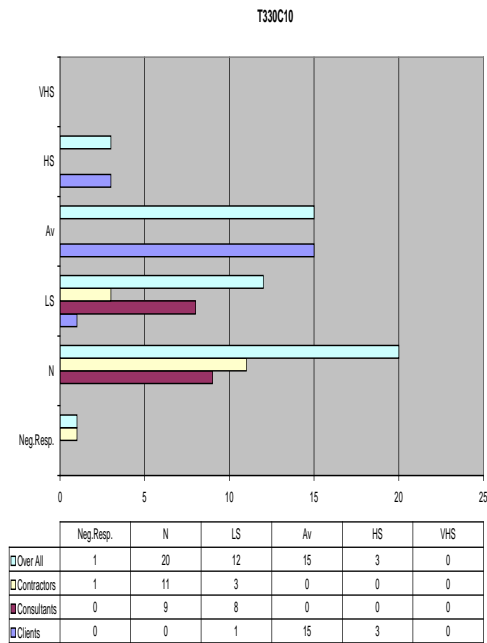


Figure 1002 T330C10

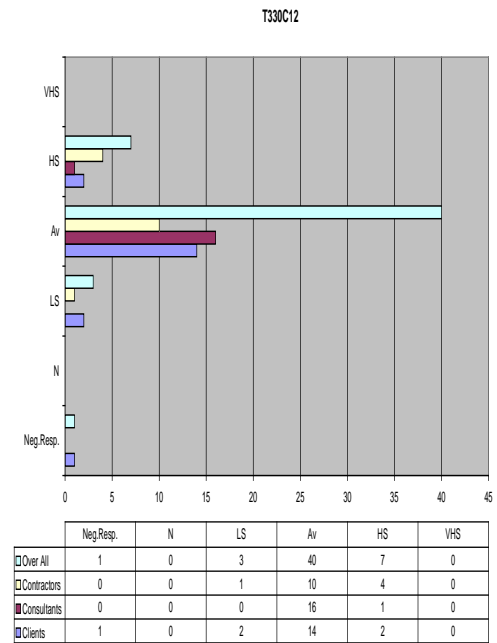


Figure 1004 T330C12

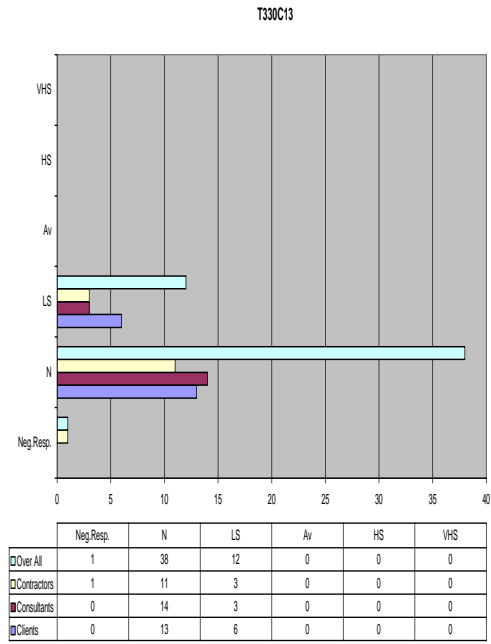


Figure 1005 T330C13

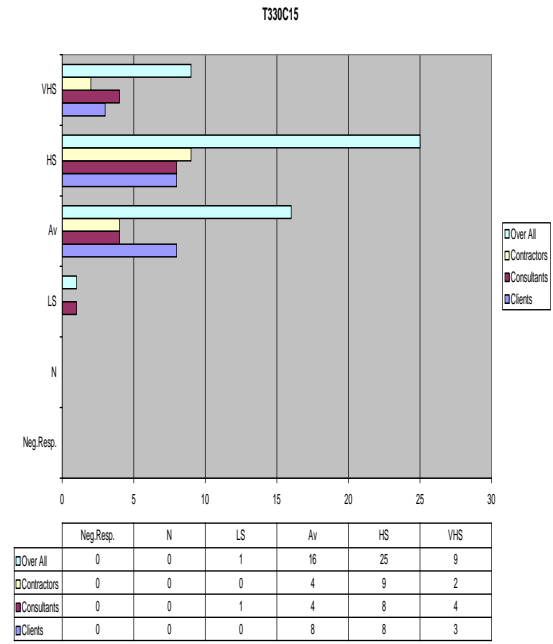


Figure 1007 T330C15

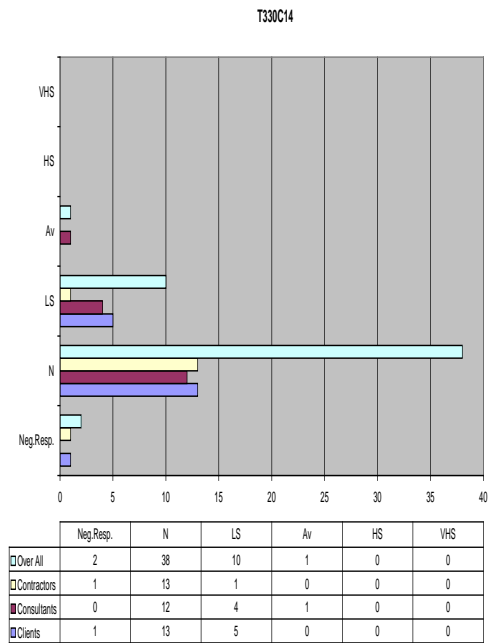


Figure 1006 T330C14

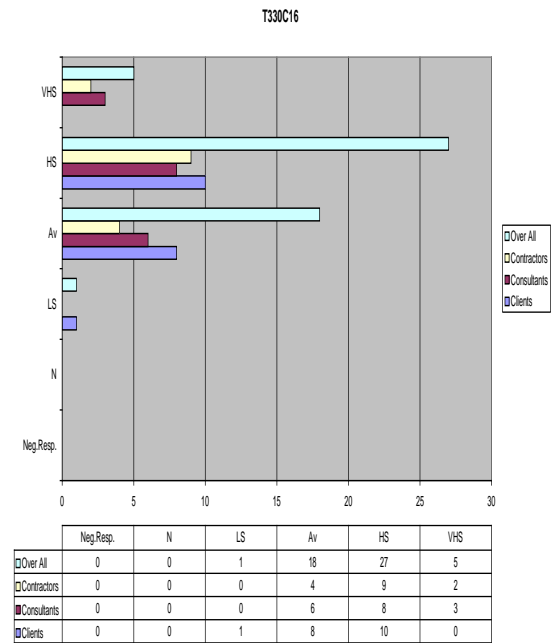


Figure 1008 T330C16

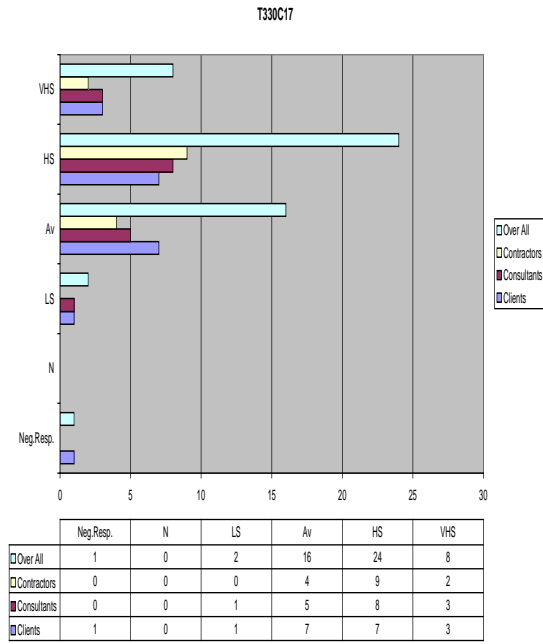


Figure 1009 T330C17

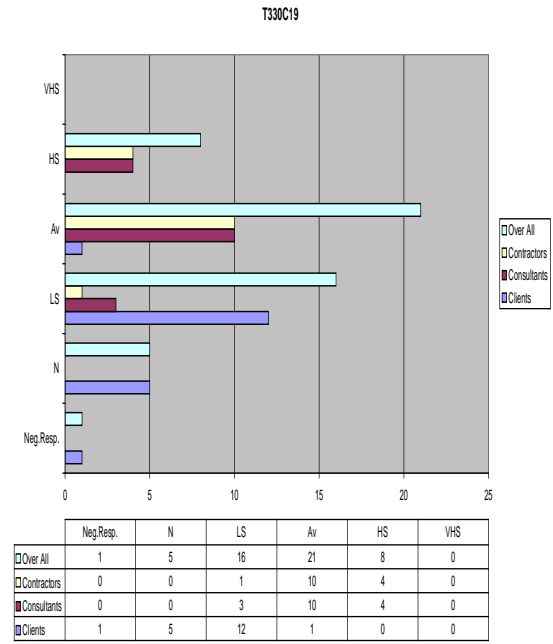


Figure 1011 T330C19

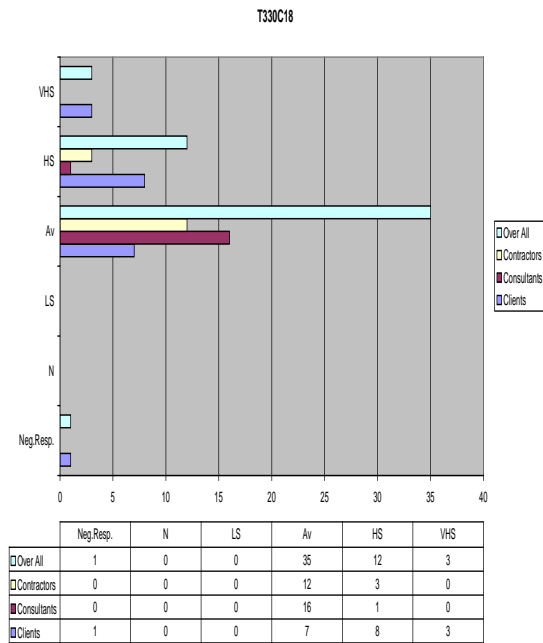


Figure 1010 T330C18

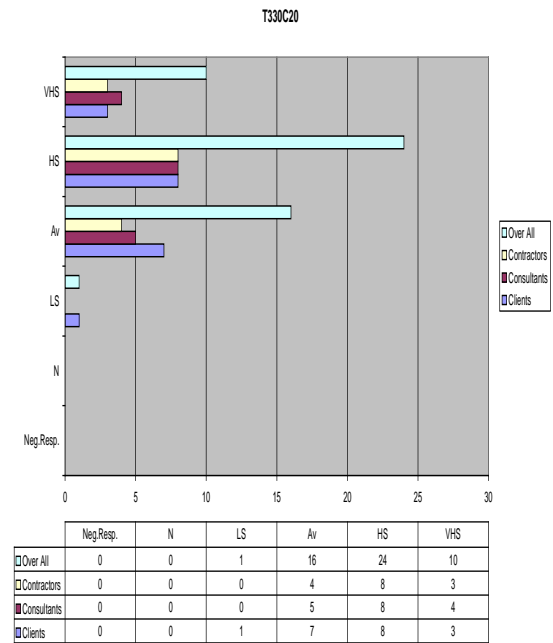


Figure 1012 T330C20

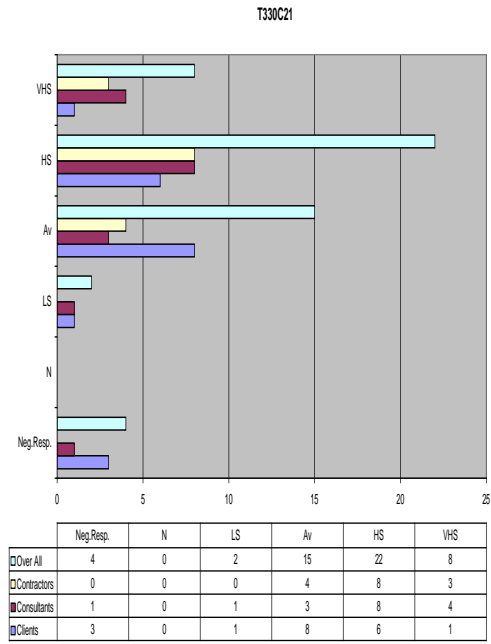


Figure 1013 T330C21

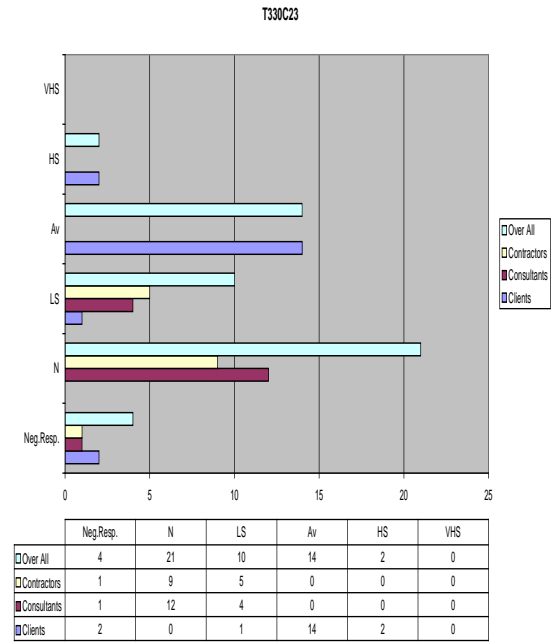


Figure 1015 T330C23

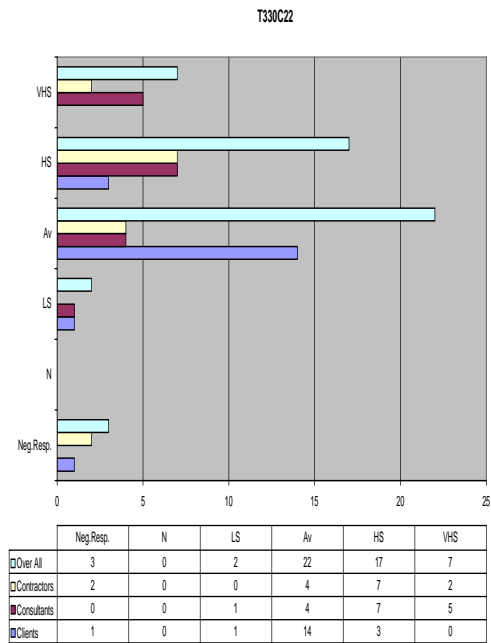


Figure 1014 T330C22

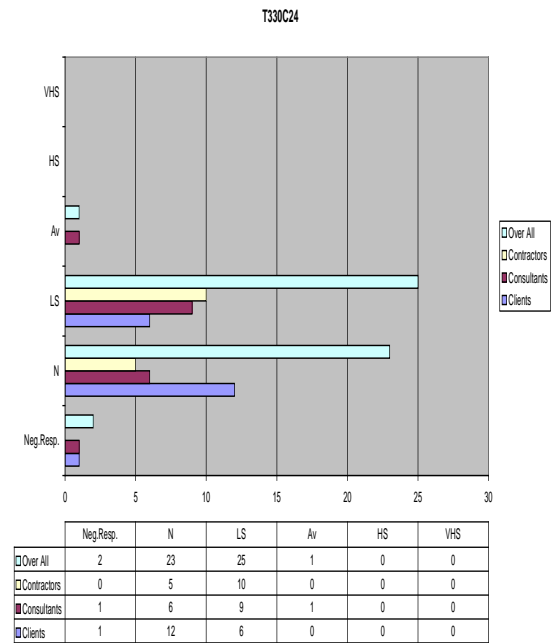


Figure 1016 T330C24

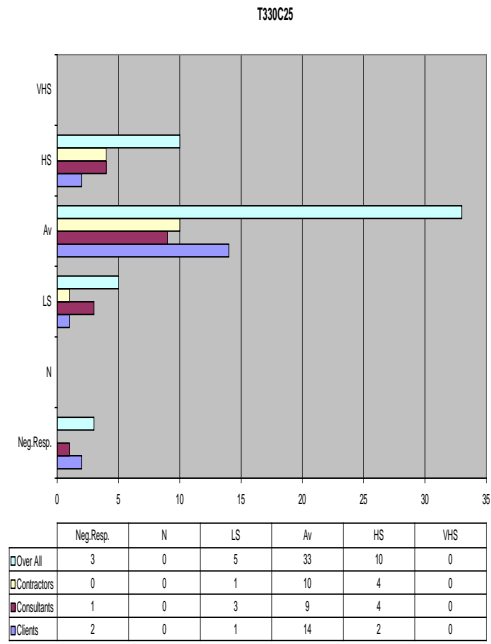


Figure 1017 T330C25

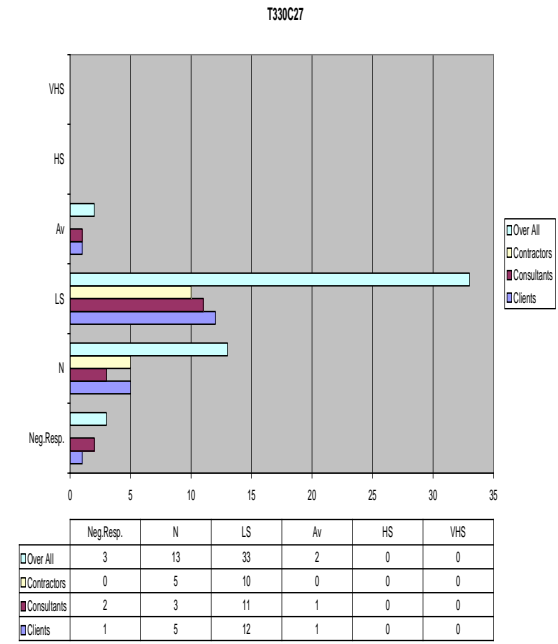


Figure 1019 T330C27

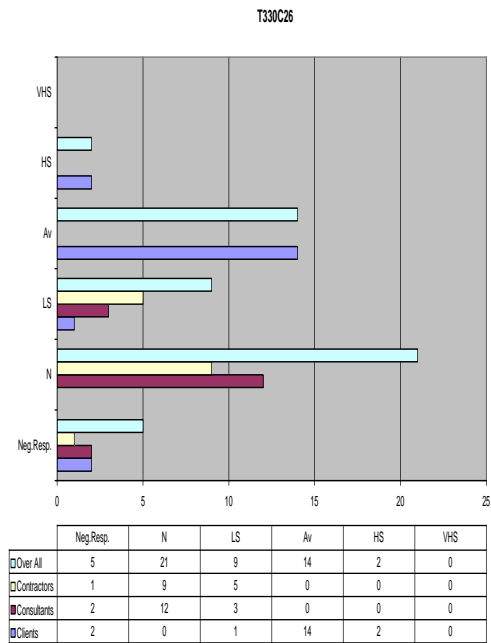


Figure 1018 T330C26

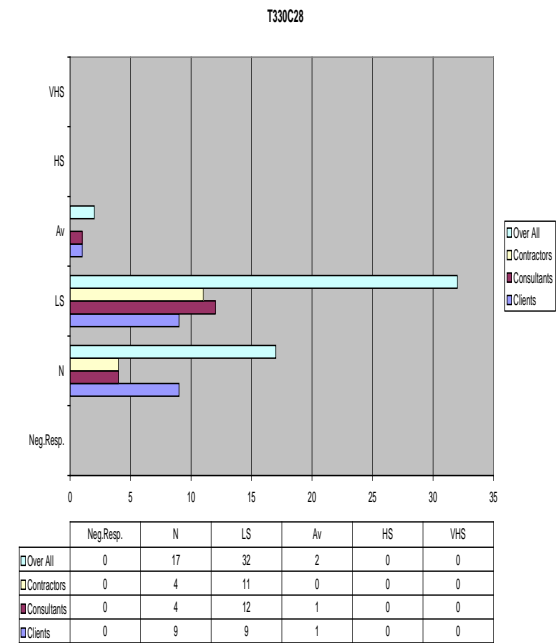


Figure 1020 T330C28

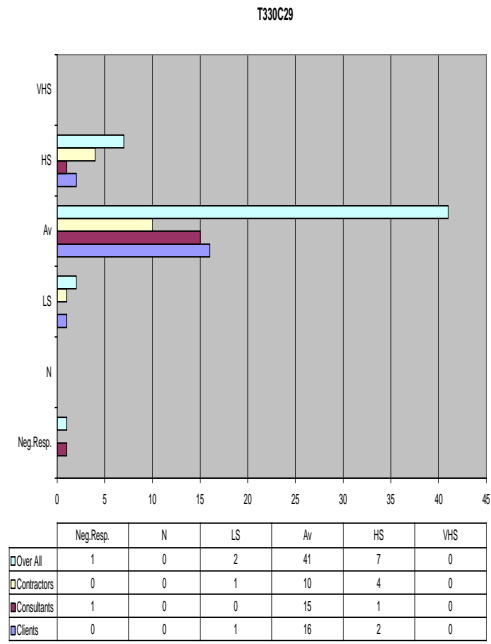


Figure 1021 T330C29

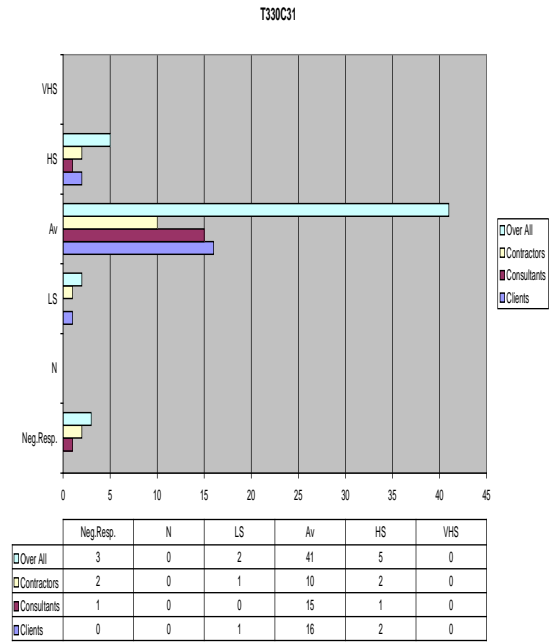


Figure 1023 T330C31

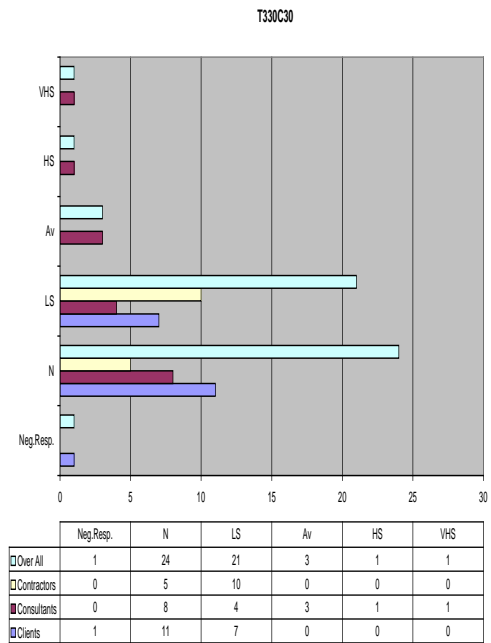


Figure 1022 T330C30

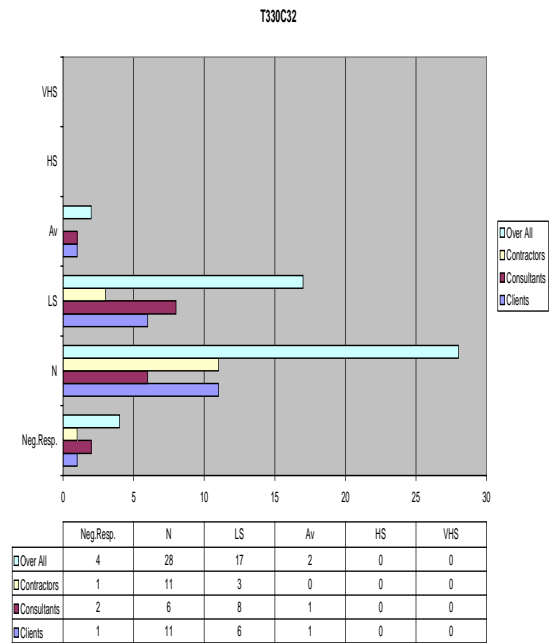


Figure 1024 T330C32

Y.3.2.34 CAUSE SIGNIFICANCE ASSESSMENT: (T34 C01) – (T34 C32)

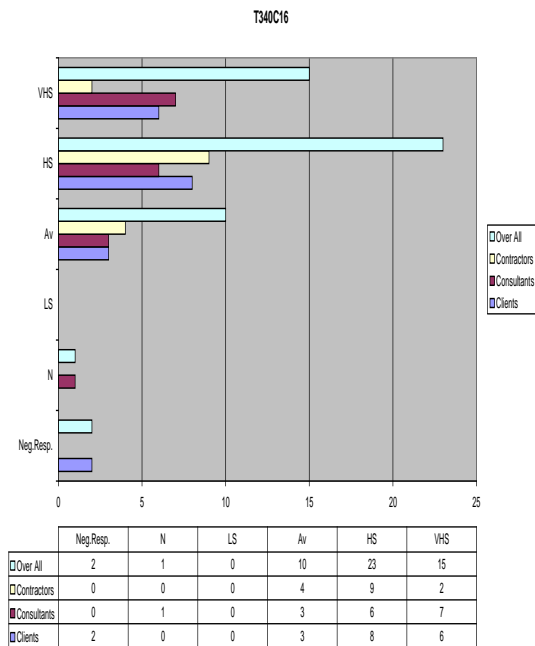


Figure 1025 T340C16

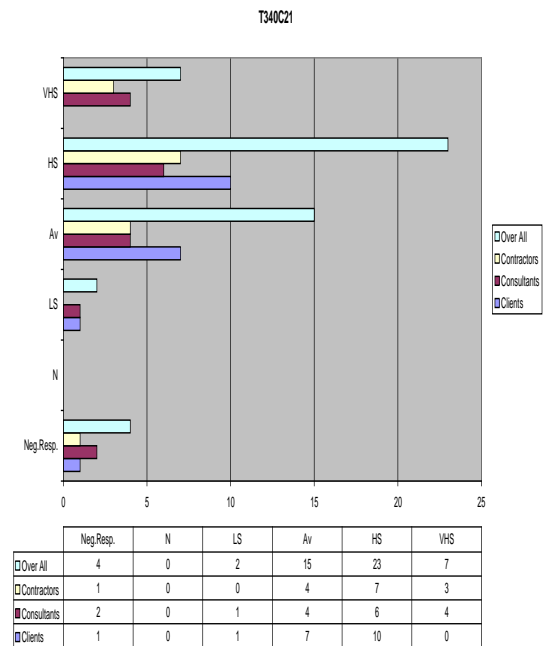


Figure 1027 T340C21

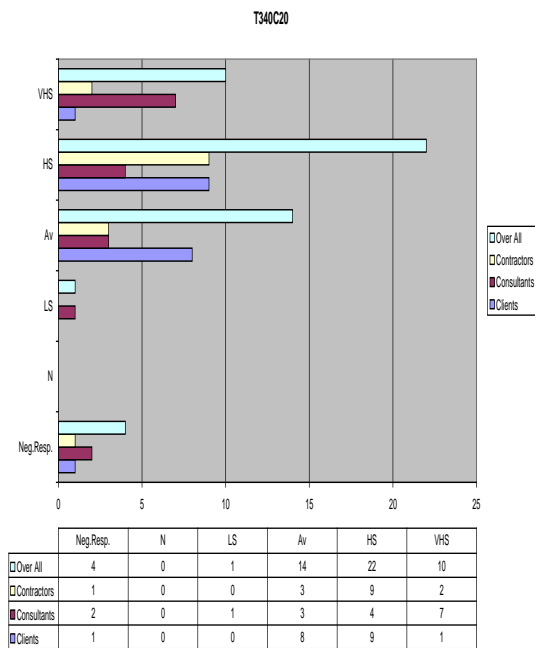


Figure 1026 T340C20

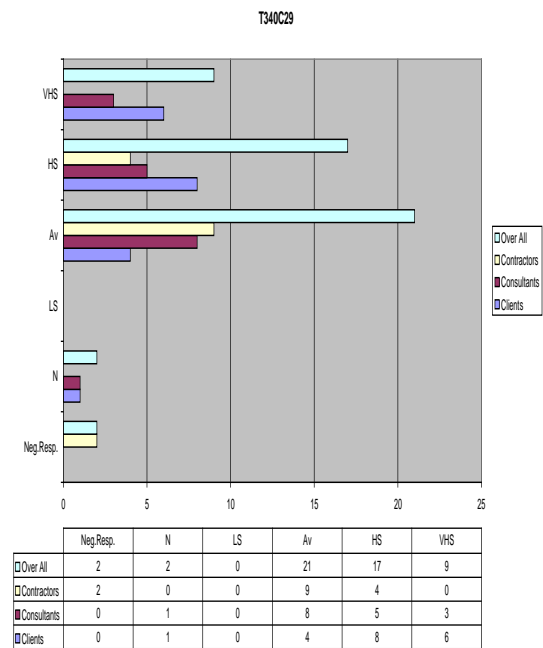


Figure 1028 T340C29

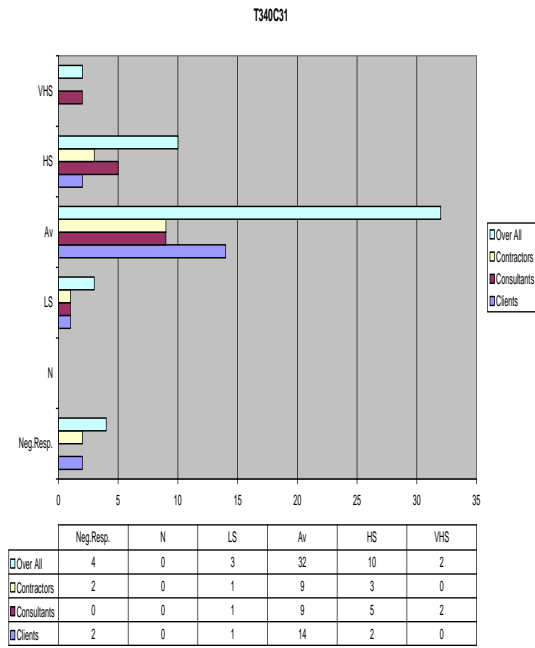


Figure 1029 T340C31

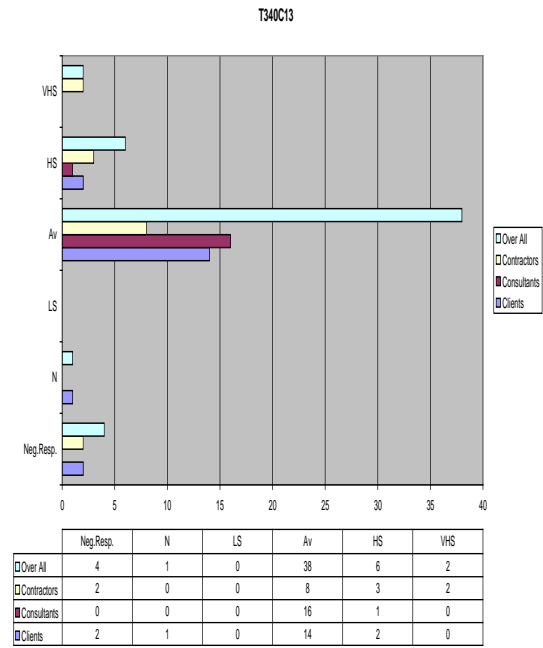


Figure 1031 T340C13

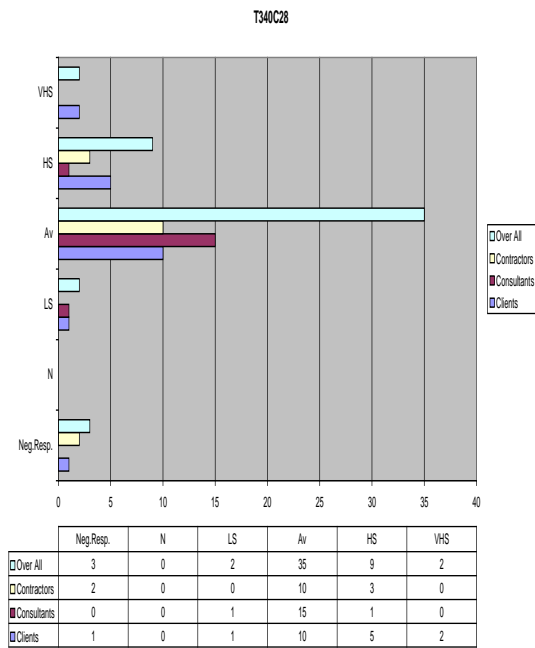


Figure 1030 T340C28

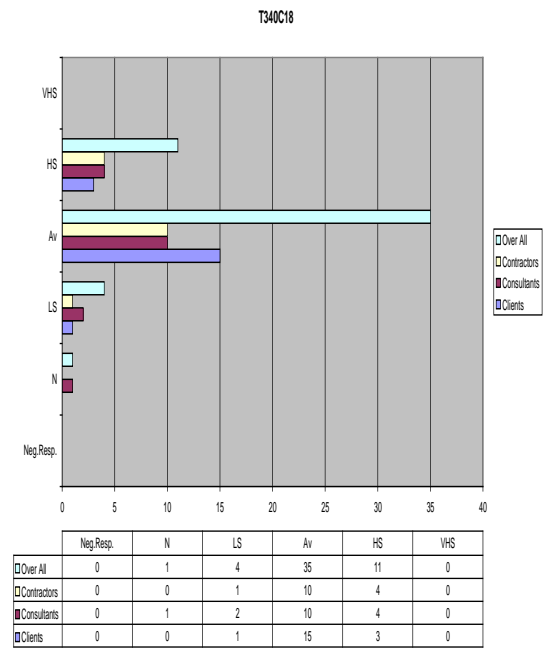


Figure 1032 T340C18

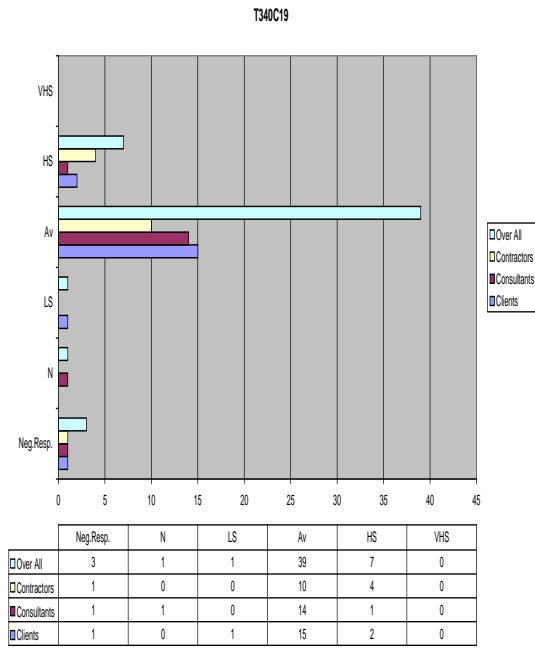


Figure 1033 T340C19

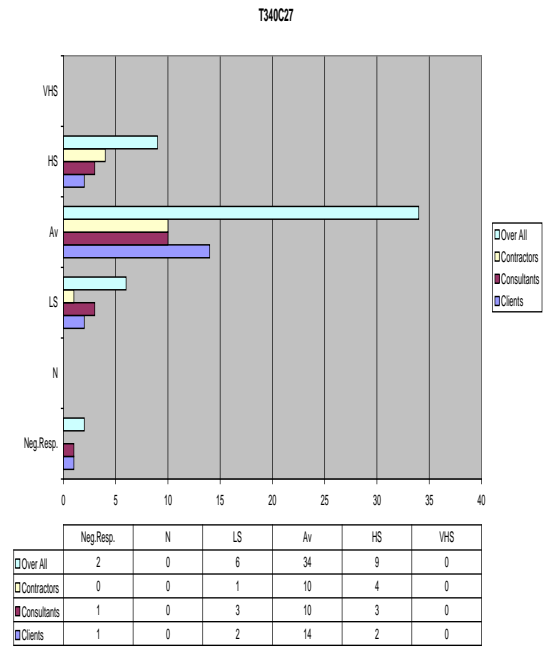


Figure 1035 T340C27

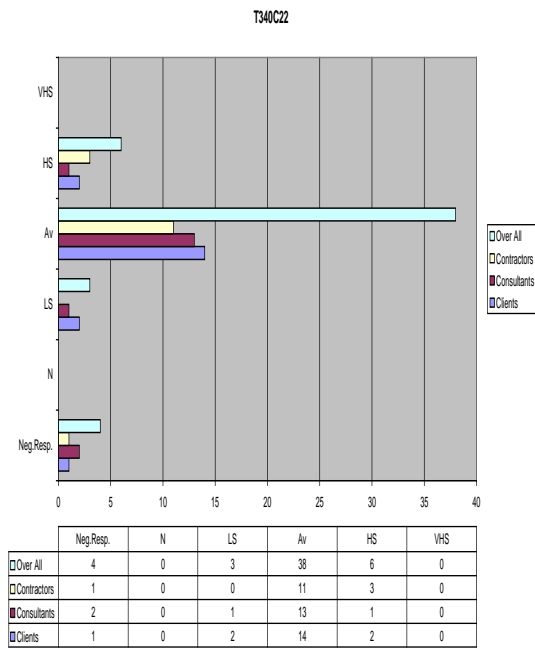


Figure 1034 T340C22

Y.3.2.35 CAUSE SIGNIFICANCE ASSESSMENT: (T35 C01) – (T35 C32)

