Modelling Construction Client Risk Performance Using Organisation Behaviour Parameters

By

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Abstract

The role of client in inducing project risk has not been adequately covered and the construction industry. A focus on this aspect of risk should enable construction to square up the ‘risk circle’ for managing projects and contribute to the general development of risk management strategies for construction organisations. The thesis investigates the client role from an organisational behaviour perspective.

The aim of the thesis is to determine whether organisational characteristics influence risk management behaviour for the client, and whether these characteristics affect the project risk performance positively or negatively. The objectives of the research that underpin the thesis were three-fold. First it was to explore the organisational characterisation of the construction client in the management of risk within the project environment. Second, it was to establish the effect of the client’s risk behaviour on the project. Third, to identify the dominant parameters which affect client risk management, and to investigate the interaction between the parameters and the client’s risk management practices and attributes. Establishing such interaction will show how the parameters explain the nature and extent of risk transfer from the organisational into the project. It also facilitate the provision of a guidance to define the client organisational attributes that are sensitive to project risk, or those attributes that are not.

The study adopted a competing values framework on organisation behaviour that resulted in an elicitation instrument for testing the relationship between organisational characteristics and risk performance. Data was obtained by surveying a sample of client organisations who are actively engaged in procuring projects in the UK construction industry.

The outcome of the research showed that the parameters that are represented in the competing values framework (namely, Open system, Rational model, Internal process, and Human resources) affected the risk practices and attributes of the client in different ways. The outcome specifically showed that the Rational Model has a significant positive influence on risk performance while the Internal Process has a significant negative influence on risk performance. Both the Open system and Human resources showed insignificant influence.

This supports the notion that construction risk is part of a functional system that extends to the client risk performance and that the client organisational characteristics contribute to the risk behaviour within the construction project. The thesis offers two very significant contributions to the body of knowledge that underpins the management of risk in project and construction organisations: namely, the contribution to the level of risk made by the client organisations should form part of the considerations in any project appraisal; and the risk contributions by the client should address the Rational model and Internal process contexts of their organisation.

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1 Chapter One: Introduction

1.1 Motivation for the Study

The role of the client has not been adequately put into the equation of managing risk in the early stages of project comparing to other factors affecting risk. Addressing this role in depth and identifying generic features of the client's risk management is where the focus of the study lies. The research investigates clients' history in managing projects in terms of perception of risk, organisational behaviour and the performance of clients during the project.

The importance of this research comes in at a time when the image of construction has taken some negative comments. For example, a survey of construction clients in the UK showed that about a third of the projects were delivered both late and over budget and two thirds were late (Morledge, 1999). This budget and schedule growth has frequently been associated with the construction industry. Klemetti (2006) has argued that the cause of this unsatisfactory performance is due to a failure to recognise or estimate the risks adequately, especially in capital projects like the new Wembley Stadium completed in 2007 and the Scottish Parliament building completed in 2004, as these projects are more sensitive to economic and market changes. On the other hand, there were some successful stories like the BAA Terminal 5 building (T5).

Financial institutions have high concerns toward controlling and estimating the large financial risks accompanying construction projects (Akintoye and MacLeod, 1997). This has caused large lemon gap in the funding strategy. Decreasing the lemon gap by introducing comprehensive understanding of the risks will increase the investment, and provide a healthier environment in the construction industry (Koh, 1998). There is a need to develop acceptable statistical models the theoretical tools that function beyond the traditional theories commonly used (Edwards and Bowen, 2004).

There is a view that the social responsibility of any business is to increase its profits, hence the client perception toward the construction project is mainly financially based. The outcome provides other bases for client perception than the common financial one. The research shows that the responsibility of the client toward its stake holder transfers to the project, the same with financial responsibility. This can affect the client judgement in managing risk.

There is more to investigate under the dome of financial risk. As clients are consumers of financial borrowing, they would have developed a learning curve in managing their finances in the developing stages. This research build a general picture of what the client assumes as normal within different levels of complexity and dynamism of different projects. The work underlines the worries regarding the limitations of the client in predicting not only the project behaviour, but also itself behaviour.

The research focuses on the organisation structure and behaviour of the client and how this reflects on client approach to managing risk in a construction project. The trigger for this research is the continuous predisposition to refer to the client as an incorporated and cooperative body which always acts in the right direction always and precisely knows what it is doing. There are many layers within the client organization which cannot be always looked at as united proficient body.

The characterisation of the client by adding new variables to the risk helps the clients to establish a better risk assessment toward the project by including the client efficiently. The client analysis helps clients to understand their involvement in the project and develop their approach toward risk in construction projects.

The outcome identifies the behavioural patterns of the client which are responsible for inducing risk, the results is particularly useful if there was a strong relationship between clients approach to managing risk and the outcome of the project. This relationship should enable managers and investors to link the behavioural pattern and organisational style of the client to the risks associated with projects

The thesis discusses in general the principles and application of risk management in the construction industry, and specifically in what is related to the financial risks in the design stage. The purpose is to establish more developed models and applications to establish an organisation analysis, and risk mitigation strategy. Many case studies show a failure to recognise or estimate these risks especially in capital projects, as these projects are more sensitive to economic and market changes (Tayles *et al*., 2002). There is an understanding for these problems in the scale of the project itself, and assessing the surrounding environment including the macro-economic environment has been covered comprehensively. However, elements relating to the client organisation structure have not. There is a necessity to discuss the different models and the contributions to overcome these risks, and how successful were these approaches.

It would be important to achieve an outline to a specific framework for optimum risk performance for the client. This framework represents a cross control between increasing the client chances of financial gain and exporting the risk to the contractor rather than increasing the overall risk of the project.

Clients would be helped to establish a better risk assessment toward the project by developing of the way client characterisation is approached. The client analysis helps clients to understand their involvement in the project and develop their approach toward risk in construction project.

It is recognised that the client approach the projects in term of a financial investment, and that the contractor cannot deny the financial reasons which drives the behaviour of the client in the project. However, the work assumes that there is more into the client behaviour than just financial drive pressured by individual characteristics.

The research message falls under the general perception that change means a risk, and applying changes to construction project cannot be based on economic reasons only. There is an understanding that in long term decision, too, the organisation needs to take in consideration the decision development from the pyramid base to its top, rather than just adapting top to bottom decisions. This will cause a healthy development of the client organisation culture, which will create a suitable environment with lower risks. In addition, postponing solving problems is dangerous and relying on contracts to bypass risk is unlikely to bring a happy ending.

To summarise, the motivation for this research stands with first helping clients to understand their involvement in the project and develop their approach toward risk in construction projects, second helping contractors to evaluate the client risk attitude, and third to improve risk performance for the client within the construction project.

1.2 Background

The client behaviour is considered as a rational decision because our knowledge of the power dynamics will conclude that when there is a power struggle the party with the stronger hand will win, and as the relationship between the contractor and client is seen as a power struggle cultures that takes an averse attitude to risk, those organisations will seek to decrease the power of the other party. This is where the rational process is different from the basic line to process, as the problem is not in defining rationality, but in defining the optimum place for both the power position for the client and contractor and the optimum allocation for risk.

Where the project gets adapted, the contribution of the client becomes crucial starting from the preliminary phase, as at this stage the notion of uncertainty becomes inherited in the project. However, the recommendations which have developed based on the experience of the industry are not client specific, it can fail on some level to recognise the risk involved with a specific category of a client.

The client's role in this correspondingly is important, when it comes to the clarity of the objective of the project, when it comes with communicating with the structure of the client, and when it comes to the induced risk when change happens to the plan of the client. Clients' priorities toward the objectives of the project rather than the systemic efficiency of the project itself are a recipe for high risk project.

The clients are the financial source of the project, and with that they have strong bargaining power over all other parties in the project once the contract has been signed and the project is on its way. The strategic management process of a client that does not attempts for high reliability and crisis attentiveness, is a failing strategic management process and will lead to an induced risk for the project.

With risk management being a modern management strategy, it is still going through development, the development covers the territorial aspects of positioning risk between the client and contractor, this had broaden the idea of risk management and we are trying to engage with another layer of that management strategy that goes beyond the project itself and into the organisational behaviour of the client itself.

The strategy is more of an individual characteristic of the organisation. Quinn (1981) had solved the integration between the organisational structure and the organisational layering to analyse the relationship of the organisation with the internal and external forces. To integrate a risk management within the organisational structure, you get to connect every variable from the risk strategy models (structure, strategy, and culture) with every variable of organisational structure (structure, strategy, context, effectiveness).

1.3 Key Questions

The background to the thesis raises two very important questions the resolution of which should provide some useful contributions to the client risk conundrum.

Q1: How does the competition between the different values of the organisation affect the client risk performance?

The argument is that clients would see their cultural shape as a default shape for behavioural management. As in within all those competing forces, there is a specific shape which can be representative to the company. This is true to some extent, as we see that while organisations can be described within a zone of the competing values model, in the end, each company has its own cultural shape, regardless of how subtle the differences are. Power (2004), Perminova *et al*. (2007), Kramer (1999), and Rashid (2011) work have supported the rational elements for a better risk management performance.

Choosing appropriate clients can be more important that just satisfying them, unstable clients can cause huge losses during critical funding stages in the project. In addition, for a business-to-business relationship, as most of the large companies have with other major companies, both of the businesses need to succeed for a long-term profit, or that market can decline leaving the company with expensive unused resources.

In some cases it would appear that clients possess an implicit paradigm of practice, however logical, but which they would apply in the absence of real engagement of project risk. The argument is that clients act partially in accordance with a pre-determined set of expectations and procedures which they acquire from previous experience in their organisation management field. Investigation of the contractor after the bedding process is finished and reliance on the pre-qualifications of the contractor takes precedence.

In mirror perspective, the contractor will have a pre determent view of the client based on the organisational presentation. If that is true, then the contractor will have to deal in high difficulty with pluralistic clients who do not present a specific organisational structure or a combination of different structures. However, there is an assumption that the client is unitary and unformed in its organisational image, and that would be the majority cases because conflict between different cultures within an organisation will cause problems for any management. When two organisations are joined, or there is a takeover, one of the first recommendations is to unify that culture within the whole organisation.

As management theories emphasises that a unitary organisations will have a higher success rate in managing itself, let alone managing investment projects, it can be concluded that these are unitary clients cases.

Q2: Which behavioural values have stronger effect on the client risk performance?

Pervious work into rational model had linked performance goals to rationality. For example DeGraff and Quinn (2007) analysed the implementation of the competing values on general companies' growth and market performance. They found out that the rational model is goals based. DeGraff and Quinn (2007) describe the environment by which rational elements are important, it's when Shareholders demand are the primary driver, there is aggressive competition, and markets change from mergers and acquisitions, investors demand quick results. Baccarini *et al*. (2004) and Matook (2007) described how deviation from goals and lack of information about requirement is a high risk factor. With information showing that the outcome of most construction projects has been unsatisfactory in term of cost and time there was a need to address the reasons for that problem and address ways to manage it. The reason for that unsatisfactory performance has been attributed to the failure in the way risk has been estimated. Research showed that client has a responsibility to address that risk and mitigate it. However, it is the ability of the client to manage that risk is what concerns this thesis most.

What should have been obvious is that experience would be a satisfactory condition to define our clients. Are those clients the types which simply address their project in financial terms or would they expand their analyses to a multi layered management of the whole process to make sure that every part of the project procedure does fall under the mishaps of high risk factors?

They say "practice makes perfect" is not an efficient strategy in construction projects due to the costly manners of those projects. Failure in delivering will create such a huge financial burden that can financially destroy an organisation, and when it comes to the public sector, it will burden the tax payer. Then you have the legal problems which arise as parties start accusing each other of causing the failures, and with many players get involved in any project at a large scale the more complex the legal action and the higher the costs are.

So it is not a surprise that generally there is a lack of trust between the contractor and client, where the client assumes that the contractor is planning to increase the expenses dramatically, and the contractor assumes that the client is planning to cut the costs on the contractor's expense. Eventually each part will try to position the risk to the other party regardless of the consequences. A part that handles risk would be less engaging in the project and will be drown into the reactive attitude toward risk rather than being a proactive.

As this thesis discusses the influence of the client, we will exclude unmanageable environmental factors or disasters caused by contractor's ill-conceived decisions. When we take a closer look at the causes, an ill-defined and ever changing goal turns out to be one of two immense causes of failure, which can both be traced back to poor executive project ownership.

1.4 Overall Aim and Objectives

The review into the literature of risk shows that numerous methods are available to address the risks and assess them at early stages, for example analytic hierarchy process (Mustafa and Al-Bahar, 1991), risk management processes (Tummalaa and Burchett, 1999), and fuzzy logic (Tah and Carr, 2000). However, the roots of these risks need further investigation, particularly regarding the role of the client in inducing these risks. There is also a need to consider the type of project as well as the type of risk when choosing the appropriate method.

The aim of the research is to investigate the relationship between organisational behaviour and risk attitude in construction clients.

The need for the research comes from the fact that the client plays an important role in the project development as one of the main stakeholders in the risk management process. The client would usually act as the final decision holder, and the decisions the client make will have a great impact on the project.

It is recognised that the client approach the projects in term of a financial investment, and that the contractor cannot deny the financial reasons which drives the behaviour of the client in the project. However, the work assumes that there is more into the client behaviour than just financial drive pressured by individual characteristics. Addressing the risk is a complicated process that has to be systematic. However, theories have a problem in coming out with good success rate when practiced on ground, especially that more than one partner plays a role in inducing the risk. Overlooking the effect the client has on inducing risk will have a regretful impact on the strategy the project manager has to manage the risk.

The role of the client starts from his background which is affected by cultural and organisational influences and this might drag his attitude toward risk into real practice in the project. This rule might have been undervalued due to lack on interest of the clients to take responsibility in managing the risk, but the changes in technological and financial tactics in construction could bring that role under stronger investigation. Managers can use these investigations and the outcome of these studies to improve their methods in dealing with the complexity of managing risk and reducing it in early stages. There is more to investigate under the dome of financial risk. As clients are users of borrowing, they would have developed a learning curve in managing their finances in the developing stages. This research builds a general picture of what the client assumes as normal within different levels of complexity and dynamism of different projects. The work underlines the worries regarding the limitations of the client in predicting not only the project behaviour, but also itself behaviour.

From this perspective it is recognized that the client should be able to recognise the best options to decide on. It is accepted that the main source of these options come within the project itself, usually with the help of the project manager who is responsible for managing risk within the project. .The research shows the flaws in accepting this relationship as the norm with no regard to risk perception of the client, which plays an important role even during the initiation of the project. Risk management, in the context that combines the essence of business success and engineering practical achievement of the project, is about reducing the cost of risks, and the cost of managing these risks.

This can be seen as a reflection of adding value to the product, which is the project itself. A project that is risk free does not exist; the same applies for a total elimination of the risks (William, 2000). However, we need to decrease the chance or the cost of that risk. This cost is so important, especially to the business investment, as it add dramatically the total cost of the project. Balancing the expenses and chances of these risks can save substantial amount of money, especially if it is managed and decided in an early stage (Adler, 1999). Managers reflect their understanding of risk management using the concepts of return, risk, and ruin. They are familiar with the fact that counter measures, even if they are nicely designed, are not always successful in the real world.

After the experience of financial disaster in some big projects, they recognise the significance of strategic implementation driven by strategic management strategies, rather than “just in time” practices, especially when you cannot find a fast funding source for the project. Besides, the improvement of these measures can be done by introducing the financial problem into the design stage as a part of a strategic benefit, and not only a problem solving style of solutions (Duffey, 2000).

Therefore the objective of the research can be summarised as follow:

1. explore the behaviour characterisation of the construction client in the management of risk within the project environment;
2. explore the importance of client behaviour on the project risk;
3. identify the values which affect client risk management;
4. investigate the importance of these values in affecting risk management practices and attributes;
5. show how those parameters transfer risk performance from the organisational into the project; and
6. provide an outcome in term of a guidance to define the client attributes that are sensitive toward project risk, or attributes which are not initially sensitive within a project.

This study explores the behaviour characterisation of the construction client in the management of risk within the project environment. The client and the contractor have their own approach to risk assessment to the project. However, due to the different relationship the client and the contractor have with the project, the way this assessment is implemented as a practical risk management can be different. The research investigates the importance of these differences in affecting risk management practices and attributes.

The research reduces some barriers between the client and the contractor by designing a healthier environment of risk management in the construction industry. It explains how each side, the client and the contractor, understands the other's position. It explains why the construction industry, which behaves conservatively toward risk, still inherits many of the risks into its projects. The study investigates whether clients have a generic risk management approach in the conceptual stage of the construction, and how this plan influences risk management and risk levels during the project. The research investigates the different approaches clients have toward assessing risk during the concept stage. If there is a generic theme, the research recognises how actively this approach induces risk of the project.

The study differentiates between risks induced by the client sourced within the organisation and transferred to the project, and the environmental risks, inherited within the project, where the client have to manage in a way or another. The research covers a range of resources which illustrate the definition of risk and the role of clients in managing the risk. The resource provides the work of previous work into the area and base the notion of where the investigation starts. Knowing the experience in the area of risk management provides an understanding of the limitation of studying the construction environment and studying the client.

The study provides an outcome in term of a guidance to define the client attributes that are sensitive toward project risk, or attributes which are not initially sensitive within a project but at a certain point will become so. Finally, the research produces recommendations based on the outcomes which can be implemented on the client role within the project. The proposed recommendations provide healthier terms in regard to the client relationship with the project and introducing a comprehensive understanding of the risks.

To achieve the set aims and objectives, the following methods are pursued:

1. Comprehensive literature review to cover the themes of construction management, risk management, clients, organisational behaviour, and cost and time overruns. This review helps to identify how risk is managed and what role the client has in managing this risk. It should explore different theories regarding organisation behaviour, strategy, and the how is the client is analysed in the industry.

2. Explore the clients' history in managing projects using some high profile examples. This will provide an understanding of how important the role of client decisions in the project and how these decisions will reflect on the outcome of the project in term of project objective. This also provides a framework of the connections between the client and the project operations.

3. Investigate a feasible sample or client organisations and detect the common styles of organisational behaviour of the clients. This provides an image about the background of the client to identify any variables which will result in inducing risk within construction project. This defines the characteristics of the clients by extending the common perceptions about client risks to other underestimated elements.

4. Interview personals responsible of identifying the risks of the project to the client. This will help finding inherited risks from the client performance to the project separated from the environmental risks associated with the project. This will show whether the influence of the organisational style of the client in decision in identify and manage risk in project

5. Evaluate the characteristics of client behaviour in term of affecting the risk of construction projects. This evaluation will offer a better understanding for the way risks are induced and transferred into problems within the project as in time and cost overruns.

The outcome demonstrates the relationship between the organizational characters of the client and the client generated risks. The research demonstrates the extent to which the organized structure of the system managed by the client facilitates the rapid and uncontrolled multiplication of undesired events and therefore induces risk within the project. This will show whether a client organization system can affect its ability of the project to recover from miner failures before they grow into larger problems as in time and spending growth.

The outcome shows a generic behaviour characteristics and these characteristics should have a valid relationship with the way risks are identified and managed in the project. The characteristics should have valid relationships with hidden risks new to the known project environment, for example the time it takes for risk management decision to take place, or how conservative the view is toward risk.

A visual mapping of the objectives and the methodology is demonstrated in Table (1-1).

Table 1-1a Research map

Aim	Investigate the relationship between organisational behaviour and risk attitude in construction clients.					
Objectives	**Tasks**	**Phase**	**Methodology** Stage	**Chapter**	**Output**	**Papers**
1-Identify how risk is managed and what role the client has in managing this risk	to cover the themes of construction management, risk management, clients, organisational behaviour, and cost and time overruns	Synthesis	Primary information gathering	2	literature review	ARCOM Conference: Does client behaviour actively induce risk in construction project?
2-Explore different theories regarding organisation behaviour, strategy, and the how is the client is analysed in the industry	case study analysis		Primary information gathering	3	literature review	AEC Conference: Is There A Need To Re-Evaluate The Client's Approach Toward Risk In Construction. Projects?
3-Understand of how important the role of client decisions in the project and how these decisions will reflect on the outcome of the project in term of project objective	Study the personals responsible of identifying the risks of the project to the client.		Primary information gathering	4	literature review	CIB Conference: Role of client behaviour in the risk environment in construction projects.

Table 1-1b Research map (continued)

Aim	Investigate the relationship between organisational behaviour and risk attitude in construction clients.					
Objectives	**Tasks**	**Phase**	**Methodology**	**Chapter**	**Output**	**Papers**
4-Identify a framework of the connections between the client and the project operations.	investigate a feasible sample or client organisations and detect the common styles of organisational behaviour of the clients	Investigation	Primary information gathering	6	Questionnaire	
5-find inherited risks from the client performance to the project separated from the environmental risks associated with the project	show whether the influence of the organisational style of the client in decision in identify and manage risk in project		Secondary information gathering	6	Interview	
6-evaluate the characteristics of client behaviour in term of affecting the risk of construction projects	understanding for the way risks are induced and transferred into problems within the project as in time and cost overruns	Application	Evaluation of information	7&8	Discussion and conclusion	

1.5 Scope of the Study

In pursuing this research the focus of attention is on the construction clients involved in construction projects and the construction project itself. The construction client is consequently the unit of analysis. Therefore the research covers private and public sector organisations, civil engineering and building projects, as well as the different types of facilities (for example health, commercial, and education). The study focuses on construction clients including the private and public sector and across the UK to ensure that potential dissimilarities due to the national environment are controlled for and kept uniform as much as possible, and to ensure that findings reflect the general trend across the UK.

The statistical data were collected using a survey method from the client sample of 53 intuitions.

1.6 Research Approach

The first stage was a desktop literature review research. The literature review involved having a framework and importing theories used in business schools for analysing operations in organizations and then trying to reflect them on the construction projects.

The second stage focused on developing the survey and the investigation the information needed is gathered from the following scholars who did their work in a similar field, particularly in international business and on how global corporations conduct their deals with their customers. The purpose is to give insight into the construction business from the pure business management perspective.

The third stage focused on surveying the client and investigating their projects, the information were be gathered from the survey of client representatives, usually from risk portfolio managers or people who are involved in how the organisation manages its risks.

The fourth stage is based on feedback on the results which were obtained by contacting a client and a contractor. After collecting the data, all generic elements regarding client behaviour can be classified and they are connected to their consequences. Measurement of the element depended on the consequences and their status within the project. For example, the research was looking at the linear interactions within any logic in defining risk within the construction project. The research identified those elements which are expected by either a familiar production or maintenance sequences to induce risk, as risk can be in a visible form but unplanned, or in an invisible form.

An association between causes and outcome system showed which generic behaviour is associated with high risk and which is not. After filtering these elements based on their relevance and their potency, a framework was developed and then compared with frameworks used by other approaches in characterising clients.

The background to the research lies in the need to develop a good model to characterise clients which integrates construction management theories especially in the area of risk management and business strategy theories especially in the area of organisation behaviour. As the research review progressed, a growing realisation appeared that insufficient was known about the nature of client generated risks.

Developed cases which had a controversial relationship between the client and the project proved to be an ideal source of the required thoughts. Other than special cases where the environmental risks were disastrous, there is a growing concern by the part of the contractors of the influence of the client in inducing risk within the project by either miscalculating the situation the client is putting the contractor in.

This miscalculation becomes critical during providing the initial information of the project to the client or during any changes that happen to the project. Whether these worries are caused by failing to appreciate the nature of the complexity of different projects or by inherited problems within the organisation of the client, this has to be addressed by studying the nature of the client himself and his experience.

1.7 Key Findings

The research has established a number of significant findings that should help to promote improvement in the way the construction views risk and its management. The client plays an important role in inducing risk in construction projects. The role of the client starts from his background which is affected by cultural and organisational influences and this might drag his attitude toward risk into real practice in the project.

The research found that the client has a role that affects the risk management practices in the construction industry. The role of the client extends to both inducing and preventing project risk which makes assessing that role an essential part of any project appraisal.

The research also established that there is a strong relationship between organisational behaviour parameters and the risk performance of the client. The essential parameters that determine organisational behaviour are Human Resource (**H**), Open Systems (**O**), Internal Process (**I**), and Rational Model (**R**) and can be represented as a competing values framework.

The modelling of the relationship between the competing values and the risk performance showed that the interaction linking the two sides of the relationship is linear and can be represented by the following mathematical model.

$$RP = -0.037H - 0.027O - 0.454I + 0.74RM$$

Where:

RP is Risk Performance, **H** is Human Recourse, **O** is Open Systems, **I** is Internal Process, and **RM** is Rational Model

The model that has emerged from the analysis showed that the parameters represented in the competing values framework (namely, Open system, Rational model, Internal process, and Human resources) affected risk practices and attributes of the client in different ways. The outcome specifically showed that the Rational Model has a significant positive influence on risk performance while the Internal Process has a significant negative influence on risk performance. Both the Open system and Human resources showed minimal negative influence.

In short, the significant positive contribution of the rational model (R) establishes the point that the more an organisation has *clarity of goals*, *clarity of implementation* and *clarity of authority*, the better its risk performance would be as a client. Conversely, the significant negative contribution made by the internal process (I) indicates that the more an organisation relies on *rules and regulations*, and *formalised plans and procedures* to manage risk, the lower its risk performance is as a client. The significant negative influence explains the loss of flexibility and a leaning toward reactive mode in the management of risk.

1.8 Thesis Structure

Chapter One: Introduction

The chapter presents the underlying research questions, which were be examined in this dissertation. It will define the concept of construction client and its influence to give an understanding of the main theory in the beginning of the research. It also provides a background of the thesis and its importance, including the reasons for choosing the topic. This chapter also identifies the objectives and the scope of the research including a definition of the sample. The chapter reviews the organisation of the thesis and the key findings of the thesis.

Chapter Two: Risk Management

The chapter covers the concept of risk management in terms of the factors associated with it and how it is implemented within the project. The chapter summarises the work investigating the theoretical background for risk management and how successful the practical implications were.

The objectives of this chapter are divided into three sections: to demonstrate how the project management team evaluate and categorise the risks associated with the project, to show how there are many factors that plays balancing roles in defining those risks and how they are prioritise, and to show the limitations in the way risk is managed and the need to widen the understanding of how risk is managed beyond the traditional means.

Chapter Three: Client Role in Managing Risk

The chapter covers the client role in managing risks in the construction industry, and investigates if the role of the client has not been adequately put into the equation of managing risk in the early stages of project comparing to other factors affecting risk. It also addresses this role in depth and identifies generic features of the clients' risk management. It investigates the clients' history in managing projects, in terms of perception of risk, organisational behaviour and the performance of clients during the project. The chapter shows the flaws in accepting this relationship as the norm with no regard to risk perception of the client, which plays an important role even during the initiation of the project.

The chapter investigates if the role of the client has not been adequately put into the equation of managing risk in the early stages of project comparing to other factors affecting risk. The chapter addresses this role in depth and identify generic features of the clients' risk management. It investigates the clients' history in managing projects in terms of perception of risk, organisational behaviour and the performance of clients during the project.

The chapter covers the relationship that could enable managers and investors to link the behavioural pattern and organisational style of the client to the risks associated with projects.

Chapter Four: Managing Risk in Projects

This chapter covers the management of risk projects and discusses the influence of organisation behaviour on the way risk in managed in construction projects.

The chapter covers the elements of an organisation and how is that relevant to the way the organisation manage its own projects. The construction industry has some distinctive project characteristics which makes the elements of any organisation important. Those elements that define what the management looks like are presented in this chapter. The chapter talks about the importance of resource management, and how can that effect the financial situation of the project.

The chapter covers the concept of leadership, and how the hierarchy system affects the speed of the decision making, and how relevant it is to feedback. The chapters covers the concept of commination and how the social interaction is the elemental means through which the business of the social world is transacted, the identities of its participants are affirmed or denied, and its cultures are conveyed, renewed, and modified. It showed that through processes of social interaction, shared meaning, mutual understanding, and the coordination of human conduct are achieved. The chapter shows the importance of those elements in defining risks and managing them.

Chapter Five: Methodology

Identifies the methodology and limitations of the research, the process by which the data was collected, the criteria by which the sample was chosen, and the research strategy of the research. The research in this case is a quantitative research methodology, with aspects of the qualitative approach incorporated to support and improve the research design. This chapter also present the risks and problems the researcher has faced in the process of making the dissertation. Arguments are presented justifying this choice of a conciliatory approach and the specific research methods applied to collect data. The data collection process is detailed in this chapter.

Chapter Six: **Data Analysis**

The chapter deals with the data collected and the analysis, it also deals with the feedback on the data using the semi structured interview. It starts by explaining data collection, its sources, the construction of the questionnaire and testing its procedure. The chapter presents an analysis of the data on the organisational orientations of these project organisations and gives an overview of the general organisational profile of project organisations working within the UK.

The chapter presents further evaluation to identify differences in the organisational orientations of the project organisations is also presented. The relationships between risk performance and the cultural orientations within the sample are examined, and inferences are drawn.

Chapter Seven: **Discussion**

The chapter presents and explains the results of the study. It explains the answers got from the questionnaire and the relevance to the objectives of the study. It tries to find the motives and drivers of the replies given and validate its useful data in explaining the reaction of the company to the market. It presents the results of the assumptions and compares it with the data given.

The extent to which the findings reported in a research study can be approved relies on the process of justification undertaken to confirm (or disconfirm) the findings of the research. The chapter describes the justification process that was undertaken in respect of this research, and the conclusions drawn from the findings.

It discusses what makes a successful strategy to accessing risk. As this thesis is about the client, the discussion tackles the lessons learned about the role of the client and debates how this role can become more effective in managing risk.

Chapter Eight: **Conclusion**

The chapter summarises the main findings of this study. Then it answers two questions: What impact has the client organisation, especially the organisational behaviour, on risk? And how well different model behavioural models operate in a construction risk management environment? The chapter presents a critical reflection of the entire research process, highlighting the limitations of the research and aspects where there is potential for improvement is provided. The chapter concludes with some recommendations for construction industry practitioners, and some recommendations for future research.

2 Chapter two: Risk Management

2.0 Overview

This chapter covers the concept of risk management in terms of the principal considerations associated with the term and how it is implemented within the construction and general projects. It draws predominantly from literature to establish what the principal concepts are. The chapter also explores work that addresses the theoretical background on risk management and the practical implications for successful exploitation of risk management solutions.

In addition, it presents a discussion of essential terminology on risk management, risk classification, perception, analysis, identification, and allocation to set the right tone for the rest of the thesis. This is achieved by exploring firstly, the relationship between risk and the project objectives, secondly, the relationship between risk and the organisation character, and thirdly, the relationship between risk and uncertainty. The last section covers and limitation of the current approaches in identifying risk.

The overall purpose of the chapter is to demonstrate how the project stakeholders evaluate and categorise the risks associated with the project and how different category of factors contribute to defining overall project risks. It also addresses how risks are prioritised, and the limitations in the way risk is managed and the need to broaden the understanding of how risk is managed beyond the traditional methods and practices.

2.1 Background on Risk Management

A survey of construction customers in Britain showed that about a third of the projects were delivered both late and over budget while two thirds were delivered late (Morledge, 1999). Klemetti (2006) argues that the cause of this unsatisfactory performance is due to a failure to recognise or estimate the risks adequately, especially in large budget projects, where these projects are more sensitive to economic and market changes.

Understanding the responsibility of the clients toward its stake holders as their financial responsibility will enable us to understand what clients transfer to the project in their judgement in managing risk. This responsibility has been restricted by the general view of social responsibility of any business to increase its profits, as Simon *et al.* (1993) survey showed that in case of inexperienced clients, the client's responsibility toward the construction project is mainly financially based, and that responsibility expands as the client gains experience. Gaining this experience can be costly, as the construction project is a time and cost-bound quality entity, and constraints in projects can cause undesirable consequences which are not supportive of the goals of the project (Murphy *et al*., 2011).

Addressing those consequences is within the territory of risk management. However, the concept of risk management applied to project and organization has only been recent. Kwak and Smith (2009) explains that while there has been a wide range of literatures discussing risk management within the domain of project management since the mid-1990s, more recently researchers consider risk management from a broader perspective. This perspective incorporates opportunity management and uncertainty management to have better management and stakeholder buy-ins (Kwak and Smith, 2009).

The review into the literature of risk shows that numerous methods are available to address the risks and assess them at early stages, for example analytic hierarchy process (Mustafa and Al-Bahar, 1991), risk management processes (Tummalaa and Burchett, 1999), and fuzzy logic (Tah and Carr, 2000). However, the roots of these risks need further investigation, particularly regarding the role of the client in inducing these risks. There is also a need to consider the type of project as well as the type of risk when choosing the appropriate method. The resource provides the work of previous work into the area and base the notion of where the investigation will start. Knowing the experience in the area of risk management will provide an understanding of the limitation of studying the construction environment and studying the client.

2.2 Risk Classification

2.2.1 Risk Terminology

Risk is seen as part and parcel of construction projects, where two key stakeholders, contractors and consultants are considered the *originators*, *mitigators* and *managers* of risk. Construction risk is generally perceived as events that influence project objectives of cost, time and quality.

In dictionary definition terms 'risk' means: ''hazard, chance of bad consequences, loss, exposure to chance of injury or loss '' (Concise Oxford Dictionary). Such definitions illustrate one problem with the term ‘risk’—its ambiguous use as a synonym of probability or chance in relation to an event or outcome, the nature of an outcome, or its cause (Ward and Chapman, 2003). Ward and Chapman (2003) argued for abandoning use of the term ‘risk’ altogether, stating that the term ‘risk’ is an obstacle to improved decision and policy making. Its multiple and ambiguous usages persistently jeopardize the separation of the tasks of identifying and evaluating relevant evidence on the one hand, and eliciting and processing necessary value judgements on the other. Ward and Chapman (2003) add that the term ‘Risk’ contaminates all discussions of probability because of the implicit value judgements that the term always brings with it, just as it contaminates all discussions of value assessment because of the implicit probability judgements that it contains.

Risks in construction projects could severely constrain the primary objectives – time, cost and quality (Willmer, 1991). The inability to secure these project objectives could have dire consequences for all the project stakeholders. This would include (Visser and Joubert, 2008):

- additional costs not originally budgeted for and hence a lower return on investment to the client;
- loss of revenue to the contractor due to imposed penalties and loss of future jobs because of a damaged reputation;
- additional rental costs, increased material costs, increased cost due to poor, quality and prohibitive operating and maintenance costs to the end-user; and
- loss of confidence by the client could have professional repercussions to the project professional.

The categories of risk for the construction business can presented as three bands inside a circle called the Marsh “risk universe” as illustrated in Figure (2-1). The risk universe is all risks that could affect an entity. The figure divides the risks into being externally driven and internally driven, with relation to the environment created within the organisation and one existing outside the organisation. Those four bands (strategic, financial, hazard, and operational) will integrate with the circle.

Figure 2-1 Risk universe adapted from Vikela, 2006

Table (2-1) provides a detailed example of how these forces can be divided into those different groups by using examples of common influencing risk factors. We notice that all the three bands are subjected to those drivers.

Table 2-1 Marsh universe

Quadrant	Inner Band	Middle Band	Outer Band
Financial Risks	Pensions Warranty issue Asset values Liquidity/cash flow issues	Financial markets Patents Credit default Foreign exchange fluctuations Global economic conditions Tax & accounting changes	Treasurer Financial Director
Strategic Risks	Time of market Research & Development Compliance Intellectual capital	Brand & Image Competition Mergers & Acquisitions Customer/Industry changes Joint ventures	Public relations Managing Director Board
Hazard Risks	Contractual liability Business continuation Public liability Employee safety	War & terrorism Fire & natural disasters Property damage Security	Risk Manager Health & Safety
Operational Risks	Information systems Key staff Staff attraction & retention Accounting systems & control Legislative compliance	Supply chain Utility supply Environmental issues Industrial action	Legal Officer Operations Manager Human Resources

Risk management can be defined then as a procedure to control the level of risk and to mitigate its effects. The generally recognised steps entailed are risk identification, risk analysis and risk response (Cooke, 1996). This shows that the project risk assessment process is a logical one. A general view of that process is shown in Figure (2-2), which describes how risk is identified and defined within the logical process. The decision making process follows a logical pattern by eliminating unnecessary routes (Dawson, 1997).

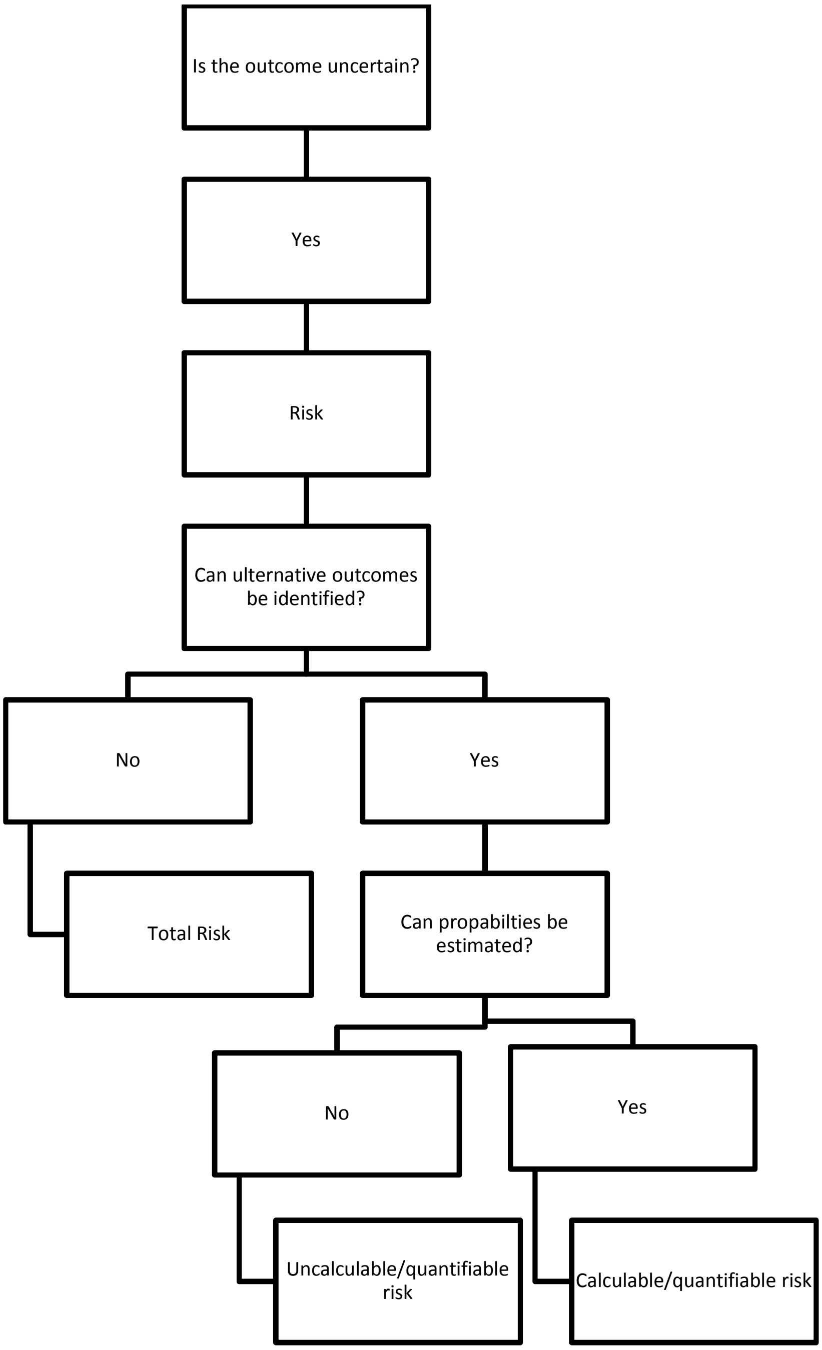

Figure 2-2 Project risk (adapted from Mustafa and Al-Bahar 1991)

Managing risk is defined (Tehranchi and Flanagan, 2006) as systematic risk assessment and management process that is staged as initiation, analysis, allocation and then response. Risk measurement is defined (Bryde and Volm, 2009) as the estimate and analysis of the possibility and time of occurrence, the influence, the severity of the consequences of risk factors. It is one of the most important phases of risk management after risk identification. We can get the influence probability, coverage and degree of risk factors through risk measurement, so can we have a. overall grasp of the occurring risk factors, and then control them (Bryde and Volm ,2009).

2.2.2 Risk Procedure

Before a company's decision to proceed with a construction project is made, it is essential that a proper appraisal of the project is undertaken. In the case of a commercial development, an assessment must be made of the business advantages of the project, and the various constraints and risks which are involved (Siehler, 2002). For a public project, there may be no marketable `output', in which case the financial analysis will be concerned with cost/ effectiveness rather than the return on funds invested (Uher and Toakley 1999).

The construction industry in particular has been slow to realise the potential benefits of risk management. There are reasons why risk management, particularly risk analysis, has not been used more effectively in construction. There are `cultural issues' such as lack of knowledge, negative attitudes and mistrust of risk analysis as being the main reasons preventing its greater use. The limited use of risk management in construction is surprising considering the presence of risk and uncertainty in every phase of the project development cycle (Uher and Toakley, 1999).

Financial implications arising from the exposure of the key project stakeholders to the presence of risk are often underestimated or even disregarded in an attempt to make the project viable (Uher and Toakley, 1999).

This results in a very limited appreciation of project uncertainty and the potential benefits of project risk management. Often it can be just as important to appreciate the positive side of uncertainty, which may present opportunities rather than threats (Chapman and Ward, 2007).

Risk management is implemented from the opening bidding process and its importance increases during the project as changes are made. During projects, contractors use systematic models such as construction risk management system to help them identify project risks and to systematically analyse and manage them (Al-Bahar and Crandall, 1990). However, these systems do not involve the client actively in managing the risk; especially that client participation plays an important role in identifying and then managing these risks (Thompson and Perry, 1992).

The next stage is the contracting stage. Each contract provides a different distribution of risk between the client and the contractor (Renn, 1998). Figure (2-3) shows the relationship between contract typology and how risk is allocated toward the client and its relationship to the contractor's incentive. We notice while some contracts allocate high risk toward the contract it provides the client with higher flexibility and vice versa.

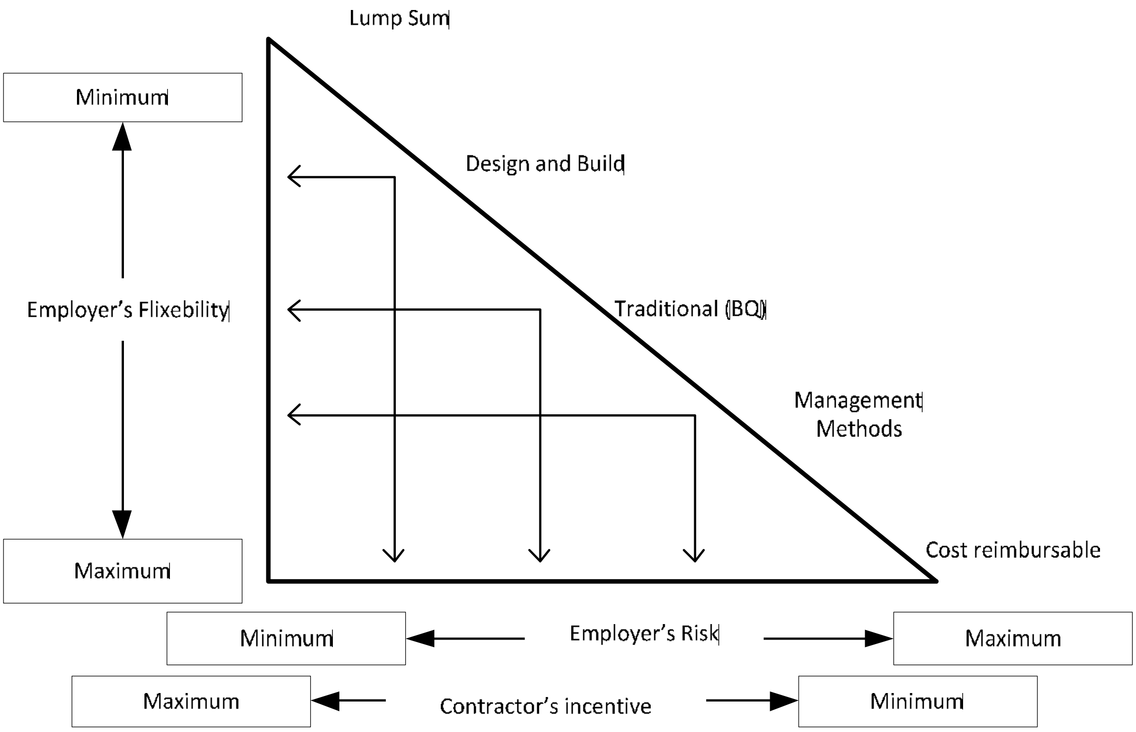

Figure 2-3 Characteristics of different type of procurement strategy (source Barnes NML (1983))

There has been however a shift in contracting style in the construction business in UK. In the UK civil engineering and infrastructure sectors, there has been a significant reduction in the use of the traditional ICE (Institution of Civil Engineers) Conditions of Contract Measurement. According to Potts (2008) The NEC (The New Engineering Contract) Engineering and Construction Contract family of contracts has swept all before it with most clients choosing the Activity Schedule approach (either Priced Contract or increasingly

Target Contract (Potts, 2008). This latter approach enables the sharing of risks and encourages innovation.

A simplistic focus on project success and uncertainty about achieving it can lead to uncertainty and risk being defined in terms of threats to success' in a purely negative sense. For example, suppose success for a project is measured solely in terms of realized cost relative to some target or commitment. Then both 'un certainty' and 'risk' might be defined in terms of the threat to success posed by a given plan in terms of the size of possible cost overruns and their likelihood. From this perspective it can be a natural step to regard risk management as essentially about removing or reducing the possibility of underperformance (Chapman and Ward, 2007).No construction project is risk free. Risk can be managed, minimized, shared, transferred or accepted. It cannot be ignored (Taroun *et al*., 2011). Moreover, construction, it is held, is exposed to more risk and uncertainty than perhaps any other industry sector. It involves numerous stakeholders, long production durations and an open production system, entailing significant interaction between internal and external environments. Such organizational and technological complexity generates enormous risks (Taroun *et al*., 2011).

On the ground however, formal risk analysis and management techniques are rarely used due to a lack of knowledge and to doubts as to the suitability of these techniques for construction industry activities. Akintoye and MacLeod (1997) explain that risk analysis and management in construction depends mainly on intuition, judgement and experience. This strategy shows that project exclusive variables would play a major role and cannot be ignored by systematic models. These variables would add to an alarmist view toward risk.

Studies have shown (Smith *et al*., 1999) that construction firms are assuming proportionally greater business risk than assumed by the literature on contingency. Managers reflect their perception of risk management using the concepts of return, risk and ruin (Pryke and Smyth, 2006). However, whether the measures used present a satisfactory insurance, these measures could be improved by introducing the variables as the financial factor into the design stage as part of a strategic benefit and not only at a later stage as a problem solving method (Pryke and Smyth, 2006).

Risk measurement is a problem of the theory and methods of measurement in essence. In construction project, risk measurement is defined as the assessment and evaluation of project risk (Zhang and Yang, 2010). In most of the projects, due attention is paid to technical risks through a risk register of one sort or another but little attention is paid formally to the other categories of risk (Ackerman *et al*., 2007). Those categories are the divided into political, customer, partner and supplier people, reputation, market and financial. Table (2-2) provides the main categories. This categorisation concentrates on the environmental factors as the main categories of risk.

Table 2-2 Categories of risk based on Ackerman *et al*., 2007

Category	Example
Political	government, planning mechanisms, safety mechanisms
Customer	changes in strategic orientation
Partner and Supplier	difficulties of collaboration and risk transfer
People	assumptions about their availability and skills
Reputation	response to unexpected stakeholder coalitions
Market	changing nature of competitors, and therefore, customer expectations
Financial	currency rates

This is not the only categorisation; Dey (2001) has divided the risks into technical, financial, political and economic, organisational, acts of God, and Clearance Risk. Figure (2-4) provides examples to those categories. This categorisation concentrates on the operational factors in defining risk, which is divided into technical, financial political and economic, organisational, acts of God, and clearance risks.

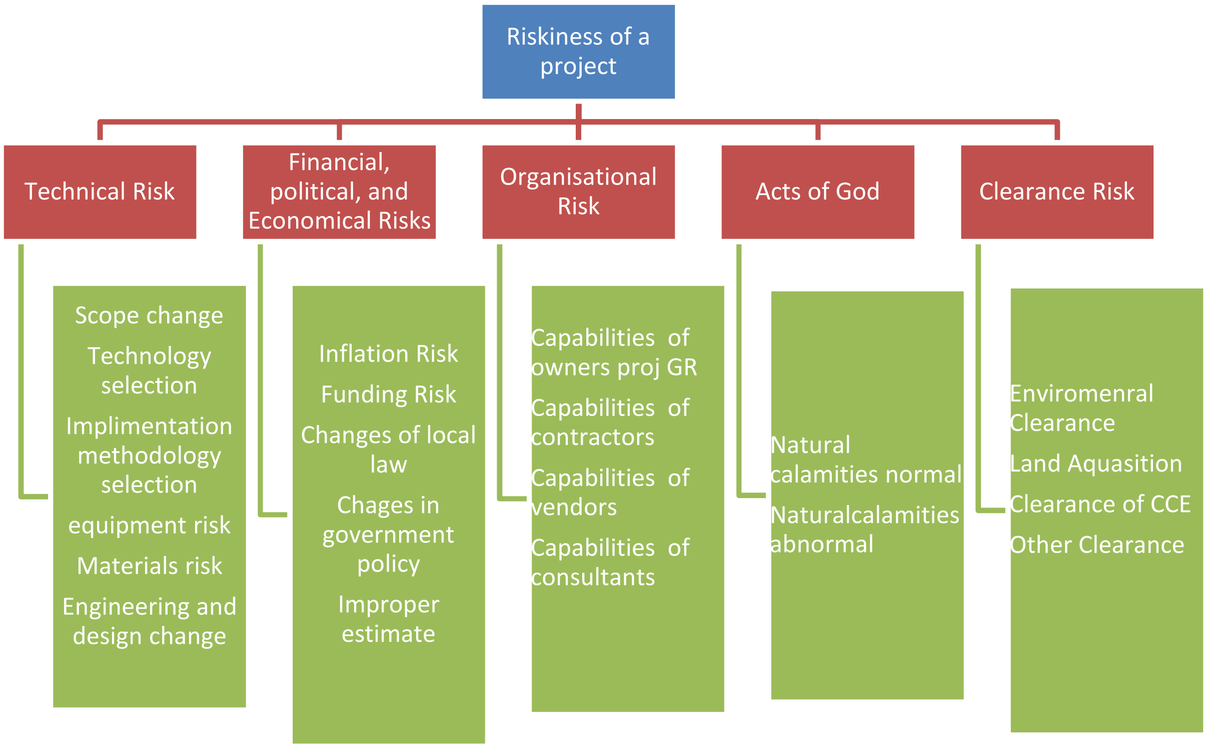

Figure 2-4 Risk categorisation based on Dey (2001)

Perminova *et al*. (2007) provides a different perceptive toward risk factors. This provides a definition of what a risk system is, as seen in Figure (2-5), risk system is the area of the over lapping risk factors with the risk undertakers under the influence of the environment, natural and human factors.

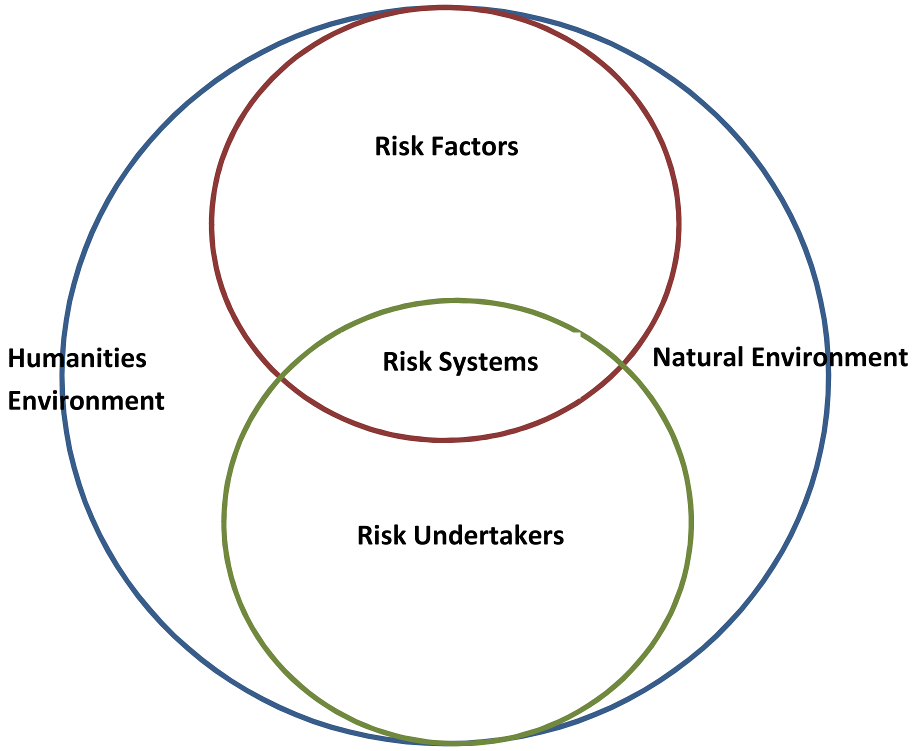

Figure 2-5 The relationship between risk environment, factors and undertakers

Perminova *et al*. (2007) states that not all the elements in project environment or organization are critical to the project success and represent sources of uncertainty. That is why identifying relevant ones from the contextual uncertainty by means of environmental scanning or other analytical models is an important part of project management. Judging the source and relevance of information that comes from the outer project environment and, thus, represent contextual uncertainty is an intuitive process rather than a rational one, since the rational processes are isolated from the surrounding world. Therefore, intuitive processes are goal-oriented and reflective.

As a result, understanding objectives and purposes of key actors, on whom project success is dependent, as well as developing communication and coordination between the parties involved is of crucial importance (Perminova *et al*., 2007). Such actions can be considered as part of Project Company’s strategy implementation and organization’s competitive advantage supporting customer – centred thinking and facilitating the ability to provide high-value integrated solutions.

This is a way of establishing certainty for the project team. Uncertainty becomes either risk or opportunity, which are certain by our definition. It must be mentioned, that uncertainty cannot be eliminated completely. Still, continuous reflective learning and information sharing make it manageable by reducing it significantly (Perminova *et al*., 2007).

2.2.3 Risk Perception

Perceived risk is psychological feelings and subjective understanding of consumers which are about various objective risks in the trading. Consumer changes, postpones or cancels the deal is affected on to a large extent. The definition of perceived risk includes two factors: uncertainty and adverse consequences. The adverse consequence is the size of the loss by the consumer's subjective perceives when the purchase is negative. According to the different manifestations of adverse consequences, there are multiple dimensions of perceived risk criteria for the classification. Du *et al*. (2009) shows eight dimensions to measure the online perceived risk: financial risk, payment risk, performance risk, delivery risk, time risk, social risk, sources risks and privacy risks.

The conceptual (initiation) phase of a new construction project is the first of a number of sequential phases in a project development cycle, the other phases being project planning and design, procurement and construction, and commissioning. The conceptual phase of a new construction project is most important, since decisions taken in this phase tend to have a significant impact on the final cost. It is also the phase at which the greatest degree of uncertainty about the future is encountered. In response to this type of situation, risk management can play an important role in controlling the level of risks and mitigating their effects. However, its adoption by industry has been rather slow with the exception of high-risk projects in the petrochemical, oil exploration and aerospace sectors (Uher and Toakley, 1999).

If we look at Table (2-3) which is a typical list of known risk facts in the industry, we would see a box ticking strategy. It assumes what is to be expected to happen and then asks to parties involved to pay attention, or on a strategic level, produce a mitigation plan for each probe.

Table 2-3 Catogeies of risk

Category of risks	*Possible specific risks*
Financial	funding affordability taxation (and any proposed changes in taxation) programming
Commercial	business profitability possible commercial conditions imposed by funders (e.g. use of materials sourced from particular countries/locations)
Planning	obtaining all necessary statutory consents the effect on programming
Design	functionality of space performance requirements quality in terms of aesthetics and functionality reliability in use
Construction	performance costs quality time
Contractual	procurement project structure, communication structure risk transfer and ownership
Political/ Social	government change regulatory change (e.g. changes in E.U requirements or regulations) impact of project on local and wider communities economic conditions market conditions statutory background (e.g. any changes in legislation) environmental
Changes in base requirements	internal (within the client organisation) external changes in corporate governance (does the project fit within the rules of the client organisation?) Changes in technology security (e.g. the effects of terrorism, theft or loss of computer networks through imported viruses)
Insurance	what insurance is available? what is its cost and effects on the viability of the project? what excesses are applicable?
Health and safety	what are the risks to health and safety of continuing to run client's business in its present way? how might these risks be best mitigated?

2.2.4 Risk Analysis

Covering every aspect with centralised attack plan will cost money and resource, parties with little experience would have a problem managing a conclusive strategy to manage those risks, and parties with high experience will have a biased attitude toward certain risk either because they assume that the impact of negligible, the probability is negligible, or that the outcome is very destructive there is nothing to be done after it happens.

This all comes from how quantities risk is usually calculated, for example Composite Risk Index formula is as follow:

$$CRI = I * P \qquad \text{Eq. 1}$$

Where:

CRI= Composite Risk Index,

I= Impact of Risk event, and

P= Probability of Occurrence

This is a bargaining attitude toward risk, and the reason for that it relies on the principles of Coase theorem, which assumes that economic efficiency of an economic allocation or outcome in the presence of externalities. The theorem states that if trade in an externality is possible and there are no transactions costs, bargaining will lead to an efficient outcome regardless of the initial allocation of property rights (Prather, 1973). In practice, obstacles to bargaining or poorly defined property rights can prevent Coasian bargaining.

The bargaining assumes that a rational, cost-minimizing party will not spend money on taking precautions if those precautions are more expensive than the costs of the harm that they prevent.

What has been done here is that it pushes the client and the contractor into transferring risk to each other rather than preventing them in the first place, simply to cut costs. Further explanation into how this affects risk behaviour is explained in the next section.

Once the risks are classified, acceptable levels of risk must be established. As risk-exposure values increase, they are initially at a value below some level; at this stage risks are considered to be so small that it is not advisable to spend time and resources for their control. As risks become elevated and their risk-exposure values increase to unacceptable levels, appropriate response actions must be taken for their containment. Unacceptable risks usually have adverse effects on the proper operation of the firm and can result in the shutdown of the assembly line. The risks for which the risk-exposure values fall between these two levels may be considered tolerable with no immediate action required. However, they should be monitored continuously and further improvement should be sought if resources are available. (Tummala and Schoenherr, 2011).

Contracts developed between customers, suppliers, logistics providers and manufacturers may aid in the determination of these acceptability levels. Overall, mapping risks along their magnitudes, as illustrated in Figure (2-6), can provide a useful overview of all risks involved in a particular supply chain, and can help determine on which risk preventive actions should be performed (Tummala and Schoenherr, 2001). The triangular shape of Figure (2-6) implies that most risks will be acceptable and tolerable, while only few risks will be completely unacceptable, for which therefore mitigation strategies should definitely be developed.

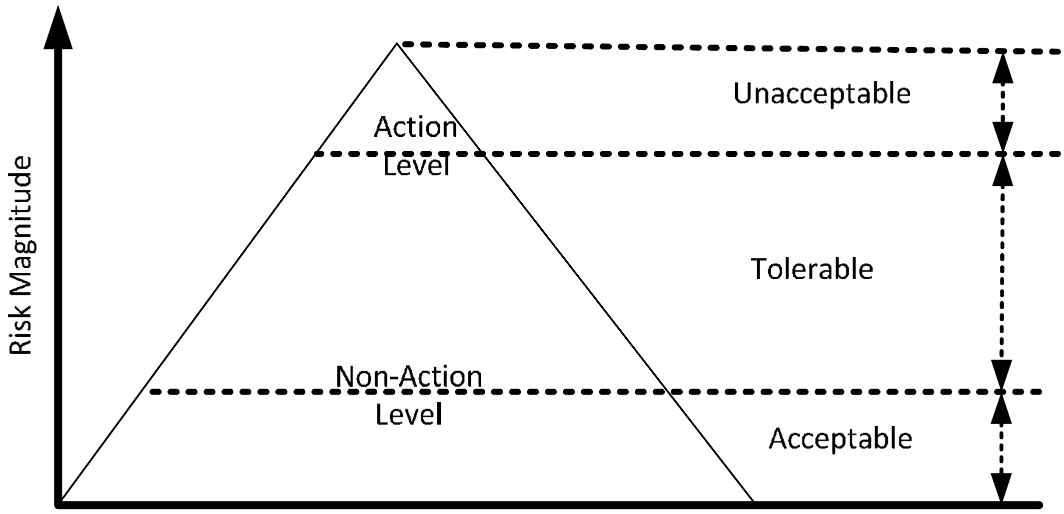

Figure 2-6 Acceptable, tolerable, and unacceptable risks

“Mitigation" refers to actions that the project team will make to lower the probabilities or impacts of identified risks. Project managers cannot mitigate all risks, nor do they want to, instead they accept some. The accepted risk level (some subtle combination of impacts and probabilities) depends on the nature of the project and on the risk tolerance of the organization; the impact is the funding needed to control the project, which is the amount needed to put the project back on its planned track after the occurrence of a risk. Good project teams will identify relevant risks and then estimate both their probabilities and their impacts, but with the possible exception of numerical simulations analogous to those used for scheduling calculation (Cioffi and Khamooshi, 2007).

The primary objective of risk assessment is to estimate risk by identifying the undesired event, the likelihood of occurrence of the unwanted event, and the consequence of such event. Risk assessment involves measures, either conducted quantitatively or qualitatively, to produce the estimation of the significance level of the individual risk factors to the project, so as to produce the estimation of the risk of the potential factors to project success.

However, this step results will become the input to the determination of the optimum decision. With a better quantification measuring result, the managers can recognize which risks are more important and then deploy more resources on it to eliminate or mitigate the expected consequences (Reza *et al*., 2011).

'Risk engineering' is a term associated with the use of the approach outlined here for identifying and measuring risk to the extent that it is useful to do so, and developing the insight to change associated risks through effective and efficient decisions. It has been applied in many contexts, and the principles are relevant to a wide variety of decisions. Project planning allows a comparatively simple treatment of the basic risk engineering notion of alternative views and representations of any given situation, with a variety of associated models and a need to select that view which is most appropriate to the particular circumstances (Chapman, 1991).

In the case of high risk projects involving significant risk, when uncertainty demands explicit attention and policy or behaviour modification, a fixed price contract may appear more attractive to the client. However, contractors may prefer a cost reimbursement contract and require what the client regards as an excessive price to take on cost risk with a fixed price contract. More seriously, even a carefully specified fixed price contract may not remove all uncertainty about the final price the client has to pay. For some sources of uncertainty, such as variation in quantity, or unforeseen ground conditions, the contractor will be entitled to additional payments via a claims procedure. If the fixed price is too low, additional risks are introduced: for example the contractor may be unable to fulfil contractual conditions and go into liquidation, or use every means to generate claims (Chapman, 1999).

The nature of uncertainty and claims, coupled with the confidentiality of the contractor's costs, introduce an element of chance into the adequacy of the payment, from whichever side of the contract it is viewed. This undermines the concept of a 'fixed price' contract and at the same time may cause the client to pay a higher than necessary risk premium because risks effectively being carried by the client are not explicitly so indicated. In effect a cost reimbursement contract is agreed by default for risks that are not controllable by the contractor or the client (Chapman, 1999).

This allocation of uncontrollable risk may not be efficient. Client insistence on placing 'fixed price' contracts with the lowest bidder may only serve to aggravate this problem (Chapman, 1999). This comes as part of planning the life cycle of risk as explained in Figure (2-7), which shows the different steps of risk management over the period of the plan. The management period is divided here into three periods which are the mitigation, control/fallback planning, and impact period.

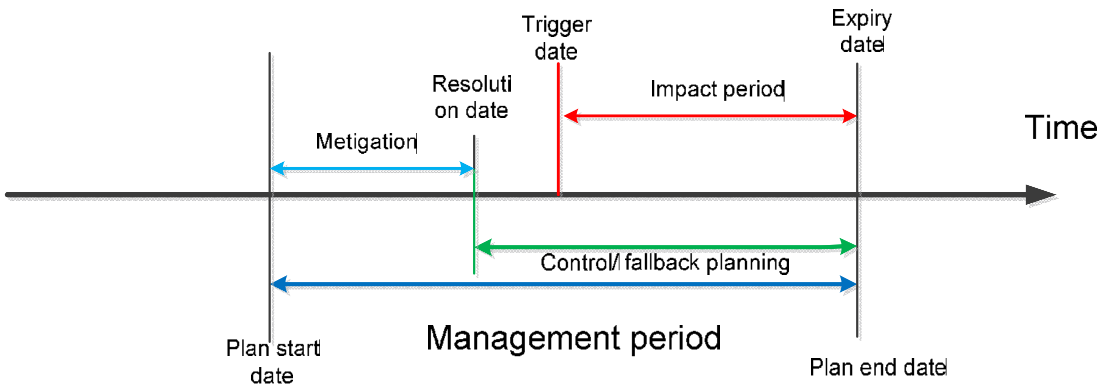

Figure 2-7 planning the life cycle of risk (adapted from Davey 2005)

Studies have shown that there is a relatively low implementation of formal risk management methods in practice, and few of them manage to produce quantitative data that should pinpoint the exact spot areas of problems (Kululanga and Kuotcha, 2010). Equally, Kululanga and Kuotcha (2010) pointed out that the construction industry consistently suffers from poor project performance due to the lack of a formalised risk management procedures. The need to for measuring of the series of steps for the project risk management process cannot be overemphasised in order to uncover the specific areas that give rise to risk challenges to construction contractors.

One of the characteristics that have contributed significantly to business process improvement lies in the methodology of measuring business processes, which often provides quick feedback for addressing under-performance within manufacturing organisations (Kululanga and Kuotcha, 2010).

However, the construction industry is widely perceived as being slow to innovate, and has trailed many manufacturing industries in innovation of its management processes (Kululanga and Kuotcha, 2010). Thus, the objective of measuring project risk management process is aimed at understating the current under-performance associated with uncertainties that continues to undermine construction project goals. Others have pointed out that one of the means for stimulating improvements in construction organisations' capabilities in the construction industry is by encouraging the measurement of business processes (Kululanga and Kuotcha, 2010).

As identifying risk is associated with experiencing the complexity of the environment past cases as an indicator will be less reliable by time, due to the changing circumstances in the construction environment. The difference of identifying the priorities within the project, as in the triangle of cost-time-quality, cannot be perceived within a single project nor be contained within the boundaries of the relationship between the contractor and the client in a project.

This becomes more clear when new types of projects and types of relationships between logistics are being presented. New legal agreements, new styles of management, and new definition or relationships between the client, contractor and the project are being produced. The construction industry is responding to the challenge of accurate budgeting in the domain of facility capital cost budgets and risk management (Jackson, 2002).

This response by the construction industry is caused by problems of perception conflict toward risk between the client and the contractor. Pryke and Smyth (2006) explained that there is a common conflict between the client and the contractor regarding the long-term objectives vs. the short term, in the same way their perception of efficiency and effectiveness is rather different. In terms of dealing with cost, there is always the pressure to produce profit using either short or long term strategies. The priority of outcomes within the project itself would differ between the client and the contractor due to the difference of financial priorities, and the general objectives of the project itself.

These conflicts are rooted in the disputes between different approaches to identifying risk. There are many systematic and mathematical approaches to manage risk, and there have been social science approaches. For example, Harty (2005) states that there is high reliance on using analytical techniques based on a statistical approach in decision making for risk management in construction projects.

However, when it comes to considering the complexity of construction projects, construction mangers cannot solely rely on mathematical approaches, but by identifying the sources of these risks within the decision making process and therefore, the participants in the decision process. There is inconsistency toward risk identification or the areas that need more attention regarding risk management.

2.2.5 Risk Identification

Edwards and Bowen (1998) explain that political, economic, financial and cultural categories of construction risk do not get enough attention, in comparison issues regarding quality assurance and occupational health and safety. Even in contract, identifying a high risk operational organization relies mainly in the contractors' quality of operation management and concentrate on experience and capabilities than anything else. The contractors operations style is then characterized by their resource management style, for example, equipment spread-out, segregated production steps and extensive substitution of suppliers and materials (Walker, 1996).

A reliable contractor does not necessary means a low risk project. Things get more complicated when the operations are placed in a harder to control environmental variables, known as the political, legal, economic, environmental, social and commercial. The client in general has no ability to change these variables and can only adjust the project to fit these variables. This should lead into investigating the responsibility of the client in understanding the fit of the project into these variable and how would affect the contractor's ability to reduce the risks emerging within the project.

Previous studies (Jackson, 2002) have concluded that two elements have major significance for the contractor to reduce the risk within the project, the first is regarding the information being available to the parties regarding all the variables of the project and that part is usually the easier to manager, the other part is the changes that will occur to the project. An examination of risk management approaches shows that there are numerous methods available to measure up the risks at early stages of the project, for example fuzzy logic (Tah and Carr, 2000), analytic hierarchy process (Mustafa and Al-Bahar, 1991), and risk management processes (Tummalaa and Burchett, 1999).

The reasonable framework of integrated risk management on construction project provides a necessary risk management environment and contributes to the risk management goal in order to establish the management structure. Zhao and Duan (2000) provided an integrated risk management model based on the Nine-Stage Model submitted by the government of Canada and Continuous Risk Management Figure (2-8) shows the model which is based on a nine step cycle (Identify, assess, measure, rank, set, develop, select, implement, and monitor) which function as the management process move from the planning to the evaluation stage. The model proposes a set of risk management practices that departments can adopt, or adapt, to their specific circumstances and mandate. As a minimum, some form of quantitative or qualitative analysis is required for making decisions concerning major risks or threats to the achievement of an organization's objectives.

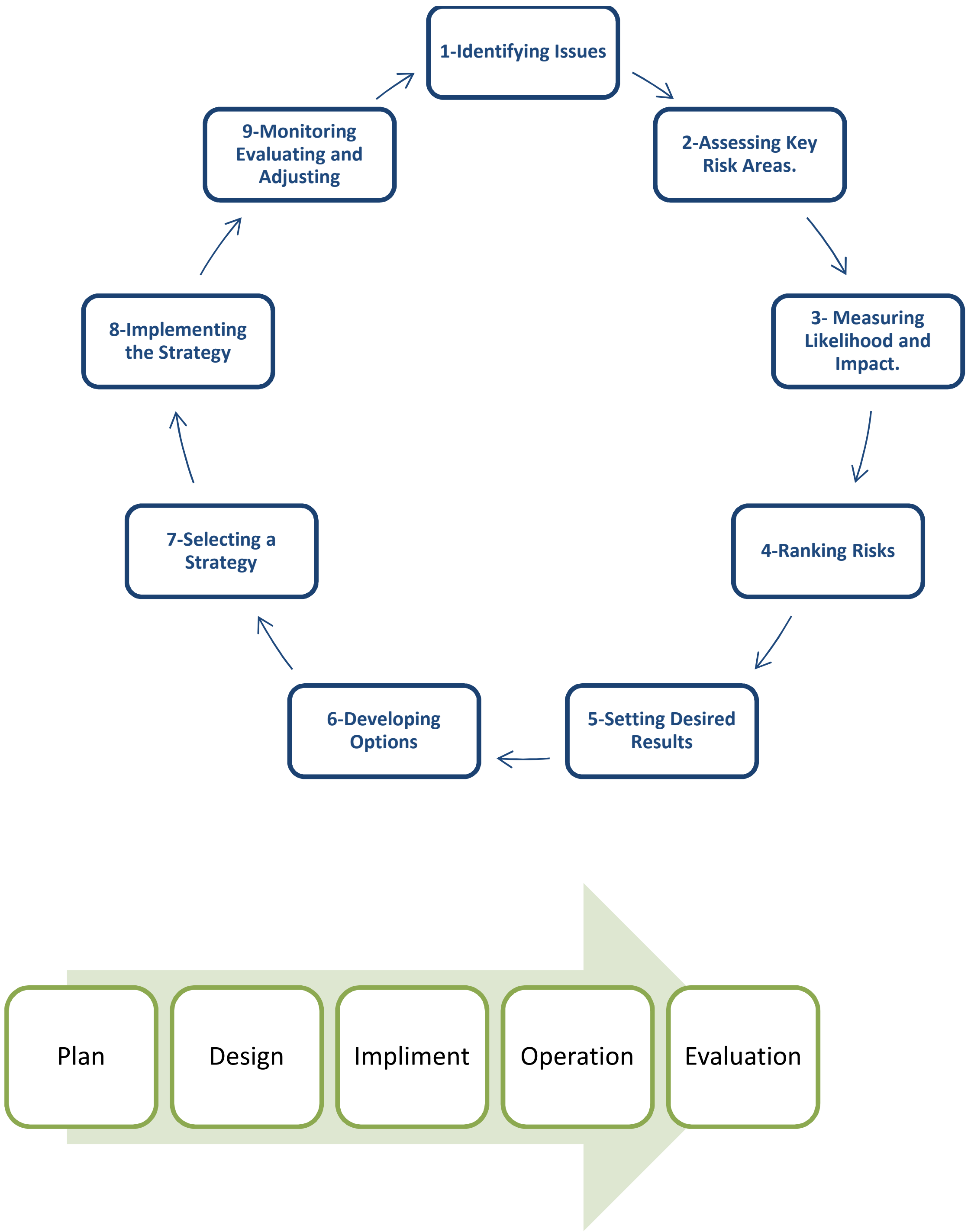

Figure 2-8 Integrated risk management model based on Zhao and Duan (2000)

When uncertainty strikes, it can have a range of effects on achievement of project objectives, from the total disaster to the unexpected welcome surprise. Despite this, the traditional risk management process as practised by the majority of project managers tends to concentrate almost exclusively on the potential negative effects of uncertainty. As a result of this focus, considerable effort is spent on identifying and managing threats, while opportunities tend to be overlooked or at best addressed reactively (Hillson, 2001).

The suggestion that a common process can be used to manage both threats and opportunities has arisen from the inclusion of positive aspects in recent definitions of ‘‘risk’’. This in turn has provoked vigorous debate among the community of risk practitioners, with individuals and groups taking and defending strong opposing positions. The issue is whether the term ‘‘risk’’ should encompass both opportunities and threats, or whether ‘‘risk’’ is exclusively negative with ‘‘opportunity’’ being qualitatively distinct. There appear to be two options (Hillson, 2001):

1. ‘‘Risk’’ is an umbrella term, with two varieties:

- ‘‘opportunity’’ which is a risk with positive effects; and
- ‘‘threat’’ which is a risk with negative effects.

2. ‘‘Uncertainty’’ is the overarching term, with two varieties:

- ‘‘risk’’ referring exclusively to a threat that is an uncertainty with negative effects; and
- ‘‘opportunity’’ which is an uncertainty with positive effects.

While professionals or contractors who bear project risk have four basic response options (Ward, *et al*., 1991):

- passing the risk on to a third party
- continue to bear the risk, and manage it for profit, but accept liabilities
- if a downside risk eventuates, try to recover costs from other parties, including the client
- if a downside risk eventuates, meet liabilities reluctantly

Risks are inherent in all construction projects. Risks can be transferred, accepted, managed, minimized, or shared, but cannot be overlooked (Rahman and Kumaraswamy, 2002). However, evidence from projects worldwide show that risks are not being apportioned with properly. The goal of optimal risk management should be to

(1) Minimize the total cost of risk to a project, not necessarily the costs to each party separately, and

(2) ‘minimize risk – whomever risk it may be’

Although many risks can be broadly identified as generic, their specific nature orform on a given project is project-specific (Rahman and Kumaraswamy, 2002). The nature and extent of such project-specific risks can only be realistically appreciated at later stages during the project execution. As a project progresses, the nature and extent of risks may change, new risks may emerge and existing risks may change in importance or be re-allocated, and any such changes may also worsen or ease some other risks (Rahman and Kumaraswamy, 2002).

2.2.6 Risk Allocation

Proper and comprehensive allocation of risks cannot be achieved through contract conditions alone. Some of the risks may also require the joint efforts of contracting parties for their effective management. In order to achieve these, traditional contract strategies for construction and their distribution of responsibilities and risks in standard conditions of contract are unsuitable for today’s high-risk circumstances and multiparty complex projects (Rahman and Kumaraswamy, 2002).

As an alternative, a tailor-made contract strategy appropriate for the active joint management of risk by all parties is seen as more suitable because not all the risks are predictable and all project information is not available at the beginning (Rahman and Kumaraswamy, 2002).

It has been found that, with some exceptions, the contracting parties had characteristically different perceptions of both present and ideal allocation of risks. It is therefore not shocking that contracting parties often disagree on their responsibilities for dealing with risks during the actual contract implementation (Rahman and Kumaraswamy, 2002).