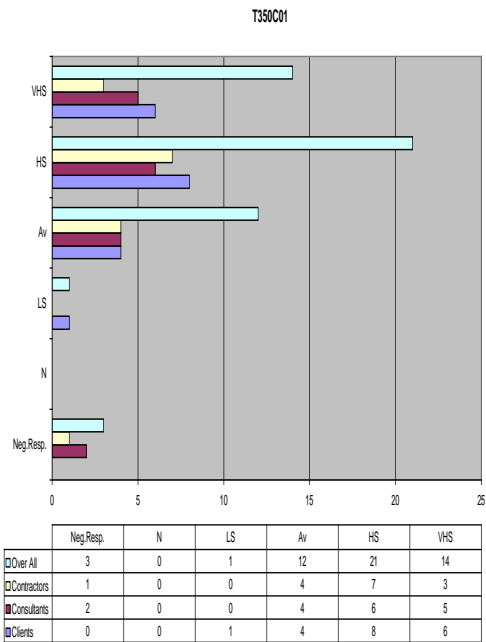


Figure 1036 T350C01

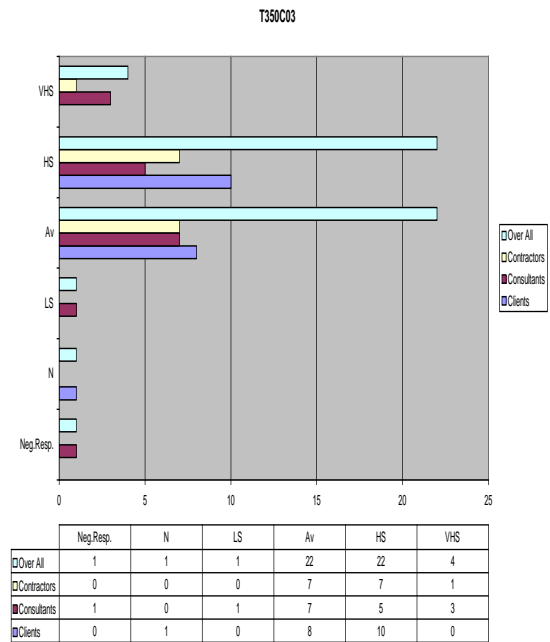


Figure 1038 T350C03

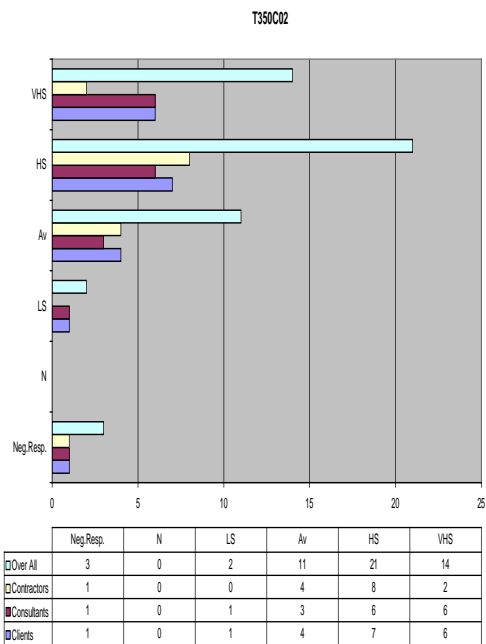


Figure 1037 T350C02

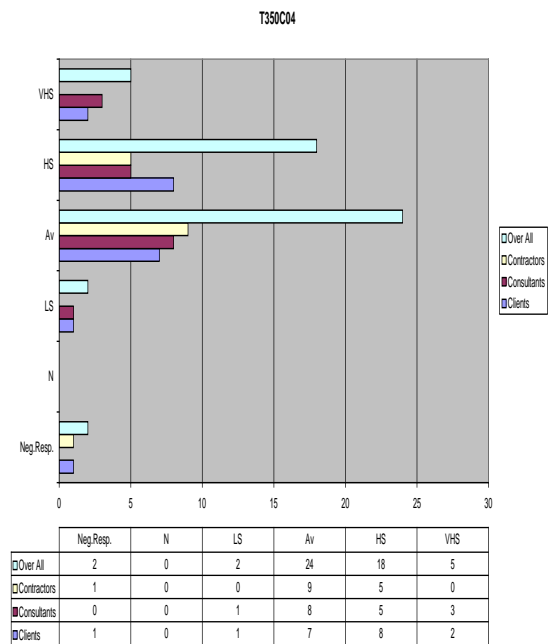


Figure 1039 T350C04

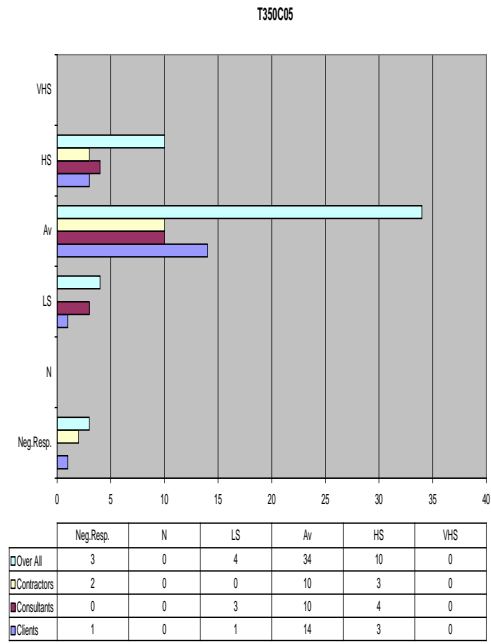


Figure 1040 T350C05

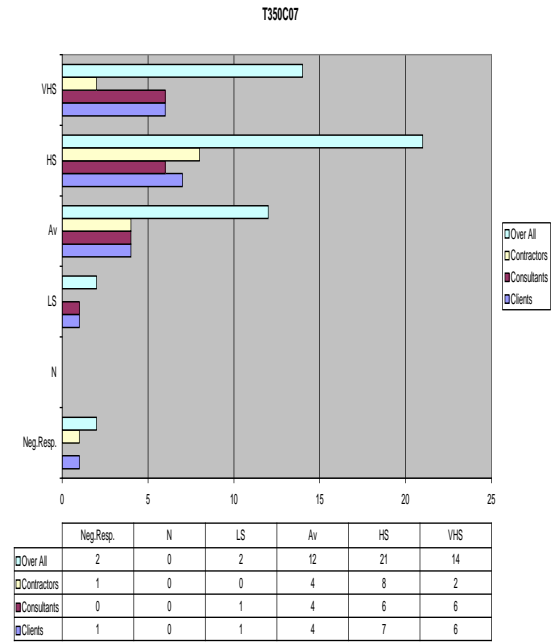


Figure 1042 T350C07

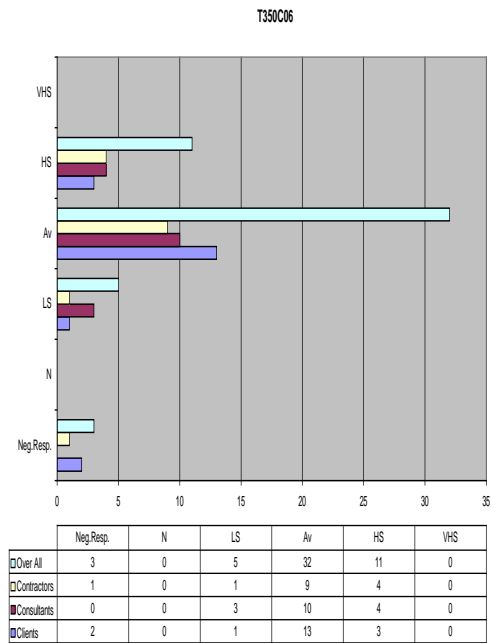


Figure 1041 T350C06

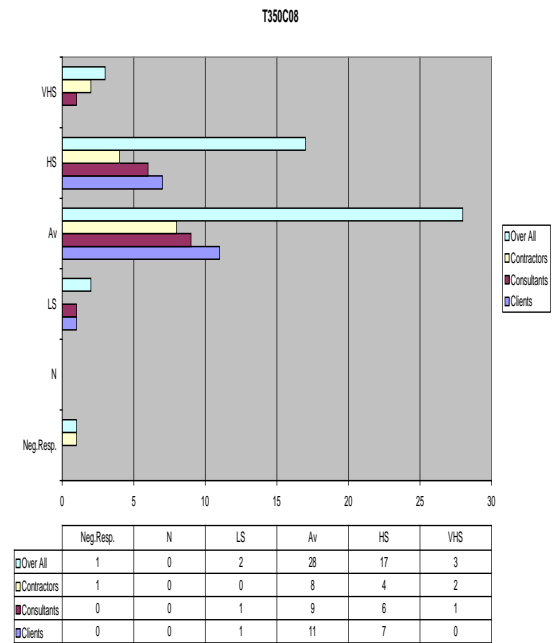


Figure 1043 T350C08

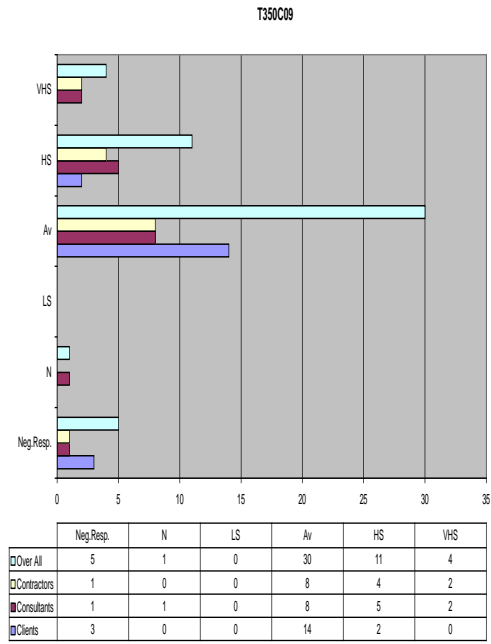


Figure 1044 T350C09

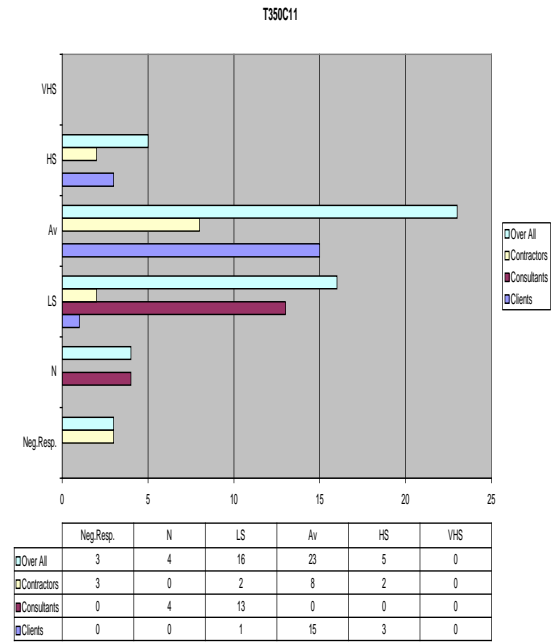


Figure 1046 T350C11

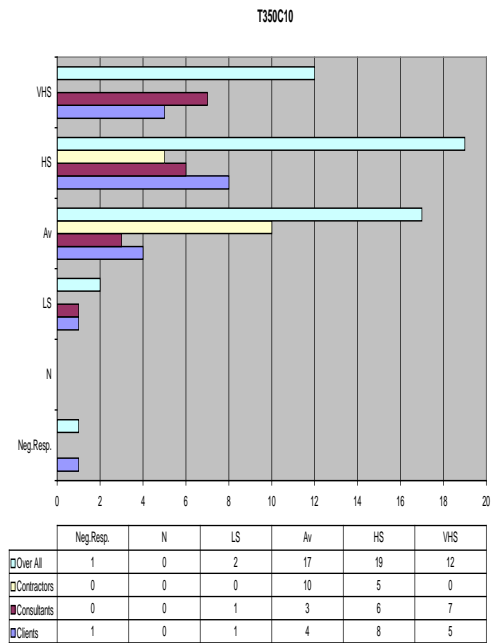


Figure 1045 T350C10

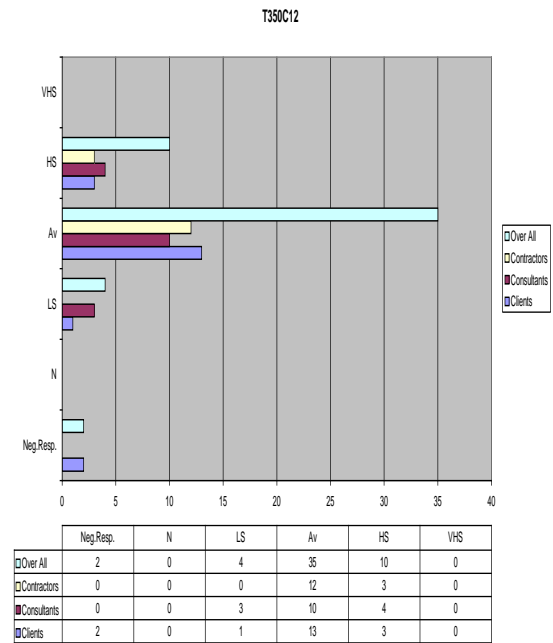


Figure 1047 T350C12

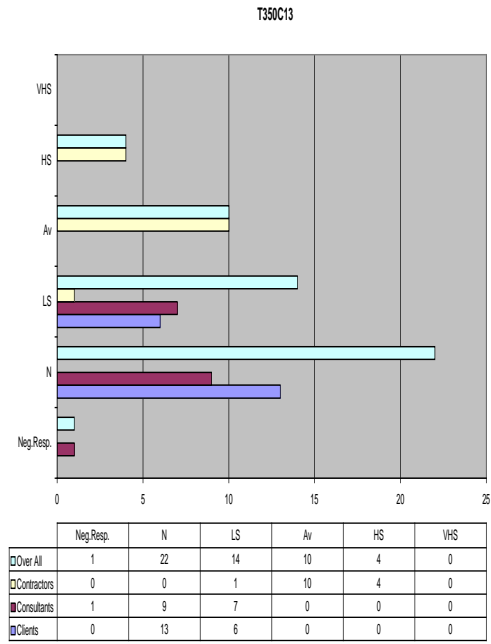


Figure 1048 T350C13

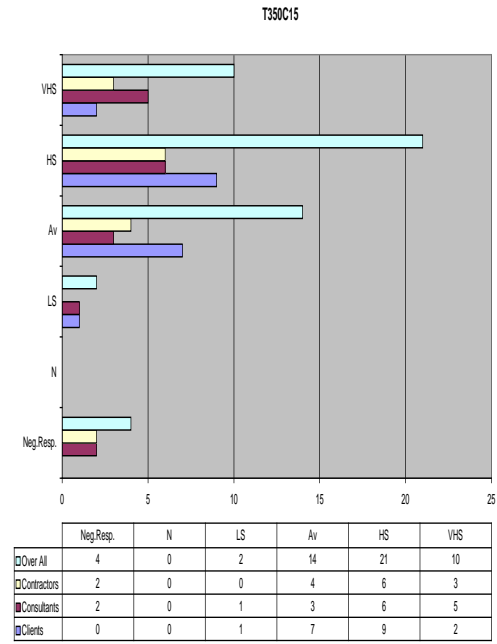


Figure 1050 T350C15

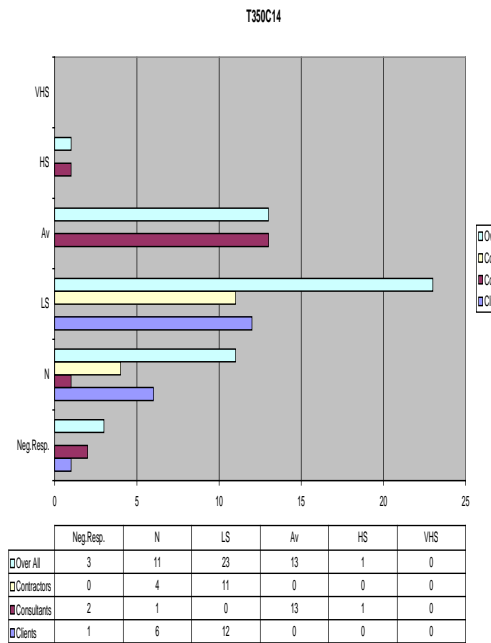


Figure 1049 T350C14

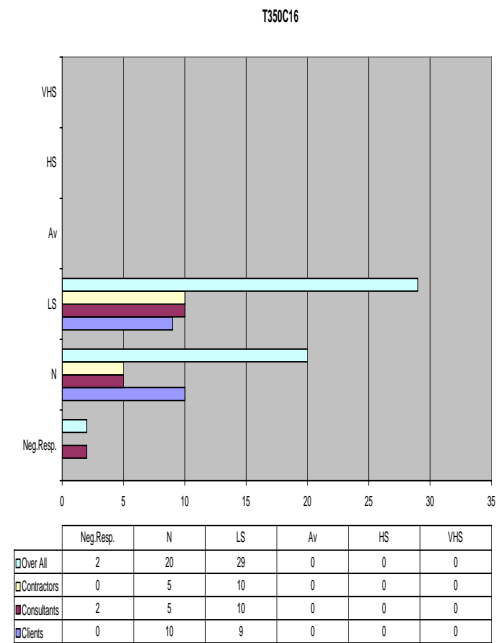


Figure 1051 T350C16

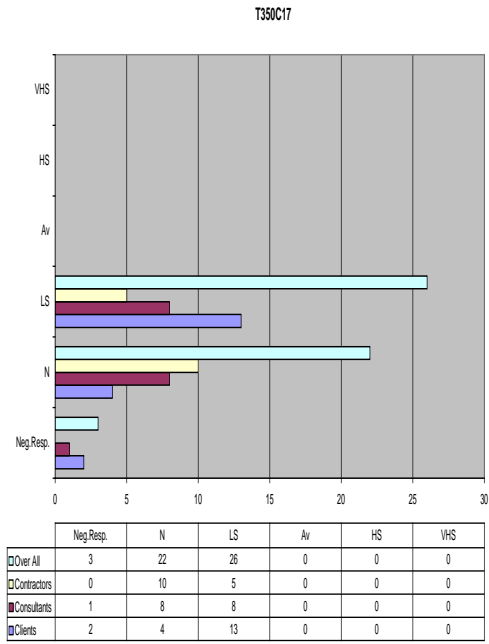


Figure 1052 T350C17

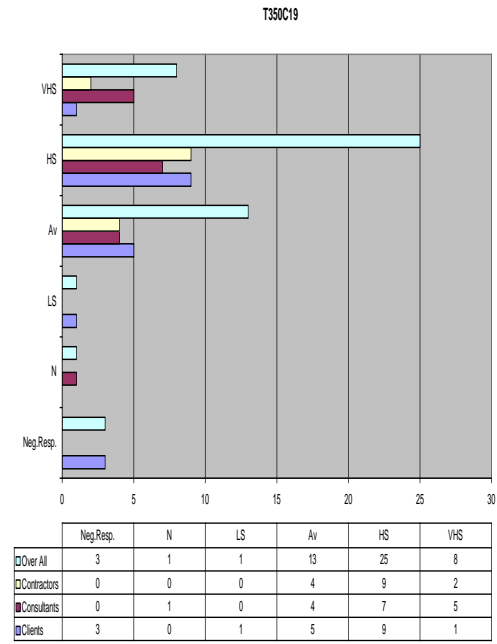


Figure 1054 T350C19

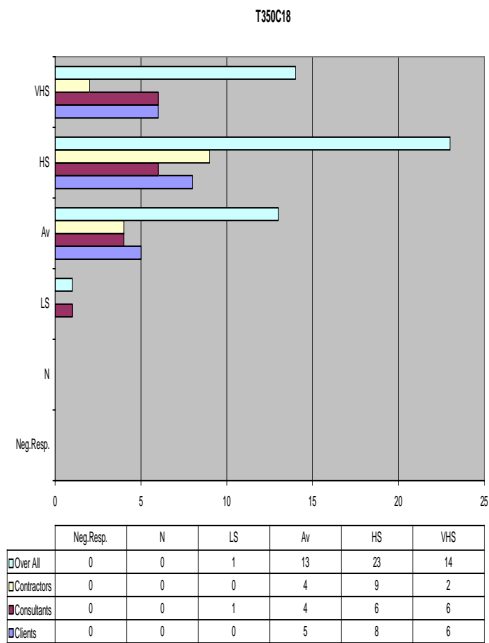


Figure 1053 T350C18

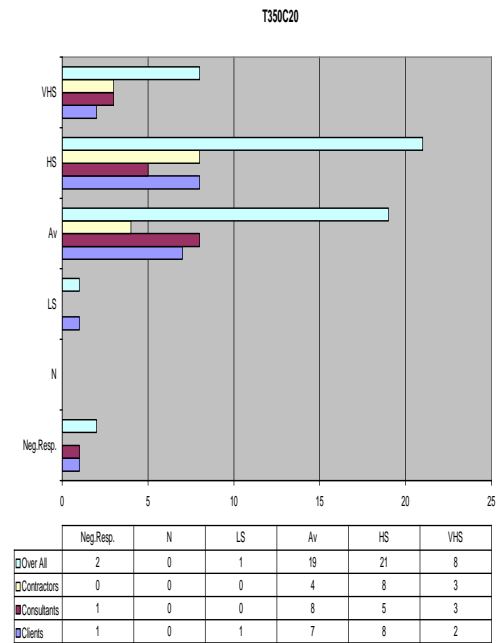


Figure 1055 T350C20

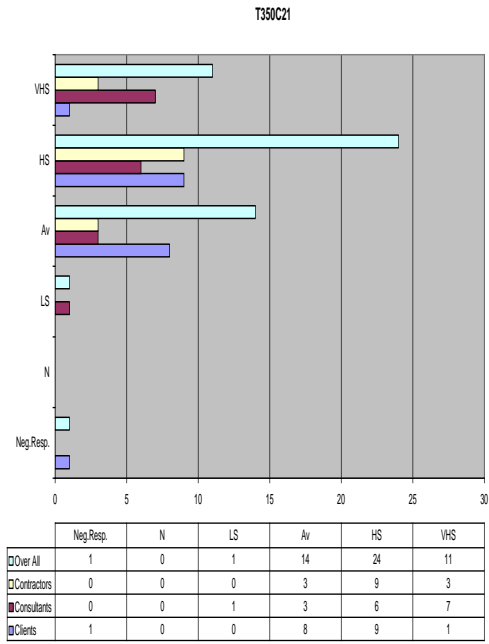


Figure 1056 T350C21

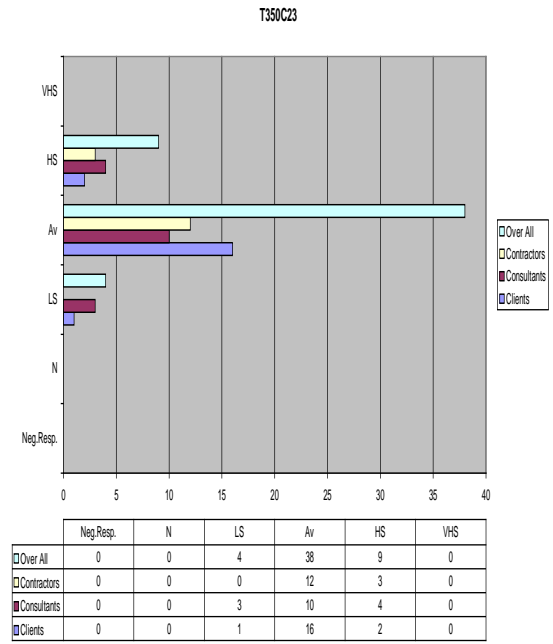


Figure 1058 T350C23

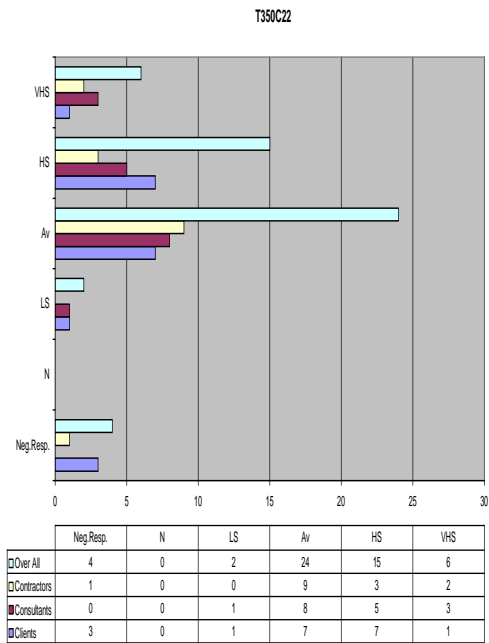


Figure 1057 T350C22

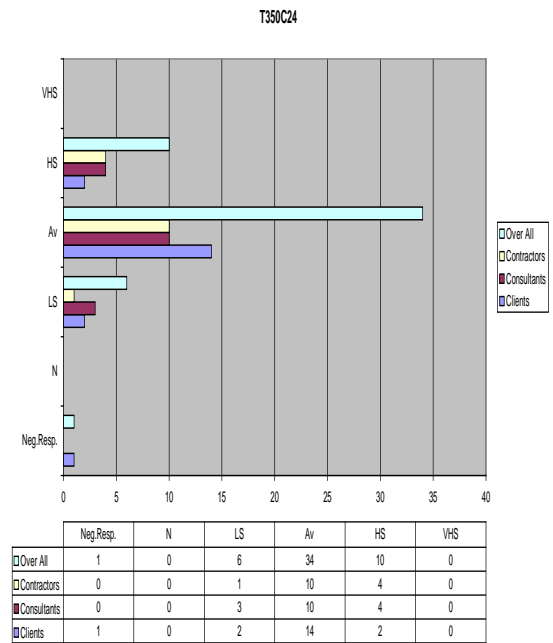


Figure 1059 T350C24

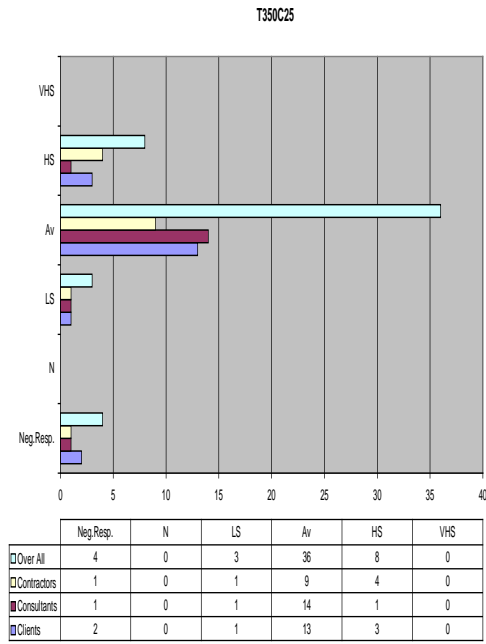


Figure 1060 T350C25

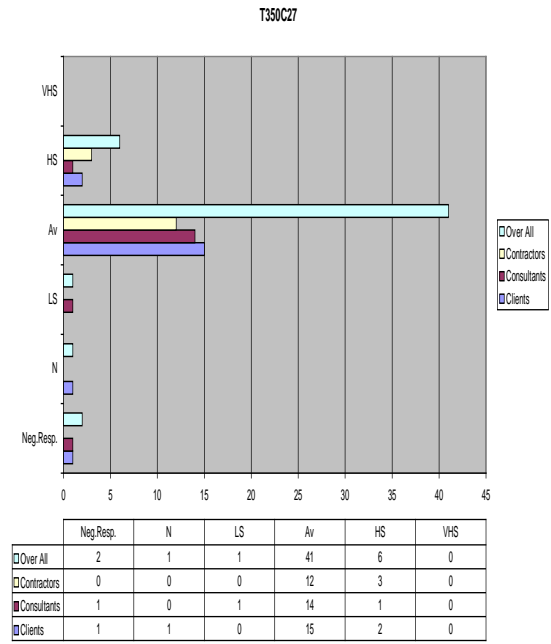


Figure 1062 T350C27

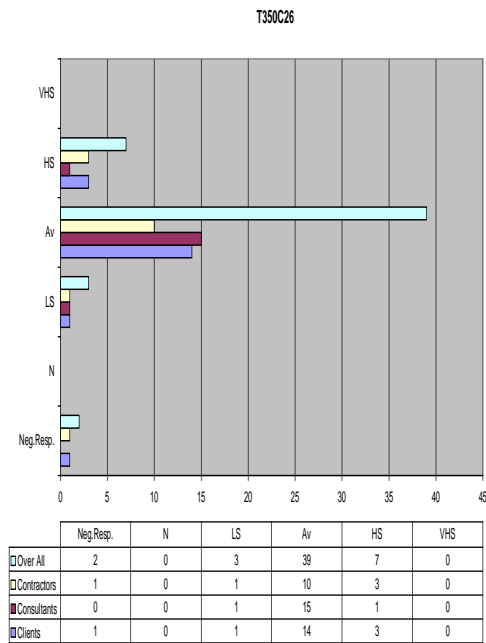


Figure 1061 T350C26

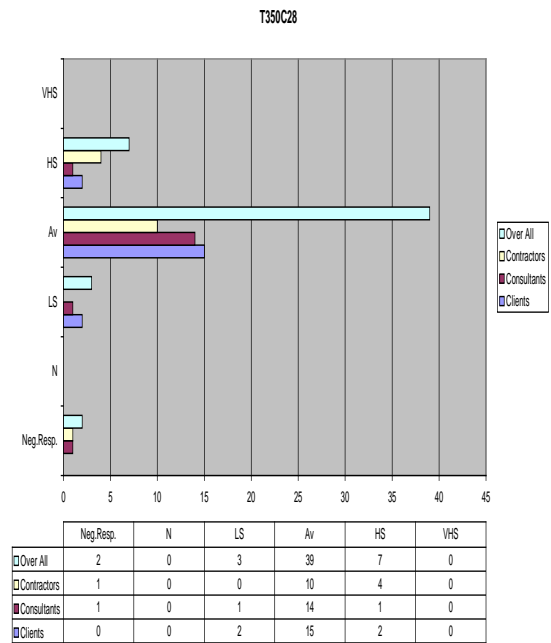


Figure 1063 T350C28

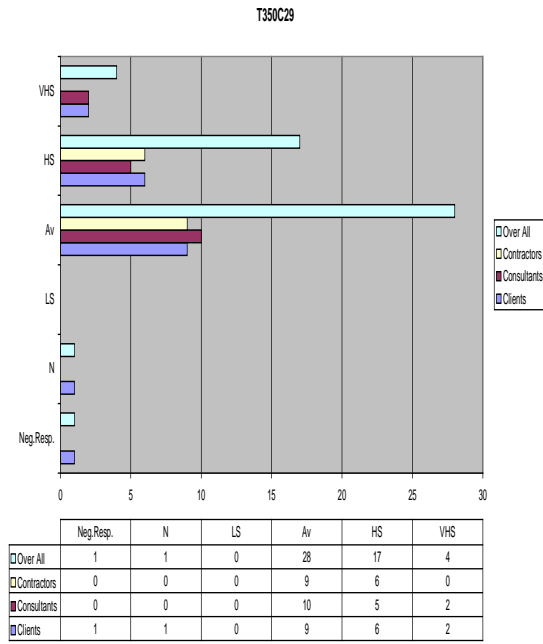


Figure 1064 T350C29

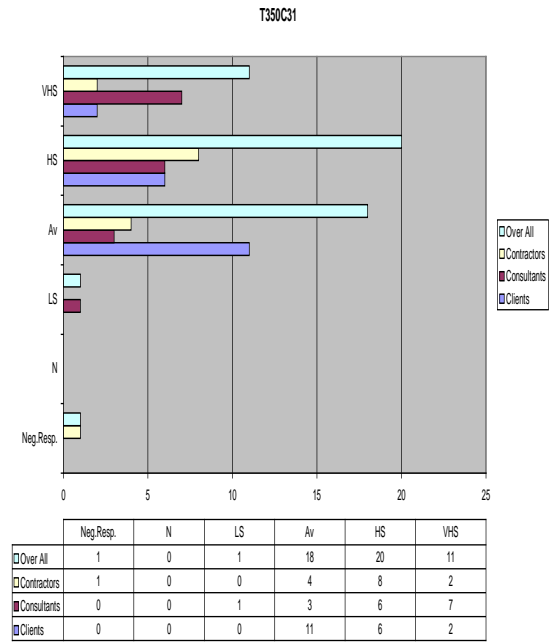


Figure 1066 T350C31

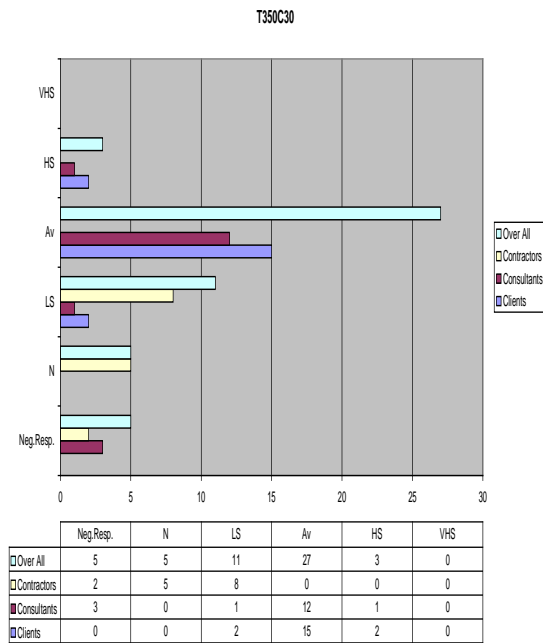