These disagreements may lead to conflicts, assertions, counter-claims and disputes. It was also found that individual respondents within the same ‘group’ have different opinions on risk clarification and such differences can be, in many cases, particularly far apart on a percentage risk allocation measure. This may arise from the perceptions of different individuals being largely accustomed by their own experiences, which may be positive or negative in consequences (Rahman and Kumaraswamy, 2002).

A more simple definition for this relationship can be obtained from the work of Miles and Snow (1984). Miles and Snow's typology proposed that the following relationships to classify risk management attitudes:

"Analysers" tend towards a predominantly proactive approach. This is by nature of their broad environmental scanning, and their limited adaptability balanced off by their stability and risk averseness.

"Protector" organizations take a less proactive approach. This is by nature of their broad environmental scanning and their very adaptability. However, they can rush in to costly failures without considering all risks.

"Defenders" tend towards a more reactive approach. They seem to be generally unwilling to carry out environmental scanning of any sort, and are therefore prone to risks they may not be able to see developing into hazards. In their favour they do thoroughly investigate investment decisions and will have a narrow set of well-identified risks which they are familiar with.

"Reactors" are fatalistic. By their very nature they do not look ahead. They are inconsistent and react to risks inappropriately.

As we investigate the variables of the organisation to determine its approach to managing risk we have covered many aspects using management theories. However there were three main features that dominate the organisation attitude toward managing risks (Smallman, 1996).

Structure: the influences the decision making process and the infrastructure of the organisations. The key dimensions for this are based on the formality and informality of limits, where informality allows an effective response to risks all over the organisation. The other factor is centralisation vs decentralisation, where decentralisation means that risks is the responsibility of all departments.

Strategy: the direct influence of the management on the course of the organisation. As we explained before a strategy which tries to prevent risk rather than relocate is more effective.

Culture: the values that effects the actions of the individuals and inner parties to the way it handles the environment. As has been explained, a pro-active risk management culture is successful than a re-active one.

If we incorporate these definitions within the integrated relationship between structure and risk strategy model in Figure (2-9) we will have this relationship.

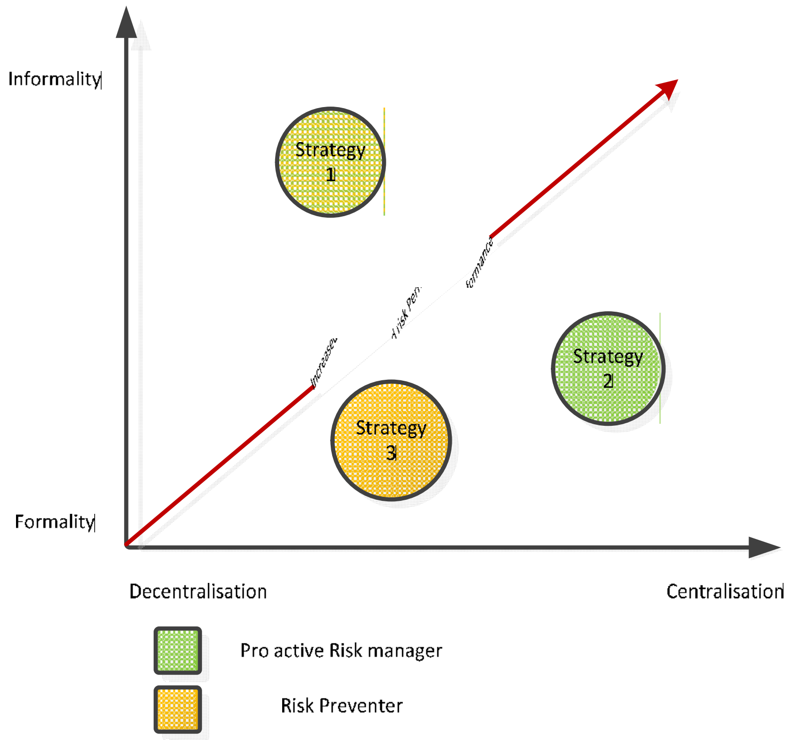

Figure 2-9 Integrated relationship between structure and risk strategy

As Figure (2-10) shows, by definition analyser will fall under the better performers of the risk performance spectrum, and the reactor under the poorest performers of the risk performance spectrum. Prospector strategy is the most aggressive of the four strategies. It typically involves active programs to expand into new markets and stimulate new opportunities. Defender strategy entails a decision not to aggressively pursue markets. As a result, they tend to do none of the things prospectors do. The analyser is in between the defender and prospector. They take less risk and make fewer mistakes than a prospector, but are less committed to stability than defenders. A reactor has no proactive strategy, often reacting to events as they occur. They respond only when they are forced to by macro environmental pressures.

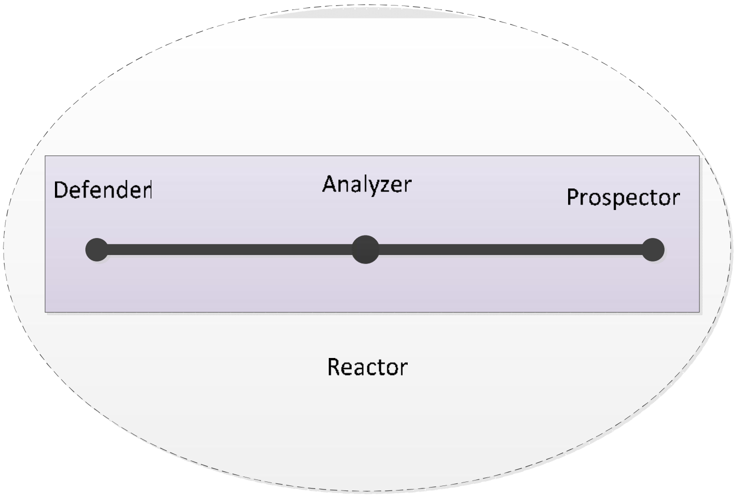

Figure 2-10 Miles and Snow Strategy Typology (Derived from Miles and Snow, 1984)

Figure (2-11) presents a zoning system when defining risk management attitude, which is fitting, as there is need for flexibility in relation to risk attitudes.

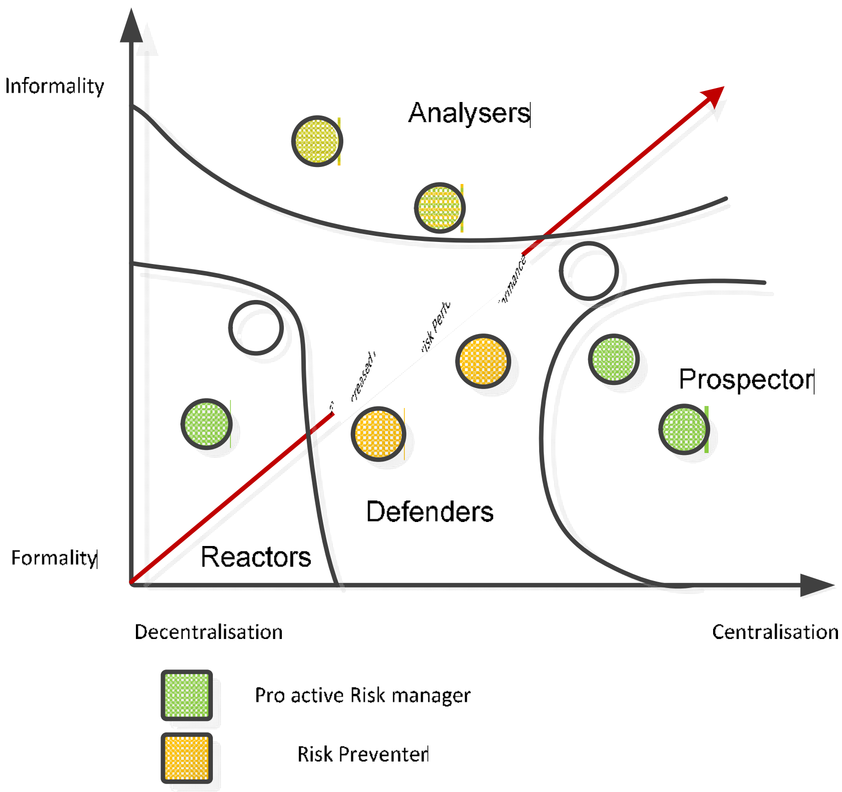

Figure 2-11 Zoning risk strategy

2.3 Systems and Risk

2.3.1 Risk and Project Objectives

The most common model that describes the main achievement in construction projects is the triangle of money, time, and quality (Figure 2-12), and when we try to understand the success of a project we try to see it through the relationship between those three elements. This is specifically important for the client and for the client the risk has always been in failing to deliver regarding this triangle.

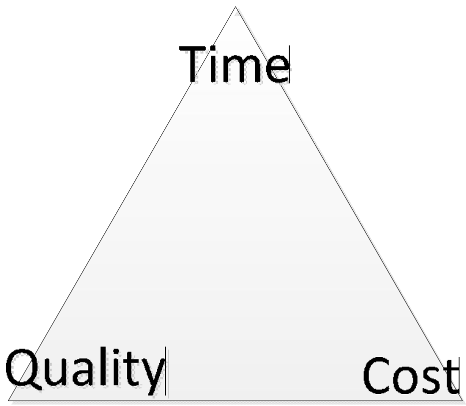

Figure 2-12 Achievment triangle

This criteria is set by the customer, hence the client has a significant role in achieving it and hold some responsibility for setting the markers of the project. Where the project get adapted, the contribution of the client becomes crucial starting from the preliminary phase, as at this stage the notion of uncertainty becomes inherited in the project.

Industries and organisations which are dependent on inter-complex service infrastructure, get dependent increasingly in an effective working infrastructure, hence, on the continuity of utility service (Figgis, 2000), this means that organisation are fragile to disturbance, from a business stability perspective, when a service or a critical infrastructure fails (Kwan, 2003).

Construction projects are one-off endeavours with many unique features such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures and such organizational and technological complexity generates enormous risks.

The diverse interests of project stakeholders on a construction project further exacerbate the changeability and complexity of the risks. While risks cannot be eliminated, successful projects are those where risks are effectively managed, of which early and effective identification and assessment of risks is essential (Stuban, 2011). Starting with a focus on what is to be achieved in a construction project, which is project objectives; risk management process builds to an understanding of what might put goals in jeopardy and what should be done to ensure success (Zou *et al*., 2007).

It is not rational for any individual, organization or professional institute to initiate changes on its own. The challenge of the risk management of everything is to roll back the culture of secondary risk management before it consumes organizational life.

This effort will need to be conducted at two levels: risk management practice and political discourse. At the level of risk management practice, the need is for an "intelligent" risk management which is not control obsessed and which has a second order capacity to observe and challenge the effects of the internal control system itself. Some organizations will say they already have this intelligence (Power, 2004).

It is a capacity to challenge the, often very ideal, organizational models and assumptions inherent in risk management standards and the systems whose design they inform. It is also a capacity to avoid being swept away by regulatory programs - very difficult given the wave of recent initiatives in the corporate world. In addition, there is a need to nurture no-blame internal organizational environments (Power, 2004).

Measures of risk perceptions typically use a compositional methodology. The overall level of perceived risk for a particular multi-attribute object (product) is calculated as a weighted sum of the product's perceived attribute levels. Two approaches are generally used to operationalize the components of perceived risk: (a) uncertainty multiplied by adverse or (b) probability of loss multiplied by importance of loss. It is also possible to use a decompositional methodology to measure perceived risk. This approach decomposes a subject's evaluations of the overall perceived risk of buying a product into the part-worth utilities associated with the attributes of the product. It has the advantages of (a) capturing the respondent's overall feeling of risk (which may have both an affective and a cognitive component) and (b) providing a method of relating this measure to the specific aspects of the purchase situation (Dowling and Staelin, 2004).

Not to confuse risk management with value management. It is contended that the current conceptual distinction between risk management and value management is unsustainable. The origins of the two traditions are reviewed and critiqued from a postmodernist perspective. It is concluded that they differ primarily in terms of their rhetoric, rather than their substantive content.

Insights into the current practice of risk and value management are provided by considering their enactment in terms of ’performance’. The scripts for such performances are seen to be provided by the accepted methodologies which determine the language to be used and the roles to be acted out. A coherent integrated script for risk and value management can be provided by the methodology known as strategic choice, which replaces the language of ’risk’ and ’value’ with that of ’uncertainty (Green, 2001)’.

In many engineering organizations, risk assessment inevitably focuses on engineering/technical risks with the possibility of financial risks being considered if, in order to win the contract, financing options increase the likelihood of success. As such, a traditional risk register will be developed by identifying items of technical risk and evaluating or estimating the likelihood of the event occurring and the expected impact (Ackerman *et al.*, 2007).

The engineering team will often undertake to create the register, with perhaps a Risk Manager or Risk Co-ordinator reporting to the project-management function. A key function of the risk register is to communicate the level and type of risks to the Senior Management and the project team. Even so, there are often problems with this way of working. Firstly, the risk registers become a bureaucratic procedure instead of being treated as a valuable exercise. Secondly, and possibly as a result of this behaviour and the focus on engineering/technical risks, those risks identified in the register tend to address only a small proportion of all types of risk (Ackerman *et al.*, 2007).

It seems that risk assessment is a debatable subject; however, it is frequently considered to be the most useful part of the risk management (RM) process. Traditionally the focus has been on quantitative risk analysis despite the difficulties encountered in obtaining objective probabilities in the construction industry, where projects are very often one-off enterprises. As a result, project managers are obliged to rely on the elicitation of subjective probabilities. Therefore, as a probabilistic approach cannot be utilized to quantify risks, individual knowledge, experience, intuitive judgment and rules of thumb should be structured to facilitate risk assessment (Taroun *et al.*, 2011).

When it comes to features of social organization we can take a social model to approach the organisational structure. A social regulation refers to the extent to which the situation is set about with constraints of rules, roles and facts that have, practically speaking, to be taken as given, or at the other end of the dimension, the extent to which these constraints are relaxed to allow a measure of voluntary choice. In effect, it measures the degree to which social relations are experienced as principally involuntary, or constraining. The second dimension is that of ‘social integration’ which measures the degree to which social relations require the accountability of the individual to a bounded group, or allow comparatively unaccountable and autonomous individual action; that is, it measures the extent to which bonds to others structure action and understanding (Fiske, 1991 and Perri, 2005).

Risk identification is a key stage in project risk management as risks cannot be managed unless they are identified (Hlaing *et al*., 2008). Many have argued that the construction industry is poor at carrying out risk identification (Hlaing *et al*., 2008).

The result of this poor risk identification could well be ‘‘nasty surprises’’ as risks are being taken on without explicit knowledge. Therefore, risk identification should be performed as part of a project’s initial definition process, along with project planning, budgeting and scheduling. In fact, these other activities cannot be done realistically without taking risk into consideration. In some cases, the risks identified could cause the project to be abandoned or modified greatly during the planning stage. If risks are identified and managed at early stages of the project their consequences on the final outcome of the project will be less because cost to implement changes to the project is also less at these stages (Hlaing *et al*., 2008).

In construction, a realistic estimate of the final cost and duration of the project is generally required as early as possible. Hence, at that stage all potential risks that can affect these estimates should be identified and this identification process is a difficult task because there is no unerring procedure, which may be used to identify construction risks (Hlaing *et al*., 2008). The identification of risk and the creation of a risk list are dependent upon many factors such as past experience, personal tendency, and the possession of information. Since the objectives of the construction projects are stated in terms of final cost, duration and quality of the constructed facility, risk factors that can affect these targets are considered most important (Hlaing *et al*., 2008).

In line with the minimizing uncertainties approach most high-risk systems are characterized by high levels of standardization in the form of standard operating procedures, which are developed with ever increasing detail in order to streamline human action and to reduce its influence as a risk factor (Woods and Shattuck, 2000).

Procedures are often a direct consequence of incidents and accidents the analysis of which provides knowledge of unforeseen wrongful courses of action against which new rules are developed as a defence. While generally there is an understanding that rules are useful guides for safe behaviour, there is also an increasing concern that too many rules incrementally developed will not make up a good system to help human actors do the right thing especially in states of abnormal operation where they would need strong, but also flexible guidance. These concerns go back to basic observations on how rules specifying the exact operations to execute can have a detrimental effect on action because they do not allow the performing person to develop an underlying plan of their own, but instead further the atomization of actions and the focus on micro-difficulties (Woods and Shattuck, 2000).

Another basic problem with standardization is that especially in non-routine situations reliance on common standards may turn into an over-reliance, impeding switches to more explicit coordination and with that switches to higher levels of common action regulation, that is. switches from skill-based to rule-based or from rule-based to knowledge-based behaviour. Standardization is a strong force towards a shared understanding of situations and their demands on a team. The expectation of shared goals, plans, perspectives, and knowledge produced by reference to the same set of standard operating procedures, as helpful as it is under most conditions, does involve the risk of not realizing the need for explicit coordination in non-routine (Grote, 2004).

2.3.2 Risk and the Characteristics of the Organisation

If culture is to be analysed and managed, it is important that we be clear about what is meant by the term. Failure to clearly specify what "culture" is can result in confusion, misunderstanding, and conflict about its basic function and importance. Culture as Control Clearly, little would get done by or in organizations if some control systems were not in place to direct and coordinate activities.

In fact, organizations are often seen to be efficient and effective solely because control systems operate. However, there is not specific definition for the concept of control system. A generic definition might be that a control system is "the knowledge that someone who knows and cares is paying close attention to what we do and can tell us when deviations are occurring?"(Tushman *et al.*, 1989).

This definition encompasses traditional formal control systems ranging from planning and budgeting systems to performance appraisals. According to this definition, control systems work when those who are monitored are aware that someone who matters, such as a boss or staff department, is paying attention and is likely to care when things aren't going according to plan (Tushman *et al.*, 1989).

The significance of this implementation is that an Effective management should involves corrective action which derived from awareness and understanding, and followed by constant cycle of double loop learning and modification to mental models (McLucas, 2001) as in the models mentioned.

This definition includes three levels of organizational culture: artefact, the espoused values, and the basic underlying assumptions. Artefacts refer to primarily visible, audible, and touchable behaviours taking place in an organization. Examples are organizational structures and practices. In the lower level of artefacts are the espoused values. The espoused values are "ought to be" in the organization whereas the artefacts are "what is". Strategies, goals, and philosophies exemplify the espoused values. This definition of organizational culture suggests that an effective strategy should be aligned to the organizational culture (Roh *et al*., 2008).

With some exceptions the majority of highly effective supply chains involve leading organizations that shape and influence the supply chain practices. Organizational culture means the overriding culture in the supply chain that reflects the organizational value traits of the dominant company in the supply chain. Which is demonstrated is the degree to which the organization emphasizes change or stability and the nature of business strategic initiatives orientation. A flexibility orientation suggests adaptability and spontaneity, while a control orientation indicates stability, control, and order. An internal orientation displays a focus on the sustenance and enhancement of the existing organization, while an external orientation reflects an emphasis on competition, interaction and growth with the external environment (Roh *et al*., 2008).

Bromiley (1991) hypothesized that industry performance will have a negative influence on risk. The argument parallels that for individual companies. If low performance results in firms taking risky actions, an industry that on the average has low performance will be populated with firms taking risky actions. If competitors are taking risky actions, such as introducing new technologies and new products, a firm of interest will be forced to take such actions to keep up, even if its performance level is high.

If we consider, for example, a high-profit firm in a low-profit industry, in which the introduction of new products is the main area of competition. Most firms in the industry are making low profits and consequently take risks by introducing new products. The high-profit firm will be under pressure to match the competitive moves of the other firms in the industry and so will also take risks by introducing new products. Thus, low industry performance should increase risk taking by the firms in an industry over and above the influence of a firm's own performance level. Applying this scenario in a competitive construction market, and we should expect similar behaviour

Sitkin and Pablo (1992) reviewed a number of potentially relevant individual, organizational, and problem characteristics that have been identified as predictors of risky individual decision making. Possibly the most significant focus of their analysis was the previously distinct effects of outcome history and problem framing, which they argued had been over looked and sometimes unintentionally confounded—in prior work. Specifically, Sitkin and Pablo (1992) suggested that previous contradictory findings could be explained by disentangling outcome history from problem framing. Following their theoretical emphasis, we focus on these two frequently studied predictors of risky decision making. This choice was guided by our desire to stress variables whose effects were predicted by Sitkin and Pablo (1992) to be mediated by risk propensity and risk perceptions, so as to provide an initial test of their core propositions.

Although it focuses on only a subset of' the broader model, Figure (2-13) echoes the essential ideas underlying the arbitrated model of the determinants of risky decision making and captures its most critical variables. First, it represents predecessor characteristics as affecting decision making only in directly, through their effect on risk propensity and risk perceptions; this is the mediated aspect of the model. In addition, the paths shown in Figure (2-13) are numerically keyed to the hypothesized bivariate relationships between the variables of the model (Sitkin and. Weingart, 1995)

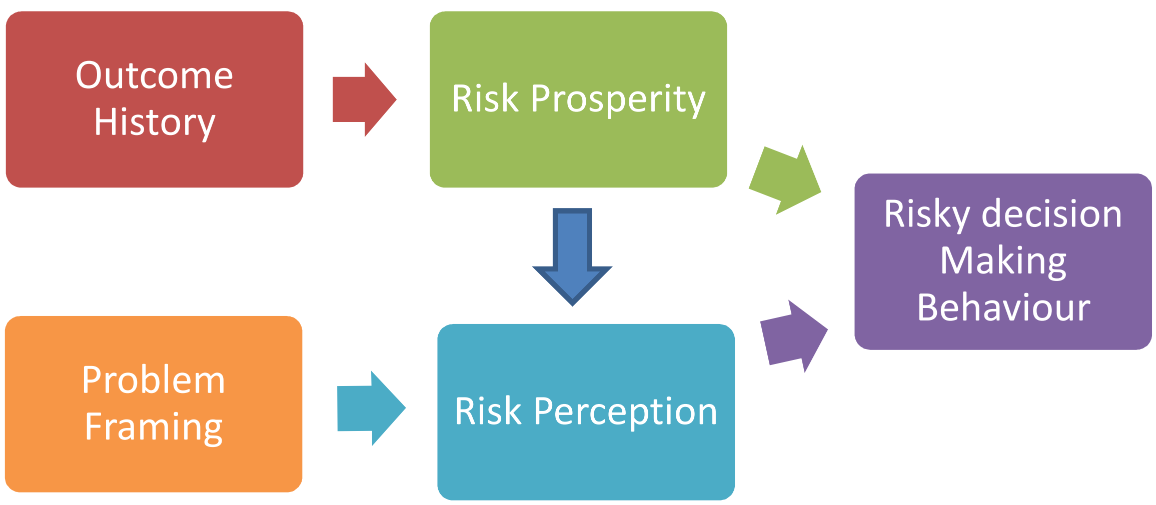

Figure 2-13 Model of determinants of risky decision-making behaviour

Before addressing the rationale for each relationship posited in the model,   several key constructs should be defined, since these distinctions underlie several of our arguments. Variables identified in the Sitkin and Pablo (1992) model addressed here include their dependent variable, decision risk, their proposed mediating variables (risk perception and risk propensity), and two key exogenous predictor variables that they identified as characterizing the person and the situation: outcome history and problem framing.

Decision risk is a construct used to characterize the alternatives challenging a decision maker. It can, for example, describe how unwelcomed the likely effects of a substitute are and the likelihood of their manifestation. Risk can also be used to characterize an overall decision—how risky it is compared to other alternatives. To the extent that a decision involves high uncertainty or risky outcomes, either in terms of the choice among alternatives or for individual alternatives in aggregate, the conclusion is characterized as risky (Loosemore, 1999).

Involved in the model are two direct determinants of resolution, risk perception and risk propensity that also serve as mediators of antecedent characteristics of the decision maker and the problem condition. Risk perception is defined as an individual's valuation of' how risky a situation is in terms of probabilistic assessments of the amount of situational uncertainty, how manageable that uncertainty is, and sureness in those estimates.

2.3.3 Uncertainty

Risk propensity is defined as an individual's current inclination to take or avoid risks. It is theorized as an individual attribute that can change over time and thus is a developing property of the decision maker. This definition of risk propensity, which follows Sitkin and Pablo (1992), is related to but departs in a critical way from previous conceptualizations of propensity as a stable dispositional attribute. It is interesting to note that even critics of the predictive value of the risk propensity have employed the traditional conception of risk propensity as a stable individual attribute (Loosemore, 1999).

The scope for uncertainty in any project is considerable, and most project management activities are concerned with managing uncertainty from the earliest stages of the Project Life Cycle (PLC), clarifying what can he clone, deciding what is to be done, and ensuring that it gets clone. Uncertainty is in pail about 'variability' in relation to performance measures like cost, duration, or 'quality'. It is also about 'ambiguity' associated with lack of clarity because of the behaviour of relevant project players, lack of data, lack of detail, lack of structure to consider issues, working and framing assumptions being used to consider the issues, known and unknown sources of bias, and ignorance about how much effort it is worth expending to clarify the situation (Chapman and Ward, 2003).

In a project context these aspects of uncertainty can be present throughout the project life cycle, but they are particularly evident in the pre-execution stages, when they contribute to uncertainty in five areas (Chapman and Ward, 2003):

1. variability associated with estimates,

2. uncertainty about the basis of estimates,

3. uncertainty about design and logistics,

4. uncertainty about objectives and priorities, and

5. uncertainty about fundamental relationships between project parties

All these areas of uncertainty are important, hut generally they become more fundamentally important to project performance as we go clown the list. Potential for variability is the dominant issue at the top of the list, but ambiguity becomes the dominant underlying issue toward the bottom of the list. Uncertainty about variability associated with estimates involves the other four areas, each of them involving dependencies on later areas in this list.

Although the tendency to take risks (for example risk propensity) is almost certainly related causally to making riskier decisions, as we will hypothesize and test below, the two constructs are not synonymous because a number of factors can impede the realization of a decision maker’s tendencies in any particular instance (Sitkin and Weingart, 1995).

Even an individual who consistently leans toward seeking risks could in a specific case, such as a business investment, fail to act on this tendency, because of inadequate funding, a missed appointment, an unexpected illness, a natural disaster, or other obstruction. That is, the situation can be portrayed in a generally positive or negative light. Outcome history, a person-situation interaction characteristic, is defined as the degree to which the decision maker believes that previous risk related decisions have resulted in successful or unsuccessful outcomes (Sitkin and. Weingart, 1995).

Effective risk management involves a four-phase process as described by Nieto-Morote and Ruz-Vila (2011), they are:

1. Risks identification: The process of determining which risks may affect the project and documenting their characteristics.

2. Risk assessment: The process of prioritizing risks for further analysis by assessing and combining, generally, their probability of occurrence and impact.

3. Risk response: The process of developing options and actions to enhance opportunities and to reduce threats to the project objectives.

4. Risk monitoring and reviewing: The process of implementing a risk response plan, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating the risk process effectiveness throughout the project.

However, Baccarini and Archer (1999) provided a more integrated risk management process which takes into account a project risk rating framework for a contract. Figure (2-10) demonstrates that framework and show the steps taken within that process.

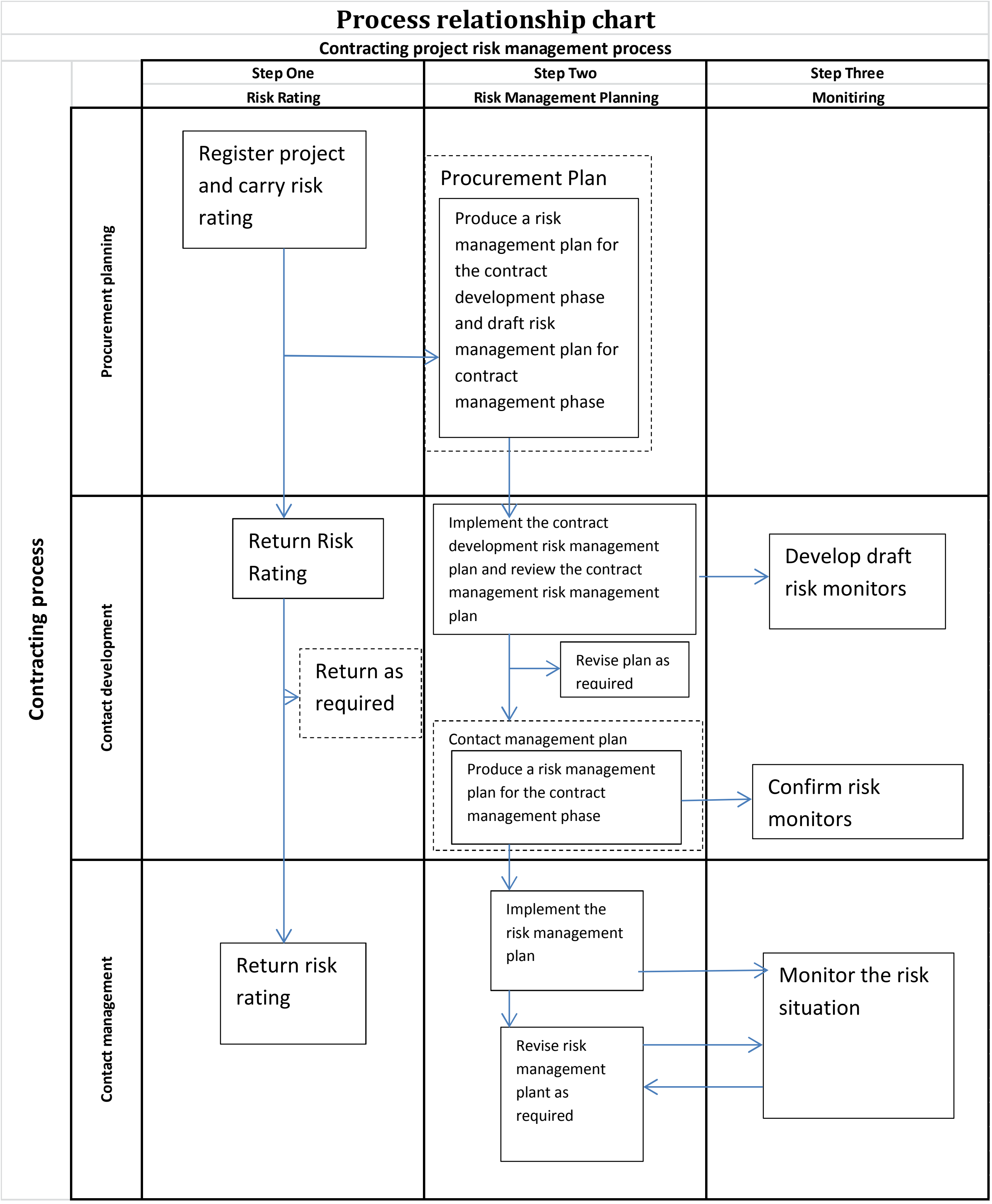

Figure 2-14 Project risk rating framework adapted from Baccarini and Archer, 1999

Elkingon and Smaliman (2000) explains that the options of which action can be taken to make the risk acceptable are divided into four groups, the first is prevention, ,where counter measures are put in place to stop the threat or problem from arising or to prevent it from having any impact on the project or business. The second is reduction, where actions either reduce the likelihood of the risk developing, or limit the impact to acceptable levels. The third is transfer of the risk to a third party where for example by taking out an insurance policy or a penalty clause. The fourth is contingency, where actions are planned and organised to come into force as and when the risk occurs.

2.4 Limitations of Current Approaches

The formal risk analysis and management techniques are rarely used by the construction industry due to the lack of knowledge and expertise. The industry is also sceptic about the suitability of these techniques to construction. In most situations, the contractors and consultants perceive risk based on their experience and judgment. The risk elimination and risk transfer to a specialty subcontractor were found to be the most favoured method of risk management (Ahmed *et al*., 2002).

Even the formal analysis methods have their problems. Odeyinka and Kaka (2008) demonstrated that calculating ''expected'' risk as probability multiplied by impact has limitations and that ranking risks according to this Figure is misleading. Odeyinka and Kaka (2008) concluded that both probability and impact must be considered at all times. Three dimensions of risk were considered, namely; probability of risk occurrence, extent of risk occurrence and impact of occurrence (Miller and Bromiley 1990).

These three dimensions of risk could be viewed in two pairs. The first, being the probability of risk occurrence/impact of occurrence, also known as subjective risk. The second considers the pair of extent of risk occurrence and the impact of occurrence, also known as objective risk.

As post hoc evaluation of cash flow data is to be considered later, objective risk is the focus of this study in which case contractors' perception of extent of occurrence of risk factors in past projects as well as impact in case of occurrence was considered. The second issue considered in data collection was deciding on which side of the cash flow equation to focus on (Artzner *et al*. 1999). The cost committed by a contractor is not affected by tender unbalancing, and contractual arrangements that are risk factors that will impact cash payment from the client. As such, it is the cost committed (cash out) side of the cash flow equation that this study focuses on and it is referred to in this study as cost flow (Odeyinka, and Kaka 2008).

Tah and Carr's studies (cited by Tserng *et al*., 2009) indicated that risk management procedure was widely accepted as the chief role to affect risk management. A good procedure design enabled a systematic and consistent approach to implement risk management; hence, many studies were dedicated to research the risk management procedure.

There is the inevitability of unforeseen – and often unforeseeable – events occurring and affecting the project, regardless of the effort invested in front-end strategizing. To mitigate the risks arising from late adaptation, especially when many design variables interact, project teams are urged to build cap If we look at the map of risk perception (Figure 2-15) we will see that at each stage there is a strong reliance on the perception of risk to decide if action is needed or not. Feedback that scored a higher sensitivity to risk will mean that they are more likely to act; hence they are more likely to manage that risk rather than ignore it or leave it to another part to do so. Hence they should perform better in risk performance.

Scholars search for the capacity to re-plan through test-driven iteration, 3-D modelling and rapid prototyping, and to pursue multiple solutions concurrently. Scholars also exhort developers to invest in relational forms of contracting with suppliers, as these commercial arrangements encourage co-operative behaviour that translates into commitment, shared goals, and flexibility to cope with late changes in design requirements (Gil and Tetherb, 2011).

A probability density function or density of a continuous random variable is a function that describes the relative likelihood for this random variable to occur at a given point. The probability for the random variable to fall within a particular region is given by the integral of this variable's density over the region (Afshar and Amiri, 2010).

Every construction project has its own unique features; hence, time and cost for a given option may significantly vary from one project to another. To integrate existing uncertainties into decision analysis, one must employ the most appropriate technique which best fits the nature of the prevailing uncertainties. Although the probabilistic risk analysis is reported to be superior to most of the common risk analysis, its application is limited to the cases where hard-to-get reliable probability density functions are at hand (Afshar and Amiri, 2010).

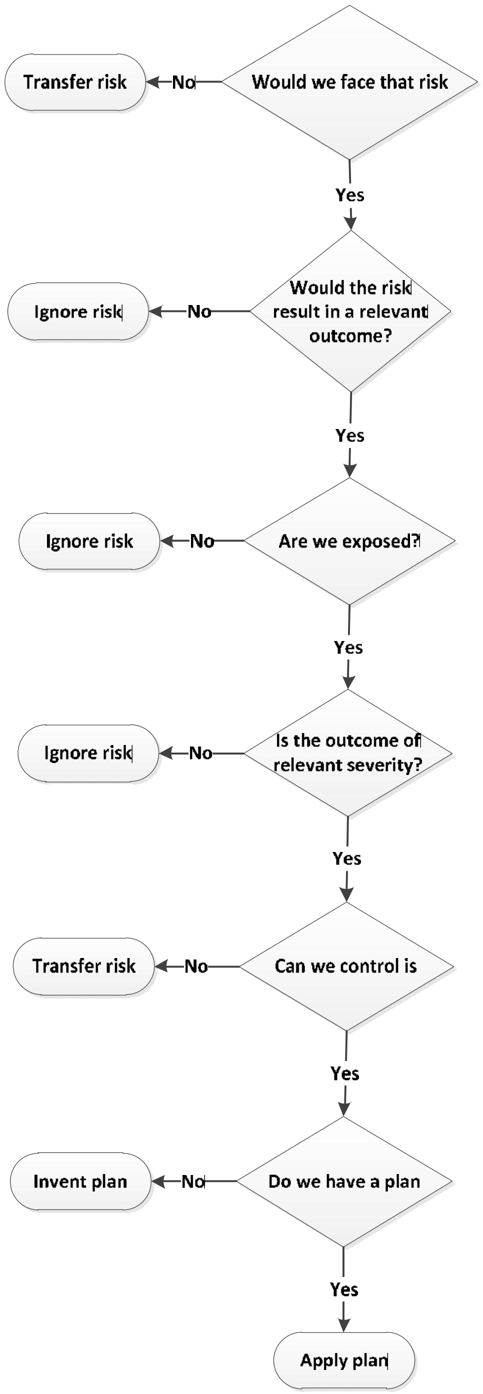

Figure 2-15 Map of risk perception

In fact, construction of such probability density functions for quantities of works needs adequate and precise data from similar projects implemented in quite similar environments and working conditions (Sarre, and Doig 2000). However, owing to the uniqueness of each construction project and unique features of every certain contract, collecting such information is very difficult, if not impossible. In such cases, expert estimations on the range of cost of options (and/or activities) may be the most useful and dependable information (Afshar and Amiri, 2010).

Akintoye and MacLeod (1997) explain that risk analysis and management in construction depends mainly on intuition, judgement and experience. This strategy shows that project exclusive variables would play a major role and cannot be ignored by systematic models. These variables would add to an alarmist view toward risk. Studies have shown (Smith *et al*., 1999) that construction firms are assuming proportionally greater business risk than assumed by the literature on contingency. Managers reflect their perception of risk management using the concepts of return, risk and ruin (Pryke and Smyth, 2006). However, whether the measures used present a satisfactory insurance, these measures could be improved by introducing the variables as the financial factor into the design stage as part of a strategic benefit and not only at a later stage as a problem solving method (Pryke and Smyth, 2006).

The difference of identifying the priorities within the project, as in the triangle of cost-time-quality, cannot be perceived within a single project nor be contained within the boundaries of the relationship between the contractor and the client in a project. This becomes more clear when new types of projects and types of relationships between logistics are being presented. New legal agreements, new styles of management, and new definition or relationships between the client, contractor and the project are being produced. The construction industry is responding to the challenge of accurate budgeting in the domain of facility capital cost budgets and risk management (Jackson, 2002).

This response by the construction industry is caused by problems of perception conflict toward risk between the client and the contractor. Pryke and Smyth (2006) explain that there is a common conflict between the client and the contractor regarding the long-term objectives vs. the short term, in the same way their perception of efficiency and effectiveness is rather different. In terms of dealing with cost, there is always the pressure to produce profit using either short or long term strategies. The priority of outcomes within the project itself would differ between the client and the contractor due to the difference of financial priorities, and the general objectives of the project itself (Loosemore, 1999).

Theories rose to manage this differentiation between objectives between different individuals. During the 1960s and early 1970s, economists explored risk sharing among individuals or groups' (Eisenhard 1989). The literature described the risk-sharing problem as one that arises when cooperating parties have different attitudes toward risk. Agency theory broadened this risk-sharing literature to include the so-called agency problem that occurs when cooperating parties have different goals and division of labour. Specifically, agency theory is directed at the ubiquitous agency relationship, in which one party (the principal) delegates work to another (the agent), who performs that work (Eisenhard, 1989). Agency theory is concerned with resolving two problems that can occur in agency relationships:

The first is the agency problem that arises when (a) the desires or goals of the principal and agent conflict and (b) it is difficult or expensive for the principal to verify what the agent is actually doing. The problem here is that the principal cannot verify that the agent has behaved appropriately. The second is the problem of risk sharing that arises when the principal and agent have different attitudes toward risk. The problem here is that the principal and the agent may prefer different actions because of the different risk preferences (Eisenhard, 1989)

These conflicts are rooted in the disputes between different approaches to identifying risk. There are many systematic and mathematical approaches to manage risk, and there have been social science approaches.

For example, Harty (2005) says that there is high reliance on using analytical techniques based on a statistical approach in decision making for risk management in construction projects. However, when it comes to considering the complexity of construction projects, construction mangers cannot solely rely on mathematical approaches, but by identifying the sources of these risks within the decision making process and therefore, the participants in the decision process. There is inconsistency toward risk identification or the areas that need more attention regarding risk management.

Edwards and Bowen (1998) explain that political, economic, financial and cultural categories of construction risk do not get enough attention, in comparison issues regarding quality assurance and occupational health and safety. Even in contract, identifying a high risk operational organization relies mainly in the contractors' quality of operation management and concentrate on experience and capabilities than anything else were delivered both late and over budget and two thirds were late (Morledge,1999).

This budget and schedule growth has frequently been associated with the construction industry. Klemetti (2006) has argued that the cause of this unsatisfactory performance is due to a failure to recognise or estimate the risks adequately, especially in capital projects like the new Wembley Stadium and the Holyrood building project, as these projects are more sensitive to economic and market changes. There are numerous methods available to address the risks and assess them at early stages, for example analytic hierarchy process (Mustafa and Al-Bahar, 1991), risk management processes (Tummalaa and Burchett, 1999), and fuzzy logic (Tah and Carr, 2000). However, the roots of these risks need further investigation, particularly regarding the role of the client in inducing these risks. The role of the client has not been adequately put into the equation of managing risk in early stages of the project comparing to other factors affecting risk.

Estimation and evaluation of model parameters are core aspects of decision support processes. The decision support process is potentially a highly iterative process, where uncertainty about how to proceed is progressively resolved by using simple working assumptions in early passes which are refined later as necessary. A holistic view of uncertainty must embrace ambiguity as well as variability.

Ambiguity is associated with lack of clarity because of lack of data, lack of detail, lack of structure to consider the issues, assumptions employed, sources of bias, and ignorance about how much effort it is worth expending to clarify the situation. This ambiguity warrants attention in all parts of the decision support process, including estimation and evaluation. However, consideration of uncertainty in the form of ambiguity is not facilitated in estimation by the commonly used probability models that focus on variability (Chapman and Ward, 2003).

The implications of uncertainty in simple deterministic model parameters and associated model outputs are commonly explored by sensitivity analysis, and complex probabilistic models often use techniques like Monte Carlo simulation to explore uncertainty modelled directly. However, neither of these evaluation approaches explicitly addresses ambiguity issues concerning the structure of the modelling of core issues, choices about the nature of the specific estimation process being used, and the wider characterisation of the context being addressed. The presence of ambiguity increases the need for data acquisition, estimation and model development to proceed in a closely coupled holistic estimation process. Failure to recognise this can lead to estimation processes that are irrational as well as ineffective and inefficient (Chapman and Ward, 2003).

2.5 Summary

The review of risk concepts has established several challenges associated with identifying risk behaviour and provided a comprehensive list of the important elements associated with the risk identification and analysis. This showed that identifying and managing risk is an essential part of managing the project. Risk can only be seen within a functioning system rather than as a separate element, and should be treated within a multi-layered universe which is integrated with the project cycle itself. However, the current practice shows a difference from such an integrated approach for managing risk in construction.

In one sense it can be argued that managing risk has always been problematic for the construction industry and one of the reasons for this problem is the limitations of the risk management approaches that are employed to manage a wider spectrum of the construction project cycle. This demonstrates the need to broaden the appreciation of how risk is managed beyond the traditional means, as there appears to be a lack of consistency in the practices involved in managing risk within the industry.

Overall the review has showed that there are limitations to the current practices on the management of risk in the construction project in that the role played by the client in inducing or preventing project risks is not given consideration during project appraisals. This is an important gap in the literature on risk and forms the focus of the next chapter.

3 Chapter Three: Client Role in Managing Risk

3.0 Overview

In this chapter the client role in managing risks in the construction industry is presented. The client plays an important role in the risk management process as one of the main stakeholders in project development. The client would usually act as the final decision holder, and the decisions the client make will have a great impact on the project. It is accepted that the main source of the risk options come within the project itself, usually established with the help of the project manager who is responsible for managing risk within the project.

The purpose of the chapter is to establish sufficiency of the role of the client as part of the overall mix for managing risk in the early stages of project. This is achieved by addressing the client's role in depth and identifying generic features of the clients' risk management. Such generic features include investigating: the clients' history in managing projects; perception of risk, organisational behaviour and the performance of clients during the project. The review in the chapter also covers the relationship that could enable managers and investors to link the behavioural pattern and organisational style of the client to the risks associated with projects.

3.1 The Client and Construction Risk

The client can be defined in respect to the perceived influence the client has on the course and the outcome of the project (Bresnen and Haslam, 1991). Initially the client is seen as the body that initiates the project and has the authority to approve expenditure on the project (Walker, 1996). The client is categorised based on what type of projects the client is involved in, value of projects, expertise or skill and the size of organisation history (Pryke and Smyth, 2006).

There is a recent growth of interest in client organizations reflects a concern that the decisions that clients make in setting up a project can have significant effects upon construction project performance. Clients may be comparatively new to construction project management and, therefore, somewhat unsophisticated and inexperienced in their use of project management and contractual systems (Zaghloul, 2003).

It is important for clients and project team leaders to ensure that clients are appropriately integrated into the project's organization structure because satisfaction at the construction stage is closely linked to the degree of control and supervision by the client himself (Walker, 1996). However, corporate client organisations are rarely suitable for providing client management of projects as the style of project management is likely to be more dynamic than that of corporate management (Walker, 1996).

There exists an apparent conflict in the literature over the relations among risk-related behaviours, firm performance and organizational decline. This conflict concerns whether firms do and whether firms should engage in riskier activities such as innovation when facing decline. This conflict is captured in two debates: (1) does organizational decline trigger increased or decreased risk; and (2) does risk contribute positively or negatively to subsequent performance (Wiseman and Bromiley, 1996).

Wild (2002) discussed the problem of self-fragmenting of construction; a market condition whereby there exists no dominant group of buyers or suppliers, but where many buyers are chasing many suppliers.

Previous discourse adopted the idea of a self-fragmenting construction resolved by improved contracts, communications and management (Boyd and Chinyio, 2006). This suggests these are aspirations of policy-makers dependent on construction for realization of public and private goals. Such prescriptions have resisted an appropriately complex model of construction setting the scene for an insufficiently critical research effort (Wild, 2002)

As 80% of projects involve one-off clients and are non-recurrent, ‘demand for construction’ could be interpreted sociologically as outsiders carrying their uncertainty into a social field destabilized by previous clients that is society (Wild, 2002). The fragmentation of construction arises in a wider social order uncertain as to its expectations of the constructed world in which it lives and works and transits through (Wild, 2002).

3.2 Different Categories of Clients

3.2.1 Client Objective

The client image then has developed based on its relationship with the other elements of the project. The client is seen in a unique position from the rest of the industry, as the client sees and experiences building different from the industry; for example, where the client needs a high value for his project the contractor is looking for a reasonable profit (Boyed and

Chinyo, 2006). The client characterisation becomes more complex when he is constructed within an organisation, as the client there is not unitary and that will cause conflict within the project (Boyed and Chinyo, 2006).

The client’s objectives play the most important feature in any building project, with a topical weighing for these objectives as shown in Figure (3-1). The Figure shows that the way in which objectives are established is closely associated with the power structure of the project participants which, if not controlled, can be complex and inappropriate in achieving the client's objective (Walker, 1996). The client objective is divided into the QPT triangle and then quality is divided into standards categories while price is divided into cost categories. The numbers represent the weighing accordance to importance.

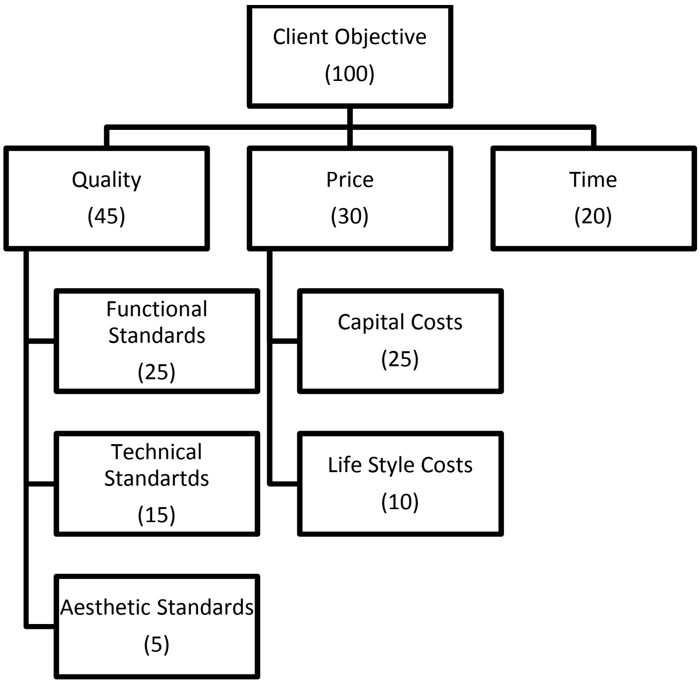

Figure 3-1 Client objectives (Walker, 1996)

Satisfaction at the construction stage is closely linked to the degree of control and supervision by the client himself. It is important for clients and project team leaders to ensure that clients are appropriately integrated into the project's organization structure because satisfaction at the construction stage is closely linked to the degree of control and supervision by the client himself (Walker, 1996). However, corporate client organisations are rarely suitable for providing client management of projects as the style of project management is likely to be more dynamic then that of corporate management particularly when the latter has a rigid hierarchical management structure linked to slowly changing long-term objectives (Walker, 1996). There are four factors which effects the client's involvement in the construction management process:

- the structure of the client's organisation;
- the client's knowledge and experience of the construction process;
- the authority vested in the various levels of the client's organisation; and
- the personal characteristics of the client's people who have responsibility for the project.

Empirical evidences provided more dynamic effect of the client organisational structure on the project. Most client systems are very much more complex than is commonly acknowledged by project teams and members of project teams can be impatient of this complexity and insist on dealing with a single client representative within whom all the internal politics of the client system can be contained. In addition, many of the problems concerning design changes, delays and difficulties during the construction phase have their origins in the unresolved conflicts within the client organisation. The earliest decisions taken by the client system have more influence over the way the project organisation is formed and its subsequent performance than those taken later. Pryke and Smyth (2006) explain that clients' decisions are personal, shaped by social and political forces as well as by economics and technical considerations and may be unjustifiably constrained by remains of the client's history.

Between the cultural identity of the organization and its actions, the process is filtered by its structure and by tracing the role of the client in shaping the project risk by identifying generic features of the client's risk management by studying their history in managing projects. The outcome should identify the behavioural patterns of the client which are responsible for inducing risk. Any feasible changes for advancement would be easier the closer it gets to the outer surface of the organisation as an onion model (Figure 3-2) where the identity stands in the core of the organisation and it will be harder whenever changes are needed in the core of the organisation (Mitroff *et al*., 1989). Analysing the organisational behaviour of the client and its effect on risk would start from defining the organisational structure of the client. The organisational structure in term of the transformation of the core identity of the organisation into its behaviour toward risk can be linked to a successful or unsuccessful risk management. This can be achieved by a thorough investigation of the organisation of the client.

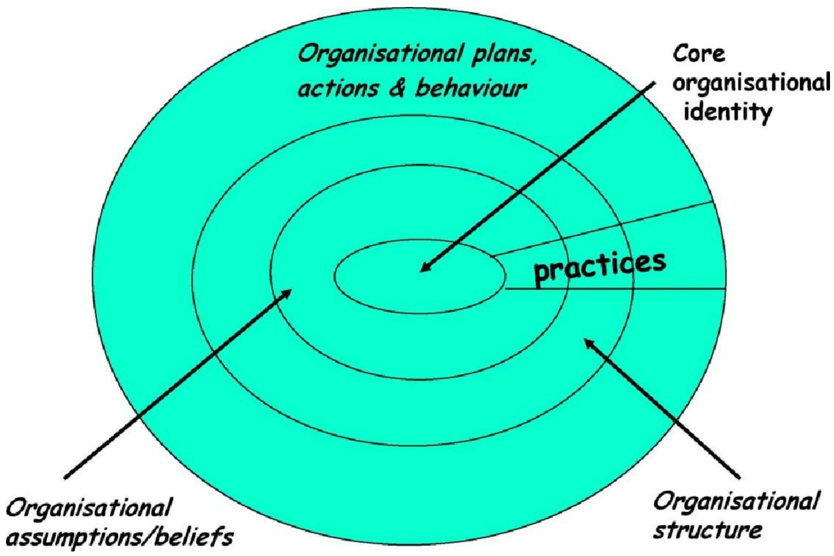

Figure 3-2 The onion model (Mitroff *et al.*, 1989)

3.2.2 Client Evaluation of Risk

Contractual relationships formed between the parties of a construction project allocate certain types of risk. Typically, the goal is to allocate risk to the party best suited to manage the particular risk and compensate that party accordingly for the risk they bear.

Although the delivery methods differ in how and when services are provided, risk is often generally allocated in a very similar fashion as described below (Erickson and Evaristo, 2006).

1. Owner (Client) – Responsible for project financing and giving design teams and contractors access to a site with known conditions.

2. Design Team – Responsible for lawfully providing a safe and complete design scope as agreed upon with the Owner.

3. Constructor – Responsible for constructing the project in accordance with the Design Team's construction documents referenced within the Contractor's agreement while adhering to governing laws during the construction of the project.

Client evaluation by construction consultancies is generally performed subjectively by construction professionals, focusing primarily on financial considerations, with superficial attention paid to management inputs and other characteristics of clients' organizations (Kometa *et al.*, 1995). Client evaluation at the moment is regarded as a single attribute issue based on the client's financial stability. Financial stability is paramount, but is not the only client attribute impacting the consultant's performance (Kometa *et al*., 1996).

According to Oyegoke (2001), the contracting procedure usually follows the procedures outlined below.

At the beginning of the management contract, the employer will appoint a professional team that prepares project drawings and a project specification, which describes generally the scope of the project (Oyegoke, 2001).

Usually the head of the team is the architect; drawings, specifications and bills of quantities are then prepared at appropriate times by the professional team for use in the various works contract (Frödell *et al*., 2008). The management contractor tasks cover two distinct phases: a pre-construction period and a construction period. The works contractor can also have contract with nominated sub-contractors and suppliers (Miller and Lessard, 2001). The works contractor shall not without the written consent of management contractor assign the works contract. Also the works contractor must not without the written consent of the management contractor sub-let any portion of the works, in any case he will be wholly responsible for the works contract (Oyegoke, 2001).

Management contractor receives payment by interim certificates during the construction period and these certificates include payment in respect of the various works contracts. When practical completion has been achieved the architect is required to issue a certificate of practical completion and during the defect liability period, the management contractor must secure the rectification of defects. All work contracts contain a provision requiring the works contractors to carry out rectification of defects not only after their own work has been practically completed but also during the management contractor's defects liability period (Oyegoke, 2001).

It is pertinent to note that construction management contracting systems use the same construction industry resources as the other contracting systems, and requires the same services to complete a project. The differences between the contracting systems are the contractual ties and assignment of responsibilities of the parties, the contracts within the system, and their legal performance requirements (Oyegoke, 2001).

The procedure of distributing the risk has been presented in Figure (3-3), where the risk is distributed between the management contractor and the owner. The management contractor carries the price and schedule risk while the owner carries the quality and administration (Mok *et al*., 1997).

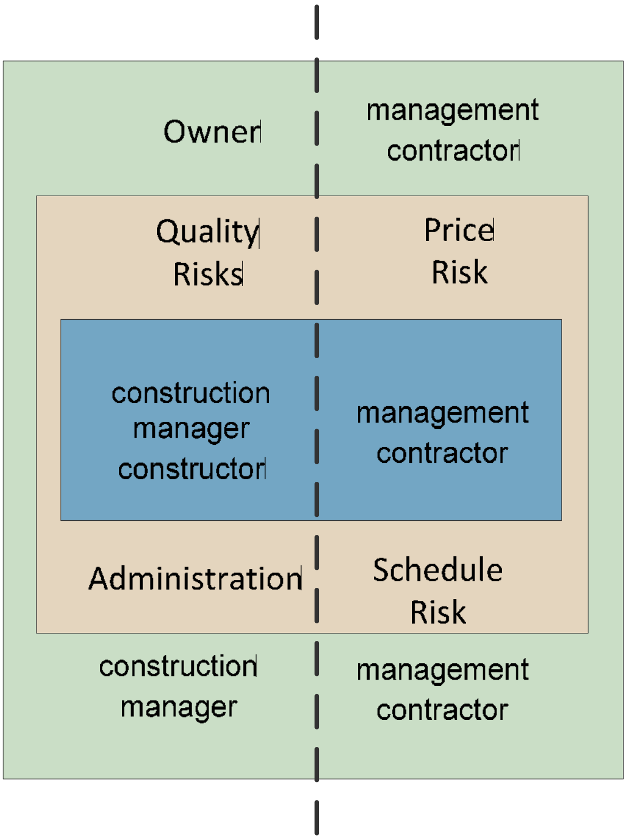

Figure 3-3 Risk distribution in construction management contracting system

Big capital clients look at their construction projects as an investment itself, so they tend to look for expenses reduction factors all through the project, and in the same times to have sufficient quality that will assure the success of the investment, and no further unnecessary expenses will be needed in the future (Mulholland, and Christian, 1999). This can be defined by one word: effectiveness; it is the core competence of the company in the construction sector. This can be compared with the term “value for money” in other type of products or services.

In any typical design build and procurement route the whole procedure goes through the step of briefing, design, construction and then use. Each step has the client’s involvement and the client will play as a risk factor throughout the four stages .In the construction industry, the design itself is led directly by the client (customer) rather than by the service performer (contractor). This places a higher responsibility on the client comparing to other industry (Naoum, 2001).

We notice that in the recommendations of the collaborative contract style which was presented to address the risks induced by the client (Naoum, 2001). This can be taken as bases of what a positive relationship between a contractor and client would look like.

Whether the client is a private or public sector organisation, it needs to be clear as to its overall objectives. In the case of a private property developer client, this might be to develop and manage a portfolio of properties that are attractive to tenants who will therefore occupy promptly and pay full market rents, thereby contributing to the developer's profitability (Nummelin, 2005).

In the case of a public sector organisation, the main objective might be to provide an enhanced service to the community making best use of available funds. Having identified the objectives of the business the next step is to identify the business risks associated with the achievement of those business objectives (Olsen and Osmundsen, 2005).

As a starting point, the parties are encouraged to consider the general categories of risk and the possible specific risks set out in the Table below.

However, the recommendations which have developed based on the experience of the industry are not client specific, it can fail on some level to recognise the risk involved with a specific category of a client (Sherif, 2006). The reason for that is like great amount of research into risk in construction, is based on listing the specific risks which was collected based on what has been recorded as a problem.

Definition of the client has changed in respect to the perceived influence the client has on the course and the outcome of the project. Initially the client is seen as the body that initiate the project and has the authority to approve expenditure on the project (Walker, 1996). The client is categorised based on type of projects he is involved in, value of projects, expertise or skill and size of organisation history (Pryke and Smyth, 2006).

3.2.3 Client's Culture

For the client to reach a decision making process in acting toward risks, the cultural background would reflect the conditions the organization is working within. In taking a decision, consideration need to be given to whether the risk can be effectively managed by the participant allocating the risk or whether the allocation causes a different, but more damaging risk; and whether the allocation of risk intended is effective and enforceable (Edwards and Bowen, 1998). In the source of the decision taken by the client, there should a trigger behaviour routed within the organization itself. This trigger behaviour can be routed within the cultural web of the organization (Figure 3-4).

The client, especially as an organisation, reflects its relationship with the stakeholders on the project. This organisation, with its elements, defines the way the client reacts to change and perceived information. The paradigm of the client classifies its flexibility and the ability to condition its objectives based on the perceived risks of the project. The client ability to balance between the demands of the stakeholders and the real objectives of the project is fixed within the character the organisation which is affected by the cultural web.

There is the need to manage clients' behaviour and expectations. Clients can unnecessarily disrupt project execution by insisting on design changes, particularly when these are made late, and/or could have been foreseen and therefore incorporated into the design earlier. Clients often violate the project process without fully realising the implications of their behaviour for the project's progress and budget. Aware of these issues (Gil and Tetherb, 2011).

It is suggested (Gil and Tetherb, 2011) that project administrators' needs should outweigh the influence of functional managers and client directors. Others recommend setting up governance structures that make explicit the cost of late design changes (Gil and Tetherb, 2011). Gil and Tetherb (2011) advocate an 'alliance culture' fostered by frequent meetings with the customers to discuss how to accomplish a 'future perfect' outcome when 'planning is almost impossible'. This approach brings soft skills such as communication, emotional intelligence, leadership, and motivation to the fore. All of these practices concern managing projects.

Jackson (2002) makes clear that complete design information leads to more accurate budget estimates and client driven design change is the greatest risk during the project. These two factors are affected by many issues like decision making source, documentation, bureaucracy, and formality vs. informality within the organisation. All these elements reside within the pieces of the cultural web of the organisation (Johnson and Scholes, 2002).

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The Figure shows a close interaction between the elements that control the culture of the organisation with the control systems, power structure, and organisational structure being the most influential elements.

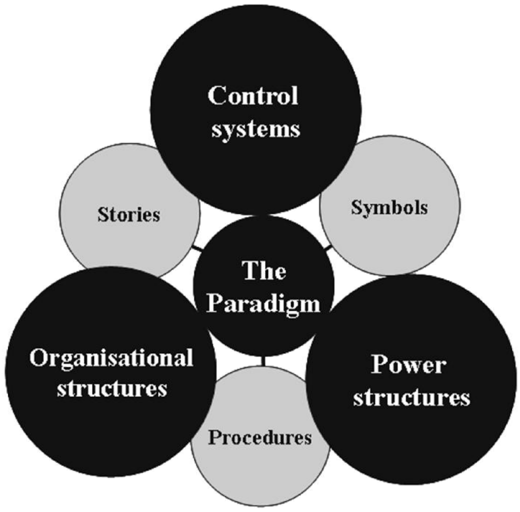


Figure 3-4 Cultural web

Jackson (2003) makes clear that complete design information leads to more accurate budget estimates and client driven design change is the greatest risk during the project. These two factors are affected by many issues like decision making source, documentation, bureaucracy, and formality vs. informality within the organisation. All these elements reside within the pieces of the cultural web of the organisation (Johnson and Scholes, 2002).

3.2.4 Client's Experience

A small, inexperienced client who has not previously handled large-scale, complex projects, or one who faces for the first time a project of untypical magnitude and complexity, may well find this information and advice of considerable use. But not all clients are like this. In fact, the industry is one in which there are a sizeable number of regular clients whose average project is one in which they have considerable experience (Michael, 1991). Such clients typically manage a fair-sized portfolio of projects varying in scale and type, and will often have some in-house capacity and well-established mechanisms and procedures for handling them. These clients are by no means the 'naive' clients often typified in the construction management literature. Indeed, they are sophisticated and experienced enough to understand the process of construction and the potential for problems that are inherent in its uncertainty and complexity. Such clients approach their projects with a consistency that belies the commonly held view that 'every project is different' and thus should be treated as such. In particular, the choices of project management systems and contractual forms are as much internally driven as project determined (Michael, 1991).

To the extent that a professional or contractor is unwilling to bear the given risk, a further increase in the premiums will be sought. The client may be unaware of the size of these premiums that are incorporated in prices tendered, although they may vary from contractor to contractor and represent a significant portion of the bids (Ward *et al*., 1991).

The client may also incur a further, additional cost via an impact on the project objectives of professionals' and contractors' behaviour over the life of the project. For example, quality may suffer, delays occur, or claims may arise that increase problems and potentially add to the project's cost (Ward *et al*., 1991).

The willingness of parties to take on risks is an important consideration in the allocation of project risks. Contractual allocation of project risks is essentially in the hands of the client. If the client is unwilling to bear a particular source of risk, he/she can pass this on to one or more of the other parties involved in the project, including the management contractor in a management contract if he so wishes. Of course, the client will pay a price for passing on this risk, although clients do not always fully appreciate the premium that they pay for this. Where a professional or contractor is aware that he/she will be required to bear a given type of risk, professional fees and tender prices will include an additional premium to reflect the expected cost of this risk, plus a contingency sum in most cases, plus a fee for the risk-bearing service (Ward *et al*., 1991).

Awarding a construction contract to the lowest bidder, without making an allowance for other factors, can result in problems such as cost overruns, delays and poor performance (Mahdi *et al*., 2002). Lowest bidding contractor may tend to implement confrontational `claims oriented position' once the project is awarded as a means of making-up any financial short full. Whilst a low tender sum may seem attractive to the client at tender stage, the project may face problems if the contractor is for example not able to finish the work on time or compromises on the quality of construction to decrease the contractor's cost (Mahdi *et al*., 2002).

Another problem with current contractor selection methods is that they depend on the skill, experience and knowledge of the decision maker (Mahdi *et al*., 2002). The experience and relevant knowledge of the decision maker diverges from one to another and there are no minimum standards that promise the quality of the selection process (Mahdi *et al*., 2002). Even with an experienced and knowledgeable decision maker, their processes are kept privately and there is still no methodical procedure by experts that can help in evaluating the contractors' qualifications, current capabilities and method of work, in comparison with the specific conditions and requirements essential for the specific project in hand (Mahdi *et al*., 2002).

It is frequently correct that no leading alternative contractor who is better than all other contractors in terms of all decision criteria will exist. Consequently, the decision maker is faced with a trade-off issue which requires a structured framework to enable the decision-maker in selecting the most appropriate tender with high confidence and, further, help in reducing the effort and time consumed in the evaluation process. In addition, the evaluation process depends to a great extent on the level of experience, the effort made by the decision-maker and the quality of information, which may vary from one situation to another (Mahdi *et al*., 2002). Therefore, the decision making process for identifying the most suitable contractor or tender requires skill and expertise, along with a methodical and predefined choice procedure.

The client organisational strategy should affect the client's choice on the construction client. Holt *et al*. (1994) have surveyed for the factors influencing U.K. Construction clients' choice of contractor. They created rankings and the weighted catalogues so it would aid other clients to assess their existing selection methods with regard to the standards they engage and the level of importance they assign to them.

Their research was made by presenting the variables which were considered important by various authors on contractor selection to construction clients for confirmation and determination of their levels of importance. The six highest scoring variables were (Holt *et al*. 1994):

1. contractors' current workload;
2. contractors' past experience in terms of size of projects completed;
3. contractors' management resource in terms of--formal training regime;
4. contractor's past experience in terms of catchment, as in national or local; and
5. experience in terms of type of projects completed.

We notice that experience of the contractor in many terms dominates those categories. The question is if the perception of experience can be considered as objective criteria. Of course there are some objective ways to consider experience, for example using comparison, especially with financial responsibility.

3.3 Client's Financial Behaviour

The construction client would fall under the financial culture of the EU, which has its own characteristics. The financial culture in Europe is one that relies on complex decision. A study by Brounen (2004) was investigating differences between European countries in addition to difference between large and small companies. Regarding the corporate finance practices the research founded little difference across countries. With respect to capital budgeting techniques a strong preference for the simple payback criterion was discovered among European firms.

Although this preference is stronger in Europe it does not differ significantly from capital budgeting policies of U.S. firms, and this preference for payback criteria is consistently stronger among small firms and among firms, which are less oriented towards shareholder wealth maximization. These differences seem to have little effect on firm's capital structure practice. Financial flexibility is reported to be the most important factor, when determining the proper of amount of corporate debt. On the other hand this urge for flexibility is not driven by the pecking order theory. Furthermore, there was no evidence for agency theories, signalling, or a role of capital structure in control contest.

This was confirmed by a previous survey by Bancel and Mitto (2003) in sixteen European countries on the determinants of capital structure across countries. This study also assured that financial flexibility and earnings per share dilution are the primary concerns of European managers when issuing debt and common stock respectively. Managers also value hedging considerations and use window of opportunity in raising capital.

Friction between clients and contractors, personal resentment or enmity can occur between clients and contractors as a result of misunderstandings, unanticipated changes in the scope of the contract, missed or delayed delivery, or some other item of dispute that polarises clients and contractors into opposing camps (Baccarini *et al*., 2004)

Projects are disrupted from achieving their objectives due to management playing politics within and between departments or external agents and due to lack of executive support. Moreover; stake holders may not support the project if they perceive that there is a lack of top-level management (Baccarini *et al*., 2004).

Baccarini *et al*. (2004) research has defined seven main reasons for projects to fail: from the input change there are incomplete requirements and insufficient information; from within the project there are unrealistic restrictions are contentious changes, from the output there are diminished window of opportunity and unrealistic expectations; and generally there is lack of single point of accountability. Figure (3-5) shows their relationship to the project.

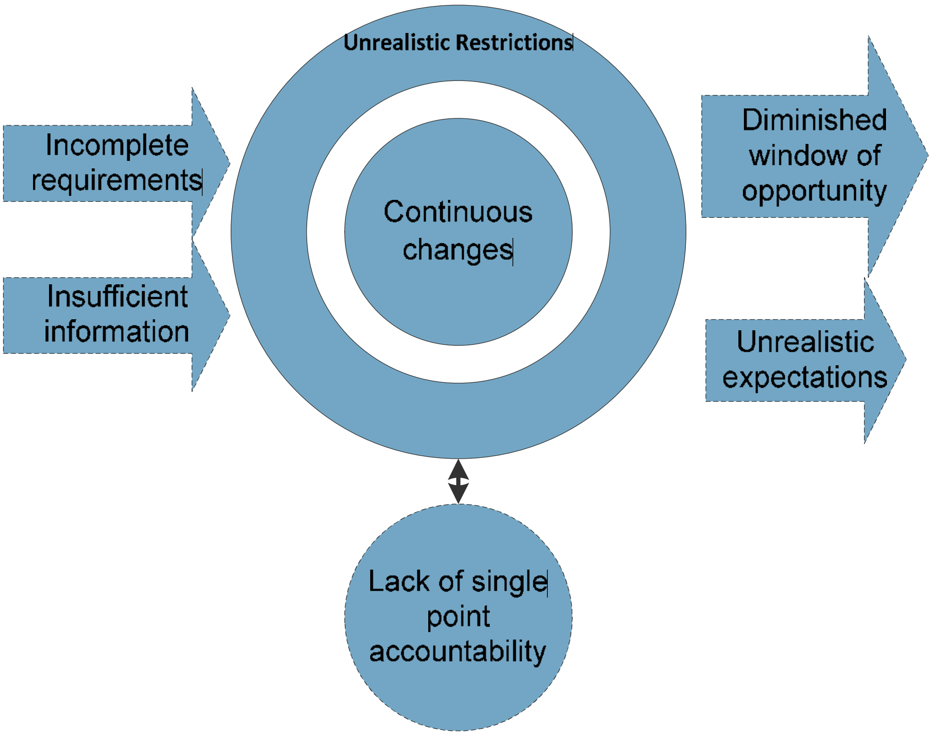


Figure 3-5 Reasons for project failure

If insufficient information has been obtained in the analysis phase, it will result in construction of a solution that does not meet project objectives. The project would also be unable to realise its objectives owing to unrealistic restrictions placed on the projects budget, schedule, quality or level of performance.

Continuous changes to requirements by client will result with stakeholders continuously make changes to the project expectations throughout the project life-cycle. The lack of single point accountability is typical of large construction projects due to having many team leaders but no single point of responsibility for deliverables, resulting in the project failing to meet its objectives. Unrealistic expectations have been a problem too, except when client expectations has been emphasised as a key criterion for project success. Consequently, the risk of unrealistic expectations will grow in importance and will need to be managed by quality, scope and communications management.

There is a critical awareness currently of the importance of fully defining clients' requirements early in the project to help achieve project success. Therefore, it is not surprising that incomplete requirements are seen as an important risk, requiring scope, quality and communications management.

And finally a disappearing window of opportunity for market functionality due to late delivery of the project is a critical issue with many projects these days as it is needed to reach the market before competitors/primal service time. Therefore, missing a window of opportunity is a high risk and requires good time management. While the speed to market was of lesser importance in the past but compared to current relatively turbulent and dynamic markets it became a very sensitive matter (Baccarini *et al*., 2004).

Big capital clients look at their construction projects as an investment itself, so they tend to look for expenses reduction factors all through the project, and in the same times to have sufficient quality that will assure the success of the investment, and no further unnecessary expenses will be needed in the future. This can be defined by one word: effectiveness; it is the core competence of the company in the construction sector. This can be compared with the term "value for money" in other type of products or services.

In any typical design build and procurement route the whole procedure goes through the step of briefing, design, construction and then use. Each step has the client's involvement and the client will play as a risk factor throughout the four stages .In the construction industry, the design itself is led directly by the client (customer) rather than by the service performer (contractor). This places a higher responsibility on the client comparing to other industry.

We notice that in the recommendations of the collaborative contract style which was presented to address the risks induced by the client. This can be taken as bases of what a positive relationship between a contractor and client would look like.

Whether the client is a private or public sector organisation, it needs to be clear as to its overall objectives. In the case of a private property developer client, this might be to develop and manage a portfolio of properties that are attractive to tenants who will therefore occupy promptly and pay full market rents, thereby contributing to the developer's profitability.

In the case of a public sector organisation, the main objective might be to provide an enhanced service to the community making best use of available funds. Having identified the objectives of the business the next step is to identify the business risks associated with the achievement of those business objectives.

As a starting point, the parties are encouraged to consider the general categories of risk and the possible specific risks set out in the Table below.

However, the recommendations which have developed based on the experience of the industry are not client specific, it can fail on some level to recognise the risk involved with a specific category of a client. The reason for that is like great amount of research into risk in construction, is based on listing the specific risks which was collected based on what has been recorded as a problem.

3.4 Case Studies

There are some cases that can demonstrate the extent to which a client role can shape the success or failure of the project. Assuming that the client can purely control the outcome is unreasonable; however, the client should be aware of the limitation of controlling complex projects. The more variables are involved, the less likely the contractor ability is to satisfy the client objectives.

3.4.1 The Wembley Stadium

Wembley is the most expensive stadium ever built at a cost of £798 million. Originally intended to open in 2006 the completion was delayed until early 2007. The delays started as far back as 2003 (Downes, 2006). There were warnings to the main contractor Multiplex about rising costs and a delay on the steel job of almost a year due to design changes which Multiplex rejected (Times Online, 2006).

The design of the stadium was carried out by architects Foster and Partners and HOK Sport while Sir Norman Foster designed the arch and the roof structure. According to Building (2008) the tendering process started with the appointment of Bovis/Multiplex consortium in 2000 as the preferred contractor which was later dissolved and Multiplex was appointed. Bovis opted out when it envisaged that the agreed price was not tenable or visible (Building, 2008). This was the genesis of the stadium's problem. As a deeply rooted company in the UK, Bovis understood very clearly that construction was not visible at that cost (Mylius, 2005). However, owing to the plausible smart play of WNSL and the ubiquities of mischief associated with the design and construct route were contractors bid low in order to wait for claims and variations to improve their profit. WNSL fell for the trap and an agreement was signed (Bowers, 2006). But this turned out to be adversarial leading to numerous accusation and court cases. Moreover, Tropus was first appointed as Wembley project manager whose contract ran out and was consequently replaced by Symonds (Building, 2008).

The delays started from the very start. The procurement process to contractor followed a twin track approach. Multiplex, who ultimately won the contract, were given preferential treatment from the start (Dezeen, 2008). An enquire by David James (the well know company doctor) concluded that the procurement process “while showing no evidence of corruption was unlikely to satisfy best practice standards” and “lacked a level playing field”. In December 2003, the constructors of the arch, subcontractors Cleveland Bridge, warned Multiplex about rising costs and a delay on the steel job of almost a year due to design changes which Multiplex rejected (Naybour, 2010).

Cleveland Bridge were removed from the project and replaced by Dutch firm Hollandia with all the attendant problems of starting over. On 20 March 2006, a steel rafter in the roof of the new development fell by a foot and a half, forcing 3,000 workers to evacuate the stadium and raising further doubts over the completion date which was already behind schedule (Naybour, 2010). Table (3-1) provides a timeline of the project disputes development.

Table 3-1 Time line of the project (nce.co.uk)

May 1998	**Mott Consortium starts design work on Wembley stadium**
May 1999	Multiplex becomes involved in project
Aug 2000	Multiplex in joint venture with Bovis submits £396M project bid which is rejected by WNSL
Sept 2000	Multiplex submits £326.5M bid
May 2001 to Jan 2002	Project is revised
Sept 2001	Work starts on the new Wembley stadium. Mott MacDonald novated to Multiplex
End 2001	Hare Consortium quits as specialist steelwork subcontractor
Feb 2002	Cleveland Bridge bids for steelwork contract
Jan 2003	Cleveland Bridge’s deadline for full and final structural designs
July 2004	Cleveland Bridge walks off job
March 2007	New Wembley stadium opens 10 months late
Sept 2008	Brookfield wins £6M from Cleveland in court ruling
Dec 2008	Brookfield submits £253M claim against Mott MacDonald

On 23 March 2006, sewers beneath the stadium buckled due to ground movement. The General, Municipal and Boliermakers Union leader Steve Kelly said that the problem had been caused by the pipes not being properly laid, and that the repair would take months. A spokesman for developers Multiplex said that they did not believe this would "have any impact on the completion of the stadium", which was then scheduled to be completed on 31 March 2006 (Naybour, 2010).