Figure 1065 T350C30

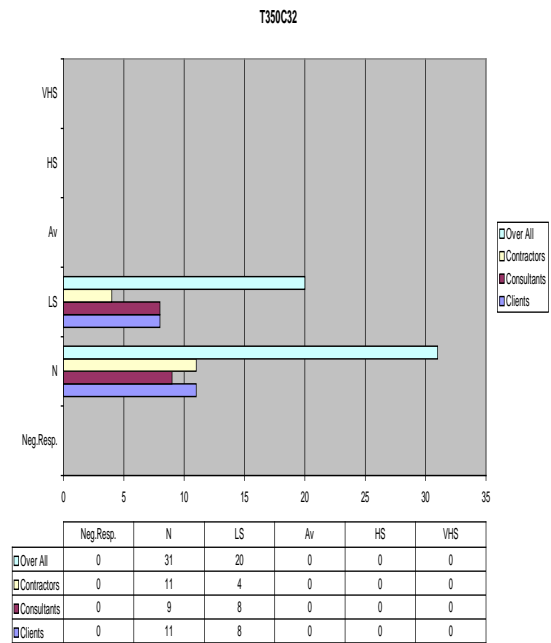


Figure 1067 T350C32

Y.3.2.36 CAUSE SIGNIFICANCE ASSESSMENT: (T36 C01) – (T36 C32)

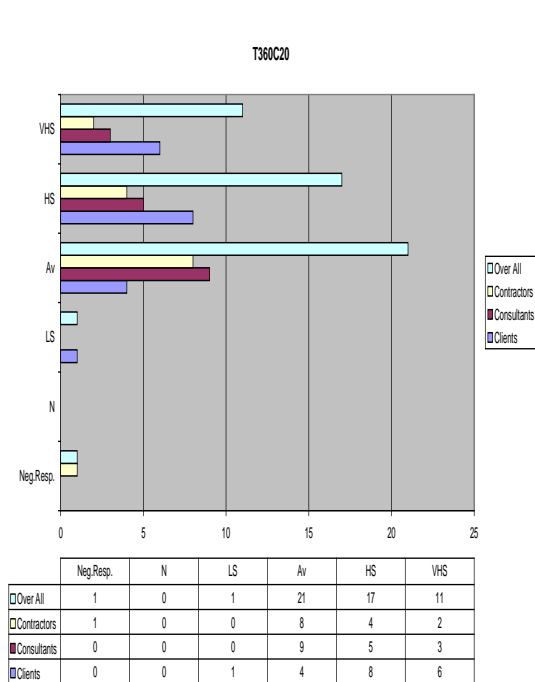


Figure 1068 T360C20

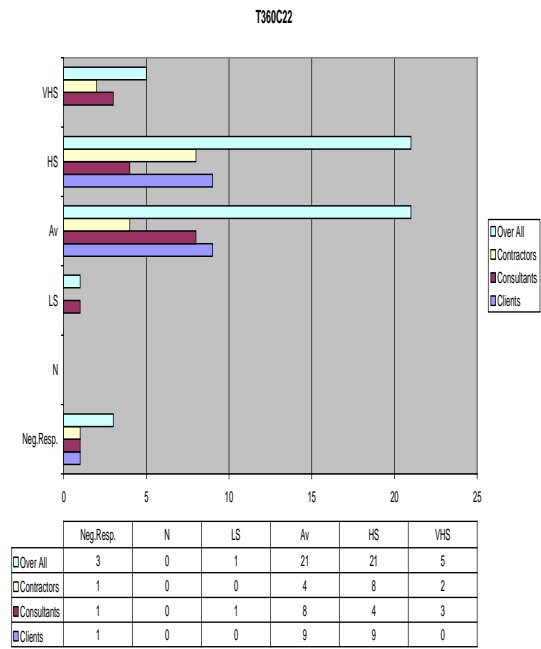


Figure 1070 T360C22

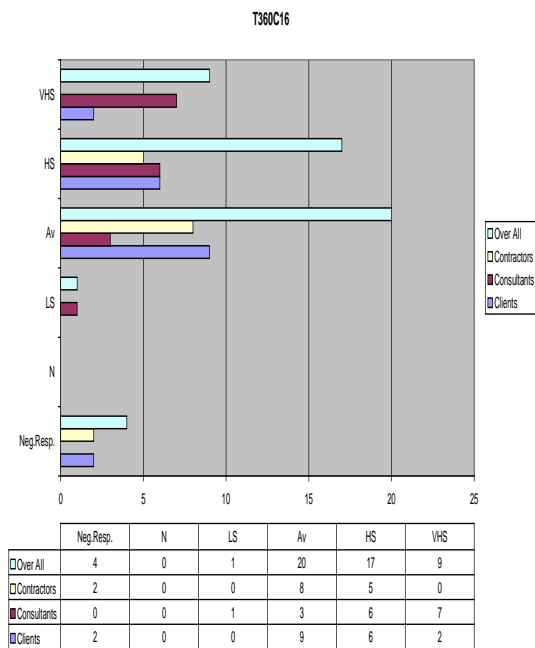


Figure 1069 T360C16

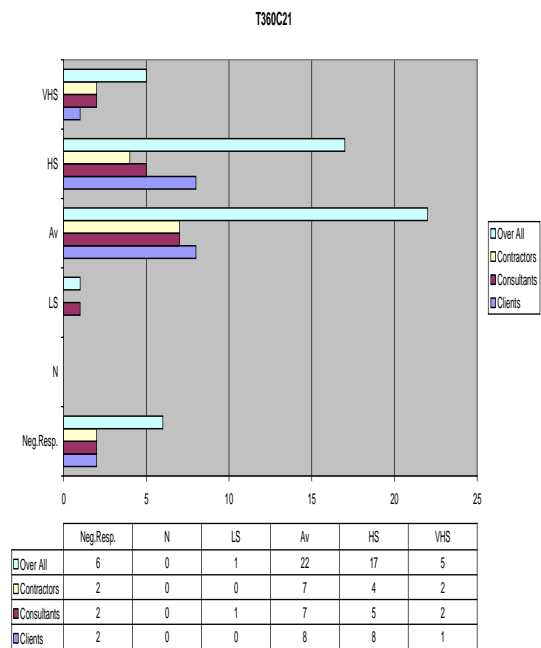


Figure 1071 T360C21

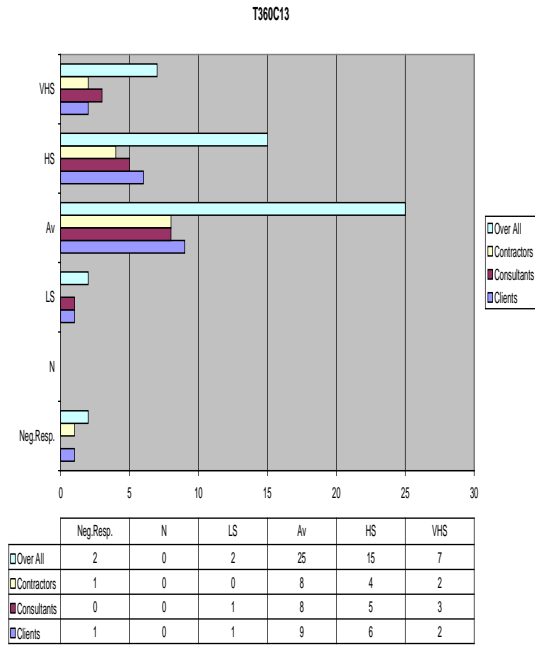


Figure 1072 T360C13

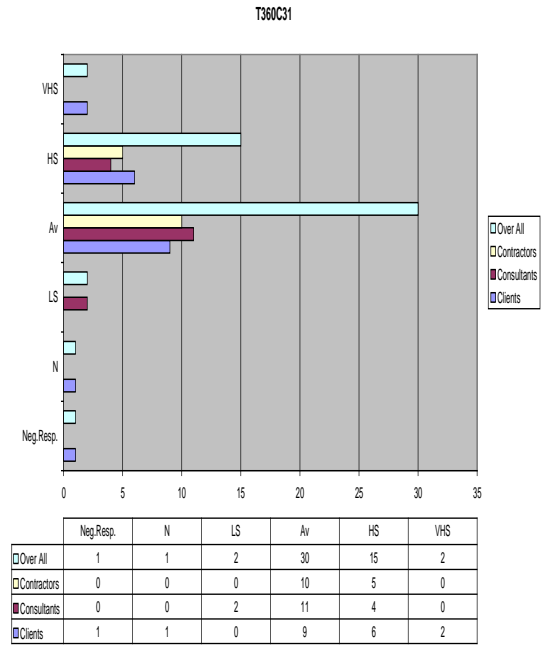


Figure 1074 T360C31

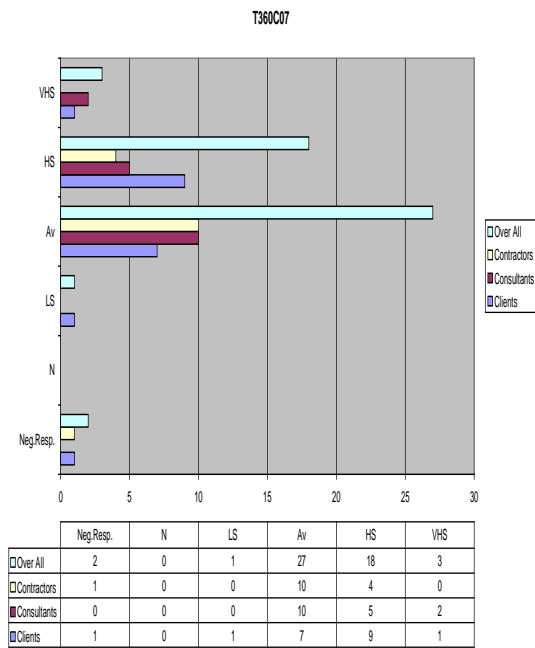


Figure 1073 T360C07

Y.3.2.37 CAUSE SIGNIFICANCE ASSESSMENT: (T37 C01) – (T37 C32)

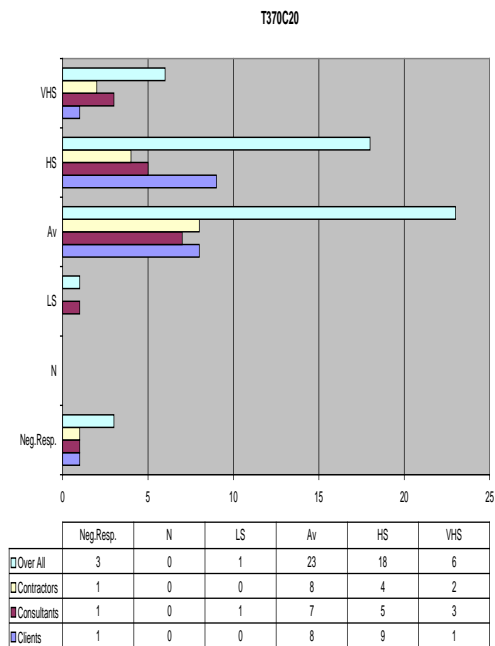


Figure 1075 T370C20

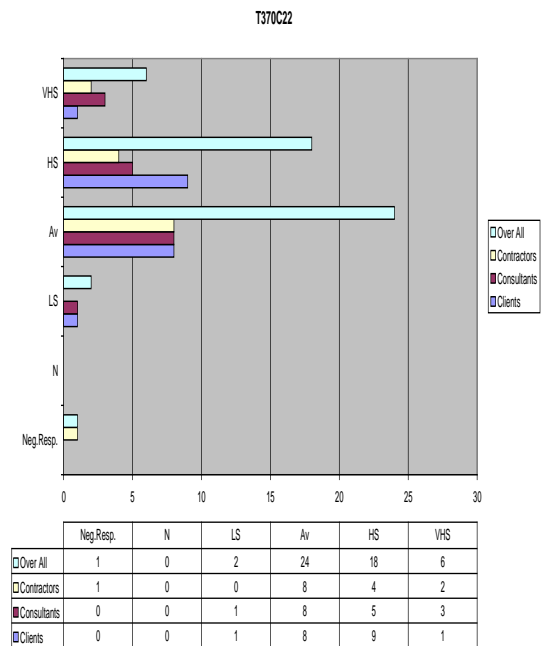


Figure 1077 T370C22

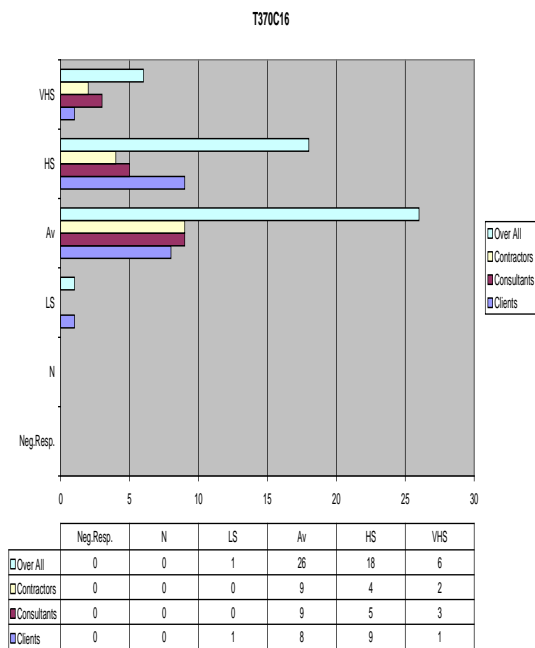


Figure 1076 T370C16

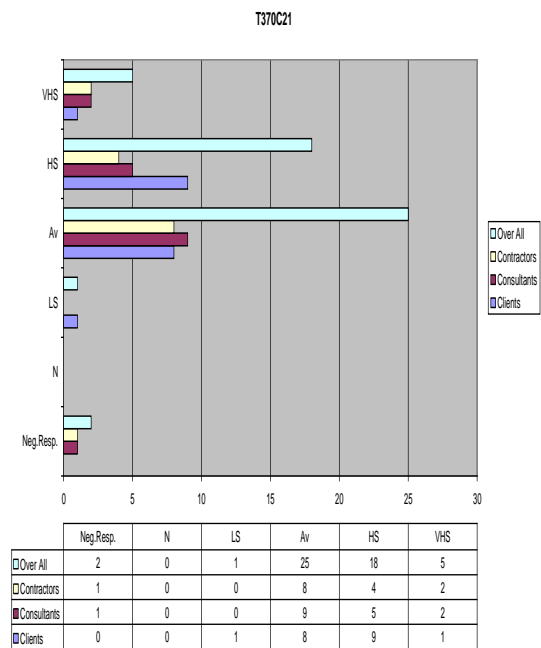


Figure 1078 T370C21

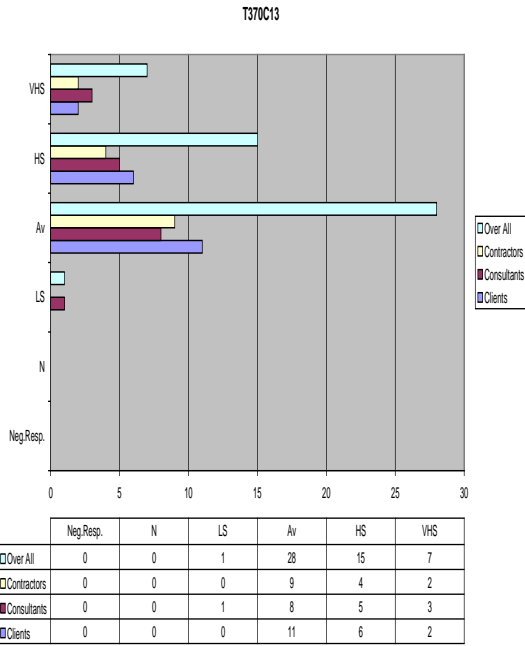


Figure 1079 T370C13

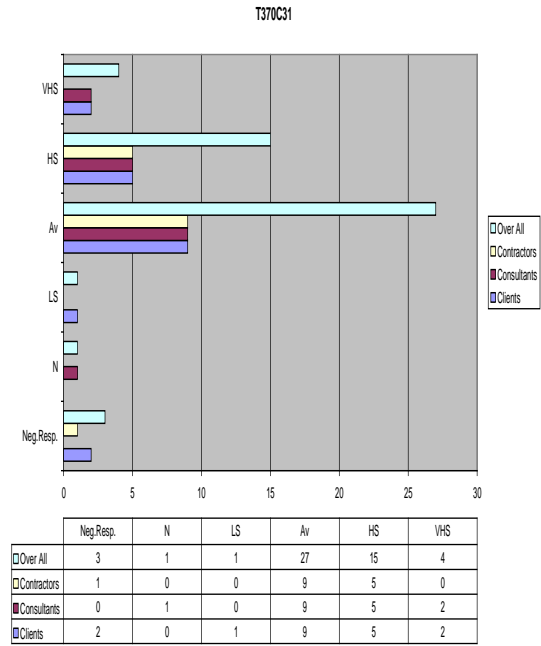


Figure 1081 T370C31

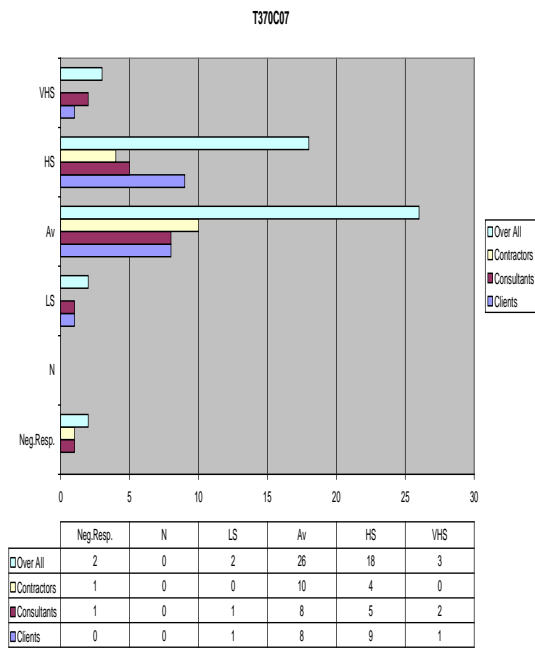


Figure 1080 T370C07

Y.3.2.38 CAUSE SIGNIFICANCE ASSESSMENT: (T38 C01) – (T38 C32)

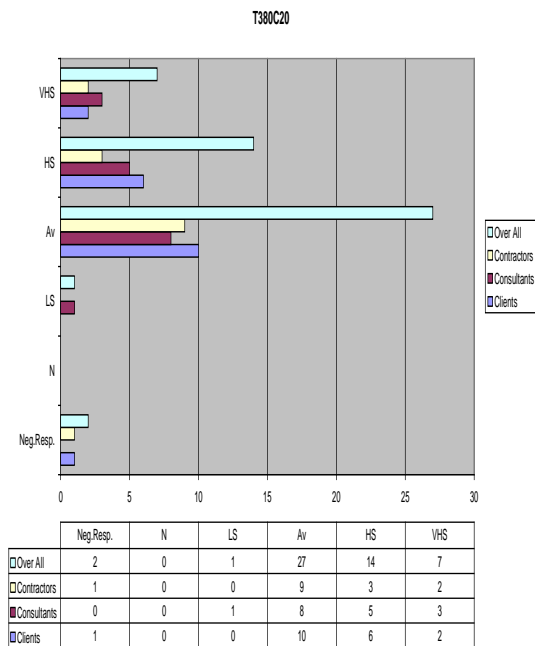


Figure 1082 T380C20

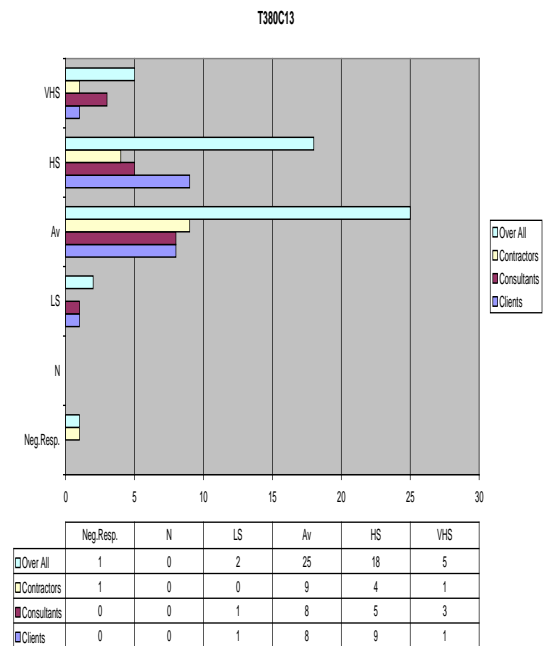


Figure 1084 T380C13

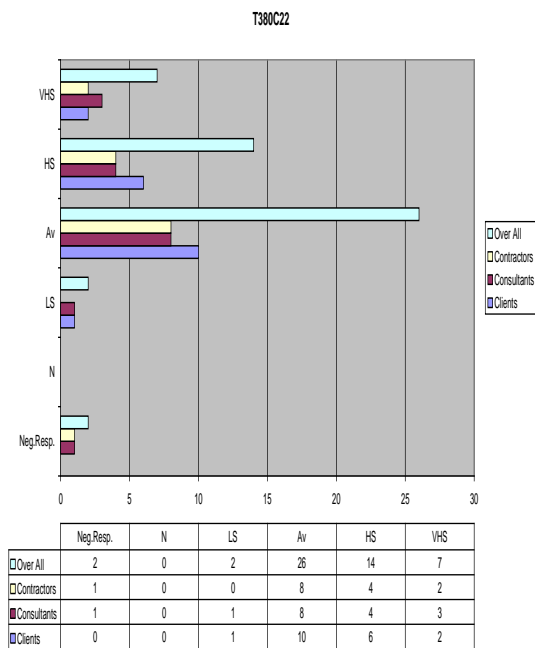


Figure 1083 T380C22

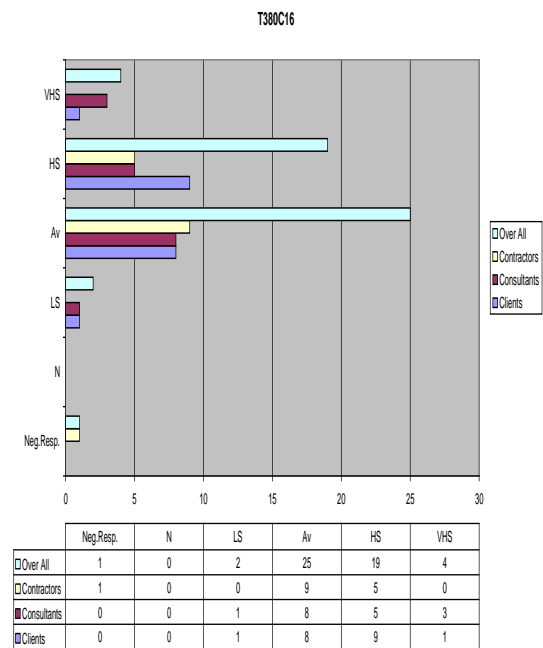


Figure 1085 T380C16

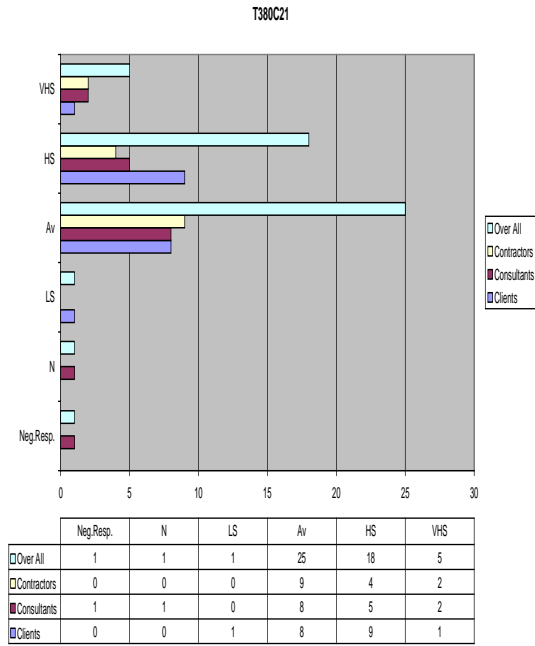


Figure 1086 T380C21

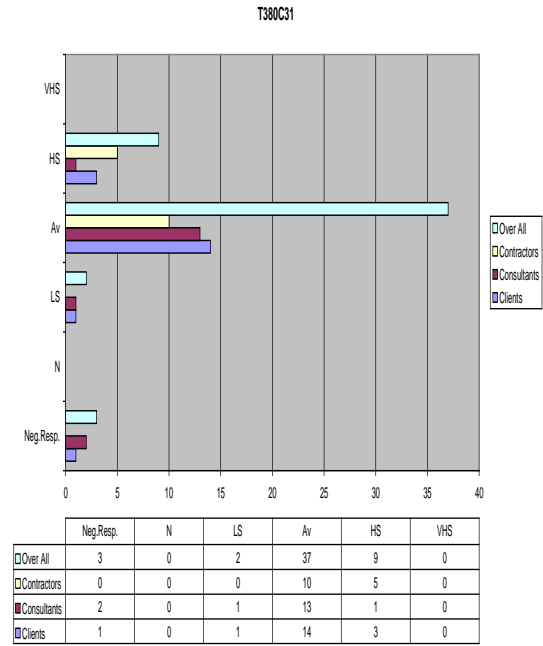


Figure 1088 T380C31

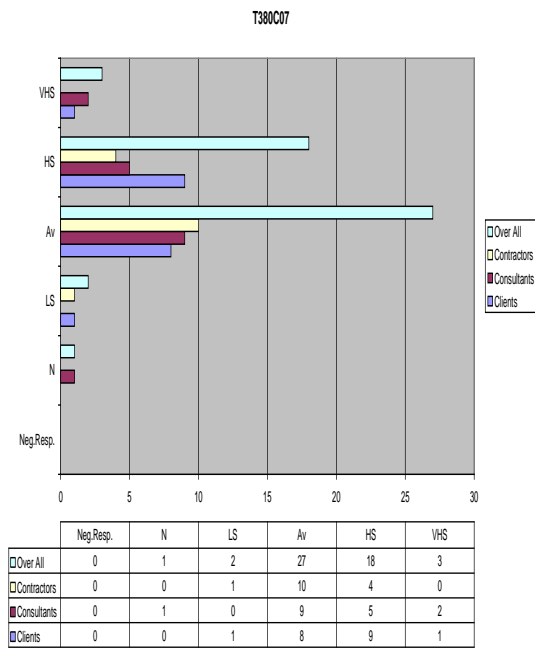


Figure 1087 T380C07

Y.3.2.39 CAUSE SIGNIFICANCE ASSESSMENT: (T39 C01) – (T39 C32)

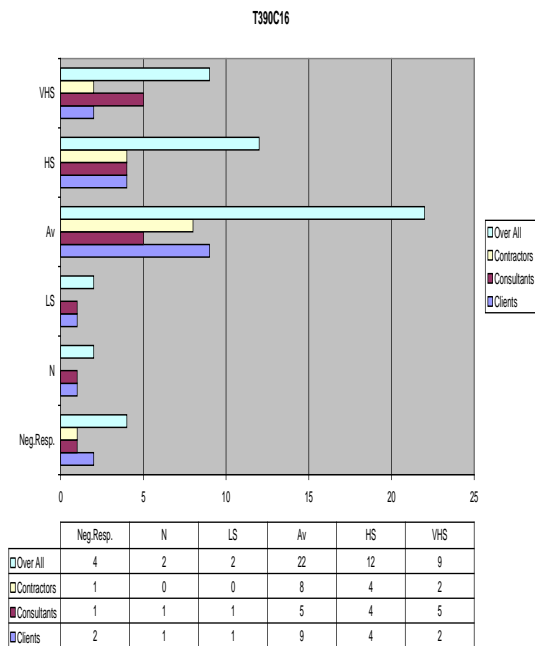


Figure 1089 T390C16

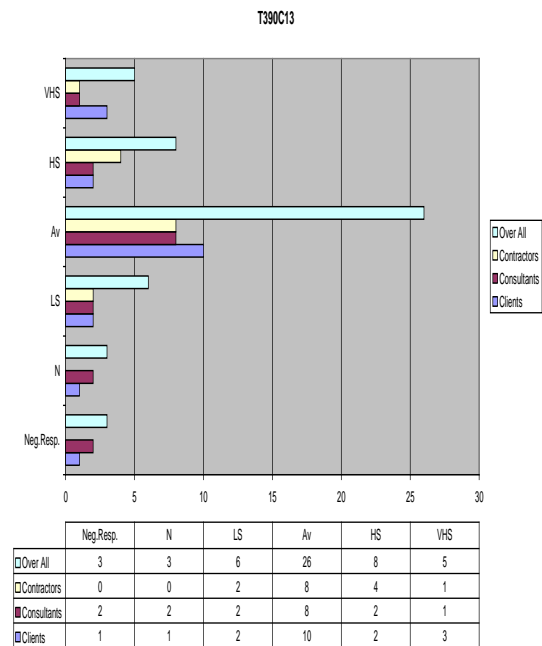


Figure 1091 T390C13

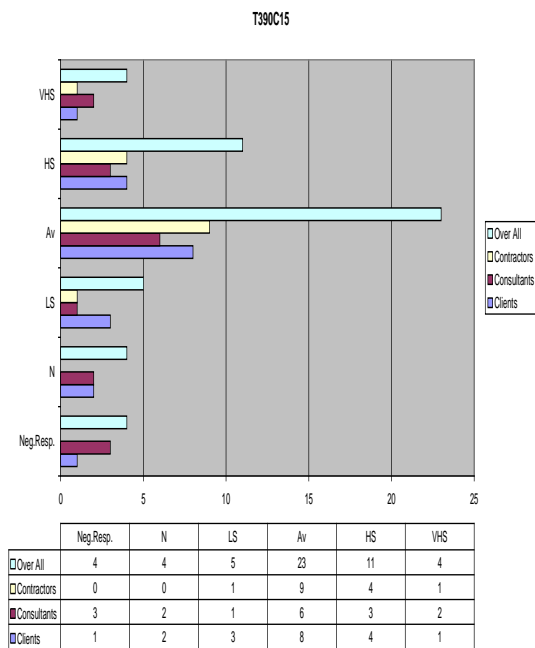


Figure 1090 T390C15

Y.3.2.40 CAUSE SIGNIFICANCE ASSESSMENT: (T40 C01) – (T40 C32)

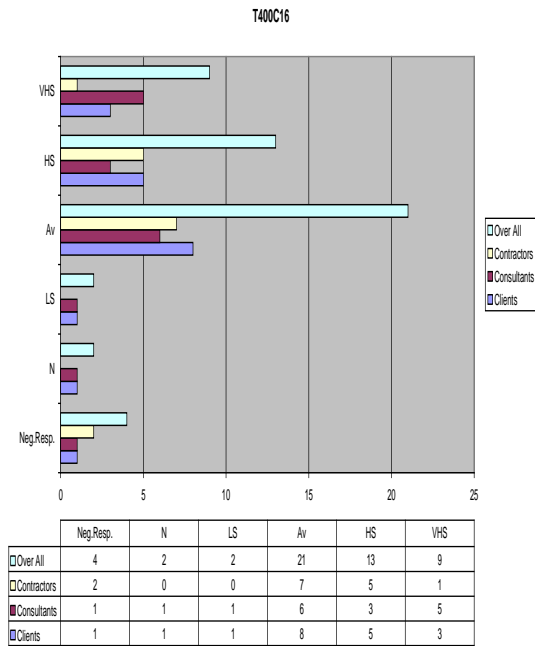


Figure 1092 T400C16

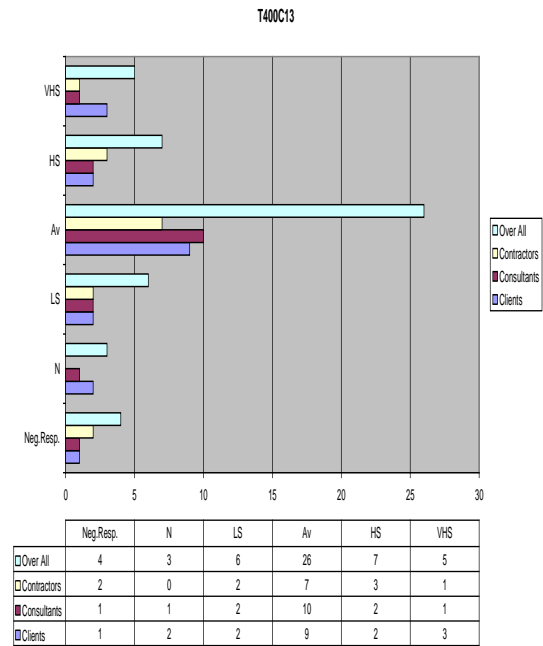


Figure 1094 T400C13

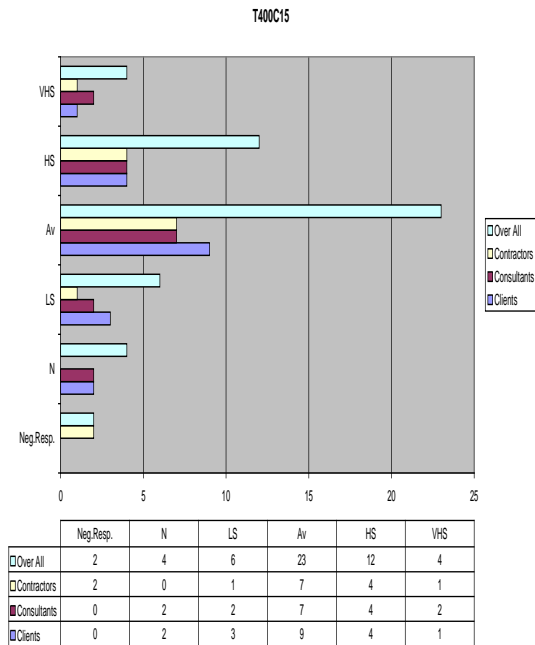


Figure 1093 T400C15

Y.3.2.41 CAUSE SIGNIFICANCE ASSESSMENT: (T41 C01) – (T41 C32)

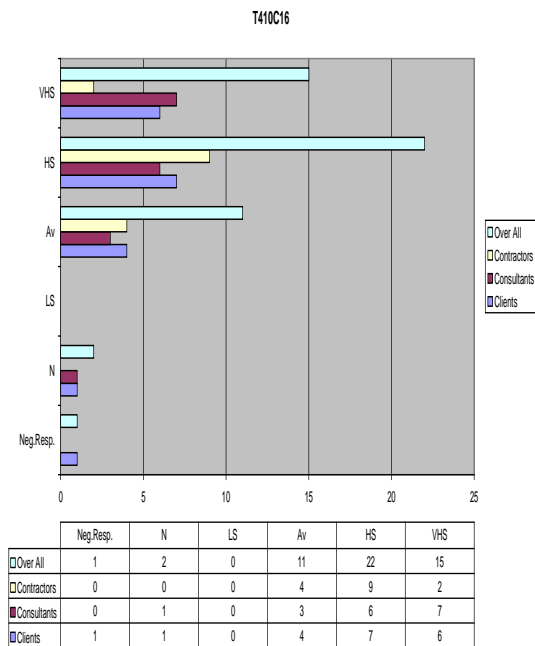


Figure 1095 T410C16

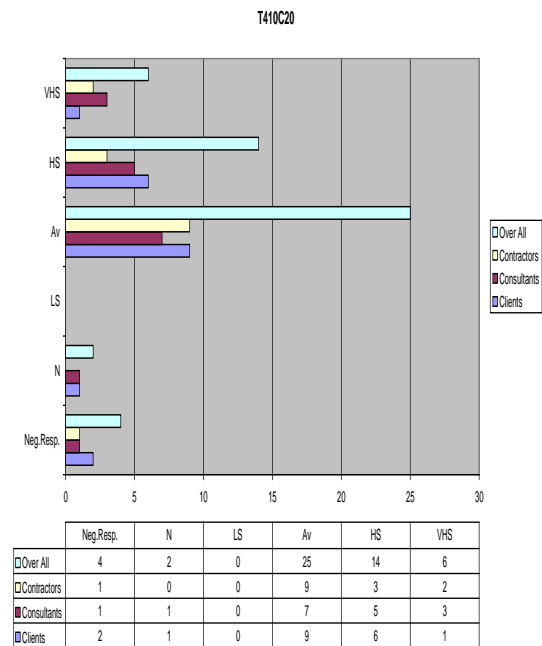


Figure 1097 T410C20

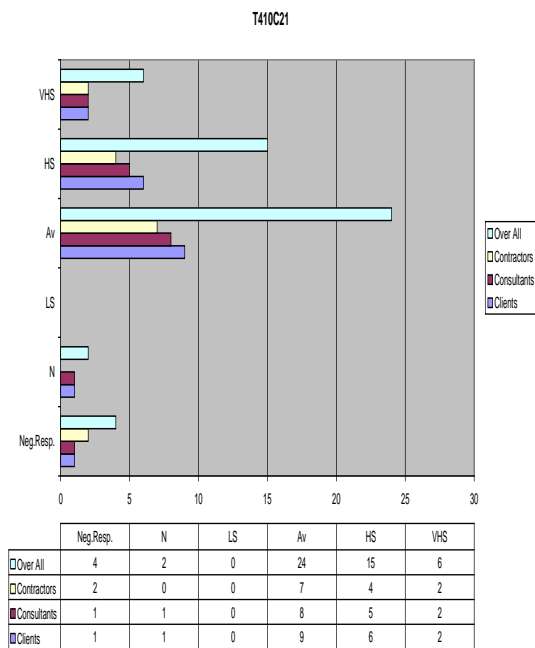


Figure 1096 T410C21

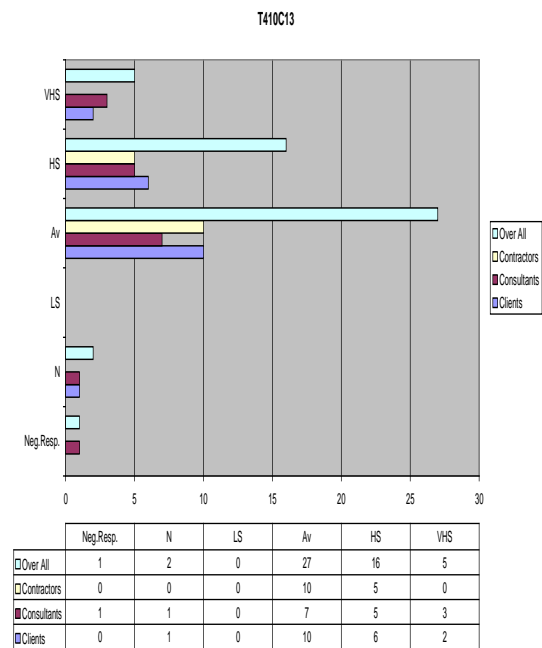


Figure 1098 T410C13

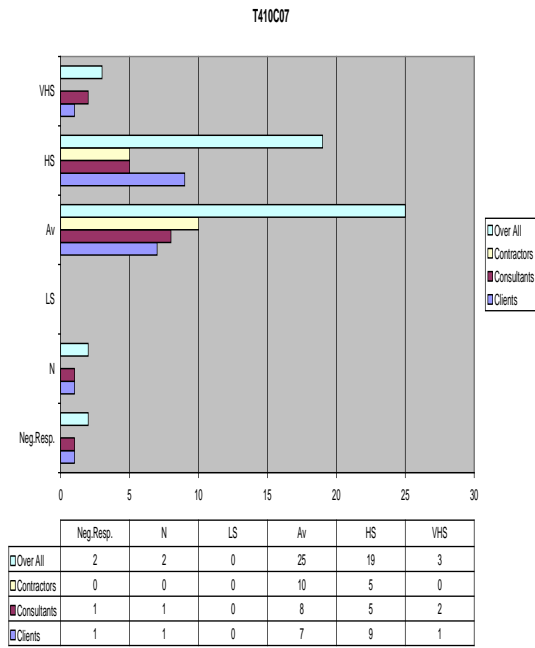


Figure 1099 T410C07

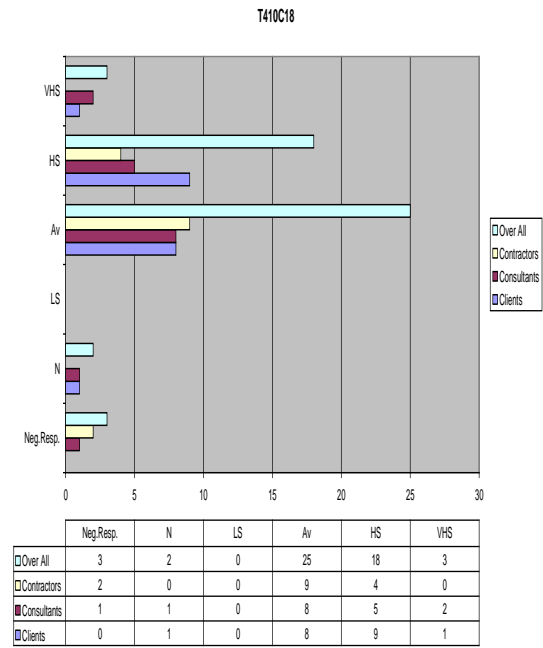


Figure 1101 T410C18

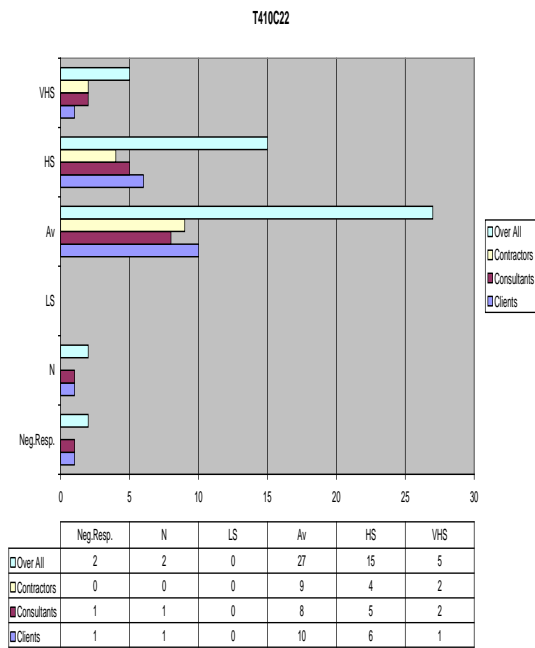


Figure 1100 T410C22

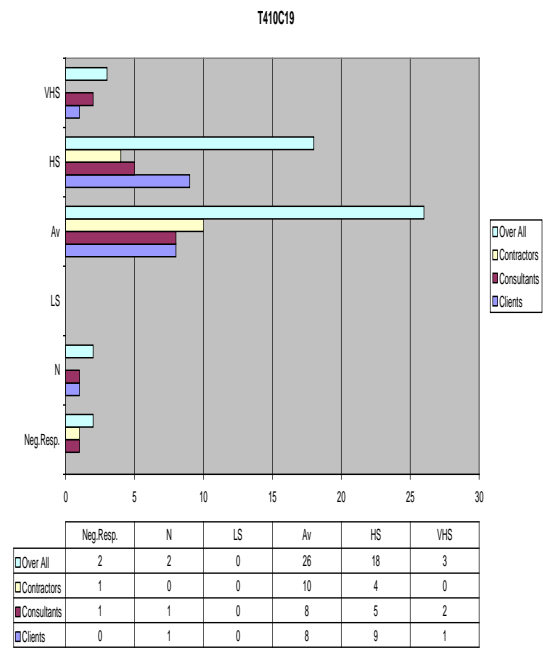


Figure 1102 T410C19

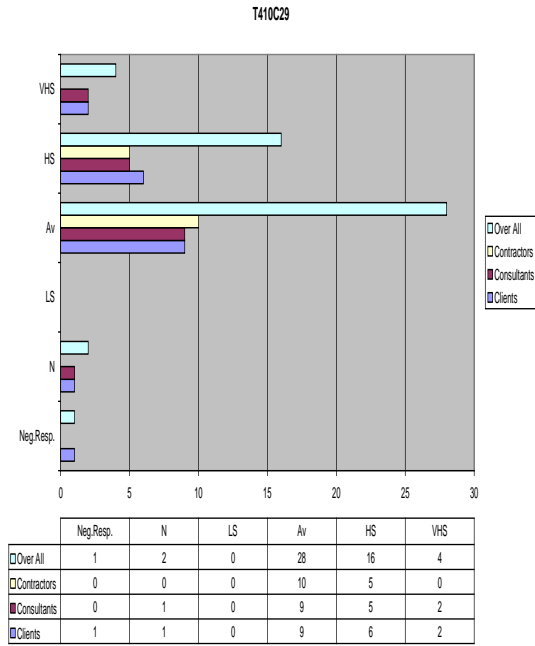


Figure 1103 T410C29

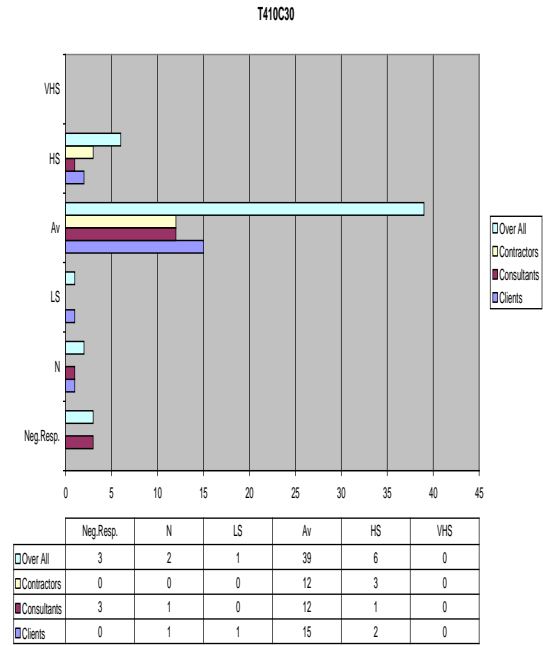


Figure 1105 T410C30

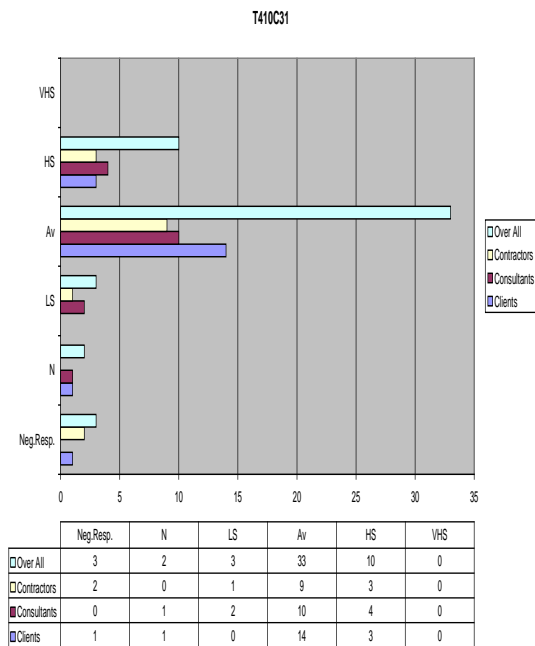


Figure 1104 T410C31

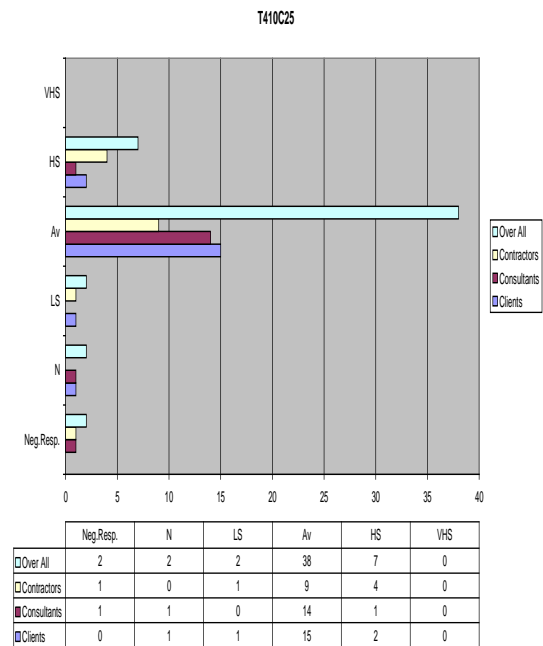


Figure 1106 T410C25

Y.3.2.42 CAUSE SIGNIFICANCE ASSESSMENT: (T42 C01) – (T42 C32)