Minor delays installing seating were blamed on the recent insolvency of a supplier. Multiplex estimates the stadium is unlikely to be ready to host a full-capacity game until June 2006. Wembley National Stadium Ltd (WNSL), the stadium owners, has disputed this claim. Many of the hold-ups have been blamed on the complicated nature of the design and Multiplex has claimed that the 560 changes made to their brief by WNSL caused the delays (Carter, 2002) and the client admitted that its design changes affected the project's timetable (BBC Online, 2006).

There are three elements to the dispute which involve Multiplex, Mott MacDonald, and Cleveland Bridge Their dispute can be summarised as follows (adapted from nce.co.uk, 2010).

- Multiplex Claims it was not given access to vital design information and that this led to increased steelwork costs.
- Mott MacDonald "Multiplex was aware of the state of design, having managed the design process and having been intimately involved in the design work".
- Cleveland Bridge "It is extraordinary how the claims by Mott MacDonald appear to be rewriting history".

Wembley's problems started with the original strategy of the client toward the risk in the project, where the client was trying to counterbalance all input to the contractor. The procurement method for the contractor and their supply chain was focused on transferring the risk. This has produced an adversarial environment where each company involved in the project were reconstructing their efforts on the demands and risks of their businesses regardless of the ones of the project. Multiplex were an Australian contractor start-up company (The Guardian Online, 2006); and would not have had the appropriate experience regarding the culture of the British construction industry. Furthermore they were involved strongly in the project with no exit strategy and their relationship with their supply chain was weak. Bewsey (2006) claims that the client made a bad decision in choosing the contractor in the first place and enforcing some limitations and changes to which the contractor was unable to adapt.

Regardless of where the biggest responsibility falls, the agreement implemented in the first place did not give enough flexibly to the contractor to adapt to the changes in the project. This should have been taken as a big risk in the design stage. The client assumed that the bargaining power of the client which is strong in first stages is adequate to maintain a controlled project. Figure (3-6) summarises the crises development and how the problematic elements started from the beginning and they simply found their route as the project developed.

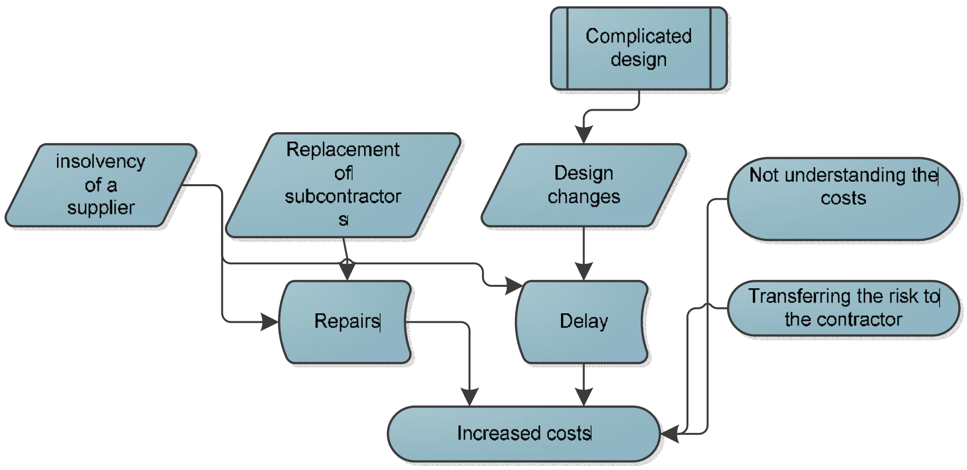


Figure 3-6 Causes of the development of the crises

3.4.2 Scotland's Parliament

Scotland's parliament, also known as the Holyrood building project, was three years late and eleven times over budget reaching £430 million, which included trebling the size of the building and changing the specifications on a daily basis (Audit Scotland, 2004). The report for the Auditor General for Scotland on the project explained that the main cause of the 20 months since September 2000 was the production of detailed design variations and the late supply of information during the construction process. There were difficulties associated with the construction of a very complex, densely developed, unusual building against very tight deadlines. Both the architects and some trade contractors did not deliver on time some critical elements of the design work (Fairs, 2001).

The problems that the Scottish parliament faced can be put into a wider shareholders context, as it was a political symbol and part of a public concern. Hence it is important to review the general view toward the development of the project. Czarnocki and Murray (2004) have investigated the media coverage of the project, which can be summarised by Table (3-2).

Table 3-2 Sample of headlines used to cover the development of the project (adopted from Czarnocki and Murray , 2004)

Year	The Scotsman	The Herald
		Cost Issues
1998	"Holyrood Site Chosen"	"Dewar did his homework – these are good reasons for choosing Holyrood"
1999	"Behind Schedule and over budget"	"Debate over Donald's Building"
2000	"MSPs back Holyrood but cap cost at £195m"	"Fears for architect mar £195m Holyrood vote"
2001	"Its out of control"	"Holyrood building cash cap removed"
2002	"Benefit fraud at Holyrood may add to spiralling cost"	"Benefit officers raid Holyrood site"
2003	"Holyrood cost soars by further £13 million"	"Holyrood is a deracinated symbol of Scotland"
		Time Issues
2000	"Spencely report charts spiral of Holyrood Cost"	"Sir David provides concrete answer for Holyrood Delay"
2002	"MSPs facing a later Holyrood moving date"	"An architectural asset in the making so lets stop carping"
2003	"Holyrood building cost surges to £338 million"	"Holyrood opening date questioned"
		Design Issues
1999	"Miralles draws up Parly rethink"	"Flexible friendly design for debate"
2000	"All change in grand design for Holyrood"	"Design changes that pushed up price"
2001	"Is it a Parliament or a supermarket"	No Report
2002	"Holyrood consultants to take home £40 million"	"MacDonald urges Holyrood fees cut"
	Political Game Playing Issues	
1999	"SNP to block building plan for Holyrood"	"SNP on trail of Euro billions"
2000	"SNP stokes row on Holyrood bill"	"Dewar and officials in clear over rising cost of Holyrood project."
2002	"No end to Holyrood bills even when it's finished"	"Holyrood cost go through the £300m roof; outrage at buildings latest £28m increase
2002	"Holyrood saga shatters Scots illusions"	"Dream still holds – just; Scottish Parliament could yet be a national asset."
2003	"McConnell building debacle must not be repeated"	"Holyrood is a deracinated symbol of Scotland."

Ojiako *et al*. (2008) explains that There are numerous reasons why this may be the case. In the first place, business change is often driven through projects but change may also affect them. As a result, organisations often find themselves dealing with projects that are increasingly difficult and expensive to implement in order to secure the financial success of their organisations. In some cases, it does appear that these organisations end up struggling to define a clear set of measurement criteria that aligns to their strategic objectives.

Project management did take part of the blame, however (Audit Scotland, 2004) , as they required a very demanding timetable for completion without addressing the root causes of the problems, which were adversely affecting both cost and programme. The main reasons for construction cost increases after 2000 were design development and delay in the construction process. The design development was entirely related to realising the detail of the building and aspects such as the quality of finish and the palette of materials that were used, in accordance with the client's requirements.

The client maintained a drive for the earliest achievable completion date, based on the recommendation of the consultants without taking into account the contractor's position. Program revisions repeatedly incorporated assumptions about design and construction performance that the design team and contractors agreed were achievable but were subsequently not achieved. There were two main reasons for the problems in the project, the first is the lack of understanding by the client of the complexity of the project, indicated by the undervalued initial cost of the project and the other is the lack of focus on the real objectives of the project regarding time, cost and quality proved by the lack of consistency toward these goals (Audit Scotland, 2004).

One possible factor in such overruns can be attributed to projects being more complex than originally anticipated at earlier stages, together with poor planning and estimating. It has been established that complexity is one of the influencing sources in cost-estimating practices in construction projects (Akintoye, 2000). Chryssolouris (1994) highlights the importance of complexity in the management of projects. It has been suggested that to achieve a better understanding of a project, its complexities should be measured so that fresh approaches can be developed for systematically reducing complexity.

As Sinha *et al*. (2011) explains, projects are made up of a number of activities and, in turn, these activities are made up of a number of subtasks. In addition , a project is said to be complex if it consists of many teams and requires a lot of detail for its efficient execution, coordination, control and monitoring from start to finish. Furthermore, it is recognized that some decisions taken at the early design stage often fail to deliver outputs that meet the expectation of customers.

Research findings (Cheng and Proverb, 2004; 2006) indicated that the client's strategic decisions, especially at the early stages of the construction process for example regarding the procurement route, have a significant impact on satisfaction levels. This is significant, as most strategic decisions have to be made during the early stages of the construction project at a time when there is much uncertainty.

These failings are attributed to a lack of understanding of the complexity of projects and result in a number of changes and hence redesign. It has also been suggested that to achieve anything more than a superficial understanding of a project, its complexities have to be measured; therefore, fresh approaches should be developed for systematically reducing complexity in production systems (Chryssolouris, 1994).

There are circumstances which are often found in relation to large scale landmark building projects. Research by Fortune (2007) into found that even among practitioners producing forecasts closer to the analytical rather than the intuitive end of the judgement continuum, that there was a problem in that although uncertainty was recognised there did not appear to be any evidence of the practitioners concerned thinking in probabilistic terms. Such skills and approaches are widely recognised in academia as being appropriate for the management of such risks but in practice there seems to be a need for the adoption of a more probabilistically based approach to forecast production (Fortune, 2007). The use of past experience and set routines can be adopted to solve typical problems but such an approach does not serve practitioners well in other less predictable circumstances as are often to be found in the context of this professional advice function (Fortune, 2007).

This case falls into Mitroff *et al*. (1989) definition of crisis-prone vs. crisis-prepared organization, where crisis-prone organizations are characterised by inflexibility and high rationalisation. But most importantly is the high denial of a crisis appearing from the first stages, and the high defensive mechanism that characterises the client. Figure (3-7) summarises the essential factors that led to the uncontrolled escalation of cost for the Holyrood project. It shows how the problematic elements started from the beginning and they gradually routed as the project reached advanced stage.

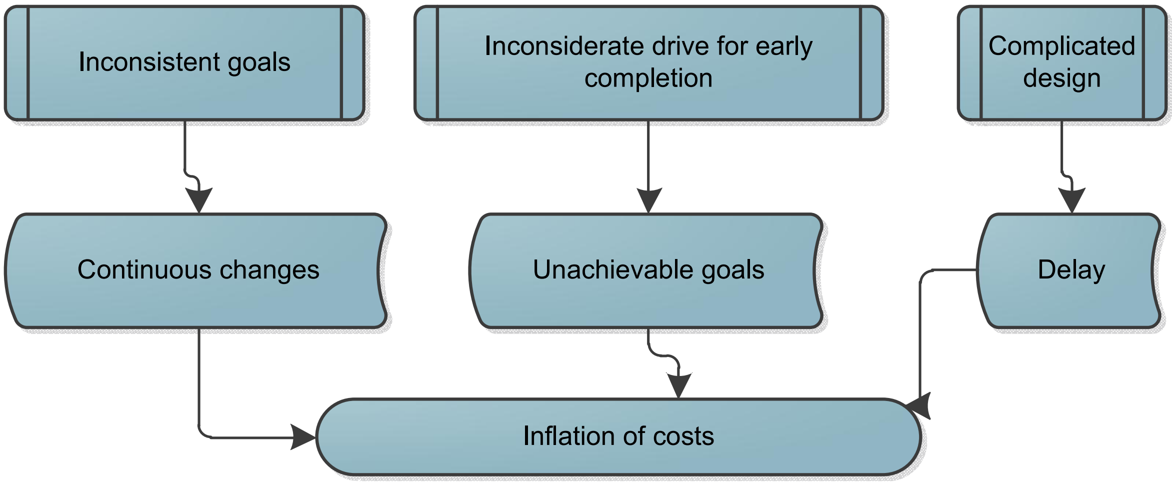


Figure 3-7 Causes of the development of crises

3.4.3 BAA

BAA's Terminal 5 Programme at Heathrow Airport was of a scale which is new to the client organisation; however, BAA's approach to risk management has been a key factor in keeping the project on budget and ahead of schedule.

T5 is one of the biggest construction projects currently underway in the world, creating over 6000 construction jobs over its five-to-six-year duration (Harty, 2006). BAA is a consistent purchaser of construction work and as such has considerable financial leverage and some understanding of the problems associated with the sector. Harty (2006) states that using this leverage, for T5's design and construction, BAA has implemented rolling framework agreements with upwards of 50 construction firms, rather than allocate work based on competitive tendering. A condition of the agreements is that firms' staff working on T5 are co-located to offices at Heathrow Airport, rather than work from their particular firms' offices (Caldwell *et al*.. 2009).

However, rather than force through implementation as a condition of work allocation, they pursued an 'integrated team approach to the project' (BAA, 2003) involving all partners in consultations over the introduction and use of the new technologies.

The history of the UK construction industry on large-scale projects suggested that had BAA followed a traditional route T5 would end up opening two years late, cost 40% over budget with six fatalities (Riley, 2005). This would have been unacceptable to BAA as their funding is determined by five-yearly reviews of landing charges by its regulator who allows BAA a set rate of return, but in order to satisfy shareholders BAA are required to beat that. 'Massive cost overruns would have wrecked the company's reputation and sent the share price plummeting' (Riley, 2005).

BAA took a brace decision to adopt a contract strategy that enabled suppliers to focus on delivery (Winch 2000). Terminal 5 is being constructed under the T5 Agreement which means BAA acts as the prime client and accepts most of the risk. With this burden removed from contractors and suppliers, it enables everyone working on T5 to focus on managing out the cause of problems, not the effects if they happen, work in truly integrated teams in a successful, if uncertain environment, and focus on proactively managing risk rather than devote energy to avoiding litigation (Woodman *et al*., 2002). This is in contrast to conventional contracts which attempt to pass on the financial cost of risk to contractors.

With this burden removed from contractors and suppliers, it enables everyone working on T5 to (BAA fact sheets, 2011) :

1. focus on managing the cause of problems, not the effects if they happen;
2. work on truly integrated teams in a successful, if uncertain environment;
3. Focus on proactively managing risk rather than devote energy to avoiding litigation.

The project management approach was developed based on the principles that went further than any other major project with two underlying principles (Mallett, 2005):

1. the client always bears the risk – no matter which procurement option is chosen.

2. partners are worth more than suppliers – BAA has developed an integrated project team approach.

Significantly BAA expected a high degree of design evolution throughout the project in order to embrace new technological solutions and changes in security, space requirements or facilities functionality. On such a complex project early freezing of the design solution was not realistic (Potts, 2008).

As Potts (2008) explains, BAA realized that they had to rethink the client's role and therefore decided to take the total risk of all contracts on the project. Under traditional contracts (JCT (Joint Contracts Tribunal) and ICE (Institution of Civil Engineers) forms) the parties are reactive and manage the effect (the consequences) resulting in claims where up to 40% of the total cost of the claims could be paid to quantity surveyors (QS) and lawyers. BAA thought differently and introduced a system under which they actively managed the cause (the activities) through the use of integrated teams.

In effect, BAA envisaged that all suppliers working on the project should operate as a virtual company. Executives were asked to lose their company allegiances and share their information and knowledge with colleagues in other professions (turnerandtownsend.com, 2011).

Figure (3-8) summarises the strategy of mitigating the risks, it shows a combination of client risk experience and flexibility for progressive methods have paid off as the project matured.

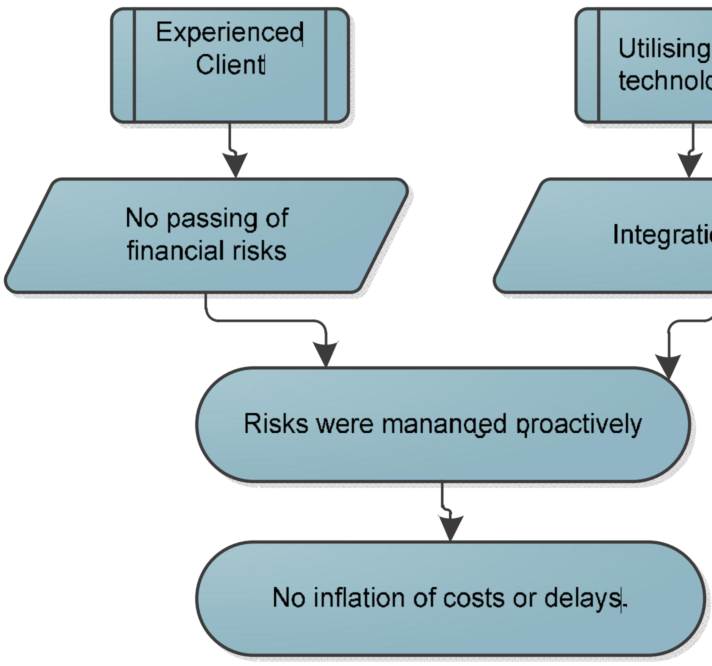


Figure 3-8 Causes of avoiding the crises

3.4.4 Comparison Between the Cases

Table (3-3) shows that the client risk management is significant to the outcome of the projects. Add to that the background of the client has played a role in those examples. We notice that an experienced client had the confidence to engage actively with the risk of the project which allowed the client to be flexible in implementing better strategies which will need the client to no divert all the risk to the contractor.

Table 3-3 Comparative factors

Factor	Causes	Client behaviour
Design changes	Original Design	Client did not understand the complexity of the design
Continues repairs	Supplier	Client did not study the suppliers sufficiently
Delay	Multiple factors	
Increased costs on the contractor		Client transferred risks to the contractor
Continuous changes		Client was not clear on the objectives
Targets not achieved	Targets were unachievable	Client was not clear on the objectives
Delay	Original Design	Client did not understand the complexity of the design
Project was financially sound	Risks were divided optimally	Client with high experience
Project was finished in time	New methods of management were applied	Client was open for innovation

On the other hand, a less experienced client suffered inability to define the objectives and act upon them strategically. This also meant that client did not understand the complexity and problems with the proposed design of the project. This has led the client to divert the risk to the contractor and resulted in a passive an ineffective risk management.

3.5 Client Strategies

3.5.1 Strategy Orientation and Risk Behaviour

In construction projects, financial incentives such as target cost arrangements are often considered essential to create joint goals and support collaboration, especially in partnering relationships. Still, research has shown that many incentive schemes are limited and inconsistent and that management is often lacking in rigour. Three roles of financial incentives in inter-organisational relationships have been identified: sources of extrinsic motivation, symbols of trust and efficiency and generators of communication processes.

Symbolic roles are primarily related to the expectations and perceptions of trust and efficiency in the early stages, while process aspects influence the development of constructive collaboration as the relationship unfolds (Kadefors *et al*., 2009). Different client strategies can be found, differing in the degree of elaboration and relational orientation, (Kadefors *et al*., 2009). Say that both practitioners and researchers need to consider all three incentive roles to understand the full range of effects of a particular strategy.

If we look at a structure of a typical Porter Five analysis (Figure 3-9) we will notice that it is based on threats and barriers (threat of entrance, threat of new substitutes, barrier to entry and barrier to exit). This kind of management attitude has been in the schools of business for the last 30 years, but not without criticism (Kevin and Subramaniam, 1996).

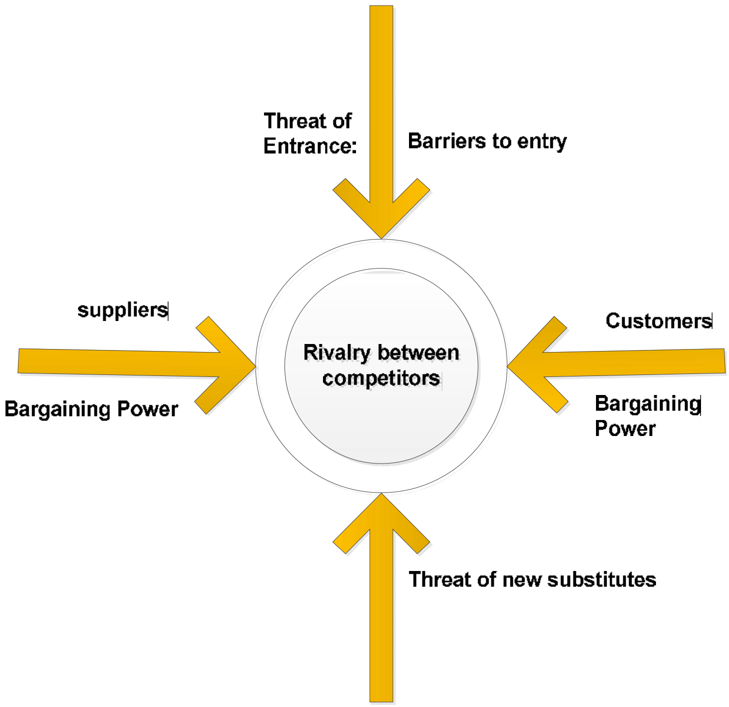


Figure 3-9 Porter's five forces

The client will allocate risk to his own party if the expected return is worth it. Understanding the limits and the potential of the expected return will then be influential in making that decision. Those practices are part of the experience of organisations in general however, their attitude toward that risk allocation even within their practice is affected the cultural shape of that company (Joseph *et al*., 2011).

3.5.2 The risk Behaviour of the Industry

The construction industry value chain includes the client or property developer, facilities management, raw material producers and manufacturers of building products (Ann *et al.*, 2010). In addition, there are designers, architects and engineers, and on site sub-contractors like demolition contractors and building maintenance organizations as in Figure (3-10). The value chain approach analyses the firms in a market chain—from input suppliers to final buyers—and the relationships among them. It analyses the factors in-fluencing industry performance, including access to and the requirements of end markets; the legal, regulatory and policy environment; coordination between firms in the industry; and the level and quality of support services. In the Figure this integration happens within the construction industry (Rowe *et al.*, 2002).

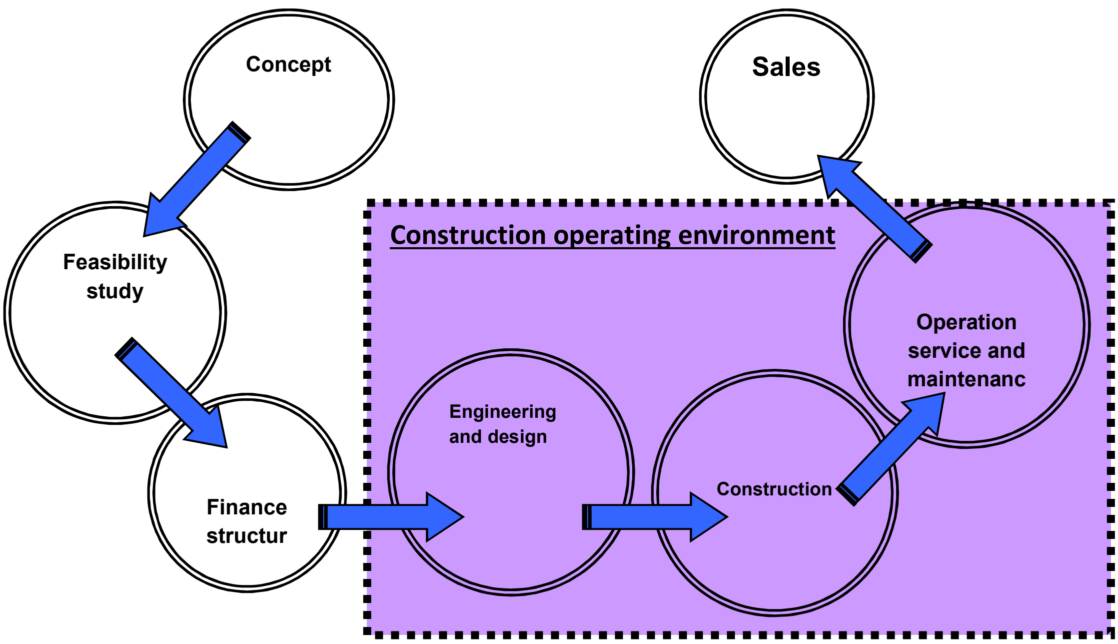


Figure 3-10 The construction value chain

Traditional contracting is at the lower margin end because the threshold of entry is generally low. Only if you are in a niche market and provide a service that your competitors cannot provide can you command a better return.

Big capital clients look at their construction projects as an investment itself, so they tend to look for expenses reduction factors all through the project, and in order to at the same time ensure sufficient quality, that will assure the success of the investment, and that no further unnecessary expenses will be needed in the future (Anders and Eriksson, 2010).

The vital customers are businesses that are affected by economic development, especially what concerns their investment initiative in construction projects. Successful companies have managed to acquire a balanced basket of market sectors that might look like a cash cow investment, but this has gone through an aggressive strategy and big takeovers. Scanning the customer typology and segments these companies have, most of their customers work in oil & gas, transport, industrial, infrastructure, and regional services with includes project management and building (Ibbs and Kwak, 2000).

In the construction market chain, the competition is concentrated on the inbound logistics, where the inventory and supply routes of material and financial resources will affect the profit margin most. As for the operations, output logistics, and services, the experience and the high technology that these companies obtain will help to control that margin, with the advantage of being absent from the consequences of the threat of outer competitions in that area.

For the small private construction companies like consultant or project management companies, the cost for exiting the business is assumed low because they have low fixed costs. However, for the large construction companies, their specialised assets and high fixed costs, as well as other factors, make them compete in the business even when they earn low or negative returns on investment, hoping for the arrival of economic miracle. Construction companies face unique characteristics of buyers – customers; based on the nature of the construction contract, especially in a business-to-business (B2B) relationship that defines their main customer segment (Pattullo, 2003):

- It is the buyers or the owners of the projects who initiate the projects, and they would award the project to the one company they assume the best through open tender.
- Every project lasts long enough to contribute a very important part of the turnover of the company, and the potential for the companies to get a new contract.
- The buyers, especially businesses, have no switching costs; they can just decide the contractors based on their own strategies rather than just the price.
- The whole set of construction activity happens only once for one particular project, and the buyers or customers can only decide the quality of the product after it is finished.

These characteristics define a very cautious customer, and in term of a long-term relationship some prefer to hold, so the clients gain strong bargaining power.

Project risk tends to be a consequence-based concept. It is usually used to designate a kind of possible, adverse state of a project. Meanwhile, it also tends to be a task related or objective-related notion. A project can be understood as a temporary system (or organization) which is fashioned to accomplish certain tasks or achieve certain objectives. The meaning of project risk is concerned with towards the system's tasks or objectives. A project risk could be considered to be a possible disruption, and its manifestation could result in departures from pre-established system objectives such as plans, quality, and effects, and so on. It can be seen in the literature that a generally accepted meaning of project risk is a possibility of nonconformity toward predefined objectives (Zhang, 2007).

Although the deviation could occur in two directions – negative deviation or positive deviation, studies of project risk usually choose the undesirable and critical ones as risk consequences. Thus, in a project risk, the harms to tasks or objectives are usually regarded as undesirable concerns, and to some extent, the undesirable consequences can be altered into economic utilities which can show the dissatisfaction of project organizations (Zhang, 2007).

The primary objective of risk assessment is to estimate risk by identifying the undesired event, the likelihood of occurrence of the unwanted event, and the consequence of such event. Risk assessment involves measures, either conducted quantitatively or qualitatively, to produce the estimation of the significance level of the individual risk factors to the project, so as to produce the estimation of the risk of the potential factors to project success. However, this step results will become the input to the determination of the optimum decision. With a better quantification measuring result, the managers can recognize which risks are more important and then deploy more resources on it to eliminate or mitigate the expected consequences (Reza *et al*., 2011).

Since a project risk indicates a kind of possible, unfavourable consequence, the analysis of it almost invariably resolves around the process and causation of its occurrence (Lester, 1991).

A project risk process is usually considered to begin with a risk event and end in a risk consequence. The centre of attention in project risk analysis is the relationship between the risk consequence and the risk event triggering it. It can be seen in the literature that project risk analysis focuses on the identification of risk events, the valuation of their influence, and the development of risk responses (Zhang, 2007).

Trust is not a homogenous or monolithic phenomenon. Dimensions and consequences of trust vary with context, an observation that has implications for how trust is built and sustained. In general, trust refers to a person's confidence in the reliability of another person with respect to certain outcomes (Giddens, 1990). Analogously, inter-organizational trust refers to shared confidence held by members of an organization that another organization's people, processes and systems are reliable with respect to certain outcomes (Sydow, 2000). While most definitions of trust include risk; risky trust exists when the magnitude of risk is significantly objectively higher than in most work or life settings (Rashid, 2011).

We first distinguish risky trust from rational, relational and common cognition models of trust, by showing how these prior conceptions connect to but do not fully capture the phenomenon we study. First, under the rational model of trust, individuals make a calculative choice to trust others on a basis of expected loss minimization and expected benefit maximization (Kramer, 1999). Risky trust, however, occurs in situations where cost-benefit calculus cannot be easily conducted because risks are too high, too intertwined, and too uncertain. Second, the relational model of trust proposes that rationality alone cannot explain people's choice to trust (Rashid, 2011).

Trust is thus a social orientation towards people and society, and trusting another may be more an effective than calculative choice (Kramer, 1999); further, the choice to trust sometimes reflects a moral obligation (Kramer, 1999), such that people can engage in trusting behaviour irrespective of others' behaviour. Also described as non-instrumental bases of trust, this perspective encompasses research on how identification with a group enables human cooperation in social dilemmas (Kramer, 1999).

Non-instrumental bases of trust (such as identification with a new group) are particularly challenging to develop for teams engaged in high-risk endeavours because of the large consequences of being wrong in the decision to trust. Moreover, in the context we examine, distinct and enduring memberships (professional, occupational, and organizational) precede the temporary shared team membership, contributing to the challenge. Additionally, a clear cost-benefit analysis cannot be undertaken because of the interdependent nature of high risk work. Hence, neither the rational nor the relational model of trust enables us to fully capture the phenomenon of trust (Rashid, 2011).

The process of managing the design and construction of a project on behalf of a client may be analysed using project management theory based on a contingency approach. The analysis provided by this approach, whilst useful for understanding the interaction of the parts of the system, the functions of project management and the effectiveness of the organization structure, may be limited by not incorporating an economic explanation of how a project organization structure is chosen(Anthony and Wing, 1999)

The transaction cost approach to the study of economic organization may provide a theoretical basis for such an explanation. This approach holds that an understanding of transaction cost economizing is central to the study of organizations as it determines whether functions are provided by the market or by hierarchy (Anthony and Wing, 1999).

3.5.3 Client Risk Decision Making

Integrated risk management addresses risks across a variety of levels in the organisation, including strategy and tactics, and covering both opportunity and threat. Effective implementation of integrated risk management can produce a number of benefits to the organisation which are not available from the typical limited-scope risk process. According to Ward and Chapman (2003), these include:

1. bridging the strategy/tactics gap to ensure that project delivery is tied to organisational needs and vision;
2. focusing projects on the benefits they exist to support, rather than simply on producing a set of deliverables;
3. identifying risks at the strategic level which could have a significant effect on the overall organisation, and enabling these to be managed proactively;
4. enabling opportunities to be managed proactively as an inbuilt part of business processes at both strategic and tactical levels, rather than reacting too little and too late as often happens;
5. providing useful information to decision-makers when the environment is uncertain, to support the best possible decisions at all levels;
6. creating space to manage uncertainty in advance, with planned responses to known risks, increasing both efficiency and effectiveness, and reducing waste and stress;
7. minimising threats and maximising opportunities, and so increasing the likelihood of achieving both strategic and tactical objectives;
8. allowing an appropriate level of risk to be taken intelligently by the organisation and its projects, with full awareness of the degree of uncertainty and its potential effects on objectives, opening the way to achieving the increased rewards which are associated with safe risk-taking; and
9. development of a risk-mature culture within the organisation, recognising that risk exists in all levels of the enterprise, but that risk can and should be managed proactively in order to deliver benefits.

All the rational models in the decision process for construction management are in reality a variation of the basic rational cycle of decision making. This can be summarised in the Figure (3-11). The circle starts with identifying the problem, then establishing the decision criteria, then weight decision criteria, then generate alternatives, then evaluating, choosing, implementing, evaluation, and it starts from the identification with a new cycle.

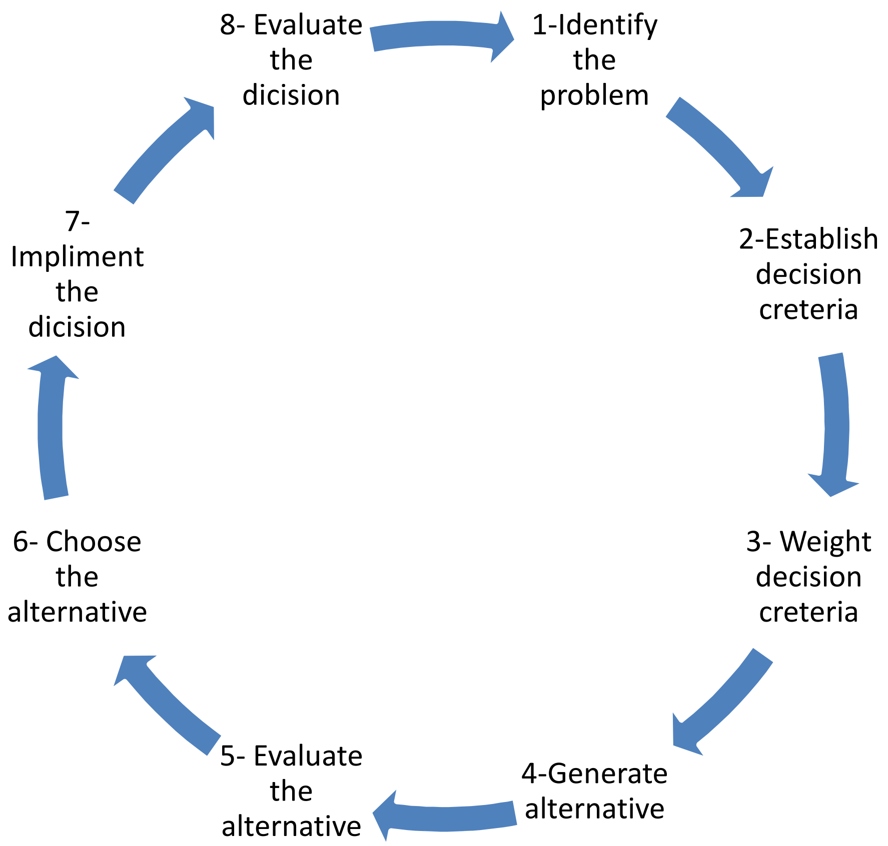


Figure 3-11 Rational decision making cycle

However, the rationality of risk has a mathematical discipline first and foremost. The basic optimal risk portfolio for any investment will look like Figure (3-12), and the approach to risk within the construction project would not be different. The simply relationship here is that the higher risk the higher the expected return is in a rational approach.

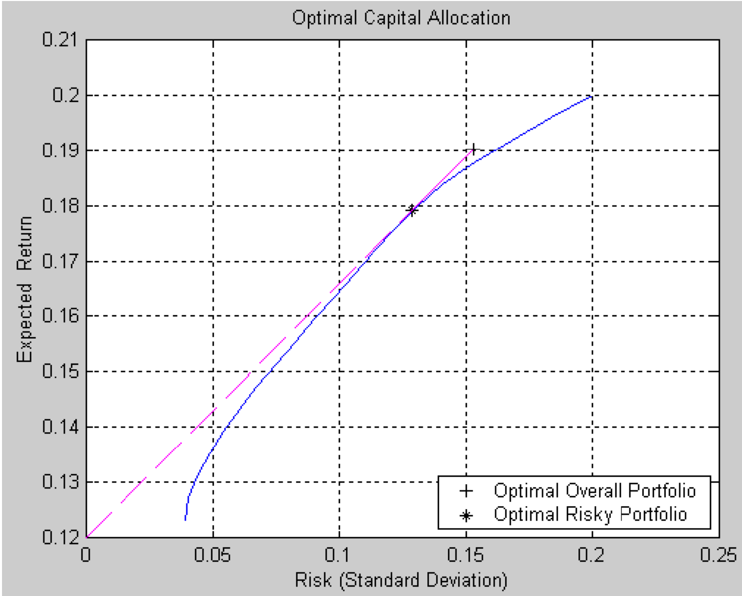


Figure 3-12 Optimal capital allocation

Contractor evaluation has received a minimal amount of attention in the UK industry. It has been the tendency that award of contracts is merely on the comparison of tender price that is the `lowest-price wins' practice (Wang and Yuan, 2011). They found that such practice allowed all tenderers who entered into tender competition, very often taking little account of other parameters during tender evaluation (Wong *et al*., 2001).

Tender evaluation is performed once pre-qualified tenderers have submitted their formal tender (Wong *et al*., 2001). The scrutiny team may consist of in-house experienced personnel, or clients' representatives. Time and cost incurred in this contractor assessment mainly rely on the nature of tenderers' information and for types of assessment methods used during this particular evaluation process (Wong *et al*., 2001).

However, lowest-price does not guarantee the overall lowest project cost upon project completion. Further, such a philosophy poses a high risk to the client because there is an increased possibility of financial collapse of contractor, bad performance, and delay in completion, time and cost over-runs and so on (Wong *et al*., 2001).

The cost of transaction is the cost of tendering, negotiating and compilation of the contract; whilst the cost for executing of the contract and its policy of resolving disputes arising from the contracted work as cost (Wong *et al*., 2001). However, methods used in contractor evaluation have a vital impact on the cost of a transaction; the cost could be higher than the cost in multi-criteria contractor selection models (Wang *et al*. 2004). One reason for this is that quantitative multi-criteria evaluation needs to address a broader range of contractors' information (Wong *et al*., 2001).

But in the end evaluation and response is based on the criteria of the risk itself. This relationship is demonstrated in Figure (3-13).There is a matrix which shows the appropriate response for the interaction of every risk issue and the environmental factor.

Environment	**Internal: event under management control**	**CELL I** • **Budgetary issues** • **Human and organisational capital issues**	**CELL II** • **Issues of adaptation to market conditions**
	External: events not under management control	**CELL III** • **Business Issues**	**CELL IV** • **Microeconomic issues**
		Administration system and procedures	**Strategic long term planning**
		Response	

Figure 3-13 environment: response matrix (derived from Arditi *et al.* 2000)

In the environment response matrix as shown in Figure (3-13), Cell I covers the 'internal-administrative' factors, and consists of budgetary and human capital issues, Cell II covers the 'internal-strategic' factors, and represents issues of adaptation to market conditions including sales, competitiveness, growth and expansion. Cell III, which covers the 'external-administrative' factors, ex-poses business issues that cover the characteristics of the individuals who manage the companies, and business conflicts. Finally, Cell IV, which covers the 'external strategic' factors, includes natural factors (the occurrence of natural disasters) and macroeconomic issues such as industry weakness and interest rates.

Quinn (1981).had solved the integration between the organisational structure and the organisational layering to analyse the relationship of the organisation with the internal and external forces. Figure (3-14) presents three major levels of analysis—an external outcomes level, an internal organization level, and an individual level. Each level emphasizes different elements in value creation which, when aligned in a corresponding way, reinforce and enhance one another.

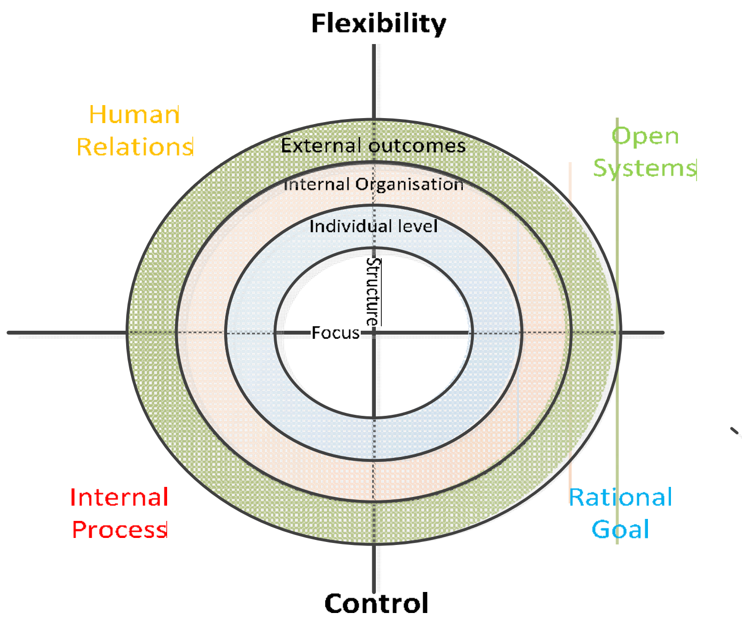


Figure 3-14 Competing values adapted from Quinn (1981)

We can see that the outside layer illustrates factors that relate to valued external outcomes produced by the organization, such as customer loyalty, innovative products, shareholder return, brand identity, or global competitiveness. These outcomes refer to different kinds of value created by organizations that have an effect beyond the boundaries of the organization itself. They stand in contrast to the internally-focused outcomes that are often used to determine effectiveness—sales, profits, or efficiency.

3.6 Client Risk Culture

Baligh (1994) defines a culture as a structure made up of components connected together in various logical ways. The connections between the components of culture may be used to identify the connections between the components of culture and those of the organization structure. The fact that a culture is "integrated" does not mean it has no logically identifiable components. It means that the components are connected, and to understand culture one needs to distinguish between components and connections.

Baligh (1994) explains that organizations are connected sets of people. The connections are different kinds of logical orders imposed on people and their decisions and actions. Besides people, the components of an organization structure are decision variables, parameters, allocations of variables to people who are to choose, or choose and set values for them, and allocations of parameters to people who are to find out their values (Warszawki, 1996).

Risk management is widely publicised as a process which seeks to give organizations an edge in today's uncertain and competitive environment. It is also generally accepted that the benefits of risk management provide (Toor and Ogunlana, 2009), for example Davey (2005) explained that the benefit would include greater understanding of project or business objects or goals, more realistic business and project planning; improved management of project and business costs; and more effective communication within an organization. It is therefore fundamental that a collaborative risk culture be developed to allow an organization to effectively address the problems and opportunities they may face. Unfortunately the farthest many organizations travel in creating a positive risk-aware culture is in developing detailed risk management processes (Shen 1990)

However, March and Shapira (1987) believe that managerial risk taking propensities vary across individuals and across contexts. The variation across individuals is seen as resulting from incentives and experience. In keeping with much of the literature, they think some people are more risk averse than others, that there are intrinsic motivational factors associated with risk and encoded as a part of an individual personality.

A major challenge is to identify where the system cultures must be strong and unified and where it is not and (Shen *et al*. 2001). A related challenge is to develop ways to ensure that an appropriate culture adhesive is in place in those parts of the system in which it is needed. Grabowski and Roberts (1999) suggest the following assertions might be tested:

- Strong cultures are required at the interfaces of organisations to ensure reliability enhancement.
- Risk mitigating organisations develop strategies for oversight as well as checks and balances in their cultural fabrics.
- Member goals, roles, and responsibilities are more carefully articulated in risk mitigating organisations than in other types of organisations.
- Clarification of roles, responsibilities, and interdependencies with others by system members will pinpoint those places in need of strong cultures in organisations.

- Content analysis of electronic mail in risk mitigating organisations should disclose more messages about concerns, findings, hypotheses, and goals than in other organisations.
- A desirable diversity of cultures will be supported only under conditions of high trust and open communication.
- Incentives and control systems in risk mitigating organisations should directly address behaviours desired to obtain low risk operations.

What people believe to be risk, or randomness, or probability differs greatly from one culture to another. Whether every specific event has a cause or there is something that is really random is an issue that has no universal solution (Baligh, 1994).

However, the structure of the organisation would affect dramatically on the management attitude toward risk. Hoskisson *et al*. (1991) claim that limited diversification, when accompanied by adoption of a Multidivisional form of structure and the decentralization of operating responsibilities, induces divisional managers to take risks. On the other hand, if firms become extensively diversified, they encounter control loss as showing in Figure (3-15) which shows the take over as a possible diversion of the maturity cycle for the company. In every stage of diversification there is an emerging risk (Wells, 2001). The focus of the divarication is important to reduce the risk. Limited diversification will result in risk induction through diversification and extensive diversification will mean risk from lack of control.

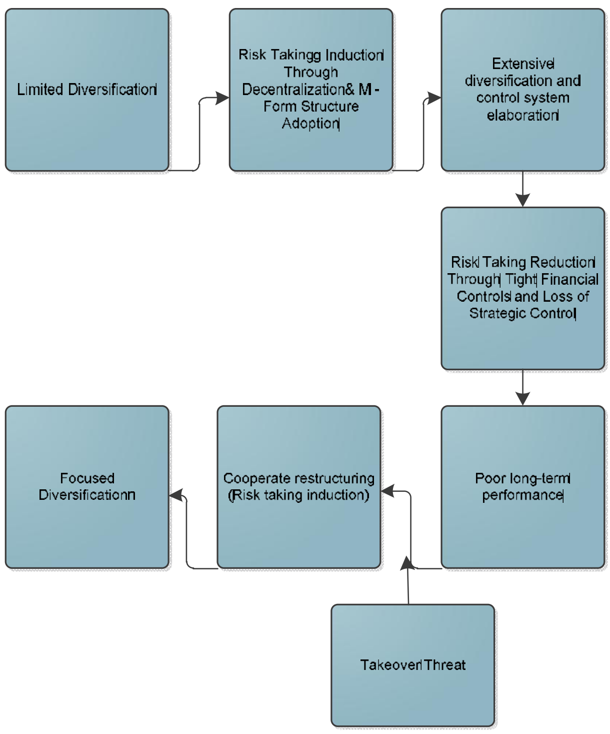


Figure 3-15 Evolution of division manager risk taking in diversified firms

The layers as demonstrated by Figure (3-16) are individual behaviour as being the most specific, group culture, organisational culture, national culture, and global culture are the most general. The word culture is difficult to define, and can have a range of meanings such as the arts and creative media, social perceptions or behaviour acquired and transmitted. From an organisational point of view it embodies the underlying values and norms of the organisation. While culture reflects a specific behavioural characteristic of an organisation which may help such an organisation to be successful, a strong culture may be responsible for resistance to change when change is required.

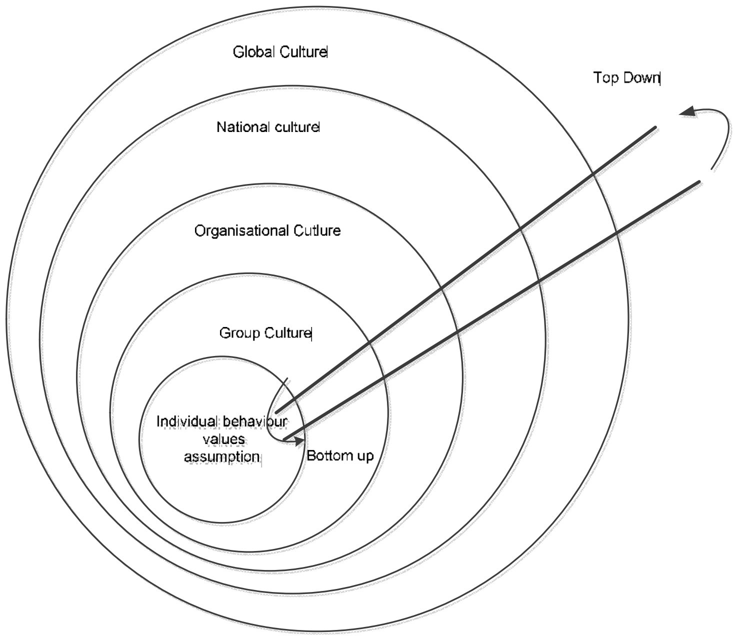


Figure 3-16 The dynamic of top-down-bottom-up processes (adapted from Leung *et al.*, 2005)

As this organisation expands into the global level, the dynamics of culture as a multi-level, multi-layer construct (Leung *et al.*, 2005) can be presented in a model portrayed in Figure (3-16) using a multi-level approach, viewing culture as a multi-level construct that consists of various levels nested within each other from the most macro-level of a global culture, through national cultures, organizational cultures, group cultures, and cultural values that are represented in the self at the individual level (Leung *et al.*, 2005).

Uher and Toakley (1999) argued that cultures in organisations comprise values that may never change and practices that may change more regularly. It is believed that values are internalised by people and are emotionally held. Success in implementing change involves the alignment of change with the basic values of the organisation (Yng Ling and Hoi, 2006). This have showed that organisational change can be achieved faster and more effectively if driven by cultural change, because culture has a greater influence on both short and long term organisational performance than structurally driven change.

Uher and Toakley (1999) concluded that cultural change should precede structural change. Uher and Toakley (1999) research showed that both individuals and their firms display a moderately strong commitment to cultural change by actively supporting new management concepts and strategies. While the construction industry is undergoing change, the rate of change appears to be slow. The main barrier seems to be a low knowledge and skill base, caused by a lack of commitment to training, research and development.

Interpersonal relationships based on respect, trust and openness stimulate the development of teamwork, win/win spirit and shared goals. These are the essential components that encourage the development of group synergy, which in turn generates new ideas, explores new concepts and shifts paradigms. For a cultural change to occur, strong interpersonal relationships must first be developed (Uher and Toakley, 1999).

Reading into the literature combining the history of construction and risk and theoretical background of risk models we can point out the main themes by risk is induced. We have chosen the context of the cultural web to present the risk elements, detailed by what is known as the 7'C's based on the work of Mitroff *et al*. (1989) as presented in the Figure (3-17). Figure (3-17) combines the elements of the cultural web with the risk zones that leads for a failure within a project. While this ignores the external factors of a risk environment, we believe that external factors a better defined when it comes to risk assessment. Hence it is important to separate those two zones, this has been done by many researchers using different models which has been summarised in the appendices.

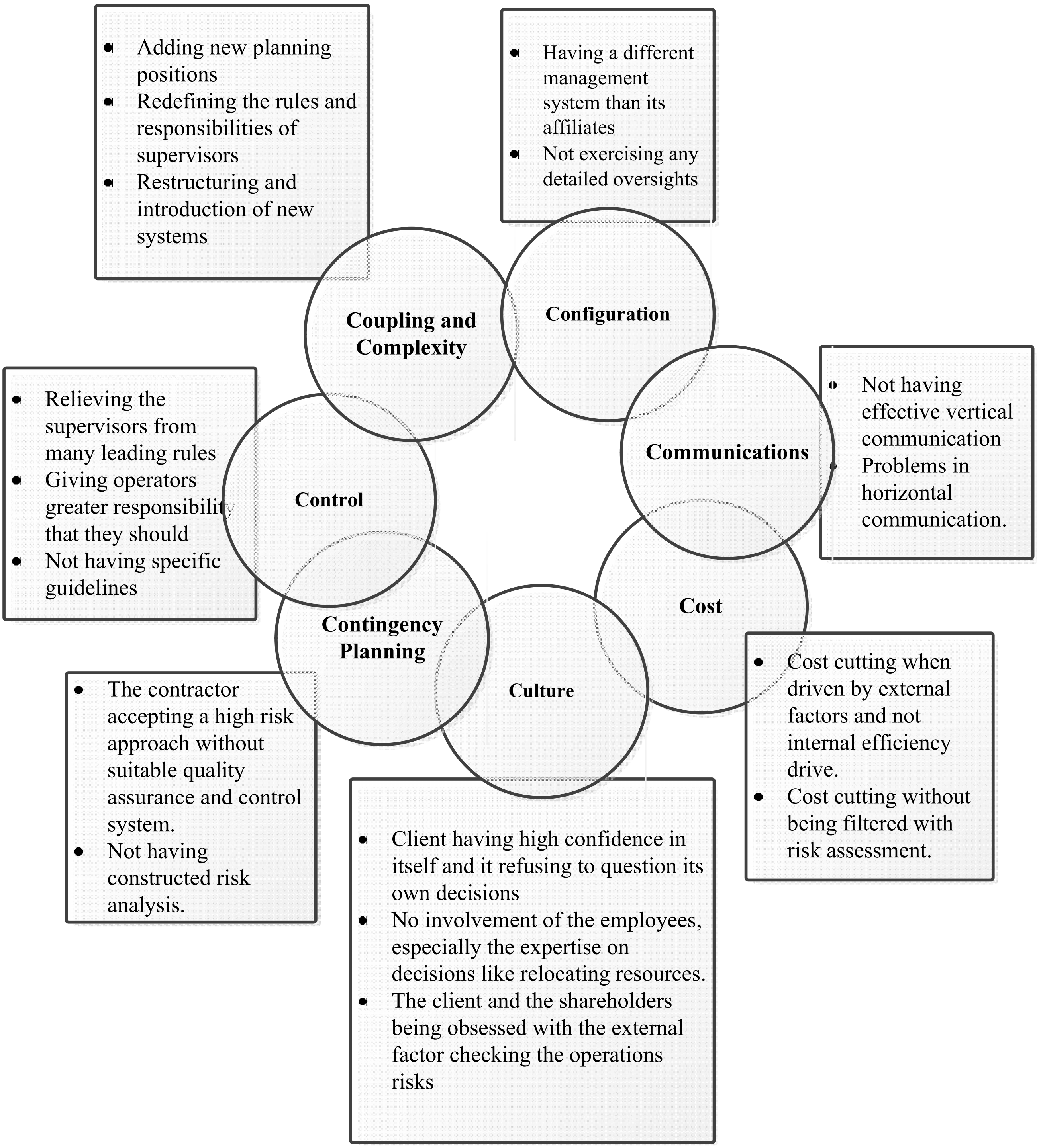


Figure 3-17 Client induced risks

Figure (3-18) shows a collection of complaints by from the project employees (consultants, project leaders and so forth.) show a sense of frustration (Bryde and Volm, 2009). They see ill-defined basic principles and goals as the most important causes for failure.

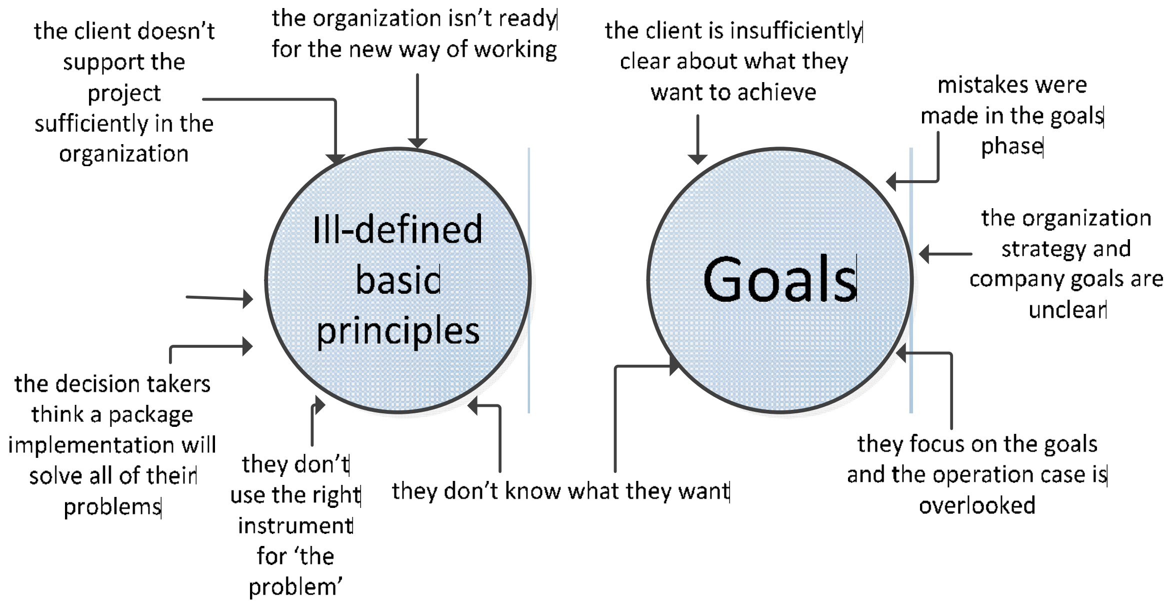


Figure 3-18 Causes for failure

As it has been affirmed by many models that managing risk is a logical procedure, why does managing risk fail? Al-Bahar and Crandall (1990) and Thompson and Perry (1992) work shows us that most risk management practices fail because stakeholders do not engage in the process of understanding what drives a risk management model results. This is an area that is not explained usually in the logic of managing risk. Presented are three examples of those models, that first is in Figure (3-19) which shows how these points relate to the risk management framework. They can be divided into three categories as character, function and outcome. It defines those categories by their functions. While Figure (3-20) has more of a central concept where the decision making process is the course of the successful risk management culture. The third example uses a proactive approach. This proactive approach is based on four pillars which are presented in the Figure (3-21) and are (Smallman, 1996) Predictive Modelling, Strategic Planning, Economic Capital Models, and Loss Reserves.

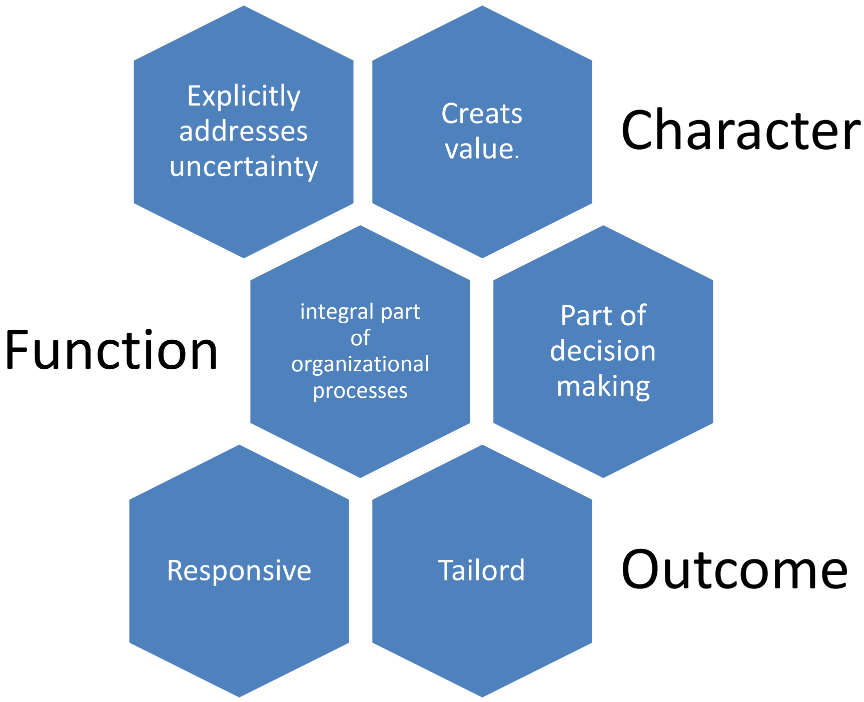


Figure 3-19 factors that influence a successful risk management framework

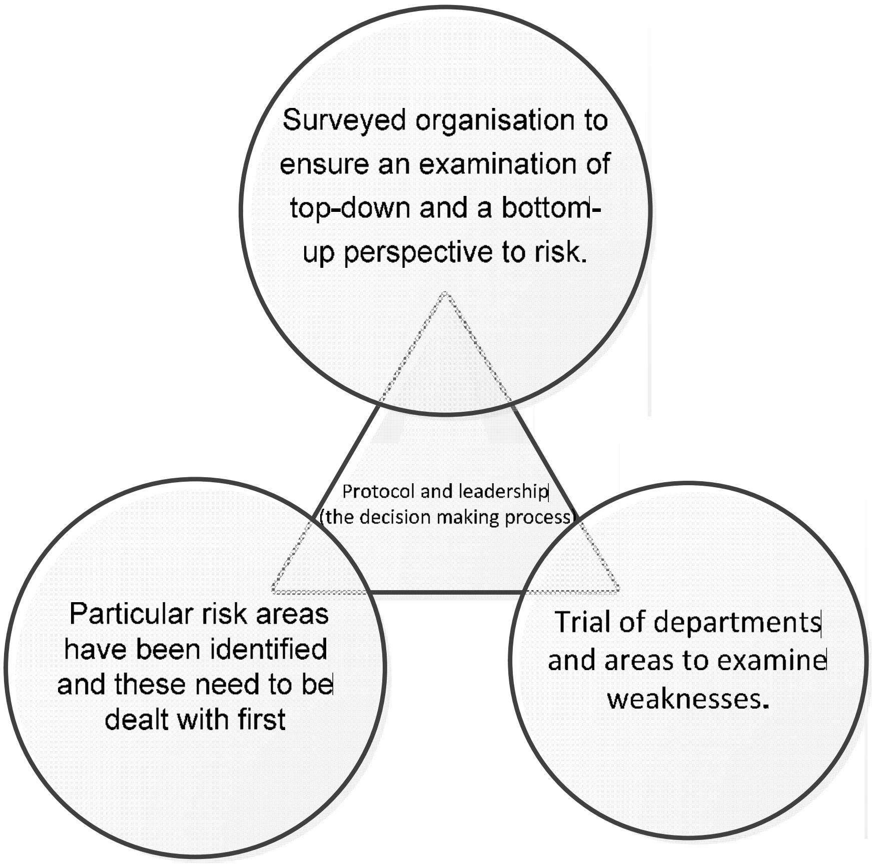


Figure 3-20 Bases for successful risk management culture

Predictive Modeling

- Predictive modeling and analytics are gradually being leveraged to boost risk measurement and reduce uncertainties in selecting and pricing individual risks. However, if effective predictive models have not yet been deployed, or if specific models are less accurate than those of competitors because of poor data quality, insurers face the danger of adverse selection, reduced profitability, or even the risk of ruin.

Strategic Planning

- Strategic planning is another area where insurers can benefit from a quantitative analysis of risks and rewards, when it is based on quality data. When planning for growth into new markets or new lines, insurers face the possibility of increasing their risk in exchange for potential opportunity. In practical terms, they need to know if the growth strategy will quickly and proficiently attract profiTable business. They also need to know if it could also attract less dependable or profiTable policyholders that will eventually require reunderwriting. In pursuing a growth strategy, insurers' overall risk profiles need to account for the probability of increased risk from new policyholders. On the flip side, the planned growth could actually generate diversification benefits, resulting in a reduced overall risk profile. In either situation, quantification and analysis of risk profiles can translate into better management of required capital for growth in insurance enterprises.

Economic Capital Models

- The application of an economic capital model to determine the appropriateness of insurers' capital is being incorporated into holistic risk-management programs and considered by various rating agencies. Using robust quality data and sophisticated stochastic models, an insurer can determine its own level of needed capital based on its individual appetite for risk. As a result, the cost of capital can be allocated to individual lines of business or profit centers and integrated into insurer business objectives and employee compensation programs.

Loss Reserve

- One of the key building blocks of an economic capital model is an insurer's loss reserves. Actuaries need quality data to estimate loss reserves and also to quantify the uncertainty in the reserve estimate. Where data is sparse or lacking statistical credibility.
- The essence of this approach is that we consider all risks and their interrelationships on a proactive basis, driven by potential risk and not by events (although organizations must learn from events). Where the orthodox approach to risk management is governed solely by event push (reactive), this approach advocates the need for "risk pull" as well.

Figure 3-21 Pro-active risk management

3.7 Summary

The review of the client role in risk and the elements associated with the client culture has revealed several parameters involved in determining the influence the client and its organisation exerts within the project. The outcome from the review identifies the behavioural patterns of the client which are responsible for inducing risk in the project.

The review has also established that there are different ways to characterise a construction client. While it is usually limited to experience and financial capabilities it should be expanded to organisational culture and organisational attitudes. Overlooking the effect the client has on inducing risk will have a significant impact on the strategy the project manager has to manage the risk. The role of the client starts from his background which is affected by cultural and organisational influences and this might drag the client's attitude toward risk into real practice in the project. In some cases, this rule might have been undervalued due to lack on interest of the clients to take responsibility in managing the risk.

The client behaviour toward risk is originated in its general risk orientation and the internal protocols of the client existing in its organisation. These in turn are determined by cultural and internal forces which affect its change attitude. It has been shown that the client reacts to risk in a project in the same way that it does to the general organisational environment. The review has revealed that project managements are seen as having a direct relationship with the management of risk. There is a fundamental flaw in accepting this relationship as the norm with no regard to risk perception of the client, which plays an important role even during the initiation of the project.

To understand the full nature of the client's risk behaviour, it would call for a systematic observation of the client commitment to the organisational goals and to analyse the different layers of organisational culture of the client. This will reflect on the client attitude toward risk within the construction project. This would enable the characterisation of the client risk behaviour based on the client internal organisational forces.

Overall the review showed that the client risk culture is part of the organisation structure, and that a connection can be made between the common strategy of an organisation managing its projects and the strategy of the organisation in managing risk.

4 Chapter Four: Managing risk in projects

4.0 Overview

The chapter objective is investigating the elements in the organisation behaviour relevant to risk assessment, and to identify the model that can be used to test these elements. It achieves this by covering the management of risk in projects and discusses the influence of organisation behaviour on the way risk in managed in construction projects. The chapter further covers the elements of an organisation and its relevance to the way an organisation manages its own projects. The construction industry has some distinctive project characteristics which makes the elements of any organisation important.

As the client is often seen as the leader for every project, the chapter also addresses the concept of leadership. In particular, it examines how hierarchy affects the speed of the decision making, and any associated feedback. The chapter covers the concept of communication and how the social interaction is the elemental means through which the business of the social world is transacted, the identities of its participants are affirmed or denied, and its cultures are conveyed, renewed, and modified. It showed that through processes of social interaction, shared meaning, mutual understanding, and the coordination of human conduct are achieved and this leads to risk mitigation.

4.1 Risk Challenges to Organisational Management

Challenges towards existing risk management processes have not been raised until recently. Such challenges focus on the risk management process itself, the suitability within an organization, other aspects influencing the effectiveness of risk management, tools and techniques for enhancing the management of uncertainties, and the acceptance and enhancement of opportunity management (Olsson, 2007).

Defining risk would make it easier to understand the rationale behind the development of such processes and would enhance the ability to verify its applicability. Defining risk as an uncertainty, it would be equally the same case for opportunity. In other words, this definition would apply to opportunity since it, as well, is derived from uncertainty. However, important here is the fact that the lack of certainty is what matters when related to specific project objectives (Olsson, 2007).

Review of construction and general management contributions (Rose, 2008) suggests that to assess the impact of financial incentive on motivation in a project environment, consideration must be given to both potential extrinsic (external) and intrinsic (internal) drivers of motivation. Therefore, a big picture approach must be taken to identify and explore the various drivers within the project that promote or discourage reason to determine the value of financial incentives in driving motivation and thus, performance. The unit of analysis is the construction project, which encompasses the project structure, team and dynamics (Bresnen and Marshall, 2000, 2001).

This outlines the role of incentive on construction projects and shows that motivation is a mediating variable between core project activities and project performance. Core project activities give rise to various drivers that influence the attitude of project participants. Mullins (1996) argues that performance is a product of motivation, ability and the environment. Similarly, Howard *et al*. (1997) argues a construction contractor's (agent's) output (or performance) is a function of factors within their control (ability and motivation) and external factors outside their control (environment).

For the building organisation the framework in which the integrated working processes has to fit is the life-cycle view, as illustrated in Figure (4-1). The cycle alternates between product and project. The project starts with concept design and ends with handover, the stage where the product stage starts and end it ends with concept design again for a new cycle.

Buildings start with the user identifying a need. Then, the subsequent phases of feasibility, concept design and detailed design are done within the construction authorities or in cooperation with consultant architects and engineers (Simmonds and Clark, 1999). During tendering and construction phases contractors are involved (Tong and Reuer, 2007). The operation and maintenance phases involve changing users' needs resulting in refurbishment, rebuilding, and restoration, thus starting the circle again. Following the current procedures for public work, which are generally based on sequential working methods and special monitoring procedures, each phase, is separated from the subsequent one more strictly than in private projects (Zantke *et al*., 1999).

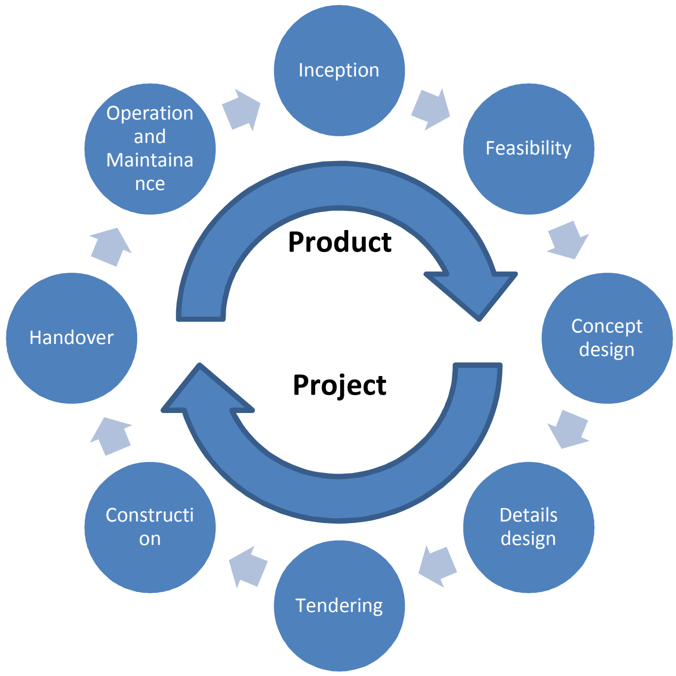


Figure 4-1 Life cycle of a building administration

4.2 Organisational Management

Yaghootkar and Gil (2011) state that a fundamental insight that emerges from studies of multiproject organizations is that specialized resources switch frequently between projects in these settings and this is a root cause of schedule pressure. In particular, top management may find it attractive to capture resources from other concurrent projects so as to accelerate a business-critical project that started late if the organization has no free capacity in terms of specialized resources and is not hiring new staff, or the organization is finding it difficult to recruit new staff with adequate skills. In the short-term, the bold practice of capturing resources from a concurrent project can be effective to ensure that the project deemed 'more important' finishes on time (Denison and Mishra, 1995).

However, increasing the size of a project team to attempt to speed up project delivery is notorious for decreasing productivity. Work productivity also deteriorates because learning curves get disrupted as resources switch back and forth between projects (Yaghootkar and Gil, 2011).

As indicated in (Figure 4-2), 'project initiators' are a subset of the parties ultimately involved'. Project initiators kick the whole process off. One or more project initiators first identify the basic purpose of the project, or intended benefit from it, the why or motives for the project

(Berkeley *et al.*, 1991). These motives will usually include profit, involving revenue and cost, along with ‘other motives’. Initially, the nature of these motives will be defined, but they will not be quantified as objectives. That is, in terms of the mission—goals—objectives hierarchy often used to move from an overall mission statement to quantified objectives, the initial focus of the why may be on mission and broadly defined goals (Ward and Chapman, 2003).

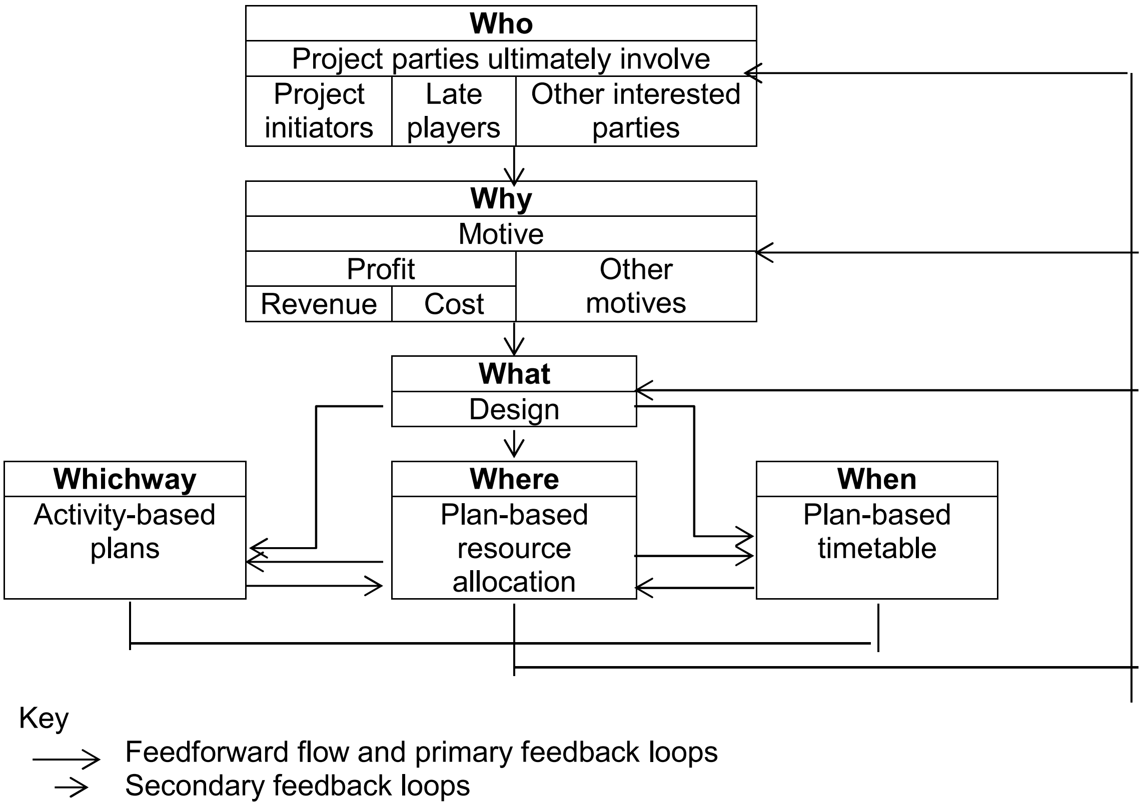


Figure 4-2 The project definition process (Ward and Chapman, 2003)

Why, in terms of the initial conception of purpose, drives the initial what, the design. The design—be it a building, other physical product, service, or process—drives the initial activity-based plans, associated plan-based resource allocations, and plan—based timetable , the initial which way, wherewithal?, and when. Subsequently, there is significant feedforward and feedback along the whichway— wherewithal— when dimensions and some feedback to the what. The whichway—where—when entities then feed back into quantification of cost, possibly revenue and other motives, and why in terms of a more developed, measured definition. These considerations may relate to capital cost only or more complex, through-life performance criteria (Orange *et al*., 2000). This can involve related feedback to the who, with changes of a still more fundamental nature involving the project initiators, 'later players', and 'other interested parties'. As the project evolves it may be appropriate to bring in further later players, enlarging the who (for example, to banks for resource reasons). It may also become appropriate to consider other interested parties who are not direct players (for example, regulators) (Ward and Chapman, 2003).

The decision model (Figure 4-3) is adapted from a decision making model for an organisation. It was adapted to demonstrate dealing with a project that has a level of risk can be rationally mitigated (Santos *et al*., 2002).

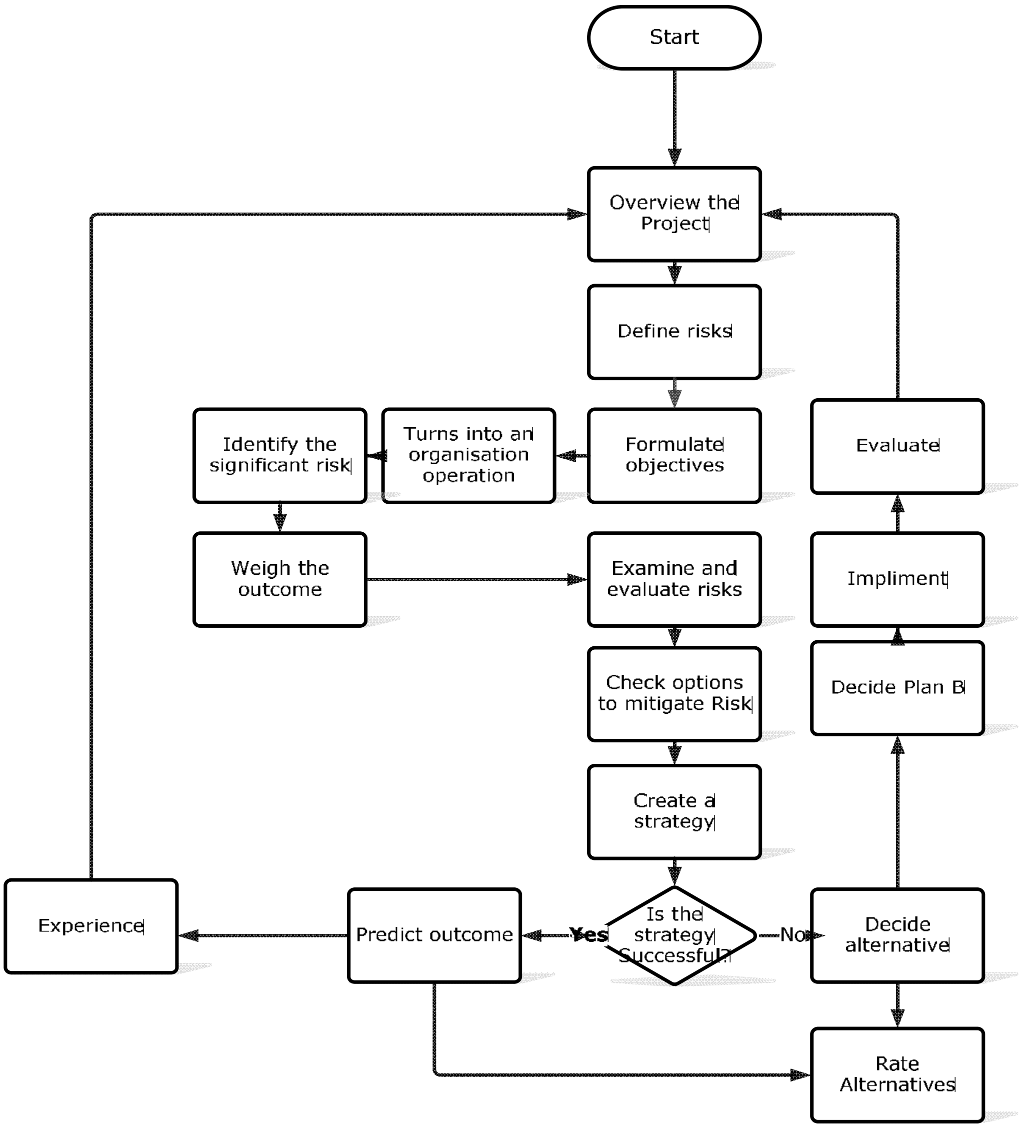


Figure 4-3 Organisational dicision process adapted from Robbins *et al*., 2007

A risk model is a quantitative tool for analysing risks, determining effective countermeasures, and, ideally, assigning financial measures to both. Ultimately, management must decide which risks are acceptable and which are not, and the extent to which an investment in risk reduction is desirable. These decisions often depend on the implicit risk culture of the organization. An organization's risk culture determines how risk is viewed, and how risk reduction compares to other organizational priorities. Security professionals tend by nature to be conservative when viewing risk, and often find organizational culture to be a puzzling obstacle to seemingly rational security measures (leVeque, 2006). There are different models but these three are the main ones as provided by leVeque, (2006).