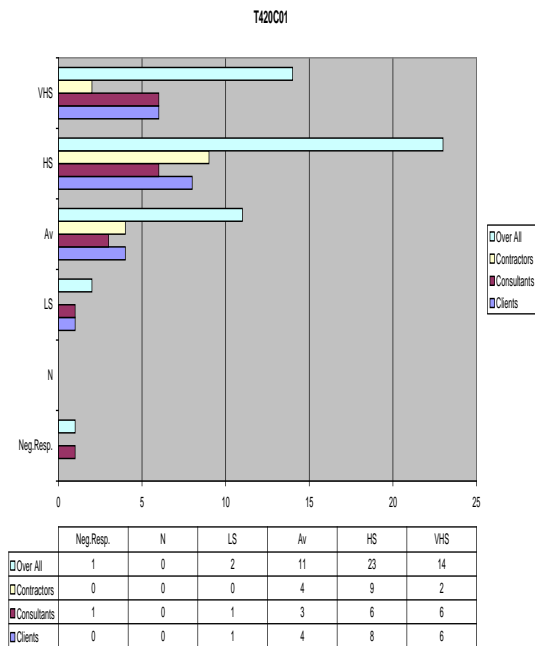


Figure 1107 T420C01

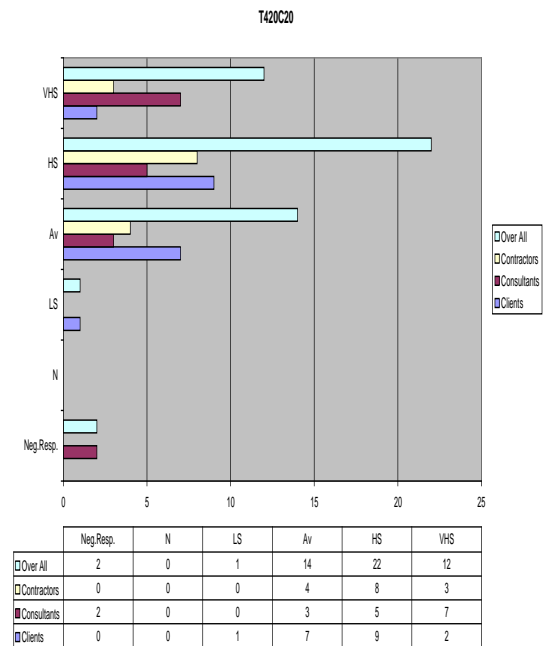


Figure 1109 T420C20

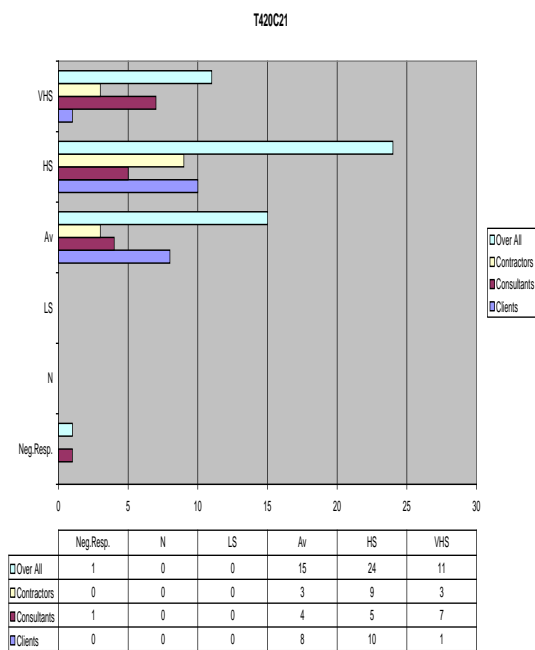


Figure 1108 T420C21

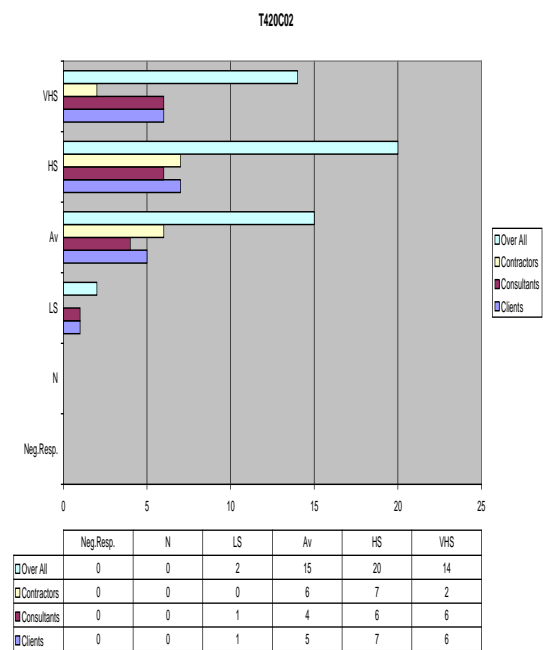


Figure 1110 T420C02

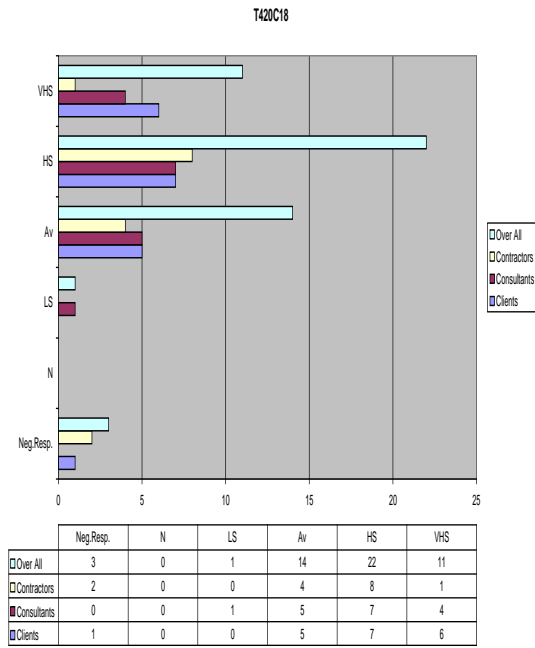


Figure 1111 T420C18

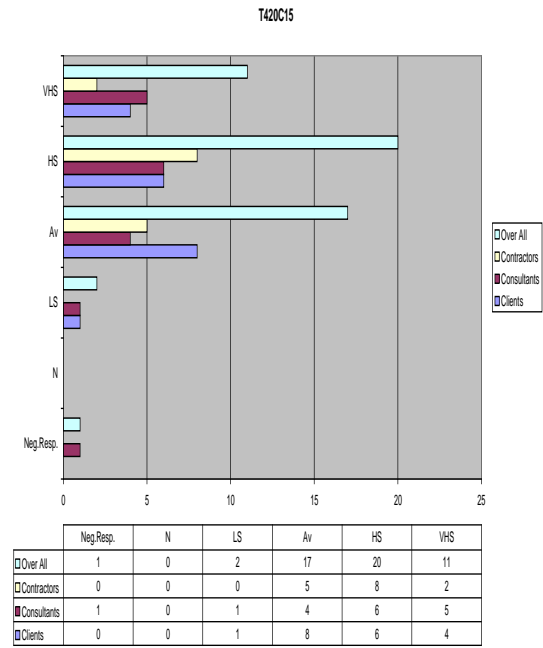


Figure 1113 T420C15

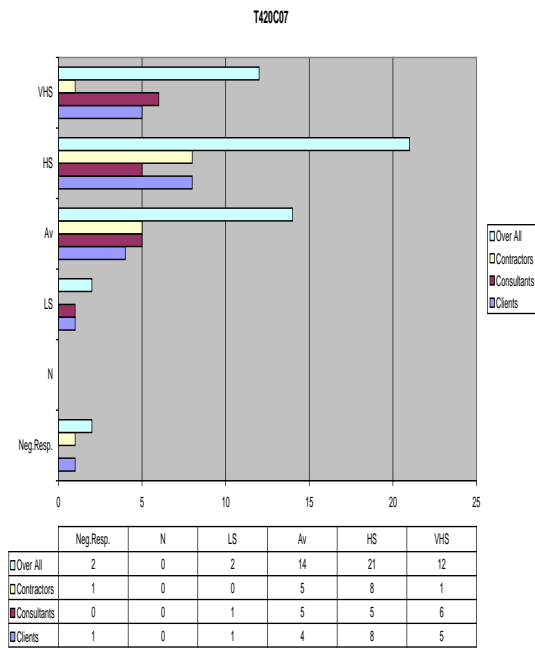


Figure 1112 T420C07

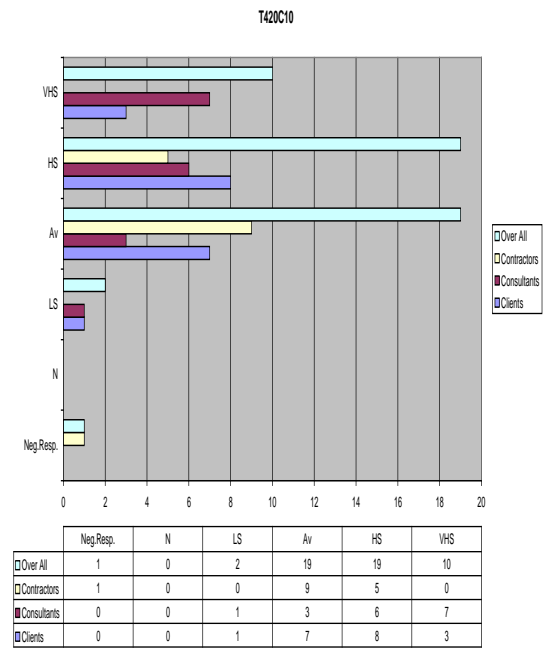


Figure 1114 T420C10

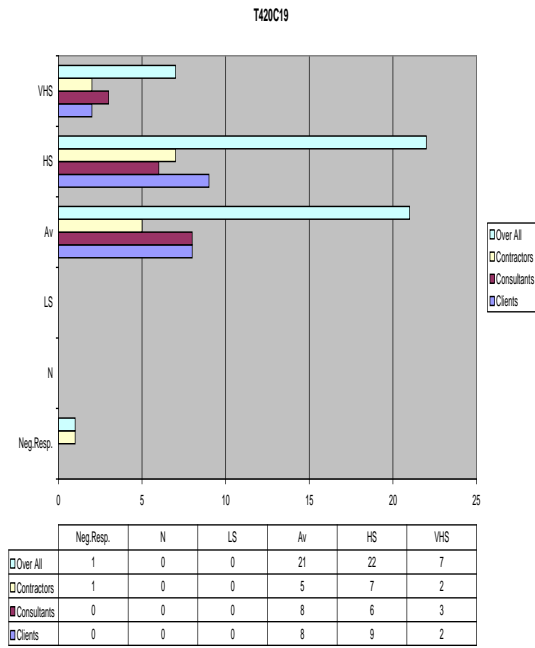


Figure 1115 T420C19

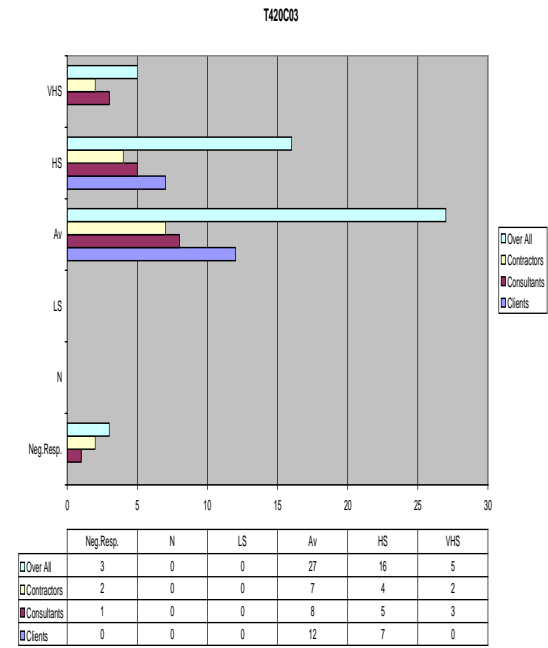


Figure 1117 T420C03

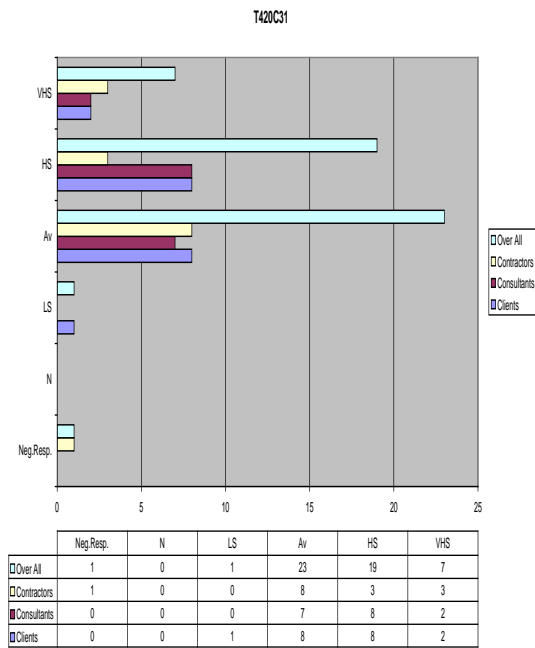


Figure 1116 T420C31

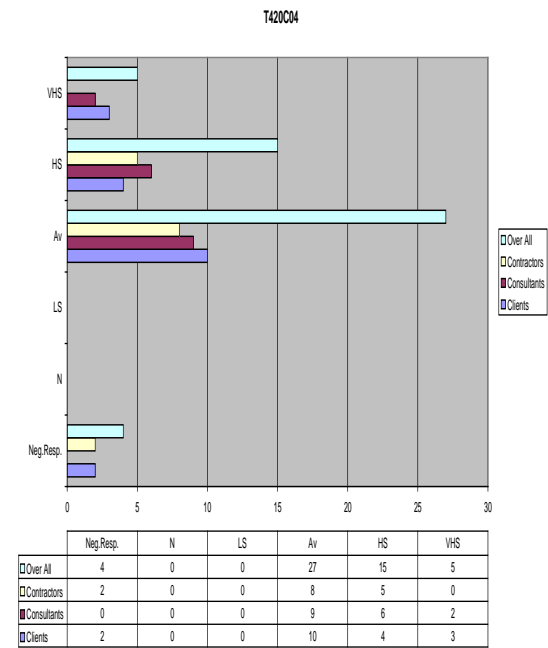


Figure 1118 T420C04

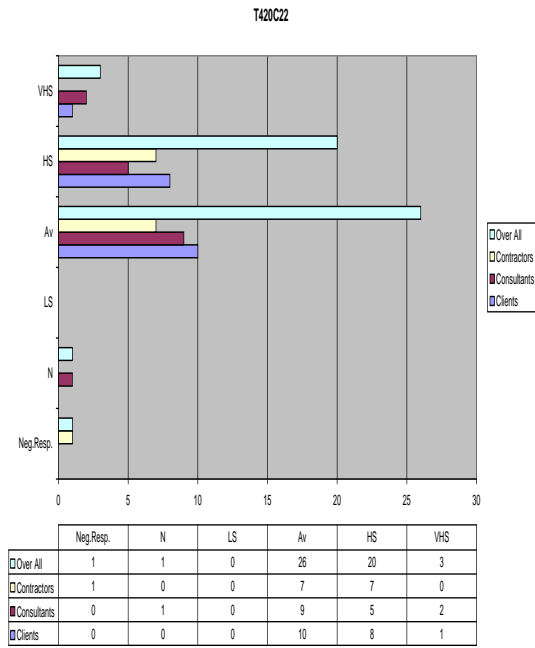


Figure 1119 T420C22

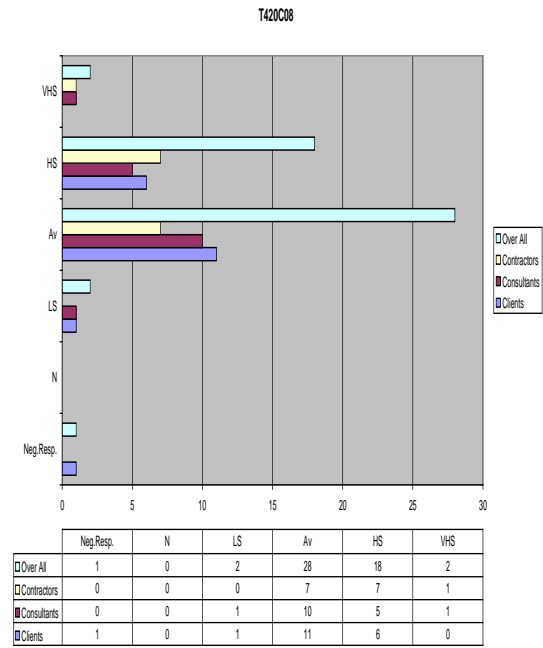


Figure 1121 T420C08

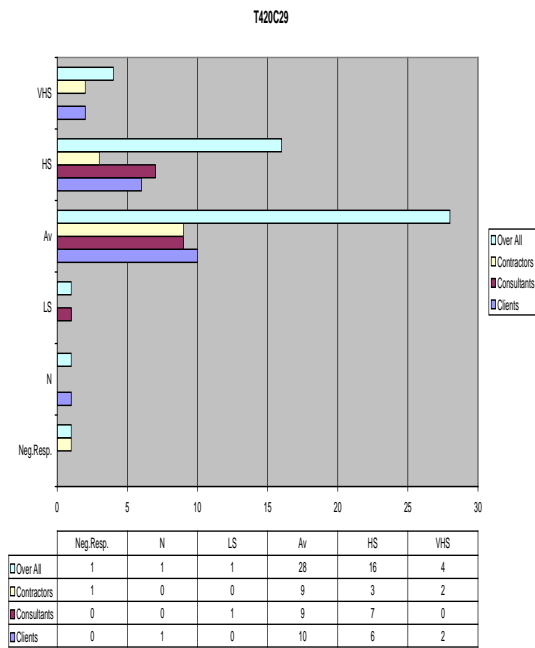


Figure 1120 T420C29

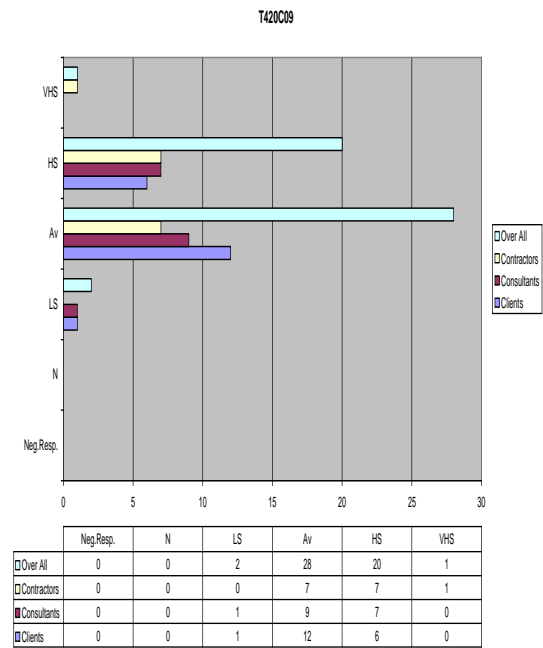


Figure 1122 T420C09

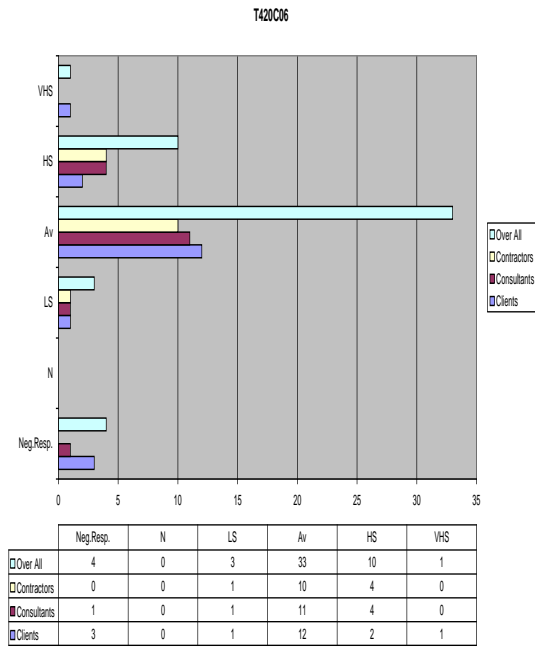


Figure 1123 T420C06

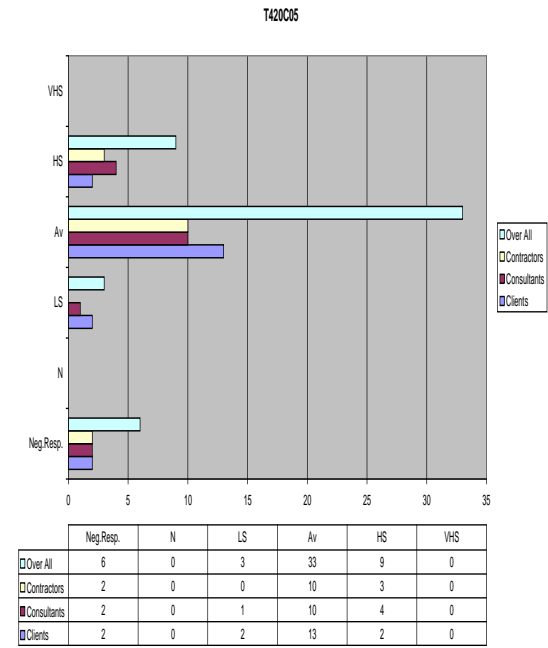


Figure 1125 T420C05

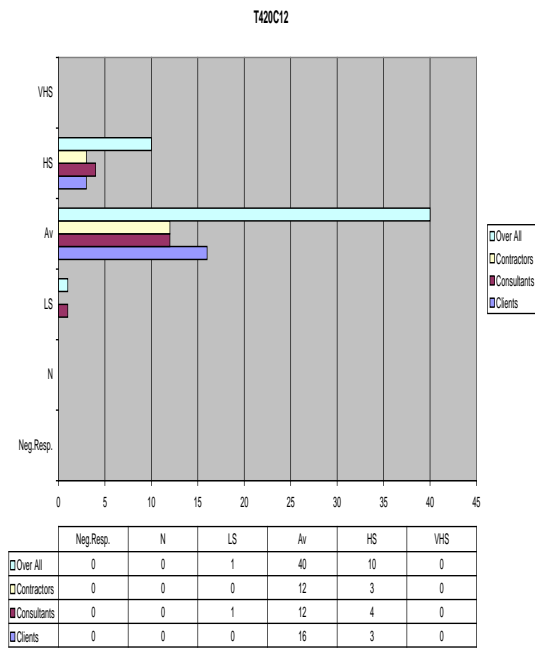


Figure 1124 T420C12

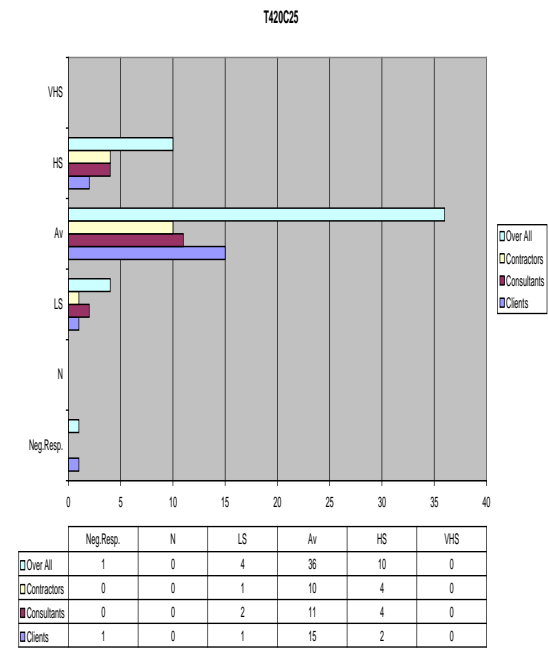


Figure 1126 T420C25

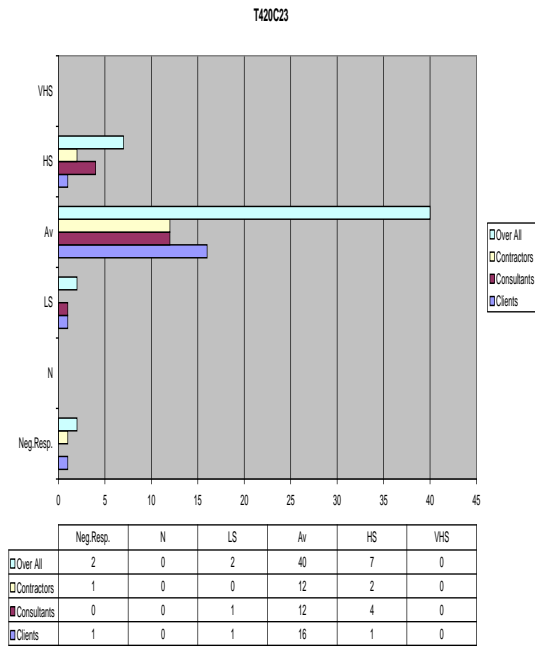


Figure 1127 T420C23

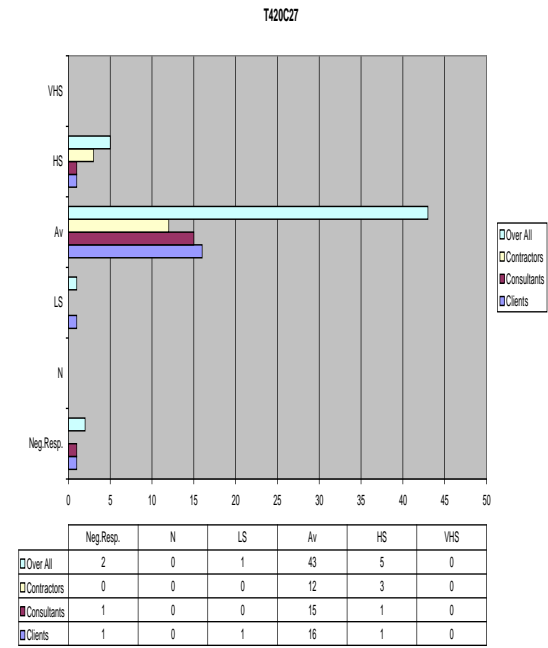


Figure 1129 T420C27

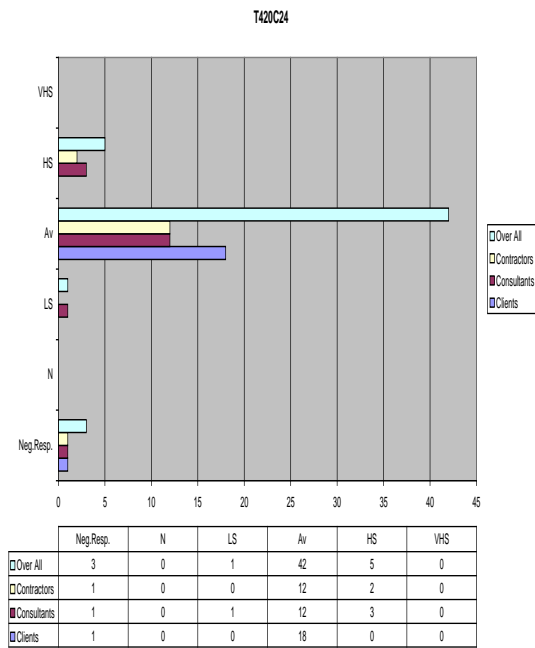


Figure 1128 T420C24

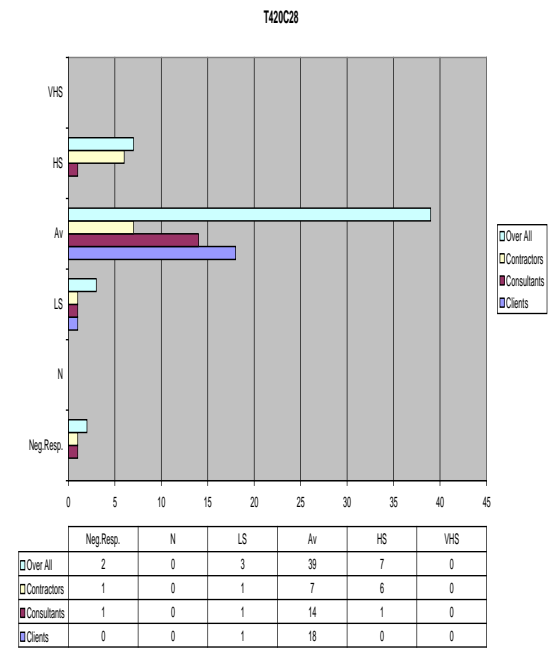


Figure 1130 T420C28

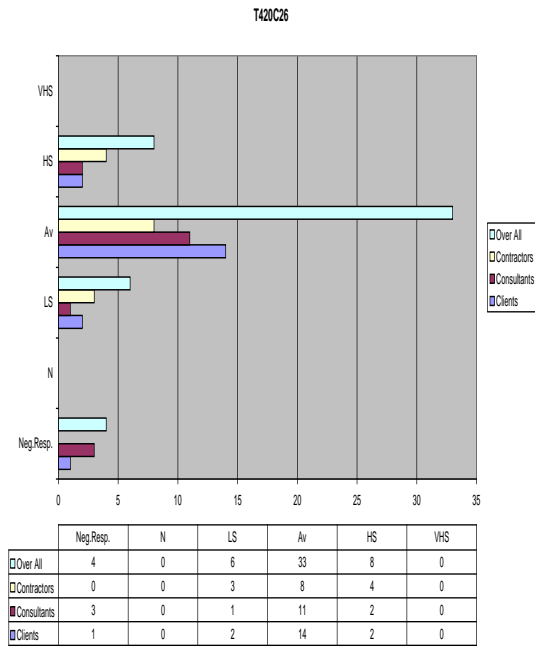


Figure 1131 T420C26

Y.3.2.43 CAUSE SIGNIFICANCE ASSESSMENT: (T43 C01) – (T43 C32)

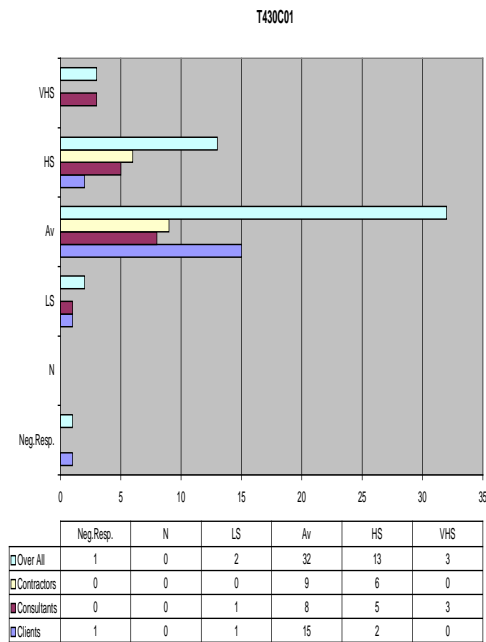


Figure 1132 T430C01

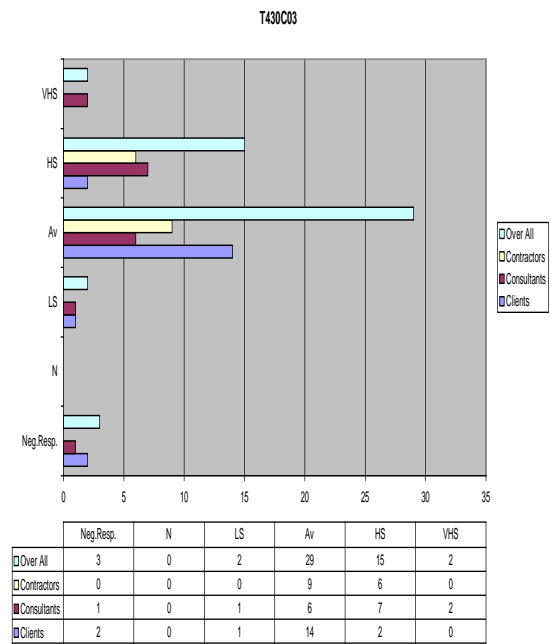


Figure 1134 T430C03

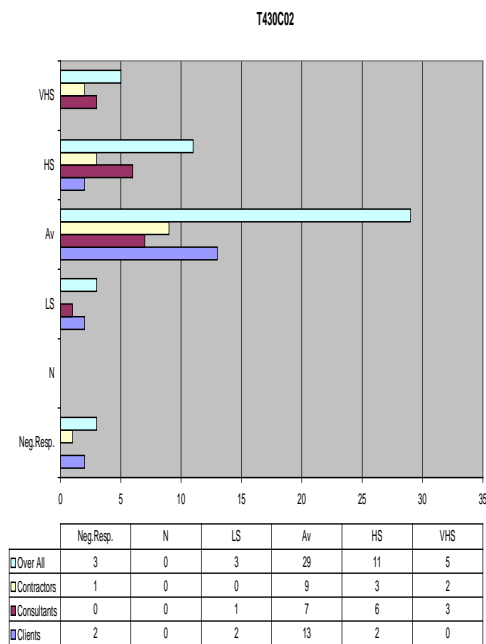


Figure 1133 T430C02

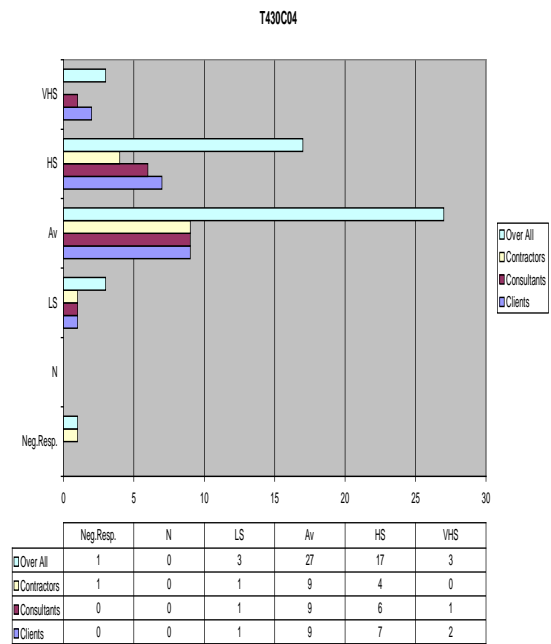


Figure 1135 T430C04

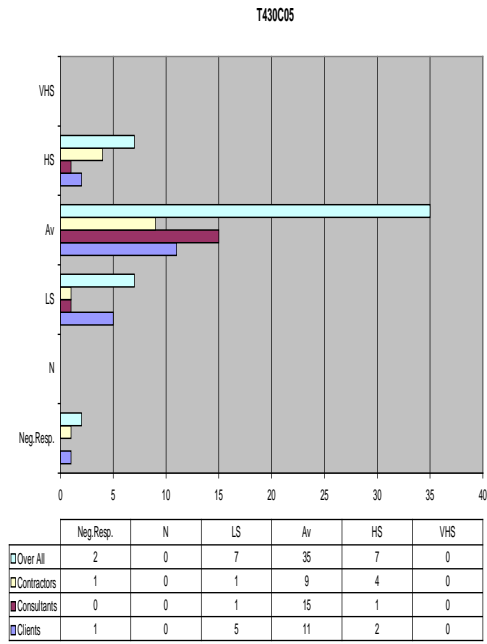


Figure 1136 T430C05

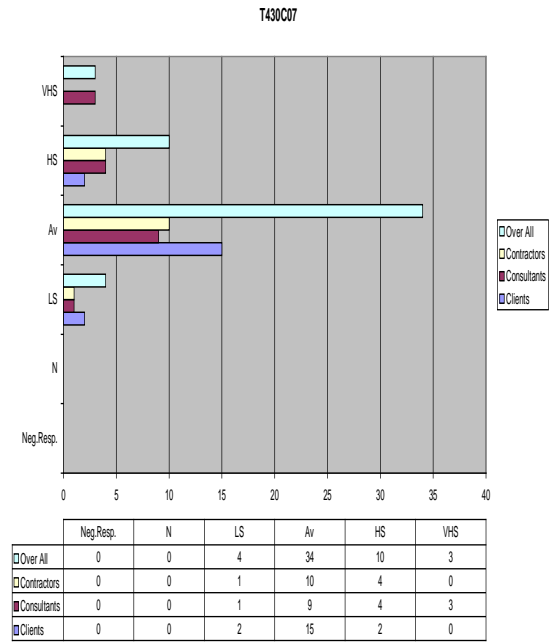


Figure 1138 T430C07

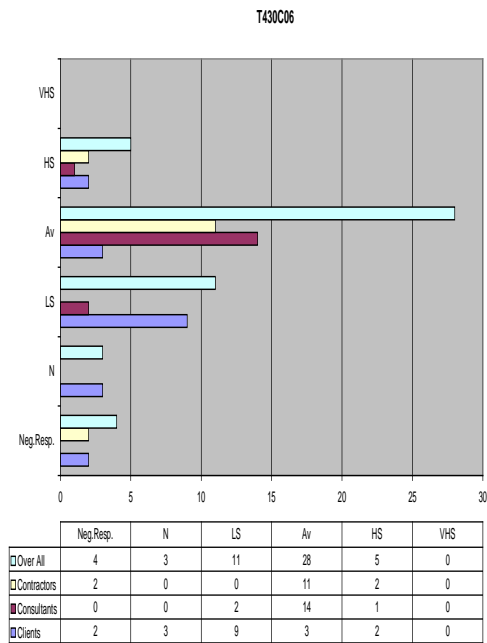


Figure 1137 T430C06

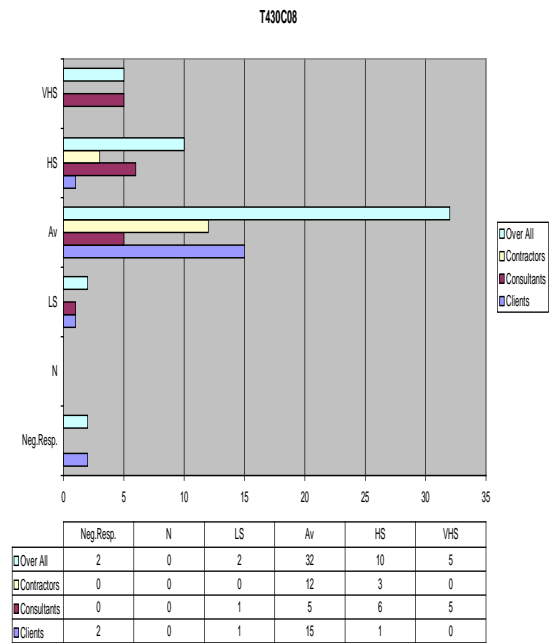


Figure 1139 T430C08

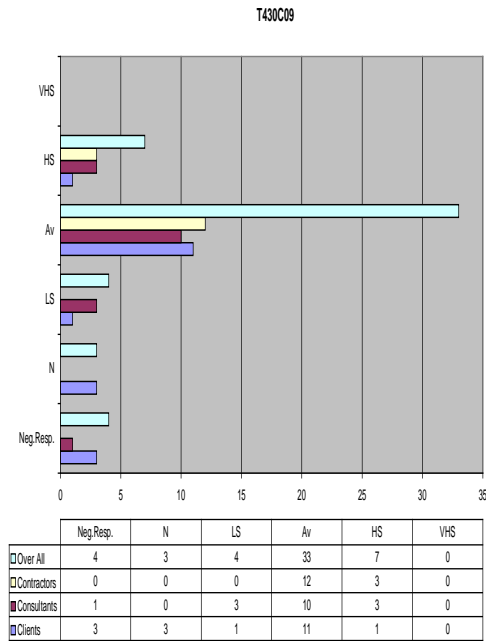


Figure 1140 T430C09

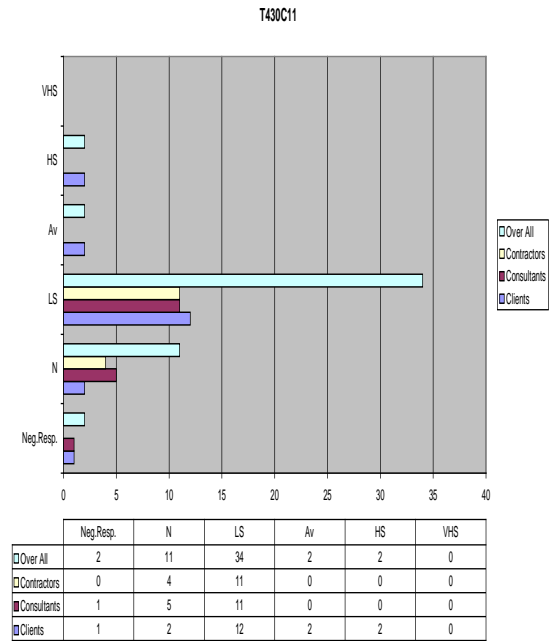


Figure 1142 T430C11

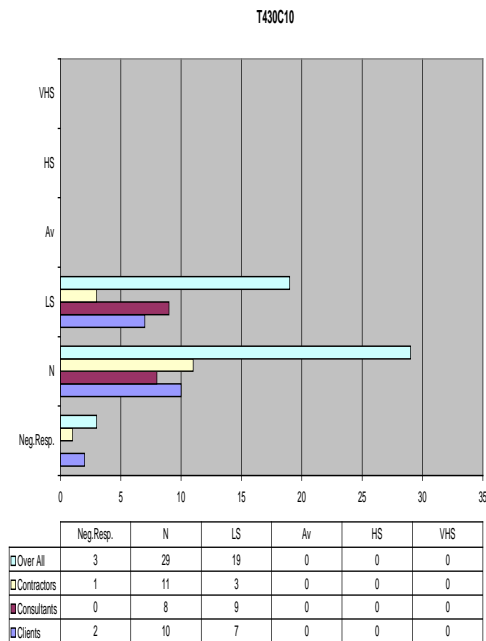


Figure 1141 T430C10

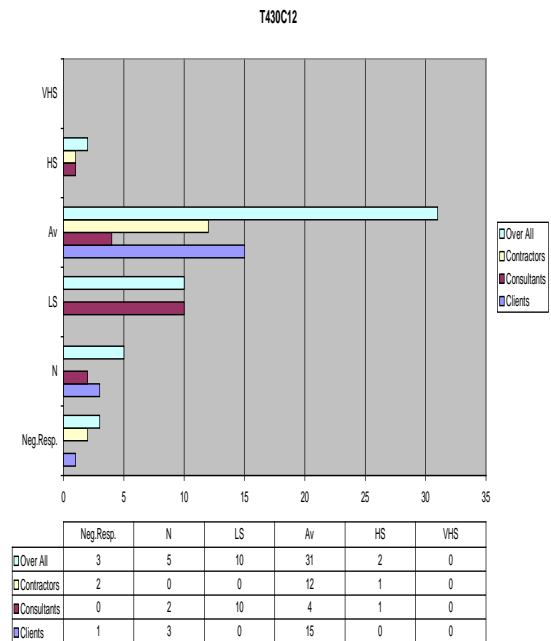


Figure 1143 T430C12

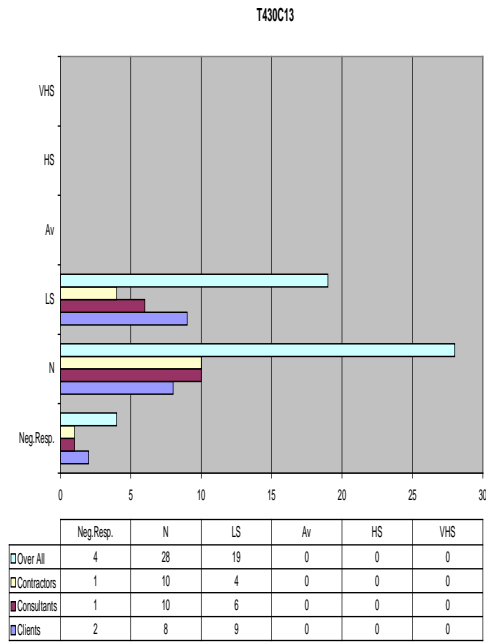


Figure 1144 T430C13

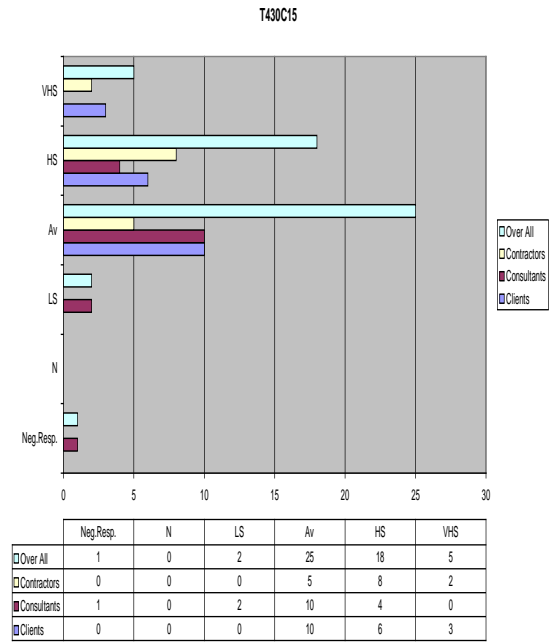


Figure 1146 T430C15

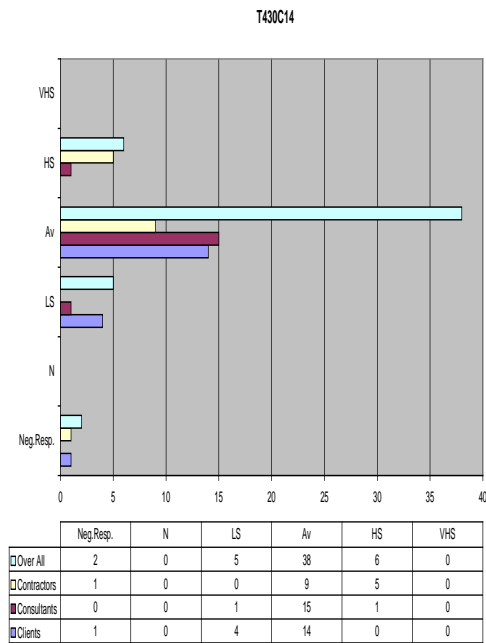


Figure 1145 T430C14

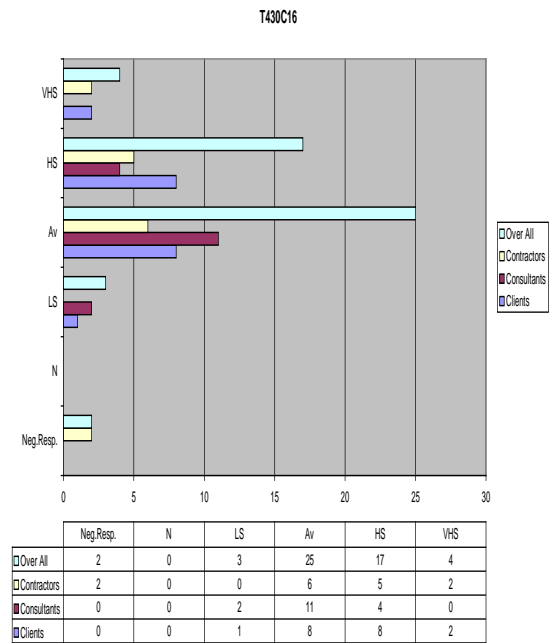


Figure 1147 T430C16

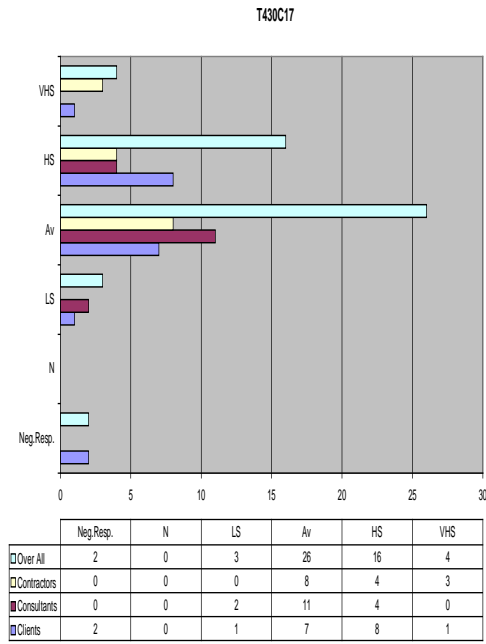


Figure 1148 T430C17

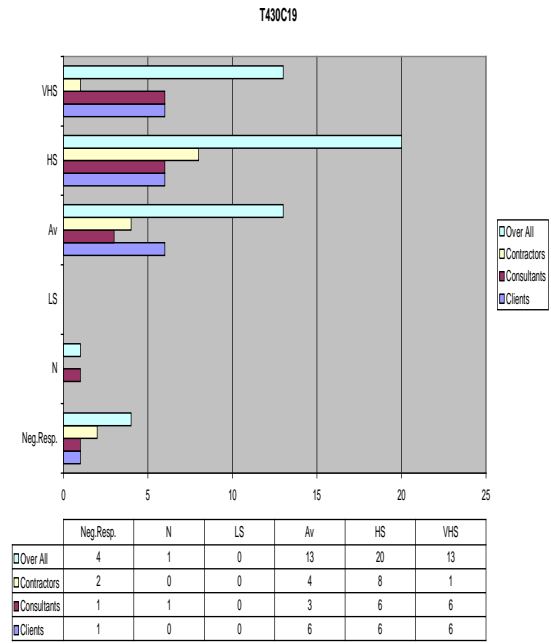


Figure 1150 T430C19

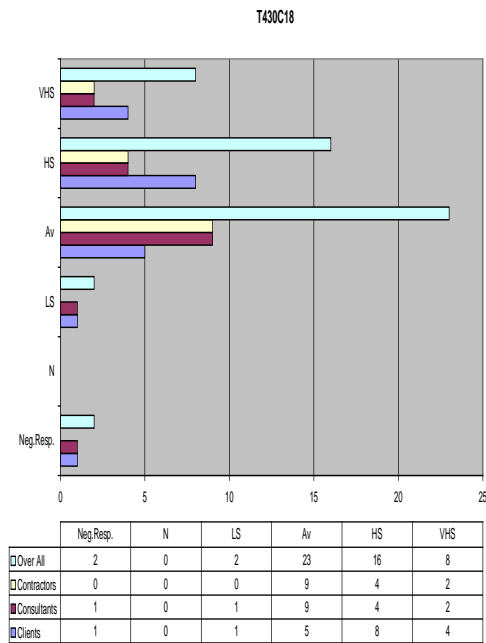


Figure 1149 T430C18

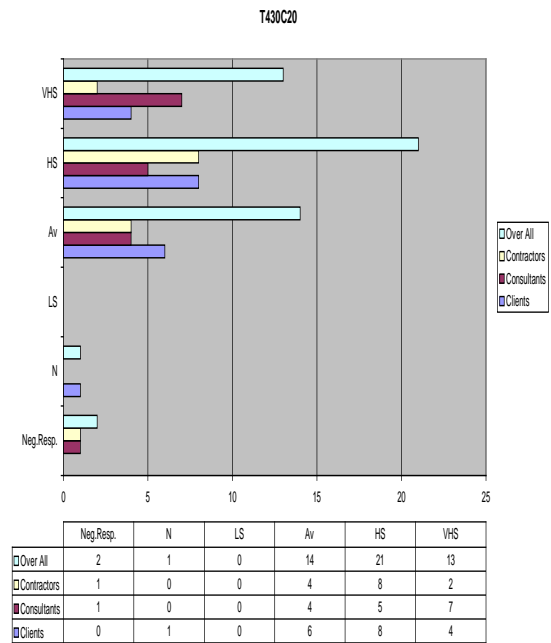


Figure 1151 T430C20

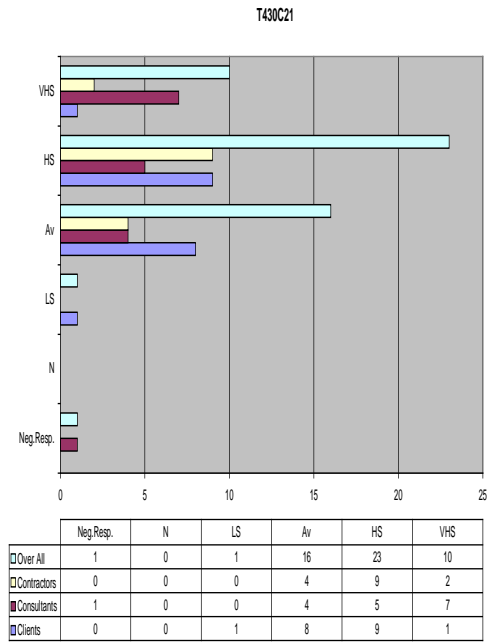


Figure 1152 T430C21

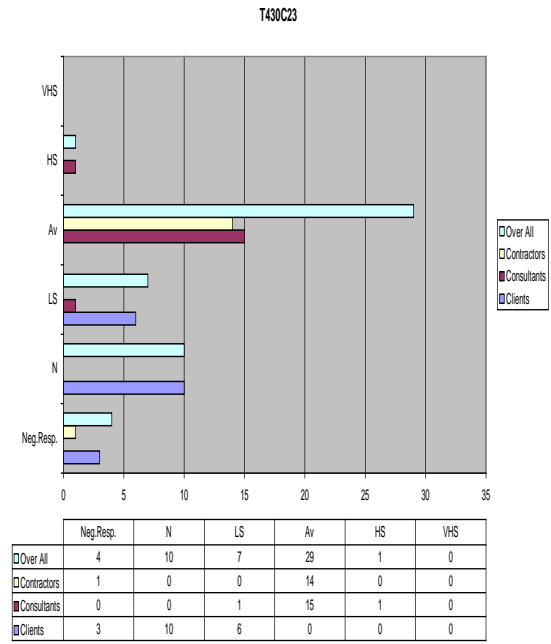


Figure 1154 T430C23

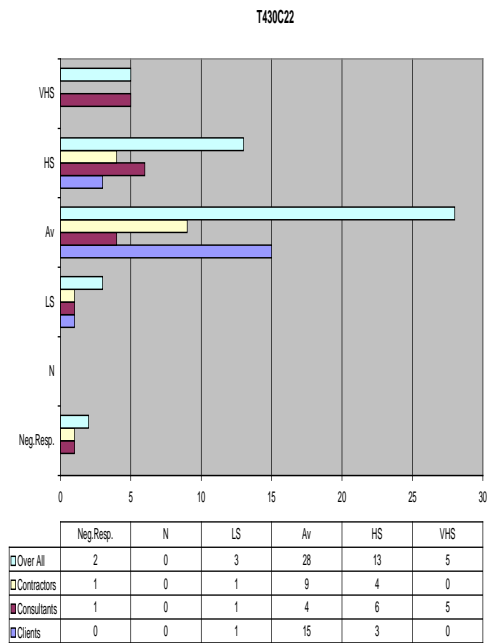


Figure 1153 T430C22

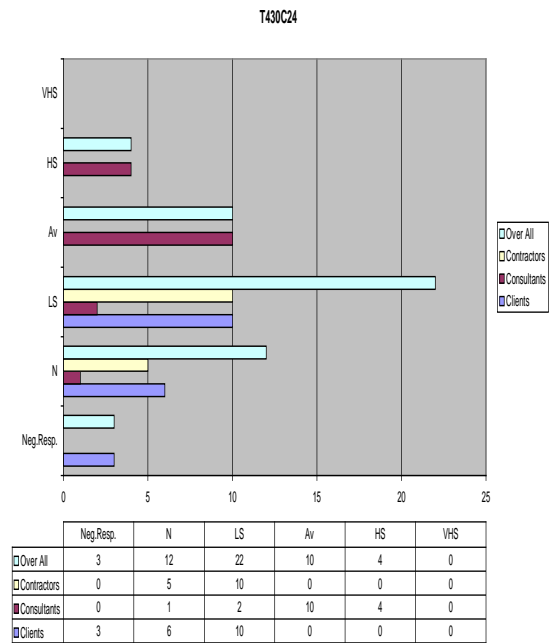


Figure 1155 T430C24

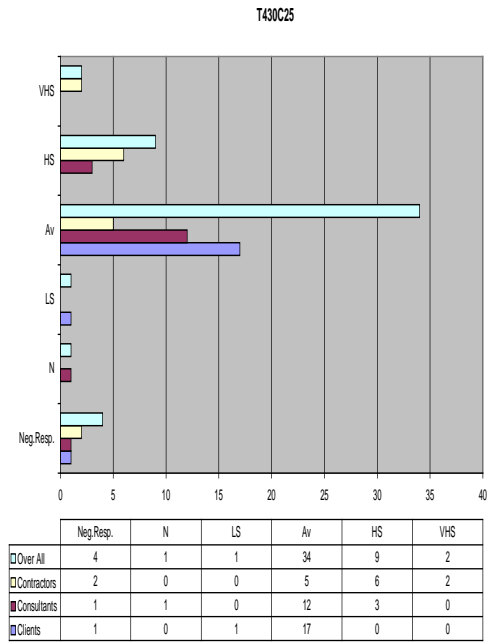


Figure 1156 T430C25

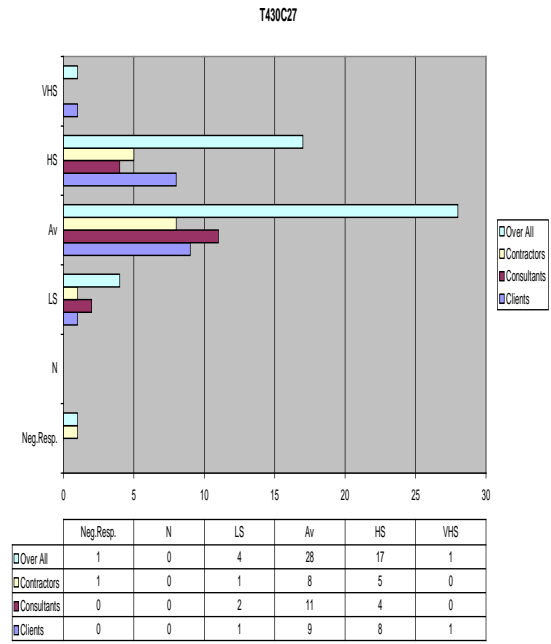


Figure 1158 T430C27

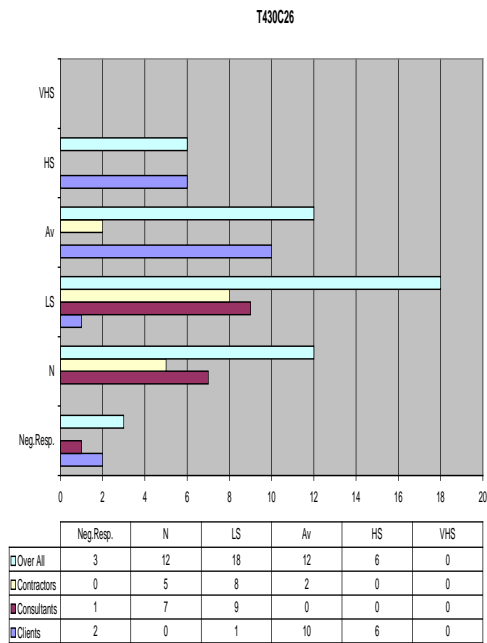


Figure 1157 T430C26

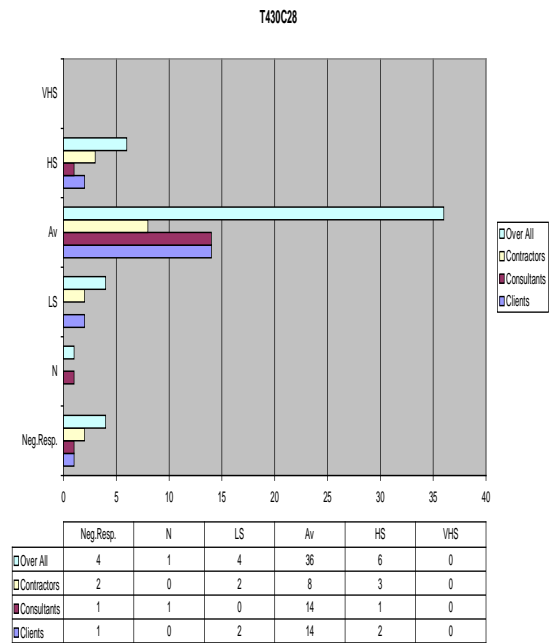


Figure 1159 T430C28

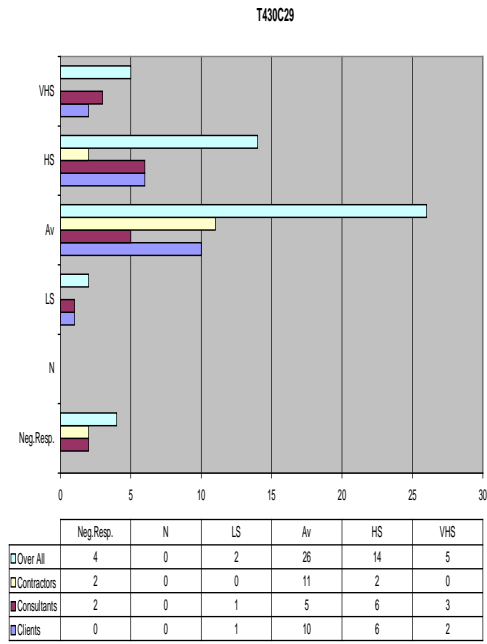


Figure 1160 T430C29

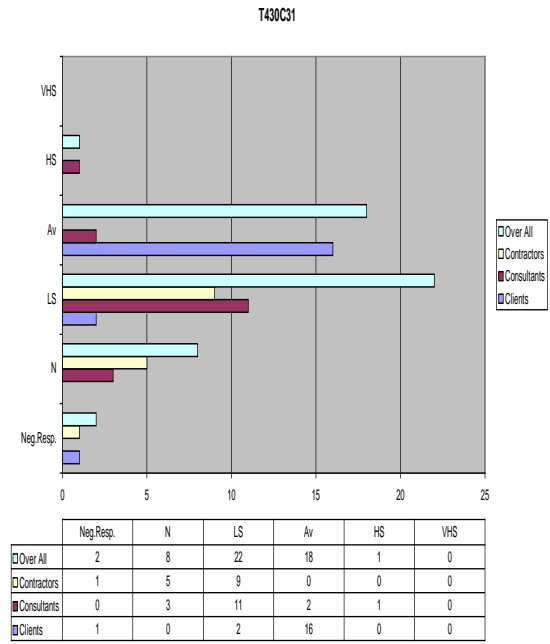


Figure 1162 T430C31

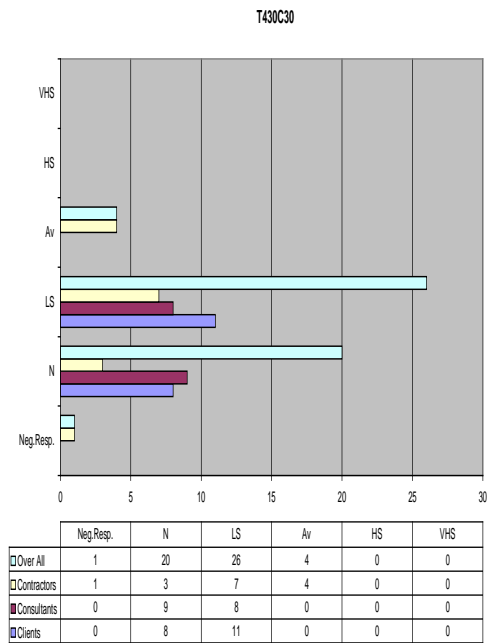


Figure 1161 T430C30

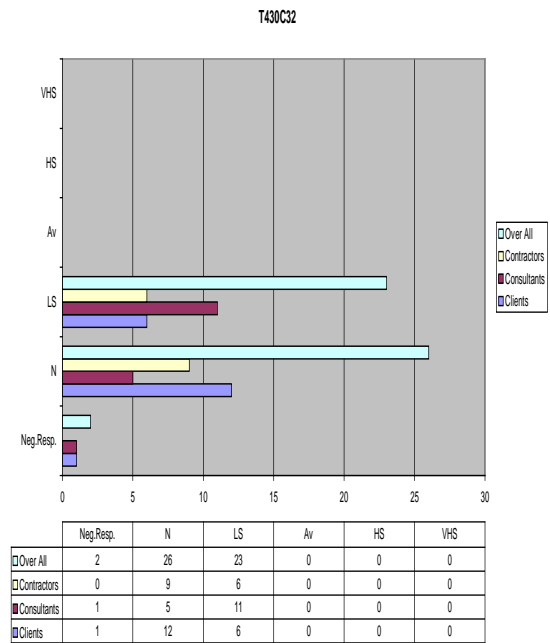


Figure 1163 T430C32

Y.3.2.44 CAUSE SIGNIFICANCE ASSESSMENT: (T44 C01) – (T44 C32)