The "classic" risk analysis model takes as its basic objects threats, vulnerabilities, expected loss, countermeasures, and the loss net of countermeasures. A threat is an external agent with the capability of damaging an organization's information assets in some way. Vulnerability is a weakness in the organization's information protections that permits the threat to create the damage. The expected loss is the financial damage resulting if the threat is realized. (Figure 4-4) illustrates this model.

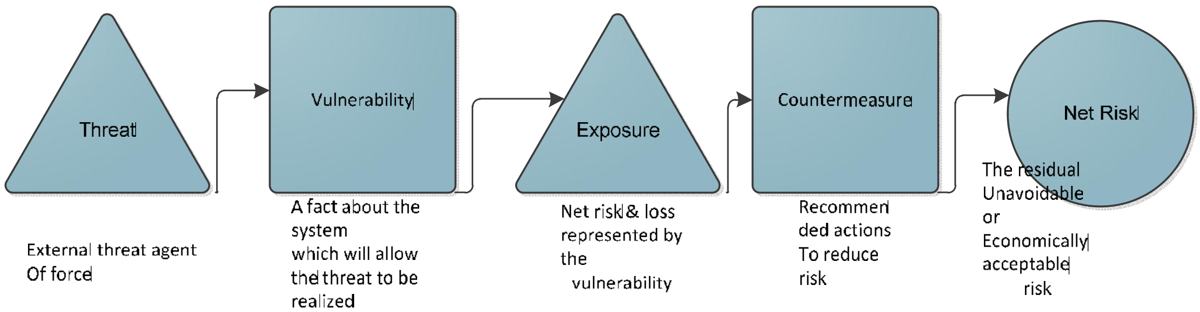


Figure 4-4 Classic risk analysis model

A process model represents a security breach as a process composed of multiple sequential activities. Each attack activity may be countered with a safeguard designed for the activity. Initial entry into the target network is blocked by a threat-obstruction safeguard, whereas unauthorized probing inside a protected network is countered by threat-detection and threat-recovery mechanisms. Finally, should the attacker overcome these safeguards, breach detection and recovery safeguards attempt to limit the resultant losses. This model is illustrated in Figure (4-5).

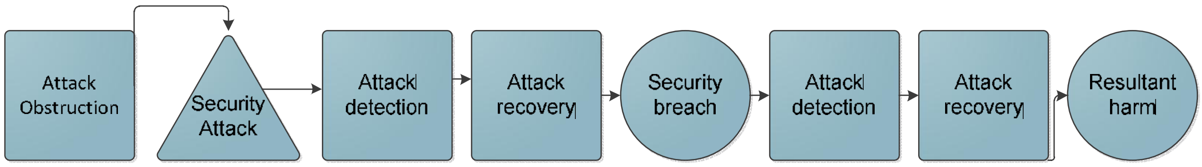


Figure 4-5 Eight-stage risk assessment model

A process-oriented model uses a process based attack definition to build a rational threat/attack taxonomy. Although the primary focus is on categorizing attacks, this paper also illustrates the benefits of viewing attacks as a process consisting of discrete events unfolding over time, as shown in Figure (4-6).

Attackers ➡ Tools ➡ Access ➡ Results ➡ Objective

Figure 4-6 Process-based attack taxonomy overview.

Tree-based models are based on well-established engineering risk models, originally called fault trees. Fault trees are used to analyse failures in safety-critical systems. A typical fault tree has as its root node the failure event. The nodes underneath the root nodes are the proximate causes of the failure event. Combinations of nodes at a level may be individually sufficient, resulting in an OR relationship between these events. This model is illustrated in Figure (4-7).

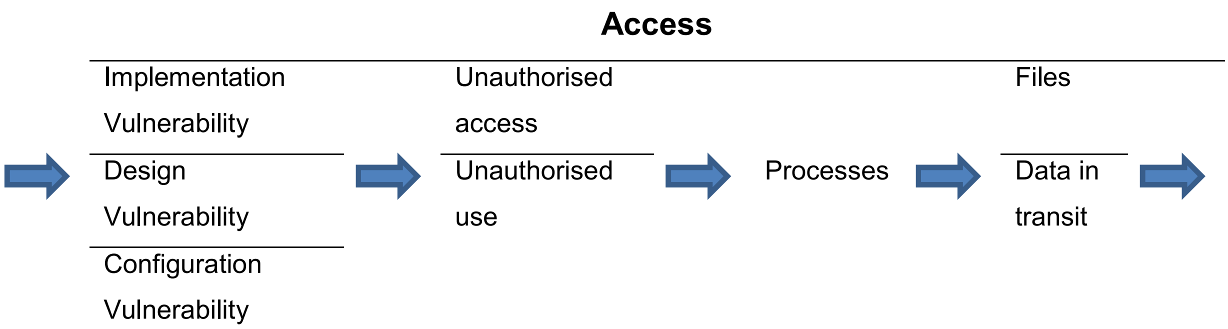


Figure 4-7 Process-based attack taxonomy detail

A forth risk assessment model, based on fuzzy reasoning, is proposed as shown in Fig. (4-8). The model consists of three steps: risks identification step, definition of risk factor function and measurement of variables step, and fuzzy inference step.

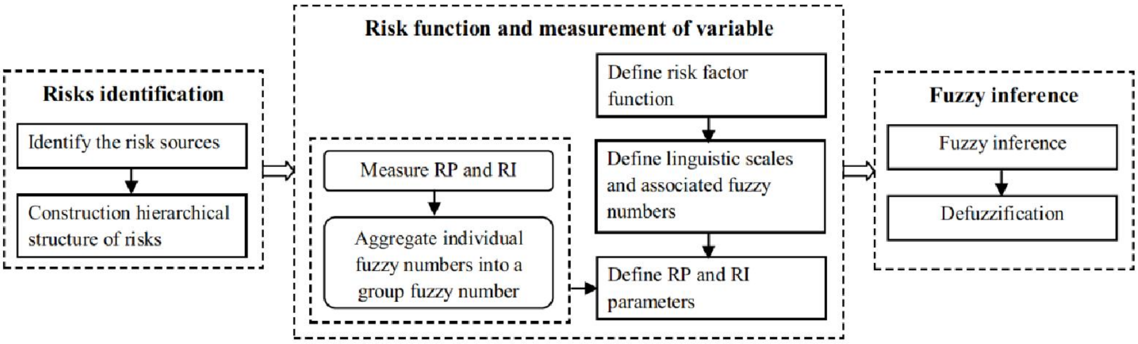


Figure 4-8 Risk assessment model (Zhang and Lee, 2011)

Project risk management with its assumptions of 'hyper-rationality' excludes many aspects of managerial behaviour. Organisations such as the Project Management Institute or the Association of Project Management claim that through the identification, analysis and response to risk, project managers can achieve planned project outcomes (Öztas and Ökmen, 2004).

Little research has been undertaken to ascertain whether project managers involved in risk management activity perceive the self-evidently correct processes and procedures they implement to be effective. There seems to be far more literature offering prescriptions to project managers on how to manage risk in project rather than assess the relative effectiveness of those prescriptions.

Neither the shortcomings of current project risk management processes nor options to change and/or expand those best practice standards to include behavioural aspects of irrelevance have received much attention in literature so far. As long as no evidence is produced, whether project risk management actually helps project managers from their point of view ('doing things right'), the acceptance of best practice project risk management standards is at stake ('doing the right things') (Chan *et al.*, 2009).

The framework is based on insights from organizational management theory (Van *et al.*, 2005), psychological motivational theory (Locke and Latham, 2002), and economic agency and reciprocity theory (Fehr and Falk, 2002).

The framework is based on a set of four indicators distilled from these theoretical sources, and interpreted in a project-based context. The four indicators represent distinct categories that cover key contributions in the literature. The indicators developed from the combined theories are: 1. Goal Commitment, 2. Distributive Justice, 3. Procedural Justice and, 4. Interactional Justice. This is the first time that such a broad range of indicators has been conceptualized for application to a construction project environment. The indicators are used in this study to assess the relative impact of financial incentives and other project-based motivation drivers. The indicators are:

1- Goal Commitment

According to goal-setting theory, individuals or groups make calculated decisions about their desired goals, and once the desired goals are identified, the goals themselves can act as a motivator. As an extension to goal-setting, goal commitment (Hollenbeck and Klein, 1987) refers to the sustained determination and motivation to try for a goal; in the case of this research, the performance goal associated with the incentive. Key antecedents of goal commitment are those that impact on the attractiveness of goal attainment and those that impact on the expectancy of goal attainment. The theory suggests that the way the goals of a financial incentive are managed over time will impact motivation and commitment.

2- Distributive Justice

Distributive justice theory suggests that the financial reward amount offered will be judged by its fairness relative to the effort required achieve the reward. Higher reward 'intensity' (strength of reward) increases a contact agent's margin in response to their increased effort (Zenger, 2000). In the case of construction projects, distributive justice and its ensuing motivation, is assessed in comparison to the risk carried by the contractor and the equity of the reward in comparison to other reward recipients in the project team.

3- Procedural Justice

Procedural justice suggests that the fairness and transparency of procedures linked to incentive distributive decisions will impact a contract agent's motivation. Procedural justice is delivered by adherence to fair measurement criteria such as consistency, correctability (flexibility), representativeness, accuracy, bias suppression and ethicality. As task interdependence is high in teams, compared to an individual's work, procedural justice is a particularly important indicator of motivation in teams (Colquitt, 2004).

4- Interactional Justice

Interactional justice relates to aspects of the communication process between principals and agents, such as honesty and respect. Interactional justice indicates that the propriety of the principals' behaviour will influence the motivation of an agent. Thus, the quality of the relationship between the principal and agent can impact on the agents' perception of incentive fairness. Organizational behaviour can also be influenced by the establishment of trust and trustworthiness in on-going economic exchanges (Gulati and Sytch, 2008).

Where potential exists for opportunistic behaviour from contract agents due to asymmetric information and incomplete contracts, trust and relational quality can play a major role in realizing mutual gains in an economic exchange (Ariño *et al*., 2001). Closely aligned with these ideas, economic reciprocity theory (Fehr and Falk, 2002) indicates that agents are motivated by mutual trustworthiness and the fairness of the incentive intention. This theory predicts an agent will be more likely to cooperate voluntarily with the principal and reciprocate positive behaviour, if they perceive an incentive's intention is fair and honourable.

These four motivation indicators where used in fieldwork to identify drivers that were conceptualized to arise from a set of five core project activities which emerged from a review of construction management literature on determinants of project performance (Chan *et al*., 2004). The five core activities are mutually exclusive and represent the known possible influences on project motivation. They comprise firstly, the four major stages involved in delivering construction projects with incentives – (i) Financial Incentive Design, (ii) Contract, (iii) Tender Selection, and (iv) Design and Construction Management. The last core project activity is v) Relationship Management, which runs through the final stage, design and construction management (Göran and Ryd, 2007).

These framework constructs, the four motivation indicators and five project activities, have been derived for the current research based on content analysis of the relevant conceptual contributions, which are listed above. These constructs represent a theoretical contribution to the literature on construction management and proved instructive during the empirical phase of this project-based research. The authors use the framework to identify construction project motivation drivers, to fill an observed gap in the literature. During fieldwork, questions were framed around the motivation indicators, linked to project activities (Rose, 2008).

Uher and Toakley (1999) suggested that the successful implementation of a management technique, such as risk management, is amplified when coordination with the structural and cultural characteristics of an organisation can be achieved.

Organisation structures themselves pose no barrier to implementing management concepts; however, some types are more accommodating than others. Matrix and horizontally structured organisations by virtue of a short span of control, largely informal communication, and a high level of empowerment, have a capacity to respond faster to a particular need and adopt a technique, such as risk management, more speedily into their structure (Uher and Toakley, 1999)

4.3 Leadership

4.3.1 Leadership Strategy

No group of people comes close to its potential without effective leadership. Planning, organizing, staffing, and controlling can substitute to some extent for leadership. Delegation of authority and responsibility and other tools for empowering employees decreases the need for leadership. Motivation, trust, and careful development of procedures and policies are also helpful. Still, each ship needs a captain. Some leadership is necessary (Frederickson, 2009).

Leadership also affects and is affected by the team context, like variables including cohesiveness, job challenge, stress, autonomy, leader power, and group cooperation. As more leaders actively intervene in cases of event disruption, the higher their effectiveness, yet the same level of intervention on the part of leaders is associated with lower effectiveness in situations of low event disruption. Just as leadership is influenced by the team context, leaders influence teams as well. As in transformational leadership is positively related to shared team vision, and can influence the nature of relationships between subordinates. The group performance tends to be highest in groups with high differentiation and high levels of task interdependence, and the degree to which leaders and followers agree on the quality of their relationships shape the context that influences outcomes (Liden and Antonakis, 2009).

Leadership is generally viewed as one of the most complex of social processes (Fry and Kriger, 2009). For the last half century the field of leadership has struggled to understand what exactly leadership is, under what contexts or situations it is effectively exercised, and how to explain leadership processes in addition to leader traits, skills and competencies. This is especially a challenge in an increasingly uncertain and rapidly evolving global economy, where leadership is affected by situational dynamics which includes not only the values of national cultures, but also the belief systems and paradigms of the world's varying religious traditions. Clearly there still is a need for theories to be developed that can increase our understanding of the broader and often subtle contexts within which effective leadership takes place (Fry and Kriger, 2009).

The extant theories of leadership proposed over the past half-century have been based almost exclusively on behaviour and interactions or traits, competencies or styles among employees, between employees and the management team, and among the management team (Fry and Kriger 2009).

Managers must learn to deal with conflict rather than avoid it. Avoiding the conflict and its causes simply postpones the pain and agony that come from personnel blowups. Conflict management strategies provide the management team positive steps for addressing the conflict. Effectiveness with the strategies is an essential skill (Frederickson, 2009).

Most employees have a fervent desire for evaluation, which is information about their performance. Many supervisors find it extremely difficult. Theoretically, the primary concern is with the power that is embedded in the overall authoritative structure and design of organizations, rather than deviations from this order, which tend to attract most attention (Brown *et al*., 2010). In so doing, we draw on a conception of organizations as socially constructed by participants through networks of conversations that feed on and contribute to prevailing discursive practices. From this perspective, the term 'organization' is best regarded as a spatial metaphor that refers to a domain of (supposedly) legitimate authority which favours certain linguistic constructions over others; a sphere of dominancy that is constituted by discursive practices. These practices both constitute our case study organization as a regime of truth and discipline participants' actions by privileging particular forms of language use (Brown *et al*., 2010).

Leadership is also a product of subtle and largely invisible inner feelings, thoughts, states and intuitions, the visible behaviour is just the tip of the iceberg of effective leadership in organizations, and that we must also focus on the images, visions and values which are central to the social construction of organizational reality (Fry and Kriger, 2009).

McLucas (2000) suggests that there is strong indication that managers and strategic decision makers similarly have weak appreciation of the nature of complexity the company deal with and are unaware of developing patterns of events and behaviour that propose underlying systemic structures. Regardless of the truth of that statement, what we agree on here is that the managers' priorities have the appreciation rather than the system itself. Preble (1997) suggested that an integrated model of strategic management and crises management should facilitate the reduction of barriers that have been blocking strategic management more widespread practice and legitimacy in the minds of some managers.

Current theories of leadership that utilize vision and/or values include transformational leadership, authentic leadership, ethical leadership, servant and spiritual leadership (Fry and Kriger, 2009). Complementing these understandings, there are, at a more micro-level, relations of power that are routinely reproduced in mundane practices of organizing. These micro-politics of power relations, which reproduce and introduce tensions, also shape the nature of professional practice (Brown *et al*., 2010). We can understand micro-practices as constitutive of the experience of professional workers rather than conflating their organizational reality with the discourse of the profession (Brown *et al*., 2010).

4.3.2 Leadership Behaviour

The behavioural contingency approaches to leadership, rather than identifying the personal traits of an effective leader, argue that leaders should adopt behaviours which are appropriate for the situation to produce organizational effectiveness. The behavioural contingency approaches have generally found two factors, people-oriented behaviours and task-oriented behaviours, suggesting that these are fundamental overall behavioural orientations via which leaders meet the needs of followers (Fry and Kriger, 2009)

Communication is an essential skill for effective human resource management. In human resource management, sending clear messages, listening, and use of feedback are especially important. Interpersonal relations, interviewing in the hiring process, building rapport in the management team and with employees, orientation and training, performance interviews, conflict resolution, and discipline, all require communication. Mediocre communication skills tremendously complicate these activities (Frederickson, 2009).

Training is helping people learn. Effective training requires teaching skills, an understanding of how adults prefer to learn, patience, communication, a systematic approach, and evaluation of whether the training has been effective (Frederickson, 2009).

Motivation of employees challenges every manager. Employee motivation helps the organization accomplish its goals while also helping workers accomplish their career goals. No motivation recipe guarantees employee motivation. Nevertheless, some managers are more effective than others in developing a work environment in which employees are consistently motivated. These managers use a combination of understanding and satisfying employee needs, compensating fairly, making it possible for employees to do their jobs with minimum frustration, and treating employees equitably. The skill to motivate employees is nebulous yet real. The employers who are best at it have usually worked long and hard to develop the skill. Attributing the ability to motivate people to nothing more than a natural gift understates how hard the best human resource managers work to develop this skill (Frederickson, 2009).

Appropriate risk sharing between principals and agents depends on the overall risk faced by the organization (Sykes. and Dunham 1995). From the firm's point of view, as the risk increases, organizations would benefit by opting for incentives rather than intensifying direct control since incentives share the risk among all the employees. Incentives motivate the employees to become involved in taking risks that improve long-term firm performance (Tacoronte and Gonza´lez, 2005).

Therefore, from a behavioural perspective, it is reasonable that, when employees are subject to HR management practices that are consistent with their preferences and job conditions, they raise their performance. In that respect, a greater involvement of managers in operational activities when the environment is perceived as volatile and a high risk assumption by the salesperson could improve the employees' feeling of security and contribute to an increase in their performance. This improvement in sales force performance should favour an increase in firm performance (Tacoronte and Gonza´lez, 2005),

Conflict is inevitable in farm teams to share performance evaluations in an honest and helpful manner. Employees dread poorly done evaluations and evaluation interviews. Supervisors lacking evaluation skills combat their frustrations by postponement, inflated evaluations, and vague communication. Both supervisors and employees need training in evaluation for it to be useful and pleasant for both parties (Frederickson, 2009).

Organizational politics refers to a broad range of activities associated with the use of influence tactics to improve personal or organizational interests. For example, managers who are good policy advocates routinely use policy influence to acquire resources for their work groups, promote initiatives that they believe will benefit the firm, and motivate employees to perform. However, the perception of strong policy advocates rules is looked at as self serving behaviours that are not officially sanctioned by the organization; and employees respond to their perceptions of policy, as opposed to an objective state of reality (Rosen et. al, 2009). Employees demonstrate adverse reactions to policy because politics are a stressor in the work environment and hinder employees from meeting personal and career goals. They are associated with interpersonal conflict and put additional demands and pressures on already taxed employees (Rosen et. al, ,2009).

In addition, previous studies have shown that organizational politics are related to employees' evaluations and beliefs about their jobs, including perceptions of injustice job equivalence, and discrimination. However, relatively little is known about employees' more immediate emotional responses to the organisation's policy (Rosen et. al, 2009). This can be addressed by integrating the organizational politics literature with research on emotions in the workplace.

4.4 Workforce

Job seekers work on and deploy their identity as a resource: they reconstruct it, manage impressions of self and interactions with others and engage in emotion work (Smith, 2010). When searching for a job in a reconfigured market with new rules it is critical to know what kind of 'organizational' self to present to employers and learn how to conform to the rules of that self. It is argued that people use multiple methods for constructing successful work identities, including 'role embracing and re-definition, emotional distancing, position taking, meaning making, adopting dress codes, and rule breaking. Studies of identity work in the new economy suggest other self-reconstruction methods such as erasing evidence of preference for bureaucratic careers (Smith, 2010).

Identity work is required by the essential of jobs, careers, and labour markets, but is simultaneously chosen as a way to master uncertainty and control life circumstances. In the new economy, learning about growth sectors, about demands for new skills and how to acquire them, understanding how to access pathways to 'good' jobs, finding jobs and holding onto them, all rely upon unique types of interactional and identity work. Identity work enables people to build and strengthen their cultural capital, insofar as cultural capital consists of learned linguistic aptitudes, norms for presentation of self and interactional styles that are specific to differing occupational and professional environments. And to the degree that individuals participate in organizations where working on one's identity is a collective and privileged activity; it builds and strengthens an individual's social capital as well (Smith, 2010).

However, this identity transform from the requiting process into the workforce of the organisation itself. There are trends away from monolithic to multiple identities and from fixed or essentialist views on identity to discursive and constructed approaches to the subject matter. Many scholars of identity and organizations argue for paying more attention to identity processes. Individuals and organizations are said to be better understood in terms of becoming rather than being .It is noted that the literature about organizational identities is 'focused more on a static sense of being identified rather than becoming identified', reflecting the dominance of the functionalist paradigm in organizational research. Definitions such as the following are, for example, typical organizational identification is the degree to which a member defines him- or herself by the same attributes that he or she believes define the organization (Sveningsson and Alvesson, 2003)

The best approach to analyse the identity of the workforce within the organisation is by avoiding the static assumptions in most work (aimed at finding correlations) in favour of a more dynamic view; taking ideas around crises/fragmentation, decentring and discourse-driven subjectivity into account, but without privileging it, providing space also for other elements, including life history, narrative identity and integrative capacities; and offering a thick description of both organizational context and individual identity work, thereby opening up how the individual constructs identity in a less pre-defined way than studies that assume the significance of social identity and organizational identification (Sveningsson and Alvesson, 2003)

The identity transform within the company as it integrate with the external environment, as in exposure to corporate image and organisational actions. Exposure is not the only identity-challenging issue faced by organizations though

Organizational efforts to draw their external stakeholders into a personal relationship with them allow access that expands their boundaries and thereby changes their organizational self-definitions. For instance, just-in-time inventory systems, value chain management and e-business draw suppliers into organizational processes, just as customer service programs encourage employees to make customers part of their everyday routines. This is similar to the ways in which investor- and community-relations activities make the concerns of these stakeholder groups a normal part of organizational life (Hatch and Schultz, 2002).

However, not only are employees persuaded to draw external stakeholders into their daily thoughts and routines, but these same external stakeholders are encouraged to think of themselves and behave as members of the organization. For example, investors are encouraged to align their personal values with those of the companies to which they provide capital (ethical investment funds), while customers who join customer clubs are invited to consider themselves organizational members. Suppliers, unions, communities and regulators become partners with the organization via similar processes of mutual redefinition. Combined, these forces give stakeholder groups greater and more intimate access to the private face of the firm than they have ever experienced before (Hatch and Schultz, 2002).

4.5 Communication

Communication is defined as “A process by which information is exchanged between individuals through a common system of symbols, signs, or behaviour” (Merriam-Webster Online Dictionary). This definition concentrates on the interpersonal level, rather than organisational one. In personal conversation people uses other means, such as body language, to make the point they are making clear, thus avoiding misunderstandings. When larger group of people is involved, however, more complex factors interfere in the way the information is delivered. As Goodwin and Heritage (1990) explain, interaction is central to society, how it is conceived, constructed and communicated. In a business context, it is critical for managers not to ignore the importance of communication (Preece *et al*., 2000).

There are two aspects to business communications: external communications with customers, subcontractors and so forth, and internal between individual employees and offices. Externally, communication throughout any project is ‘critical to developing and maintaining stakeholder support’ (Smith, 2003). This is particularly true in a globalised context where, due to global economic convergence, business is moving away from localism, tradition, and parochialism, which means changes have had to take place in business and corporate communication theory and practice (Ihator, 2004). Organisations engage internally in explicit and intentional communication with employees in various ways, but communication will not be received in a neutral context; as employees operate in an organisational or behavioural context determined by the organisational culture, structures and systems, and the management practices (Frahm and Brown, 2006). In addition, given the close relationship between culture and behaviour, explicit communication that calls for quality and service oriented behaviour for example, will have little effect if the existing culture is not similarly supportive (Hoogervorst *et al*., 2004).

Failure in communication can occur due to breakdown in the sender, the method or the recipient of the message as shown in Figure (4-9), where the failure can occur from sender’s breakdown, method’s breakdown, or recipient breakdown. This makes it problematical to classify where the problem is unless an investigation is established in each of these sections. However, Brooks (1999) explains that there are common causes for these failures, for example the structure of the company and its communication channel. Long chains of command and a high level of bureaucracy, where the message passes many individuals before it reaches its target, may cause delays and uncontrollable changes to the message itself. In addition, the message itself may cause problems due to its complexity, language, ambiguity, and lack of details and explanation, which can make it incomprehensible to the receiver (Loosemore and Hughes, 1998).

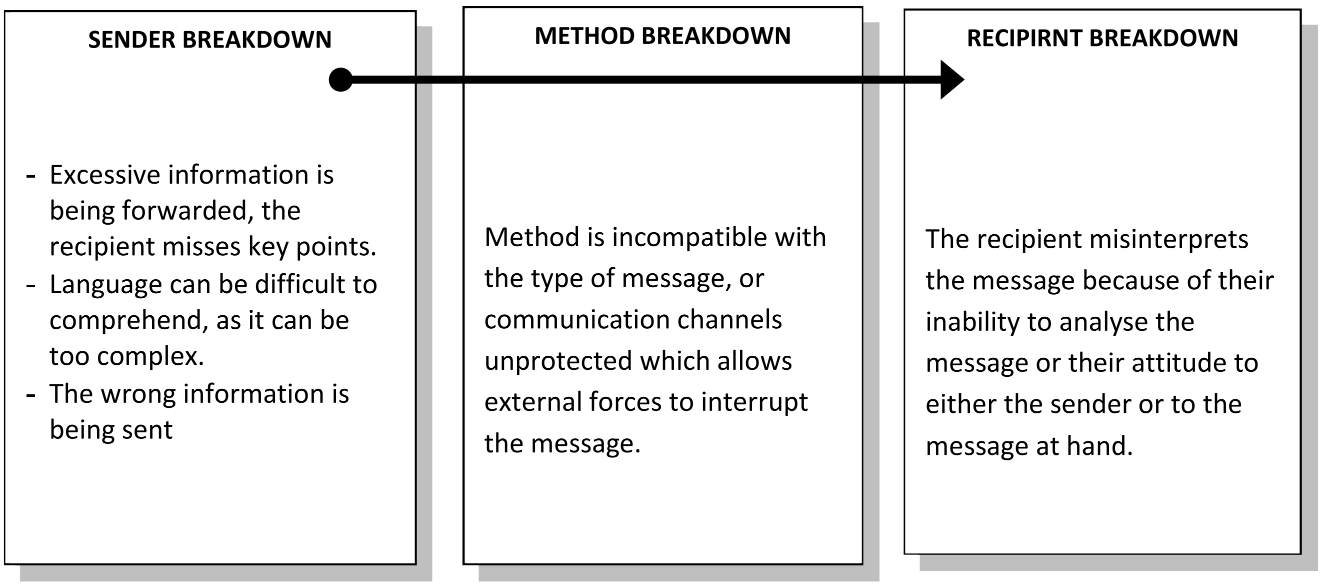


Figure 4-9 Causes of communication failure (adapted from Mullins, 2004).

The status of the two parties involved can affect communications, for example, the balance of power can make it uncomfortable to present a non-agreeable message. As Goodwin and Heritage (1990) found by research on organisations, agreements are usually delivered promptly and with vigour, while disagreements are delayed and toned down in a variety of ways.

Over 75 per cent of business transformations fail and it has been suggested that two of the key reasons for this are lack of communication with employees, and the failure to recognise the impact of change (Collyer, 2000). Since change is stressful it is particularly important to communicate efficiently in times of transformation. Aspects of internal communication are related to both perceived work climate and job satisfaction (Muchinsky, 1977). Poor communication can lead to cynicism about change (Reichers *et al*., 1997), which involves a real loss of faith in the leaders of change and is a response to a history of change attempts that are not entirely or clearly successful. One purpose of communication during organisational change can be to prevent resistance to change, or at least try to reduce it.

This can be achieved by utilising the function of communication as a mean to create a community (Elving, 2005). In reality however, attention is usually given to short-term financial and legal issues to the disadvantage of long-term corporate identity and corporate communication issues (Balme and Dinnie ,1999).

It's hard to cover all levels of behavioural influence within an organisation; the parameters are fast, to the point that even the dominant brain hemisphere of an engineer can make a difference. Singh (2002) explains that this difference in orientation partially explains why the design and construction engineers are unable to see eye-to-eye in issues concerning implementation of drawings. Left hemisphere dominant engineers are also seen to desire more organizational changes than their right hemisphere dominant counterparts. Ideally, researchers believe that a 50–50 distribution of hemisphericities in large organizations is desirable. There is no guarantee of the compatibility of message with method, or the compatibility between the sender and the receiver, however, a transformation from monologic to dialogic communication (see Table 4-1) can decrease the risk failure of communication specially in during change. The Table describes the essential differences between those two types of communication.

Table 4-1 Difference between monologic and dialogic communication (Frahm and Brown, 2006)

Differences	Monologic communication	Dialogic communication
Process	Seeking to instrumnentalize receivers by engaging in goaldirected, feedback orientations.	Both parties have genuine concern for each other, rather than seeking to fulfil their own needs. Creating meanings by means of dialogue
Purpose	Achieving a relationship characterized by power over people and viewing them as objects for enjoyment or as things through which to profit"	Move a discussion up or down between levels of abstraction
Style	Command, coerce, manipulate, exploit	Authenticity, inclusion, confirmation. supportive climate, a spirit of mutual equality
Focus	Communicator's message	Relationships and attitudes that participants have toward one another

One way of protecting communication channels is called 'controlled communication'; where communication is controlled by a third party (Yalem, 1971). This controlled communication suffers a number of limitations, and in practical situations (Yalem, 1971.) where it was hoped to facilitate negotiation in order to resolve conflict, the results were disappointing (Yalem, 1971.). However, there are cases where this system works. In our experience, when it comes to make or even implement a construction contract, dialogue or communication between contractors and clients has always failed unless a third party was involved, this is caused by the fact that claim culture is very common in the construction industry (Rahmad, 2002). This claim culture is explained by Bayfield and Roberts (2004) as arising from a situation where the client assumes that the contractor is planning to cheat, and the contractor assumes that the client is planning to delay or cut the contractor's fees.

Hinds and Kiesler (1995) study found that the rise of technical work and the horizontal organisation of technical worker increases collaboration and non-hierarchical communication, and organisations can encourage communication flows across organizational boundaries by strengthening horizontal structures and supporting old and new technology use by all employees. This means that the communication development can starts from the technical level rather than the managerial level; this is assisted by the lack of barriers in their chain of command (Haimes, 2004).

One means of addressing communication problems has been to use ICT systems to break communication barriers. An example is the Integrated Business Programme, used by Guinness to break down geographical barriers and to ensure that its business processes and IT systems supported its brand development (Collyer, 2000). On the other hand, Olesen and Myers' (1999) study of the use of information technology to facilitate communication and collaboration; demonstrated that the introduction of such technology had to counter forces which wished to maintain the status quo, and which in some instances caused communication failure. Further, when dealing with complex, cross-functional competences, a change of the competence is bound to affect the entire organization, and possibly create the need for developing the whole organizational structure and communication channels (Drejer, 2000).

This needs an understanding of the themes of interaction between the sides of communication; these themes of interaction were defined by Molesworth and Denegri-Knott (2004) as informational interaction (individuals asking for information), relational interaction (group finding a common interest), transformational interaction (group making a plan), and recreational interaction. Balance of power, as Molesworth and Denegri-Knott (2004) put it, defines the rules of this interaction, and there is a need to break though the psychological and bureaucratic barriers created by power positions.

4.6 Trust

Trust in any context entails risk; however, three elements of risky trust distinguish the concept from other trust experiences – breadth and depth of risk, combined personal and procedural nature of the work, and level of analysis.

High-risk, complex tasks often present multiple forms of interdependence at the same time (namely pooled, sequential and reciprocal), creating uncertainty and giving rise to financial, legal, or reputational risk for involved parties (Manley and Shaw, 2004). Pooled interdependence allows people to bring individually produced contributions together with minimal adjustment; sequential interdependence requires attention to sequence because people engage in tasks that use inputs from and/or produce outputs for others, each affecting what the next person in the sequence does. Reciprocal interdependence requires people to actively coordinate decisions and adjust their actions to produce an outcome (Thompson, 1990). When pooled, sequential and reciprocal interdependencies co-exist, uncertainty and risk are particularly high, and trust may be challenging to achieve. Further, under these interdependencies, people incorporate work that is outside their knowledge and organizational boundaries and thereby assume risks that lie beyond their expertise and responsibility. The focus is on trust that occurs in settings with some or all of these inherent task-based risks that are higher than what people face in many work or life settings (Rashid and Edmondson, 2011)..

In general, trust pertains to the trustworthiness of other people. In risky contexts, trust takes an additional form; in addition to trusting the intentions and competence of others, having a procedure in place that people trust matters greatly. When risks are objectively high (at personal and organizational levels) trust in others' intentions and competence may be insufficient to build confidence in joint action. In risky endeavours, therefore, when team members trust that a procedure in place mitigates risk and enables task achievement, they are better able to monitor each other's actions and to align their own actions with the requirements of the shared process (Rashid and Edmondson, 2011).

It can be argued that such a process is in fact a product of on-going human relationships. Just as organizations are comprised of the on-going organizing that transpires from sequences of events, the process we describe is actually an on-going processing that transpires through interpersonal interactions. Trust in process during a risky engagement means trust in the rules and procedures that govern team life and serve as behavioural and task guidelines for team members (Rashid and Edmondson, 2011).

Trust should lead to empowerment, which has become an important theme within general management over the course of recent years (Mbachu and Nkado, 2007). There is general encouragement to give employees sufficient latitude in their work-definition and authority to be able to apply the full breadth of ability to the overall aims of the company. Recently, the usefulness of empowerment has started to become recognized in the different environment of Project Management. Rutland' (Williams, 1997) discusses its importance both between companies, leading towards an increase in structures such as partnering (which implies a level of trust between the companies), which can be summarised by (Williams, 1997);

Empowerment of teams within a project, and project risk management, compete with each other in modern, intra-connected, complex projects. Attempting to implement both philosophies leaves the project risk manager with an irreconcilable dissonance.

The contractors allocate more risks onto themselves than what the owners have contemplated. This may be due to the present practise in the industry where the contractor is expected to bear many risks whether they could appropriately manage it or not. Ironically though, it is the owner, who ends up paying for these risks, as the contractors will normally price these risk items in their tender (Ahmed *et al*., 1999).

Owners however display less readiness to accept risks. There is risk evasive attitude of the owners and there is need for more innovative methods for contract procurement, which will be better capable of allocating risks to the party that could best handle them (Ahmed *et al*., 1999). Nevertheless, there are positive trends where owners are ready to accept risks of site safety and quality of work as risks to be shared. This obviously demonstrates the increasing awareness among owners as to how they could participate in the management of safety and quality (Ahmed *et al*., 1999).

Project risk management frameworks should inform project teams about likely cross-impacts of planned actions.Teams should not be empowered to take actions cross impacting other project areas. They should, however, be able to make desires known and influence project decisions. The best approach for the risk manager to adopt in such an environment is that known in the literature as "accommodation".

4.7 Relationship Classification

The client and the contractor have their own approach to risk assessment to the project due to the different relationship the client and the contractor have with the project. The industry will benefit from reducing the blame culture between the client and the contractor and focuses on explaining why the construction industry, which behaves conservatively toward risk, still inherits many of the risks into its projects. For the client to reach a decision making process in acting toward risks, the cultural background would reflect the conditions the organization is working within. In taking a decision, consideration need to be given to whether the risk can be effectively managed by the participant allocating the risk or whether the allocation causes a different, but more damaging risk; and whether the allocation of risk intended is effective and enforceable (Edwards and Bowen, 1998).

In the source of the decision taken by the client, there should a trigger behaviour routed within the organization itself. This trigger behaviour can be routed within the cultural web of the organization. The client, especially as an organisation, reflects its relationship with the stakeholders on the project. This organisation, with its elements, defines the way the client reacts to change and perceived information. The paradigm of the client classifies its flexibility and the ability to condition its objectives based on the perceived risks of the project. The client ability to balance between the demands of the stakeholders and the real objectives of the project is fixed within the character the organisation which is affected by the cultural web.

Market wise, the client plays a pulling force in the construction market, and this is the strongest force in defining the direction of the market. Therefore, risk will be approached retrospectively to the client background, as the relationship between the client background toward the client influence is detailed in Figure (4-10). The logic behind this approach is taken from the basic understanding of management theories.

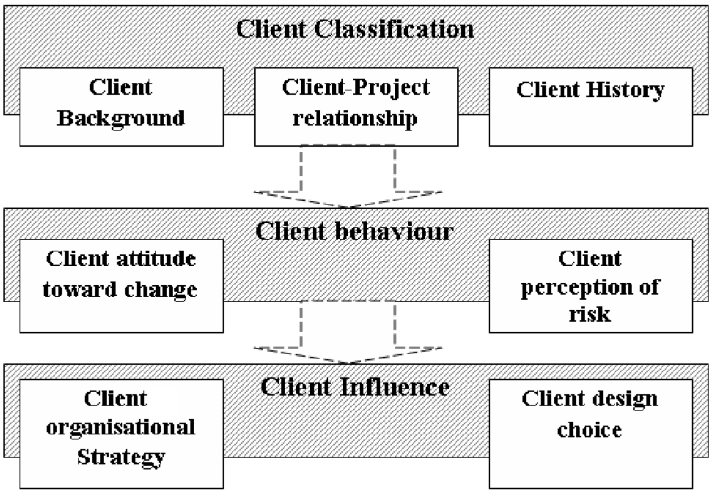


Figure 4-10 Approaching the client

The client classification is based on the client background, which serves putting the client into qualitative categories. While the financial stability is usually applied as it is on the client, the funding source should be addressed as a reflection of the decision making sources inside the company. Flexibility and type of funding source can define the relationship the client would have with the project and would reflect either the conservative or untraditional attitude the client has regarding projects. This will transfer into the priorities of the client toward the client investment as in the project.

Using case studies permit sample discretion in different aspects of the research, in the selection of bases as well as the use of sources of evidence and analysis techniques, which make it essential to establish from the start a coherent design, clearly stating the guidelines of the study and avoiding that the high number of options as well as the ample authority of the researcher lead to arbitrary decisions and a low quality investigation. The design will form a concrete plan, which establishes the different stages and its iterations. The idea that underlines this whole process is to ease the external validation by means of fixing, beforehand, the needs and criteria that justify each important decision, so that the auditor of the research can analyse if such criteria is adequate for the problem to be solved and if the decision taken adapts to it (Nieto, 2000).

The classification serves putting the client into qualitative categories. Funding reflect one of the decision making sources inside the company. The more the client relies on a non-flexible funding source the more conservative it will be regarding projects. This can be verified by addressing the client himself. The information needed for this section is not complicated and can be obtained from the balance sheet. Loans – Investment ration reflect the internal financial strategy the client has in private companies. Unbalanced ratio reflects a high risk client to deal with. It shows how it affects is liquidity and cash flow. In addition, it shows how risky the client is when making investments (Green, 1996).

The client behaviour toward risk is originated in its rational of risk and the internal protocols of the client as in the organisational cultural and its internal forces which affect its change attitude and its inclination to fall in organisational crises. An innovative client faces less risk during change, as change has a very strong association with risk. While clients Strategy reflects in the survivability of the client in deferent environments, clients' strategy derives from the clients' organisational focus, which reflects the way the client adapt its objective in different environments, and how it divides it resources. For the client to manage its short term and long term objectives, it needs innovative approaches usually developed by its general competitiveness in the market (Green, 1996).

Whilst the preceding classifications of client organizations are widely accepted, they tend to underplay the social complexity of many client organizations. A more realistic approach which recognizes that clients are often multi-faceted in nature, comprising several different interest groups whose objectives differ, and may well be in conflict. The chances of eventual success are severely diminished if conflict and ambiguity regarding a project's objectives are not resolved during its early stages. The majority of the literature continues to classify clients in accordance with pre-determined characteristics. It is contended that the insights gained by such attempts to understand clients `from the outside' will always be limited. It must be recognized that client organizations are social systems. They therefore possess the inherent complexity of any situation characterized by people (Green, 1996).

4.7.1 Competing Values Dimensions

A value model can be constructed using the competing value dimensions which results from client influence, classification, and behaviour. Those dimensions and their element have been detailed in Table (4-2), (4-3), and (4-4)

Table 4-2 Client influence

Client influence:	
Dimension	**Elements**
Client design choice:	• Time, cost, quality • Organisational context of project • Contractor choice: Contractor Organisation, Financial consideration, Management Resource, experience and performance, prior relationship • Quality priorities: Function, sustainability, value for money, performance
Client organisational strategy:	• Control • Communication • Distribution of resources • Organisational Focus • Competitiveness

Table 4-3 Client behaviour

Client Behaviour:	
Dimension	**Elements**
Client perception of Risk	• Internal Forces of change: individual, organisational • External forces of change: Market, transformation • Client rational of risk : power, urgency, legitimacy • Client rational of risk management :legality, power dependency
Client organisational strategy:	• Control • Communication • Distribution of resources • Organisational Focus • Competitiveness

Table 4-4 Client classification

Client Classification:	
Dimension	**Elements**
Client Background:	• Client funding: public, private • Client size: turnover • Financial status: credit, assets, liabilities • Client's organizational structure • Experience of client's staff
Client history:	• Number of projects • Number of years' client is in the construction industry • Client's project portfolio • Client's past performance in projects • Client's litigation tendency
Client project relationship:	• Project objectives • Project priority (Ratio of total investment) • Type of contractual system client uses

4.7.2 Competing Values Model:

Focus: whether dominant values concern issues that are internal to the organization or external to it. Internal focus reflects management concern for well-being and efficiency of employees. External focus reflects an emphasis on the well-being of the organization itself and its "fit" with its environment.

Structure: whether stability versus flexibility is the dominant structural consideration. Stability reflects a management value for efficiency and top-down control, while flexibility represents a management value for learning and change. These two dimensions were development as Dimensions of Effectiveness by Quinn (1981).

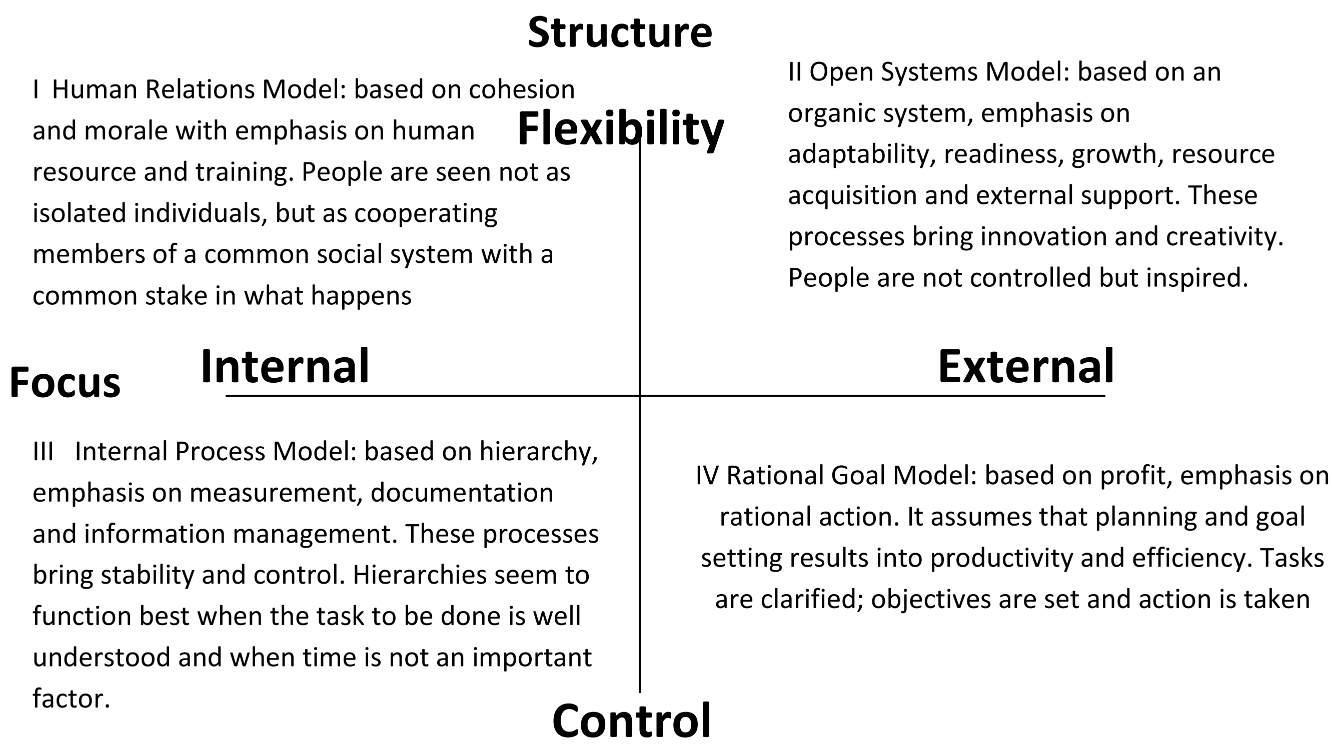


Figure 4-11 Competing values dimensions adapted from Quinn (1981)

The Figure (4-11) presents four models:

I: Human Relations Model – internal Focus and flexible structure. Management concern is on the development of human resources. Employees are given opportunities for autonomy and development. Management works toward sub-goals of cohesion, morale, and training opportunities. Organizations using this are more concerned with employees than the environment.

There are some assumptions common to managers in organizations using the human relations model:

- Employee satisfaction is the key to productivity and quality
- Open supportive communication enhances satisfaction
- Meeting the individual needs of employees is a key goal of management
- Managers need to pay close attention to building good relationships on the job
- Employees will be motivated to do good work if the work environment permits it.

This model can be tested through four variables presented in Table (5-4):

Table 4-5 Human relation variables

Human relation	
variable	**assumptions**
Good Communication - redundancy, informal networks, few barriers	• The manager explains his decisions to the employees regularly. • The objectives of the project is clear to the employees • The employees are allowed to exercise self-direction
Clear Performance Goals facilitated with feedback, quick and specific	• Information is always shared between employees and managers. • Errors are quickly corrected. • Source of errors is easily identified.
***Meaningful Rewards linked to performance. This should tick the majority of these* boxes**	• There is an individual recognition • Their work is an important part of the project • They will accept new goals and tasks willingly
Culture (especially at mid and upper levels) to support 1, 2, 3.	• People in the project share a common set of needs. • Employees feel there is a clear culture of the company. • Employees feel that they fit in the culture of the company,

II: Open Systems Model – Combination of external focus and flexible structure.

Management's goals are primarily growth and resource acquisition. Sub-goals are flexibility, readiness, and positive evaluation by the external environment. Dominant value is establishing a good relationship with the external environment to grow and acquire resources, which is Similar to the Systems Resource Model.

This model originates from the fact that no system can be disconnected from the environment (Figure 4-12). Closed systems do not realistically represent real organisations because organisations are open rather than closed. Thus, any theories or models that treat organisations as closed systems are inadequate. Furthermore, although closed system models work best in a relatively static environment, such environments are rare and likely to become even less so. Depending on environmental demand or contingency, organisations respond to perturbations in the environment either via an adaptation process, which can be viewed using an open systems model or homeostatic equilibrium model, or transformation, which is best viewed using a dissipative systems thermodynamic non-equilibrium model.

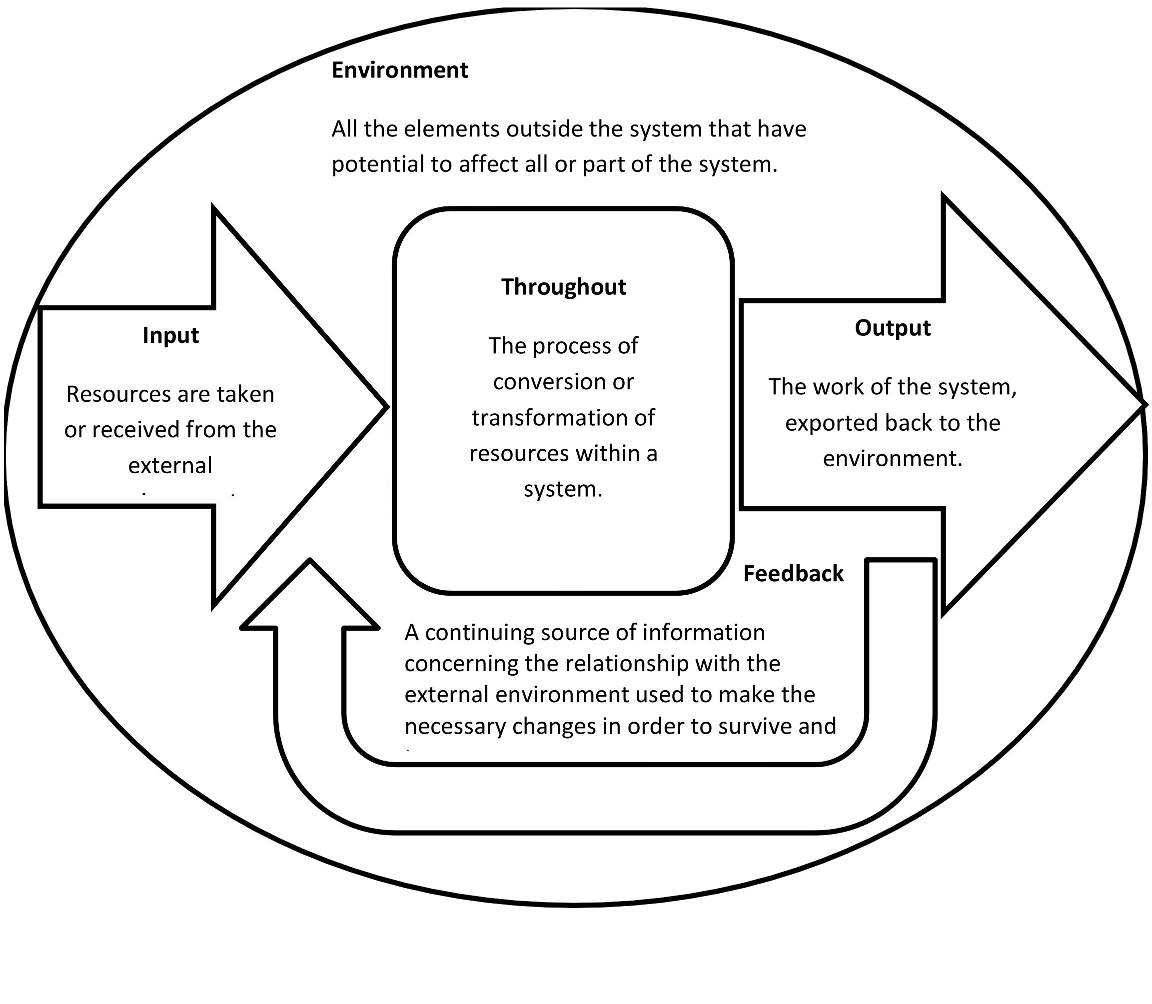


Figure 4-12 Systems resource model (Khalil, 1995)

Adaptation operates in response to limited environmental disturbances, but beyond these limits organisations need to transform themselves into more sophisticated forms that are more complex and capable of managing higher levels of environmental contingencies (Hasan, 2002).

However, a complex system must be in a far-from-equilibrium condition, which is characterised by instability, so that transformation can occur. In adaptation, changes in the environment require that organisations modify some of their properties (strategy, structure, procedures or technology, and size) to be aligned with that environment. But adaptation cannot accommodate cultural change, which involves changing of people's beliefs held at a deep level. When organisations have to cope with an extremely high environmental contingency, transformation, which is a more substantial and pervasive form of change that includes the change of organisational culture and its political web, must be introduced to ensure their survival. Since the environment of organisations is ever more complex and dynamic, it is argued that a unified model, which encompasses both adaptation and transformation, should be developed and empirically tested with the aim of better representing and understanding change in organisations. (Sundarasaradula, 2002).

There are two main forces that drive this model, adaptation and transformation. .These two variables can be divided into four variables: .Change, individualism, creativity, and growth (detailed in Table 4-6)

Table 4-6 Open system drivers

Open system	
variable	**Driver**
Change	• The company review its objectives periodically • The company has gone through different transformations in the past • The team structure changes periodically
Individualism	• The management is flexible in its decisions • Competition between employees is promoted by the management • There is a personal development plan
Creativity	• There are personal development schemes • New ideas are periodically discussed • There is high reward to individual initiatives
Growth	• The company's size has increased • A new department had been created • There is an interest in the global market

III: Internal Process Model – Reflects the values of internal focus and structural control, and seeks a stable organizational setting that maintains itself in an orderly way. Well established in environment and just wish to keep their current position. Sub-goals include mechanisms for efficient communication, information management, and decision-making.

1. Efficiency of tasks is the most important feature of organizational functioning.

2. Effective transmission of messages is essential.

3. Formal channels are the way messages are transmitted and authority is maintained.

4. The system depends on standardized rules.

5. Motivation is provided by use of punishments and rewards.

6. Decision-making is largely centralized at the top of the organization, thus relying heavily on downward orders and upward reporting of results.

There are two roles within the Internal Process model, the monitor (who, in essence, pays attention to what's happening) and the coordinator (who pulls people together to get work done). These control four variables to be monitored, which are detailed in Table (4-7)

Table 4-7 Internal process drivers

Internal process drivers	
variable	**Driver**
Centralisation	• Communication is allowed only though specified channels. • All decisions have to be approved by the supervisor. • The management is the only sources of ideas.
Rules	• Work has to be done right in all details even if it was delivered late. . • It's important to finish the tasks using the guides provided by the management • Every employee needs to be knowledgeable of the project's rules
Monitoring	• The supervision relies on punishment and reward system for motivation. • Reports needs to be provided by the employees periodically about implementation of tasks. • Monitoring system is considered the best way to insure quality
Coordination	• A supervisor plays an important role in getting the task done • Communication between team members has to be done through a supervisor. • Supervisor is important to clear up any confusion in the tasks.

IV: Rational Goal Model – Reflects Management values of structural control and external focus. Primary goals are productivity, efficiency, and profit. Organization wants to achieve output goals in a controlled way. Sub-goals include internal planning and goal-setting, which are rational management tools and similar to the Goal Approach.

Four different opposing value sets within the organization. Exist simultaneously, and the "right" balance for the organization is subject to managerial discretion. Emphasis may change over time, especially as the organization evolves through its life cycle.

The systems resource model analyses the decision-makers' capability to efficiently distribute resources among various subsystem's needs. The systems resources model defines the organization as a network of interrelated subsystems.

These subsystems have been classified by Green (2004) as follow:

1. bargaining position -ability of the organization to exploit its environment in acquisition of scarce and valued resources;
2. ability of the systems' decision-makers to perceive, and correctly interpret, the real properties of the external environment;
3. ability of the system to produce a certain specified output;
4. maintenance of internal day-to-day activities;
5. ability of the organization to co-ordinate relationships among the various subsystems;
6. ability of the organization to respond to feedback regarding its effectiveness in the environment.
7. ability of the organization to evaluate the effect of its decisions; and
8. ability of the organization' system to accomplish its goals.

This rational should go through six points of planning (Quinn and Cameron, 1983):

1. Verifying: Verifying, defining and detailing the problem (problem definition, goal definition, information gathering). This step includes recognizing the problem, defining an initial solution, and starting primary analysis. Examples of this are creative devising, creative ideas, inspirations, breakthroughs, and brainstorms.
2. Establishing evaluative criteria: Evaluative criteria are measurements to determine success and failure of alternatives. This step contains secondary and final analysis along with secondary solutions to the problem. Examples of this are site suitability and site sensitivity analysis.
3. Identifying alternatives to achieve goals: This step encloses two to three final solutions to the problem and preliminary implementation to the site. Examples of this are Planned Units of Development and downtown revitalizations.
4. Evaluating alternative policies: This step comprises a final solution and secondary implementation to the site. At this point the process has developed into different strategies of how to apply the solutions to the site.

5. Implementing the preferred alternative: This step includes final implementation to the site and preliminary monitoring of the outcome and results of the site. This step is the building/renovations part of the process.
6. Monitoring and evaluating outcomes and results: This step contains the secondary and final monitoring of the outcomes and results of the site. This step takes place over a long period of time.

Social relationships are clustered in roles which individuals take on entering work organizations, experiencing technology as a cultural artefact present in task systems. Individuals carry culture and their emotional states into roles where they experience both task-mediated social relations and direct face-to-face relations. The individual, social and technological interpenetrate in work roles creating the socio-technical view of organizations. Roles vary in their degree of definition, ambiguity, integration and contradiction of other aspects of organizational life. The environment is carried as culture by people into work roles and vice versa inducing a degree of instability and requiring adaptation by organizations. This personal quality of culture imparts vitality to a society and the individual functions as a change agent. Attitude as a concept segments the social from the psychological and the inner self of emotions. Attitude change programs leave role systems in institutions unaffected (Wild, 2002).

4.8 Risk Tolerance

Measures of risk perceptions use a compositional methodology where perceived risk is uncertainty multiplied by adverse consequences. We can then calculate the risk tolerance for the client (detailed definitions in Table 4-8), with elements to calculate risk tolerance include age of company, turnover, handling crises, future perspective, long-term Vs. short term, attitude toward losses, and attitude toward projected losses

Table 4-8 Risk tolerance

Risk Tolerance	
Risk tolerance	**Position**
Risk averse	Risk-averse are those who, when faced with two investments with the same expected return but two different risks, prefer the one with the lower risk.
Risk neutral	Risk-neutral is indifferent between an investment with a certain outcome and a risky investment with the same expected return but an uncertain outcome.
Risk seeking	Risk-seeking investors prefer an investment with an uncertain outcome to one with the same expected return and certainty that it will deliver them.

A classification can be founded on the portfolio of the client using the Modern portfolio theory (MPT) (Figure 4-13). Modern portfolio theory (MPT) (Sharpe, William F 1964) proposes how rational investors will use diversification to optimize their portfolios, and how a risky asset should be priced. The basic concepts of the theory are Markowitz diversification, the efficient frontier, capital asset pricing model, the alpha and beta coefficients, the Capital Market Line and the Securities Market Line.

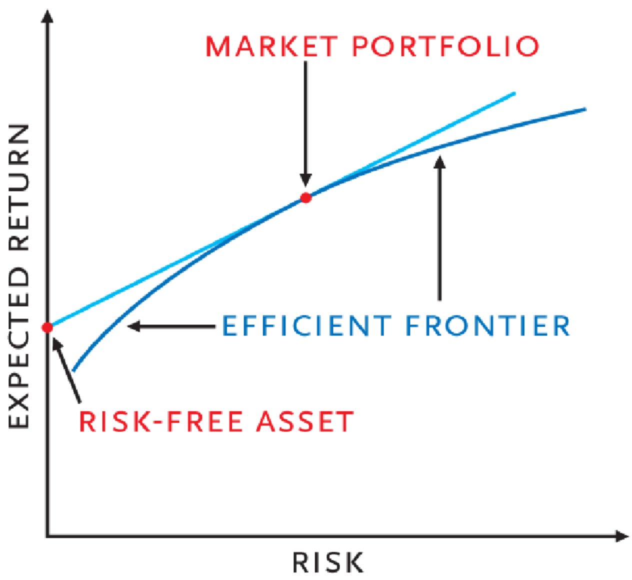


Figure 4-13 Modern portfolio theory

MPT models an asset's return as a random variable, and models a portfolio as a weighted combination of assets so that the return of a portfolio is the weighted combination of the assets' returns. Moreover, a portfolio's return is a random variable, and consequently has an expected value and a variance. Risk, in this model, is the standard deviation of return (Bradley, 2000).

The model assumes that investors are risk averse, meaning that given two assets that offer the same expected return, investors will prefer the less risky one. Thus, an investor will take on increased risk only if compensated by higher expected returns. Conversely, an investor who wants higher returns must accept more risk. The exact trade-off will differ by investor based on individual risk aversion characteristics. The implication is that a rational investor will not invest in a portfolio if a second portfolio exists with a more favourable risk-return profile, for example, if for that level of risk an alternative portfolio exists which has better expected returns (Bradley, 2000).

The scope of risk assessment, as a methodology that enables to evaluate and estimate the risk associated with a system, has vastly changed over the last 10 years, progressively expanding its bearing to areas such as safety management, regulation development, and design. While this growth proves the power and validity of the methodological approach, it also requires that new methods and techniques are developed so as to satisfy the requirements and specifications of new areas and domains of application (Cacciabue, 2000).

When standard probabilistic risk assessment PRA , also called probabilistic safety assessment PSA , or quantitative risk assessment QRA type analyses are performed, then the ‘‘bottleneck’’ of providing numerical measures of the likelihood of certain events and of their associated consequences is still a very important requirement to be satisfied (Cacciabue, 2000). This implies that, independently of the specific application of risk assessment being performed, when the goal of the analyst includes the quantification of risk associated with a certain system, then two main conditions must be satisfied:

1. An adequate database, or at least a consolidated technique for data collection, has to be available which suits the theoretical construct that sustains the risk analysis; and

2. An appropriate methodological framework has to be applied, so as to link different methods and techniques utilized in the overall PRA or QRA application (Cacciabue, 2000).

Measures of risk perceptions typically use a compositional methodology Using this approach, the overall level of perceived risk for a particular multiattribute project is calculated as a weighted sum of the product's perceived attribute levels. As demonstrated in Figure (4-13).two approaches are generally used to operationalize the components of perceived risk: (a) uncertainty multiplied by adverse consequences or (b) probability of loss multiplied by importance of loss (Dowling and Staelin, 1994).

It is noted that it is also possible to use a decompositional methodology to measure perceived risk. This approach decomposes a subject's evaluations of the overall perceived risk of buying a product into the part-worth utilities associated with the attributes of the product. It has the advantages of (a) capturing the respondent's overall feeling of risk (which may have both an affective and a cognitive component) and (b) providing a method of relating this measure to the specific aspects of the purchase situation (Dowling and Staelin, 1994) (Figure 4-14).

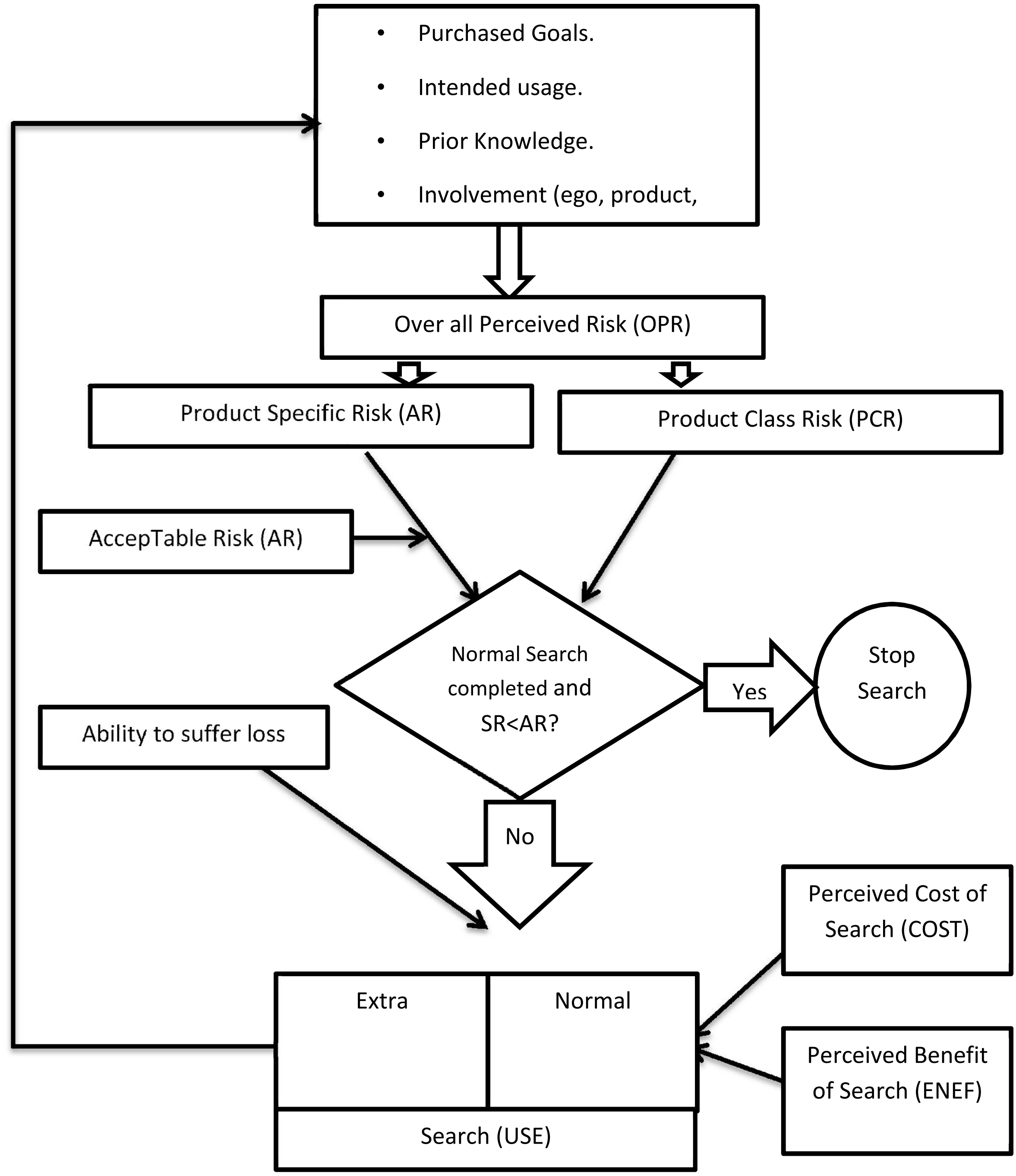


Figure 4-14 Processed model for perceived risk and information research

Proactive risk management needs to be embedded in both base plans and contingency plans. Further, proactive and reactive planning are not alternatives, they are complementary aspects of planning as a whole, with proactive contingency planning supporting reactive contingency planning when this is cost-effective. Similarly, crisis management is not an alternative to risk management; it is a consequence of risk management failure. Nevertheless, even the most effective risk management must fail on occasions if it is to remain cost-effective on the average. Only if risk management fails completely, or is simply not addressed, will crisis management become the dominant management mode (Ward and Chapman, 2003).

Project risk management is usually associated with the development and evaluation of contingency plans supporting activity-based plans. Really effective risk management will strongly influence design and may significantly influence motives and parties. It will certainly influence basic timing and resource allocation plans (Ward and Chapman, 2003).

Planning and risk management in this sense are integrated and holistic. Treating project management and project risk management as closely coupled processes is central to the approach taken in this hook. In practice, some separation may be essential because different people and organizations may be involved, and other differences are important. However, the reparability should be limited, to avoid imposing constraints that can prove very expensive. This is another key aspect of an integrated and holistic approach (Ward and Chapman, 2003).

4.9 Risk Performance

'Performance' is used with a wide range of meanings within industrial and business activities. However, unlike construction quality, which is yet to be resolved within a clear and commonly agreed definition, construction performance, and particularly building performance, are fairly well-documented concepts.

Building performance has been broadened to such an extent that terms such as 'total building performance', 'whole life performance', 'overall performance' or 'integrated building performance' are being. Presently, the performance approach is primarily concerned with the description of what building, and/or service are required to achieve – the 'end' – and not on how they should be achieved – the 'means' (Almeida *et al.*, 2010).

Progress of a project is corresponding with the occurrence of risks. Risks have been categorized into three major captions; Financing, political and technical risks. The successes of a project are measured by the overall project cost, duration and quality of the final product or services delivered. Usually the risks are corresponding with these three parameters. The risks could be clustered as global and elemental risks (Bokharey, 2010).

Global risks are defined as being exerted externally to the project environment (Baloi and Price, 2001). Adversely, elemental risks originate from the sources within the project structure which are manageable within the elements of the project (Bokharey, 2010).

4.9.1 Measurement

Risk measurement is the estimate and analysis of the possibility and time of occurrence, the influence, the severity of the consequences of risk factors. It is one of the most important phases of risk management after risk identification.

Several methods have been proposed and utilized thorough research by a lot of scholars to help contractors and subcontractors to evaluate and select the best projects in order to decide which projects are more risky. And so these models help to plan for the potential sources of risk in each project and manage each source during construction. Currently project management teams have more options from which to choose (Reza *et al.*, 2011).

Risk assessment methods have ranged from simple classical methods to fuzzy approach mathematical models. Many construction project risk assessment techniques currently used are comparatively mature tools (Reza *et al.*, 2011).

The multiple dimensions of building performance are identifiable and controllable by practitioners due to the efforts of clarification and categorization of performance information. For example, building performance information can be organized in terms of topics such as performance requirements, interested parties which relate to those performances or a perception of building performance (Bokharey, 2010).

From an organizational point of view, 'risk' may be defined as the effect of uncertainty in objectives and risk management as the coordinated activities to direct and control an organization with regard to risk. Thus, risk management can be seen as a discipline or management practices focused on realizing opportunities and averting threats. The construction sector and construction projects in particular, are particularly risk-laden (Bokharey, 2010).

For management purposes, construction risks can be considered as: 'inherent risks' that are difficult or impossible to manage and control because they are external to the building project and to human organized, or factors that induce 'aggravation of inherent risk'. These include gross human error occurring inside building project resources and within human organized systems (Bokharey, 2010).

Measuring the past performance of a trading system or a portfolio of assets is one of the most important issues for financial practitioners and portfolio managers Evaluating performances heavily depends on estimating risk. In the past different measures has been proposed but there is no general agreement about which one is the most robust estimator for the "quality" of a trading strategy (Bokharey, 2010).

The definition of risk can be subjective and, in fact, it does not exist in a generally accepted definition. It is often associated with the fluctuation of returns around their mean value and thus to their standard deviation. However, fluctuation towards positive returns may not be considered a form of risk. Therefore, one sided definitions of standard deviation are also used by practitioners (Bokharey, 2010).

The performance of a trading strategy is characterized by two key quantities: the cumulative return over time, and the risk incurred in using it (Bartolozzi and Mellen, 2011). While it is intuitive to associate profitability with the goodness of a trading strategy, high profits can be due to lucky trades or temporary favourable market conditions.

This is the reason why investors tend to monitor the performance of their trading systems in time in order to recognize a possible deterioration in their strategy. The risk-adjusted performance measures proposed in literature, see for example, attempt to assert the quality of a trading system by assuming that an investor will make his/her decision based not only on the past returns but also on their fluctuations (Bartolozzi and Mellen, 2011).

Then you have the deadweight costs to consider, as deadweight costs associated with financial distress occur when other real, not merely opportunity, costs are imposed on the organisation as a result of the loss event. Such costs may include legal costs associated with distress, refinancing costs, the diversion of managerial time and attention, tighter supplier terms, loss of key employees, or the diminution of brand equity or reputation (Godfrey *et al.*, 2008).

It is required to create a format that verifies the risk factors existing in a project and their influences by analysing the risk performance and calculation results proposed in this study. Therefore, we looked into the performance indexes and qualitative aspects that measure the risk performance as indexes, and quantitative aspects that measure risks in monetary amounts (Godfrey *et al.*, 2008).

A risk performance index (RPI) can assess the risk management in development projects and can be combined with similar measurement. The combined performance measurement index can then be used to measure the performance in the three aspects of cost/schedule/risk. There are many types of RPI, we’ve chosen the Cost Risk Performance Index (CRPI) and Schedule Risk Performance Index (SRPI) as examples to explain the methodology used (adapted from Kim, 2011):

1-Cost Risk Performance Index (CRPI)

The cost risk performance index (CRPI) can be calculated by subtracting the residual cost risk variance (RCRV) from the forecast cost risk variance (FCRV) and dividing by the FCRV at a specific point during the business period.

The analysis of the CRPI can be performed as follows:

$$CPRI = \frac{FCRV - RCRV}{FCRV}$$

Equation 1 Cost Risk Performance index

First, if the CRPI is 1, then the RCRV is 0, showing the perfect elimination of the cost risk. It can also be seen that the residual risk in the project is 0, which is the best condition of the cost risk. Second, if the CRPI is greater than 0 and less than 1, it shows that the RCRV is lower than the FCRV. This means that although there are still some risks in the project, they are at a low level compared with the forecasts and so the cost risk shows a good status. Third, if the CRPI is 0, the FCRV is the same as the RCRV. Because this shows that there has been no reduction in the FCRV, it also shows no reduction in the cost risk. Fourth, if the CRPI is less than 0, it shows that the RCRV exceeds the FCRV, indicating an increase in the cost risk in the project as explained in Table (4-0)

Table 4-9 CRPI analysis

Index	Description
CRPI = 1	Best status, residual cost risk is 0, all cost risks have been eliminated
0<CRPI<1	Good status, residual cost risks are smaller than forecasted cost risks
CRPI = 0	Unchanged status, residual cost risks are equal to forecasted cost risks
CRPI <0	Bad status, residual cost risks are larger than forecasted cost risks

2-Schedule Risk Performance Index (SRPI)

The schedule risk performance index (SRPI) can be computed by subtracting the residual schedule risk variance (RSRV) from the forecast schedule risk variance (FSRV) and dividing by the FSRV at a specific point during the business period.

The SRPI can be analysed as follows.

$$SRPI = \frac{FSRV - RSRV}{FSRV}$$

Equation 2 Schedual risk performance index

First, if the SRPI is 1, it shows that the RSRV is 0, indicating the perfect elimination of the schedule risk. The remaining risk in the project is 0, which shows the best condition of the schedule risk. Second, if the SRPI is greater than 0 and less than 1, it shows that the RSRV is lower than the FSRV. This means that although there are still some risks in the project, they are at a low level compared with the forecasts, indicating that the schedule risk is in an excellent state. Third, if the SRPI is 0, the FSRV is the same as the RSRV. Because this shows there is no reduction in the FSRV, it also shows no reduction in the schedule risk. Fourth, if the SRPI is less than 0, it shows that the RSRV exceeds the FSRV, indicating an increase in the schedule risk in the project as detailed in Table (4-10).

Table 4-10 SRPI analysis

Index	Description
SRPI = 1	Best status, residual schedule risk is 0, all schedule risks have been eliminated
0<SRPI<1	Good status, residual schedule risks are smaller than forecasted schedule risks
SRPI = 0	Unchanged status, residual schedule risks are equal to forecasted schedule risks
SRPI < 0	Bad status, residual schedule risks are larger than forecasted schedule risks

The terms 'disruption and delay' or 'delay and disruption' are used freely when claims are made for cost overruns on complex projects. The two words making up the term are meaningful in their own right-disruptions are events that preclude the contractor completing the work as bid, and delays involve the completion of the project being later than originally planned (disrupting the continuity). Any event that extends the delivery date will usually force the contractor to take action to accelerate activity and avoid late delivery. The subsequent project compression will cause parallel working with concomitant disruptions that appear to be self-inflicted. These actions typically exacerbate the situation further and so vicious cycles arise which are very difficult to demonstrate in a transparent manner, and there are extensive difficulties in demonstrating the distinction between self-inflicted damages from disruption and delay as compared to damages caused by the client (which are those to be legitimately claimed) (Eden *et al*., 2000).