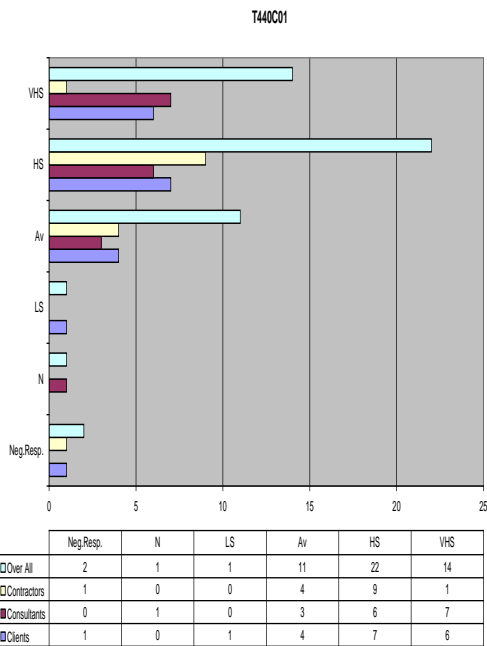


Figure 1164 T440C01

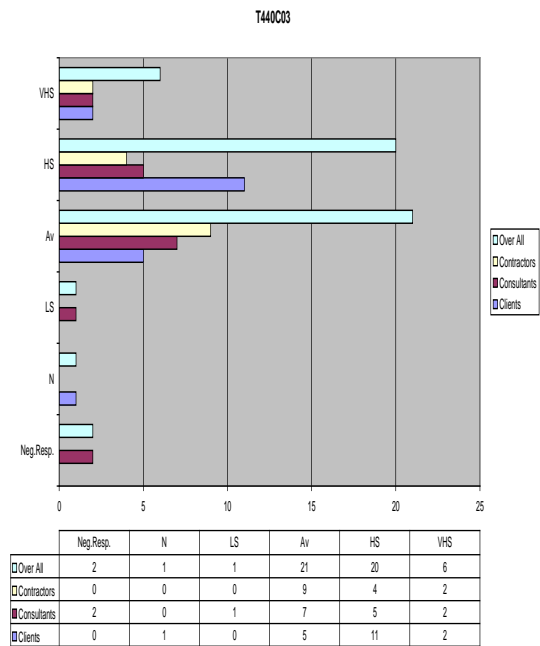


Figure 1166 T440C03

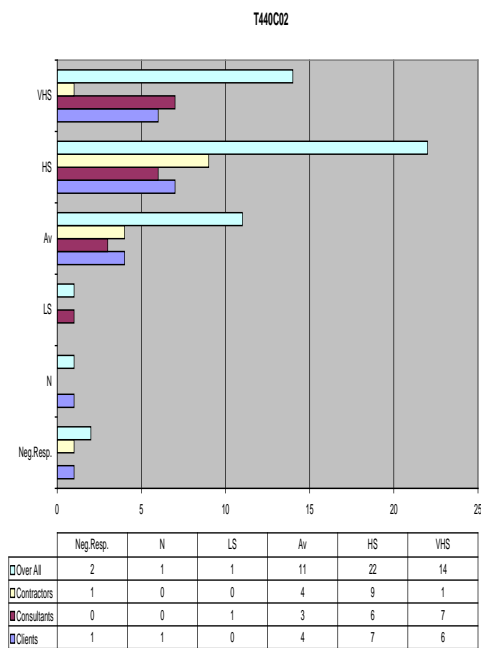


Figure 1165 T440C02

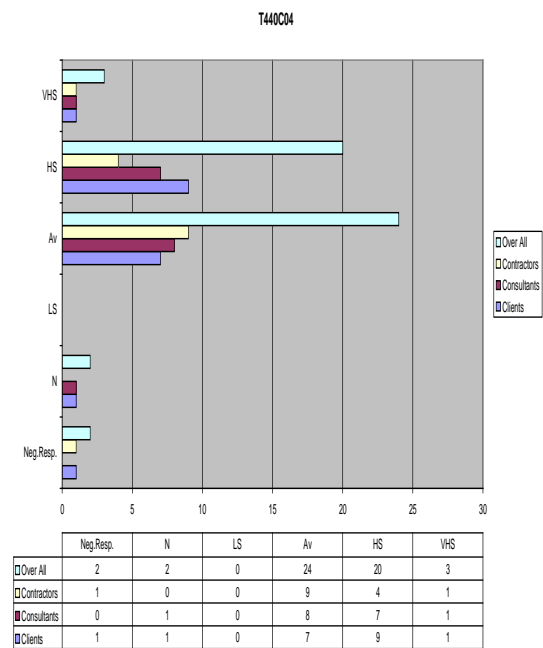


Figure 1167 T440C04

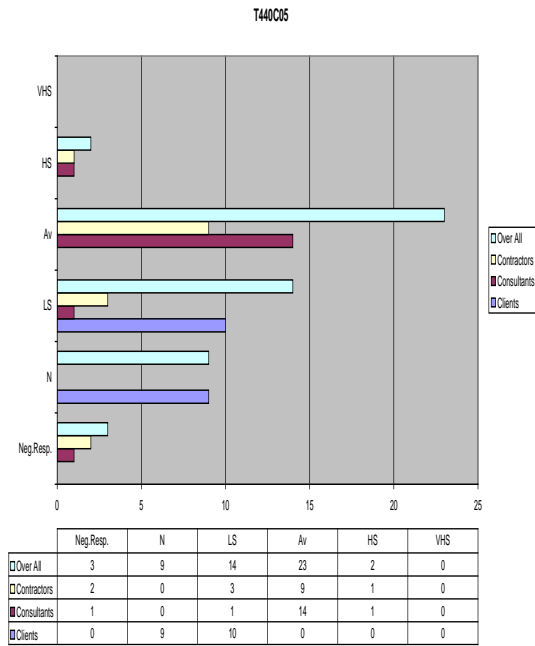


Figure 1168 T440C05

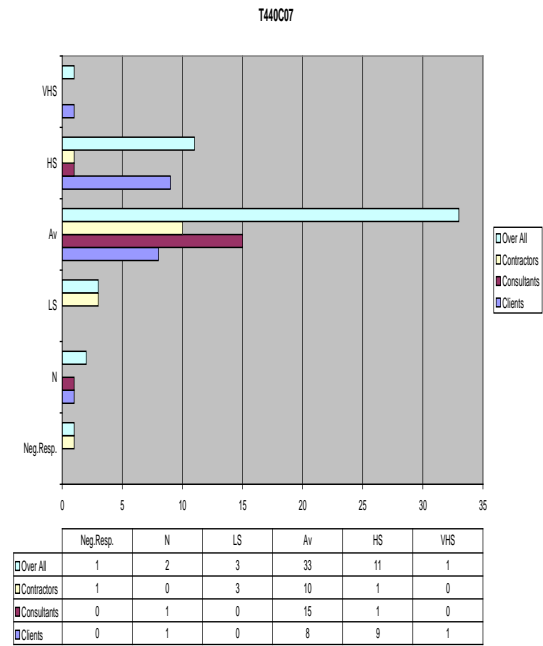


Figure 1170 T440C07

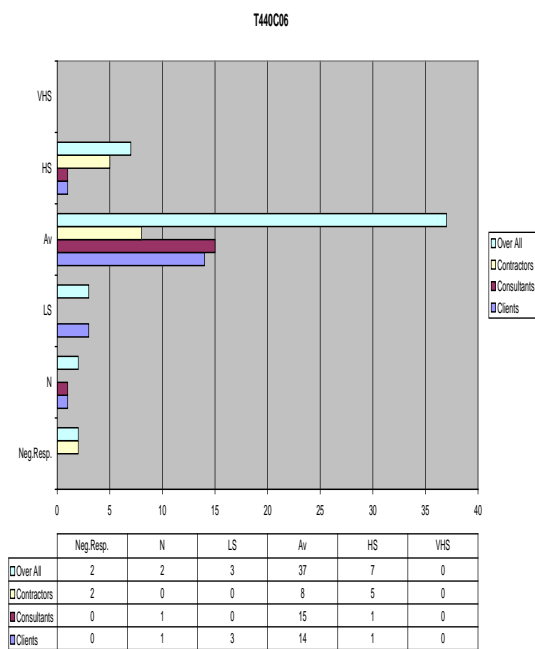


Figure 1169 T440C06

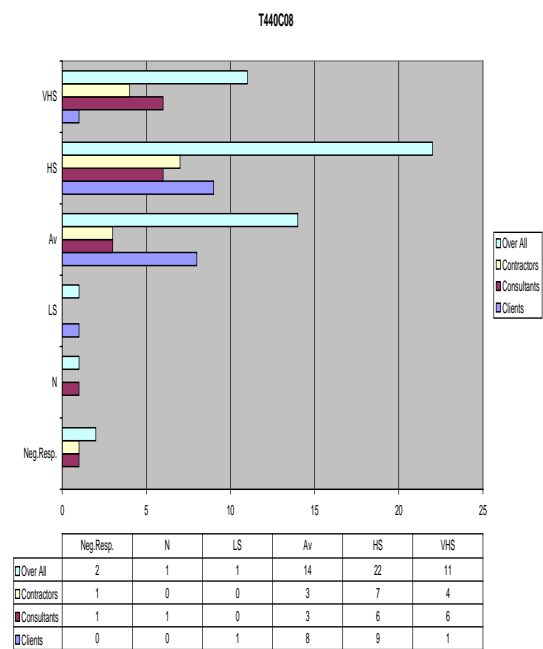


Figure 1171 T440C08

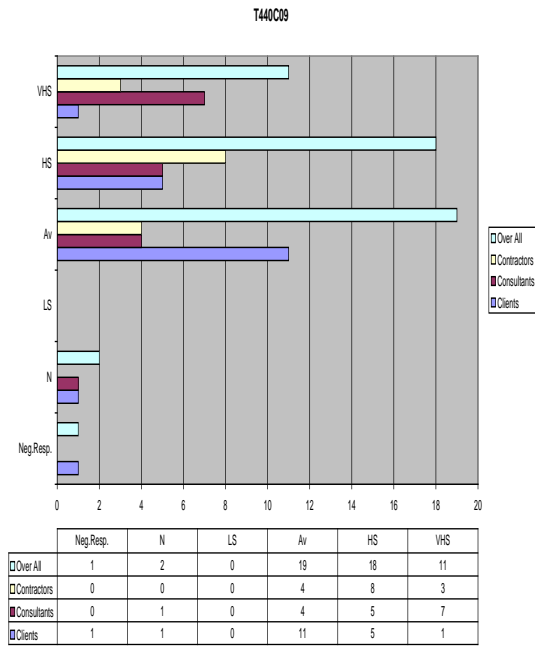


Figure 1172 T440C09

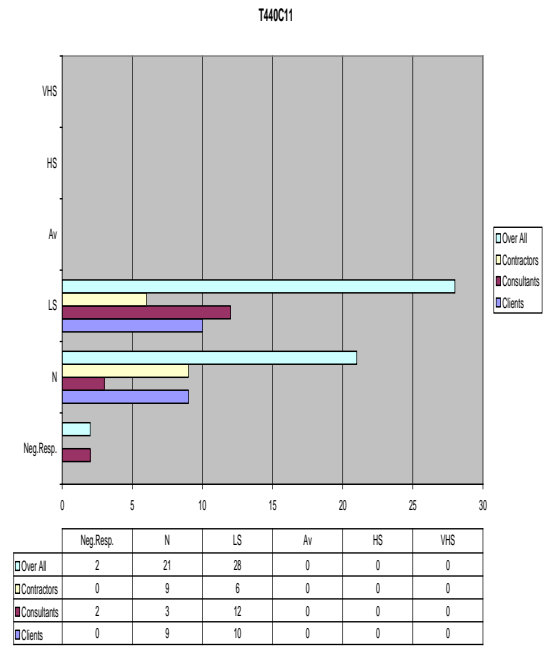


Figure 1174 T440C11

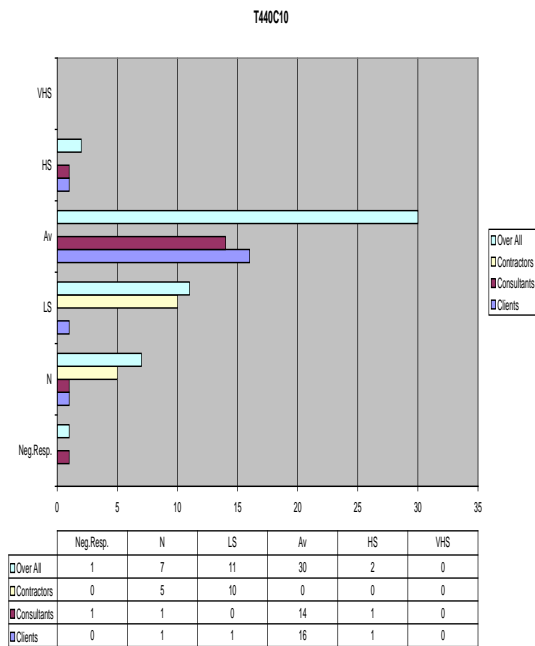


Figure 1173 T440C10

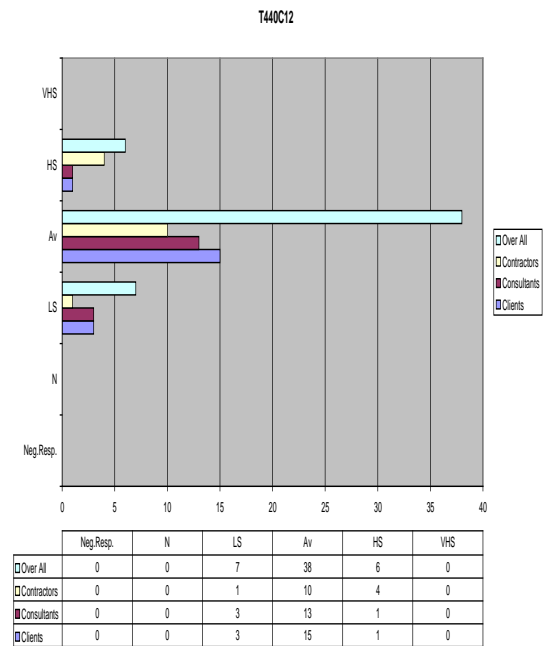


Figure 1175 T440C12

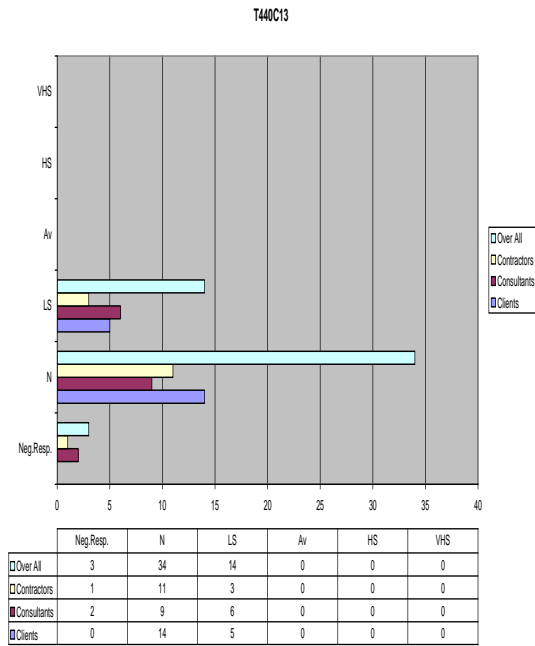


Figure 1176 T440C13

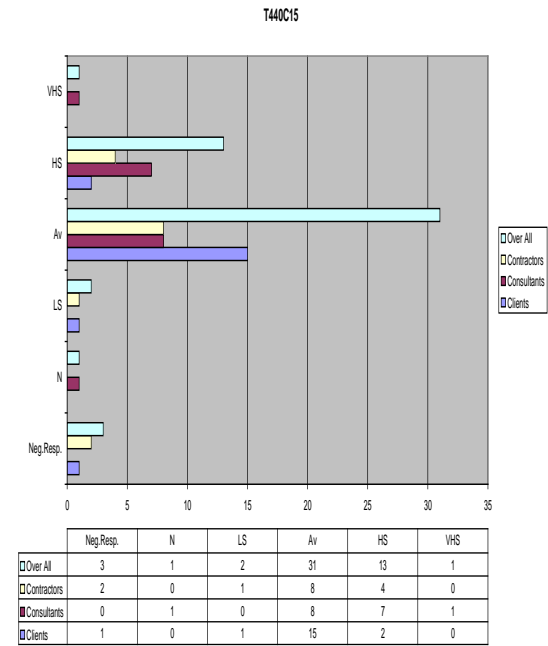


Figure 1178 T440C15

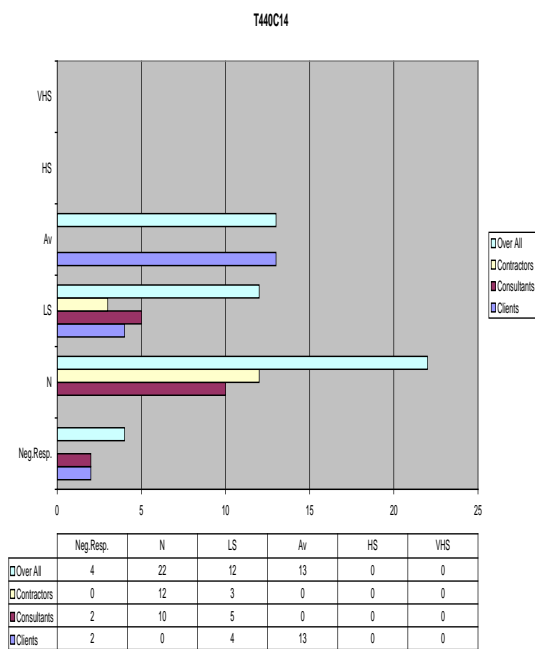


Figure 1177 T440C14

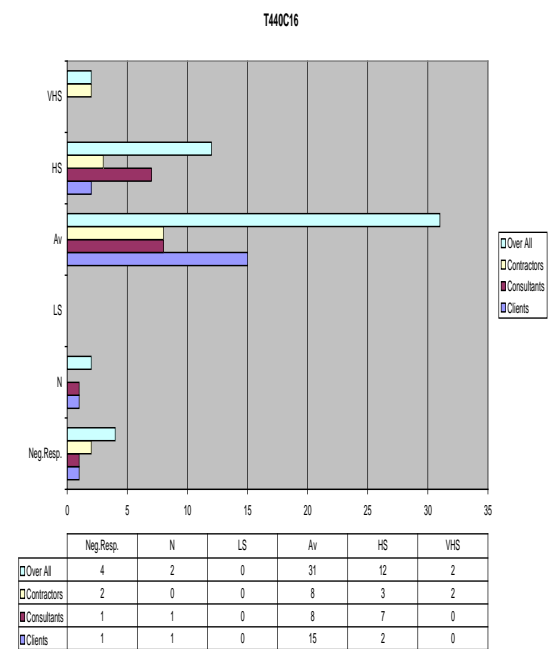


Figure 1179 T440C16

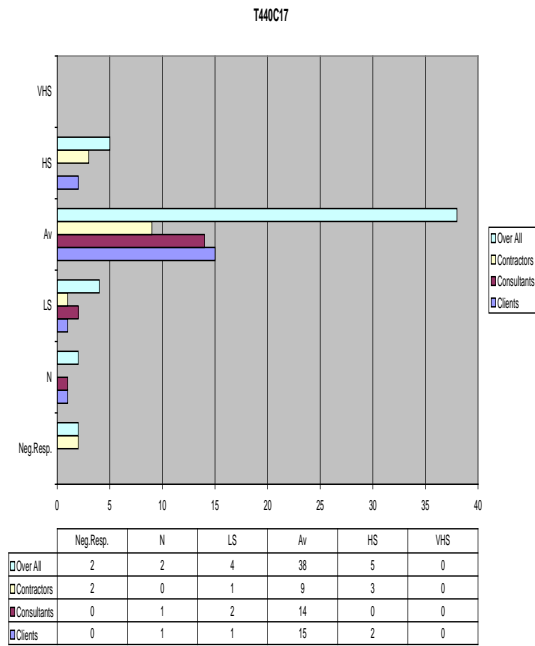


Figure 1180 T440C17

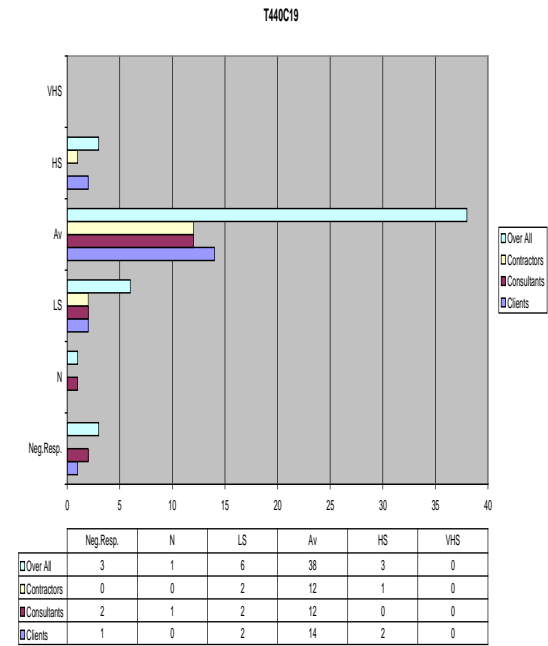


Figure 1182 T440C19

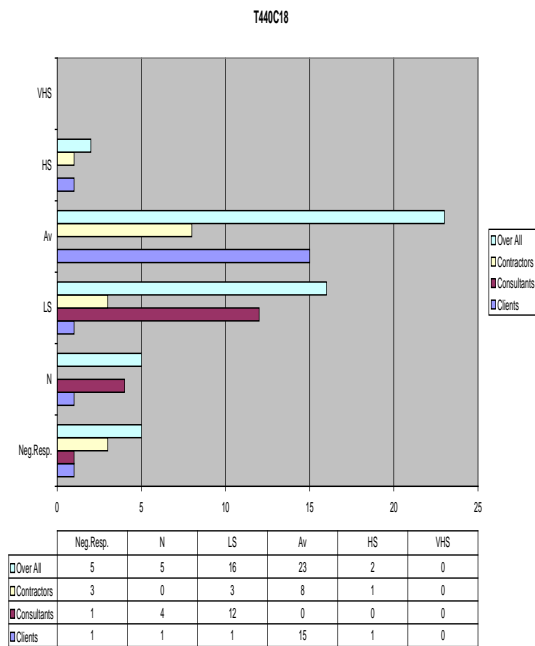


Figure 1181 T440C18

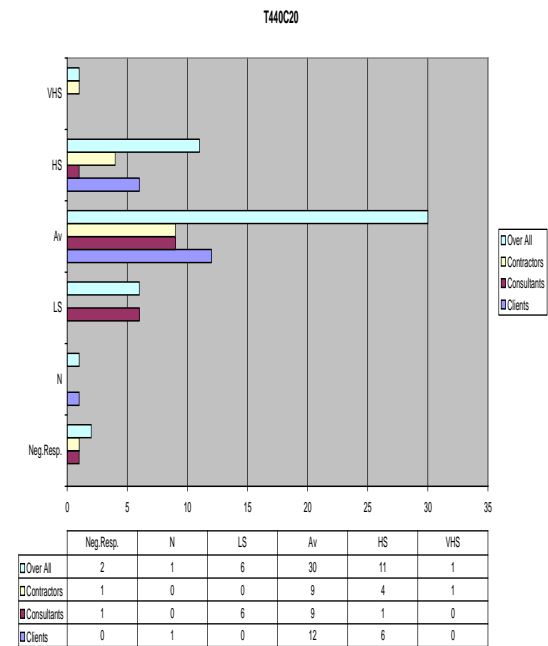


Figure 1183 T440C20

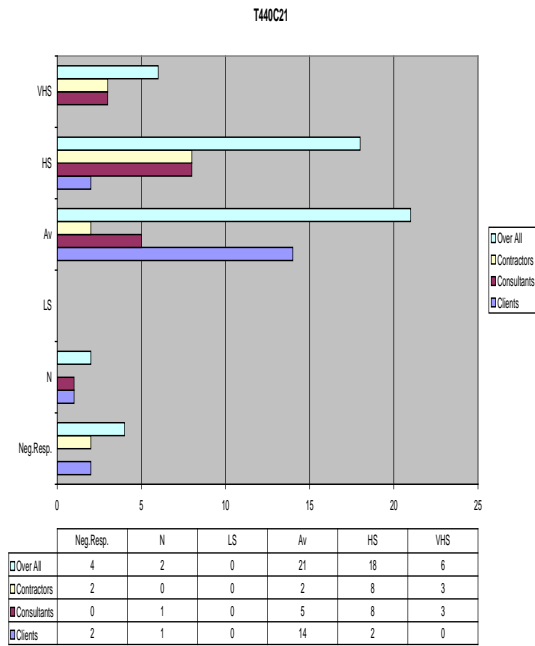


Figure 1184 T440C21

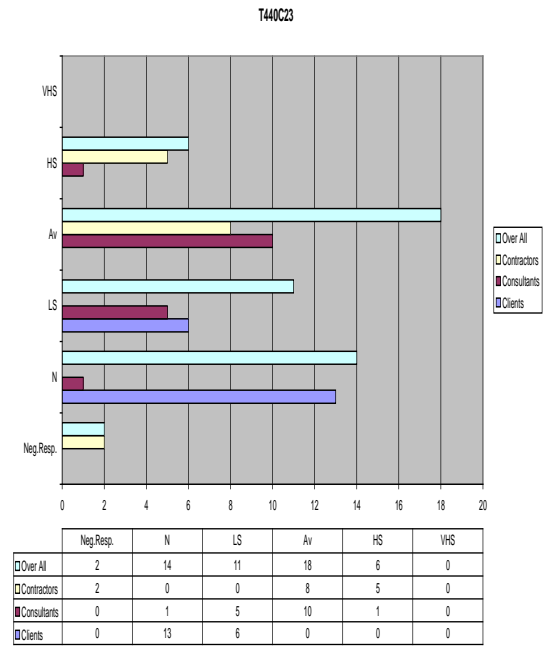


Figure 1186 T440C23

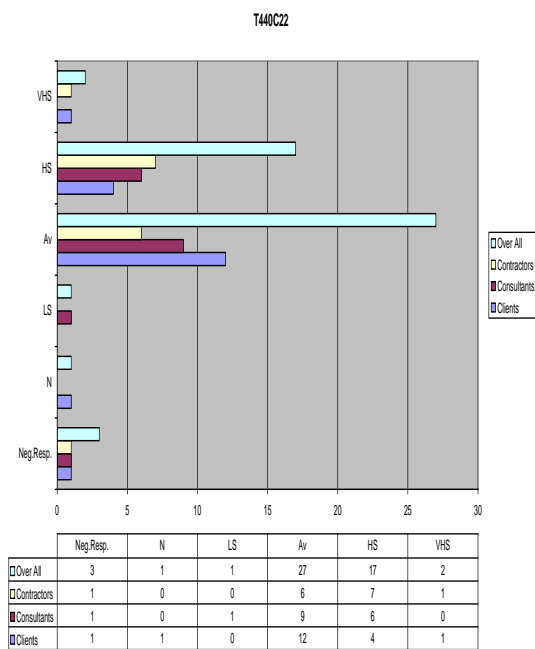


Figure 1185 T440C22

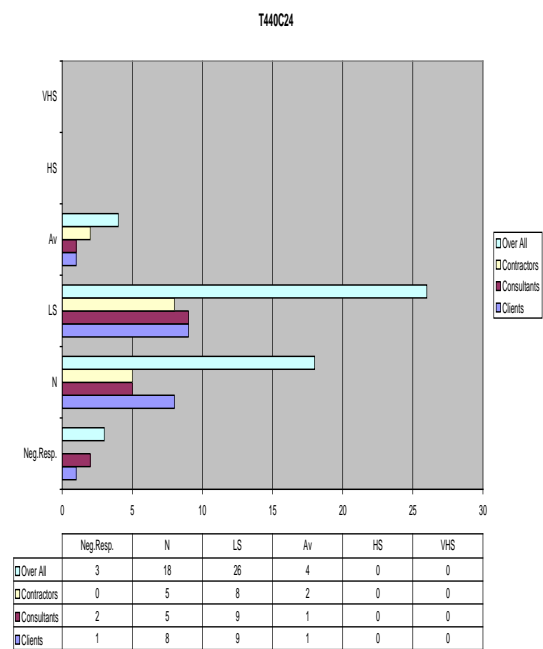


Figure 1187 T440C24

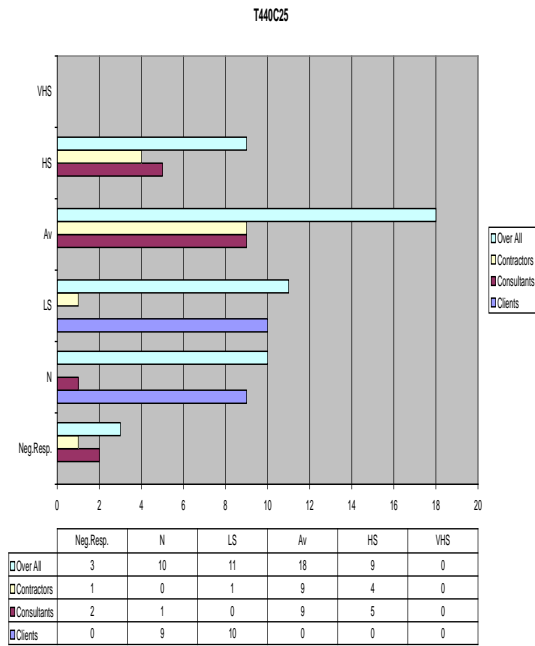


Figure 1188 T440C25

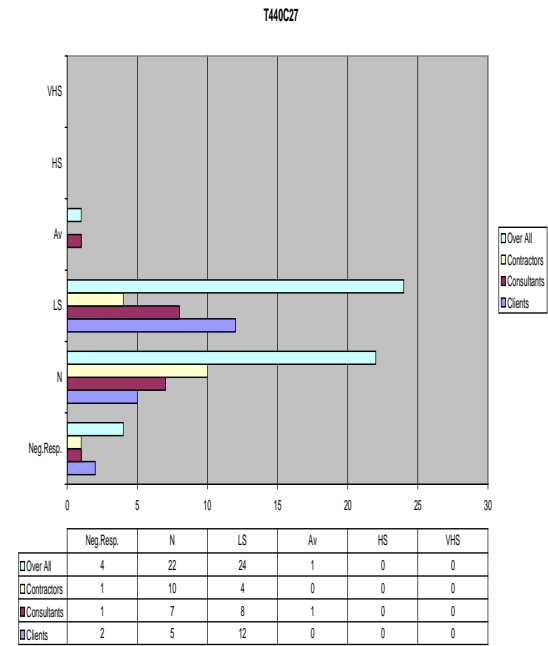


Figure 1190 T440C27

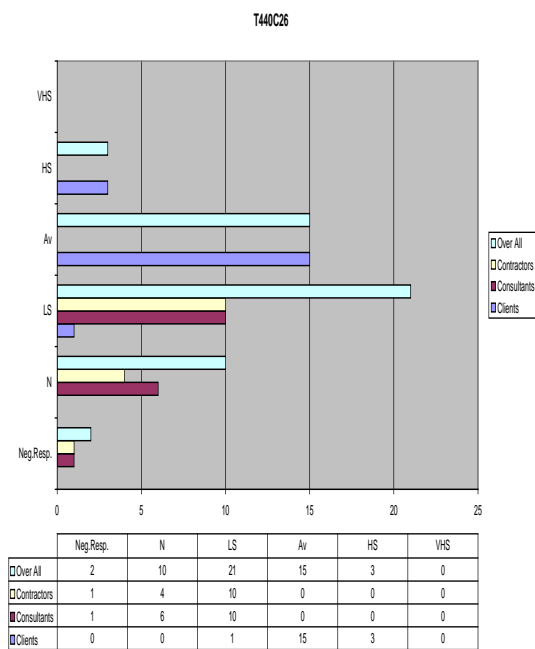


Figure 1189 T440C26

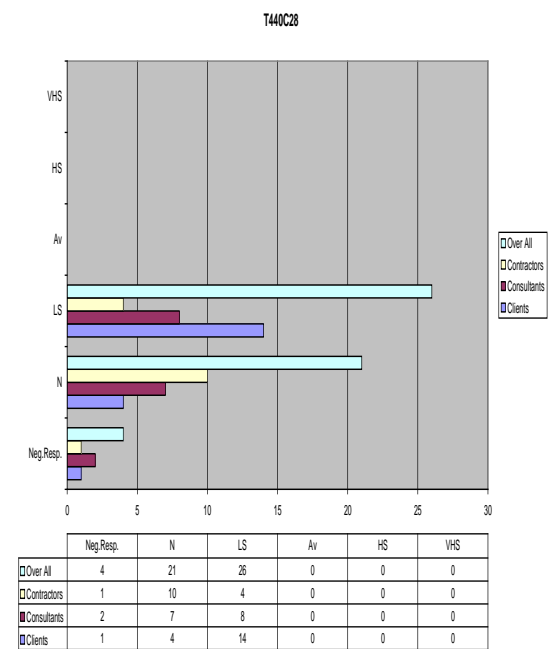


Figure 1191 T440C28

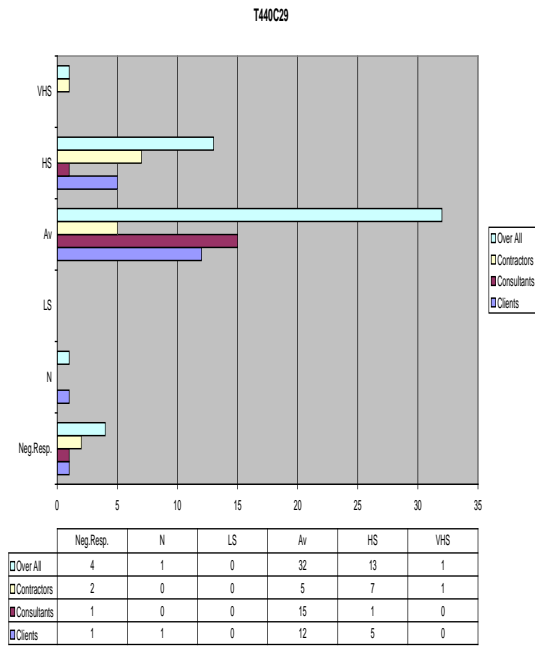


Figure 1192 T440C29

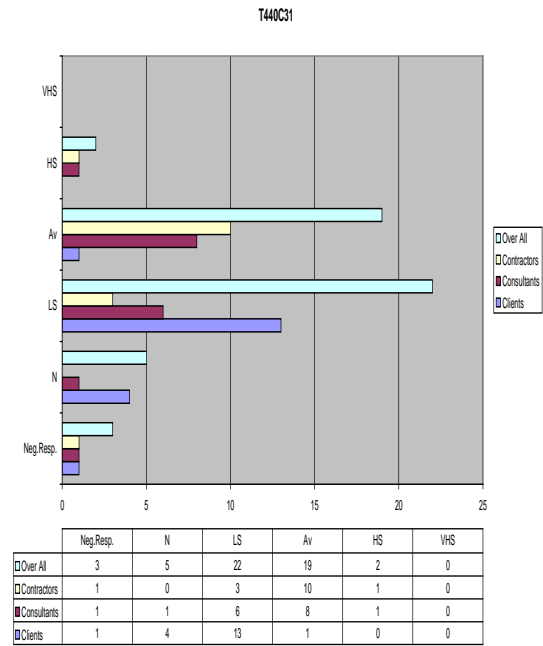


Figure 1194 T440C31

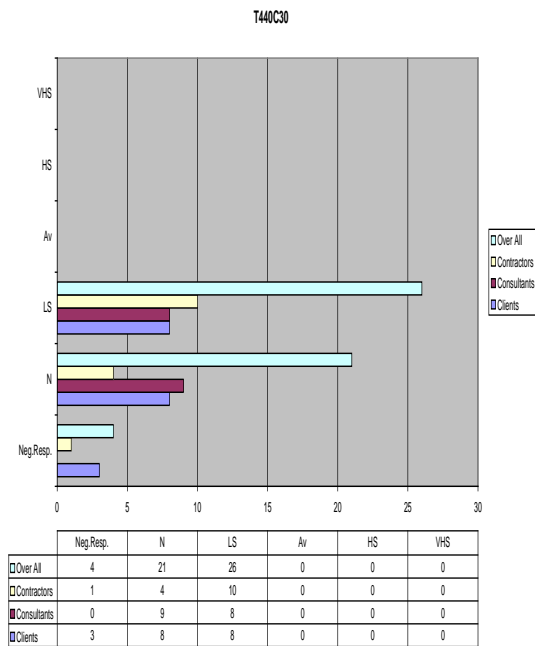


Figure 1193 T440C30

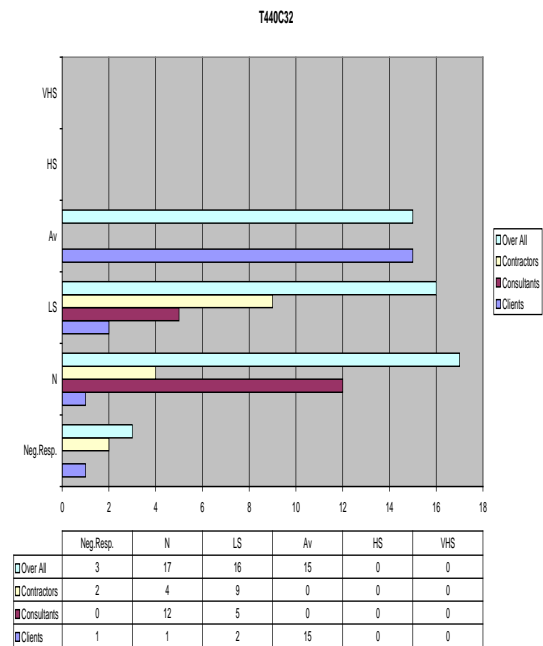


Figure 1195 T440C32

Y.3.2.45 CAUSE SIGNIFICANCE ASSESSMENT: (T45 C01) – (T45 C32)

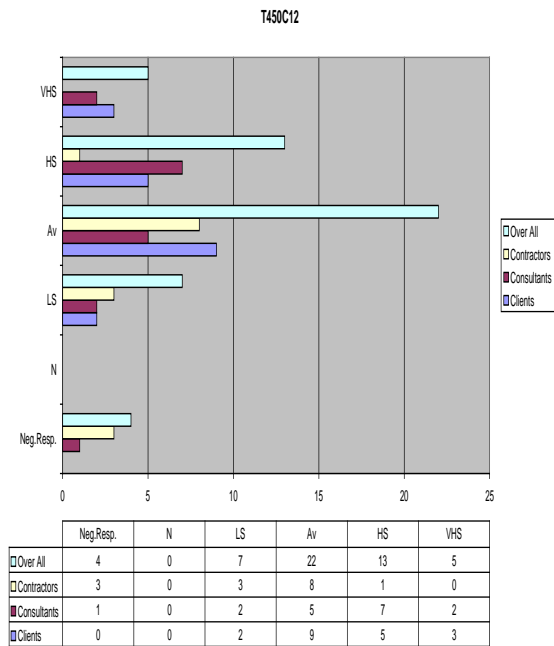


Figure 1196 T450C12

Y.3.2.46 CAUSE SIGNIFICANCE ASSESSMENT: (T46 C01) – (T46 C32)

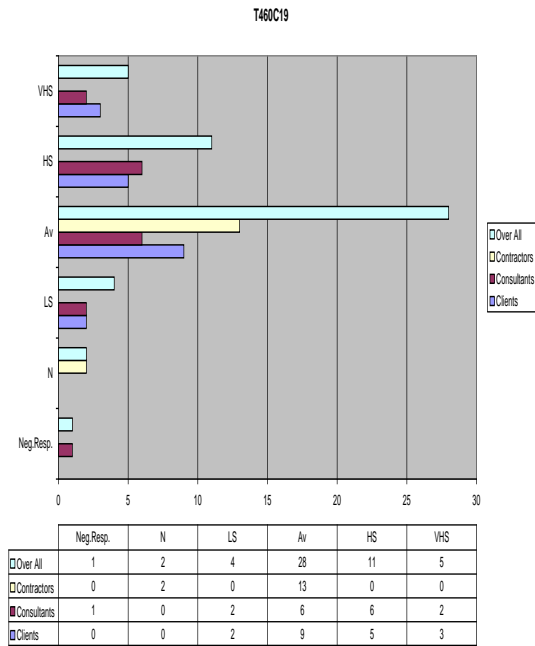


Figure 1197 T460C19

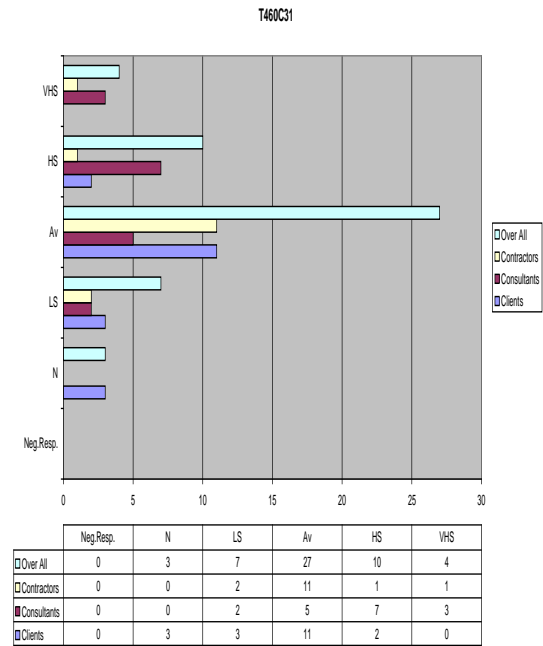


Figure 1199 T460C31

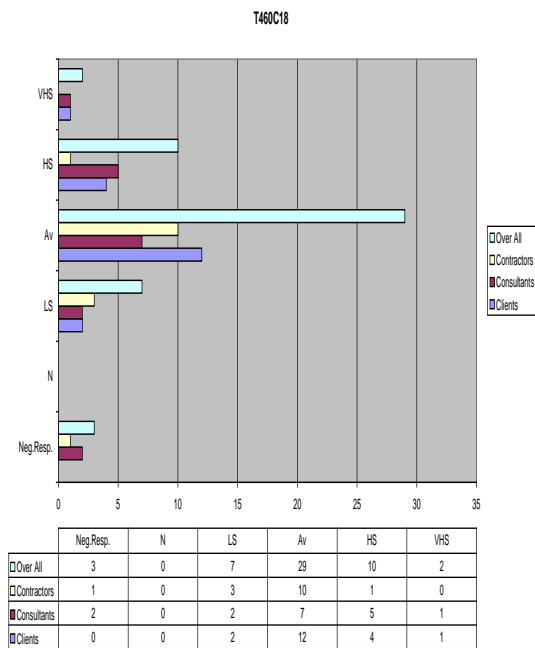


Figure 1198 T460C18

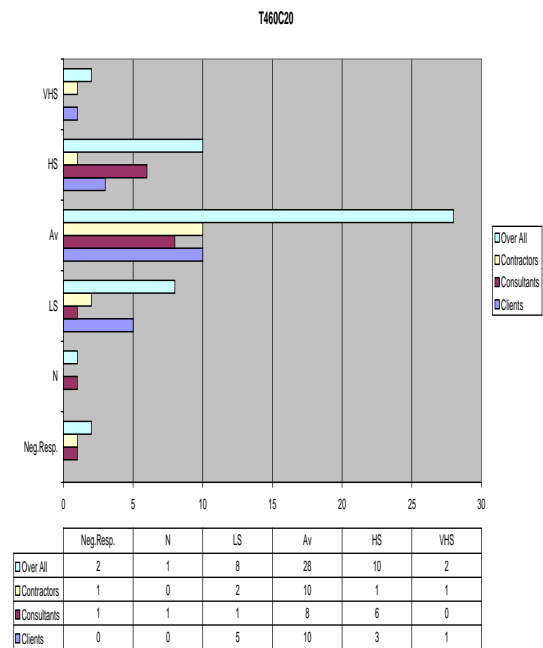


Figure 1200 T460C20

Y.3.2.47 CAUSE SIGNIFICANCE ASSESSMENT: (T47 C01) – (T47 C32)

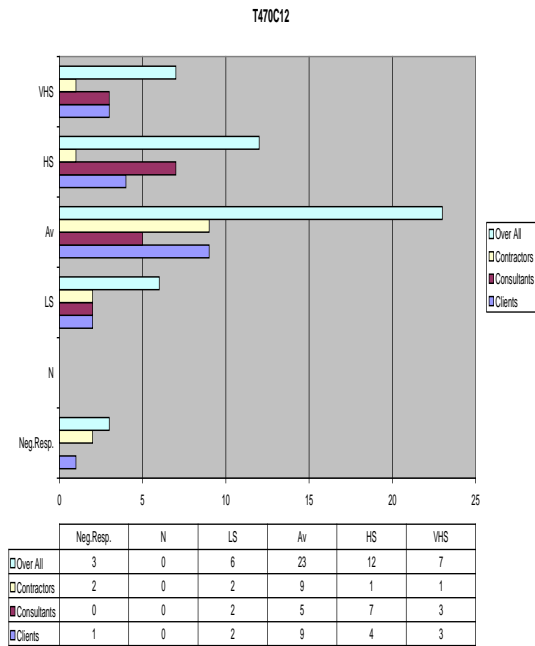


Figure 1201 T470C12

Y.3.2.48 CAUSE SIGNIFICANCE ASSESSMENT: (T48 C01) – (T48 C32)

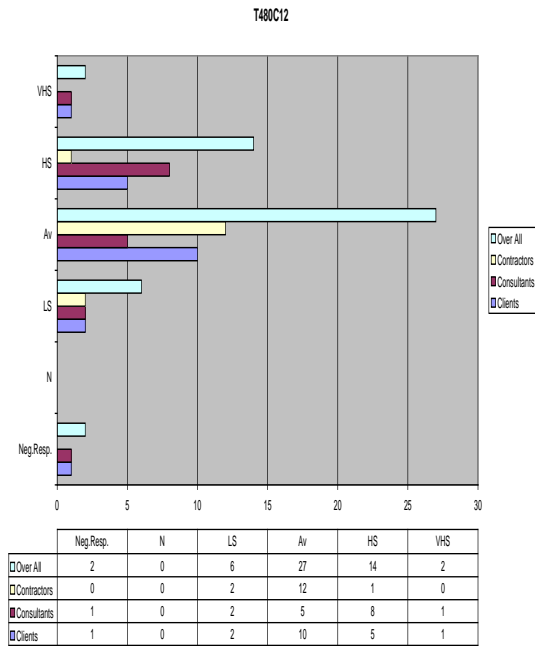


Figure 1202 T480C12

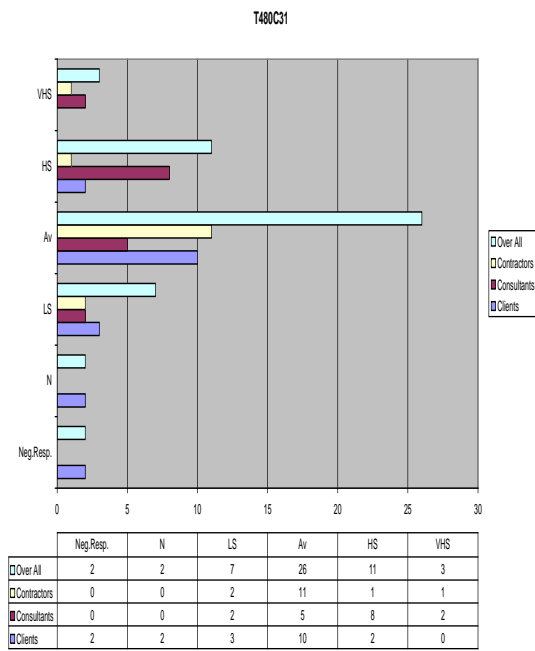


Figure 1203 T480C31

Y.3.2.49 CAUSE SIGNIFICANCE ASSESSMENT: (T49 C01) – (T49 C32)

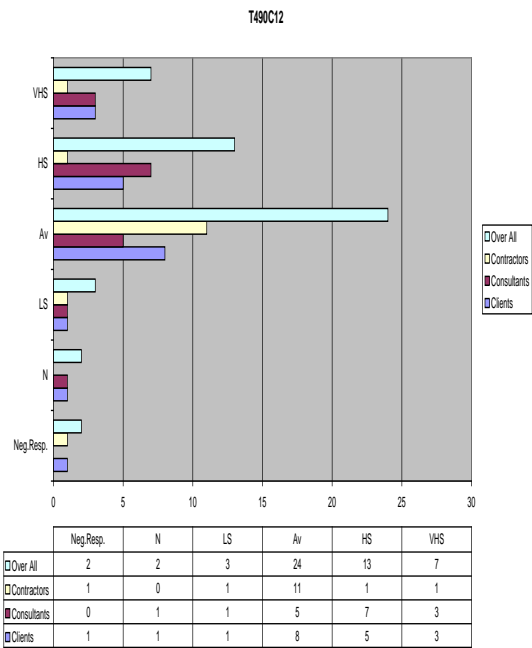


Figure 1204 T490C12

Y.3.2.50 CAUSE SIGNIFICANCE ASSESSMENT: (T50 C01) – (T50 C32)

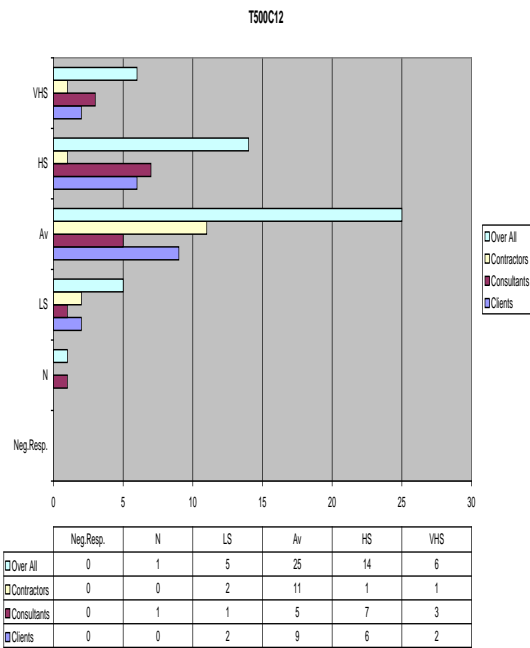


Figure 1205 T500C12

Y.3.2.51 CAUSE SIGNIFICANCE ASSESSMENT: (T51 C01) – (T51 C32)