There is also the financial performance. It is a generally accepted practice to assess company performance using financial ratios; the practice is widely understood and long accepted as a way of establishing a company’s financial structure and as a way of comparing that company against industry benchmarks.

Financial ratios can also be used as input to a financial risk analysis, and may provide the only substantial and reliable information on a company’s financial health And, even though there is a considerable debate on the value relevance of financial ratios and their ability to immediately impact share prices, they are easy to obtain and are useful in providing information and understanding for long-term investors who are more interested in the longevity of a company (Balatbat *et al*., 2009).

With experience, analysts have developed acceptable ranges and norms for some financial ratios. Companies operating outside of those ranges signal potential risk. Nevertheless, these ranges and norms are subjective and are not universally accepted. Some believe it is not appropriate to compare financial ratios between different business types and even sizes. Consequently, differences in these ratios can only suggest a difference in the general industry characteristics, unless the values of the ratios are extremely unfavourable (Balatbat *et al*., 2009).

A company’s financial performance, as measured by ratios, may not be in agreement with share price and some investors may choose to not consult financial ratio information before investing. Poor share market price does not imply poor financial standing of a company (Balatbat *et al*., 2009).

The ratios are calculated based on actual company performance, whereas the share price is dependent on the markets' perceptions and opinions, and trading volatility. And since many investors perceive that investing in construction carries risk, particularly with fluctuating economies, the disagreement between share price and ratios may be greater with construction companies than for companies in other industries (Balatbat *et al*., 2009).

The information input for risk functions requires one to estimate the modal value and its extremes, for example for activity time: the most likely, shortest and longest possible duration. Alternative data sets may be used to generate these parameters, for example the variance or mean value; however, considerable difficulty arises in the actual estimation of many of these values. The more realistic estimates based on what project managers think (Berny, 1989) are three types:

1. The most likely (mode) is a natural part of any estimate.
2. The shortest time or lowest cost. This may reasonably be estimated as it assumes good workmanship, with the idealization of working conditions having minimal interference. If this is not available, the lowest limit with an associated probability may be used.
3. An estimate of chance to exceed the mode.

Measuring Quality falls in different norms. Ireland and Lewis (1991) states that any method that senses to measure Project Quality must consider at least two aspects:

1. Technical Quality, as measured by Defect Counts and positive counts or indicators.

2. Perception of Quality, a subjective factor that can be measured by such indicators as Customer Involvement and Stakeholder Satisfaction.

The problem with the technical quality is the lack of consistency, as every observer would have different criteria to their indicators. There is no official description that can be generalised or has a accessible records of. As for perception of quality, it is as in the description a subjective factor. This means that it cannot be generalised or be used as a tool of measurements.

4.9.2 Determinants of Risk performance

4.9.2.1 Client relationship with the projects

The problem of establishing relationships is seen as one of transforming a conflict (political) system into a cooperative (rational) one. A conflict system is one in which individuals have objectives that are not jointly consistent. It organizes through exchanges and other interactions between strategic actors. A cooperative system is one in which individuals act rationally in the name of a common objective (Turnera and Simisterb, 2001).

Conflict systems can arise either through bounded rationality (the participants would like to act rationally but through human frailty fail to) or opportunism (the participants try to optimize their position at the expense of others). In order to reduce the chance of both of these happening, the client (who is ultimately responsible for creating the project organization and has the most to gain from its being effective) needs to (Turnera and Simisterb, 2001):

1. Increase communication flow on the project to ensure participants have sufficient information to behave rationally, and to reduce the chance of the deceit on which opportunism depends; and

2. Ensure the project participants are properly incentivized so that all the project participants do indeed share a common objective

Changes are implemented in the design and planning of building projects through a complex and iterative process, which may extend over a long period of time. The impact of these changes on the project often becomes clear only at the end of this process. Project teams often implement changes without fully understanding their eventual impact on the cost and duration of the project, or on performance requirements regarding quality and functional aspects of the project, as specified by the client (Bubshait and Almohawis, 1994).

This is because the tools currently used for project planning and designs do not facilitate the evaluation of the consequences of a specific change, before the plan and design are fully updated. As a result, deviations from the client objectives, caused by changes in the project, are often revealed either late in the project or after its completion. At that stage, it is obviously much more difficult to make adjustments. It is often too late to consider alternatives to the implemented changes without causing significant delays and cost increases (Isaac and Navon, 2009).

Human factors such as the attitude of the parties and bias in personal judgments may impose significant variation on the decision outcome. There is a divergence of perception on risk allocation in construction contracts among different groups. It is not surprising that improper risk allocation in construction contracts remains a concern in the construction industry (Lam *et al*., 2007).

4.9.2.2 The company relations with the industry

A company's performance, the performance of its industry, and its expectations, aspirations, and slack will influence the amount of risk it takes. The direct impact of performance on risk taking is central for the investment argument. The economic argument for the impact of performance on risk taking goes as follow (Bromiley, 1991). If the utility to a firm of each additional dollar in profits is slightly less than the utility of a previously gained profit dollar (declining marginal utility of income), the expected utility of an investment will decline with increases in the variance of returns for that investment. For a high-variance investment to have equivalent utility to a low-variance investment, the high-variance investment would need to show higher mean performance.

The outcomes of this study should present some tentative conclusions about the interrelationship of business-level strategy, organizational processes, and performance in strategic management research. Although it is important to recognize the limitations of a study in a single industry, the results of this study raise several important questions about our conception of performance, the importance of environmental interaction, the relative contribution of strategy and processes to performance, and the organizational processes associated with strategy types. This suggests that the relationship of strategy, processes, and performance is more complex than what is usually acknowledged. This study expects to find that organizational processes and strategy were related to both return and risk. In addition, the processes that varied with return were different from those that varied with risk. This suggests that our conception of performance should be expanded to include both return and risk on the strategic management level, assuming the risk dimension of performance were included in strategic management.

Operational objectives refer to location, inventory and transportation arrangements which can minimise relevant costs while meeting customer service requirements (Vidalakis *et al*., 2010). The following list demonstrates how these can be compromised by a number of special construction industry and project characteristics:

1. Location of demand (location of construction sites) of uncertain levels of demand are highly fluctuating with demand peaks varying in correspondence with the demand for construction projects;
2. Levels of demand for particular products and materials fluctuate further according to specific project requirements;
3. Demand for made-to-order products is possible due to the tailor-made nature of construction projects;
4. Levels of demand cannot be communicated upstream to the builders' merchants prior to contracts' nomination.
5. Unforeseen demand cannot be satisfied due to contractors' limited ability to maintain appropriate levels of buffer inventories; and high levels of demand can generate increased demand for transportation capacity which, due to the high volume and low value of the majority of construction components and raw materials, does not necessarily come with proportional income increase.

This list can also be viewed as including the reasons which could potentially prevent the industry from addressing logistics. Furthermore, it confirms that the issue of construction logistics goes beyond traditional industry skills and potential solutions need to incorporate incentives for organisations outside the construction industry (Vidalakis *et al*., 2010).

For organisations, the creation of a comprehensive risk management system requires knowledge of the risk types to which it is exposed. Risk is the danger that a decision leads to negative deviations from set goals. Risk is the product of the probability of occurrence of a possible loss and the resulting damage. Firms face many risks along the supply chain, and the purchasing environment has become one of the most important components for generating added value, profitability, and even ensuring survival (Matook, 2007).

It is suggested that there are two dimensions in which a firm's foreign operations can be defined, that is, geographic scale and scope (Qian and Li ,1998). Geographic scale refers to the foreign involvement or multinationality. But the world risk is not constant at all. This could be due to incomplete market integration and the existence of more than one source of risk. Geographic scope indicates a firm's expansion into different world regions or markets. A neglect of any dimension may fail to reflect the living reality of firms in the process of internationalization.

Studies have shown differences in competitiveness between local and foreign contractors, owing to the latter are firm-specific advantages (Ofori *et al*., 2002). Project management companies internationally need to be aware of the potential for conflict that their position causes and develop strategies for dealing with these situations (Wilkinson, 2001).

One of the most important objectives for foreign operations is to stabilize the profits at the firm level. However, the conditions for being successful depend, to a great extent, on the exploitation of a firm's ownership advantages and the use of its internal hierarchy. Thus, these two dimensions of foreign operations can be placed into the discussion on ownership and internalization advantages and relatedness of project cycles in different marketplaces (Qian and Li, 1998).

Supply chain organizations have a number of responses available to manage and mitigate risks. Insurance is risk mitigation by definition. But other means can be used, to include information sharing. With respect to outsourcing, different levels of coordination can still be applied, although the term outsourcing implies a looser degree of control. Outsourcing reduces many risks to core organization. Outsourcing can allow for easier compliance with local regulations. Outsourcing also makes it possible to react to market timing, as the core organization could be more agile in terms of response to market demand than they would be if they had to construct all facilities needed throughout the supply chain. Outsourcing organizations could also avoid many political problems (Olson and Wu, 2011).

Decisions relating to changes in the supply chain structure and relationships ought to involve the analysis and evaluation of the associated potential outcomes in terms of benefits, costs and risks. Performance and risk are interconnected and require deliberate and robust implementation of supplier management tools and controls to maximise performance whilst controlling the consequential risks (Ritchie and Brindley, 2007).

Existing methods of project control, such as cost control, focus on identifying and controlling deviations, such as cost escalation. What is required, however, is a method that, in addition to recognizing the symptoms, identifies and focuses attention on the elements that are a potential cause for deviations before they influence the project. The timely identification of change impacts on building projects could greatly contribute to effective project management (Isaac and Navon, 2009).

4.9.2.3 The management relationship with the shareholders

As for the shareholders, from an agency theory perspective (Kimmel, *et al.*, 1995), shareholders attempt to design compensation contracts that motivate managers to maximize the value of the firm rather than their own private wealth. The "first-best" solution to this contracting problem is to make compensation a direct function of a manager's actions. To implement this direct monitoring approach, shareholders must be able to specify which managerial actions maximize firm value and observe whether managers actually take those actions. Direct monitoring is therefore costly and often not feasible in practice. As a consequence, shareholders must devise other mechanisms that encourage a manager to maximize firm value. Agency research suggests that shareholders turn to the "second-best" solution, which is to link compensation to firm performance measures, such as common stock returns and return on assets (Kimmel, *et al*., 1995).

In an attempt to better align the interests of managers with those of the shareholders; many companies have adopted long-term performance plans for their managers. Although these contracts provide managers a base salary and perhaps a bonus for short-term performance, they are usually characterized by ownership of shares of the project or bonuses. As a result, a significant portion of the manager's portfolio becomes directly linked to the project performance.

When a performance outcome is positive, the payoff to managers from their compensation will often dwarf the benefit received from the base salary and bonus. Because of this potential payoff, the focus of self-serving managers will be on maximizing and protecting the value of their liable pay. It is believed this will provide managers with the necessary motivation to decrease the degree of risk-aversion in their investment and leverage decision-making (Vogel and McGinnis, 1999).

Theoretical considerations about the relationship of managerial ownership and risk show two opposing effects. On the one hand, since managers are risk averse, one would expect a negative relationship between company risk and managerial ownership (Mueller and Spitz, 2002). The utility loss of concentrating money in one investment is higher if the investment is riskier. On the other hand, managerial ownership can also serve as a signal for company quality. A manager will only be willing to invest large amounts of his wealth into the company if he is convinced that the company will be successful. This is taken into account by banks when deciding on loan applications. Since banks are especially reluctant to lend to risky companies, we expect that managers of risky companies need to make more use of this signal. Therefore there can be a positive relationship between company risk and managerial ownership (Mueller and Spitz, 2002).

4.9.2.4 The contract

The performance of a construction project can never be accurately predicted and the contracts for construction projects are considered as incomplete. The incompleteness of contract is due to the reality of transaction cost, bounded rationality and information asymmetries which make the employer and contractor design a complete contract. The extent of contract completeness is important in determining which kind of incentive to be used in a contract (Chan *et al*., 2011).

According to Construction (Design and Management) Regulations 2007, all what the client needs to do is:

- check competence and resources of all appointees;
- ensure there are suitable management arrangements for the project welfare facilities;
- allow sufficient time and resources for all stages; and
- provide pre-construction information to designers and contractor

Traditional fixed price contracts have been restricted to projects with few uncertainties on technology and economics. In practice, owing to information asymmetries, even a risk-neutral contractor may not be willing to sign a fixed-price contractor without offering a high price. However, the high cost of identifying unforeseen events makes it difficult to draft a very elaborate contract to deal with all kinds of uncertainties at the post contract stage. Cost plus contracts may avoid the problem of overpayment, provided that it is well documented, but the client itself may expose himself to the problem of cost padding (Chan *et al*., 2011).

The problems associated with the traditional procurement approach have manifested in the form of cost overrun and adversarial working relationship between employer and contractor, especially in case of competitive fixed-price lump-sum contracts .It is suggested by Chan *et al*., (2011) that gain-share and pain-share affecting the success of the entire project make the employer and contractor consider each other’s views better and collaborate more efficiently.

The objective of a target cost contract (TCC) is to motivate contracting parties to lower the cost incurred without affecting the quality or delivery to maximise the contractor’s profitability and client’s savings (Chan *et al*., 2011) .

Infrastructure developments (for example roads, railways, metros, bridges, utility services, and so forth) play a vital role in influencing the economic viability and social welfare of every country. The complexity and dynamics of the decision making in infrastructure development and management has steadily increased over recent years. Target cost contracts have been widely applied to deliver and manage critical modern infrastructure systems and buildings, with the purpose of enhancing the effectiveness and efficiency of their service delivery (Chan *et al*., 2011).

There are three components of payment in target cost contracts. The first is the definite cost incurred by the contractor. The costs qualified to be included in actual cost are defined in the contract and are usually limited to those which the employer can quantity relatively easily and over which he may be able to exert some control. Second, there is a fee paid to the contractor to cover profit and all costs not included in the description of actual cost, mainly offsite overhead costs (Perry and Barnes, 2000).

This fee may be a fixed amount or a percentage applied to the actual cost (Perry and Barnes, 2000).

Thirdly, target cost contracts include a share arrangement in which the contractor and the employer share the final difference between the target amount set at the beginning and the final total actual cost incurred by the contractor. The share of the cost overrun or saving may be a constant proportion or may vary conditional on the size of the departure of the actual cost from the target (Perry and Barnes, 2000).

Mega projects often result in cost overrun, schedule delays, and sudden project terminations because risks are poorly identified and under estimated. Given the complexity and dynamics of the defence projects that involve technical, legal, and political risks, all the stakeholders who are involved in defence projects should have a strategy and knowledge of applying risk management processes, procedures, and policies and to implement them rigorously from the initial stage of the project (Kwak and Smith, 2009).

In order to reduce the negative effect of cost plus contracts, it becomes a common practice to replace standard cost plus contract with target cost contracts, which are believed to reinforce the collaboration between the client and the contractor. Agency theory, suggests that outcome-based contracts can be effective in curbing agent opportunisms (Kwak and Smith, 2009)

Governments had experimented with the Private finance initiative to share risk. The three types of projects which the government encourages within the Private Finance Initiative are:

• financially free-standing projects;

• joint ventures; and

• provision of services purchased by the public sector.

There are two fundamental requirements which every

PFI scheme must satisfy:

1 the public sector must secure value for money (VFM), and

2 there must be an appropriate transfer of risk to the private sector.

For PFI, securing VFM entails formulating a detailed estimate of what the service will cost to design, implement, operate and maintain over the contract period under an alternative publicly funded scenario. The private sector bids are then measured against this yardstick in order to reach a decision to accept or reject the estimate. A value for money comparison can then be made after all qualitative and quantitative assessments and adjustments have been made for risks involved and a risk transfer assessment completed (Akintoye and MacLeod., 1997).

Identifying the source of such risks is also relevant to the successful management of risk and Performance-Based Contracting (PBC) may be seen as an attempt to change the way risks are allocated on a construction project by shifting them from client to producer. This may be a somewhat naive view, especially when public sector projects are considered. For example, transferring to the private sector the performance risk associated with, say, a prison, may increase the contractor's risk, but if the contractor fails to perform has to provide a prison: closure due to failure of a commercial consideration is not an option as the public service would still need to be maintained (Gruneberg *et al*., 2006)

Therefore, there is not a finite amount of risk being shared around, but risk to contractors may be arbitrarily increased. By implication, if buildings are the focus of subjective and immeasurable risk identification, only those producers who are confident in calculating the subjective risks and reward structures would be willing to accept a PBC Project. When contractors carry the risks in PBC, the position of the client is strengthened, because, in principle, the contractor relies on the client for payment after completion when the building is in use. However, if, by the time the building is constructed, a client's financial position has weakened, contractors may be extremely vulnerable financially as their cash flow is dependent on the client. Only the public sector can guarantee contractors' rewards by offering a guaranteed income stream (Gruneberg *et al*., 2006).

Considerable expertise is required in preparing bids, since the terms of the bid not only influence the chances of winning, but also shape the working context for successful bids. In principle, bid preparation ought to include risk analysis to not only evaluate uncertainty about the tasks required under the contract, but also to help formulate bids that give an appropriate balance between the risk of not getting the contract and the risk associated with potential profit and losses if the contract is obtained.

Effective and efficient bidding processes which are based on a sound understanding of all the important issues, and the concerns of all parties involved, are critical success factors for contractor organisations. Many managers would argue that quantitative models cannot be reliable because their use of historical data requires the unrealistic assumption that competitors will exhibit the same bidding behaviour as they have in the past. Others may argue that obtaining the information required by quantitative models is too difficult, too expensive, or impossible.

Such arguments may reflect a lack of understanding on the part of the managers, or a lack of organisation and effort in collecting, collating and interpreting the relevant information. This in turn suggests either a failure on the part of authors to convince managers that such efforts are worthwhile, or a failure on the part of theorists to convince practitioners that theoretically sound approaches are a practical proposition (Chapman *et al.*, 2000).

The goal of risk management should be to minimize the total cost of risk to a project, not necessarily the costs to each contracting party separately. The most challenging of the task is to decide what the equitable risk allocation is such that the goal is effectively accomplished. While model or standard sets of general conditions of contract are available, it is argued that the principles behind the allocations in these documents have not been clearly stated. Problems can arise using any of them if additional clauses affecting risk are applied to them. Moreover, the nature and extent of risks tend to be project- specific in today's high-risk scenarios and multiparty complex projects that adoption of tailor-made contract strategies is more desirable (Lam *et al.*,2007).

4.10 Summary

There is a relationship between the organizational characters of the client and the client generated risks. The organized structure of the system managed by the client controls the multiplication of desired and undesired events and therefore can induce risk within the project. The client organisation behaviour adapts to the project as organisations tend to move towards a few common configurations in order to achieve internal coordination and consistency between structures, cultures, strategies and contexts.

There are many elements that create the cultural shape of the organisation, like the management style, leadership, workforce, communication, and the element of trust which is specifically significant in the context of risk allocation. To put all these elements in recognisable shape the competing values model was adopted which describes the structure and focus of the organisation as a way to understand its behaviour and its potential.

Over all the review paves the way to implementing the data collection part of the thesis. By reading the risk performance of an organisation and correlate it with its organisational culture using the competing values as a reference it is possible to determine the relationship between organisational behaviour parameters and the risk performance of the client. This provides a tool to adapt suitable determents regarding the relationship of the client organisation and the project itself.

5 Chapter Five: Methodology

5.0 Overview

This chapter explains the research design and methodology used and compares the different research types and approaches. The methodology describes the methods by which research can be carried out and lies at the core of any examination. The chapter identifies the methodology and limitations of the research, the process by which the data was collected, the criteria by which the sample was chosen, and the research strategy of the research. The research techniques adopted for the study relied on a quantitative methodology with aspects of the qualitative approach incorporated to support and improve the overall design. This chapter also presents the risks and problems the researcher has faced in the process of completing the data collection required for the dissertation. Arguments are presented justifying this choice of a conciliatory approach and the specific research methods applied to collect data. The data collection process is detailed in this chapter.

5.1 Research Concept

Lately in construction academic conferences there were an increased interest in covering the latest development of the construction industry that would widen and its success in facing the changes in the economy. There were an interest in finding a link in risk management solutions and the current complications caused by the same economical difficultly, and there were an increased interest in seeing if the business school of thought has found modern solutions to those problems.

However, a single cross-sectional survey cannot separate the different contributions of each of these attributes to the others. By explaining the relationship using the models covered in the literature review, as depicted in Figure (2-7) (Perminova *et al.*, 2007), Figure (3-3) (Mitroff *et al.*, 1989), and Figure (3-14) (Quinn, 1981), and by showing correlations between the parameters and the performance, a relationship can be established.

This investigation was concerned generally to see how what kind of organisational structure the construction clients had, and how this model would affect the attitude of the client to risk and the risk performance to that organisation.

Particular issues include concepts like communication, human relationship, leadership, creativity, and achieving objectives. More broadly the study asked about the values that govern that organisation and therefore the culture it is created by those values.

As the study started three stages of research were constructed to answer the objectives. First, the area of how client organisation think of the concept of risk is studied and what kind of strategies those organisations take to achieve their goals in term of risk management. The client as a rational decider is looked at and it is to be understood how the rational procedure is affected by either environmental factors or by an innate factors cause from internal factors of the client organisation itself.

Second, the organisations were framed into value a model that represents different management culture parameters. As the importance of cultural values on the way the organisation behave is covered, managerial definition for those values based is created on the understanding of strategic management theories.

Third, the relationship between these models and risk parameters were investigated, like risk management style, risk perception and risk performance, as to see how different value models perform in the construction market.

This research starts from identifying the cultural background of the client and its effect on the managerial style of the client, then the effect of this background on the attitude of the client toward risk, the project, the contractor managing the project and finally how this relationship reflect on inducing risk as shown in Figure (5-1) .

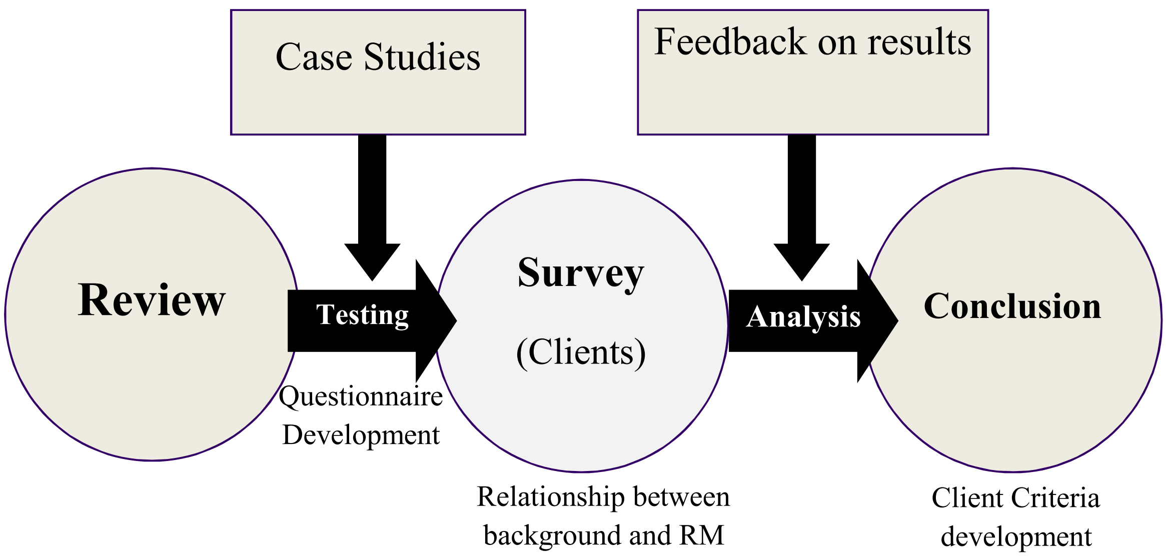


Figure 5-1 Research development

5.2 Research Paradigm and Philosophy

For this study, selecting an overall research philosophy was to be between two primary choices: a positivist or a phenomenological philosophy. In a positive philosophy there is a single, uniform reality that researchers attempt to measure in a precise, objective, and neutral manner, the observer is independent, the focus is on facts, the research is in the casualty of the fundamental issue, and the area of research is reduced into is basic elements. The observer is independent. This is more appropriate with surveys and reliable sample size.

The phenomenological needs an active role of the observer, using varieties of methods, and in depth investigation of small sized samples. This is more appropriate with qualitative methods of research.

While this research benefits highly from the different source of information, the goal is to obtain theories that are as close to be universal as it can in their implications. Especially in the case of the construction industry as there is a need for a practical implantation for this study. Hence this research needs to use quantitative measures to show relationship between a specific numbers of variables abstracted from context.

Positivist approaches rely heavily on experimental and manipulative methods. These methods ensure that there is a distance between the subjective biases of the researcher and the objective reality she or he studies. This generally involves hypothesis generation and testing: proving or refuting. Typically, quantitative methods are used.

The positivist position is grounded in the theoretical belief that there is an objective reality that can be known to the researcher, if researcher uses the correct methods and applies those methods in a correct manner. Eventually research is evaluated using three criteria of validity, reliability, and generalizability.

However, the limitations of positivism is recognised and it is accepted that the critical realist approach toward positivism where there is a reality independent of our thinking about it that science can study, hence all observation is fallible and has error and that all theory is revisable. Due to that fact that all measurement methods are imperfect, the importance of multiple measures and observations is accepted, and it has been tried to add as many reaffirming data from multiple sources to support any of the conclusions.

It was essential to have a portfolio of research methods that could be used as and when appropriate based on the contextual requirements at the time. This flexibility was a significant factor when it has been decided to engage in the research procedure. The researcher had to first identify the overall aim of the research, a need to identify related parameters by which clients engage in their risk behaviour. It recognised the need to investigate to gain a greater understanding of their business, in particular how the different cultures of the client organisation and construction contractor work together, and how they could improve their distinguished situation toward risk within the project specifically and the industry sector generally.

The overall methodology was to split the research into three phases: investigation, synthesis, and application (adapted from Morse, (1994)). Table (5-1) shows how each phase was subdivided into separate stages. Investigation occurs whilst the research gathers data from various sources to provide an in depth understanding of the subject matter of the research. Analysis of this data identifies shortcomings in the research subject and further aspects to be researched. Once the investigation is complete, further objectives and work tasks can be identified during the synthesis phase.

Table 5-1 Research phases and stages

PHASE	STAGE
Investigation	Preliminary Information Gathering Problem Definition
Synthesis	Secondary Information Gathering Secondary Problem Definition Questionnaire design
Application	Model design Solution Implementation Feedback

This is when further data collection and analysis is undertaken (secondary information gathering). During this phase, secondary problem definition occurs leading to proposal, system design and system validation. Once the system has been validated, then the third phase, application, occurs. This includes validation and observation of the use of the system.

In survey research, independent and dependent variables are used to define the scope of study, but cannot be explicitly controlled by the researcher. Before conducting the survey, the researcher must predicate a model that identifies the expected relationships among these variables. The survey is then constructed to test this model against observations of the phenomena.

In contrast to survey research, a survey is simply a data collection tool for carrying out survey research. Kraemer (1991) defined a survey as a “means for gathering information about the characteristics, actions, or opinions of a large group of people”. Surveys can also be used to assess needs, evaluate demand, and examine impact. The term survey instrument is often used to distinguish the survey tool from the survey research that it is designed to support.

Combining the qualitative and quantitative method can be difficult, especially since they can result in different conclusions. However, a triangulated study can be used here to reduce some of the limitations the study have. Studying behaviour needs a thorough investigation and cannot be touched only on the surface. However, looking for generic behaviour needs to cover a sizable sample which cannot be obtained by exploratory methods only.

Dash (1993) lists a Selection of research paradigms and research methods which a researcher can adapt. The paradigms has been summarised in Table (5-2). The common paradigms are positivism, anti-positivism, and critical theory.

Table 5-2 Selection of research paradigms and research methods

Research paradigms	Research approach	Research methods	Examples
Positivism	Quantitative	Surveys: longitudinal, cross-sectional, correlational; experimental, and quasi-experimental and ex-post facto research	- Attitude of distance learners towards online based education - Relationship between students’ motivation and their academic achievement. - Effect of intelligence on the academic performances of primary school learners
Anti-positivism	Qualitative	Biographical; Phenomenological; Ethnographical; case study	- A study of autobiography of a great statesman. - A study of dropout among the female students - A case study of a open distance learning Institution in a country.
Critical theory	Critical and action-oriented	Ideology critique; action research	- A study of development of education during the British rule in India - Absenteeism among standard five students of a primary school

Positivism is usually to measure attitudes and relationships. To achieve that positivism uses surveys and correlations. As the research objectives demands finding attitudes and relationships, as in the relationship between organisational behaviour and risk attitudes, the positivist approach had been adopted and its tools of survey and correlations were used to collect and analyse the data.

5.3 Research Setting

The research reported in the thesis is resulting from a survey of construction industry clients in UK, the goal of which was to map features of client organizations and, by concentrating on a specific behaviour to measure the impact of clients' decisions and practices upon construction project risk performance. Thus both client and project attributes would be formulated as a set of independent variables whose relationship to performance criteria would be assessed. Particular attention had been be directed at client organisational attributes, project characteristics and decisions made with respect to the.

The aim here was as much to examine the interrelationships among these variables as to test their effects upon performance. Moreover, a major concern would have been to conduct this analysis across a sample of client organizations that reflected the variation found within the industry.

The client was defined as that organization accountable for the development of the building. In some examples, this would be parallel to the prospective occupiers (for example a private company); in others, it would correspond to those developing the premises on behalf of current or prospective tenants (for example developers and local authorities). The clients who were to be excluded from the sample were private home builders and overseas direct investors.

In order to examine organisation management practices, attention were focused on projects that clients had recently commissioned and completed. All new building and refurbishment work are included.

The sample of client organizations was generated using listings from advertised clients from construction companies, and looking at lists of recent projects that have been completed, or a subset of projects with an anticipated final completion within the year prior or including the planned data gathering dates was obtained. This allows for some significant overrun on the contract programme and also allow research to be phased to correspond more or less to a comparable point in time quite soon after each project had finished.

It is expected that the procedure adopted have a tendency to differentiate marginally against the addition of projects with either very short or very long chief times frame. Since the client, rather than the project itself, was the unit of analysis, clients with multiple projects were calculated only once, with the first randomly selected applicable project being chosen.

Because the method used was based on a listing of projects from construction companies, the probability was increased that 'multiple' clients were to be selected.

Hence, the sample tends to reflect the importance of experienced clients who have invested in large projects within the industry. A target sample of 161 clients was initially approached. The final sample consisted of 53 clients, representing a response rate of 33%.

The list of clients who were originally targeted is listed in the Appendix C.

Once sample was decided were selected, the sample was contacted trying to get a response. For example telephone calls were made to establish who would be best able to act as key informant about the organization especially in the project management department. The communication process was not easy, as most respondents did feel that it was in the best interest of the company to discuss the risk approach of the organisation. The reasons for that would be discussed in the discussion chapter.

Other communication procedures was emails and ask them to contribute to an online survey, this has failed to bring any significant response. As for the feedback interviews, this was only possible using personal connections, as there was an anxiety toward the whole idea of discussion the quality of the management. It was important to make the questionnaire as efficient as possible, as the barrier was high and the respondents were not interested in discussing details of their management behaviour.

It was in our interest not to trigger a polarised response hence the questionnaire concentrated on non-sensitive elements that are related to the subject of the study. The terminology stayed within the barriers of organisational structure performance elements.

Figure (5-2) shows the development of data collection process and the influence of the environment on the success rate.

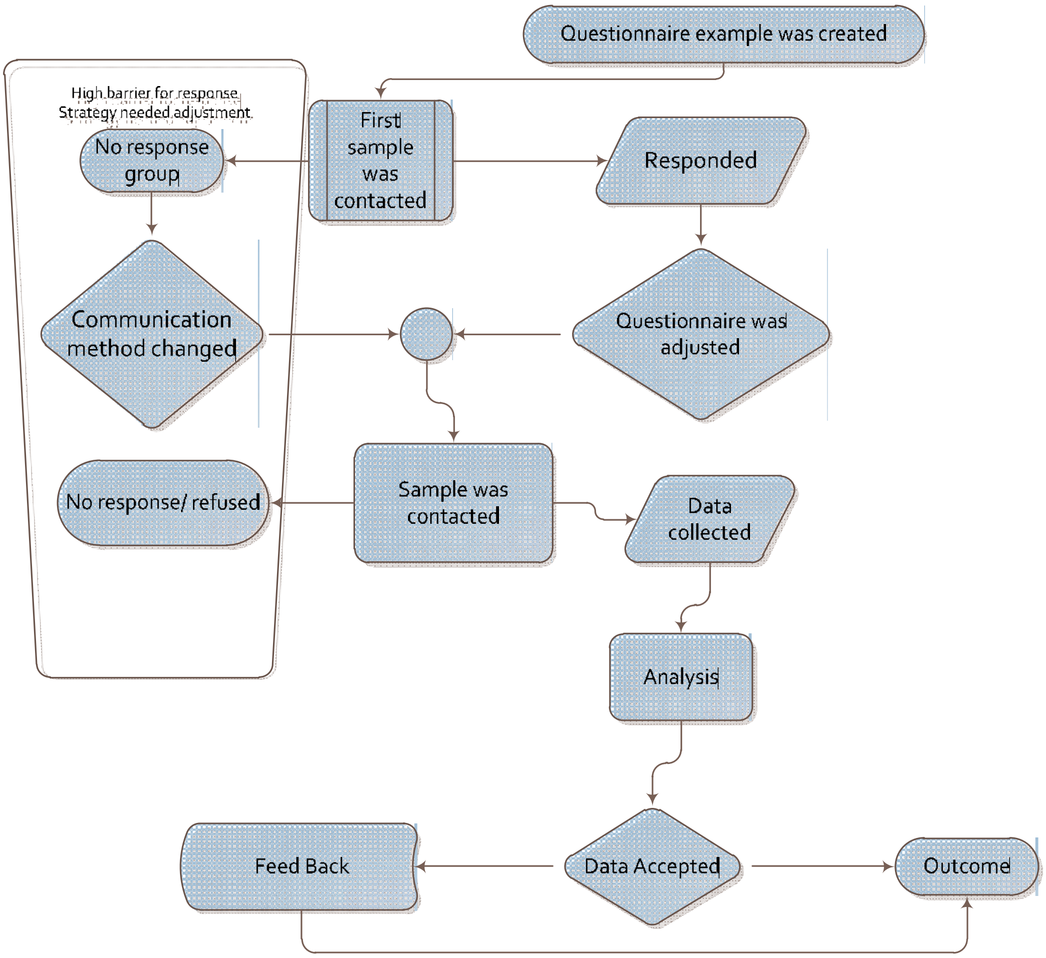


Figure 5-2 development of data collection process

5.4 Research Design

The research method is employed for the purpose of the study looks at risk from two different angles: risk management literature and organizational management literature. This study concentrates on the way perceptions of risk are shaped and discusses the influential factors on risk perception from the client perspective. The methods to be used for the study consist of a comprehensive literature survey followed up by semi-structured interviews, transferred into a wider survey. The literature survey was carried out in both risk management literature and organizational management literature.

For all types of research, the methods of collecting data impacts upon the analysis which then is performed, and therefore the conclusions, and validity of the study. This data is classified as either quantitative or qualitative. Quantitative data is gathered using a variety of techniques such as questionnaires, measurements, and so forth. It may be considered 'hard' and is often analysed using analytical or descriptive statistics.

Walker (1997) adds that the reason for undertaking a quantitative approach for the case study PhD work was its adoption and verification by others. This approach could also yield results that indicated which factors significantly affect construction time performance for the data set tested. The disadvantage of relying entirely upon this approach was that the research question related to an explanation of why some buildings were constructed more quickly than others and how these factors may interact with each other. This requires interpretative and deductive reasoning more akin to a qualitative approach.

Data of this type can be characterised by building a catalogue of its presence before identification by the study. Qualitative data tends to be gathered using techniques such as interviews, observation and so forth. It may be considered 'soft' and is typically analysed using methods such as content analysis (to structure unstructured information).

Qualitative approaches seek to find out individual beliefs by asking how and why? Data of this type is generated by the study as a consequence of its implementation. Modern construction research benefits from the merits of both approaches (Seymour and Rooke 1995, Wing *et al*., 1998).

The review covered over 250 sources which vary in their relation to the subject and the importance of their reference. The literature part produces a three part story of investigation which should comprehensively cover the relationship between the investigated elements as shown in Figure (5-3).

There were other subjects which had small contribution, although they were useful in providing some definitions, especially imported ones from other industries. The size of the data base of the review became so big that it became hard to control. Therefore, the data bases has been summarised based on the use of the resource. Some resources have provided some useful concepts and diagrams which are presented in Appendix E1, these concepts are mainly imported from other industries, however they were found very useful to apply on the construction industry. Part of the idea of this research is to import theories and concepts used in other schools.

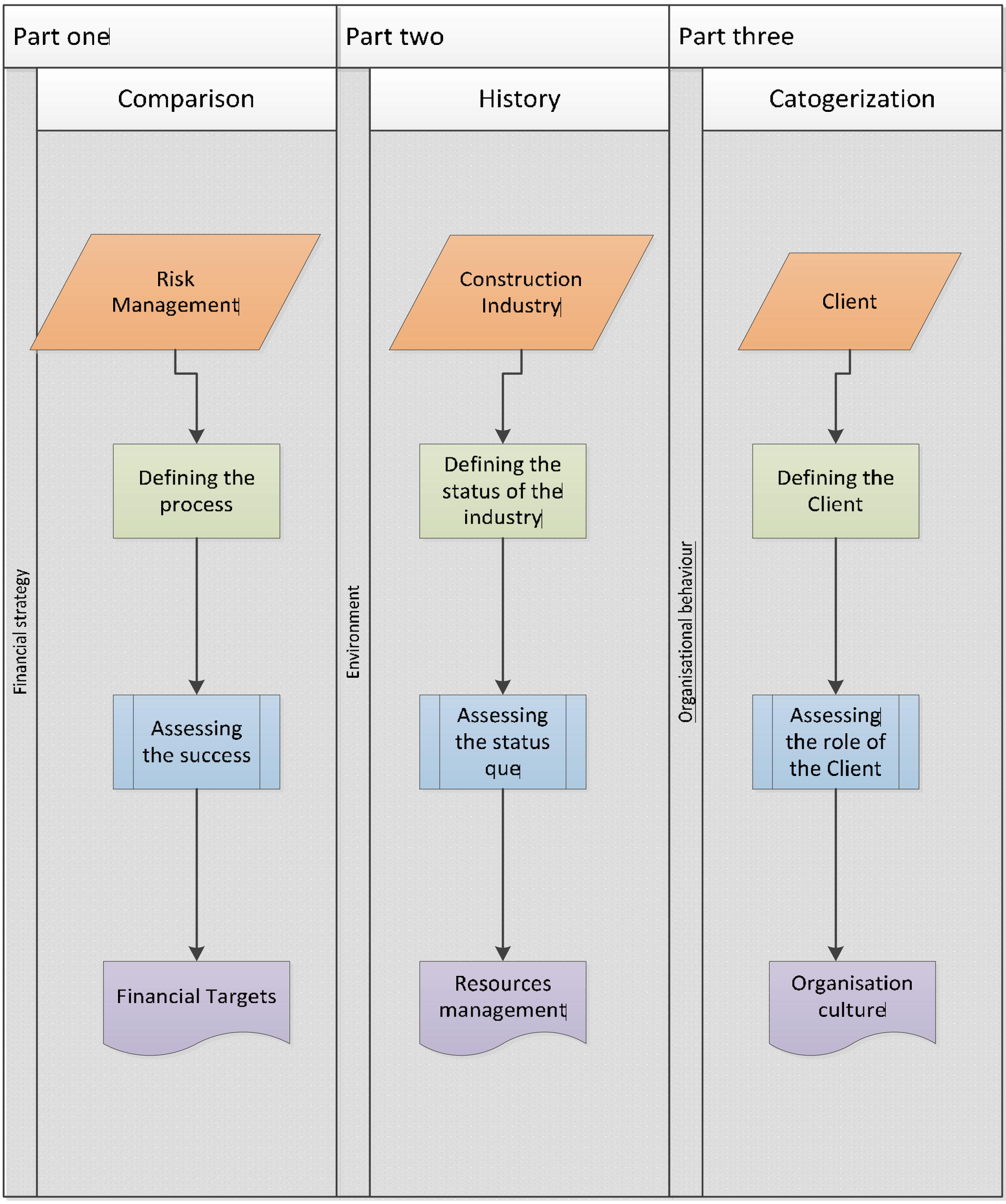


Figure 5-3 The review structure

Some case studies which have some iconic presence in construction risk where presented and most of its sources came from audit reviews and news coverage. In general choosing the source of the information became more critical as the research proceeded. For example, when investigating the new Wembley stadium, Bewsey (2006) an author of "No room for manoeuvre" was used as a source to judge client conduct within the contract, it was found in other sources that Bewsey works for the contractor company.

This example shows how sensitive this industry is when it comes to claims, but on the other hand it shows that the opinion of all parties should have good access to the literature of the construction industry. Therefore, this research is interested to investigate the client behaviour through the client and then check the feedback with other parties as has been explained in other sections in this chapter.

A methodology, which combines both qualitative and quantitative information, was studied by using Kumar's Research Methodology: A Step-by-Step Guide for Beginners (Kumar, 1999), Tashakkori and Teddlie's Mixed Methodology: Combining Qualitative and Quantitative Approaches (Tashakkori and Teddlie, 1998), Saunders., Lewis, & Thornhill's, Research Methods for Business Students, (Saunders et al., 2003) and, Research Methods for Construction (Fellows and Liu, 2002), as guidance to tackle the varied information. The information provided in questionnaires and the statistics are interpreted using management theories to reflect on the management level rather than on the human resource level, as most of the research tackles strategy rather than individual tasks.

The study starts with a literature review. The purpose of the literature review is to provide the basis for area of research and prepare for a development of a future hypothesis. The literature review provides an overview of both the basics of the organization theory and project risk management, as well as their applications in the specific construction projects which is analysed and discussed. The literature review is a combination of present understanding or the role of the client and the management of the risks caused by organisation structure. The literature material consists of several recent articles published in international journals and a few related books. Literature sources were found using the library databases and internet. The search words used are presented in the appendix.

Many articles had some references which were found as useful. Most articles were from the journals of "Construction Management and Economics", "International Journal of Project Management", and "Journal of Construction Engineering and Management". Over 90% of the references were dated after year 1990, and over 70% were dated after year 2000.Development of characterising the client by adding new variables to the risk helps the clients to establish a better risk assessment toward the project by including the client efficiently. The client analysis helps clients to understand their involvement in the project and develop their approach toward risk in construction projects. Three case studies were addressed in the first stage. The survey concentrated on the quality rather than quantity of feedback. There were feedbacks of 53 usable client surveys

5.5 Designing the Questionnaire

The Questionnaire follows a hierarchal system where the first order relies on the average of second order. There were multiplied factors added based on how related the model is for the mission statement to the organisation.

The questionnaire is a reflection of the philosophy of addressing the subject through the three stages of study, frame, and investigation of information. The model of confronting the area of study has gone through many transformations as demonstrated in the graphs of the study structure. This ultimately reached a mature set of questions that enabled us to construct the model in question. One of the sections relating to risk perception has not provided us with interesting outcomes however the proves of developing the questions were useful in understanding the underlying causes of risk behaviour and the data would be of use for any future research.

The literature review investigated the relevant elements that would be useful to demonstrate the cultural shape of the client in terms of risk. Each of the elements was covered in review chapters three and four. In the search of a suitable model that covers the most relevant elements in the literature review, it was found that Competing Values Dimensions adapted from Quinn (1981) is adaptable and comprehensive to the objectives of the research.

The research questions (Sample provided in Appendix A) were divided into Background information; Client Classification; Internal management force; Human Relations; Open Systems; Internal Process; Rational Model; Risk perception; and Risk performance;

The first part of the questionnaire addressed the client classification as shown in Figure (5-4), which is divided into private sector and private sector and what type of construction development the organisation is involved in. It also addressed the history of the client especially within the experience of the organisation in this industry.

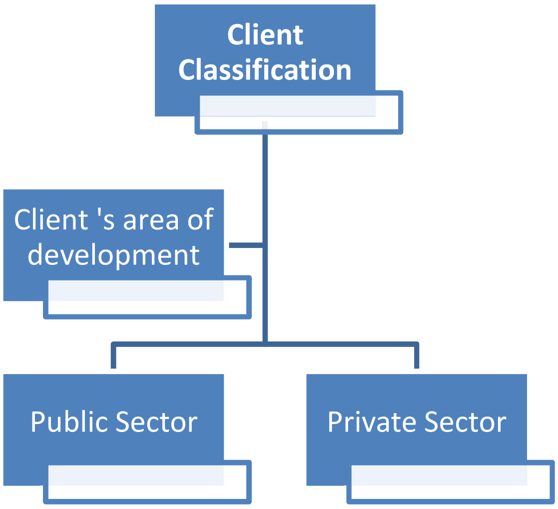


Figure 5-4 Client classification

The second part addressed the model groups based on the competing values model (Figure 5-5) which is divided into four sections

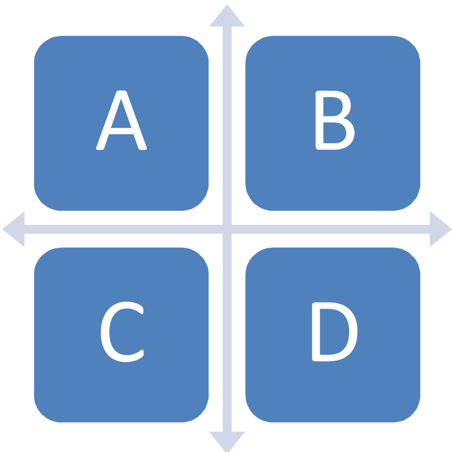


Figure 5-5 Organisational model groups

The elements which are tested are based on the Competing Values Dimensions adapted from Quinn (1981) which has been described in the literature review (see section 4.7.2 in chapter 4). Each of the subcategories has been described thoroughly in the literature review.

Group A (Human Relations) is based on four sun categories described in Figure (5-6), which are Communication, Goals, Rewards, and Culture. Each of the second order elements is based on three questions with marking points (0, 1.5, 3) each. Therefore each of the second order has a combined mark ranging from 0-9 points.

The other factor in the formula is how related this value to the mission statement of the organisation based on the perception of the sample, this used a marking from 1-15 then divided by 10.

The final marking for the group is based on a formula like this

$$A = \overline{X} * I$$

Equation 3 First order value

Where:

A is the value for the group (first order);

X is the value of the second order; and,

I is the factor of importance.

The same relation applies with Group B (Open Systems) with sub categories of Change, Individualism, Creativity, and Growth (Figure 5-7) , and is repeated in Group C (Internal process) with sub categories of Centralisation, Rules, Monitoring, and Coordination (Figure 5-8). This is also repeated in Group D (Rational Model) with sub categories of Defined Structure, Strong Authority, Active Evaluation system, and Goal implementation (Figure 5-9).

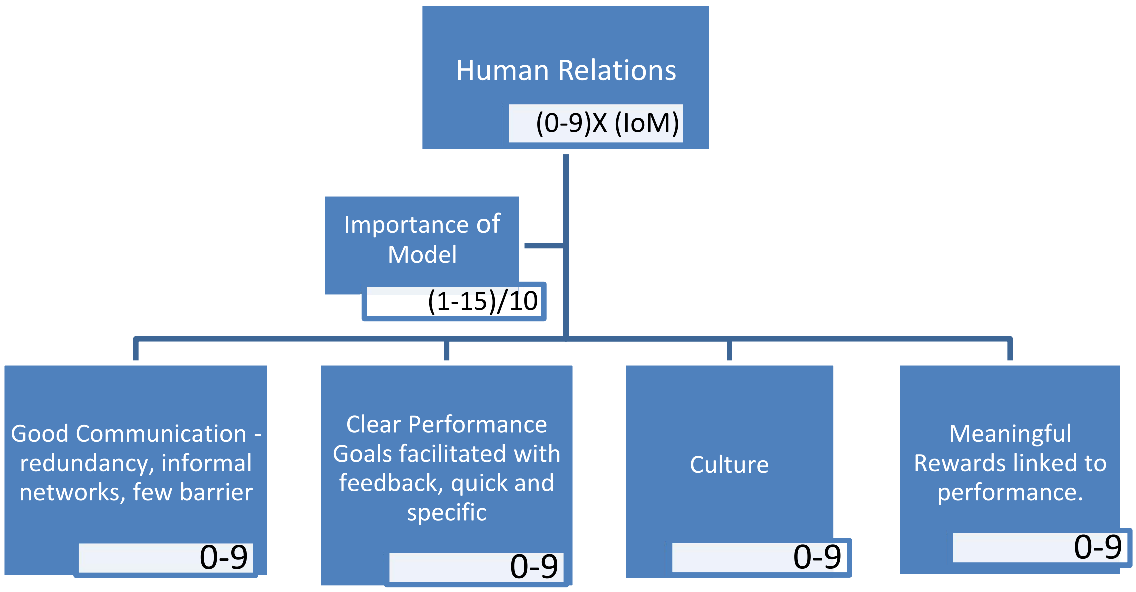


Figure 5-6 Human Relations (based on the competing values dimensions adapted from Quinn (1981)

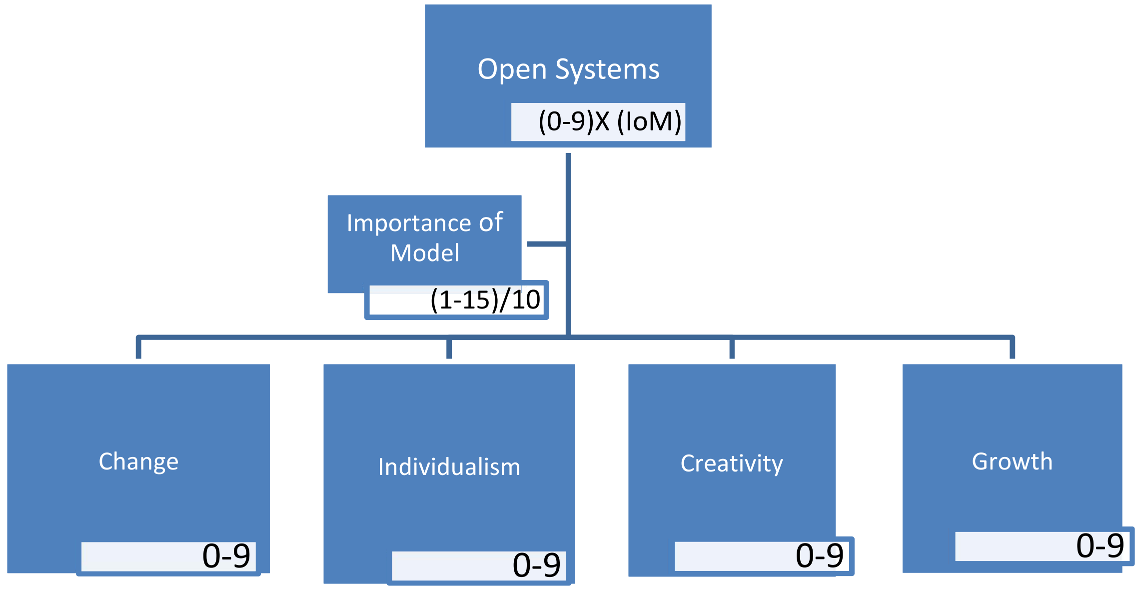


Figure 5-7 Open Systems (based on the competing values dimensions adapted from Quinn (1981)

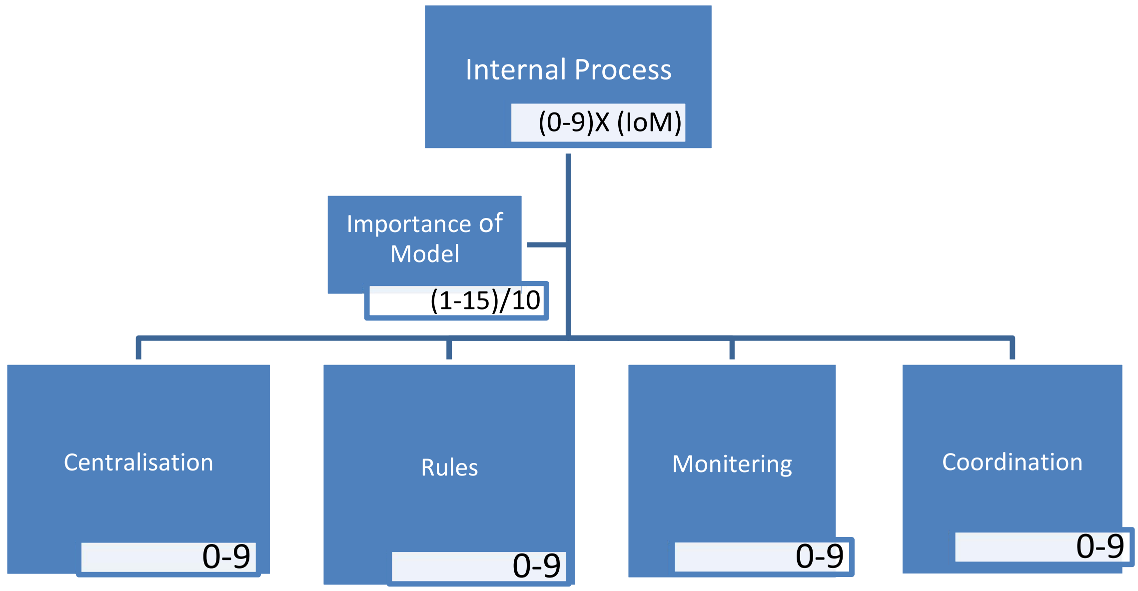


Figure 5-8 Internal Process (based on the competing values dimensions adapted from Quinn (1981)

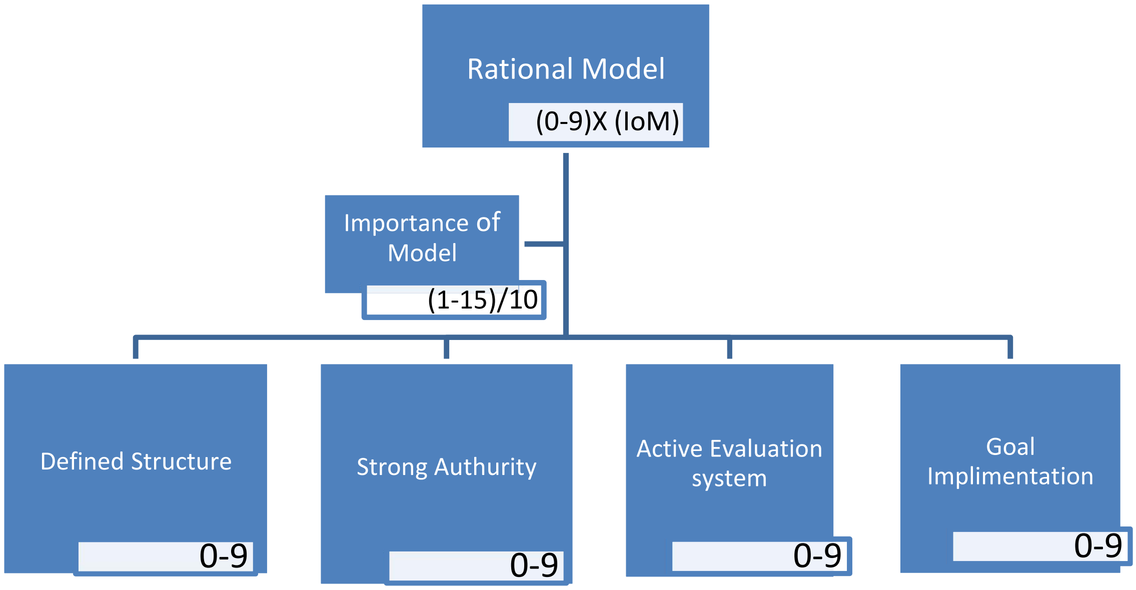


Figure 5-9 Rational Model (based on competing values dimensions adapted from Quinn (1981)

Risk Perception was based on the client tolerance to risk using two examples one is based on an internal risk probability and one on an external risk probability. The average is multiplied by a factor based on Market confidence (Figure 5-10).

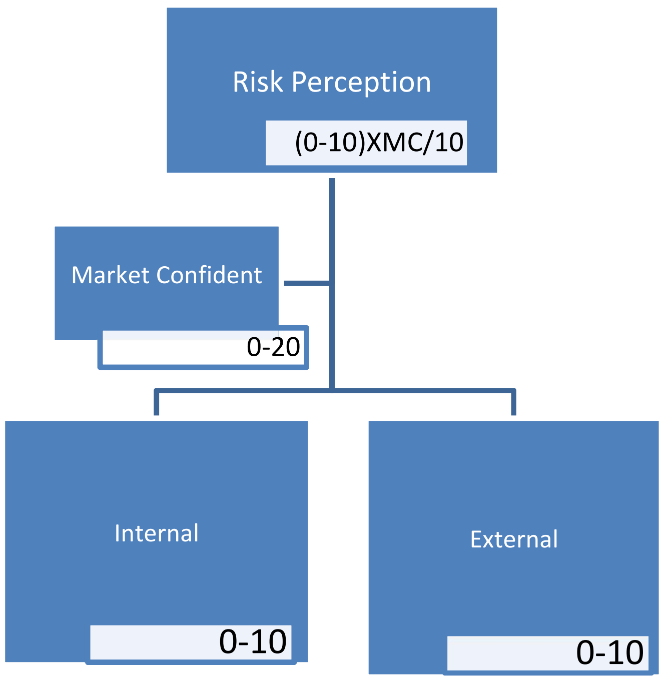


Figure 5-10 Risk perception

As for Risk Performance (Figure 5-11), the value was calculated by the average of two categories one is based on cost and the other based on schedule. Both measures were based on accomplishing the objectives of the two categories. The average was calculated as follow

$$Risk\ Performance = (Cost + Schedual)/3$$

Equation 4 Risk performance value

A detailed description of the categories of risk performance was covered in the literature review chapter four, section 4.9.

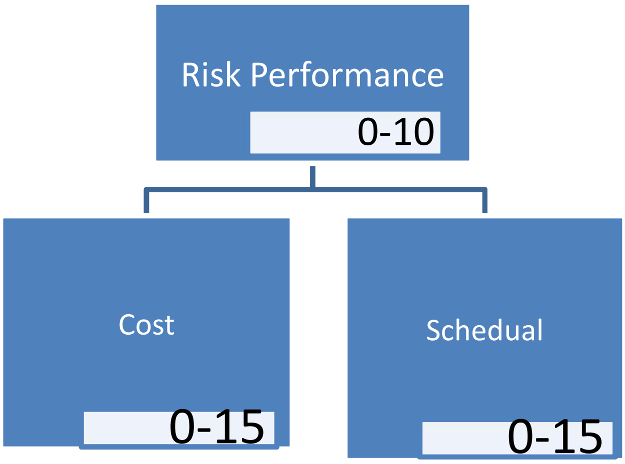


Figure 5-11 Risk performance

The marking was created in proportion to provided easy to read to outcomes, taking into consideration it does not affect the relationships or the correlations outcomes.

5.6 Data Collection

The methodology combines both qualitative and quantitative information. The information provided in the interview and the statistics is interpreted using management theories to think on the management level rather than on just the operational. The research first identifies the elements which has an effect on the client regarding risk. Then it clarifies the effect of these elements based on the different categories of the client as shown in Figure (5-12).

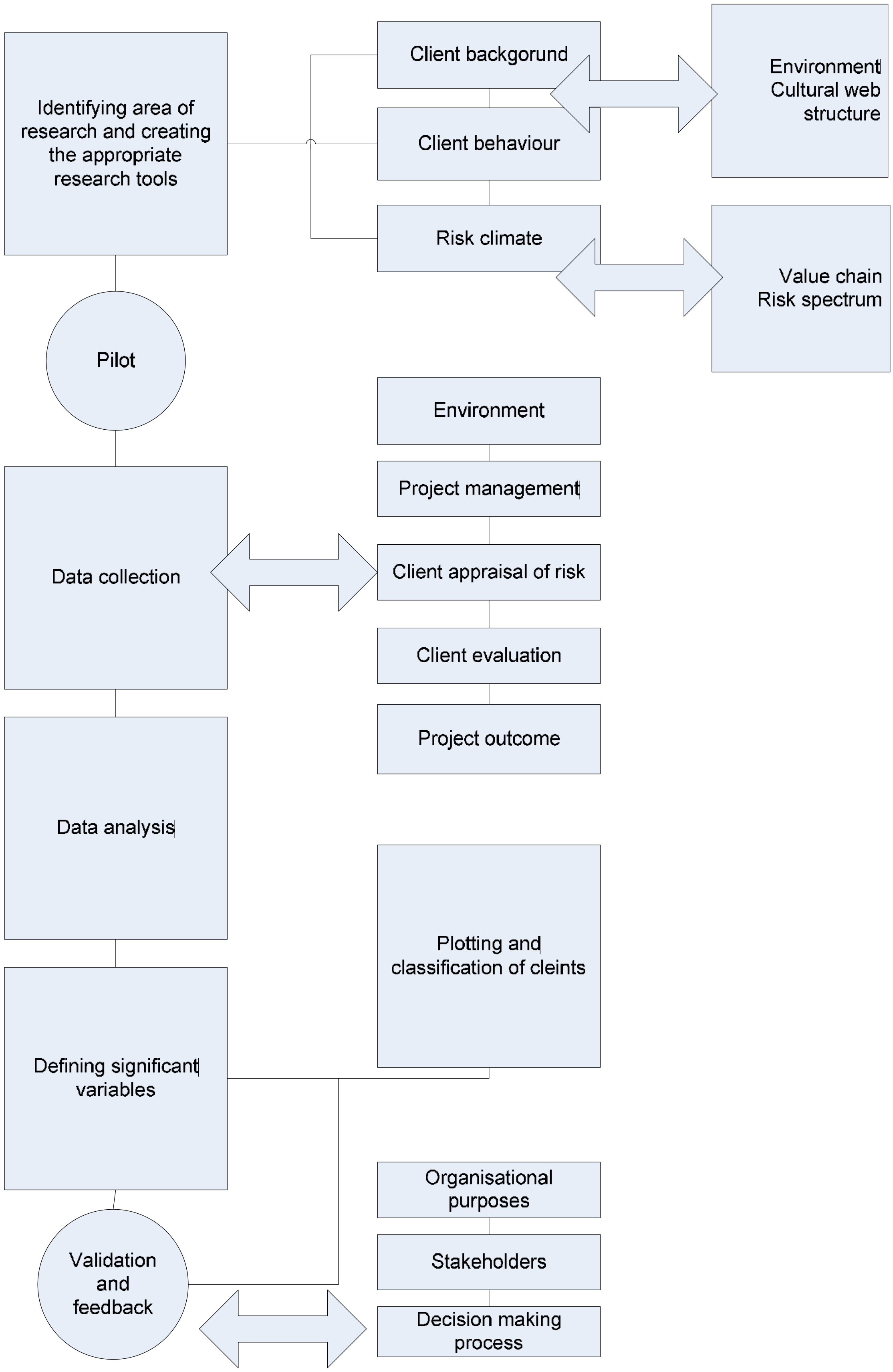


Figure 5-12 Research structure

Complications would arise from the fact that there are different sources for the information. This is intended to provide different perspectives and also give a pragmatic overview of the state of the industry. The information consists of values reflecting the objectives of the organisation and transformation of these objectives into its activities within the project. These values would be compared with values representing the internal variables of the project that reflect on the risks.

The first stage looked into literature of selected case study approach to investigate operations in the client organisation. The case studies where of high profile as it gives the advantage of bigger literature coverage. There were many variables to examine, including structural and cultural variables, as this study needed a deep analysis of the sample on many levels. There are different possible outcomes which vary from multiplicity and diversity or accepting previous assumptions of standardization and institutional theory. Therefore this stage is needed to produce a valid structure to survey the industry. The case studies included three examples chosen especially for this research, and there is limited use of secondary data. There was no hypothesis to assure or deny at this stage. The comparison is between the reviews rather than between the outcome and the hypothesis. This approach fits the inductive approach as Saunders (2003) describes it where theory would follow data rather than vice versa as in the deductive approaches. This approach is time consuming; however, it comes out with profound conclusions.

The second stage undertook the method of survey for collecting information with a feedback from client firms. The assumption of the work is based on the fact that client risk management performance depends on its organisational behaviour; this proposition is tested and later compared with previous observations to check if the outcome is in line with these studies. The information consists of values reflecting the objectives of the organisation and transformation of these objectives into its activities within the project.

These values were compared with values representing the internal variables of the project that reflect on the risks. This Research started from identifying the cultural background of the client and its effect on the managerial style of the client, then the effect of this background on the attitude of the client toward risk, the project, the contractor managing the project and finally how this relationship reflect on inducing risk as shown in (Figure 5-13).

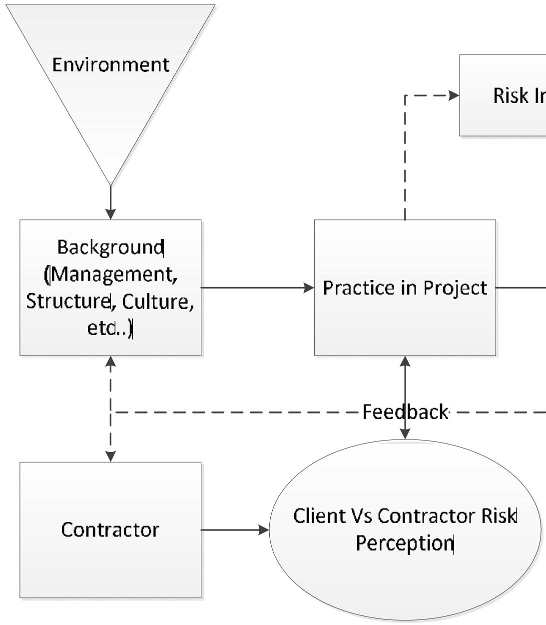


Figure 5-13 Proposed method for identifying client induced risk

The definition provided by Saunders *et al*. (2003) relates deductive approach with the development of a theory that is subjected to a rigorous test, citing Robenson (1993) where the progress of this method usually expresses the hypothesis in operational terms. This definition should fit in this study approach, where the assumption can be later proven by statistical approaches. This approach is based on a positivism philosophy, where generalization – with a defined scope – is a base factor in comparison with the research assumptions. As for their strategy, a survey was adapted, which had challenging response rate. However, it should be noticed that this survey needs to cover different styles of risk management as described in objective. Where the sample might not be totally balanced, this should mean that not all styles were presented equally, but it would reflect a character of the market which can be discussed after the survey. While this unbalance might not threaten the outcome, it should be noticed that the fact of having many variables, for example different sizes of organisations, the survey cannot control the final shape of the sample.

The survey collection started with the invitation using different means of communication, there was a struggle to receive a positive reaction. Eventually the increasingly popular online survey methods had been used, using the popular service of an online tool known as Wufoo. The respondents simply filled in the online questionnaire and the data was available for analysis. The online survey was the only successful method of getting a response. It is expected that the reason is that it is faster and more convenient to fill, and that it is provides more anonymity. It has to be noted that it took over 8 months to get the 53 responses out of 163 originally approached UK based intuitions (Appendix C). By the end of the period the response rate stopped and there were no more respondents.

A questioning theme was divided into two main sections. The first section contained questions seeking information on their attitudes towards risk and their risk management practices, such as the style of contracting and risk allocation. The second section would contained a list of potential factors that may contribute to this style of practice to implement, like in the control system and the decision making process. Behavioural theories are introduced to represent a heuristic knowledge of project management. The relationships between risk factors, risks, and their consequences can be represented on cause and effect diagrams. The closest applicable style of diagrams is by using the concepts of fuzzy association and fuzzy composition. There are other theories which can be applied to identify relationships between risks sources and the consequences for project performance measures, as in the relationship between the client background and the associated risk of the client.

A methodology for evaluating the risk exposure of the project can be presented only if the consequences were considered in terms of time, cost, quality, and safety performance measures of the entire project. These terms are the core of client objective which is traded with other variable associated with the client. These terms are redefined by associating them with the other investigated variable and then used to evaluate the risk exposure. Table (5-3a and 5-3b) present the overall research methodology and demonstrates where various research methods identified below were used during the different stages of the research. It should be noted that several of the work tasks occurred concurrently. The Table identifies the objectives and work tasks against the phases and stages of the research methodology.

Table 5-3a Research map

Aim	Investigate the relationship between organisational behaviour and risk attitude in construction clients.					
Objectives	**Tasks**	**Phase**	**Methodology** Stage	**Chapter**	**Output**	**Papers**
1-Identify how risk is managed and what role the client has in managing this risk	to cover the themes of construction management, risk management, clients, organisational behaviour, and cost and time overruns		Primary information gathering	2	literature review	ARCOM Conference: Does client behaviour actively induce risk in construction project?
2-Explore different theories regarding organisation behaviour, strategy, and the how is the client is analysed in the industry	case study analysis	Synthesis	Primary information gathering	3	literature review	AEC Conference: Is There A Need To Re-Evaluate The Client's Approach Toward Risk In Construction. Projects?
3-Understand of how important the role of client decisions in the project and how these decisions will reflect on the outcome of the project in term of project objective	Study the personals responsible of identifying the risks of the project to the client.		Primary information gathering	4	literature review	CIB Conference: Role of client behaviour in the risk environment in construction projects.

Table 5-3b **Research map (continued)**

Aim	Investigate the relationship between organisational behaviour and risk attitude in construction clients.					
Objectives	**Tasks**	**Phase**	**Methodology**	**Chapter**	**Output**	**Papers**
4-Identify a framework of the connections between the client and the project operations.	investigate a feasible sample or client organisations and detect the common styles of organisational behaviour of the clients	………………………Investigation……	Primary information gathering	6	Questionnaire	
5-find inherited risks from the client performance to the project separated from the environmental risks associated with the project	show whether the influence of the organisational style of the client in decision in identify and manage risk in project		Secondary information gathering	6	Interview	
6-evaluate the characteristics of client behaviour in term of affecting the risk of construction projects	understanding for the way risks are induced and transferred into problems within the project as in time and cost overruns	……..Application	Evaluation of information	7&8	Discussion and conclusion	

5.7 Response to Objectives and Research Questions

The research had to go through four stages of development. The stages were to control the research design, understanding the limitation of the research, making use of selected theories in developing the research, and then its last configuration.

The feedback from the first year was concentrated on issues concerning the research design and how the proposed methods can be applied on a practical one. There were concerns on the ability of choosing the right research method, being quantitative, qualitative, or triangular, as there weren't enough evidence of a relationship between the chosen protocol for the research and objectives of the research.

In the beginning there were a proposal of using a combination of both qualitative and a quantitative methods to collect the proper data to identify the elements which have an effect on the client regarding risk. A study of how the environment of the industry and the background of the client will affect the client behaviour in general was established. There was a research stage of previous studies in this subject which also included the experience of other industries, like the IT sector. There were an extensive literature survey carried out in both construction risk management literature and business literature.

To concentrate the research focus, the survey concentrated on reflecting the objectives of the organisation and transformation of these objectives into its activities within the project. So the research was divided into two parts. The first part concentrates of the background of the client organisation, by finding criteria to measure the client in term of organisational behaviour. The second concentrate on the outcome in term of the risk tolerance of the client. Developing these two parts and connecting together made the core of the research.

Many limitations appeared and it had to be addressed. The whole approach toward data collection needed to be reformed. The first problem was about defining a proper sample from the client organisation. There were two options; the first was to approach the industry in a holistic perspective, which concentrates more on market data. The advantage of that approach is the accessibility, however, after investigation of the trends in the industry, it was concluded that these data cannot be representative of the reality of the internal dynamics of any organisation, and on conclusion regarding how these organisations work can be obtained. Therefore this approach was dropped.

The other option was by sampling the industry, and this needed to find a model which can be tested on the sample. To make things easier, an investigation to find previously tested models on similar industry was taken. After trying different models, it was established that the Dimensions of Effectiveness would be the most suitable model. After that there was a development of the model to suit in the industry and the development of a protocol for data collection.

The protocol objective to position the organisation within a matrix based on the model using variables regarding structure, authority, internal evaluation, and goals.

The second part of the research was about defining the risk tolerance of the clients. This is necessary to relate the risk climate and the project outcome with the organisational behaviour of the client. First there was a need to find definitions for the risk tolerance of the client; this has been covered in the first year which indicated that there is a relationship between the client behaviour and the client approach toward risk. Transferring that relationship into tangible information is an important objective of the research. There were two options for data collection to investigate, the first using historical data from the samples, the data from the projects the clients have been involved in. Finding the pattern in this data and then correlation with the data collected from the first part would be satisfying to come out with valid conclusions. However, this method had some strong obstacles, mainly the accessibility to this data, and the availability of this data. Another problem would be validating this data in term of its relationship with any pattern in the client behaviour.

This has concluded into dropping this strategy and finding an alternative one. The other approach would be a behavioural survey where the sample is tested in term of its views and approaches, which mean there has to be a psychological justification to validate the data. The psychological justification was based on organisational behaviour theories which were covered in the first year.

5.8 Limitations

This section discusses the key limitations affecting the research relating to the research methods and the research environment.

Like all research methodologies, a market investigation has limitations. As client investigation is part of reflecting on the market in general. A researcher needs to be aware of these limitations and take suitable steps to tone down their influence. Looking for the truth can be hard as statistics and presentations lack the descriptive truth, and have more interest in profiling. In addition, each organisation has its own way in presenting its image and organisation statement.

While surveys are capable of obtaining information from large samples of the population they are also well suited to gathering demographic data that describe the composition of the sample Surveys are inclusive in the types and number of variables that can be studied, require minimal investment to develop and administer, and are relatively easy for making generalizations (Bell, 1996). Surveys can also elicit information about attitudes that are otherwise difficult to measure using observational techniques. It is important to note, however, that surveys only provide estimates for the true population, not exact measurements.

On the other hand Pinsonneault and Kraemer (1993) noted that surveys are generally unsuitable where an understanding of the historical context of phenomena is required. Bell (1996) observed that biases may occur, either in the lack of response from intended participants or in the nature and accuracy of the responses that are received. Other sources of error include intentional misreporting of behaviours by respondents to confound the survey results or to hide inappropriate behaviour. Finally, respondents may have difficulty assessing their own behaviour or have poor recall of the circumstances surrounding their behaviour.

There were two problems that were faced in the survey and limited its validity; the first concerns the people who respond to the survey. The topic of the research is related to strategic thinking and strategic management, however it can be hard to assure that the response can come from that level, or that the person involved was part of the decision making process of the related topic, in this case the risk management decision. This can further be limited if the method used for communication was the internet and emails, by which there is no opportunity to investigate what personnel were involved.

The second problem is related to the validity of this survey with regard to the organisation itself. It is known that every organisation, regardless of how many shared characteristics it has with other clients, have some differentiation in the personal logic that lead the decision making process in separation of the organisation structure and culture as a whole. This has to be identified as differentiating factor.

The quality of research findings is dependent on the choice of research methodology, the data gathered, and the statistical tools used (Walker, 1997). The reliability of the results can be influenced by the validity of the research instrument (for example the questionnaire), the validity of the data gathered, the appropriate use of statistics and the validity of the conclusions drawn. The research methods selected in this research did have their limitations; the effects of these on the validity and reliability of the research data is discussed below.

Questionnaire survey: Survey techniques, such as questionnaires, interviews and so forth, are highly labour intensive on the part of the respondents and particularly on the part of the researcher; one consequence can be a low response rate. As happened in this research. The limitations of the survey can be divided into two categories.

The first category comprises the limitations inherent in almost every postal survey such as low response rate, missing data, the length of the questionnaire, and so forth. The second in identifying a suitable questionnaire to identify the distinctive characteristics of the organisation that uncovers inherent effect on the risk behaviour of the organisation.

However, it would be hard to identify in the first place. Therefore, it might become more valid to customise the questionnaire to suit each organisation, with some type of flexibility rather than a systematic structure of survey. This might be even beneficial in developing the coarse the research is taking. Nevertheless, this process would require more extended time than is available for this type of research.

As has been described, the survey covered 53 respondents of construction clients. As all surveys it was recognised that the coverage represented the data collected at a single point of time, and in this research this point is affected by a background of political and economic tensions in reference to the current economic circumstances facing the British economy. As this survey covered the British industry there is no escaping putting the outcomes within that context.

This meant that when the survey was answered, companies were trying to improve their reputation by adopting a better risk strategy; there were incentives to adopt a more thoughtful attitude toward risk. Would this survey been pictured as a test for those organisations ability to handle risk, it would be seen as unapproachable. This would explain difficulties many researches including this one in finding access to response.

It is not assumed that the organisations approached felt threatened; however, the sensitivity of the subject would make them more cautious in having their strategies under investigation.

The survey is not meant to provide strong evidence of cause and effect. Cause as in adopting an organisational structure or a specific value and effect as in risk performance for the organisation. As the survey collected data on risk performance and risk factors at the same time, it would be fallacious to decide which come first, the risk factor or the risk performance. Without having a historical association, it is challenging to verify whether that the reputed risk factor actually causes the performance.

5.9 Summary

This chapter has explained the various options available for the execution of the field research and the logic for the selection of the specific approach, strategy and methods applied in this research project.

As the research objectives demands finding attitudes and relationships, as in the relationship between organisational behaviour and risk attitudes, the positivist approach had been adopted and its tools of survey and correlations were used to collect and analyse the data. The overall methodology is one based on a positivist philosophy to measure relationships, attitudes, and effects in relations to client structure and risk behaviour. It emphasises empirical approaches in research and quantitative data; is objective rather than subjective (the researcher sees himself as a non-involved factors); is inductive in terms of theory as it constructs and evaluates general propositions that are derived from research examples and other previous work of research; used mainly quantitative methods; and employed an interview and case study analysis as the secondary research strategy.

The chapter covered the research design which combined two broad subjects one is the civil engineering focus of research and the other is management school focus of research. The research takes three stages of development, where first it identifies the elements of organisation behaviour, then second by framing that behaviour into a value model, and third by establishing a relationship between the model and risk performance using correlations and multivariable analysis.

A research map was provided which contains all the main elements of the research procedure that has been accomplished. Every procedure has taken into consideration the objectives of the research using the positivist approach. The objectives were addressed separately over the sections of the research.

The research limitations were combination of the limitations hereditary to the pessimism philosophy of research and other specific to this research due to the reaction of the industry to the subject of risk and the sensitivity of such area of research in the current economic climate.

6 Chapter six: Results and Data Analysis

6.0 Overview

This chapter deals with the data collected and the analysis, it also deals with the feedback on the data using the semi structured interview. The chapter provides a description of the data and its management. It shows the analyses work which was performed on the data and the outcome regarding any relationships between the numbers. It shows the outcome of analysis and describes what significance the results have for both research and practice.

6.1 Pilot

The principal elements of the investigation addressed the following three relationships.

-The relationship between the organisational model of a client organisation and the organisation's risk performance.

-The relation between a dominant organisational structure and the construction client.

-Are there dominant organisational structures reflected among construction clients that explain the trend in risk performance?

The outcome of the analyses should demonstrate if whether any significant conclusions can be drawn for each of these relationships based on the significance of the correlations and the shape of the data distribution. To ensure that the instrument for elicitation was sufficiently reliable, an initial pilot was conducted.

The pilot study consisted of 4 questionnaires to addresses the essential requirements of the study. It had the purpose of identifying the right level of language for eliciting data on construction risk within the business organisation of clients. Earlier, literature had revealed the complex nature of client risk behaviour. Additionally, the literature revealed the widespread scope of the problem across the industry. However, the pilot sample was intended for construction industry within the United Kingdom.

Data Collection for the Pilot Study included the participation of 4 professionals within the destination sample. The identification of sample consisted of contacting 20 construction clients from throughout the country. The potential participants consisted of clients who invest in the construction industry within the United Kingdom, are an organisation representatives and not just independent individuals. The pool of contacts was expanded with the use of online projects data research, referrals, and collecting client lists from construction companies.

The summary of participant's feedback in the pilot study can be viewed in Table 6-1.

Table 6-1 Pilot participants

Sample	Answered all the Questions	Answers were usable for analysis	Provided feedback	Participated in expanded survey
Townsfolk Limited	Yes	Yes	No	Yes
Leicester City Council	Yes	No	Yes	Yes
Break Charity	Yes	No	No	Yes
Royal Mail	Yes	Yes	No	No

Additional questions were constructed after the pilot (Categorisation of the sample), and the section regarding risk performance were modified. The method of marking the answers was modified including the scale used in the multi choice questions.

6.2 Sample Collection and Analysis

A literature survey was chosen to initiate the research investigation as it is the most efficient means of initial information gathering. The search of various approaches to risk management and the way clients mitigate risk in their projects in academic literature was used to identify gaps in existing knowledge and therefore act to focus and direct the research to addressing these gaps.

The survey collection started with the invitation using different means of communication, there was a struggle to receive a positive reaction. Eventually the increasingly popular online survey methods had been used, using the popular service of an online too, known as Wufoo. The respondents simply filled in the online questionnaire and the data was available for analysis. The online survey was the only successful method of getting a response. It is expected that the reason is that it is faster and more convenient to fill, and that it is provides more anonymity. The final sample consisted of 53 responses out of 163 originally approached UK based intuitions (Appendix C).

As for the survey data, multivariate analysis dealt with the statistical analysis of the data collected on more than one (response) variable using SPSS. These variables were correlated with each other, and their statistical dependence was taken into account when analysing such data. This consideration of statistical dependence would make multivariate analysis somewhat different in approach and considerably more complex than the corresponding univariate analysis, when there is only one response variable under consideration (Abdi, 2004).

The project addressed all of the above tests, using a variety of approaches within the overall portfolio of methods.

Due to the limitation of the sample size, a semi-constructed interview was made to reflect on the quality of the statistic and provide reliability for the outcomes, while adding a set of methods, somewhat less conventional, proved to be especially fruitful. Predominantly qualitative in nature, they were based on unobtrusive and nonparticipant observation as well as archival materials.

The pattern of archive usage was then compared with data culled from interviews, and the cross-sectional survey. It should be underscored that the qualitative results were used largely to supplement the quantitative data, rather than the reverse which is far more common in organizational research.

The surveys became more meaningful when interpreted in light of critical qualitative information just as other statistics were most useful when compared with content analyses or interview results. Triangulation, in this respect, can lead to a prominent role for qualitative evidence just as it also should assure a continuing role for quantitative data. Figure (6-1) shows a diagram of the process for the analysis and details the essential investigation that was conducted and how they relate to the overall study.

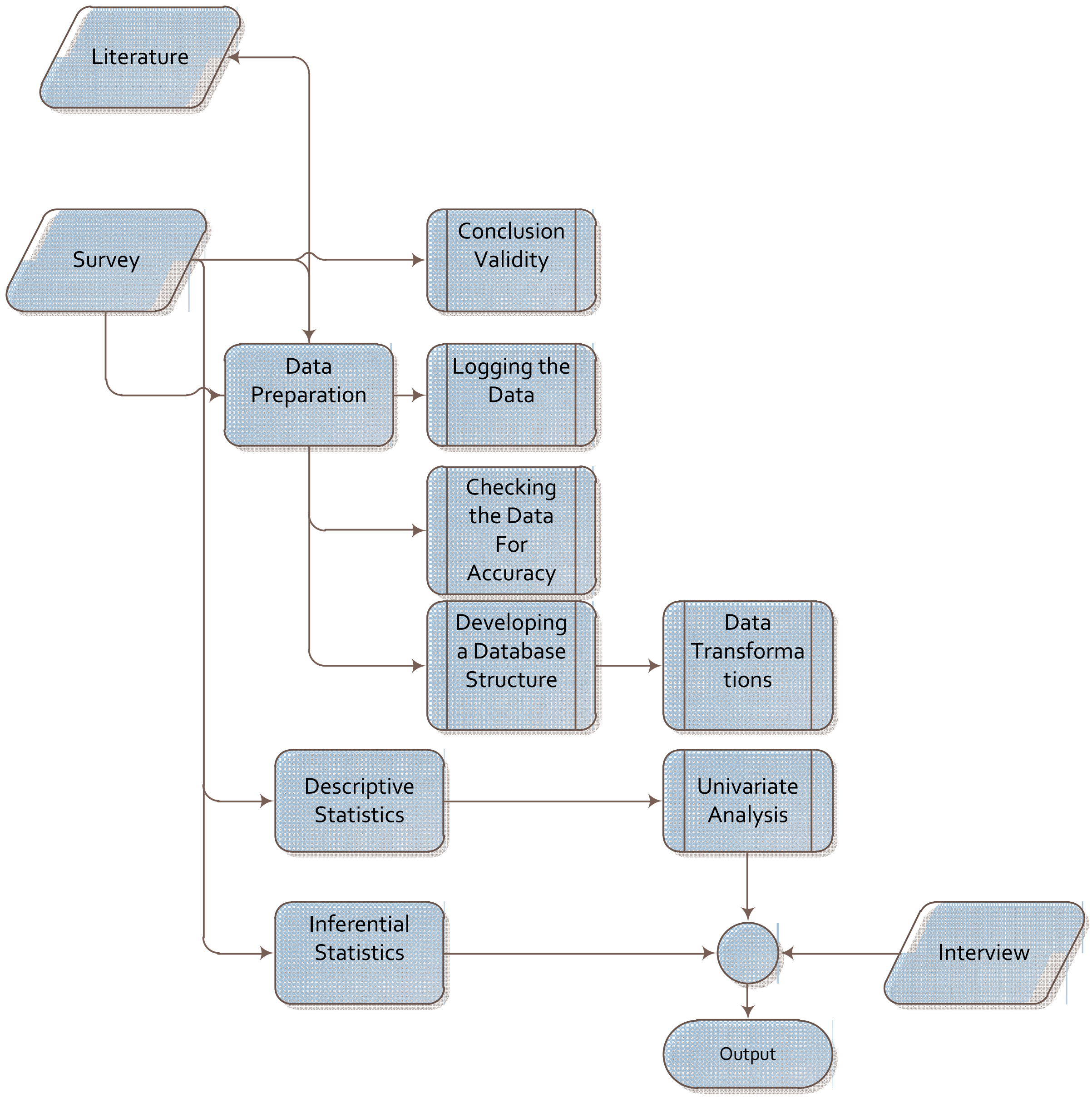


Figure 6-1 Analysis procedure

6.3 Descriptive Analyses

The survey consists of 53 respondents of construction clients. The survey (Appendix A) consisted of six statistical categories to define 4 organisational models (rational model, human relation, open system, and internal process), and investigate any relationship with risk related categories (risk perception, and risk performance.)

The data entered into a spread sheet in excel can be seen in Table (6-2) which is divided into 6 main and 21 sub categories. The first order is divided into Client Classification, Human Relationship, Open System, Internal Process, Rational Model, Risk Perception and Risk Performance.

The Human Relationship numbers are an outcome from the average of the four sub categories under the order (Culture, Reward, Goals, and Communication) and multiplied by factor based on the data related to the importance of the model regarding the sample surveyed. The Open system (Growth, Creativity, Individualism, and Change), The Internal Process (Coordination, Centralisation, Monitoring, and Rules), and The Rational Model (Goal Implementation, Active Evaluation, Strong Authority, and Defined Structure) and processed in the same manner. Risk Performance was calculated by the average of the Cost and Schedule ([Cost+Schedual]/3). Risk Perception was calculated by the average of Internal and External and multiplied by the factor of Market Confidence ([Internal+External]/2*[Market Confidence/10].

An increase in the value for the 4 organisational models (rational model, human relation, open system, and internal process) means a more dominant attitude toward that model. An organisational model does not come as a pure specific model and totally eliminate the rest. There is always a combination of the entire variables and this data is reflective of this fact.

The Risk perception scale is a description of how risky the client sees the market. The higher the value, the riskier the client sees the market. Risk performance scale presents the increase of the cost and time of the project comparing with the estimated plane. While this provides a negative value it was left positive to simplify the analysis.

The clients are characterised into two main groups, public (Pbh and Pbl) and private (Prh and Prl). Although this characterisation does not have significant implication on the outcome of the data, it provides us with an image of distribution of cases (Graph 6-1) with a significant correlations between Risk perception and Risk performance ($r=0.326$, $p=0.017$). This Correlation shows that within the sample taken there was positive relationship between Risk Perception and Risk Performance.

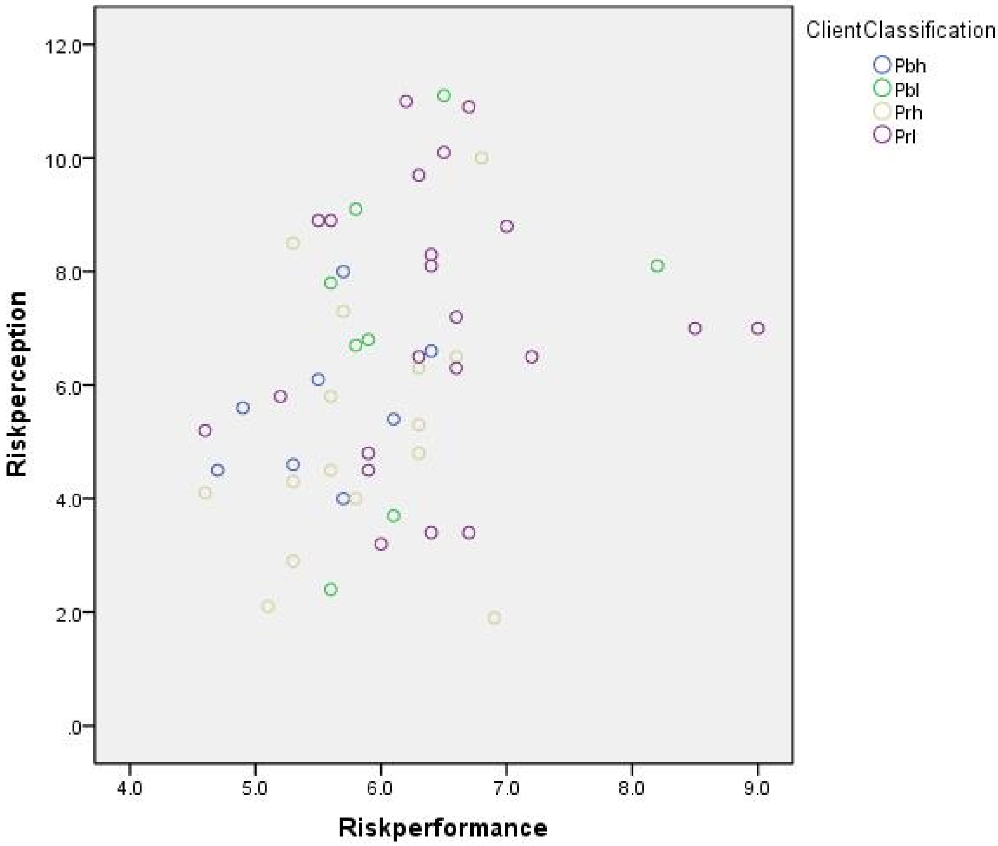
Table 6-2 Collected data

ClientClassification	Cases	HRAdjusted	EP1	HumanRelations	Communication	Goals	Rewards	Culture	Osadjusted	Column2	OpenSystems	Change	Individualism	Creativity	Growth	IPAdjusted	Column3	InternalProcess	Centralisation	Rules	Monitoring	Coordination	RMAdjusted	Column4	RationalModel	Definedstructure	StrongAuthority	ActiveEvaluation	GoalImplementation	Riskperception	MarketConfidence	Internal	External	Riskperformance	Cost	Schedual
Pbh	1	5	0.75	6.7	6	6	4.5	7.5	7.3	0.95	7.8	8.5	6	6	7.5	7.2	0.85	8.3	9	6	7.5	7.5	4.68	0.75	7.1	6	6	6	7.5	4.5	7.5	6	6	4.7	6.9	7.2
Pbh	2	3.5	0.65	5.4	1.5	6	6	6	4.25	0.75	5.8	4.4	4.5	6	6	3.15	0.5	6.3	4.5	6	4.5	7.5	4.77	0.8	6.7	6	6	6	6	5.4	9.1	6	6	6.1	9.7	8.6
Pbh	3	4.05	0.7	5.8	6	3	6	6	3.15	0.65	5	9	3	1.5	4.5	7.3	0.85	8.3	7.5	7.5	9	6	4.23	0.75	6.3	6	6	4.5	6	5.6	10.7	4.5	6	4.9	7.1	7.7
Pbh	4	4.1	0.7	5.8	6	6	3	6	2.4	0.5	4.6	3	4.5	4.5	4.5	5.35	0.7	7.5	7.5	6	6	7.5	4.27	0.8	5.8	4.5	6	4.5	6	4	7.7	5.3	5.3	5.7	9.4	7.7
Pbh	5	2.3	0.5	4.6	3	1.5	3	9	2.45	0.55	4.6	4.5	3	3	6	8.2	0.9	9.2	7.5	9	7.5	9	4.32	0.8	5.8	4.5	3	6	7.5	6.1	10.8	5.3	6	5.5	9	7.5
Pbh	6	5	0.75	6.7	6	3	6	9	3.75	0.7	5.4	6	3	4.5	6	2.15	0.4	5.4	4.5	6	3	6	5.32	0.85	7.1	7.5	4.5	6	7.5	6.6	10.9	6	6	6.4	10.5	8.6
Pbh	7	2.9	0.6	5	1.5	4.5	6	6	2.55	0.55	4.6	3	3	4.5	6	7.05	0.85	8.3	7.5	6	7.5	9	3.95	0.8	5.4	3	4.5	6	6	4.6	9.4	4.5	5.3	5.3	8.7	7.3
Pbh	8	3	0.6	5	6	6	3	3	4.3	0.75	5.8	6	4.5	6	4.5	4.05	0.6	6.7	6	6	6	6	4.23	0.8	5.8	6	6	4.5	4.5	8	14.3	5.3	6	5.7	9.1	8.1
Pbl	9	4.15	0.7	5.8	6	3	6	6	4.3	0.75	5.8	4.5	4.5	6	6	7.3	0.9	8.3	4.5	9	7.5	9	4.91	0.8	6.7	6	4.5	6	7.5	6.7	11.2	6	6	5.8	8.9	8.6
Pbl	10	2.4	0.5	4.6	1.5	3	6	6	3.2	0.65	5	3	4.5	4.5	6	4.4	0.6	7.1	7.5	6	4.5	7.5	4.14	0.85	5.4	3	4.5	6	6	6.8	12.9	4.5	6	5.9	10.1	7.7
Pbl	11	4.65	0.75	6.3	3	4.5	6	9	5.75	0.85	6.7	6	4.5	6	7.5	7.45	0.9	8.3	4.5	9	9	7.5	4.59	0.8	6.3	4.5	4.5	6	7.5	7.8	13	6	6	5.6	8.1	8.6
Pbl	12	5.95	0.85	7.1	6	6	4.5	9	9.15	0.95	9.4	13	6	7.5	7.5	4	0.55	7.1	7.5	6	6	6	7.36	1.1	7.5	6	6	7.5	7.5	8.1	11.4	6.8	7.5	8.2	14.8	9.8
Pbl	13	6	0.85	7.1	6	6	4.5	9	5.05	0.8	6.3	4.5	4.5	6	7.5	5.5	0.75	7.5	7.5	6	4.5	9	5.77	0.9	7.1	6	6	6	7.5	11.1	14.8	6	9	6.5	10.4	9.2
Pbl	14	4.2	0.7	5.8	6	6	3	6	5.8	0.85	6.7	6	6	6	6	2.75	0.45	5.8	3	6	6	6	4.59	0.8	6.3	6	6	4.5	6	3.7	6.6	6	5.3	6.1	9.5	8.8
Pbl	15	4.2	0.7	5.8	6	3	6	6	4.3	0.75	5.8	7.5	3	4.5	6	4.7	0.65	7.1	6	7.5	7.5	4.5	4.23	0.8	5.8	6	3	6	6	2.4	5	5.3	4.5	5.6	8.7	8.1
Pbl	16	4.65	0.75	6.3	6	6	4.5	6	5.1	0.8	6.3	6	6	6	4.5	4.2	0.65	6.7	4.5	6	7.5	6	4.55	0.8	6.3	6	6	6	4.5	9.1	13.4	6	7.5	5.8	8.8	8.6
Prh	17	6.05	0.85	7.1	6	6	4.5	9	5.15	0.8	6.3	4.5	6	4.5	7.5	4.05	0.6	6.7	6	9	3	6	5.73	0.9	7.1	6	6	6	7.5	6.5	10.2	6	6.8	6.6	10.5	9.2
Prh	18	4.25	0.75	5.8	6	3	6	6	3.8	0.7	5.4	6	3	4.5	6	4.15	0.65	6.7	6	3	7.5	7.5	4.18	0.8	5.8	6	3	6	6	5.8	10.2	5.3	6	5.6	8.9	7.9
Prh	19	4.25	0.75	5.8	6	6	6	3	3.85	0.7	5.4	3	6	6	4.5	5.5	0.75	7.5	7.5	7.5	6	6	4.05	0.8	5.4	4.5	6	6	3	4.5	8.6	5.3	5.3	5.6	9.1	7.7
Prh	20	4.65	0.75	6.3	6	1.5	6	9	3.3	0.65	5	7.5	1.5	3	6	4.7	0.65	7.1	7.5	0	9	9	3.73	0.75	5.4	6	1.5	4.5	7.5	2.1	5.2	4.5	3.8	5.1	8	7.3
Prh	21	2.45	0.55	4.6	3	3	4.5	6	2.65	0.6	4.6	3	4.5	3	6	3.95	0.6	6.7	9	4.5	4.5	6	3.32	0.8	4.6	3	3	4.5	6	7.3	13.9	4.5	6	5.7	9.9	7.1
Prh	22	4.7	0.75	6.3	3	4.5	6	9	5.2	0.85	6.3	4.5	6	6	6	4.65	0.65	7.1	6	6	4.5	9	5.00	0.8	6.7	3	6	6	9	6.3	10.5	6	6	6.3	9.9	8.8
Prh	23	5.4	0.8	6.7	6	6	6	6	7.5	0.95	7.9	6	7.5	7.5	7.5	5.75	0.75	7.5	6	9	6	6	4.95	0.85	6.3	6	6	7.5	3	5.3	8.8	6	6	6.3	9.5	9.4
Prh	24	6.1	0.85	7.1	7.5	4.5	7.5	6	5.25	0.85	6.3	6	4.5	6	6	4.05	0.6	6.7	3	7.5	6	7.5	5.95	0.9	7.1	6	6	7.5	6	1.9	3.6	6	4.5	6.9	11.4	9.2
Prh	25	2.55	0.55	4.6	1.5	3	6	6	5.85	0.9	6.7	6	6	6	6	4.6	0.65	7.1	6	6	6	7.5	3.59	0.8	5	3	3	6	6	4	8.9	4.5	4.5	5.8	9.3	8.1

ClientClassification	Cases	HRAdjusted	EP1	HumanRelations	Communication	Goals	Rewards	Culture	Osadjusted	Column2	OpenSystems	Change	Individualism	Creativity	Growth	IPAdjusted	Column3	InternalProcess	Centralisation	Rules	Monitoring	Coordination	RMAdjusted	Column4	RationalModel	Definedstructure	StrongAuthority	ActiveEvaluation	GoalImplementation	Riskperception	MarketConfidence	Internal	External	RPAdjusted	Riskperformance	Cost	Schedual
Prh	26	7.5	0.95	7.9	6	6	7.5	9	6.5	0.9	7.1	7.5	4.5	6	7.5	3.8	0.6	6.3	3	6	9	4.5	4.91	0.75	7.1	6	6	6	7.5	8.5	12.6	6	7.5	9.7	5.3	6.6	9.2
Prh	27	5.45	0.8	6.7	6	6	6	6	4.35	0.75	5.8	6	6	1.5	7.5	6.65	0.85	7.9	4.5	9	9	6	4.55	0.75	6.7	6	6	4.5	7.5	4.3	7.2	6	6	10	5.3	7.5	8.4
Prh	28	3.55	0.65	5.4	3	6	4.5	6	3.9	0.7	5.4	3	6	6	4.5	1.65	0.35	5	4.5	6	3	4.5	4.41	0.85	5.8	4.5	6	4.5	6	4.8	9.1	5.3	5.3	15.5	6.3	10.6	8.3
Prh	29	5.5	0.8	6.7	3	6	6	9	5.9	0.9	6.7	7.5	6	4.5	6	7.05	0.9	7.9	4.5	9	9	6	4.09	0.7	6.3	4.5	6	6	6	4.1	7.3	6	5.3	6.9	4.6	5.3	8.4
Prh	30	6.75	0.9	7.5	6	6	6	9	4.35	0.75	5.8	4.5	4.5	6	6	6.3	0.8	7.9	9	6	6	7.5	6.09	0.95	7.1	6	6	6	7.5	10	16.6	6	6	18.8	6.8	11.3	9
Prh	31	4.3	0.75	5.8	6	6	6	3	8	0.95	8.3	6	7.5	7.5	9	6.3	0.85	7.5	6	6	9	6	4.77	0.8	6.7	6	6	6	6	2.9	5.6	6	4.5	10.5	5.3	6.5	9.6
Prl	32	6.15	0.85	7.1	6	6	7.5	6	5.3	0.85	6.3	4.5	3	6	9	5.7	0.75	7.5	6	7.5	6	7.5	5.91	0.9	7.1	6	6	6	7.5	10.1	16.8	6	6	17	6.5	10.4	9.2
Prl	33	8	0.95	8.3	9	6	6	9	4.35	0.75	5.8	7.5	6	4.5	3	6.05	0.8	7.5	4.5	7.5	9	6	5.36	0.85	7.1	7.5	6	6	6	8.9	13.2	6	7.5	12	5.6	8.1	8.6
Prl	34	4.3	0.75	5.8	6	3	3	9	3.35	0.65	5	6	3	4.5	4.5	2.35	0.4	5.8	7.5	4.5	4.5	4.5	3.82	0.85	5	6	3	4.5	4.5	3.4	7.6	4.5	4.5	16	6.4	11.6	7.5
Prl	35	4.3	0.75	5.8	6	6	3	6	2.75	0.6	4.6	4.5	3	3	6	2.75	0.45	6.3	7.5	7.5	3	4.5	4.09	0.9	5	6	4.5	4.5	3	3.4	7.6	4.5	4.5	18.2	6.7	12.6	7.5
Prl	36	6.8	0.9	7.5	6	6	6	9	4.35	0.75	5.8	7.5	4.5	6	3	4.5	0.7	6.7	4.5	4.5	9	6	4.23	0.75	6.3	6	6	6	4.5	5.8	9.6	6	6	9.4	5.2	7.5	8.3
Prl	37	3.65	0.65	5.4	4.5	6	3	6	4.35	0.75	5.8	4.5	4.5	6	6	3.1	0.5	6.3	6	3	6	7.5	3.95	0.85	5	6	4.5	4.5	3	8.1	15.5	4.5	6	16.1	6.4	11.2	7.9
Prl	38	5.55	0.85	6.7	6	3	9	6	3.4	0.7	5	3	1.5	9	4.5	3.25	0.5	6.7	7.5	6	4.5	6	9.09	1.05	9.6	9	7.5	9	9	7	15.6	3	6	26.2	9	17.4	9.6
Prl	39	6.85	0.9	7.5	7.5	9	6	4.5	3.9	0.7	5.4	3	6	7.5	3	1.05	0.2	5	3	7.5	3	4.5	7.77	1.05	8.3	9	7.5	6	7.5	7	15.6	4.5	4.5	24.5	8.5	16.3	9.2
Prl	40	6.2	0.9	7.1	3	4.5	9	9	6.95	0.9	7.5	7.5	6	7.5	6	4.75	0.65	7.1	3	9	4.5	9	5.32	0.85	6.7	6	9	4.5	4.5	8.3	15.7	4.5	6	16.3	6.4	9.8	9.4
Prl	41	3.05	0.6	5	3	3	6	6	3.95	0.75	5.4	4.5	6	1.5	7.5	4.65	0.65	7.1	4.5	9	6	6	5.00	0.85	6.7	6	6	4.5	7.5	4.8	7.9	6	6	13.3	5.9	9.3	8.4
Prl	42	4.35	0.75	5.8	4.5	4.5	4.5	7.5	2.1	0.5	4.2	7.5	1.5	3	3	7.65	0.9	8.3	7.5	7.5	9	6	4.55	0.75	6.7	4.5	9	3	7.5	5.2	10	5.3	5.3	7.2	4.6	6.2	7.7
Prl	43	3.7	0.7	5.4	4.5	6	3	6	5.95	0.9	6.7	7.5	4.5	4.5	7.5	5.45	0.75	7.1	6	3	9	7.5	6.05	0.85	7.9	7.5	7.5	4.5	9	4.5	8	6	5.3	13.1	5.9	8.1	9.6
Prl	44	4.35	0.75	5.8	3	6	3	9	4.35	0.75	5.8	4.5	4.5	6	6	4.1	0.6	6.7	7.5	6	3	7.5	6.00	0.95	7.1	6	6	6	7.5	10.9	18.1	6	6	18.5	6.7	11.2	9
Prl	45	6.95	0.9	7.5	9	6	6	6	7.55	0.95	7.9	7.5	9	7.5	4.5	6.9	0.85	7.9	7.5	6	9	6	5.27	0.85	6.7	6	6	6	6	3.2	6.1	6	4.5	13.4	6	8.3	9.6
Prl	46	8.5	0.95	8.8	9	9	7.5	6	6	0.9	6.7	6	4.5	6	7.5	5.95	0.8	7.5	6	7.5	6	7.5	5.82	0.9	7.1	6	6	6	7.5	11	18.4	6	6	14	6.2	9.5	9.2
Prl	47	6.25	0.9	7.1	3	9	7.5	6	7	0.95	7.5	7.5	7.5	4.5	7.5	7.55	0.9	8.3	9	9	6	6	6.00	0.95	7.1	7.5	6	6	6	9.7	14.4	6	7.5	15.8	6.3	9.5	9.6
Prl	48	6.3	0.9	7.1	9	4.5	3	9	6.05	0.9	6.7	3	7.5	6	7.5	4.1	0.6	6.7	6	6	3	9	6.59	0.95	7.5	9	9	4.5	4.5	6.5	14.4	4.5	4.5	20.3	7.2	11.9	9.6
Prl	49	7	0.95	7.5	6	9	3	9	5.35	0.85	6.3	3	4.5	7.5	7.5	3.25	0.5	6.3	6	4.5	4.5	7.5	3.95	0.85	5	6	4.5	4.5	3	6.5	14.5	4.5	4.5	14.1	6.3	10.9	7.9
Prl	50	7.55	0.95	7.9	9	6	4.5	9	2.8	0.6	4.6	3	7.5	3	3	2	0.35	5.4	6	4.5	3	6	4.82	0.85	6.3	6	6	6	4.5	6.3	10.4	6	6	17.5	6.6	11.7	8.1
Prl	51	7.05	0.95	7.5	9	6	6	6	4.35	0.75	5.8	3	6	7.5	4.5	5.3	0.7	7.5	6	9	6	6	4.73	1.05	5	6	4.5	4.5	3	8.8	16.8	4.5	6	19.8	7	13.2	7.9
Prl	52	3.15	0.65	5	4.5	6	4.5	3	4.35	0.75	5.8	4.5	7.5	4.5	4.5	3.6	0.6	6.3	7.5	3	7.5	4.5	3.59	0.8	5	6	4.5	4.5	3	8.9	16.9	4.5	6	11.3	5.5	8.8	7.7
Prl	53	4.7	0.75	6.3	6	6	4.5	6	4.35	0.75	5.8	4.5	4.5	4.5	7.5	3.25	0.5	6.3	6	6	3	7.5	4.32	0.95	5	6	4.5	4.5	3	7.2	12.7	5.3	6	17.9	6.6	11.8	8.1

1 West Lothian Council, UK
2 Cambridge City Council
3 Leicester City Council
4 Nottingham City Council
5 Ribble Valley Borough Council
6 Norfolk County Council
7 Kent County Council
8 Sheffield City Council
9 Sunderland ARC
10 Poplar HARCA, UK
11 Cambridgeshire PCT
12 Hull Teaching PCT
13 Newcastle PCT
14 Sheffield PCT
15 James Paget Healthcare NHS Trust
16 Norfolk Mental Care - NHS Trust
17 Townsfolk Limited
18 William Sutton Housing Association
19 Accord Housing Association
20 Break Charity
21 Caldmore Area Housing Association Ltd
22 Camphill Communities East Anglia
23 Roman Catholic Diocese of East Anglia
24 Focus Housing Central & Midlands
25 Haig Homes
26 Sheringham Museum Norfolk Trust
27 Jephson Homes Housing Association Ltd
28 The Walsingham College Trust Association
29 Orbit Housing Association
30 Whitlingham ChariTable Trust
31 Beechdale Homes
32 Grosvenor Properties
33 Kings Head Sporting Club Limited
34 Wymondham Property Dev Co Ltd
35 Turner & Townsend
36 Tesco plc
37 Waitrose pls
38 J sainsbury plc
39 Kier Eastern
40 TH Kenyon plc
41 Octagon Healthcare
42 Walter Lilly & Co Ltd
43 Avondale Coachcraft Ltd
44 GLF Cawston (UK) Limited
45 Bridge Foundary Co. Ltd
46 UK Capital Investments(Group) Ltd
47 Cadbury Trebor Bassett
48 Cameron-Price Ltd, Birmingham
49 Freightliners
50 Witnesham Ventures Limited
51 Richard Burbridge Ltd
52 Secure Trust Bank PLC
53 Unilever

The raw data was transformed into an output that can represent each of the four structures. Each case can have its unique structural shape as seen in the examples in Figure (6-2, 6-3, and 6-4).



Graph 6-1 Risk perception and risk performance

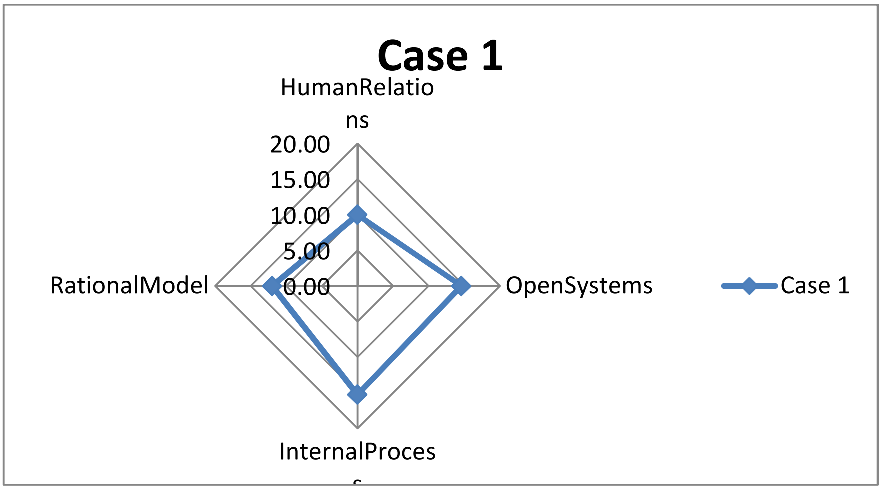


Figure 6-2 Case 1

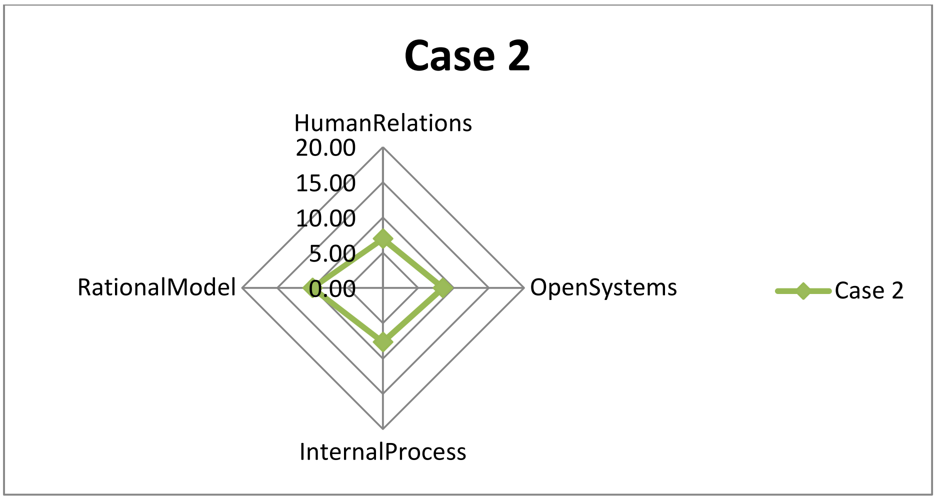


Figure 6-3 Case 2

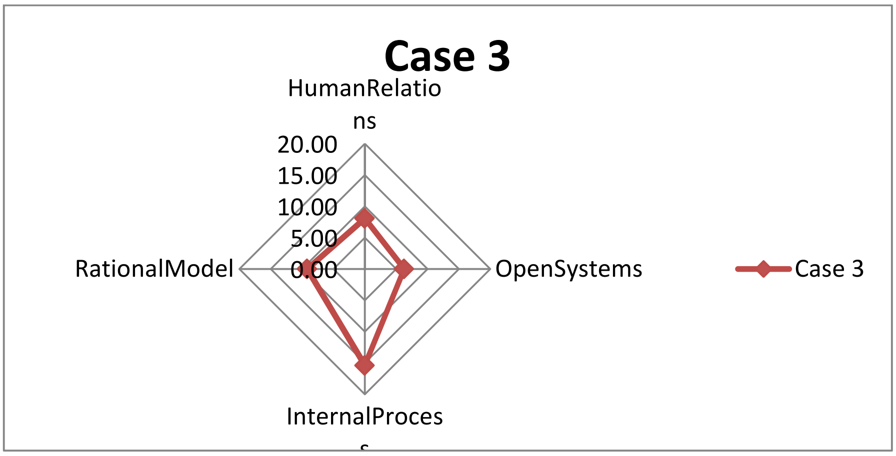


Figure 6-4 Case 3

This shape can be used as a description of a structure we access in the relationship with risk variables. However, we note that the scale used is comparative and not absolute; hence it's useful when using categorical description of the company.

Looking at the sample at hand it shows a stronger leaning toward the Internal Process behaviour (Figure 6-5, 6-6), and leaning away from the Human Relation behaviour. The numbers show no specific variable which shifted the shape of the behaviour but instead it was distributed on the areas covered to describe wither the Internal Process or the Human Relation behaviour.

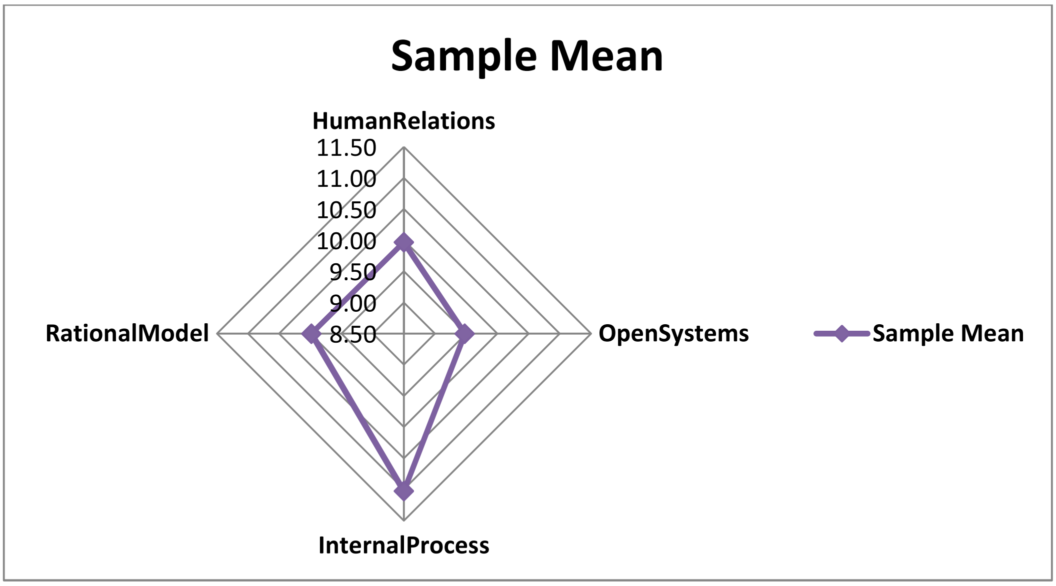


Figure 6-5 Sample mean

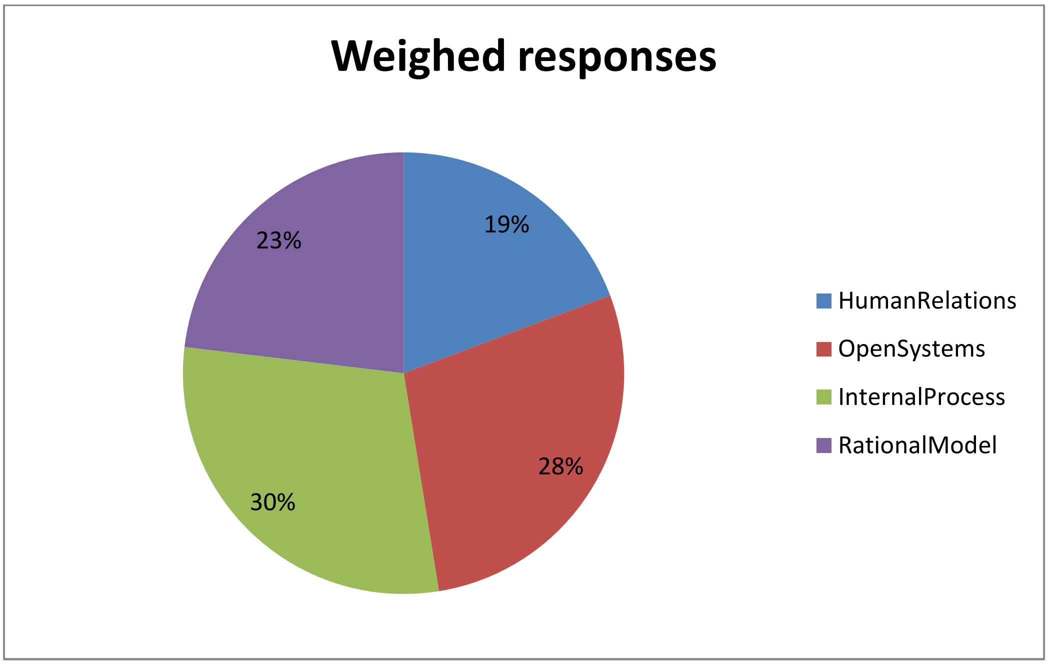


Figure 6-6 Weighed responses

The data was tested for reliability and normality presented in Table (6-3). As the number of the cases was not large a Shapiro-Wilk test was seen appropriate. In the reliability test α>.7, and in the normality test Sig. value > 0.05. Both test show a valid data for parametric testing.

Table 6-3a Reliability statistics

Cronbach's Alpha	N of Items
.783	27

Table 6-4b Reliability statistics

	Shapiro-Wilk		
	Statistic	df	Sig.
Human Relations	.972	53	.255
Open Systems	.961	53	.079
Internal Process	.977	53	.378
Rational Model	.977	53	.392
Risk performance	.968	53	.163
Risk perception	.979	53	.477

A descriptive analysis was performed on the data presented in Table (6-4). The Rational Model has shown the highest mean statistic of the models, it slow showed the highest maximum, range, and minimum value. Within the sample the rational model showed to be of the highest values within the survey. However, in terms of number of responses who were classified as applying Rational Model were not the highest. Looking at other models with the same comparison we see that in the sample, responses which applied the rational model showed stronger leaning toward their model than responses which were classified as internal process for example.

Table 6-5 Descriptive statistics

	N	Range	Minimum	Maximum	Mean
	Statistic	Statistic	Statistic	Statistic	Statistic
HR Adjusted	53	12.4	4.6	17.0	9.970
Os adjusted	53	14.1	4.2	18.3	9.479
IP Adjusted	53	14.3	2.1	16.4	9.628
RM Adjusted	53	12.7	7.3	20.0	10.853
Risk performance	53	4.4	4.6	9.0	6.091
Valid N (listwise)	53				

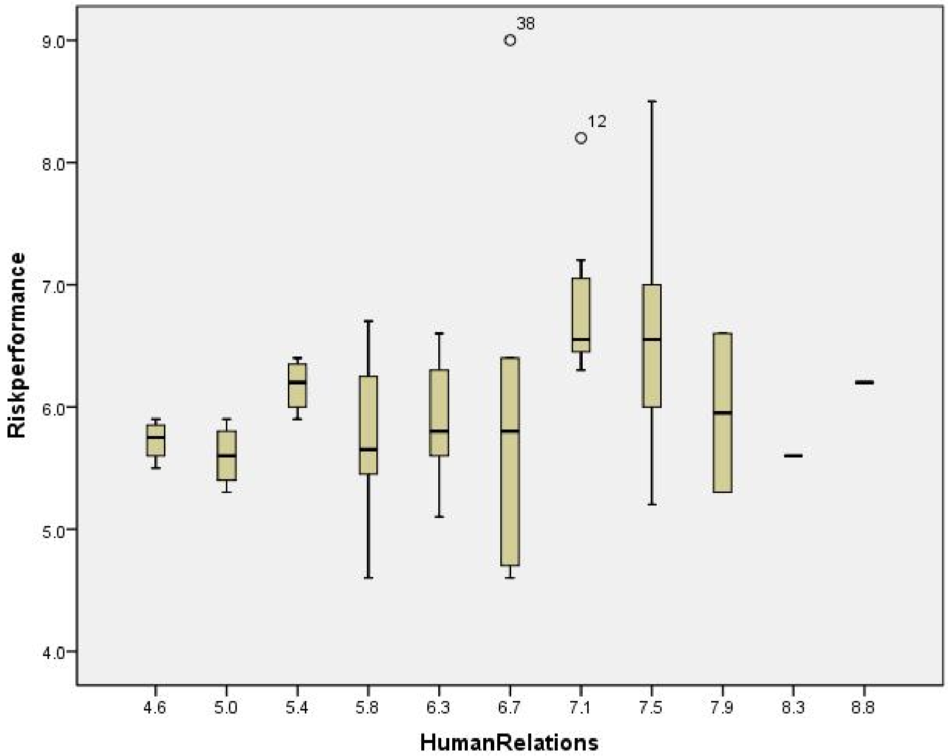
The column in Table (6-5) presents the value that Cronbach's alpha would be if that particular item was deleted from the scale. It’s noticed that removal of any question except for IPAdjusted and Centralisation would result in a lower Cronbach's alpha. Removal of those two sections would lead to a small improvement in Cronbach's alpha and it is seen that the Corrected Item-Total Correlation value for IPAdjusted and Centralisation was low (0.019 and.117 respectively) for the items. Removal of those items would improve alpha a little however it is to be noticed that only item Centralisation is a question.

Table 6-6 Item-Total statistics

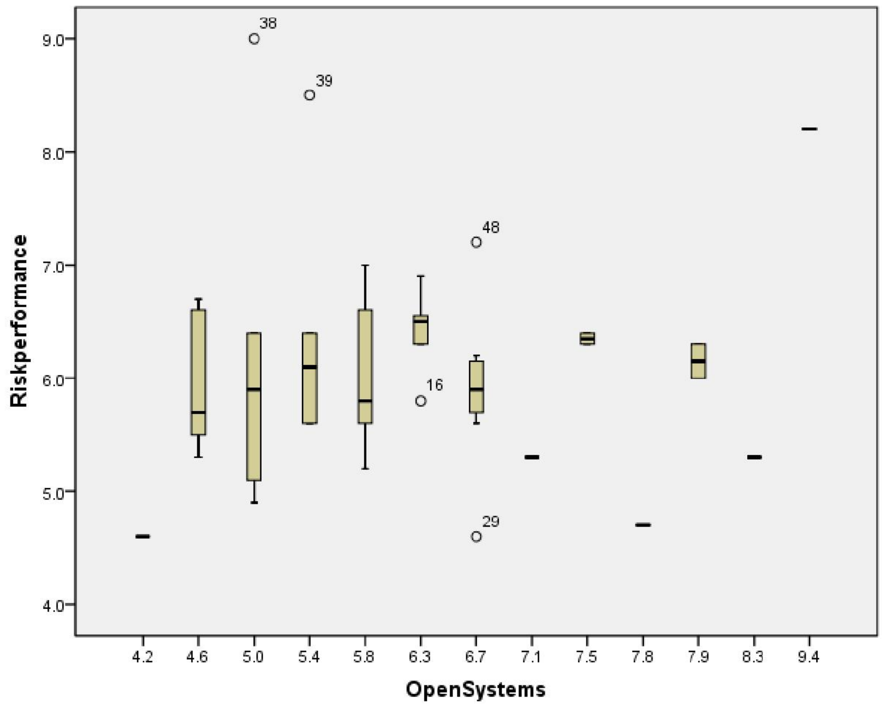
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
HR Adjusted	190.040	435.403	.641	.998	.753
Communication	194.632	496.345	.299	.993	.777
Goals	194.774	492.891	.408	.992	.773
Rewards	194.689	503.330	.312	.988	.777
Culture	193.132	510.485	.170	.992	.783
Os adjusted	190.530	449.526	.513	.997	.763
Change	194.540	511.047	.138	.990	.785
Individualism	195.057	506.792	.241	.985	.780
Creativity	194.717	487.444	.506	.984	.769
Growth	194.066	510.611	.215	.987	.781
IP Adjusted	190.381	512.915	.019	.997	.801
Centralisation	193.925	534.001	-.117	.985	.793
Rules	193.585	501.489	.260	.988	.779
Monitoring	193.868	540.520	-.176	.992	.799
Coordination	193.302	521.654	.068	.972	.785
RM Adjusted	189.157	444.008	.763	.994	.750
Defined structure	194.208	497.513	.473	.928	.773
Strong Authority	194.491	493.746	.469	.965	.772
Active Evaluation	194.462	505.049	.462	.927	.775
Goal Implementation	193.981	509.014	.203	.956	.781
Risk perception	193.702	467.402	.531	.998	.764
Market Confidence	188.825	453.499	.376	.997	.775
Internal	194.594	517.358	.287	.956	.781
External	194.226	508.189	.423	.967	.777
RP Adjusted	185.711	439.781	.397	.995	.776
Risk performance	193.919	506.529	.525	1.000	.775
Cost	190.211	494.770	.271	.999	.779
Schedule	191.532	500.466	.781	.996	.772

The stem and leaf Box plots showed us the number of outliners in each model The Graph (6-2) shows us that Case 38 and Case 12 are outliners; The Graph (6-3) shows us Case 38, 39, 48, 16, and 29 as outliners. The Graph (6-4) shows us Case 38 as an outliner. The Graph (6-5) shows us Case 1 as an outliner.

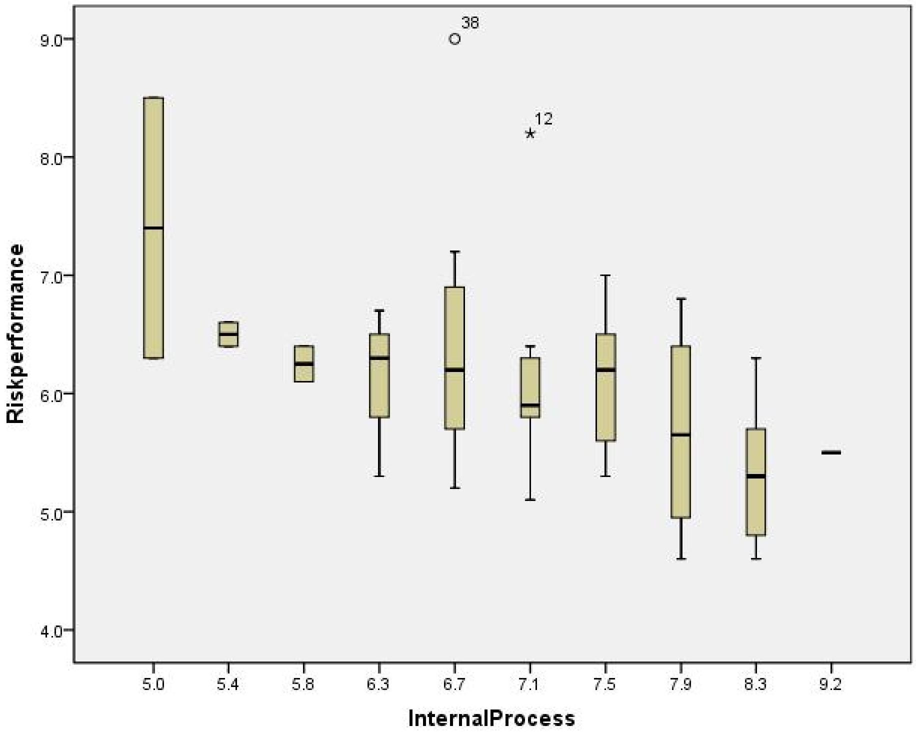
This tells us that Case 38 has showed as an outliner in three models and that the Open Model has the highest number of outliners.



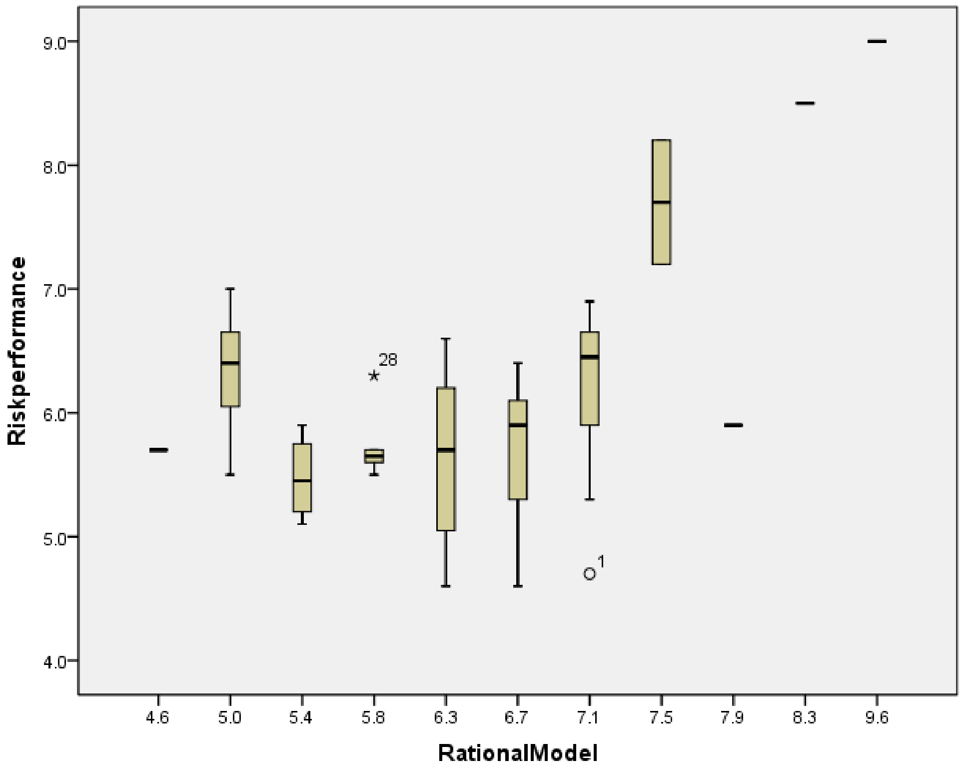
Graph 6-2 Human relations plot box



Graph 6-3 Open systems plot box



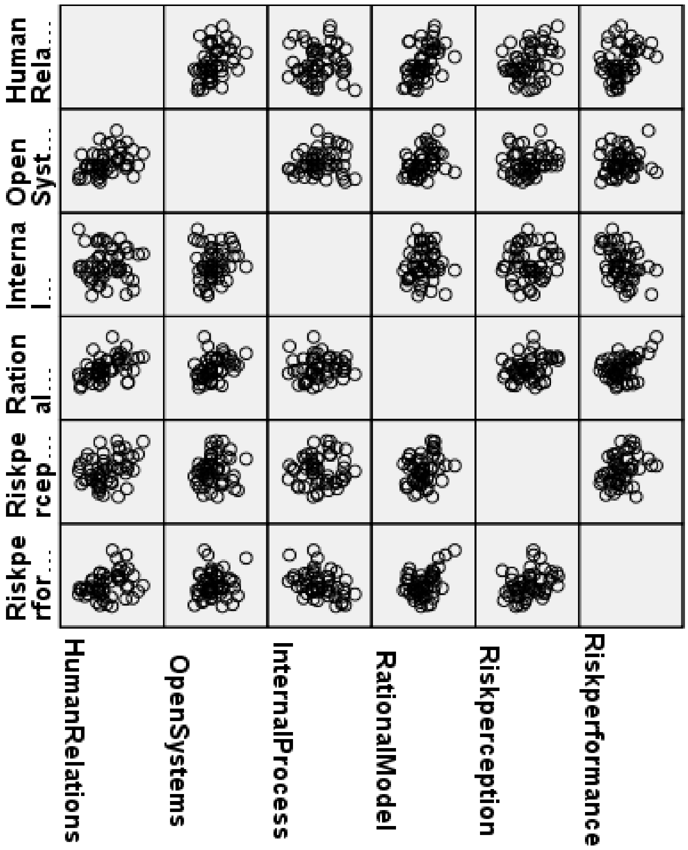
Graph 6-4 Internal process plot box



Graph 6-5 Rational model plot box

6.4 Output

Graph (6-6) and Table (6-6) show that a Pearson product-moment correlation was run to determine the relationship between the different groups.



Graph 6-6 Pearson product-moment correlation

The strength of the association was medium at best. There were two correlations of interest. Risk performance showed medium strength of association with the Rational Model (r=0.762, p=0.000) and a negative medium strength of association with the internal process (r=0.532, p=0.000). In both cases P<.001

This shows that in a linear relationship between risk performance and the rational model elements are the strongest within the investigated group, and that the internal process model is the only model that has a negative effect on the risk performance.

Table 6-7 Correlations

		RM Adjusted	Os adjusted	IP Adjusted	HR Adjusted	Risk performance	Risk perception
RM Adjusted	Pearson Correlation	1	.312*	-.102	.488**	.760**	.337*
	Sig. (2-tailed)		.023	.467	.000	.000	.014
	N	53	53	53	53	53	53
Os adjusted	Pearson Correlation	.312*	1	.171	.380**	.112	.109
	Sig. (2-tailed)	.023		.221	.005	.424	.438
	N	53	53	53	53	53	53
IP Adjusted	Pearson Correlation	-.102	.171	1	-.013	-.534**	.019
	Sig. (2-tailed)	.467	.221		.924	.000	.890
	N	53	53	53	53	53	53
HR Adjusted	Pearson Correlation	.488**	.380**	-.013	1	.320*	.336*
	Sig. (2-tailed)	.000	.005	.924		.020	.014
	N	53	53	53	53	53	53
Risk performance	Pearson Correlation	.760**	.112	-.534**	.320*	1	.298*
	Sig. (2-tailed)	.000	.424	.000	.020		.030
	N	53	53	53	53	53	53
Risk perception	Pearson Correlation	.337*	.109	.019	.336*	.298*	1
	Sig. (2-tailed)	.014	.438	.890	.014	.030	
	N	53	53	53	53	53	53

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

A regression test has been performed and it shows what follows:

Table 6-8 Model summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889[a]	.790	.773	.4141

a. Predictors: (Constant), RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted

b. Dependent Variable: Riskperformance

The R value is 0.899, which represents the simple correlation and, therefore, indicates a high degree of correlation. The R Square value indicates how much of the dependent variables (RationalModel, InternalProcess, OpenSystems, HumanRelations) can be explained by the independent variable, Risk performance. In this case, 79% can be explained, which is respectable

Table (6-8) is the ANOVA Table. This Table indicates that the regression model predicts the outcome variable significantly well. This indicated by the statistical significance of the regression model that was applied. Here, $P < 0.0005$ which is less than 0.05 and indicates that, overall, the model applied is significantly good enough in predicting the outcome variable.

Table 6-9 ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.975	4	7.744	45.160	.000[a]
	Residual	8.231	48	.171		
	Total	39.205	52			

a. Predictors: (Constant), RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted

b. Dependent Variable: Riskperformance

A one-way ANOVA (Table 6-9) was used to test for preference differences among the four models. Preferences for models differed significantly across the group, $F(4, 48) = 45.160$, $p < .000$. Tukey post-hoc comparisons of the groups indicate that the Rational Model (Coefficient = 0.74, 95% CI [0.201,0.321]) gave significantly higher preference ratings than other groups. With Internal Process being the only other model with sig < 0.005 ((Coefficient =-0.454, 95% CI [-0.148,-0.080])

Table 6-10 Coefficients

Coefficients[a]

Model		Unstandardized Coefficients	
		B	Std. Error
1	(Constant)	4.486	.332
	HRAdjusted	-.010	.022
	Osadjusted	-.007	.020
	IPAdjusted	-.114	.017
	RMAdjusted	.265	.028

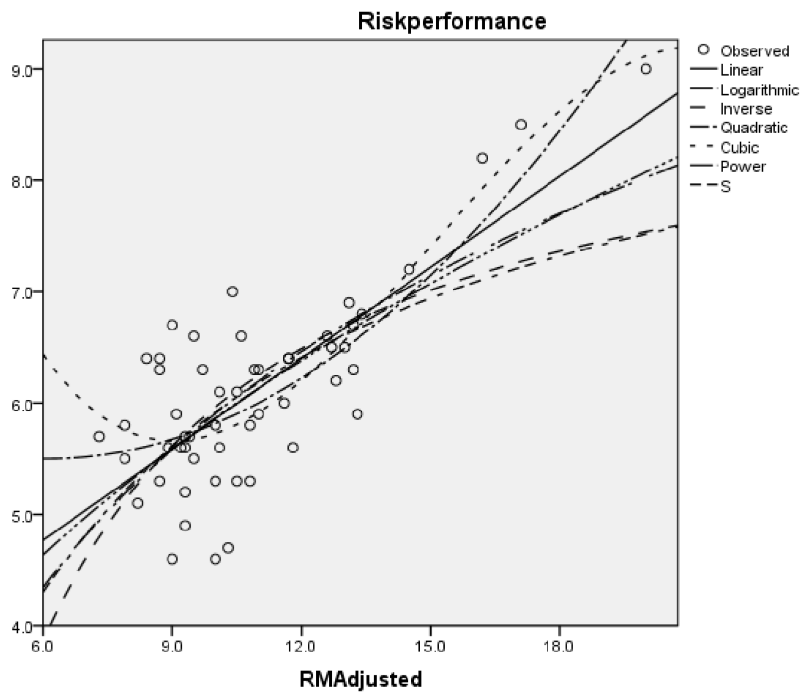
Coefficients[a]

Model		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		Beta			Lower Bound	Upper Bound
1	(Constant)		13.524	.000	3.819	5.153
	HRAdjusted	-.037	-.471	.640	-.055	.034
	Osadjusted	-.027	-.366	.716	-.049	.034
	IPAdjusted	-.454	-6.671	.000	-.149	-.080
	RMAdjusted	.740	9.547	.000	.209	.321

Coefficients[a]

Model		Correlations		
		Zero-order	Partial	Part
1	(Constant)			
	HRAdjusted	.320	-.068	-.031
	Osadjusted	.112	-.053	-.024
	IPAdjusted	-.534	-.694	-.441
	RMAdjusted	.760	.809	.631

We investigated a curve fit between risk performances A curve fit test has been performed and it showed what follows regarding the regression between Risk performance and every model. The Rational model showed the best fit from all the models with the highest value of R in the Quadric and Quebec fit with the quadric fit R square is 0.628 and in the cubic fit R square is 0.650. This has been presented below in Graph (6-7)



Graph 6-7 Rational model curve fit

In Table (6-10), The R value is 0.783, which represents the simple correlation and, therefore, indicates a high degree of correlation. The R Square value indicates how much of the dependent variable (Risk Performance) can be explained by the independent variable, Rational Model. In this case, 62.8% can be explained, which is acceptable. F=42.284 and sig < 005.

Table 6-11 Rational model quadric fit

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.793	.628	.614	.540

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	24.638	2	12.319	42.284	.000
Residual	14.567	50	.291		
Total	39.205	52			

The independent variable is RMAdjusted.

In Table (6-11). the R value is 0.806, which represents the simple correlation and, therefore, indicates a high degree of correlation. The R Square value indicates how much of the dependent variable (Risk Performance) can be explained by the independent variable, Rational Model. In this case, 65% can be explained, which is acceptable. F=30.274 and sig<005.

Table 6-12 Rational model cubic fit

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.806	.650	.628	.530

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.466	3	8.489	30.274	.000
Residual	13.739	49	.280		
Total	39.205	52			

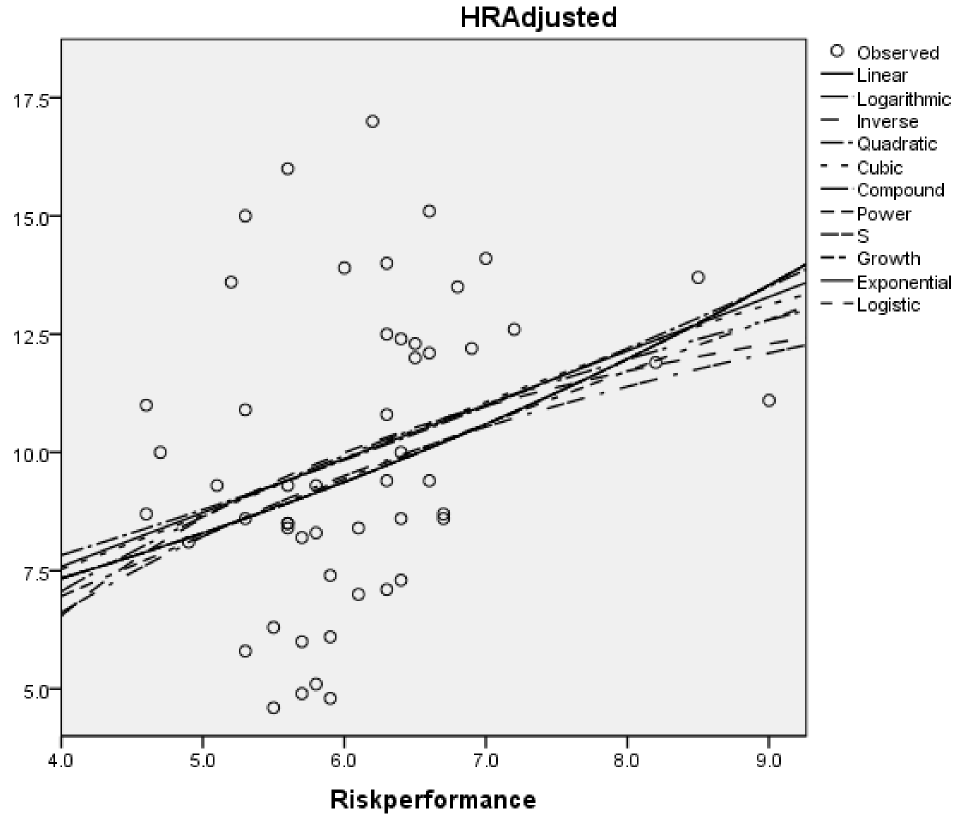
The independent variable is RMAdjusted.

The Table indicates that the regression model predicts the outcome variable significantly well. This indicated by the statistical significance of the regression model that was applied. Here, $P < 0.0005$ which is less than 0.05 and indicates that, overall, the model applied is significantly good enough in predicting the outcome variable.

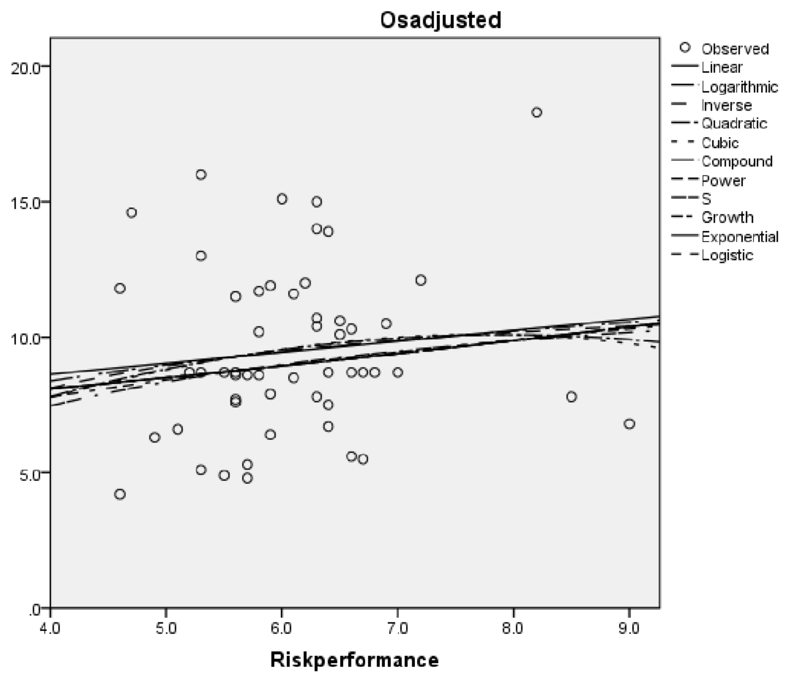
The graph (6-8) demonstrates the curvilinear relationship (cubic, quadric) between risk performance and the rational model. As the Risk performance scale is to be in negative value, it tells that that with the increased dominance of the rational model in the organisation, the company will perform better at risk management. However this increase cannot continue ad infinitum, it will reach a plateau, where any more shift toward the rational model does not cause any an improvement in risk performance, and may even cause a decline. If a quadratic relationship is a reasonable representation then there will be an intermediate optimum (maximum). They are continuous, differentiable functions.

The other models showed lower values of fit with Human Resource providing R square highest value of 0.105 in Cubic fit. Open system Model provided higher R square of value in the “S” shape of R square equals 0.022. Internal Process Model provided higher R square of value in the Cubic and Quadric of R square equals 0.306 and 305 respectively. Open system

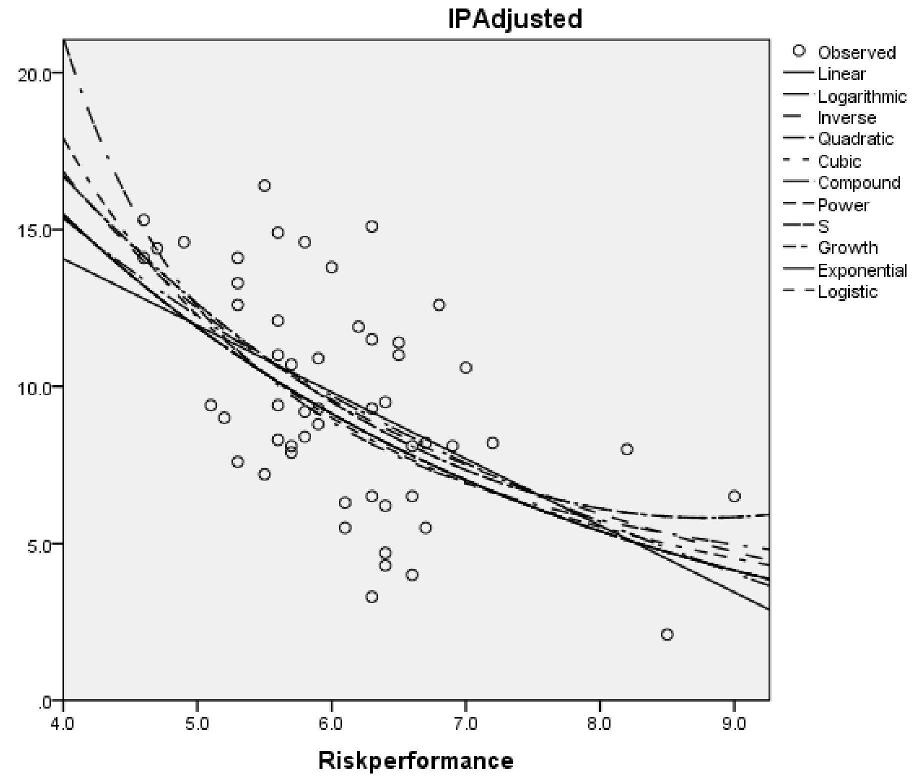
Model provided higher R square of value in the “S” shape of R square equals 0.022. Graphs (6-8, 6-9, and 6-10) demonstrate a visual of that curve fit.



Graph 6-8 Rational model curve fit



Graph 6-9 Open systems model Curve Fit



Graph 6-10 Internal process model curve Fit

Table (6-12) to Table (6-18) investigates the inter-item correlations. The highest correlation values are between Human Resource and Communication of (0.7), Open System and Schedule (0.68), Internal Process and Monitoring (0.68), Rational Model and Risk Performance (0.76), Rational Model and Schedule (0.77), Risk Performance and Cost (0.85).