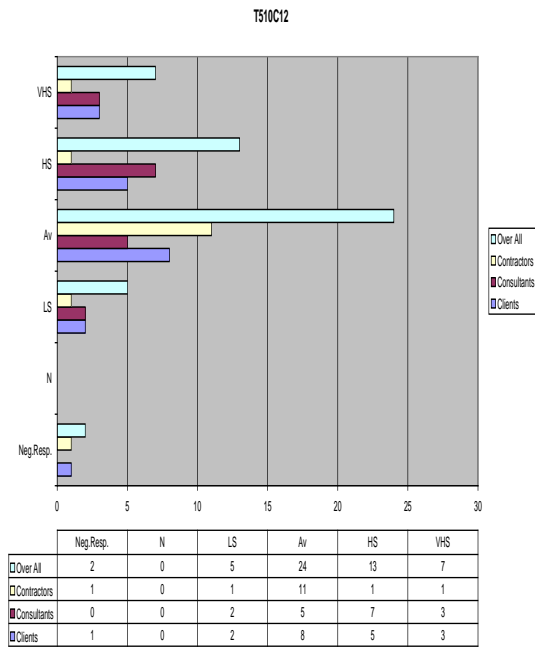


Figure 1206 T510C12

Y.4 RELATION AMONGST CAUSE SIGNIFICANCE AND AVOIDABILITY:

Y.4.1 PARTICIPANT'S ASSESSMENT (OVER ALL):

Table 8-1 Values for the Significant and Avoidable Root Causes

Variations			Change of design/ design omission / errors by the client (engineer)			Delay/ disruption to regular progress due to variation			Ambiguity in documents		
Type code		T19	Type code		T03	Type code		T26	Type code		T01
Type rank		1	Type rank		2	Type rank		3	Type rank		4
Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability
C01	80.00	81.18	C01	81.18	81.18	C01	77.08	81.18	C01	81.96	81.18
C02	78.43	78.43	C02	77.25	78.43	C02	77.87	78.43	C02	76.08	78.43
C03	71.02	83.14	C03	68.24	83.14	C03	75.00	83.14	C03	70.20	83.14
C04	70.20	82.75	C04	70.20	82.75	C04	69.80	82.75	C04	75.29	82.75
C05	40.00	83.53	C05	52.55	83.53	C05	42.80	83.53	C05	59.22	83.53
C06	49.60	82.35	C06	46.27	82.35	C06	51.60	82.35	C06	54.00	82.35
C07	61.60	70.98	C07	33.06	70.98	C07	62.40	70.98	C07	42.35	70.98
C08	77.20	68.98	C08	59.61	68.98	C08	77.25	68.98	C08	64.71	68.98
C09	74.40	82.35	C09	69.41	82.35	C09	72.50	82.35	C09	74.12	82.35
C10	46.80	70.59	C10	28.16	70.59	C10	39.61	70.59	C10	24.90	70.59
C11	39.20	62.40	C11	29.58	62.40	C11	40.00	62.40	C11	41.57	62.40
C12	57.25	69.02	C12	42.75	69.02	C12	56.86	69.02	C12	44.17	69.02
C13	36.40	74.90	C13	27.08	74.90	C13	36.25	74.90	C13	25.83	74.90
C14	43.20	70.20	C14	45.31	70.20	C14	42.04	70.20	C14	29.20	70.20
C15	65.00	60.00	C15	52.80	60.00	C15	65.53	60.00	C15	28.94	60.00
C16	62.80	57.25	C16	40.41	57.25	C16	64.08	57.25	C16	28.24	57.25
C17	57.20	64.71	C17	35.10	64.71	C17	58.75	64.71	C17	27.76	64.71
C18	43.20	63.60	C18	50.80	63.60	C18	45.00	63.60	C18	62.75	63.60
C19	57.20	63.92	C19	58.37	63.92	C19	57.87	63.92	C19	62.75	63.92
C20	59.61	52.94	C20	67.84	52.94	C20	62.13	52.94	C20	68.00	52.94
C21	70.59	55.69	C21	67.45	55.69	C21	77.14	55.69	C21	50.98	55.69
C22	67.45	63.53	C22	51.37	63.53	C22	66.67	63.53	C22	59.22	63.53
C23	35.00	58.04	C23	31.06	58.04	C23	36.67	58.04	C23	34.12	58.04
C24	34.29	70.98	C24	35.00	70.98	C24	35.92	70.98	C24	48.75	70.98
C25	47.76	60.78	C25	49.20	60.78	C25	48.80	60.78	C25	44.49	60.78
C26	38.78	63.14	C26	29.39	63.14	C26	48.33	63.14	C26	27.50	63.14
C27	29.60	62.35	C27	36.73	62.35	C27	33.62	62.35	C27	29.39	62.35
C28	29.41	62.75	C28	39.60	62.75	C28	34.00	62.75	C28	29.39	62.75
C29	63.27	58.43	C29	51.76	58.43	C29	64.80	58.43	C29	52.94	58.43
C30	27.35	57.65	C30	30.80	57.65	C30	28.16	57.65	C30	28.98	57.65
C31	46.53	41.96	C31	42.08	41.96	C31	45.60	41.96	C31	25.31	41.96
C32	36.47	56.86	C32	33.33	56.86	C32	37.39	56.86	C32	28.57	56.86

Table 8-33 Continued: Values for the Significant and Avoidable Root Causes

Unanticipated soil condition			Unforeseen ground condition/ unforeseeable obstruction			Differing site condition			Change of project profile and site		
Type code		T12	Type code		T13	Type code		T11	Type code		T09
Type rank		5	Type rank		6	Type rank		7	Type rank		8
Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability	Cause Code	Signifi- cance	Avoid ability
C01	75.29	81.18	C01	75.29	81.18	C01	75.69	81.18	C01	76.86	81.18
C02	75.69	78.43	C02	76.00	78.43	C02	76.00	78.43	C02	73.73	78.43
C03	68.40	83.14	C03	68.98	83.14	C03	68.40	83.14	C03	74.12	83.14
C04	60.78	82.75	C04	61.20	82.75	C04	60.78	82.75	C04	65.88	82.75
C05	31.60	83.53	C05	31.67	83.53	C05	31.37	83.53	C05	35.00	83.53
C06	28.89	82.35	C06	28.40	82.35	C06	28.63	82.35	C06	30.67	82.35
C07	31.25	70.98	C07	31.49	70.98	C07	31.49	70.98	C07	26.40	70.98
C08	69.41	68.98	C08	69.41	68.98	C08	69.41	68.98	C08	70.59	68.98
C09	74.51	82.35	C09	74.80	82.35	C09	74.51	82.35	C09	74.90	82.35
C10	40.00	70.59	C10	39.57	70.59	C10	40.00	70.59	C10	33.64	70.59
C11	30.64	62.40	C11	31.25	62.40	C11	30.61	62.40	C11	26.53	62.40
C12	28.80	69.02	C12	28.80	69.02	C12	28.63	69.02	C12	26.38	69.02
C13	26.40	74.90	C13	26.38	74.90	C13	26.40	74.90	C13	25.10	74.90
C14	33.88	70.20	C14	34.17	70.20	C14	34.17	70.20	C14	32.77	70.20
C15	40.00	60.00	C15	40.00	60.00	C15	40.00	60.00	C15	60.39	60.00
C16	30.59	57.25	C16	30.42	57.25	C16	31.02	57.25	C16	58.04	57.25
C17	26.53	64.71	C17	26.67	64.71	C17	26.40	64.71	C17	56.80	64.71
C18	56.86	63.60	C18	57.83	63.60	C18	57.20	63.60	C18	61.18	63.60
C19	56.08	63.92	C19	56.40	63.92	C19	56.47	63.92	C19	56.47	63.92
C20	60.00	52.94	C20	60.39	52.94	C20	60.39	52.94	C20	58.82	52.94
C21	60.41	55.69	C21	60.41	55.69	C21	60.40	55.69	C21	66.67	55.69
C22	49.60	63.53	C22	49.60	63.53	C22	49.80	63.53	C22	49.80	63.53
C23	32.00	58.04	C23	31.84	58.04	C23	32.08	58.04	C23	28.80	58.04
C24	76.47	70.98	C24	76.47	70.98	C24	76.47	70.98	C24	76.86	70.98
C25	33.33	60.78	C25	33.06	60.78	C25	33.20	60.78	C25	57.25	60.78
C26	62.45	63.14	C26	61.60	63.14	C26	62.00	63.14	C26	32.34	63.14
C27	29.41	62.35	C27	29.39	62.35	C27	29.79	62.35	C27	28.80	62.35
C28	29.17	62.75	C28	29.13	62.75	C28	29.17	62.75	C28	31.60	62.75
C29	58.43	58.43	C29	58.78	58.43	C29	58.40	58.43	C29	56.00	58.43
C30	32.80	57.65	C30	33.33	57.65	C30	32.92	57.65	C30	44.08	57.65
C31	55.69	41.96	C31	55.69	41.96	C31	56.25	41.96	C31	36.73	41.96
C32	26.09	56.86	C32	26.09	56.86	C32	26.12	56.86	C32	26.09	56.86

Table 8-33 Continued: Values for the Significant and Avoidable Root Causes

Rectification of works/ specification change due to defective design			Delay/ disruption to regular progress due to late issue of consent (approval)			Delays due to incomplete design/ insufficient information by client/consultant			Delayed site possession/ restricted access		
Type code		T05	Type code		T28	Type code		T02	Type code		T10
Type rank		9	Type rank		10	Type rank		11	Type rank		12
Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability
C01	76.47	81.18	C01	80.41	81.18	C01	81.18	81.18	C01	75.29	81.18
C02	76.08	78.43	C02	79.17	78.43	C02	78.04	78.43	C02	76.00	78.43
C03	69.80	83.14	C03	75.10	83.14	C03	73.33	83.14	C03	74.90	83.14
C04	75.29	82.75	C04	73.20	82.75	C04	69.80	82.75	C04	73.33	82.75
C05	52.80	83.53	C05	61.63	83.53	C05	58.43	83.53	C05	58.00	83.53
C06	39.61	82.35	C06	49.17	82.35	C06	50.98	82.35	C06	47.92	82.35
C07	37.60	70.98	C07	50.20	70.98	C07	47.35	70.98	C07	65.49	70.98
C08	63.92	68.98	C08	52.24	68.98	C08	67.84	68.98	C08	71.37	68.98
C09	64.71	82.35	C09	76.96	82.35	C09	73.33	82.35	C09	74.90	82.35
C10	29.60	70.59	C10	26.94	70.59	C10	27.50	70.59	C10	64.71	70.59
C11	28.00	62.40	C11	30.00	62.40	C11	29.17	62.40	C11	46.27	62.40
C12	28.51	69.02	C12	41.25	69.02	C12	41.22	69.02	C12	39.60	69.02
C13	26.27	74.90	C13	25.96	74.90	C13	26.96	74.90	C13	29.39	74.90
C14	51.43	70.20	C14	51.02	70.20	C14	59.61	70.20	C14	31.82	70.20
C15	66.67	60.00	C15	76.47	60.00	C15	71.76	60.00	C15	63.53	60.00
C16	51.20	57.25	C16	61.63	57.25	C16	58.82	57.25	C16	56.86	57.25
C17	52.80	64.71	C17	62.00	64.71	C17	60.00	64.71	C17	27.35	64.71
C18	53.73	63.60	C18	75.92	63.60	C18	63.67	63.60	C18	60.00	63.60
C19	58.82	63.92	C19	68.57	63.92	C19	61.20	63.92	C19	58.37	63.92
C20	47.20	52.94	C20	76.25	52.94	C20	70.98	52.94	C20	69.02	52.94
C21	59.61	55.69	C21	75.20	55.69	C21	67.45	55.69	C21	69.80	55.69
C22	53.73	63.53	C22	67.84	63.53	C22	60.39	63.53	C22	58.40	63.53
C23	48.80	58.04	C23	37.60	58.04	C23	37.55	58.04	C23	31.06	58.04
C24	35.51	70.98	C24	36.33	70.98	C24	35.83	70.98	C24	66.67	70.98
C25	39.59	60.78	C25	62.92	60.78	C25	60.00	60.78	C25	56.08	60.78
C26	27.92	63.14	C26	27.08	63.14	C26	27.76	63.14	C26	25.71	63.14
C27	39.17	62.35	C27	61.67	62.35	C27	56.08	62.35	C27	27.66	62.35
C28	37.87	62.75	C28	56.47	62.75	C28	47.06	62.75	C28	29.80	62.75
C29	35.60	58.43	C29	58.75	58.43	C29	54.29	58.43	C29	60.00	58.43
C30	30.59	57.65	C30	36.60	57.65	C30	32.27	57.65	C30	42.04	57.65
C31	36.33	41.96	C31	49.36	41.96	C31	39.59	41.96	C31	62.75	41.96
C32	30.80	56.86	C32	28.16	56.86	C32	28.51	56.86	C32	24.68	56.86

Table 8-33 Continued: Values for the Significant and Avoidable Root Causes

Extension of time for completion			Delay/ disruption to regular progress due to late instruction by the client/consultant engineer			Delay disruption to regular progress caused by utility services organization			Default of subcontractor, nominated subcontractor or suppliers.		
Type code		T35	Type code		T27	Type code		T31	Type code		T43
Type rank		13	Type rank		14	Type rank		15	Type rank		16
Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability	Cause Code	Significance	Avoidability
C01	80.00	81.18	C01	80.39	81.18	C01	61.70	81.18	C01	66.80	81.18
C02	79.58	78.43	C02	80.00	78.43	C02	60.42	78.43	C02	67.50	78.43
C03	70.80	83.14	C03	75.42	83.14	C03	61.30	83.14	C03	67.08	83.14
C04	70.61	82.75	C04	73.73	82.75	C04	66.09	82.75	C04	68.00	82.75
C05	62.50	83.53	C05	62.55	83.53	C05	38.00	83.53	C05	60.00	83.53
C06	62.50	82.35	C06	50.43	82.35	C06	34.69	82.35	C06	54.89	82.35
C07	79.18	70.98	C07	49.60	70.98	C07	60.00	70.98	C07	64.71	70.98
C08	68.40	68.98	C08	51.67	68.98	C08	61.60	68.98	C08	67.35	68.98
C09	67.39	82.35	C09	76.80	82.35	C09	52.08	82.35	C09	58.72	82.35
C10	76.40	70.59	C10	27.08	70.59	C10	30.64	70.59	C10	27.92	70.59
C11	52.08	62.40	C11	30.00	62.40	C11	26.25	62.40	C11	37.96	62.40
C12	62.45	69.02	C12	42.00	69.02	C12	61.63	69.02	C12	52.50	69.02
C13	38.40	74.90	C13	26.40	74.90	C13	27.08	74.90	C13	28.09	74.90
C14	41.67	70.20	C14	51.43	70.20	C14	27.76	70.20	C14	60.41	70.20
C15	76.60	60.00	C15	76.40	60.00	C15	69.80	60.00	C15	70.40	60.00
C16	31.84	57.25	C16	62.00	57.25	C16	53.88	57.25	C16	68.98	57.25
C17	30.83	64.71	C17	62.40	64.71	C17	33.88	64.71	C17	68.57	64.71
C18	79.61	63.60	C18	75.92	63.60	C18	76.33	63.60	C18	72.24	63.60
C19	75.83	63.92	C19	70.42	63.92	C19	78.04	63.92	C19	78.72	63.92
C20	74.69	52.94	C20	76.60	52.94	C20	76.73	52.94	C20	78.37	52.94
C21	78.00	55.69	C21	75.60	55.69	C21	62.04	55.69	C21	76.80	55.69
C22	70.64	63.53	C22	67.60	63.53	C22	62.08	63.53	C22	68.16	63.53
C23	61.96	58.04	C23	37.08	58.04	C23	27.84	58.04	C23	48.94	58.04
C24	61.60	70.98	C24	36.47	70.98	C24	40.44	70.98	C24	42.50	70.98
C25	62.13	60.78	C25	63.14	60.78	C25	54.58	60.78	C25	64.26	60.78
C26	61.63	63.14	C26	27.60	63.14	C26	44.58	63.14	C26	45.00	63.14
C27	61.22	62.35	C27	61.70	62.35	C27	60.43	62.35	C27	66.00	62.35
C28	61.63	62.75	C28	56.40	62.75	C28	61.60	62.75	C28	60.00	62.75
C29	69.20	58.43	C29	59.60	58.43	C29	61.96	58.43	C29	69.36	58.43
C30	52.17	57.65	C30	36.40	57.65	C30	40.00	57.65	C30	33.60	57.65
C31	76.40	41.96	C31	48.98	41.96	C31	74.04	41.96	C31	44.90	41.96
C32	27.84	56.86	C32	28.33	56.86	C32	24.58	56.86	C32	29.39	56.86

Y.4.2 CAUSE SIGNIFICANCE AND AVOIDABILITY MATRIX (OVER ALL): SIGNIFICANT TYPES

CASUSE OF CLAIMS & DISPUTES ASSESSMENT		Causes of Claims Code											Preventive Techniques Ranking
		Cause Controllability Importance Index											
		Cause Controllability Ranking											
		Cause Controllability Description											
		Cause Controllability Categorisation; Where, 'HS-											
		Causes of Claims Rank											
TYPE OF CLAIMS & DISPUTES ASSESSMENT													
DESCR	CODE	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Cause Avoid	Cause Avoid Imp. Index	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	
Variations	T19	4.08	81.63%	1	4.49	89.80%	1	3.80	76.08%	8	4.12	82.50%	1
Change of Design/ Design Omission / Errors b	T03	3.83	76.60%	2	4.20	83.92%	3	4.02	80.39%	4	4.02	80.30%	2
Delay/ Disruption to Regular Progress Due To	T26	3.82	76.47%	3	4.33	86.67%	2	3.62	72.40%	14	3.93	78.51%	3
Ambiguity in Documents	T01	3.39	67.84%	11	3.73	74.51%	11	4.49	89.80%	1	3.87	77.40%	4
Unanticipated Soil Condition	T12	3.63	72.65%	4	4.00	80.00%	4	3.69	73.73%	12	3.77	75.46%	5
Unforeseen Ground Condition/ Unforeseeable	T13	3.58	71.67%	7	3.96	79.13%	5	3.71	74.12%	11	3.75	74.97%	6
Differing Site Condition	T11	3.63	72.55%	5	3.93	78.70%	6	3.67	73.33%	13	3.74	74.86%	7
Change of Project Profile and Site	T09	3.55	71.02%	8	3.77	75.32%	8	3.76	75.29%	9	3.69	73.88%	8
Rectification of Works/ Specification Change	T05	3.23	64.58%	16	3.61	72.16%	14	4.20	83.92%	3	3.68	73.56%	9
Delay/ Disruption to Regular Progress Due To	T28	3.63	72.50%	6	3.88	77.50%	7	3.50	70.00%	16	3.67	73.33%	10
Delays Due to Incomplete Design/ Insufficient	T02	3.35	66.94%	14	3.59	71.76%	15	3.94	78.80%	6	3.63	72.51%	11
Delayed Site Possession/ Restricted Access	T10	3.38	67.60%	12	3.76	75.29%	9	3.73	74.51%	10	3.62	72.47%	12
Extension of Time For Completion	T35	3.51	70.22%	9	3.74	74.80%	10	3.24	64.71%	25	3.50	69.90%	13
Delay/ Disruption to Regular Progress Due To	T27	3.25	65.00%	15	3.63	72.50%	13	3.59	71.76%	15	3.49	69.76%	14
Delay Disruption to Regular Progress Caused b	T31	3.49	69.79%	10	3.71	74.29%	12	3.08	61.57%	36	3.43	68.54%	15
Default of Subcontractor, Nominated Subcontr	T43	3.38	67.50%	13	3.45	69.02%	17	3.22	64.31%	26	3.35	66.94%	16

Figure 8-2 Claims and Disputes Matrix (Group 1 and 2)

CASUSE OF CLAIMS & DISPUTES ASSESSMENT													Causes of Claims Code								
													Cause Controllability Importance Index								
													Cause Controllability Ranking								
													Cause Controllability Description								
													Cause Controllability Categorisation; Where, "HS- Causes of Claims Rank								
TYPE OF CLAIMS & DISPUTES ASSESSMENT																					
DESCR	CODE	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking Impact	Impact Avg. Mean	Impact Imp. Index	Impact Ranking Cause Avoid	Cause Avoid Imp. Index	Cause Avoid CMF Avg. Mean	CMF Imp. Index	CMF Ranking	Preventive Techniques Ranking									
												C21	C20	C29	C16	C31	C23	C30	C32		
												55.69%	52.94%	58.43%	57.25%	41.96%	58.04%	57.65%	56.86%		
												6	7	1	4	8	2	3	5		
												LA	LA	LA	LA	LA	LA	LA	LA		
												3	3	4	4	4	4	4	4		
												25	26	27	28	29	30	31	31		
Variations	T19	4.08	81.63%	1	4.49	89.80%	1	3.80	76.08%	8	4.12	82.50%	1	HS-LA	LS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Change of Design/ Design Omission / Errors b	T03	3.83	76.60%	2	4.20	83.92%	3	4.02	80.39%	4	4.02	80.30%	2	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Delay/ Disruption to Regular Progress Due To	T26	3.82	76.47%	3	4.33	86.67%	2	3.62	72.40%	14	3.93	78.51%	3	HS-LA	HS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Ambiguity in Documents	T01	3.39	67.84%	11	3.73	74.51%	11	4.49	89.80%	1	3.87	77.40%	4	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Unanticipated Soil Condition	T12	3.63	72.65%	4	4.00	80.00%	4	3.69	73.73%	12	3.77	75.46%	5	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Unforeseen Ground Condition/ Unforeseeable	T13	3.58	71.67%	7	3.96	79.13%	5	3.71	74.12%	11	3.75	74.97%	6	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Differing Site Condition	T11	3.63	72.55%	5	3.93	78.70%	6	3.67	73.33%	13	3.74	74.86%	7	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Change of Project Profile and Site	T09	3.55	71.02%	8	3.77	75.32%	8	3.76	75.29%	9	3.69	73.88%	8	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Rectification of Works/ Specification Change	T05	3.23	64.58%	16	3.61	72.16%	14	4.20	83.92%	3	3.68	73.56%	9	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Delay/ Disruption to Regular Progress Due To	T28	3.63	72.50%	6	3.88	77.50%	7	3.50	70.00%	16	3.67	73.33%	10	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Delays Due to Incomplete Design/ Insufficient	T02	3.35	66.94%	14	3.59	71.76%	15	3.94	78.80%	6	3.63	72.51%	11	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Delayed Site Possession/ Restricted Access	T10	3.38	67.60%	12	3.76	75.29%	9	3.73	74.51%	10	3.62	72.47%	12	HS-LA	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA
Extension of Time For Completion	T35	3.51	70.22%	9	3.74	74.80%	10	3.24	64.71%	25	3.50	69.90%	13	HS-LA	HS-LA	HS-LA	LS-LA	HS-LA	HS-LA	LS-LA	LS-LA
Delay/ Disruption to Regular Progress Due To	T27	3.25	65.00%	15	3.63	72.50%	13	3.59	71.76%	15	3.49	69.76%	14	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA
Delay Disruption to Regular Progress Caused b	T31	3.49	69.79%	10	3.71	74.29%	12	3.08	61.57%	36	3.43	68.54%	15	HS-LA	HS-LA	HS-LA	LS-LA	HS-LA	LS-LA	LS-LA	LS-LA
Default of Subcontractor, Nominated Subcontr	T43	3.38	67.50%	13	3.45	69.02%	17	3.22	64.31%	26	3.35	66.94%	16	HS-LA	HS-LA	HS-LA	HS-LA	LS-LA	LS-LA	LS-LA	LS-LA

Figure 8-3 Claims and Disputes Matrix (Group 2 and 4)

CASUSE OF CLAIMS & DISPUTES ASSESSMENT													Causes of Claims Code												
													Cause Controllability Importance Index												
													Cause Controllability Ranking												
													Cause Controllability Description												
													Cause Controllability Categorisation; Where, "HS-												
													Causes of Claims Rank												
TYPE OF CLAIMS & DISPUTES ASSESSMENT																									
DESCR	CODE	Frequency Avg. Mean	Frequency Imp. Index	Frequency Ranking	Impact Avg. Mean	Impact Imp. Index	Impact Ranking	Cause Avoid	Cause Avoid Imp. Index	Cause Avoid Ranking	CMF Avg. Mean	CMF Imp. Index	CMF Ranking	Preventive Techniques Ranking											
Variations	T19	4.08	81.63%	1	4.49	89.80%	1	3.80	76.08%	8	4.12	82.50%	1	C01	C02	C03	C04	C09	C08	C15	C18	C22	C21	C20	
Change of Design/ Design Omission / Errors b	T03	3.83	76.60%	2	4.20	83.92%	3	4.02	80.39%	4	4.02	80.30%	2	81.18%	78.43%	83.14%	82.75%	82.35%	68.98%	60.00%	63.60%	63.53%	55.69%	52.94%	
Delay/ Disruption to Regular Progress Due To	T26	3.82	76.47%	3	4.33	86.67%	2	3.62	72.40%	14	3.93	78.51%	3	4	5	1	2	3	6	9	7	8	10	11	
Ambiguity in Documents	T01	3.39	67.84%	11	3.73	74.51%	11	4.49	89.80%	1	3.87	77.40%	4	HA	HA	HA	HA	HA	HA	HA	HA	HA	HA	LA	LA
Unanticipated Soil Condition	T12	3.63	72.65%	4	4.00	80.00%	4	3.69	73.73%	12	3.77	75.46%	5	1	1	1	1	1	1	1	1	1	3	3	
Unforeseen Ground Condition/ Unforeseeable	T13	3.58	71.67%	7	3.96	79.13%	5	3.71	74.12%	11	3.75	74.97%	6	1	1	1	1	5	6	7	8	9	25	26	
Differing Site Condition	T11	3.63	72.55%	5	3.93	78.70%	6	3.67	73.33%	13	3.74	74.86%	7	1	1	1	1	5	6	7	8	9	25	26	
Change of Project Profile and Site	T09	3.55	71.02%	8	3.77	75.32%	8	3.76	75.29%	9	3.69	73.88%	8	1	1	1	1	5	6	7	8	9	25	26	
Rectification of Works/ Specification Change	T05	3.23	64.58%	16	3.61	72.16%	14	4.20	83.92%	3	3.68	73.56%	9	1	1	1	1	5	6	7	8	9	25	26	
Delay/ Disruption to Regular Progress Due To	T28	3.63	72.50%	6	3.88	77.50%	7	3.50	70.00%	16	3.67	73.33%	10	1	1	1	1	5	6	7	8	9	25	26	
Delays Due to Incomplete Design/ Insufficient	T02	3.35	66.94%	14	3.59	71.76%	15	3.94	78.80%	6	3.63	72.51%	11	1	1	1	1	5	6	7	8	9	25	26	
Delayed Site Possession/ Restricted Access	T10	3.38	67.60%	12	3.76	75.29%	9	3.73	74.51%	10	3.62	72.47%	12	1	1	1	1	5	6	7	8	9	25	26	
Extension of Time For Completion	T35	3.51	70.22%	9	3.74	74.80%	10	3.24	64.71%	25	3.50	69.90%	13	1	1	1	1	5	6	7	8	9	25	26	
Delay/ Disruption to Regular Progress Due To	T27	3.25	65.00%	15	3.63	72.50%	13	3.59	71.76%	15	3.49	69.76%	14	1	1	1	1	5	6	7	8	9	25	26	
Delay Disruption to Regular Progress Caused b	T31	3.49	69.79%	10	3.71	74.29%	12	3.08	61.57%	36	3.43	68.54%	15	1	1	1	1	5	6	7	8	9	25	26	
Default of Subcontractor, Nominated Subcontr	T43	3.38	67.50%	13	3.45	69.02%	17	3.22	64.31%	26	3.35	66.94%	16	1	1	1	1	5	6	7	8	9	25	26	

Figure 8-4 Claims and Disputes Matrix (Group 1 and 3)

Theses Data Are Based on The <u>Un Counted Causes (Not Valid)</u> (Based on There Significance % Defined @ The Top of The Matrix)										
Categorization Of The Significance & The Avoidable Causes Under Each Type of Claims & Disputes										
Number of Causes Under Each Category					Percentage of Causes Under Each Category					
HS - HA	HS - LA	LS - HA	LS - LA	TOTAL	HS - HA	HS - LA	LS - HA	LS - LA	TOTAL	CODE
9	3	15	5	32	28.13%	9.38%	46.88%	15.63%	100.00%	T19
5	2	19	6	32	15.63%	6.25%	59.38%	18.75%	100.00%	T03
9	4	15	4	32	28.13%	12.50%	46.88%	12.50%	100.00%	T26
8	1	16	7	32	25.00%	3.13%	50.00%	21.88%	100.00%	T01
8	2	16	6	32	25.00%	6.25%	50.00%	18.75%	100.00%	T12
8	2	16	6	32	25.00%	6.25%	50.00%	18.75%	100.00%	T13
8	2	16	6	32	25.00%	6.25%	50.00%	18.75%	100.00%	T11
9	1	15	7	32	28.13%	3.13%	46.88%	21.88%	100.00%	T09
7	0	17	8	32	21.88%	0.00%	53.13%	25.00%	100.00%	T05
13	3	11	5	32	40.63%	9.38%	34.38%	15.63%	100.00%	T28
12	2	12	6	32	37.50%	6.25%	37.50%	18.75%	100.00%	T02
11	4	13	4	32	34.38%	12.50%	40.63%	12.50%	100.00%	T10
20	5	4	3	32	62.50%	15.63%	12.50%	9.38%	100.00%	T35
13	3	11	5	32	40.63%	9.38%	34.38%	15.63%	100.00%	T27
13	4	11	4	32	40.63%	12.50%	34.38%	12.50%	100.00%	T31
16	4	8	4	32	50.00%	12.50%	25.00%	12.50%	100.00%	T43

169 42 215 86 512 5.28125 1.3125 6.71875 2.6875 16 0

33.01% 8.20% 41.99% 16.80% 100.00%

Significant Not Significant Total

33.01% 41.99% 75.00% Avoidable

8.20% 16.80% 25.00% Not Avoidable

41.21% 58.79% 100.00% Total

80.09% 71.43%

19.91% 28.57%

100.00% 100.00%

APPENDIX Z: SUPPORTING LETTERS (SCHOLARSHIP)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الإمارات العربية المتحدة
UNITED ARAB EMIRATES

LONDON EMBASSY
EDUCATION DEPARTMENT

سفارة لندن
المكتب الثقافي

AAM/jd

16 August 2004

TO WHOM IT MAY CONCERN

Dear Sirs

RE: NADHEM ASAAD ASAAD TAHER

This is to confirm that the above named is a sponsored student of the Ministry of Higher Education in the the United Arab Emirates, currently continuing with his postgraduate studies in the U.K.

This scholarship will pay his tuition fees and medical expenses. He also receives a monthly salary from his employers of £2,200.00

We have no hesitation in recommending this student to you as we feel him to be honest and trustworthy.

The Embassy of the United Arab Emirates Cultural Division trusts that this letter will meet your requirements for confirmation of support for the above.

This certificate is issued as a confirmation of the amount of allowances and does not imply financial responsibility for any debts or loans that may be incurred. Please note that we are unable to act as guarantor for any of our students currently studying in the U.K.

Yours faithfully


JO DENT
STUDENT COUNSELLOR

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الإمارات العربية المتحدة
UNITED ARAB EMIRATES

**LONDON EMBASSY
EDUCATION DEPARTMENT**

سُفارة لندن
المكتب الثقافي

DATE : November 12, 2007

TO WHOM IT MAY CONCERN

Embassy Reference : File Number : 7084/12 Card Number : 1955
University ID No.: 96107286
Re. : Nadhem Asaad Asaad Taher

This is to confirm that the above named student is sponsored by the Government of the United Arab Emirates for the academic year 2007/2008

This department is responsible for the payment of tuition fees, and to ensure the student has adequate means of support.

It is with our approval that this student continues further studies. Providing progress is satisfactory the sponsorship will be continued for the duration of studies.

Yours faithfully

JO PRITCHARD
STUDENT COUNSELLOR

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



الإمارات العربية المتحدة
UNITED ARAB EMIRATES

LONDON EMBASSY
EDUCATION DEPARTMENT

سفارة لندن
المكتب الثقافي

التاريخ ٢٠٠٣/٧/٣ م

شهادة لمن يهمله الأمر

نفيد بأن السيد/ناظم أسعد طاهر موظف لدي دائرة الأشغال في ابوظبي. ولديه
منحة دراسية من قبل وزارة التعليم العالي والبحث العلمي لدراسة الدكتوراه
والتخصص في إدارة المنازعات الهندسية من جامعة جلومورجان بالمملكة المتحدة.

الرجاء تقديم المساعدة له في كل ما يتطلب ذلك. وقد حررت له هذه الإفادة بناء
علي طلبه.

وتفضلوا بقبول وافر التحية والاحترام،،،

الملحق الثقافي

عبدالرحيم المرعي