Table 6-13 Inter-Item correlation matrix

Inter-Item Correlation Matrix

	HRAdjusted	Communication	Goals	Rewards	Culture
HRAdjusted	1.000	.696	.550	.354	.385
Communication	.696	1.000	.286	-.013	.010
Goals	.550	.286	1.000	-.066	-.151
Rewards	.354	-.013	-.066	1.000	-.060
Culture	.385	.010	-.151	-.060	1.000
Osadjusted	.380	.136	.397	.215	.058
Change	.172	.077	-.031	.152	.222
Individualism	.260	.172	.472	-.012	-.160
Creativity	.356	.184	.371	.224	-.062
Growth	-.016	-.178	.080	.074	.065
IPAdjusted	-.013	-.112	-.099	.219	.033
Centralisation	-.232	-.099	-.112	-.244	-.040
Rules	.172	-.030	.123	.324	-.009
Monitoring	-.017	.021	-.135	.201	-.090
Coordination	-.092	-.211	-.239	.027	.302
RMAdjusted	.488	.305	.247	.316	.133
Definedstructure	.505	.581	.282	.078	.019
StrongAuthority	.386	.180	.426	.150	.015
ActiveEvaluation	.264	.068	-.004	.495	.076
GoaldImplementation	.020	-.166	-.221	.262	.280
Riskperception	.336	.046	.364	.108	.174
MarketConfidence	.270	.042	.322	.080	.076
Internal	.274	.105	.300	.011	.208
External	.208	-.043	.187	.133	.222
RPAdjusted	.317	.273	.206	.048	.059
Riskperformance	.320	.264	.207	.082	.044
Cost	.188	.219	.118	-.019	.002
Schedual	.512	.234	.367	.351	.097

Table 6-14 Inter-Item correlation matrix

Inter-Item Correlation Matrix

	Osadjusted	Change	Individualism	Creativity	Growth	IPAdjusted
HRAdjusted	.380	.172	.260	.356	-.016	-.013
Communication	.136	.077	.172	.184	-.178	-.112
Goals	.397	-.031	.472	.371	.080	-.099
Rewards	.215	.152	-.012	.224	.074	.219
Culture	.058	.222	-.160	-.062	.065	.033
Osadjusted	1.000	.534	.593	.559	.538	.171
Change	.534	1.000	.013	-.040	.120	.316
Individualism	.593	.013	1.000	.269	.078	.008
Creativity	.559	-.040	.269	1.000	.068	-.172
Growth	.538	.120	.078	.068	1.000	.222
IPAdjusted	.171	.316	.008	-.172	.222	1.000
Centralisation	-.172	-.037	-.155	-.181	.036	.309
Rules	.157	.014	.206	.014	.140	.417
Monitoring	.172	.547	-.056	-.168	-.011	.676
Coordination	.026	-.134	-.161	.071	.330	.363
RMAdjusted	.312	.062	.068	.462	.100	-.102
Definedstructure	.213	.119	.079	.242	-.006	-.253
StrongAuthority	.293	.070	.307	.287	-.068	.055
ActiveEvaluation	.329	.102	.070	.480	.119	.049
GoaldImplementation	.051	.218	-.273	-.082	.214	.264
Riskperception	.109	-.100	.065	.241	.089	.019
MarketConfidence	-.015	-.278	-.002	.300	-.007	-.093
Internal	.468	.423	.347	-.016	.303	.268
External	.168	.181	.114	.015	.119	.152
RPAdjusted	.097	-.288	.086	.471	.013	-.526
Riskperformance	.112	-.261	.066	.506	-.005	-.534
Cost	-.099	-.368	-.059	.392	-.117	-.592
Schedual	.677	.228	.392	.540	.340	-.007

Table 6-15 Inter-Item correlation matrix
Inter-Item Correlation Matrix

	Centralisation	Rules	Monitoring	Coordination	RMAdjusted
HRAdjusted	-.232	.172	-.017	-.092	.488
Communication	-.099	-.030	.021	-.211	.305
Goals	-.112	.123	-.135	-.239	.247
Rewards	-.244	.324	.201	.027	.316
Culture	-.040	-.009	-.090	.302	.133
Osadjusted	-.172	.157	.172	.026	.312
Change	-.037	.014	.547	-.134	.062
Individualism	-.155	.206	-.056	-.161	.068
Creativity	-.181	.014	-.168	.071	.462
Growth	.036	.140	-.011	.330	.100
IPAdjusted	.309	.417	.676	.363	-.102
Centralisation	1.000	-.242	-.029	.107	-.083
Rules	-.242	1.000	-.015	-.083	.213
Monitoring	-.029	-.015	1.000	-.005	-.262
Coordination	.107	-.083	-.005	1.000	.025
RMAdjusted	-.083	.213	-.262	.025	1.000
Definedstructure	-.206	-.017	-.128	-.204	.658
StrongAuthority	-.242	.320	-.087	-.020	.586
ActiveEvaluation	-.028	.183	-.030	.047	.541
GoaldImplementation	-.001	.087	.179	.229	.478
Riskperception	.087	.112	-.221	.140	.337
MarketConfidence	.114	.041	-.321	.132	.330
Internal	-.233	.250	.233	.015	.102
External	.026	.210	.008	.042	.223
RPAdjusted	-.032	.076	-.712	-.042	.726
Riskperformance	-.054	.050	-.663	-.065	.760
Cost	.053	-.026	-.719	-.080	.604
Schedual	-.323	.262	-.081	.024	.771

Table 6-16 Inter-Item correlation matrix

Inter-Item Correlation Matrix

	Definedstructure	StrongAuthority	ActiveEvaluation	GoaldImplementation
HRAdjusted	.505	.386	.264	.020
Communication	.581	.180	.068	-.166
Goals	.282	.426	-.004	-.221
Rewards	.078	.150	.495	.262
Culture	.019	.015	.076	.280
Osadjusted	.213	.293	.329	.051
Change	.119	.070	.102	.218
Individualism	.079	.307	.070	-.273
Creativity	.242	.287	.480	-.082
Growth	-.006	-.068	.119	.214
IPAdjusted	-.253	.055	.049	.264
Centralisation	-.206	-.242	-.028	-.001
Rules	-.017	.320	.183	.087
Monitoring	-.128	-.087	-.030	.179
Coordination	-.204	-.020	.047	.229
RMAdjusted	.658	.586	.541	.478
Definedstructure	1.000	.395	.150	.040
StrongAuthority	.395	1.000	.024	.153
ActiveEvaluation	.150	.024	1.000	.295
GoaldImplementation	.040	.153	.295	1.000
Riskperception	.183	.207	.112	.055
MarketConfidence	.218	.200	.012	-.058
Internal	-.017	.177	.225	.309
External	.059	.175	.253	.173
RPAdjusted	.482	.245	.358	-.001
Riskperformance	.501	.247	.399	.046
Cost	.395	.087	.295	-.059

Inter-Item Correlation Matrix

	Definedstructure	StrongAuthority	ActiveEvaluation	GoaldImplementation
HRAdjusted	.505	.386	.264	.020
Communication	.581	.180	.068	-.166
Goals	.282	.426	-.004	-.221
Rewards	.078	.150	.495	.262
Culture	.019	.015	.076	.280
Osadjusted	.213	.293	.329	.051
Change	.119	.070	.102	.218
Individualism	.079	.307	.070	-.273
Creativity	.242	.287	.480	-.082
Growth	-.006	-.068	.119	.214
IPAdjusted	-.253	.055	.049	.264
Centralisation	-.206	-.242	-.028	-.001
Rules	-.017	.320	.183	.087
Monitoring	-.128	-.087	-.030	.179
Coordination	-.204	-.020	.047	.229
RMAdjusted	.658	.586	.541	.478
Definedstructure	1.000	.395	.150	.040
StrongAuthority	.395	1.000	.024	.153
ActiveEvaluation	.150	.024	1.000	.295
GoaldImplementation	.040	.153	.295	1.000
Riskperception	.183	.207	.112	.055
MarketConfidence	.218	.200	.012	-.058
Internal	-.017	.177	.225	.309
External	.059	.175	.253	.173
RPAdjusted	.482	.245	.358	-.001
Riskperformance	.501	.247	.399	.046
Cost	.395	.087	.295	-.059
Schedual	.521	.590	.467	.328

Table 6-17 Inter-Item correlation matrix

Inter-Item Correlation Matrix

	Riskperception	MarketConfidence	Internal	External	RPAdjusted
HRAdjusted	.336	.270	.274	.208	.317
Communication	.046	.042	.105	-.043	.273
Goals	.364	.322	.300	.187	.206
Rewards	.108	.080	.011	.133	.048
Culture	.174	.076	.208	.222	.059
Osadjusted	.109	-.015	.468	.168	.097
Change	-.100	-.278	.423	.181	-.288
Individualism	.065	-.002	.347	.114	.086
Creativity	.241	.300	-.016	.015	.471
Growth	.089	-.007	.303	.119	.013
IPAdjusted	.019	-.093	.268	.152	-.526
Centralisation	.087	.114	-.233	.026	-.032
Rules	.112	.041	.250	.210	.076
Monitoring	-.221	-.321	.233	.008	-.712
Coordination	.140	.132	.015	.042	-.042
RMAdjusted	.337	.330	.102	.223	.726
Definedstructure	.183	.218	-.017	.059	.482
StrongAuthority	.207	.200	.177	.175	.245
ActiveEvaluation	.112	.012	.225	.253	.358
GoaldImplementation	.055	-.058	.309	.173	-.001
Riskperception	1.000	.927	.112	.713	.327
MarketConfidence	.927	1.000	-.212	.457	.409
Internal	.112	-.212	1.000	.400	-.174
External	.713	.457	.400	1.000	.078
RPAdjusted	.327	.409	-.174	.078	1.000
Riskperformance	.298	.396	-.209	.056	.687
Cost	.247	.391	-.372	-.015	.648
Schedual	.291	.187	.412	.252	.494

Table 6-18 Inter-Item correlation matrix
Inter-Item Correlation Matrix

	Riskperformance	Cost	Schedual
HRAdjusted	.320	.188	.512
Communication	.264	.219	.234
Goals	.207	.118	.367
Rewards	.082	-.019	.351
Culture	.044	.002	.097
Osadjusted	.112	-.099	.677
Change	-.261	-.368	.228
Individualism	.066	-.059	.392
Creativity	.506	.392	.540
Growth	-.005	-.117	.340
IPAdjusted	-.534	-.592	-.007
Centralisation	-.054	.053	-.323
Rules	.050	-.026	.262
Monitoring	-.663	-.719	-.081
Coordination	-.065	-.080	.024
RMAdjusted	.760	.604	.771
Definedstructure	.501	.395	.521
StrongAuthority	.247	.087	.590
ActiveEvaluation	.399	.295	.467
GoaldImplementation	.046	-.059	.328
Riskperception	.298	.247	.291
MarketConfidence	.396	.391	.187
Internal	-.209	-.372	.412
External	.056	-.015	.252
RPAdjusted	.687	.648	.494
Riskperformance	1.000	.658	.507
Cost	.858	1.000	.241
Schedual	.507	.241	1.000

Table 6-19 Correlations

Correlations

		Change	Individualism	Creativity	Growth
OpenSystems	Pearson Correlation	.558**	.587**	.557**	.529**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Centralisation	Rules	Monitoring	Coordination
InternalProcess	Pearson Correlation	.386**	.419**	.607**	.422**
	Sig. (2-tailed)	.004	.002	.000	.002
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Definedstructure	StrongAuthority	ActiveEvaluation
RationalModel	Pearson Correlation	.615**	.671**	.510**
	Sig. (2-tailed)	.000	.000	.000
	N	53	53	53

Correlations

		GoaldImplementation
RationalModel	Pearson Correlation	.657**
	Sig. (2-tailed)	.000
	N	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Cost	Schedual
Riskperformance	Pearson Correlation	.858**	.507**
	Sig. (2-tailed)	.000	.000
	N	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Internal	External
Riskperception	Pearson Correlation	.112	.713**
	Sig. (2-tailed)	.425	.000
	N	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		RMAdjusted	Osadjusted	IPAdjusted
RMAdjusted	Pearson Correlation	1	.312*	-.102
	Sig. (2-tailed)	.000	.023	.467
	N	53	53	53
Osadjusted	Pearson Correlation	.312*	1	.171
	Sig. (2-tailed)	.023		.221
	N	53	53	53
IPAdjusted	Pearson Correlation	-.102	.171	1
	Sig. (2-tailed)	.467	.221	
	N	53	53	53
Riskperformance	Pearson Correlation	.760**	.112	-.534**
	Sig. (2-tailed)	.000	.424	.000
	N	53	53	53
Riskperception	Pearson Correlation	.337*	.109	.019
	Sig. (2-tailed)	.014	.438	.890
	N	53	53	53

Correlations

		Riskperformance	Riskperception
RMAdjusted	Pearson Correlation	.760**	.337*
	Sig. (2-tailed)	.000	.014
	N	53	53
Osadjusted	Pearson Correlation	.112	.109
	Sig. (2-tailed)	.424	.438
	N	53	53
IPAdjusted	Pearson Correlation	-.534**	.019
	Sig. (2-tailed)	.000	.890
	N	53	53
Riskperformance	Pearson Correlation	1	.298*
	Sig. (2-tailed)		.030
	N	53	53
Riskperception	Pearson Correlation	.298*	1
	Sig. (2-tailed)	.030	
	N	53	53

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

6.5 Results

The linear model provides valid predictions to construct a formula

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889[a]	.790	.773	.4141
a. Predictors: (Constant), RM, IP, OS, HR)				
b. Dependent Variable: Risk performance				

The coefficients extracted from the linear model were as follow

Coefficients[a]						
Model		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		Beta			Lower Bound	Upper Bound
1	(Constant)		13.524	.000	3.819	5.153
	HR	-.037	-.471	.640	-.055	.034
	OS	-.027	-.366	.716	-.049	.034
	IP	-.454	-6.671	.000	-.149	-.080
	RM	.740	9.547	.000	.209	.321

$$b = a_1x_1 + a_2x_2 + \cdots a_nx_n$$

Equation 5 Multi variable linear equation

$$RP = -0.037H - 0.027O - 0.454I + 0.74RM$$

Equation 6 Competing values and risk performance relationship

Where

RP: Risk Performance, H: Human Recourse, O: Open Systems, I: Internal Process, RM: Rational Model

6.6 Validation

To validate the data, external validation were used to check whether the experimental results can be generalised. The full external assessment is conducted by interviewing a qualified, independent external assessor. This approach involved experienced and professional project managers

6.6.1 Description of the Interview

There were two interviews to get a feedback on the outcome of the survey. The interview was conducted on are representative of a client organisation and on a representative of a contractor. The client was from a local council, and the contractor was from an over-seas company.

The idea is to compare what is considered a rational decision making model in accessing risk with the procedure, and what is considered as an acceptable relationship between the contractor and the client considering risk.

The subjects were asked if the decision making process is reflected within the shape and culture of the organisation. The decision process (Figure 6-7) was used as the background layer to investigate the connection between the organisational behaviour and the risk behaviour.

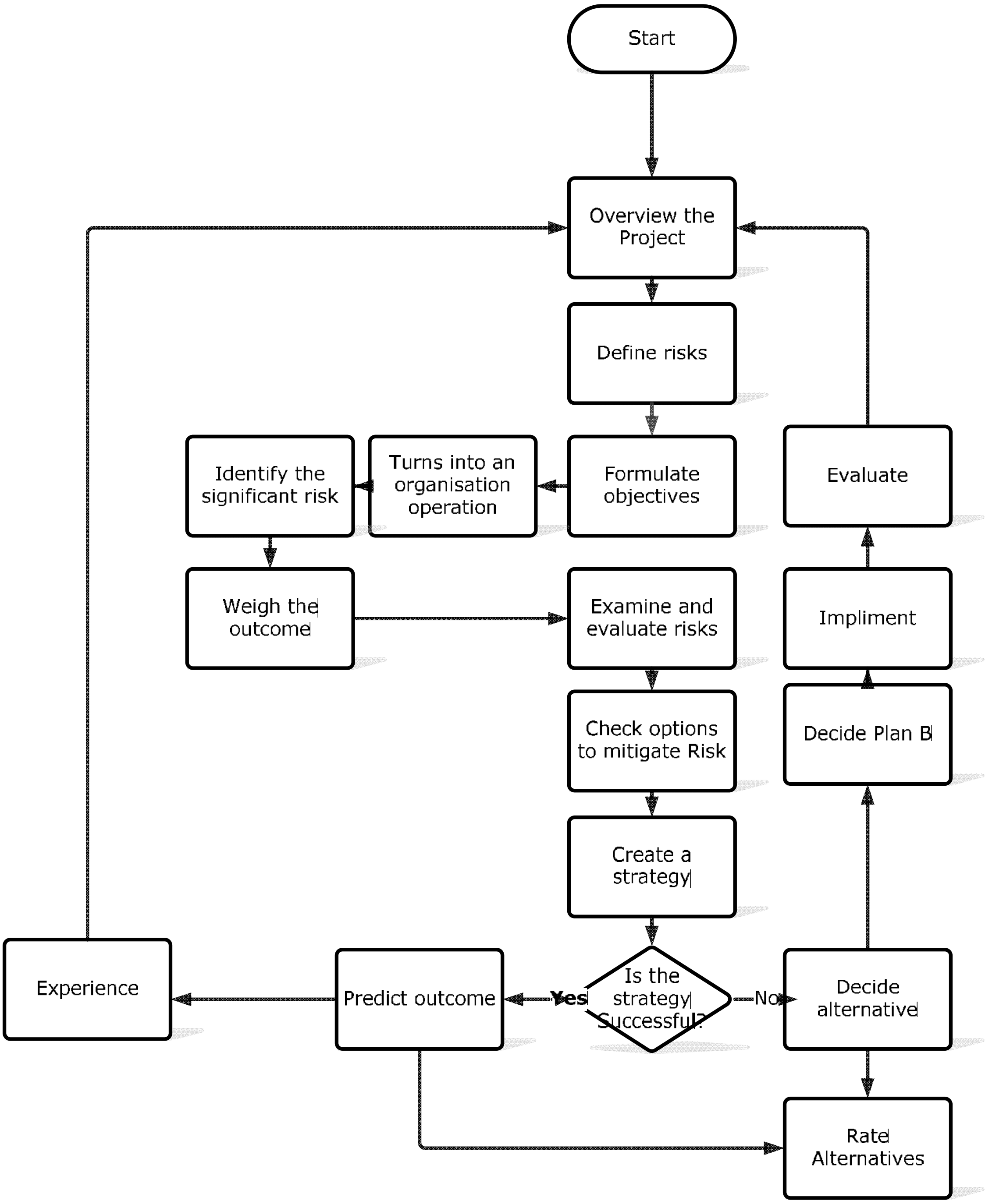


Figure 6-7 Organisational decision process adapted from Robbins *et al.*, 2007

The Table (6-19) addresses the subjects that were discussed the responses, it underlines the main themes of the interview and how those themes are interpreted into understanding the main concerns of the client and contractor risk relationship regarding the organisational behaviour.

Table 6-20 Content analysis

Raw data themes	**Higher order sub-themes**
Uncertainty is the corner stone of risk We all think we are rational in making our decisions We assume that the other party is rational or we won't be able to create a valid relationship	Rational approach is essential
All the organization is becomes eventually involved in the decision process directly or indirectly The feedback of the other party is one of the factors in making the decision	Decision process
The other party should know what's going on in his house better than me I have no influence in managing uncertainty of the other part	Managing client uncertainty
I like to know everything about what I am getting involved into beforehand	Managing project uncertainty
Different clients have different way in managing their organization I find some clients easier to deal with I do categories clients based on experience We don't have usually enough information to see the client within the specific categorization presented (rational model, open system, internal process, and Human resource)	Client organization characterization
I do believe that we carry more risk in the projects than we have to	Risk allocation

6.6.2 Output

The content analyses showed that the outcome of the survey is consistent with the feedback. The objectives of the thesis overlap with the observations presented in the interviews.

- Both agreed that a rational approach to risk management is important.
- Both have related at least partially toward the structure of an organisation decision process.
- The client stated that uncertainty is a problem that the contractor needs to manage.
- The contractor stated that uncertainty increases the risk for both parties.
- The client agreed that uncertainty increases the risk for both parties.
- The client stated the decision making process including managing risk is imbedded within the organisational culture.
- The contractor stated that different groups of clients provide different risk challenges.
- The client stated that it is rational for the organisation to not carry the risk.
- The contractor stated that carrying risks increases uncertainty.

6.7 Summary

The survey consists of 53 respondents of construction clients in the United Kingdom. Multivariate analysis dealt with the statistical analysis of the data collected on more than one (response) variable.

The data shows some significant correlations and acceptable prediction model between the dependant (risk performance) and independents (rational model, human relation, open system, and internal process. There was also a significant curvilinear relationship between the dependant (risk performance) and independents (rational model).

All three proposed relationships have been investigated. While the relationship between the organisational model of a client organisation and the organisation’s risk performance showed significant correlations by outcome of data, the relation between a dominant organisational structure and the construction client and finding dominant organisational structures in the construction client that explains the trend in risk performance is inconclusive as the relationship was not strong enough to provide a generalisation.

The analysis showed that the relationship between the competing values and risk performance is a linear relationship with significant correlations with a good model fit. The values which are represented in the competing values model (Open system, rational model, Internal process, and Human resources) showed that it affects the risk practices and attributes of the client, where The Rational Model has a significant positive influence on risk performance while the Internal Process has a significant negative performance. This relationship was transformed into an equation (Equation 6) and has been validated externally using two interviews which supported the outcome.

7 Chapter seven: Discussion

7.1 Overview

The objective of the discussion is to show the reader that the researcher has established a satisfactory understanding of his subject and that the work has provided additional knowledge to our understanding to the organisational behaviour on the client risk strategy and performance in construction projects.

This chapter covers the discussion part of the thesis. It is divided into three main parts. The first part reflects on the literature review and addresses the models that previous researchers have created and how their work would be beneficial to the objective of the thesis. It tries to connect the dots and see where there are overlaps. It discusses what makes a successful strategy to assessing risk.

The second part reflects on the data and the outcome of the analysis. It shows how the outcome of the data is related to the objectives of the research and explains the outcome in relation to what has been already discussed in the review.

The third part discusses the relationships between the objectives and the outcomes of the research. As this thesis is about the client, the discussion would be about tackling the lessons learned about the role of the client and debating how this role can become more effective in managing risk.

7.2 Reflecting on the Literature

The influence of the client has been stressed through the research as a driving force separated from the perceived outcomes. Researchers address the risk of failing to deliver in terms of financial issues, and what is meant by that is exceeding the projected cost of the project, while the client plays the main role in financing that project in the first place. A sustainable cash flow and strategically-located expenses reduces many of the financial risks.

It is found that the client’s role in this is important when it comes to the clarity of the objective of the project, when it comes with communicating with the structure of the client, and when it comes to the induced risk when change happens to the plan of the client. Researchers address the quality of the project, and the criteria of what a satisfactory quality of a project is.

The criteria start from the design of the project, and as has been mentioned before, the project's quality is an objective that goes beyond the point of delivering the project. It is noticed that with a high profile project quality can become a political issue and the risk of failing increases as struggles between the forces in the project about the quality dominates the procedure.

While this does not happen in the separation of the external environment, managing the external environment has a different strategy from managing the risk induced by the client. The researchers have explored the relationship between the external and internal forces of the risk which has been summarised in what is known as the risk universe described by Vikela (2006).

It is seen that there is strong indication that in failing projects clients, especially strategic decision makers, have a weak appreciation of the nature of the complexities that the contractor deals with and are unaware of developing patterns of events and behaviour that propose underlying systemic structures. Regardless of the truth of that statement, what can be agreed on here is that the client's priorities toward the objectives of the project, rather than the systemic efficiency of the project itself, are a recipe for a high risk project.

The client role is so important. As has been discussed, the clients are the financial source of the project, and with that they have strong bargaining power over all other parties in the project once the contract has been signed and the project is on its way. At that stage the concern of the client shifts toward the shareholders. Shareholders need to blame specific position, rather than integrated system to be happy in case there was a problem. Reason (1997) explains that the important distinguishing feature of high reliability organizations is their collective preoccupation with the possibility of failure. An organisation that defines risk within isolated terms cannot be considered reliable.

To resolve this dilemma, it is suggested (Preble, 1997) that an integrated model of strategic management and crises management should facilitate the reduction of barriers that have been blocking strategic management to provide more widespread practice and legitimacy in the minds of some managers. The strategic management process of a client that does not aim for high reliability and crisis attentiveness is a failing strategic management process and will lead to an induced risk for the project.

Regarding environment, it is seen that high risk attitudes are the aspects of the client that discards the environment caused by the client culture itself. The paradox which emerges here is that the client, who discards the importance of its own system approach to deal with risk in the project, and focuses on error instead in isolation of the environment, is a reason of induced risk. Although this can be credited to the pressure by stakeholder groups who are affiliated with the objectives of the construction project, the culture of the company influences how the company deals with the environment. For example taking a reactive approach rather than the pro-active approach in dealing with environmental factors, would find itself more compatible with that culture the company has taken, even if that approach is less efficient in dealing with risk.

It can be argued that the operations of the project itself part are mainly the responsibility of the contractor, with all the elements of design, equipment, procedure, operation, supplies and materials, and the environment. Usually what defines a good contractor is the ability of the contractor to utilise and manage those elements to reach for the base objective of the project (time-cost-quality). This means that there is a theoretical explanation of how the organisation model can affect risk performance. As Figure (7-1) shows, an organisational model can be positioned in a suitable zone to define its effect on the risk management attitude and therefore risk performance.

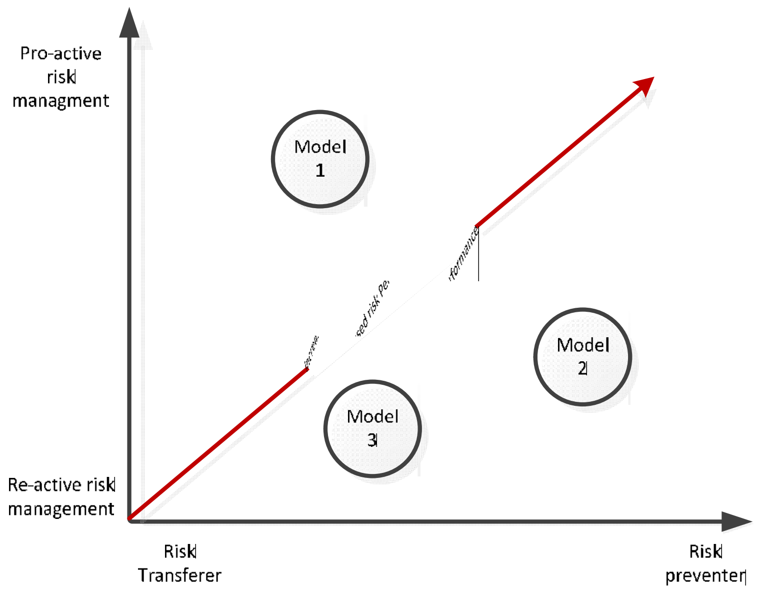


Figure 7-1 Relationship between risk attitude and risk performance

It is common to divide the risk source in term position (external and internal). When researching the risk management measurement and determents (Reza *et al.*, 2011), it is found that the collective of the risk management can be divided into two main risk categories, which have more relevance to practice, direct and indirect.

Direct risk sources are harder to forecast. They are based on the human resources, the organisational behaviour, and technological mishaps. Indirect risks are easier to predict and harder to change. However they alter our ability to manage direct risk and cause an increase in the damage. These risks are associated with the political atmosphere of the project, the capability of the infrastructure to support the project operation, and the regulations that the contractor needs to uphold. Figure (7-2) shows a simple model, where those direct and indirect forces work within the natural environment of the project. Analysis and assessment is a continuous process, which is necessary for an effective risk strategy.

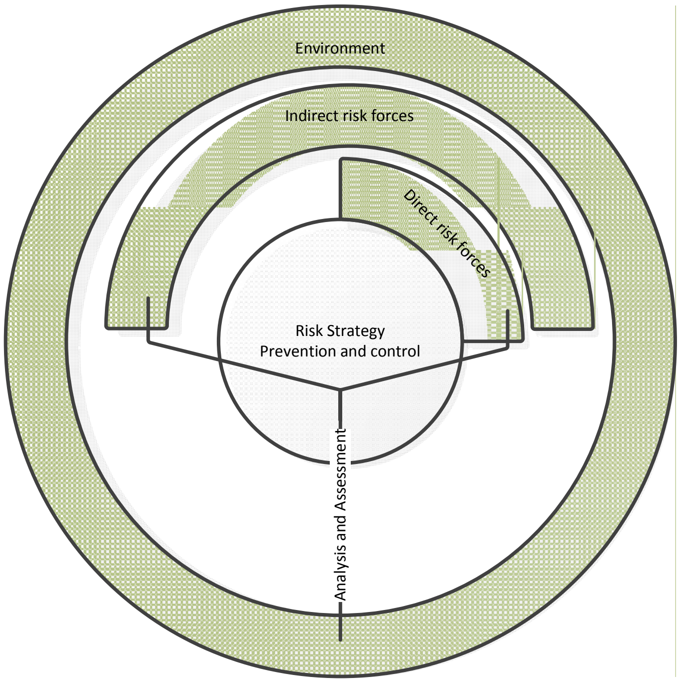


Figure 7-2 Dealing with risk environment

The variables of the organisation are investigated to determine its approach to managing risk. Many aspects of this have been covered using management theories. However there are three main features that dominate the organisation attitude toward managing risks (Smallman, 1996).

Structure: influences the decision making process and the infrastructure of the organisations. The key dimensions for this are based on the formality and informality of limits, where informality allows an effective response to risks all over the organisation. The other factor is centralisation versus decentralisation, where decentralisation means that risks are the responsibility of all departments.

Strategy: the direct influence of the management on the course of the organisation. As it was explained before, a strategy which tries to prevent risk rather than relocate it is more effective.

Culture: the values that effect the actions of the individuals and inner parties to the way they handle the environment. As has been explained, a pro-active risk management culture is more successful than a re-active one.

If the competing value model, which was used to categorise the clients in this research is looked at it, it will be noticed that it uses focus and structure to define its models. This mainly covers the cultural and structural aspect of the organisation. The strategy is more of an individual characteristic of the organisation. The Framework makes clear that achieving valued outcomes in each of the quadrants is crucial for organizational effectiveness over the long term. Managers would consider multiple outcomes in each of the quadrants, as they pursue value creation strategies. Narrowly defining value to include only financial outcomes might end up producing only short-term results while compromising long-term value creation.

To integrate a risk management within the organisational structure, you get to connect every variable from the risk strategy models (structure, strategy, and culture) with every variable of organisational structure (structure, strategy, context, and effectiveness).

7.3 Discussing the Data

Our research has shown significant correlations between Risk perception and Risk performance. This is not surprising. Client engage in risky events on daily basis and this ubiquity has encouraged a substantial effort within the industry to understand how people understand risk. Clients are seeking to manage risk, and they are all predicting because if they knew for certain, they would not be dealing with risk. This is caused by the definition of risk, as in any definite situation, an adverse outcome may or may not occur and causative factors skew the probabilities of diverse outcomes.

As it has been explained before from the literature, the issue of perceiving risk has different stages to it. One of those stages is whether clients do face risk voluntarily. That would certainly be based on how severe they perceive the risk to be. For the client to be positioned to choose if it is a rational decision to take that risk or not, they must rate that risk internally.

The second dimension would be about the immediacy of the effect and the clients would have to analyse how far or strong the connection is between the outcome and cause, as in the stronger the connection is the more probable the outcome is. The third dimension would be about whether the client would know precisely if one is exposed to take those risks, therefore there is a definitive answer to whether an action will be taken or not.

The fourth stage would be for the client to evaluate the severity of the consequences of that risk. It is unlikely that clients would consider that the consequences would be impossible to mitigate at this stage or they would not have accepted to face them in the first place. The fifth stage would be testing the level of control, as in the internal skills, where the client has to decide that one has the ability to demonstrate good skills in managing risk. And finally, it is about the newness of the risk. If the risk has been experienced before then the client would be able to repeat tested methods to manage it. If the risk is new then innovation would be important.

Our research has shown stronger leaning toward the Internal Process and weaker leaning toward the Human Relation behaviour. This can be explained by the definition of the internal process model. The internal process model is a model mainly focused on control. According to Quinn (1981), this model is dominant in organizations, which have large and complex scope and scale, where government regulations and standards determine business practices, and therefore failure is not an option for its projects.

The sample investigated in this study was organisations which are large enough to have investments in the construction industry. Investing in this industry should put the mentioned concerns in the core of the strategy. It was explained in the beginning of the chapter how high the stakes in investing in a construction project are. Therefore, regulations dominate the environment by which this industry is active.

The purpose for this model is to provide efficiency. Efficiency has become a major concern for most industry nowadays, especially in the current climate. The model relies on implementing large-scale technology and systems, applying continuous improvement processes, complying with regulations, and adhering to standards.

As this model shape is financially driven and shaped by budgets. It is more likely that those organisations have a cost-based milestone attitude. As it was explained in this chapter, taking a risk management strategy, which is based on avoiding cost, is counterproductive. That does not mean that adopting the internal model will result in adopting that strategy, but between the four models, this one shares more of the objectives than the rest.

There a weak leaning toward open systems. This is not a surprise; open systems tend to be less common in all management strategies. Generally management is too structured, and focuses on barriers. On the other hand, the human relation model is the least likely of all the models to prevent creativity. It establishes a method for identifying the key elements of success and/or failure as they relate to the achievement of a defined objective, and what defines those elements is up to the creativity of the people involved in the identification.

Transferring that into a risk management strategy, the risk management process would use a cause and outcome analysis to explore the drivers of success or failure, or on a smaller perspective identifying the real costs. Risk management here is presented as the key elements of success and/or failure are identified. Utilising the human resource would help to identify a range of possibilities beyond the established protocol when it comes to considering what will cause an objective to be successful, as well as what may cause it to be unsuccessful. This way, risk management would be able to establish which objective may be an enabling or controlling action or strategy for a raised level of risk. Identifying the high risk objective would be initially the responsibility of the client.

When testing the correlation between the competing value model and the risk performance an r value of 0.619 was found, this is significant. The coefficient of determination R2 showed a 36.3% proportion of variability. This is used in the context of statistical model used based on the variables of Rational Model, Internal Process, Open Systems, and Human Relations. This provides a good measure of how well future outcomes are likely to be predicted by the model, especially that there is previous established research linking some the managerial trends with risk management performance.

The linear model of

$$RP = \alpha H + \beta O + \gamma I + \delta R$$

Where

RP: Risk Performance, H: Human Recourse, O: Open Systems, I: Internal Process, RM: Rational Model

This showed that the Rational Model has a positive influence on risk performance while the Internal Process has a negative performance.

It is acknowledged that the highest importance of decisions are made during the early stages in the project life cycle and the cost implications of decisions which are prepared at this time would have a dramatic effect on the overall feasibility of the project. Therefore, the organisation's managers' and stakeholders' involvement in the early stages of the project cycle is critical, as this is when high level strategic decisions are made, which would affect the overall business development and procurement strategies.

Previous studies have shown that Risk Management commences during the pre-design phase (which is also referred to as the 'conceptual' stage), where proposal outlines and sketch designs are completed. This conceptual stage is concurrent with the feasibility study performed by the client, or before that in some cases, especially in larger projects.

It can be established from the data collected that the choice of risk approach depends partly upon the adopted organizational metaphorical representation. However, the degree to which clients really do make a judgment regarding their adopted approach cannot be established. The propensity for clients to employ an inappropriate perspective for the design process has already been researched.

The evidence in this study supports the conclusion of a linear relationship between rational model elements and risk performance in construction clients: the relationship between the two variables is positive for low and high levels of rational goal, and negative for intermediate levels of rational goal. Therefore, it is considered that the investigation into a relationship between the model and performance is significant, since the relationship between one of the model corners and risk performance on the level of organisational performance, and is consequently non-linear.

As the sample tested was referring to organisations, they all come under the pressure of shareholders, or stakeholders in case of government-owned institutions. As the rational elements also push toward managing performance through objectives, it would make it easier for organisations with different layers to measure that performance. The rational model is strongly based on return on investment criteria to measure success, rather than budget adherence and counting failures. It is more suitable for high pressure environments and pay for performance contracting.

This would explain the similarity of the behaviour of the rational model with the quadratic curve. A quadratic function's vertex is at the point in between the x intercepts where: if the parabola is pointing upwards is the lowest point, if the parabola is opening downwards is the highest point. At the extreme points of the curve, a dominant value will have a positive effect on risk performance.

To summarise the positive attribute of the rational model in relation to risk performance with one word it would be clarity. The rational model emphasises the clarity of goals, the clarity of implementation and the clarity of authority. The results – from the survey that was tested – show that there is a relationship between the organisational behavioural structures and risk behaviour, and that the rational model is the most influential value model that impacts positively on risk performance.

The model is very methodological; it relies on specific measures to define what is good and bad for the project, which are budget adherences, milestones achieved number of failures, and regulatory compliance

There are other factors to be taken into consideration, even putting aside other established factors regarding risk. For instance, two organisations using the same model would apply it and relate to it differently. First, the level of maturity of both processes and practices between different organisations would be different, with some having more experience or there could be compatibility issues within the organisation itself. For example an organisation could apply the human relationship model because this model follows the objectives and the values of that organisation. However, there are unfitting elements within the organisation that makes the model behave differently from the way it is intended to.

The second is that there are dominating decision making processes that will override the cultural perspective and at the same time can have unpredictable outcomes. That makes it hard to include and even harder to exclude.

Third the structure of the client industries and of the organization of project personnel can be dissimilar. The construction relies heavily on long-term partnership arrangements, and clients who invest a lot in the construction will have a division specifically to deal with the project personnel. This division can be a good buffer between the client industry and the construction project.

And the fourth factor would the multi-layering of processes and practices with the organisation. While the uniformity of the culture within the organisation has been confirmed in literature, the way this culture transfers to the strategic, managerial and operational level would vary on micro factors. The clarification of those factors within the organisation to the management will allow it to manage the project successfully and integrate each section with the general operation. Some organisations are better in this than others.

If those variables were implemented on an onion model of a company, the outcome would be something like Figure (7-3), where layers work as buffers between an objective and implementation.

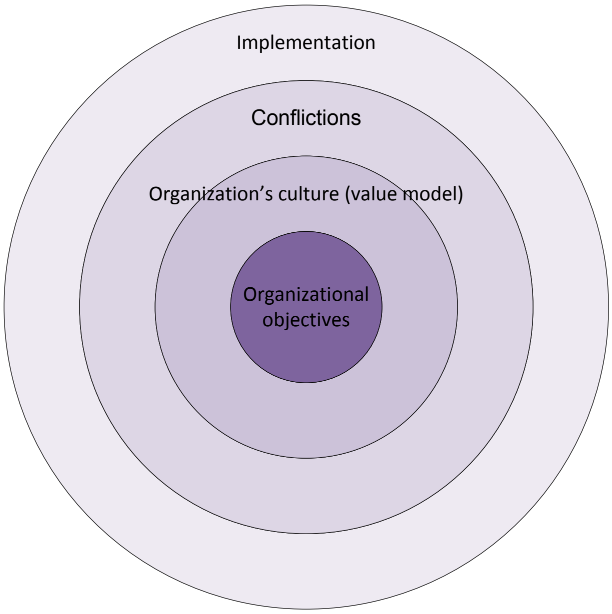


Figure 7-3 Buffers of implementation

As has been established, clarity provides a good base for an organisation to manage risk. However, it is needed to think of how this clarity can benefit the organisation in the project. The organisation needs to deal with their risk in terms of problem solving. In terms of nature and content, reaching design and construction process, the management needs to consider the development of a solution from a need identified in the project objectives or internally within an organization to the implementation of that solution.

Figure (7-4) shows us that this decision process is multi-layered and it would be unfeasible for the management team to simply pre-decide a management style that will help them with managing risk in future construction projects.

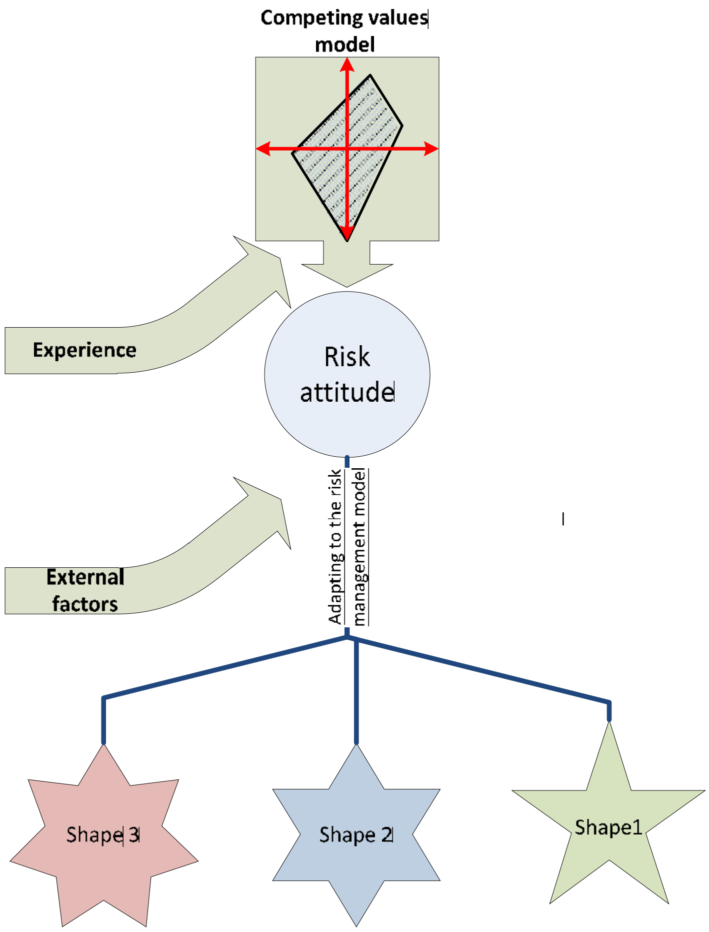


Figure 7-4 Relationship between competing values and risk decisions.

The client would benefit from improving the risk performance by adopting positive values. Clients have high confidence of their choice of method but less regard for the feedback. A collection of anecdotal evidence shows us that when this power produces an ill-defined project or it constantly changes goals, it will reach to failure in the project (Holt *et al.*, 1994).

7.4 Objectives and the Outcomes

The data analysis provided this formula to describe the relationship between risk performance and the behavioural values

$$RP = -0.037H - 0.027O - 0.454I + 0.74RM$$

Equation 7 Competing values and risk performance relationship

Where

RP: Risk Performance, H: Human Recourse, O: Open Systems, I: Internal Process, RM: Rational Model

The outcome is linear relationship which signifies the rational model.

One of the objectives was to explore the behaviour characterisation of the construction client in the management of risk within the project environment, and to explore the importance of client behaviour on the project risk While there was not a disagreement between the contractor and the client and what constitutes a risk, the disagreement was where to define the responsibility for managing that risk. The research explored the importance of client behaviour on mitigating the project risk. It is to be said that this feedback cannot be used to determine a general position for that responsibility position. The first reason is that this is not a sample to be a representative of any sector of an industry; it constitutes an understanding of the previous findings from a more personal perspective to explore if the conclusions sound familiar within the industry.

The other reason, which is more important, is that the allocation of risk is determinant using the contract normally. As this was not a case study into a specific relationship with an active project, it would not serve that purpose. However, the outcome was interesting, as there was the parties reached an agreement rational approach to address risk management in the project should be used. The rational model again is shown to be a positive force for risk performance within the construction industry.

On the other hand, defining rationality can be problematic. The subjective term for rationality is mathematical in origin, but it reflects on the systematic approach to things. In the case of project management a rational decision is one that is not just reasoned, but is also optimal for achieving a goal or solving a problem.

When identifying the values, which affect client risk management, determining optimality for rational behaviour required a quantifiable formulation of the problem, and the making of several key assumptions. When the goal or problem involves making a decision, rationality factors in how much information is available. Collectively, the formulation and background assumptions are the model within which rationality relates to. Illustrating the relativity of rationality: if one accepts a model in which benefiting one is ideal, then rationality is equated with behaviour that is self-interested to the point of being selfish; whereas if one accepts a model in which benefiting the group is optimal, then purely selfish behaviour is deemed irrational. It is thus pointless to proclaim rationality without also specifying the background model assumptions describing how the problem is outlined and formulated as part of investigating the importance of these values in affecting risk management practices and attributes.

To show how those values transfer risk performance from the organisational into the project a question was presented, if the rational process is rather obvious and is the same everywhere, why would some parties act differently when faced with different value backgrounds? First, rationality can be limited to its own closed system, the game theory showed that limitation and how can each party seeking its own benefit can cause a negative impact to all parties. The other reason is related to the power relationship between the client and the contractor. The bargaining power which has been explained in Porter five forces when relating to the market.

Each party will seek to gain the upper hand, as a higher power decision will always be seen as a positive and a productive force. This element would not be seen as restricting for the dynamics of the project. This means in an orthodox organisational culture it would be important to attain a high power with less risk, although this would cause a paradox.

With the universality of Control being seen as a relation empowerment beyond the centre of the organisation, the idea of increasing the bargaining power of each party means that it will provide a dynamic approach to exercise the control over the project. Even without much influence over how the risk is managed, but more on how the risk is allocated.

This is considered to be a rational decision because our knowledge of the power dynamics concludes that when there is a power struggle the party with the stronger hand will win. As the relationship between the contractor and client is seen as a power struggle, those organisations will seek to decrease the power of the other party, because this is a culture that takes an adverse attitude to risk. As there is a value model adopted by the organisation, how would the organisation exercise the power within the boundaries of that model? The interview concluded that it resides with the issue of uncertainty. Parties will try to decrease uncertainty in their part so that they will decrease the risk in the project.

In the human relation model, gaining information would be the strategy in implementing risk minimisation. The open system would rely on differentiation to tackle uncertainty. The internal process will rely on regulation and constructed plans to manage risks. The rational model will reply on quick responses to problems.

While all those methods are reasonable and practical ways of addressing risks, each would perform differently depending on the environmental factors and the type of risk the organisation will face. More importantly, the success of any risk management strategy depends on the relationship with the contractor and how the risk is allocated optimally between the parties. This is where the rational process is different from the basic line to process, as the problem is not in defining rationality, but in defining the optimum place for both the power position for the client and contractor, and the optimum allocation for risk. This has been asserted by Miles and Snow (1984) in defining the optimal risk management position and by Smallman (1996) in defining organisational attitudes toward risk.

The relationship between clients and contractors is seen to be moving toward a different affiliation as the clients are seeing a transformation of responsibilities and risk from the clients' management to the contractors' responsibility as part of managing the project. This is caused by the clients using outside services from their non-specialities and finding help from experienced services and contractors. This is more common when there is a technical issue that needs to be dealt with that is out of the financial benefit of the client.

However, this might cause a problem in the client's long term understanding of to their responsibilities in the project. As with responsibility, experience in risk management is built. Clients who decide to distance themselves from that responsibility and position themselves in an area of funding only, have been a source of complaints by the contractors.

The contractors can define this typology of the client as an increased source of risk for the project, as clients who are disconnected from process of the project have already been shown to be of lower risk performance by many researchers. The clients however would not have a problem with strategic partnership if that partnership is seen a rational decision to the benefit of the project.

Experience is how the client can see the benefit of such process. Experience does play a part in developing the confidence and the tools in understanding how it is possible to integrate processes like supply charts and risk management. This is a different approach from the original three-based objective approach to the success of the project, cost, quality and time. As the language changes, the objectives are described with different terms imported from the management school in the way business deals with its risk and implementing product strategy, where cost becomes return on investment, quality becomes performance, and time is window of opportunity.

The other objectives of the research are to identify the values which affect client risk management, and to investigate the importance of these values in affecting risk management practices and attributes. The organisational decision process forms through rational decisions, as presented in every single model that takes on this process. Having an overview of the project is the first important step. The common factor for risk was uncertainty. Not knowing what is to be expected at every stage would be a recipe for disaster.

It has been discussed before that the role of the client in creating the roots of risk or managing them from the beginning, as it starts as the project is being underappreciated. Any model of risk perception would be initialised based on whether the client decides to evaluate a project in a specific environment and for a specific usage (Zhang, 2007).

Addressing the risk is a complicated process that has to be systematic. However, theories often suffer from a low success rate when practised on the ground. This is especially true of the theory that more than one partner plays a role in inducing the risk. Overlooking the effect the client has on inducing risk will have a negative impact on the strategy the project manager has to manage the risk.

This provides guidance to define the client attributes that are sensitive toward project risk, or attributes, which are not initially sensitive within a project. The role of the client starts from their background, which is affected by cultural and organisational influences and this might drag their attitude toward risk into real practice in the project. This rule might have been undervalued due to clients' lack of interest in taking responsibility for managing the risk, but the changes in technological and financial tactics in construction could bring that role under stronger investigation. Managers can use these investigations and the outcome of these studies to improve their methods in dealing with the complexity of managing risk and reducing it in the early stages.

7.5 Summary

This chapter has placed in context the results of the analysis and provided explanations as to why clients address risks in different ways and how the way their organisation works affects that, which is part of the objective of the thesis.

The chapter discussed the outcomes of the thesis. It addressed the data and how the data has been understood through the previous models and concepts, which were addressed in the literature review. The data provides a framework, which was developed in defining the client in term of risk assessment. As one of the objectives of this thesis is to address the parameters of the client so the client risk performance can be modelled by analysing the parameters of the organisational behaviour of the client.

The evidence in this study supports the conclusion that there is a relationship between rational model elements and risk performance in construction clients: the relationship between the two variables is positive for low and high levels of rational goals, and negative for intermediate levels of rational goals.

8 Chapter eight: Conclusion

8.0 General Aspects

The role of the client has not been adequately put into the equation of managing risk in the early stages of project, compared to other factors affecting risk. Addressing this role in depth and identifying generic features of the clients' risk management is where the focus of the research lies. The research investigated the clients' history in managing projects, in terms of their perception of risk, organisational behaviour and the performance of clients during the project. The outcome identified the organisational behavioural patterns of the client, which are responsible for inducing risk. This identification should enable managers and investors to link the behavioural pattern and organisational style of the client to the risks associated with projects.

8.1 Significance of the Research

The background to the research lies in the need to develop a good model to characterise clients, which integrates construction management theories. It is particularly important to consider risk management and business strategy theories in the area of organisation behaviour. As the research review progressed, it appeared that insufficient information was known about the nature of client-generated risks. Developed cases, which had a controversial relationship between the client and the project, proved to be an ideal source of the required information. Other than special cases where the environmental risks were disastrous, contractors are increasingly concerned about the influence of the client in inducing risk within the project by miscalculating the situation the client is putting the contractor in. This miscalculation becomes critical during providing the initial information of the project to the client or during any changes that happen to the project. Whether these worries are caused by failing to appreciate the nature of the complexity of different projects or by inherited problems within the organisation of the client, this has to be addressed by studying the nature of the client and their experience.

8.2 Summary of the Work

The thesis started by covering the literature and developing layers of different themes which can be used to understand the client. The literature review involved having a framework and importing theories used in business schools for analysing operations in organizations and then trying to reflect them on the construction projects.

The application of both quantitative and qualitative research approaches, which was based on survey and interview research methodologies, proved to be more powerful than one single approach in this type of research domain. The research work packages introduced in Table (5-3) were achieved by employing a range of research methods during the four phases for fulfilling the research objectives, namely: literature review; interviews; questionnaire survey; and case study research. The key limitations will also be outlined in this chapter. Managing risk has always been problematic for the construction industry and one of the reasons for this problem is the limitation of the risk management approach when managing a wider spectrum of the construction project cycle. This demonstrated the need to broaden the appreciation of how risk is managed beyond the traditional means, as it has been realised that insufficient information was known about the nature of generated risks.

The evaluation process, which covers different relationships between the environment and the project, showed that miscalculation becomes critical when providing the initial information about the project to the client or during any changes that happen to the project. Whether these worries are caused by failing to appreciate the nature of the complexity of different projects or by inherited problems within the management of the client, this has to be addressed by studying the nature of the client and the client experience.

The patterns of the risk identification, which are responsible for detecting risk, were investigated. The work of other research into risk has been covered, including the development of models to characterise risks, which were based on construction management theories, especially in the area of risk management and business strategy theories. This showed the project management team evaluate and categorise the risks associated with the project. The rating, management planning, and monitoring are the three main stages of managing risk.

The methodology that determines the many factors that play balancing roles in defining those risks and how they are prioritised was studied. However, there are limitations in the way risk is managed, and this demonstrated the need to broaden the appreciation of how risk is managed beyond the traditional means, as it has been realised that insufficient information was known about the nature of generated risks.

The evaluation process, which covers the different relationships between the environment and the project, showed that miscalculation becomes critical when providing the initial information about the project to the client or during any changes that happen to the project. Whether these worries are caused by clients failing to appreciate the nature of the complexity of different projects or by inherited problems within the clients' management, this has to be addressed by studying the nature of the client and the client experience.

The definition of the client as a risk manager in the construction industry was covered, and showed the influence of the cultural identity and the organisational structure in defining the risk strategy for the client. Different models of what shape or process the cultural identity of the organisation of the client is were covered. The models showed a multi-layered system with a two way route for transferring information. The models showed the challenges in influencing the decision making process for the client, especially when dealing with core cultural identity.

The clients' history in managing projects by looking at some case studies was explored, and the ones covered in this chapter are the cases of the new Wembley stadium, Scotland's new parliament, and BAA's terminal 5. This has provided an understanding of how important the role of client decisions are in the project and how these decisions will reflect on the outcome of the project in terms of the project's objective. This has also provided a framework based on the relationship between the client and the project's operations.

It was found that the client's role in this is important when it comes to the clarity of the objective of the project, when it comes with communicating with the structure of the client, and when it comes to the induced risk when change happens to the plan of the client. Clients' priorities towards the objectives of the project, as in certain objectives are prioritised, rather than the systemic efficiency of the project itself, are a recipe for high risk project.

The clients are the financial source of the project, and with that they have strong bargaining power over all other parties in the project once the contract has been signed and the project is on its way. The strategic management process of a client that does not attempt for high reliability and crisis attentiveness is a failing strategic management process and will lead to an induced risk for the project. The client's behaviour towards risk originates in its rationalisation of risk and the client's internal protocols, as in the organisational cultural and its internal forces, which affect its change attitude and its inclination to fall in organisational crises.

The client reacts to risk in projects in the same way as the client react to the general environment, as a client's strategy reflects in the survivability of the client in different environments, and client's strategy derives from the client's organisational focus, which reflects the way the client adapts its objective in different environments, and how it divides its resources. To predict the client's risk behaviour, it is necessary to observe the client's commitment to the organisational goals and analyse the different layers of organisational culture of the client. This will reflect on the client attitude toward risk within the construction project. Leadership is important, as it facilitates intervention to manage risk when needed, with the behavioural model becoming part of the organisational structure; personal traits are becoming less important when dealing with project management. Failure in communication is one of main reasons for failing in managing risk. The failure in the communication process can happen in any part within the agreement between the client and the contractor. Trust can face the same outcome and will cause failure in risk management; the problem is that when risk is identified as high, trust between the parties is the first thing to suffer.

As risk management is a modern management strategy, it is still going through development. The development covers the territorial aspects of positioning risk between the client and contractor. This growth has broadened the concept of risk management and risk management is pushed to engage with another layer of that management strategy that goes beyond the project and into the organisational behaviour of the client. A model that provides an overview of how the elements investigated work together with the organization and reflect on risk was used as a base from which to develop the survey. Elements were weighted based on the feedback and this will help future researchers to develop a scale on which different variables can be included when reflecting on risk assessment methods.

Measurement of each element depended on the consequences and their status within the project. The research looked at the linear interactions within any logic in defining risk within the construction project and identified those elements, which are expected by either a familiar production or maintenance sequences to induce risk. In addition risk can be in a visible form but unplanned, or in an invisible form. An association between causes and the outcome system showed which generic behaviour is associated with high risk and which is not. After filtering these elements based on their relevance and their potency, a framework was developed and then compared with frameworks used by other approaches in characterising clients.

The collected data from the interviews and case studies were transferred into a conceptual framework. The reason for choosing this method is due to the qualitative nature of the research. There are criteria to show if an organisation is a crisis prone organisation or not; and there are criteria to show if a style of a managing risk is effective or not. A comparison between the client behaviour and these criteria were used to show a relationship between client behaviour and induced risk situations.

There were two groups of data, the first were collected in a survey, and the second from interviews. The data show some significant correlations and acceptable prediction model between the dependant (risk performance) and independents (rational model, human relation, open system, and internal process. There was also a significant curvilinear relationship between the dependant (risk performance) and independents (rational model).

The research ended with discussing behavioural models that the organisation can fit into and then be analysed. Those behavioural models are then associated with risk tolerance and risk performance as leading measurements. The literature demonstrated that there is a transition from the client classification to the client behaviour and ending with the client influence on the outcome of the project. Risk performance is strongly reliant on the internal relationships within the organisation and within the construction project itself.

The strategy is more of an individual characteristic of the organisation. Quinn (1981) had solved the integration between the organisational structure and the organisational layering to analyse the relationship of the organisation with the internal and external forces. To integrate a risk management within the organisational structure, you get to connect every variable from the risk strategy models (structure, strategy, and culture) with every variable of organisational structure (structure, strategy, context, and effectiveness).

8.3 Response to the Objectives

The first objective was to explore the behaviour characterisation of the construction client in the management of risk within the project environment. Construction risk is part of a functional system that extends to the client risk performance. The literature review covered the concept of risk management in depth and identified generic features of the clients' risk management. It investigated the history of risk management in managing projects; in terms of classification of risk, system development and the performance of risk management during construction projects. The model of classification was based on dividing the risks into financial, strategic, hazard and operational.

The second objective was to explore the impact of client behaviour on the project's risk. The client's organisational behaviour contributes their behaviour when faced with risks in construction project within the construction project. Where the project does get adapted, the contribution of the client is crucial from the preliminary phase, as at this stage the notion of uncertainty is inherited in the project. However, the recommendations, which have developed based on the experience of the industry are not client specific, those conclusions can fail on some level to recognise the risk involved with a specific category of a client.

The third objective was to identify the values that affect client risk management. Risk performance is strongly reliant on the internal relationships within the organisation and within the construction project itself. Identifying and managing risk is an essential part of managing the project; it is impossible to successfully manage a construction project without successfully managing the risks associated with it. Risk can only be seen within a functioning system, rather than as a separate element. It acts within a multi-layered universe, which is integrated within the project lifecycle itself. Risk performance is associated with both high risk sensitivity and a methodological approach to managing risk.

The fourth objective was to investigate the importance of these values in affecting risk management practices and attributes. The values, which are represented in the competing values model (Open system, Rational model, Internal process, and Human resources), affect the risk practices and the attributes of the client. By reading the risk performance of an organisation and correlating it with its organisational culture using the competing values as a reference, observers would be able to determine the relationship between organisational behaviour parameters and the risk performance of the client. This will enable us to adapt to suitable determinants regarding the relationship of the client organisation with the project.

The fifth objective was to show how those parameters transfer risk performance from the organisation into the project. Those values influence the risk performance of the client. The research focused on the drivers responsible for defining the risks of the project to the client. This has showed inherited risks, which have been seen in the client performance to the project, as being separate from the environmental risks associated with the project. It showed that problems do start from an early stage of the project. This has shown the impact of the shape of the organisational style of the client and the client strategy in identifying and managing risk in construction projects

The sixth objective was to provide an outcome in terms of guidance to define the client attributes that are sensitive toward project risk, or attributes which are not initially sensitive within a project. The Rational Model has a positive influence on risk performance while the Internal Process has a negative effect. We conclude that the client behaviour is considered to be a rational decision because our knowledge of the power dynamics will determine that when there is a power struggle the party with the stronger hand will win, and as the relationship between the contractor and client is seen as a power struggle, those organisations will seek to decrease the power of the other party, because this is a culture that takes an adverse attitude to risk. This is where the rational process is different from the thought process of bargaining, as the problem is not in defining rationality, but in defining the optimum place for both the power position for the client and contractor, and the optimum allocation for risk.

8.4 Summary of conclusions

The research has confirmed that the client has a role that affects the risk management practices in the construction industry. The role of the client extends to both inducing and preventing project risk which makes assessing that role an essential part of any project appraisal.

The research also established that there is a strong relationship between organisational behaviour parameters and the risk performance of the client. The essential parameters that determine organisational behaviour are Human Resource (**H**), Open Systems (**O**), Internal Process (**I**), and Rational Model (**R**) and can be represented as a competing values framework.

The modelling of the relationship between the competing values and the risk performance showed that the interaction between the two sides of the relationship is linear.

The model that emerged from the analysis showed that the parameters represented in the competing values framework (namely, Open system, Rational model, Internal process, and Human resources) affected risk practices and attributes of the client in different ways. The outcome specifically showed that the Rational Model has a significant positive influence on risk performance while the Internal Process has a significant negative influence on risk performance. Both the Open system and Human resources showed minimal negative influence.

In short, the significant positive contribution of the rational model (**R**) establishes the point that the more an organisation has *clarity of goals*, *clarity of implementation* and *clarity of authority*, the better its risk performance would be as a client. Conversely, the significant negative contribution made by the internal process (**I**) indicates that the more an organisation relies on *rules and regulations*, and *formalised plans and procedures* to manage risk, the lower its risk performance is as a client. The significant negative influence explains the loss of flexibility and a leaning toward reactive mode in the management of risk.

8.5 Limitations

The methodology chapter stated the technical limitations the study had. It can be summarised by the sample size, which was limited due to the response rate and the accessibility to what is considered to be sensitive information.

The research addressed this issue by conducting two interviews to reflect on the data and what they mean. The interviews asked about the relationship between the organisation's culture and the decision making process to see if they think it is connected and how. The research then compared the interview outcomes with the conclusions.

The research also addressed the outcomes by the coverage of research done by others in similar areas of interest and looked for overlapping conclusions or synonymous outcomes. This was addressed in the discussion chapter.

The other matter would be related to the reliability of the data. While the data has been tested for normality, there is an issue of quantifying some of elements addressed in this study. The first is this is the researchers own initiative to quantify elements based on the competing values mode, a model which used in business schools to describe how companies deal with their markets, and has many qualitative descriptions common in the business school. However, the research has transferred this tool into a manageable instrument to read the construction industry and adapt that into a formula.

The research addressed that morphing the model to fit the construction market could be problematic, and the research looked into those elements in more details by investigating previous work by other researchers, however, to take this model to another level, it will need future research which will be addressed in the next part.

The second is the issue of perception. There is no established methodology to quantify culture without using a newly defined scale, nor would that such a methodology is considered of higher validity. However this would mean that those perceptions have to be considered when discussing that data. Perception suffers from arguments of illusion, as the subject can or cannot be aware of its own stature relative to the element being tested. The other problem is the ordinary conception of perceptual experience. As this study is based on how the company perceives its own culture, perception has to be considered with care. The research addressed this by focusing the survey on quantifying as far as possible the survey readings and avoids any non-numeral ratings.

8.6 Impact

Choosing appropriate customers can be more important that just satisfying them, where unstable clients can cause huge losses during critical funding stages in the project. In addition, for a business-to-business relationship, as most construction companies (like other major companies) need to succeed for a long-term profit, or that market can decline leaving the company with expensive unused resources.

Three issues are noticed when it comes to risk classification; the first is there is more than one major stakeholder when it comes to construction industry. Construction projects are, by default, collaborative particularly in the case of large infrastructure industrial or civil projects.

The second is bias, as both internal and external factors can introduce biases in decision making, particularly in a multi-attribute decision-making scenario. Internal factors are within the control of the decision maker and include the following: the decision maker's experience in decision making; the decision maker's preference; attitude towards risk; resource availability; and organizational structure. External factors are outside the control of the decision maker, such as government regulations and the prevailing market conditions. These biases influence the eventual decision.

There are different sectors of industry involved in this process, but multiple third party stakeholder clusters add to the complexity and difficulty of managing projects. The participants fall in a broad range of disciplines from financial, construction, engineering, and legal to service and operation. Clients, consultants, contractors, subcontractors and third parties all pursue their own interests. Each group has their own perception and preferred way of handling risks.

The third is that knowledge of risk strategies is exclusive to specific groups; information about risk management strategies is regarded as proprietary knowledge for engineering firms. They use this knowledge as a competitive edge over their rivals in the bidding process. This type of knowledge is not easy to acquire because it takes noteworthy resources and direct involvement in projects.

This would provide two problems to the risk management strategy: first, is that any lack of integration between the stake holder groups in a construction project will cause confrontation and disagreement on the way risk is classified, this confrontation becomes most problematic when the confrontation is between the client and the contractor. The second is that while clients and contractors would have an interest in applying a risk management plan, lack of access to viable knowledge would cause mistakes that can only be corrected with experience, which has its own problems as has been explained before.

The interest in involving the client in the risk management rather than keeping the client in a passive position is based on the evidence that a pro-active client involvement will have positive effects on risk performance and management.

8.7 Lessons for the Industry and Research

The industry needs to use the knowledge of the client organisation structure in processing bids. This has part of how risk management is applied in any modern theory, as risk has to be taken as part of any project and will be applied on all levels of that project. However, risk becomes critical when strategies are applied, and this is where general organisational strategies need to be taken seriously, as they will transfer into the project. Managers of organisations that have a strategy to implement, especially a new one, will have to be the risk taking type. This has been noticed lately in the way markets have suffered financially because of the way risks has been managed. The construction industry is no foreigner to this type of behaviour, as the bases of organisational behaviour are not that different in terms of financial seeking and the risks associated with other long term investments.

With risk management being a modern management strategy, it is still being developed. The development covers the territorial aspects of positioning risk between the client and contractor. This had broadened out the idea of risk management and the research is aiming to engage with another layer of that management strategy that goes beyond the project itself and into the organisational behaviour of the client. This perspective integrates opportunity management and uncertainty management to have better management and stakeholder relationships.

A project can have ill-defined and constantly changing goals. The cause is often to be found in the way of thinking and working, combined with a lack of leadership. Designers tend to create project propositions, which have a general or unclear goal at first, because they expect they will be able to clarify the goal of the project along the way as the briefing client matures.

This approach, upgrading the project goal, is considered a normal part of a project-oriented construction approach. Project goals can only be defined in general terms and fine-tuned over the course of a project. It sounds logical and convincing. The problem is, however, is that the people involved all too often overestimate their ability to direct the developments in the direction they have worked out for themselves, especially when lack of expertise, trust, and communication are involved.

Without the help from the head business management, failure is more likely than success. Project management is often delegated to a level that is too low within the organization, and so the project manager lacks overview and authority. According to the collection of complaints recorded with interviewing construction teams, any practical obstacles contractors may encounter are usually only dealt with in the second half of the project.

These obstacles can occur in many forms: the necessary alignment of business and construction does not work out; the architects from the head office will not cooperate; the strategy behind it is unclear, so the owners do not know what they want yet; the construction outcome is unsuitable; the infrastructure is not compatible or not finished yet; or unit managers will not cooperate or constantly come up with new demands, and so forth.

One of the factors that the thesis addressed is risk perception. The main problem that faced the research is that risk perception itself comes in an abstract form. While things that present shortcomings can be quantified objectively, terms associated with risk are based on human judgement. It is hard to qualify risk perception as an objective term, rather than subjective one.

While it can be argued that risk itself has been quantified after years of work and models that disciplined the measurement of risk, the concept of risk perception is still stuck in the subjective domain. This has been felt when collecting the data as the numbers faced strong variations. There are three important, but basic things that influence the success of a risk management strategy. First, it is important to engage the managers and staff in thinking about risk. An organisation that engages in risk management in its internal structure will have fewer problems understanding the risk it takes with routing for a high value construction project.

Second, there has to be a feedback loop for the success and failures of the risk management strategy. If the organisation does not engage member of staff in the organisation in a process of thinking about risk, they are going to have difficulty generating any substantial level of success with the risk management programme.

The third point is about flexibility. Establishing and sustaining a capable framework for the management of risks would mean dealing with uncertainty. That cannot be effective without the ability to adapt to changes and search for creative methods.

The common definition of a successful approach to managing any project is the ability to anticipate any change that might arise, and therefore be able to penetrate the borders of that change within the value chain to be able to obtain support for any future arrangements. The responsibility for controlling the costs of making those decisions and then the responsibility for the risks associates with that behaviour will be part of the package. This is where any organisation should assume responsibility, including the client's organisation. Managers will be expected to provide fast and quick decisions if the strategy of the organisation demands so even at the expense of a higher risk.

8.8 Contribution to Knowledge

This study has uncovered a new relationship between origination behaviour parameters with risk behaviour regarding the client. The research covered the elements of managing risk in construction projects and discussed the impact of organisation behaviour, leadership, communication, trust, the relationship between the contractor and client, and risk tolerance on the way risk in mitigated in construction projects. There were different risk assessment models and each tries to manage risk differently; however they share the hyper-rationality problem which excludes more active managerial influence.

Most studies into client risk behaviour and its influence on project risk have taken a case study feature, while this thesis has taken a boarder statistical work. This is important because it allowed the use of model to measure client risk behaviour.

After collecting the data, all generic elements regarding client behaviour were classified and they were connected to their consequences. The collected data from the interviews and case studies were transferred into a conceptual framework. The reason for choosing this method is due to the qualitative nature of the research. There are criteria to show if an organisation is a crisis-prone organisation or not, and there are criteria to show if a style of a managing risk is effective or not. A comparison between the client's behaviour and these criteria show a relationship between client behaviour and induced risk situation.

8.9 Possible Areas for Future Research

Research into the Rational Model could be expanded to identify the most positive attributes of client organisation structure. Other elements of organisational behaviour could be studied, such as structural shape, which would provide an insight into how decision making structures like hierarchical or centralised would influence the risk mitigation process. Previous research into the subject has claimed that the existing information in the area of risk mitigation strategies is fragmented and incomplete.

As covered in the literature review, there have been suggestions to improve on the contribution for framing an effective arrangement to accumulate and exploit strategies applicably. For example, there is a need for a risk classification structure featuring a searchable, open to improvement, and flexible risk management framework. There is a need for a list of characteristics to correctly and accurately define a risk response strategy. There is a need for primary list of characteristics for the risk mitigation strategies that can be compiled into a workable model. There is a need for a rationally broad list of risk reactions along with the relevant characteristics for both clients and contractors.

This gap in the area of risk assessment shows that our understanding of risk should not be limited by past experience. This supports the idea that access to the knowledge of risk management is limited. This might explain some of the problems regarding the clients' attitude toward risk; however this area is not part of this research. In addition, this does not explain the failure of high resource clients in addressing their risk. Therefore more work could be done in these areas by future researchers. This lack of explanation has Implications on the internal relationship which the value chain of the industry.

The research project is restricted to what can be accomplished in the allocated size and the focus of the study. Furthermore, there are limitations to what can be concluded from a specific methodology by nature of any project. The results of the research can be used as basis to investigate more either for further detail or to reaffirm the results.

The target for additional research is to get a further insight into the mechanism of organisation behaviour and how that transfers to risk management in construction projects. This research surveyed to the clients to see if there is a connection, and while the mechanism has been described by previous research, the coverage has been based on surveys rather than action research. Action research should identify details in the decision making process than can only be seen onsite.

The elements, which were based on the competing values model, have not been actively studied in the construction industry. By testing those elements one by one, future researchers could observe the critical ones. As the sample size would need to be much larger to cover that type of relationship, this research had to focus its interest on the significant correlation that can be observed with this sample.

The second area is around developing the model itself. There is currently an interest in building over what is learned from manufacturing businesses and research in business school, and to observe how the models are adopted can serve the construction industry. This research is part of that trend, and it only covered one side of organisation behaviour models.

Other models that can investigate this phenomenon can be the implicit and explicit organisation philosophies, which can be divided to autocratic, custodial, supportive, collegial, and system. The other option is theory X and theory Y, which are the paradigms of possible explanations for managers. The area of motivation provides important insight into person behaviour including risk behaviour.

Another investigation would be in determining the relationship between organisational structure and risk management in the construction industry. While the vast majority of organisations use hierarchical system, there are many variations to this system. There are other systems that are applied differently, due to cultural differences or specific tasks needing a specific structure. Those structures are Pre-bureaucratic structures, Bureaucratic structures, Post-bureaucratic, Functional structure, Divisional structure, and Matrix structure.

In conclusion this thesis has provided an original insight into client behaviour in the construction industry and made contribution to knowledge by showing the relation between the organisational behaviour and risk. This work provides a foothold for research in that area and provided applicable measuring tools for that relation between organisational behaviour and risk behaviour.

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10 Appendices

10.1 Appendix A: Survey Questions

Background information;

Please choose the appropriate description

A-Public Sector

- ◻ Housing Associations
- ◻ Education
- ◻ Healthcare
- ◻ infrastructure
- ◻ other

B- Private Sector

- ◻ Developers
- ◻ Specialist, Charities & Trusts
- ◻ Commercial
- ◻ Housing
- ◻ Other

Part one

1-The manager explains his decisions to the employees:
- ◻ Weekly
- ◻ Monthly
- ◻ Yearly or less

2-The objectives of the construction project are explained to the employees involved
- ◻ Yes
- ◻ No

3-The employees are allowed to make their own adjustments regarding the project
- ◻ Without the need to consult the manager
- ◻ It depends on the adjustment
- ◻ Adjustment has to come from the manager.

4-The management shares information beyond the original brief regarding the project;
- ◻ Limited information
- ◻ No information is shared
- ◻ Always

5-Correcting Errors:
- ◻ Can be applied without referring to the management
- ◻ Has to be referred to the management
- ◻ Only when the management asks to

6-Source of errors during work;
- ◻ Is usually identified easily
- ◻ Is usually hard to identify

7-There is an individual recognition;
- ◻ There is a high recognition for every individual
- ◻ Recognition depends only on individual accomplishment
- ◻ There is no individual recognition

8-The employee feels their work is an important part of the project
- ◻ Yes
- ◻ Somehow
- ◻ No

9-The employee will accept new goals and tasks willingly
- ◻ Will discuss them with the management first
- ◻ Always
- ◻ It depends on the authority

10-People in the project share a common set of needs.

□ True

□ False

11-Employees feel there is a clear culture of the company.

□ True

□ False

12-Employees feel that they fit in the culture of the company,

□ True

□ False

13-How relevant the concepts presented in Part One to the mission statement of the organisation?

Please provide a mark out of 15:

….. (1-5) little

….. (6-10) medium

….. (11-15) High

Part Two

14-The company review its objectives periodically

□ True

□ False

15-The company has gone through different transformations in the past

□ True

□ False

16-The team structure changes periodically

□ True

□ False

17-The management is flexible in its decisions

□ Very flexible

□ Somehow Flexible

□ inflexible

18-Competition between employees is promoted by the management

□ True

□ False

19-There is a personal development plan for the employees

□ True

□ False

20-There are personal development schemes

□ True

□ False

21-New ideas are periodically discussed between the employees and the management

□ True

□ False

22-There is high reward to individual initiatives

□ True

□ False

23-The company's size has increased

□ During the last year

□ During the last 5 years

□ Has not changed

24-A new department had been created

□ During the last year

□ During the last 5 years

□ Has not changed

25-There is an interest in the global market

□ True

□ False

26-How relevant the concepts presented in Part Two to the mission statement of the organisation?

Please provide a mark out of 15:

….. (1-5) little

….. (6-10) medium

….. (11-15) High

Part Three

27-Communication is allowed only though specified channels.

□ True

□ False

28-All decisions have to be approved by the supervisor.

□ True

□ False

29-The management is the only sources of ideas.

□ True

□ False

30-Work has to be done right in all details even if it was delivered late. .

□ True

□ False

31-It’s important to finish the tasks using the guides provided by the management

□ True

□ False

32-Every employee needs to be knowledgeable of the project’s rules

□ True

□ False

33-The supervision relies on punishment and reward system for motivation.

□ Always

□ Sometime

□ Never

34-Reports needs to be provided by the employees about implementation of tasks.

□ Monthly

□ Periodically

□ Not applicable

35-Monitoring system is considered the best way to insure quality

□ Agree

□ Do not agree

36-A supervisor plays an important role in getting the task done

□ Agree

□ Do not agree

37-Communication between team members has to be done through a supervisor.

□ True

□ False

38-Supervisor is important to clear up any confusion in the tasks.

□ Agree

□ Do not agree

39-How relevant the concepts presented in Part Three to the mission statement of the organisation?

Please provide a mark out of 15:

…..	(1-5) little
…..	(6-10) medium
…..	(11-15) High

Part Four

40-There are little or no shared tasks between different divisions in the project.

- ◻ Agree
- ◻ Do not agree

41-There is no shared responsibility between an employee and another.

- ◻ Agree
- ◻ Do not agree

42-The employee is only responsible to the supervisor

- ◻ True
- ◻ False

43-The higher management involves itself directly in supervising and directing the tasks

- ◻ True
- ◻ False

44-The leadership is considered strong in project

- ◻ True
- ◻ False

45-There is a person to person discussion between the employees and the supervision about the goals of the task

- ◻ True
- ◻ False

46-Employees are substituted quickly if tasks are unsatisfactory.

- ◻ Always
- ◻ Sometime
- ◻ No

47-Employees are reevaluated periodically after every project.

- ◻ Always
- ◻ Rarely

48-Employees’ skills are put into action once they are assigned to project.

- ◻ Agree
- ◻ Do not agree

49-The policy of the leadership changes:

- ◻ Rarely
- ◻ Sometimes
- ◻ Many times

50-There is always plan B in every project.

- ◻ True

□ False

51Employees are rewarded when goals achieved.

□ Always
□ Sometimes
□ Never

52-How relevant the concepts presented in Part Four to the mission statement of the organisation?

Please provide a mark out of 15:

….. (1-5) little
….. (6-10) medium
….. (11-15) High

Part Five

53-If you would give a score to how risky the organisation construction project during the last 3 years what score would you give?

	□	□	□	□	□	□	□	□	□	□	
Low	1	2	3	4	5	6	7	8	9	10	High

54-If you would give a score to how risky the organisation construction project which the organisation is currently involved in what score would you give?

	□	□	□	□	□	□	□	□	□	□	
Low	1	2	3	4	5	6	7	8	9	10	High

55-If you were to give a score to how confident you are in the future of the market

	□	□	□	□	□	□	□	□	□	□	
Low	1	2	3	4	5	6	7	8	9	10	High

Part Six

56-How successful has the organisation been in meeting its financial targets (projected costs) in the construction projects it invested in?
Please provide a mark out of 15:
….. (1-5) little
….. (6-10) medium
….. (11-15) High

57-How successful has the organisation been in meeting its schedule targets (finishing within the projected/proposed time table) in the construction projects it invested in?
Please provide a mark out of 15:
….. (1-5) little
….. (6-10) medium
….. (11-15) High

10.2 Appendix B: Conversation

Interview one (contractor)

How would the client and the contractor agree on the decision process?

It's important to define the line between the client and the contractor……. especially regarding the performance of the project….

Defining the responsibilities…. The client determines the needs of the project.

All the organization is becomes eventually involved in the decision process directly or indirectly

Insufficient knowledge will cause problems in defining the process…. The lack of knowledge about what role does the client have and what role the contractor has

Does the process take a rational approach?

It has to be ration. We all think we are rational in making our decisions…. uncertainty will always be part of the process….. however, the contractor needs to take into account the requirements of the client … while client is in charge of the project choice they client cannot just add the project over the course of it.

In the end the client is asking for a product.

How does the contractor handle uncertainty about the client in the project?

The client is a separate entity, however the other party should know what's going on in his house better than me…The distinction between contractor and client is even more problematic if both are part of the same corporate structure, which happens in some cases. If this happen in a clear contractual definition of the respective roles is very important.

There are clients who are better in delivering information than others. You know what you deal with.

How about uncertainty about the project itself?

The more information I know about the project beforehand the less problematic things are.

To ensure a successful project, defining the roles of each entity and to appoint a representative of the client and the contractor is part of the protocol in any contract. Conflict requirements and coordination problems will be dealt with according to the contract.

Is the current risk allocation fair in your experience?

No one likes to carry the risk if they don't have to.

The contractors are carrying more risk that they should be. Good communication makes it easier to allocate the risk according the right responsibilities, as this creates trust; however, good communication is a skill that develops with experience. I do categories clients based on experience

Do you have usually obtain enough information to see the client within the specific categorization presented (rational model, open system, internal process, and Human resource)?

No

Interview two (Client)

How would the client and the contractor agree on the decision process?

The objectives of the project are usually well known… and the decision process techniques have already developed by the practice.

Are there any differences in the process making due to differences with the clients themselves? For example, culture?

Variations will exist of course. The decision making process for any company is rooted within the organisational shape and culture

Does that include risk management?

Yes

Does the process take a rational approach?

It has to be.

Including allocating risk?

It is rational for any business to not carry unnecessary risks.

Do you expect the other party to adopt such rational approach?

We assume that the other party is rational or we won't be able to create a valid relationship

And how do you decide what is the best fit for allocating the risks of the project?

Different elements…. The project itself… the financial capability…The feedback of the other party is one of the factors in making the decision.

How do you manage uncertainty within the project with the other party?

………… , there are protocols within the contract that manages uncertainty, in reality I have no influence in managing uncertainty of the other party…

10.3 Appendix C: List of targeted clients

1. Acivico
2. Ac Lloyd (Builders) Ltd
3. Accord Housing Association
4. Adonis Construction Ltd
5. Allied Irish Bank
6. Angela Amesbury Design
7. Anser Project Management
8. Aquarius Entertainment Ltd
9. Augmentis Ltd
10. Avondale Coachcraft Ltd
11. BAE Systems
12. Bank Of Scotland
13. BBC
14. Beechdale Homes
15. Birmingham City Council
16. Break Charity
17. Bridge Foundary Co. Ltd
18. Bridgford Construction Ltd
19. British Gas
20. Bupa Healthcare
21. Cadbury Trebor Bassett
22. Caldmore Area Housing Association Ltd
23. Cambridge City Council
24. Cambridgeshire PCT
25. Camden Ventures Ltd
26. Cameron-Price Ltd, Birmingham
27. Camphill Communities East Anglia
28. Central & Country Developments Ltd
29. Chase Midland Ltd
30. Chersterfield Properties Ltd
31. Concept Ltd
32. Coventry City Council
33. Crossrail
34. Davies & Baron Ltd
35. Department for Transport
36. Department for Work & Pensions
37. Department of Health
38. Derwent London
39. Dudley Metropolitan Borough Council
40. East Riding of Yorkshire Council
41. EDF Energy / NNB GenCo

42. Environment Agency
43. Equinix
44. Felton Construction Ltd
45. Fisher German
46. Focus Housing Central & Midlands
47. Foscote Developments Ltd
48. Freightliners
49. Gaelic Athletic Association
50. Greater London Authority
51. Greywell Property Ltd
52. Grosvenor Properties
53. H.M. Prison Service
54. Hadwins Audi
55. Haig Homes
56. Hand Picked Hotels
57. Harwoods Ltd
58. Haydock Finance
59. Headley Developments Ltd
60. Heathrow Airport Limited
61. Highways Agency
62. Holloway Foo Architects
63. Horton Estates Ltd
64. Hull Teaching PCT
65. Igloo Regeneration
66. Implemental Ltd
67. Interserve Ltd
68. J sainsbury plc
69. James Paget Healthcare NHS Trust
70. Jardine Motors Group
71. Jephson Homes Housing Association Ltd
72. Kent County Council
73. Kier Eastern
74. Kings Head Sporting Club Limited
75. Lambeth Living
76. Lancaster Plc
77. Land Securities
78. Leicester City Council
79. Little Gem Homes Ltd
80. London & Western
81. London Underground
82. Lookers Plc
83. Loomis Uk Ltd
84. Magnox
85. Mid Staffordshire General Hospitals NHS Trust
86. Nationwide Building Society

87. Natwest Bank
88. NCH
89. Network Rail
90. Newcastle PCT
91. Norfolk County Council
92. Norfolk Mental Care - NHS Trust
93. North Warwickshire General NHS Trust
94. Northern Birmingham Community Health NHS Trust
95. Northumbrian Water
96. Nottingham City Council
97. NuGen
98. Orbit Housing Association
99. Peel Hotels Plc
100. Pel Interiors Ltd
101. Pendragon Plc
102. Persimmon Homes
103. Poplar HARCA, UK
104. Port of Tyne Authority
105. ProCure 21
106. Quintain Estates & Developments Ltd
107. Ribble Valley Borough Council
108. Richard Burbridge Ltd
109. Rochdale Boroughwide Housing
110. Roman Catholic Diocese of East Anglia
111. Royal Bank Of Scotland
112. Royal Mail
113. Rreef Office Property Ltd
114. Sand Project Management
115. Sandwell & West Birmingham Hospitals NHS Trust
116. Sandwell Metropolitan Borough Council
117. Scape
118. Secure Trust Bank PLC
119. Shaylor Construction
120. Sheffield City Council
121. Sheffield PCT
122. Sheringham Museum Norfolk Trust
123. Shropshire County Council
124. Solihull Metropolitan Borough Council
125. South Warwickshire NHS Trust
126. Stafford Borough Council
127. Staffordshire County Council
128. Sunderland ARC
129. Sytner Group Ltd
130. Talbot Construction Ltd
131. Telford & Wrekin Council

132. Tesco plc
133. TH Kenyon plc
134. The Royal Orthopaedic Hospital NHS Foundation Trust
135. The Royal Wolverhampton Hospitals NHS Trust
136. The Walsingham College Trust Association
137. Thompson Motor Company
138. Town & Country Inns Ltd
139. Townsfolk Limited
140. Tripod Crest
141. Tuffin Ferraby Taylor
142. Turner & Townsend
143. Unilever
144. University Hospital of North Staffordshire NHS Trust
145. University of Cambridge
146. Volkswagen Group United Kingdom Limited
147. Waitrose pls
148. Walsall Metropolitan Borough Council
149. West Lothian Council, UK
150. West Midlands Police
151. Westfield Group
152. Wfc Ltd
153. Whitlingham Charitable Trust
154. William Sutton Housing Association
155. Willmott Dixon Construction
156. Wolverhampton City Council
157. Worcester County Council
158. Worcestershire County Council
159. Worthing Homes
160. Wymondham Property Dev Co Ltd
161. Yorkshire Water Services LTD.

10.4 Appendix D: Survey Raw Data

Question

1	0 3 1.5 3 1.5	0 1.5 1.5 0 3	3 3 0 3 3	0 1.5 3 0 0	3 3 0 3 1.5	1.5 1.5 1.5 0	1.5 3 3 1.5	3 1.5 1.5 0	0 3 3 3	1.5 3 1.5 3	0 3 3 1.5	1.5 1.5 1.5 3
2	3 3 0 1.5 1.5	0 1.5 1.5 3 3	3 3 3 3 3	3 1.5 0 0 1.5	0 3 0 0 1.5	1.5 1.5 1.5 1.5	0 3 3 3	3 1.5 1.5 0	0 0 3 3	0 0 1.5 3	1.5 3 0 0	1.5 3 1.5 3
3	3 0 0 0 3	1.5 3 3 3 3	0 0 3 1.5 3	3 3 0 3 3	0 0 3 0 3	3 3 3 3	0 0 0 0	0 3 3 3	3 0 3 3	0 0 3 3	1.5 0 3 1.5	3 3 3 3
	6 6 1.5 4.5 6	1.5 6 6 6 9	6 6 6 7.5 9	6 6 3 3 4.5	3 6 3 3 6	6 6 6 4.5	1.5 6 6 4.5	6 6 6 3	6 3 9 9	1.5 3 6 9	3 6 6 3	6 7.5 6 9
4	1.5 1.5 3 0 3	3 3 1.5 3 1.5	1.5 3 1.5 3 1.5	0 1.5 0 0 1.5	1.5 3 3 3 1.5	0 0 1.5 3	0 3 0 3	0 1.5 1.5 1.5	0 3 3 1.5	3 1.5 0 3	0 1.5 3 3	3 0 1.5 3
5	1.5 1.5 0 3 3	3 3 1.5 0 1.5	1.5 0 1.5 3 1.5	3 1.5 3 3 1.5	0 3 3 0 1.5	0 0 1.5 0	3 3 3 3	3 0 1.5 1.5	0 0 3 1.5	0 3 0 3	3 1.5 3 3	3 3 1.5 0
6	3 3 0 3 3	0 0 3 0 3	0 0 3 3 3	3 3 3 1.5 3	0 0 0 0 3	3 3 3 1.5	1.5 0 3 0	3 0 3 3	3 0 0 3	0 0 3 3	1.5 3 0 3	0 1.5 3 1.5
	6 6 3 6 9	6 6 6 3 6	3 3 6 9 6	6 6 6 4.5 6	1.5 6 6 3 6	3 3 6 4.5	4.5 6 6 6	6 1.5 6 6	3 3 6 6	3 4.5 3 9	4.5 6 6 9	6 4.5 6 4.5
7	1.5 0	1.5 3	3 3	0 3	1.5 1.5	0 3	3 3	3 3	0 3	3 3	0 3	1.5 1.5

	3	1.5	3	3	1.5	1.5	1.5	3	1.5	0	0	3
	1.5	3	1.5	3	1.5	3	3	0	1.5	1.5	3	1.5
	1.5	1.5	1.5	0	3							
8	3	1.5	3	1.5	1.5	3	0	0	3	3	3	3
	3	0	3	0	3	3	3	3	1.5	3	3	3
	3	3	3	0	3	3	3	1.5	3	0	3	3
	0	3	3	3	3	0	0	0	1.5	3	3	0
	0	3	1.5	1.5	0							
9	0	3	0	1.5	0	3	3	0	3	0	3	0
	1.5	0	0	1.5	0	0	0	0	0	0	0	3
	0	3	0	1.5	1.5	1.5	1.5	3	1.5	3	0	0
	1.5	3	1.5	3	1.5	1.5	0	3	3	3	1.5	1.5
	1.5	0	3	3	1.5							
	4.5	6	6	3	3	6	6	3	6	6	6	4.5
	4.5	3	6	4.5	4.5	6	6	6	4.5	6	6	7.5
	6	7.5	6	4.5	6	6	6	7.5	6	3	3	6
	3	9	6	9	6	4.5	3	3	6	7.5	7.5	3
	3	4.5	6	4.5	4.5							
10	3	3	1.5	0	3	3	0	0	0	3	3	3
	3	3	3	3	3	3	3	3	3	3	3	3
	3	3	3	1.5	3	3	0	1.5	3	3	1.5	3
	0	1.5	1.5	3	1.5	3	3	3	1.5	1.5	1.5	3
	3	3	1.5	0	1.5							
11	3	3	1.5	3	3	3	3	0	3	3	3	3
	3	3	3	3	3	3	0	3	3	3	3	3
	3	3	3	3	3	3	0	3	3	3	3	3
	3	3	3	3	3	3	3	3	1.5	1.5	1.5	3
	3	3	1.5	0	1.5							
12	1.5	0	3	3	3	3	3	3	3	0	3	3
	3	0	0	0	3	0	0	3	0	3	0	0
	0	3	0	1.5	3	3	3	1.5	3	3	1.5	3
	3	1.5	0	3	1.5	1.5	0	3	3	3	3	3
	3	3	3	3	3							
	7.5	6	6	6	9	9	6	3	6	6	9	9
	9	6	6	6	9	6	3	9	6	9	6	6
	6	9	6	6	9	9	3	6	9	9	6	9
	6	6	4.5	9	6	7.5	6	9	6	6	6	9
	9	9	6	3	6							
13	8	7	7	7	5	8	6	6	7	5	8	9
	9	7	7	8	9	8	8	8	6	8	8	9
	6	10	8	7	8	9	8	9	10	8	8	9
	7	9	9	9	6	8	7	8	9	10	9	9
	10	10	10	7	8							

	0.75 0.85 0.85 0.75 0.95	0.65 0.85 0.55 0.9 0.9	0.7 0.7 0.95 0.65 0.9	0.7 0.7 0.8 0.85 0.95	0.5 0.75 0.65 0.9 0.95	0.75 0.85 0.8 0.9 0.95	0.6 0.75 0.9 0.6 0.65	0.6 0.75 0.75 0.75 0.75	0.7 0.75 0.85 0.7	0.5 0.55 0.95 0.75	0.75 0.75 0.75 0.9	0.8
14	1.5 0 3 3 1.5	1.5 0 3 3 1.5	3 1.5 3 0 1.5	0 3 3 3 0	1.5 3 1.5 3 3	0 3 3 3	0 3 3 3	3 3 3 3	1.5 3 3 3	3 1.5 3 3	0 3 3 3	3 3 1.5 1.5
15	3 1.5 3 0 0	1.5 3 3 0 0	3 3 3 2.5 0	1.5 3 0 3 1.5	1.5 0 3 0 0	3 3 0 1.5	0 0 0 1.5	3 3 0 0	0 0 3 1.5	0 3 0 0	3 3 0 1.5	0 3 3 0
16	3 3 0 1.5 1.5	1.5 3 1.5 0 1.5	3 3 0 1.5 1.5	1.5 0 0 1.5 3	1.5 1.5 3 1.5 1.5	3 0 1.5 3	3 0 3 3	0 1.5 1.5 1.5	3 0 1.5 3	0 0 3 3	3 0 1.5 3	0 0 3 1.5
	7.5 4.5 6 4.5 3	4.5 6 7.5 3 3	9 7.5 6 3 3	3 6 3 7.5 4.5	4.5 4.5 7.5 4.5 4.5	6 6 4.5 7.5	3 3 6 7.5	6 7.5 4.5 4.5	4.5 3 7.5 7.5	3 4.5 6 6	6 6 4.5 7.5	3 6 7.5 3
17	1.5 0 3 3 0	1.5 0 3 0 3	3 0 3 3 1.5	1.5 3 3 3 1.5	1.5 0 3 3 3	3 3 3 1.5	0 3 3 3	3 1.5 1.5 1.5	1.5 1.5 3 3	3 3 1.5 3	1.5 3 1.5 3	3 0 3 3
18	1.5 3 3 0 3	1.5 3 1.5 1.5 3	0 0 3 0 1.5	1.5 3 0 0 3	1.5 3 0 0 0	0 0 0 0	1.5 3 1.5 0	0 0 1.5 0	1.5 3 0 3	1.5 3 1.5 0	1.5 3 1.5 1.5	3 1.5 0 3
19	3 1.5 0 1.5 1.5	1.5 3 0 0 1.5	0 3 0 3 3	1.5 0 3 3 3	0 3 3 3 1.5	0 0 1.5 0	1.5 0 3 1.5	1.5 0 0 3	1.5 0 3 3	0 0 0 1.5	1.5 1.5 0 3	0 3 1.5 1.5
	6 4.5 6	4.5 6 4.5	3 3 6	4.5 6 6	3 6 6	3 3 4.5	3 6 7.5	4.5 1.5 3	4.5 4.5 6	4.5 6 3	4.5 7.5 3	6 4.5 4.5

	4.5 4.5	1.5 7.5	6 6	6 7.5	6 4.5	1.5	4.5	4.5	9	4.5	7.5	7.5
20	3 0 3 3 1.5	1.5 3 3 3 3	0 0 0 3 3	1.5 3 3 3 0	1.5 3 3 0 1.5	1.5 1.5 3 1.5	1.5 3 3 3	0 0 3 3	0 3 3 3	1.5 3 3 1.5	0 3 1.5 3	1.5 3 3 1.5
21	3 3 3 0 3	1.5 3 3 3 0	0 1.5 0 1.5 3	1.5 3 0 1.5 3	1.5 0 0 0 0	1.5 3 0 1.5	0 3 1.5 0	3 0 0 0	3 0 0 1.5	3 3 0 1.5	3 3 1.5 0	3 3 0 1.5
22	0 3 0 3 3	3 0 0 3 0	1.5 3 1.5 3 1.5	1.5 0 3 3 1.5	0 1.5 1.5 1.5 3	1.5 0 3 0	3 0 3 1.5	3 3 3 3	3 0 1.5 3	0 0 1.5 3	3 1.5 0 1.5	3 0 3 3
	6 6 6 6 7.5	6 6 6 9 3	1.5 4.5 1.5 7.5 7.5	4.5 6 6 7.5 4.5	3 4.5 4.5 1.5 4.5	4.5 4.5 6 3	4.5 6 7.5 4.5	6 3 6 6	6 3 4.5 7.5	4.5 6 4.5 6	6 7.5 3 4.5	7.5 6 6 6
23	1.5 3 3 0 3	3 3 3 1.5 0	1.5 3 3 1.5 1.5	1.5 3 1.5 3 0	3 3 3 3 3	3 3 0 1.5	0 3 3 3	1.5 0 3 3	0 3 1.5 1.5	3 0 1.5 3	0 3 3 3	3 0 1.5 1.5
24	3 3 3 3 3	3 3 3 0 0	1.5 3 3 1.5 3	1.5 0 0 3 1.5	3 3 0 1.5 3	3 3 3 0	3 1.5 3 1.5	3 3 3 3	3 3 1.5 0	3 3 0 1.5	1.5 3 3 1.5	3 3 1.5 3
25	3 1.5 0 3 1.5	0 0 0 3 3	1.5 0 1.5 0 0	1.5 1.5 3 0 3	0 1.5 3 3 1.5	0 0 3 1.5	3 0 3 3	0 3 3 0	3 0 0 3	0 3 3 3	3 1.5 0 3	1.5 3 0 3
	7.5 7.5 6 6 7.5	6 6 7.5 4.5 3	4.5 6 7.5 3 4.5	4.5 4.5 4.5 6 4.5	6 7.5 6 7.5 7.5	6 6 6 3	6 4.5 9 7.5	4.5 6 9 6	6 6 3 4.5	6 6 4.5 7.5	7.5 7.5 6 7.5	7.5 6 3 7.5

26	10 8 9 8 9	8 9 9 7 6	7 8 8 7 8	5 8 7 9 8	6 8 9 8 8	7 7 8 5	6 7 10 9	8 7 9 8	8 6 8 10	7 9 7 9	9 10 6 10	10 9 8 9
	0.95 0.95 0.95 0.65 0.95	0.75 0.8 0.85 0.6 0.9	0.65 0.85 0.9 0.75 0.95	0.5 0.75 0.9 0.75 0.9	0.55 0.8 0.75 0.7 0.85	0.7 0.8 0.7 0.7 0.6	0.55 0.7 0.9 0.9 0.75	0.75 0.7 0.75 0.75 0.75	0.75 0.65 0.95 0.5 0.75	0.65 0.6 0.85 0.9	0.85 0.85 0.75 0.75	
27	3 3 3 3 1.5	1.5 1.5 3 1.5 1.5	1.5 0 3 3 1.5	1.5 1.5 1.5 0 1.5	1.5 3 1.5 1.5 3	3 3 3 3	3 1.5 0 3	3 1.5 3 3	0 3 1.5 3	1.6 3 3 3	1.5 3 3 3	1.5 0 1.5 1.5
28	3 3 3 3 1.5	1.5 1.5 0 3 1.5	3 3 0 0 1.5	3 0 0 3 3	3 3 0 0 3	1.5 3 3 3	3 3 3 3	3 3 3 3	1.5 3 0 3	3 3 1.5 3	1.5 3 1.5 3	3 0 0 1.5
29	3 1.5 0 0 3	1.5 0 0 3 3	3 3 1.5 0 3	3 3 3 3 3	3 0 3 3 0	0 0 3 1.5	1.5 3 3 0	0 3 0 1.5	3 3 3 1.5	3 0 3 0	1.5 0 3 3	3 3 3 3
	9 7.5 6 6 6	4.5 3 3 7.5 6	7.5 6 4.5 3 6	7.5 4.5 4.5 3 7.5	7.5 6 4.5 4.5 6	4.5 6 9 7.5	7.5 7.5 6 6	6 7.5 6 7.5	4.5 9 4.5 7.5	7.5 6 7.5 6	4.5 6 7.5 9	7.5 3 4.5 6
30	1.5 0 3 0 0	3 3 3 0 3	3 1.5 3 3 3	3 3 3 3 3	3 3 3 3 3	3 3 3 3	0 3 0 0	0 0 3 3	3 0 3 0	3 3 1.5 3	3 3 3 3	0 1.5 1.5 3
31	1.5 3 3 0 3	0 3 3 3 1.5	3 3 3 3 3	3 3 3 3 0	3 3 3 3 3	3 0 3 1.5	3 3 3 0	3 0 1.5 3	3 1.5 1.5 3	3 3 3 3	3 3 1.5 3	3 3 0 3
32	3 3 0	3 0 0	1.5 3 3	0 0 0	3 3 3	0 0 0	3 1.5 3	3 0 3	3 3 3	0 0 0	3 3 3	3 3 3

	3 1.5	3 0	1.5 3	3 0	3 0	3	3	0	3	1.5	3	0
	6 6 6 3 4.5	6 6 6 6 4.5	7.5 7.5 9 7.5 9	6 6 6 9 3	9 9 9 9 6	6 3 6 7.5	6 7.5 6 3	6 0 7.5 6	9 4.5 7.5 6	6 6 4.5 7.5	9 9 7.5 9	6 7.5 4.5 6
33	3 1.5 3 3 3	1.5 3 3 1.5 0	3 1.5 3 0 3	1.5 3 3 1.5 1.5	3 3 3 3 0	3 3 3 3	3 3 3 3	3 3 3 0	1.5 0 3 3	1.5 0 1.5 0	3 3 3 3	0 0 3 0
34	3 1.5 3 3 1.5	1.5 3 3 0 0	3 3 3 0 3	1.5 3 0 0 3	3 0 3 3 0	0 3 3 3	3 3 3 3	3 3 3 0	0 3 3 3	3 3 0 3	3 3 0 3	3 3 3 0
35	1.5 1.5 0 0 0	1.5 0 3 3 3	3 3 3 3 0	3 1.5 0 3 3	1.5 0 3 0 3	0 1.5 0 3	1.5 0 3 3	0 3 0 3	3 1.5 3 3	0 1.5 3 3	3 0 0 0	3 3 3 3
	7.5 4.5 6 6 4.5	4.5 6 9 4.5 3	9 7.5 9 3 6	6 7.5 3 4.5 7.5	7.5 3 9 6 3	3 7.5 6 9	7.5 6 9 9	6 9 6 3	7.5 4.5 9 9	4.5 4.5 4.5 6	9 6 3 6	6 6 9 3
36	1.5 3 3 3 3	3 3 3 0 3	0 1.5 0 1.5 0	3 3 1.5 3 0	3 3 0 0 3	0 3 3 3	3 3 1.5 3	1.5 3 3 3	3 0 0 0	3 3 1.5 3	3 0 1.5 3	3 3 3 3
37	3 3 3 1.5 3	3 3 1.5 3 3	3 1.5 3 0 3	3 3 0 3 1.5	3 3 3 3 3	3 3 1.5 3	3 3 3 1.5	1.5 3 1.5 1.5	3 3 3 3	3 3 0 1.5	3 3 0 3	3 3 3 3
38	3 3 1.5 3 1.5	1.5 0 0 3 0	3 1.5 3 3 3	1.5 0 3 3 3	3 0 3 3 1.5	3 1.5 3 0	3 0 1.5 3	3 3 3 3	3 3 3 3	1.5 3 3 3	1.5 3 3 0	0 1.5 0 3

	7.5 9 7.5 7.5 7.5	7.5 6 4.5 6 6	6 4.5 6 4.5 6	7.5 6 4.5 9 4.5	9 6 6 6 7.5	6 7.5 7.5 6	9 6 6 7.5	6 9 7.5 7.5	9 6 6 6	7.5 9 4.5 7.5	7.5 6 4.5 6	6 7.5 6 9
39	9 8 7 5 5	5 5 6 5 4	9 7 9 2 7	7 7 4 7 6	9 6 9 7 5	4 7 8 9	9 8 9 8	6 7 8 6	9 6 8 9	6 7 4 8	9 8 5 9	6 6 7 6
	0.85 0.55 0.75 0.45 0.9	0.5 0.75 0.6 0.7 0.6	0.85 0.45 0.65 0.5 0.5	0.7 0.65 0.6 0.5 0.35	0.9 0.65 0.85 0.2 0.7	0.4 0.6 0.35 0.65 0.6	0.85 0.65 0.9 0.65 0.5	0.6 0.75 0.8 0.9	0.9 0.65 0.85 0.75	0.6 0.6 0.75 0.6	0.9 0.65 0.8 0.85	0.4 0.8
40	3 1.5 3 1.5 3	3 1.5 3 3 0	0 1.5 3 3 3	1.5 1.5 1.5 1.5 0	1.5 1.5 0 1.5 0	3 1.5 1.5 3	0 1.5 1.5 3	3 3 1.5 1.5	0 3 1.5 1.5	0 3 1.5 1.5	0 3 1.5 3	3 3 1.5 3
41	3 3 0 3 3	3 3 3 3 3	3 3 3 3 3	1.5 3 3 3 3	1.5 3 1.5 3 3	3 3 3 1.5	0 0 3 1.5	3 3 3 3	3 0 3 3	0 0 3 3	3 3 3 1.5	3 3 3 3
42	0 1.5 0 1.5 0	0 1.5 0 3 3	3 1.5 0 3 0	1.5 1.5 0 1.5 3	1.5 1.5 3 1.5 3	1.5 1.5 1.5 0	3 3 1.5 3	0 0 1.5 1.5	3 0 3 1.5	3 0 1.5 1.5	1.5 0 1.5 3	0 0 1.5 3
	6 6 3 6 6	6 6 6 9 6	6 6 6 9 6	4.5 6 4.5 6 6	4.5 6 4.5 6 6	7.5 6 6 4.5	3 4.5 6 7.5	6 6 6 6	6 3 7.5 6	3 3 6 6	4.5 6 6 7.5	6 6 6 9
43	1.5 3 3 3 1.5	1.5 3 3 3 1.5	0 1.5 3 1.5 1.5	3 3 0 3 0	1.5 3 0 0 0	1.5 0 0 3	0 3 0 3	1.5 0 0 0	1.5 3 0 3	0 3 3 0	0 3 0 3	3 3 0 3
44	1.5 3 0	3 3 3	3 1.5 3	3 3 3	1.5 3 3	0 0 3	1.5 3 3	3 0 3	0 0 3	3 3 0	3 3 3	3 3 3

	1.5	1.5	3	3	3	3	1.5	3	3	3	3	3
	1.5	1.5	1.5	3	3							
45	3	1.5	3	0	0	3	3	1.5	3	1.5	1.5	0
	0	0	0	0	0	3	0	1.5	0	0	0	0
	0	0	0	3	3	3	3	3	3	0	1.5	3
	0	3	3	3	3	3	3	3	0	3	0	3
	1.5	3	1.5	1.5	1.5							
	6	6	6	6	3	4.5	4.5	6	4.5	4.5	4.5	6
	6	6	3	6	6	3	6	1.5	3	6	6	6
	3	6	6	6	6	6	6	6	6	3	4.5	6
	4.5	7.5	7.5	9	6	9	7.5	6	6	6	6	9
	4.5	6	4.5	4.5	4.5							
46	1.5	3	1.5	1.5	3	1.5	0	1.5	0	3	0	1.5
	3	1.5	3	3	3	3	3	1.5	3	0	1.5	3
	0		0	1.5	0	0	0	0	0	1.5	0	0
	0	3	0	3	1.5	0	3	0	0	0	0	0
	3	0	1.5	0	0							
47	3	3	1.5	1.5	3	1.5	3	1.5	3	3	3	3
	3	3	3	3	3	3	3	0	1.5	3	3	3
	3	3	3	0	3	3	3	3	3	3	1.5	3
	1.5	3	3	1.5	3	0	1.5	3	3	3	3	3
	1.5	3	1.5	3	1.5							
48	1.5	0	1.5	1.5	0	3	3	1.5	3	0	3	3
	0	0	0	0	0	0	0	3	0	3	3	1.5
	3	3	1.5	3	3	3	3	3	3	0	3	3
	3	3	3	0	0	3	0	3	3	3	3	1.5
	0	3	1.5	1.5	3							
	6	6	4.5	4.5	6	6	6	4.5	6	6	6	7.5
	6	4.5	6	6	6	6	6	4.5	4.5	6	7.5	7.5
	6	6	4.5	4.5	6	6	6	6	6	4.5	4.5	6
	4.5	9	6	4.5	4.5	3	4.5	6	6	6	6	4.5
	4.5	6	4.5	4.5	4.5							
49	1.5	0	3	0	3	1.5	0	3	3	3	3	1.5
	1.5	3	3	0	1.5	0	3	1.5	3	3	3	3
	0	1.5	3	0	0	3	0	3	0	1.5	0	3
	0	3	3	1.5	3	3	3	3	1.5	3	0	3
	0	3	0	3	3							
50	3	3	1.5	3	3	3	3	0	3	0	3	3
	3	3	3	3	3	3	0	3	3	3	0	3
	3	3	3	3	3	3	3	3	3	3	0	1.5
	0	3	3	3	3	3	3	3	3	3	3	1.5
	0	1.5	0	0	0							

51	3	3	1.5	3	1.5	3	3	1.5	1.5	3	1.5	3
	3	0	0	1.5	3	3	0	3	0	3	0	0
	3	3	1.5	3	3	1.5	3	1.5	3	0	3	0
	3	3	1.5	0	1.5	1.5	3	1.5	1.5	1.5	3	0
	3	0	3	0	0							
	7.5	6	6	6	7.5	7.5	6	4.5	7.5	6	7.5	7.5
	7.5	6	6	4.5	7.5	6	3	7.5	6	9	3	6
	6	7.5	7.5	6	6	7.5	6	7.5	6	4.5	3	4.5
	3	9	7.5	4.5	7.5	7.5	9	7.5	6	7.5	6	4.5
	3	4.5	3	3	3							
52	8	8	8	8	8	9	8	8	8	9	8	11
	9	8	8	8	9	8	8	8	8	8	9	9
	8	8	8	9	7	10	8	9	9	9	9	8
	9	11	11	9	9	8	9	10	9	9	10	10
	9	9	11	8	10							
	0.75	0.8	0.75	0.8	0.8	0.85	0.8	0.8	0.8	0.85	0.8	1.1
	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.75	0.8	0.8	0.85	0.9
	0.8	0.75	0.75	0.85	0.7	0.95	0.8	0.9	0.85	0.85	0.9	
	0.75	0.85	1.05	1.05	0.85	0.85	0.75	0.85	0.95	0.85	0.9	
	0.95	0.95	0.85	0.85	1.05	0.8	0.95					
53	6	6	6	5.3	6	6	5.3	6	6	6	6	7.5
	9	5.3	4.5	7.5	6.8	6	5.3	3.8	6	6	6	4.5
	4.5	7.5	6	5.3	5.3	6	4.5	6	7.5	4.5	4.5	6
	6	6	4.5	6	6	5.3	5.3	6	4.5	6	7.5	4.5
	4.5	6	6	6	6							
54	6	6	4.5	5.3	5.3	6	4.5	5.3	6	4.5	6	6.8
	6	6	5.3	6	6	5.3	5.3	4.5	4.5	6	6	6
	4.5	6	6	5.3	6	6	6	6	6	4.5	4.5	6
	4.5	3	4.5	4.5	6	5.3	6	6	6	6	6	4.5
	4.5	6	4.5	4.5	5.3							
55	7.5	9.1	10.7	7.7	10.8	10.9	9.4	14.3	11.2	12.9	13	
	11.4	14.8	6.6	5	13.4	10.2	10.2	8.6	5.2	13.9	10.5	8.8
	3.6	8.9	12.6	7.2	9.1	7.3	16.6	5.6	16.8	13.2	7.6	7.6
	9.6	15.5	15.6	15.6	15.7	7.9	10	8	18.1	6.1	18.4	
	14.4	14.4	14.5	10.4	16.8	16.9	12.7					
56	7.2	8.6	7.7	7.7	7.5	8.6	7.3	8.1	8.6	7.7	8.6	9.8
	9.2	8.8	8.1	8.6	9.2	7.9	7.7	7.3	7.1	8.8	9.4	9.2
	8.1	9.2	8.4	8.3	8.4	9	9.6	9.2	8.6	7.5	7.5	8.3
	7.9	9.6	9.2	9.4	8.4	7.7	9.6	9	9.6	9.2	9.6	9.6
	7.9	8.1	7.9	7.7	8.1							
56	6.9	9.7	7.1	9.4	9	10.5	8.7	9.1	8.9	10.1	8.1	
	14.8	10.4	9.5	8.7	8.8	10.5	8.9	9.1	8	9.9	9.9	9.5
	11.4	9.3	6.6	7.5	10.6	5.3	11.3	6.5	10.4	8.1	11.6	

	12.6	7.5	11.2	17.4	16.3	9.8	9.3	6.2	8.1	11.2	8.3	9.5
	9.5	11.9	10.9	11.7	13.2	8.8	11.8					

10.5 Appendix E: Data Analysis

Descriptives

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean
	Statistic	Statistic	Statistic	Statistic	Statistic
HRAdjusted	53	12.4	4.6	17.0	9.970
Osadjusted	53	14.1	4.2	18.3	9.479
IPAdjusted	53	14.3	2.1	16.4	9.628
RMAdjusted	53	12.7	7.3	20.0	10.853
Riskperformance	53	4.4	4.6	9.0	6.091
Valid N (listwise)	53				

Descriptive Statistics

	Mean	Std. Deviation	Variance	Skewness	
	Std. Error	Statistic	Statistic	Statistic	Std. Error
HRAdjusted	.4253	3.0962	9.586	.242	.327
Osadjusted	.4317	3.1431	9.879	.625	.327
IPAdjusted	.4746	3.4553	11.939	.032	.327
RMAdjusted	.3328	2.4232	5.872	1.535	.327
Riskperformance	.1193	.8683	.754	1.106	.327
Valid N (listwise)					

Descriptive Statistics

	Kurtosis	
	Statistic	Std. Error
HRAdjusted	-.673	.644
Osadjusted	.121	.644
IPAdjusted	-.679	.644
RMAdjusted	3.265	.644
Riskperformance	2.439	.644
Valid N (listwise)		

Explore

HumanRelations

Descriptives[a,b]

	HumanRelations			Statistic	Std. Error
Riskperformance	4.6	Mean		5.725	.0854
		95% Confidence Interval for Mean	Lower Bound	5.453	
			Upper Bound	5.997	
		5% Trimmed Mean		5.728	
		Median		5.750	
		Variance		.029	
		Std. Deviation		.1708	
		Minimum		5.5	
		Maximum		5.9	
		Range		.4	
		Interquartile Range		.3	
		Skewness		-.753	1.014
		Kurtosis		.343	2.619
	5.0	Mean		5.600	.1291
		95% Confidence Interval for Mean	Lower Bound	5.189	
			Upper Bound	6.011	
		5% Trimmed Mean		5.600	
		Median		5.600	
		Variance		.067	
		Std. Deviation		.2582	
		Minimum		5.3	
		Maximum		5.9	
		Range		.6	
		Interquartile Range		.5	

	Skewness		.000	1.014
	Kurtosis		-1.200	2.619
5.4	Mean		6.175	.1109
	95% Confidence Interval for Mean	Lower Bound	5.822	
		Upper Bound	6.528	
	5% Trimmed Mean		6.178	
	Median		6.200	
	Variance		.049	
	Std. Deviation		.2217	
	Minimum		5.9	
	Maximum		6.4	
	Range		.5	
	Interquartile Range		.4	
	Skewness		-.482	1.014
	Kurtosis		-1.700	2.619
5.8	Mean		5.750	.1881
	95% Confidence Interval for Mean	Lower Bound	5.336	
		Upper Bound	6.164	
	5% Trimmed Mean		5.761	
	Median		5.650	
	Variance		.425	
	Std. Deviation		.6516	
	Minimum		4.6	
	Maximum		6.7	
	Range		2.1	
	Interquartile Range		1.0	
	Skewness		-.080	.637
	Kurtosis		-.417	1.232
6.3	Mean		5.880	.2634

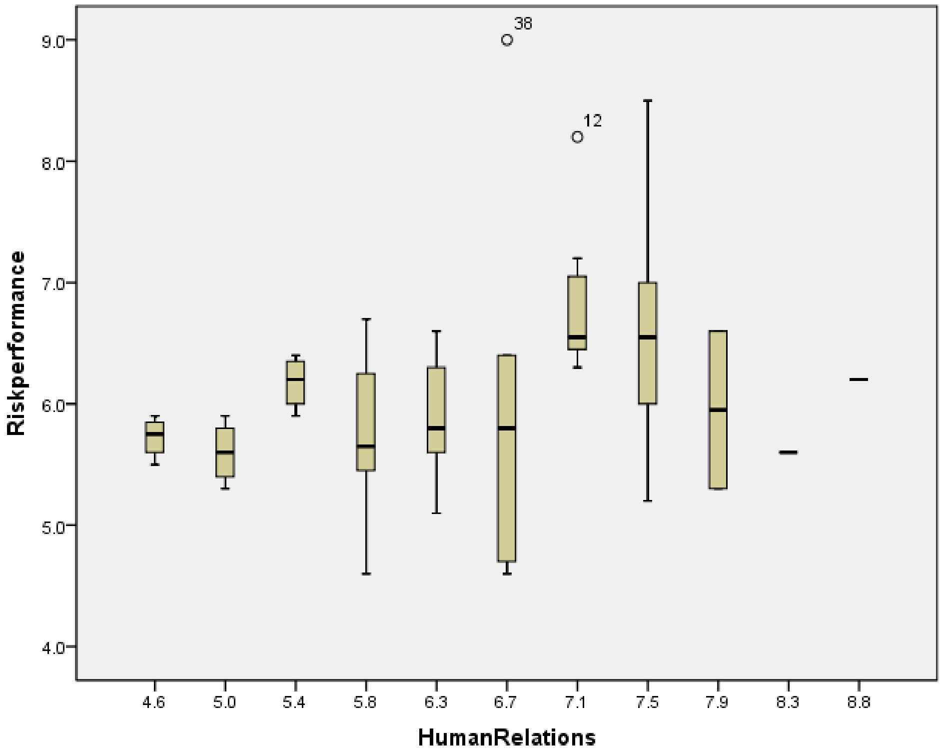
	95% Confidence Interval for Mean	Lower Bound	5.149	
		Upper Bound	6.611	
	5% Trimmed Mean		5.883	
	Median		5.800	
	Variance		.347	
	Std. Deviation		.5891	
	Minimum		5.1	
	Maximum		6.6	
	Range		1.5	
	Interquartile Range		1.1	
	Skewness		-.101	.913
	Kurtosis		-.980	2.000
6.7	Mean		6.050	.6677
	95% Confidence Interval for Mean	Lower Bound	4.334	
		Upper Bound	7.766	
	5% Trimmed Mean		5.967	
	Median		5.800	
	Variance		2.675	
	Std. Deviation		1.6355	
	Minimum		4.6	
	Maximum		9.0	
	Range		4.4	
	Interquartile Range		2.4	
	Skewness		1.358	.845
	Kurtosis		1.949	1.741
7.1	Mean		6.825	.2218
	95% Confidence Interval for Mean	Lower Bound	6.301	
		Upper Bound	7.349	
	5% Trimmed Mean		6.778	

	Median		6.550		
	Variance		.394		
	Std. Deviation		.6274		
	Minimum		6.3		
	Maximum		8.2		
	Range		1.9		
	Interquartile Range		.7		
	Skewness		1.814	.752	
	Kurtosis		3.351	1.481	
7.5	Mean		6.633	.4551	
	95% Confidence Interval for Mean	Lower Bound	5.463		
		Upper Bound	7.803		
	5% Trimmed Mean		6.609		
	Median		6.550		
	Variance		1.243		
	Std. Deviation		1.1147		
	Minimum		5.2		
	Maximum		8.5		
	Range		3.3		
	Interquartile Range		1.6		
	Skewness		.720	.845	
	Kurtosis		1.254	1.741	
7.9	Mean		5.950	.6500	
	95% Confidence Interval for Mean	Lower Bound	-2.309		
		Upper Bound	14.209		
	5% Trimmed Mean		.		
	Median		5.950		
	Variance		.845		
	Std. Deviation		.9192		

	Minimum	5.3	
	Maximum	6.6	
	Range	1.3	
	Interquartile Range	.	
	Skewness	.	.
	Kurtosis	.	.

a. Riskperformance is constant when HumanRelations = 8.3. It has been omitted.

b. Riskperformance is constant when HumanRelations = 8.8. It has been omitted.



OpenSystems

Descriptives[a,b,c,d,e]

	OpenSystems			Statistic	Std. Error
Riskperformance	4.6	Mean		5.917	.2400
		95% Confidence Interval for Mean	Lower Bound	5.300	
			Upper Bound	6.534	
		5% Trimmed Mean		5.907	
		Median		5.700	
		Variance		.346	
		Std. Deviation		.5879	
		Minimum		5.3	
		Maximum		6.7	
		Range		1.4	
		Interquartile Range		1.2	
		Skewness		.698	.845
		Kurtosis		-1.717	1.741
	5.0	Mean		6.260	.7366
		95% Confidence Interval for Mean	Lower Bound	4.215	
			Upper Bound	8.305	
		5% Trimmed Mean		6.183	
		Median		5.900	
		Variance		2.713	
		Std. Deviation		1.6471	
		Minimum		4.9	
		Maximum		9.0	
		Range		4.1	
		Interquartile Range		2.7	
		Skewness		1.534	.913

	Kurtosis		2.464	2.000
5.4	Mean		6.383	.4453
	95% Confidence Interval for Mean	Lower Bound	5.239	
		Upper Bound	7.528	
	5% Trimmed Mean		6.309	
	Median		6.100	
	Variance		1.190	
	Std. Deviation		1.0907	
	Minimum		5.6	
	Maximum		8.5	
	Range		2.9	
	Interquartile Range		1.3	
	Skewness		1.944	.845
	Kurtosis		4.077	1.741
5.8	Mean		6.023	.1695
	95% Confidence Interval for Mean	Lower Bound	5.654	
		Upper Bound	6.392	
	5% Trimmed Mean		6.015	
	Median		5.800	
	Variance		.374	
	Std. Deviation		.6112	
	Minimum		5.2	
	Maximum		7.0	
	Range		1.8	
	Interquartile Range		1.1	
	Skewness		.294	.616
	Kurtosis		-1.457	1.191
6.3	Mean		6.414	.1280
	95% Confidence Interval	Lower Bound	6.101	

	for Mean	Upper Bound	6.728	
	5% Trimmed Mean		6.421	
	Median		6.500	
	Variance		.115	
	Std. Deviation		.3388	
	Minimum		5.8	
	Maximum		6.9	
	Range		1.1	
	Interquartile Range		.3	
	Skewness		-.675	.794
	Kurtosis		1.676	1.587
6.7	Mean		5.914	.2931
	95% Confidence Interval for Mean	Lower Bound	5.197	
		Upper Bound	6.632	
	5% Trimmed Mean		5.916	
	Median		5.900	
	Variance		.601	
	Std. Deviation		.7755	
	Minimum		4.6	
	Maximum		7.2	
	Range		2.6	
	Interquartile Range		.6	
	Skewness		-.074	.794
	Kurtosis		1.998	1.587
7.5	Mean		6.350	.0500
	95% Confidence Interval for Mean	Lower Bound	5.715	
		Upper Bound	6.985	
	5% Trimmed Mean		.	
	Median		6.350	

		Variance		.005	
		Std. Deviation		.0707	
		Minimum		6.3	
		Maximum		6.4	
		Range		.1	
		Interquartile Range		.	
		Skewness		.	.
		Kurtosis		.	.
	7.9	Mean		6.150	.1500
		95% Confidence Interval for Mean	Lower Bound	4.244	
			Upper Bound	8.056	
		5% Trimmed Mean		.	
		Median		6.150	
		Variance		.045	
		Std. Deviation		.2121	
		Minimum		6.0	
		Maximum		6.3	
		Range		.3	
		Interquartile Range		.	
		Skewness		.	.
		Kurtosis		.	.

a. Riskperformance is constant when OpenSystems = 4.2. It has been omitted.

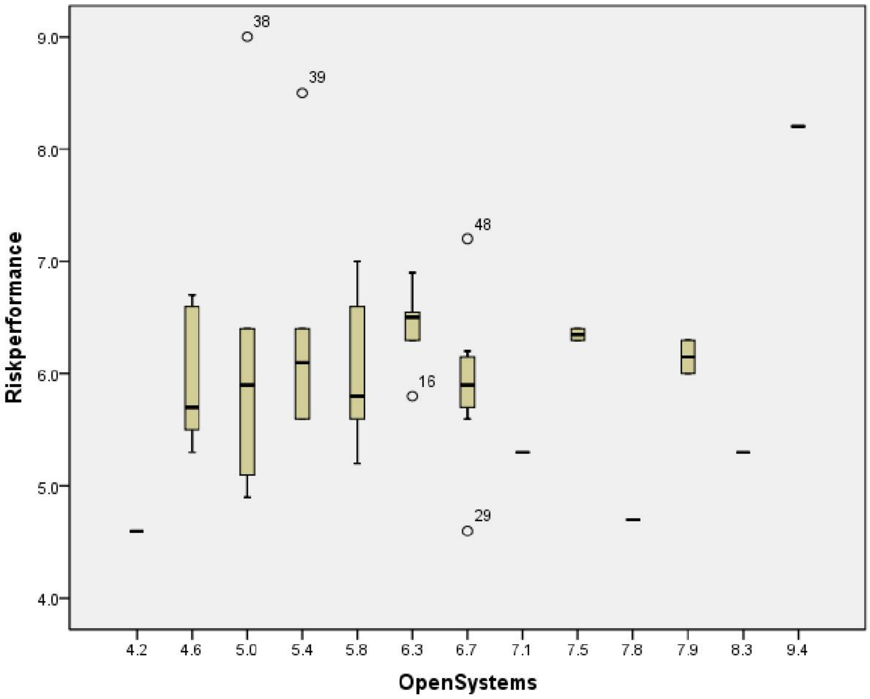
b. Riskperformance is constant when OpenSystems = 7.1. It has been omitted.

c. Riskperformance is constant when OpenSystems = 7.8. It has been omitted.

d. Riskperformance is constant when OpenSystems = 8.3. It has been omitted.

e. Riskperformance is constant when OpenSystems = 9.4. It has been omitted.

Boxplots



InternalProcess

Descriptives[a]

	InternalProcess			Statistic	Std. Error
Riskperformance	5.0	Mean		7.400	1.1000
		95% Confidence Interval for Mean	Lower Bound	-6.577	
			Upper Bound	21.377	
		5% Trimmed Mean		.	
		Median		7.400	
		Variance		2.420	
		Std. Deviation		1.5556	
		Minimum		6.3	
		Maximum		8.5	
		Range		2.2	
		Interquartile Range		.	

		Skewness		.	.
		Kurtosis		.	.
	5.4	Mean		6.500	.1000
		95% Confidence Interval for Mean	Lower Bound	5.229	
			Upper Bound	7.771	
		5% Trimmed Mean		.	
		Median		6.500	
		Variance		.020	
		Std. Deviation		.1414	
		Minimum		6.4	
		Maximum		6.6	
		Range		.2	
		Interquartile Range		.	
		Skewness		.	.
		Kurtosis		.	.
	5.8	Mean		6.250	.1500
		95% Confidence Interval for Mean	Lower Bound	4.344	
			Upper Bound	8.156	
		5% Trimmed Mean		.	
		Median		6.250	
		Variance		.045	
		Std. Deviation		.2121	
		Minimum		6.1	
		Maximum		6.4	
		Range		.3	
		Interquartile Range		.	
		Skewness		.	.
		Kurtosis		.	.
	6.3	Mean		6.129	.2032

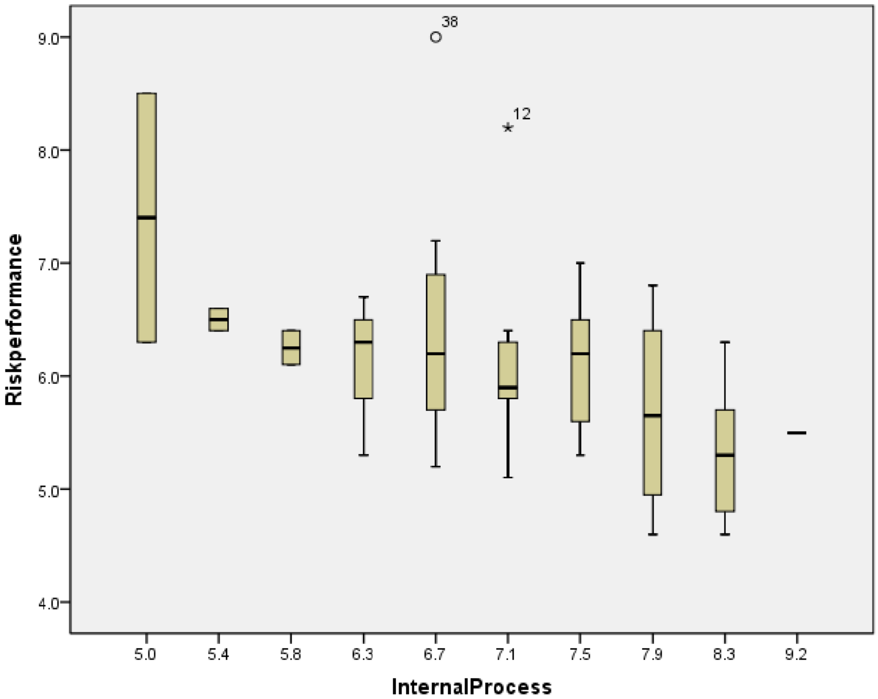
	95% Confidence Interval for Mean	Lower Bound	5.631	
		Upper Bound	6.626	
	5% Trimmed Mean		6.143	
	Median		6.300	
	Variance		.289	
	Std. Deviation		.5376	
	Minimum		5.3	
	Maximum		6.7	
	Range		1.4	
	Interquartile Range		1.1	
	Skewness		-.752	.794
	Kurtosis		-.989	1.587
6.7	Mean		6.440	.3525
	95% Confidence Interval for Mean	Lower Bound	5.643	
		Upper Bound	7.237	
	5% Trimmed Mean		6.367	
	Median		6.200	
	Variance		1.243	
	Std. Deviation		1.1147	
	Minimum		5.2	
	Maximum		9.0	
	Range		3.8	
	Interquartile Range		1.3	
	Skewness		1.380	.687
	Kurtosis		2.298	1.334
7.1	Mean		6.122	.2886
	95% Confidence Interval for Mean	Lower Bound	5.457	
		Upper Bound	6.788	
	5% Trimmed Mean		6.064	

	Median		5.900	
	Variance		.749	
	Std. Deviation		.8657	
	Minimum		5.1	
	Maximum		8.2	
	Range		3.1	
	Interquartile Range		.7	
	Skewness		1.912	.717
	Kurtosis		4.885	1.400
7.5	Mean		6.078	.1854
	95% Confidence Interval for Mean	Lower Bound	5.650	
		Upper Bound	6.505	
	5% Trimmed Mean		6.070	
	Median		6.200	
	Variance		.309	
	Std. Deviation		.5563	
	Minimum		5.3	
	Maximum		7.0	
	Range		1.7	
	Interquartile Range		.9	
	Skewness		.192	.717
	Kurtosis		-.991	1.400
7.9	Mean		5.675	.4715
	95% Confidence Interval for Mean	Lower Bound	4.175	
		Upper Bound	7.175	
	5% Trimmed Mean		5.672	
	Median		5.650	
	Variance		.889	
	Std. Deviation		.9430	

		Minimum		4.6	
		Maximum		6.8	
		Range		2.2	
		Interquartile Range		1.8	
		Skewness		.130	1.014
		Kurtosis		-.986	2.619
	8.3	Mean		5.314	.2365
		95% Confidence Interval for Mean	Lower Bound	4.736	
			Upper Bound	5.893	
		5% Trimmed Mean		5.299	
		Median		5.300	
		Variance		.391	
		Std. Deviation		.6256	
		Minimum		4.6	
		Maximum		6.3	
		Range		1.7	
		Interquartile Range		1.1	
		Skewness		.408	.794
		Kurtosis		-1.018	1.587

a. Riskperformance is constant when InternalProcess = 9.2. It has been omitted.

Boxplots


38
12
9.0
8.0
7.0
6.0
5.0
4.0
Riskperformance
5.0
5.4
5.8
6.3
6.7
7.1
7.5
7.9
8.3
9.2
InternalProcess

RationalModel

Descriptives[a,b,c,d]

	RationalModel			Statistic	Std. Error
Riskperformance	5.0	Mean		6.338	.1711
		95% Confidence Interval for Mean	Lower Bound	5.933	
			Upper Bound	6.742	
		5% Trimmed Mean		6.347	
		Median		6.400	
		Variance		.234	
		Std. Deviation		.4838	
		Minimum		5.5	
		Maximum		7.0	
		Range		1.5	
		Interquartile Range		.8	
		Skewness		-.649	.752
		Kurtosis		.043	1.481
	5.4	Mean		5.475	.1750
		95% Confidence Interval for Mean	Lower Bound	4.918	
			Upper Bound	6.032	
		5% Trimmed Mean		5.472	
		Median		5.450	
		Variance		.123	
		Std. Deviation		.3500	
		Minimum		5.1	
		Maximum		5.9	
		Range		.8	
		Interquartile Range		.7	
		Skewness		.321	1.014

	Kurtosis		-1.598	2.619
5.8	Mean		5.733	.1174
	95% Confidence Interval for Mean	Lower Bound	5.432	
		Upper Bound	6.035	
	5% Trimmed Mean		5.715	
	Median		5.650	
	Variance		.083	
	Std. Deviation		.2875	
	Minimum		5.5	
	Maximum		6.3	
	Range		.8	
	Interquartile Range		.3	
	Skewness		2.076	.845
	Kurtosis		4.681	1.741
6.3	Mean		5.637	.2471
	95% Confidence Interval for Mean	Lower Bound	5.053	
		Upper Bound	6.222	
	5% Trimmed Mean		5.642	
	Median		5.700	
	Variance		.488	
	Std. Deviation		.6989	
	Minimum		4.6	
	Maximum		6.6	
	Range		2.0	
	Interquartile Range		1.3	
	Skewness		-.176	.752
	Kurtosis		-1.179	1.481
6.7	Mean		5.744	.1923
	95% Confidence Interval	Lower Bound	5.301	

	for Mean	Upper Bound	6.188	
	5% Trimmed Mean		5.772	
	Median		5.900	
	Variance		.333	
	Std. Deviation		.5769	
	Minimum		4.6	
	Maximum		6.4	
	Range		1.8	
	Interquartile Range		.9	
	Skewness		-.968	.717
	Kurtosis		.494	1.400
7.1	Mean		6.208	.1928
	95% Confidence Interval for Mean	Lower Bound	5.784	
		Upper Bound	6.633	
	5% Trimmed Mean		6.254	
	Median		6.450	
	Variance		.446	
	Std. Deviation		.6680	
	Minimum		4.7	
	Maximum		6.9	
	Range		2.2	
	Interquartile Range		.9	
	Skewness		-1.329	.637
	Kurtosis		1.064	1.232
7.5	Mean		7.700	.5000
	95% Confidence Interval for Mean	Lower Bound	1.347	
		Upper Bound	14.053	
	5% Trimmed Mean		.	
	Median		7.700	

	Variance	.500	
	Std. Deviation	.7071	
	Minimum	7.2	
	Maximum	8.2	
	Range	1.0	
	Interquartile Range	.	
	Skewness	.	.
	Kurtosis	.	.

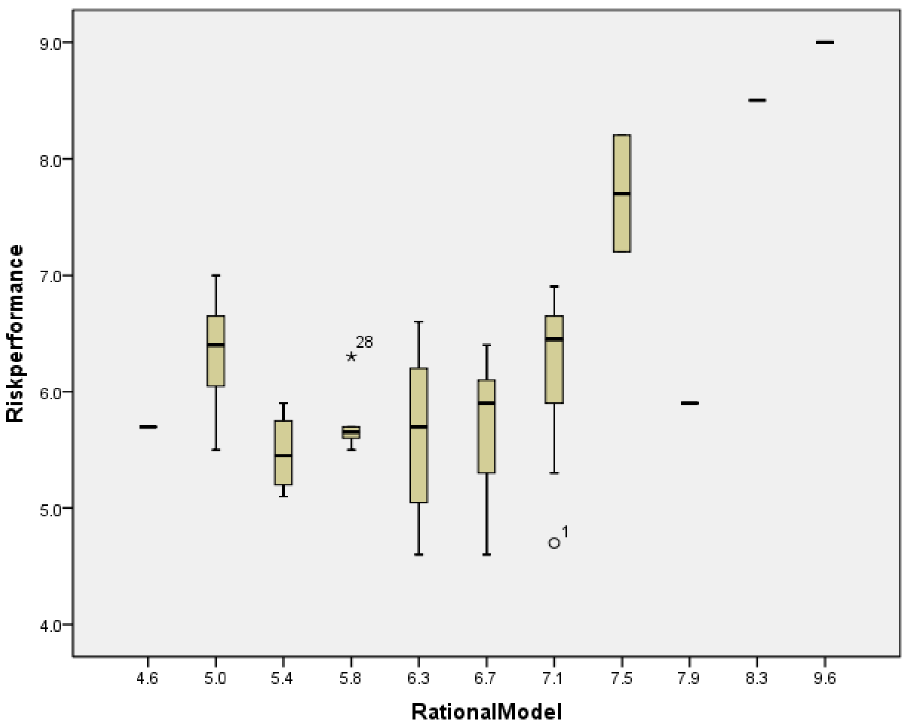
a. Riskperformance is constant when RationalModel = 4.6. It has been omitted.

b. Riskperformance is constant when RationalModel = 7.9. It has been omitted.

c. Riskperformance is constant when RationalModel = 8.3. It has been omitted.

d. Riskperformance is constant when RationalModel = 9.6. It has been omitted.

Boxplots



Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Riskperformance	6.091	.8683	53
HRAdjusted	9.970	3.0962	53
Osadjusted	9.479	3.1431	53
IPAdjusted	9.628	3.4553	53
RMAdjusted	10.853	2.4232	53

Correlations

		Riskperformance	HRAdjusted	Osadjusted
Pearson Correlation	Riskperformance	1.000	.320	.112
	HRAdjusted	.320	1.000	.380
	Osadjusted	.112	.380	1.000
	IPAdjusted	-.534	-.013	.171
	RMAdjusted	.760	.488	.312
Sig. (1-tailed)	Riskperformance	.	.010	.212
	HRAdjusted	.010	.	.002
	Osadjusted	.212	.002	.
	IPAdjusted	.000	.462	.110
	RMAdjusted	.000	.000	.011
N	Riskperformance	53	53	53
	HRAdjusted	53	53	53
	Osadjusted	53	53	53
	IPAdjusted	53	53	53
	RMAdjusted	53	53	53

Correlations

		IPAdjusted	RMAdjusted
Pearson Correlation	Riskperformance	-.534	.760
	HRAdjusted	-.013	.488
	Osadjusted	.171	.312
	IPAdjusted	1.000	-.102
	RMAdjusted	-.102	1.000
Sig. (1-tailed)	Riskperformance	.000	.000
	HRAdjusted	.462	.000
	Osadjusted	.110	.011
	IPAdjusted	.	.233
	RMAdjusted	.233	.
N	Riskperformance	53	53
	HRAdjusted	53	53
	Osadjusted	53	53
	IPAdjusted	53	53
	RMAdjusted	53	53

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted	.	Enter

a. All requested variables entered.

b. Dependent Variable: Riskperformance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889[a]	.790	.773	.4141

a. Predictors: (Constant), RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.975	4	7.744	45.160	.000[a]
	Residual	8.231	48	.171		
	Total	39.205	52			

a. Predictors: (Constant), RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted

b. Dependent Variable: Riskperformance

Coefficients[a]

Model		Unstandardized Coefficients	
		B	Std. Error
1	(Constant)	4.486	.332
	HRAdjusted	-.010	.022
	Osadjusted	-.007	.020
	IPAdjusted	-.114	.017
	RMAdjusted	.265	.028

Coefficients[a]

Model	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	Beta			Lower Bound	Upper Bound

1	(Constant)		13.524	.000	3.819	5.153
	HRAdjusted	-.037	-.471	.640	-.055	.034
	Osadjusted	-.027	-.366	.716	-.049	.034
	IPAdjusted	-.454	-6.671	.000	-.149	-.080
	RMAdjusted	.740	9.547	.000	.209	.321

Coefficients[a]

Model		Correlations		
		Zero-order	Partial	Part
1	(Constant)			
	HRAdjusted	.320	-.068	-.031
	Osadjusted	.112	-.053	-.024
	IPAdjusted	-.534	-.694	-.441
	RMAdjusted	.760	.809	.631

a. Dependent Variable: Riskperformance

Riskperformance

Linear

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.760	.578	.569	.570

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.642	1	22.642	69.717	.000
Residual	16.563	51	.325		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
RMAdjusted	.272	.033	.760	8.350	.000
(Constant)	3.135	.363		8.649	.000

Logarithmic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.716	.512	.502	.612

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.072	1	20.072	53.504	.000
Residual	19.133	51	.375		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
ln(RMAdjusted)	3.057	.418	.716	7.315	.000
(Constant)	-1.133	.991		-1.143	.258

Inverse

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.659	.434	.423	.659

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	17.031	1	17.031	39.169	.000
Residual	22.175	51	.435		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 / RMAdjusted	-31.500	5.033	-.659	-6.259	.000
(Constant)	9.113	.491		18.545	.000

Quadratic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate

.793	.628	.614	.540

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	24.638	2	12.319	42.284	.000
Residual	14.567	50	.291		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
RMAdjusted	-.253	.203	-.706	-1.246	.219
RMAdjusted ** 2	.021	.008	1.483	2.618	.012
(Constant)	6.270	1.246		5.033	.000

Cubic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.806	.650	.628	.530

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.466	3	8.489	30.274	.000
Residual	13.739	49	.280		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
RMAdjusted	-2.297	1.206	-6.410	-1.904	.063
RMAdjusted ** 2	.182	.094	12.981	1.933	.059
RMAdjusted ** 3	-.004	.002	-5.925	-1.718	.092
(Constant)	14.544	4.968		2.927	.005

Power

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.685	.469	.459	.100

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.455	1	.455	45.135	.000
Residual	.515	51	.010		
Total	.970	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(RMAdjusted)	.460	.069	.685	6.718	.000
(Constant)	2.033	.330		6.152	.000

The dependent variable is ln(Riskperformance).

S

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.636	.405	.393	.106

The independent variable is RMAdjusted.

ANOVA

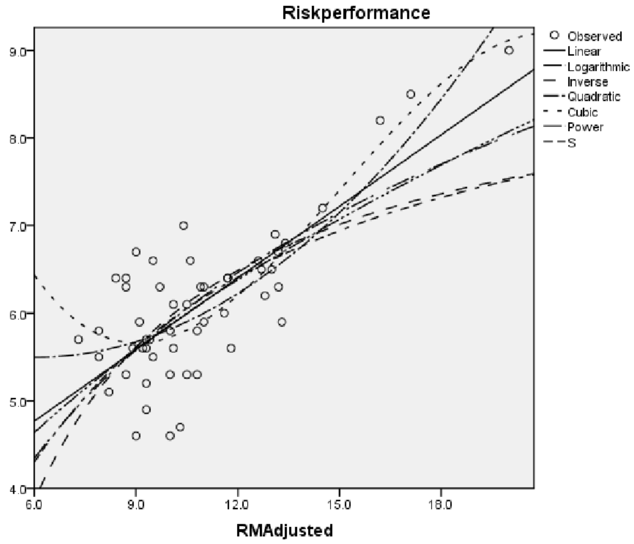
	Sum of Squares	df	Mean Square	F	Sig.
Regression	.393	1	.393	34.708	.000
Residual	.577	51	.011		
Total	.970	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / RMAdjusted	-4.784	.812	-.636	-5.891	.000
(Constant)	2.256	.079		28.463	.000

The dependent variable is ln(Riskperformance).



Scale: ALL VARIABLES

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.783	.819	28

Item Statistics

	Mean	Std. Deviation	N
HRAdjusted	9.970	3.0962	53
Communication	5.377	2.0473	53
Goals	5.236	1.7558	53
Rewards	5.321	1.5723	53
Culture	6.877	1.8237	53
Osadjusted	9.479	3.1431	53
Change	5.470	2.0282	53
Individualism	4.953	1.6792	53
Creativity	5.292	1.6797	53
Growth	5.943	1.5275	53
IPAdjusted	9.628	3.4553	53
Centralisation	6.085	1.6488	53
Rules	6.425	1.9375	53
Monitoring	6.142	2.0856	53
Coordination	6.708	1.3673	53
RMAdjusted	10.853	2.4232	53
Definedstructure	5.802	1.3493	53
StrongAuthority	5.519	1.5222	53
ActiveEvaluation	5.547	1.0436	53
GoaldImplementation	6.028	1.7276	53
Riskperception	6.308	2.3818	53
MarketConfidence	11.185	3.7574	53
Internal	5.415	.7553	53
External	5.783	.9772	53
RPAdjusted	14.298	4.2175	53
Riskperformance	6.091	.8683	53
Cost	9.798	2.3019	53
Schedual	8.477	.7650	53

Inter-Item Correlation Matrix

	HRAdjusted	Communication	Goals	Rewards	Culture
HRAdjusted	1.000	.696	.550	.354	.385
Communication	.696	1.000	.286	-.013	.010
Goals	.550	.286	1.000	-.066	-.151
Rewards	.354	-.013	-.066	1.000	-.060
Culture	.385	.010	-.151	-.060	1.000
Osadjusted	.380	.136	.397	.215	.058
Change	.172	.077	-.031	.152	.222
Individualism	.260	.172	.472	-.012	-.160
Creativity	.356	.184	.371	.224	-.062
Growth	-.016	-.178	.080	.074	.065
IPAdjusted	-.013	-.112	-.099	.219	.033
Centralisation	-.232	-.099	-.112	-.244	-.040
Rules	.172	-.030	.123	.324	-.009
Monitoring	-.017	.021	-.135	.201	-.090
Coordination	-.092	-.211	-.239	.027	.302
RMAdjusted	.488	.305	.247	.316	.133
Definedstructure	.505	.581	.282	.078	.019
StrongAuthority	.386	.180	.426	.150	.015
ActiveEvaluation	.264	.068	-.004	.495	.076
GoaldImplementation	.020	-.166	-.221	.262	.280
Riskperception	.336	.046	.364	.108	.174
MarketConfidence	.270	.042	.322	.080	.076
Internal	.274	.105	.300	.011	.208
External	.208	-.043	.187	.133	.222
RPAdjusted	.317	.273	.206	.048	.059
Riskperformance	.320	.264	.207	.082	.044
Cost	.188	.219	.118	-.019	.002
Schedual	.512	.234	.367	.351	.097

Inter-Item Correlation Matrix

	Osadjusted	Change	Individualism	Creativity	Growth	IPAdjusted
HRAdjusted	.380	.172	.260	.356	-.016	-.013
Communication	.136	.077	.172	.184	-.178	-.112
Goals	.397	-.031	.472	.371	.080	-.099
Rewards	.215	.152	-.012	.224	.074	.219
Culture	.058	.222	-.160	-.062	.065	.033
Osadjusted	1.000	.534	.593	.559	.538	.171
Change	.534	1.000	.013	-.040	.120	.316
Individualism	.593	.013	1.000	.269	.078	.008
Creativity	.559	-.040	.269	1.000	.068	-.172
Growth	.538	.120	.078	.068	1.000	.222
IPAdjusted	.171	.316	.008	-.172	.222	1.000
Centralisation	-.172	-.037	-.155	-.181	.036	.309
Rules	.157	.014	.206	.014	.140	.417
Monitoring	.172	.547	-.056	-.168	-.011	.676
Coordination	.026	-.134	-.161	.071	.330	.363
RMAdjusted	.312	.062	.068	.462	.100	-.102
Definedstructure	.213	.119	.079	.242	-.006	-.253
StrongAuthority	.293	.070	.307	.287	-.068	.055
ActiveEvaluation	.329	.102	.070	.480	.119	.049
GoaldImplementation	.051	.218	-.273	-.082	.214	.264
Riskperception	.109	-.100	.065	.241	.089	.019
MarketConfidence	-.015	-.278	-.002	.300	-.007	-.093
Internal	.468	.423	.347	-.016	.303	.268
External	.168	.181	.114	.015	.119	.152
RPAdjusted	.097	-.288	.086	.471	.013	-.526
Riskperformance	.112	-.261	.066	.506	-.005	-.534
Cost	-.099	-.368	-.059	.392	-.117	-.592
Schedual	.677	.228	.392	.540	.340	-.007

Inter-Item Correlation Matrix

	Centralisation	Rules	Monitoring	Coordination	RMAdjusted
HRAdjusted	-.232	.172	-.017	-.092	.488
Communication	-.099	-.030	.021	-.211	.305
Goals	-.112	.123	-.135	-.239	.247
Rewards	-.244	.324	.201	.027	.316
Culture	-.040	-.009	-.090	.302	.133
Osadjusted	-.172	.157	.172	.026	.312
Change	-.037	.014	.547	-.134	.062
Individualism	-.155	.206	-.056	-.161	.068
Creativity	-.181	.014	-.168	.071	.462
Growth	.036	.140	-.011	.330	.100
IPAdjusted	.309	.417	.676	.363	-.102
Centralisation	1.000	-.242	-.029	.107	-.083
Rules	-.242	1.000	-.015	-.083	.213
Monitoring	-.029	-.015	1.000	-.005	-.262
Coordination	.107	-.083	-.005	1.000	.025
RMAdjusted	-.083	.213	-.262	.025	1.000
Definedstructure	-.206	-.017	-.128	-.204	.658
StrongAuthority	-.242	.320	-.087	-.020	.586
ActiveEvaluation	-.028	.183	-.030	.047	.541
GoalImplementation	-.001	.087	.179	.229	.478
Riskperception	.087	.112	-.221	.140	.337
MarketConfidence	.114	.041	-.321	.132	.330
Internal	-.233	.250	.233	.015	.102
External	.026	.210	.008	.042	.223
RPAdjusted	-.032	.076	-.712	-.042	.726
Riskperformance	-.054	.050	-.663	-.065	.760
Cost	.053	-.026	-.719	-.080	.604
Schedual	-.323	.262	-.081	.024	.771

Inter-Item Correlation Matrix

	Definedstructure	StrongAuthority	ActiveEvaluation	GoalImplementation
HRAdjusted	.505	.386	.264	.020
Communication	.581	.180	.068	-.166
Goals	.282	.426	-.004	-.221
Rewards	.078	.150	.495	.262
Culture	.019	.015	.076	.280
Osadjusted	.213	.293	.329	.051
Change	.119	.070	.102	.218
Individualism	.079	.307	.070	-.273
Creativity	.242	.287	.480	-.082
Growth	-.006	-.068	.119	.214
IPAdjusted	-.253	.055	.049	.264
Centralisation	-.206	-.242	-.028	-.001
Rules	-.017	.320	.183	.087
Monitoring	-.128	-.087	-.030	.179
Coordination	-.204	-.020	.047	.229
RMAdjusted	.658	.586	.541	.478
Definedstructure	1.000	.395	.150	.040
StrongAuthority	.395	1.000	.024	.153
ActiveEvaluation	.150	.024	1.000	.295
GoalImplementation	.040	.153	.295	1.000
Riskperception	.183	.207	.112	.055
MarketConfidence	.218	.200	.012	-.058
Internal	-.017	.177	.225	.309
External	.059	.175	.253	.173
RPAdjusted	.482	.245	.358	-.001
Riskperformance	.501	.247	.399	.046
Cost	.395	.087	.295	-.059
Schedual	.521	.590	.467	.328

Inter-Item Correlation Matrix

	Riskperception	MarketConfidence	Internal	External	RPAdjusted
HRAdjusted	.336	.270	.274	.208	.317
Communication	.046	.042	.105	-.043	.273
Goals	.364	.322	.300	.187	.206
Rewards	.108	.080	.011	.133	.048
Culture	.174	.076	.208	.222	.059
Osadjusted	.109	-.015	.468	.168	.097
Change	-.100	-.278	.423	.181	-.288
Individualism	.065	-.002	.347	.114	.086
Creativity	.241	.300	-.016	.015	.471
Growth	.089	-.007	.303	.119	.013
IPAdjusted	.019	-.093	.268	.152	-.526
Centralisation	.087	.114	-.233	.026	-.032
Rules	.112	.041	.250	.210	.076
Monitoring	-.221	-.321	.233	.008	-.712
Coordination	.140	.132	.015	.042	-.042
RMAdjusted	.337	.330	.102	.223	.726
Definedstructure	.183	.218	-.017	.059	.482
StrongAuthority	.207	.200	.177	.175	.245
ActiveEvaluation	.112	.012	.225	.253	.358
GoalImplementation	.055	-.058	.309	.173	-.001
Riskperception	1.000	.927	.112	.713	.327
MarketConfidence	.927	1.000	-.212	.457	.409
Internal	.112	-.212	1.000	.400	-.174
External	.713	.457	.400	1.000	.078
RPAdjusted	.327	.409	-.174	.078	1.000
Riskperformance	.298	.396	-.209	.056	.987
Cost	.247	.391	-.372	-.015	.948
Schedual	.291	.187	.412	.252	.494

Inter-Item Correlation Matrix

	Riskperformance	Cost	Schedual
HRAdjusted	.320	.188	.512
Communication	.264	.219	.234
Goals	.207	.118	.367
Rewards	.082	-.019	.351
Culture	.044	.002	.097
Osadjusted	.112	-.099	.677
Change	-.261	-.368	.228
Individualism	.066	-.059	.392
Creativity	.506	.392	.540
Growth	-.005	-.117	.340
IPAdjusted	-.534	-.592	-.007
Centralisation	-.054	.053	-.323
Rules	.050	-.026	.262
Monitoring	-.663	-.719	-.081
Coordination	-.065	-.080	.024
RMAdjusted	.760	.604	.771
Definedstructure	.501	.395	.521
StrongAuthority	.247	.087	.590
ActiveEvaluation	.399	.295	.467
GoalImplementation	.046	-.059	.328
Riskperception	.298	.247	.291
MarketConfidence	.396	.391	.187
Internal	-.209	-.372	.412
External	.056	-.015	.252
RPAdjusted	.987	.948	.494
Riskperformance	1.000	.958	.507
Cost	.958	1.000	.241
Schedual	.507	.241	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation
HRAdjusted	190.040	435.403	.641
Communication	194.632	496.345	.299
Goals	194.774	492.891	.408
Rewards	194.689	503.330	.312
Culture	193.132	510.485	.170
Osadjusted	190.530	449.526	.513
Change	194.540	511.047	.138
Individualism	195.057	506.792	.241
Creativity	194.717	487.444	.506
Growth	194.066	510.611	.215
IPAdjusted	190.381	512.915	.019
Centralisation	193.925	534.001	-.117
Rules	193.585	501.489	.260
Monitoring	193.868	540.520	-.176
Coordination	193.302	521.654	.068
RMAdjusted	189.157	444.008	.763
Definedstructure	194.208	497.513	.473
StrongAuthority	194.491	493.746	.469
ActiveEvaluation	194.462	505.049	.462
GoalImplementation	193.981	509.014	.203
Riskperception	193.702	467.402	.531
MarketConfidence	188.825	453.499	.376
Internal	194.594	517.358	.287
External	194.226	508.189	.423
RPAdjusted	185.711	439.781	.397
Riskperformance	193.919	506.529	.525
Cost	190.211	494.770	.271
Schedual	191.532	500.466	.781

Item-Total Statistics

	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
HRAdjusted	.998	.753
Communication	.993	.777
Goals	.992	.773
Rewards	.988	.777
Culture	.992	.783
Osadjusted	.997	.763
Change	.990	.785
Individualism	.985	.780
Creativity	.984	.769
Growth	.987	.781
IPAdjusted	.997	.801
Centralisation	.985	.793
Rules	.988	.779
Monitoring	.992	.799
Coordination	.972	.785
RMAdjusted	.994	.750
Definedstructure	.928	.773
StrongAuthority	.965	.772
ActiveEvaluation	.927	.775
GoaldImplementation	.956	.781
Riskperception	.998	.764
MarketConfidence	.997	.775
Internal	.956	.781
External	.967	.777
RPAdjusted	.995	.776
Riskperformance	1.000	.775
Cost	.999	.779
Schedual	.996	.772

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
200.009	527.796	22.9738	28

Correlations

Correlations

		Change	Individualism	Creativity	Growth
OpenSystems	Pearson Correlation	.558**	.587**	.557**	.529**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Centralisation	Rules	Monitoring	Coordination
InternalProcess	Pearson Correlation	.386**	.419**	.607**	.422**
	Sig. (2-tailed)	.004	.002	.000	.002
	N	53	53	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Definedstructure	StrongAuthority	ActiveEvaluation
RationalModel	Pearson Correlation	.615**	.671**	.510**
	Sig. (2-tailed)	.000	.000	.000
	N	53	53	53

Correlations

		GoaldImplementation
RationalModel	Pearson Correlation	.657**
	Sig. (2-tailed)	.000
	N	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Cost	Schedual
Riskperformance	Pearson Correlation	.958**	.507**
	Sig. (2-tailed)	.000	.000
	N	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Internal	External
Riskperception	Pearson Correlation	.112	.713**
	Sig. (2-tailed)	.425	.000
	N	53	53

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		RMAdjusted	Osadjusted	IPAdjusted
RMAdjusted	Pearson Correlation	1	.312*	-.102
	Sig. (2-tailed)	.000	.023	.467
	N	53	53	53
Osadjusted	Pearson Correlation	.312*	1	.171
	Sig. (2-tailed)	.023		.221
	N	53	53	53
IPAdjusted	Pearson Correlation	-.102	.171	1
	Sig. (2-tailed)	.467	.221	
	N	53	53	53
Riskperformance	Pearson Correlation	.760**	.112	-.534**
	Sig. (2-tailed)	.000	.424	.000
	N	53	53	53
Riskperception	Pearson Correlation	.337*	.109	.019
	Sig. (2-tailed)	.014	.438	.890
	N	53	53	53

Correlations

		Riskperformance	Riskperception
RMAdjusted	Pearson Correlation	.760**	.337*
	Sig. (2-tailed)	.000	.014
	N	53	53
Osadjusted	Pearson Correlation	.112	.109
	Sig. (2-tailed)	.424	.438
	N	53	53
IPAdjusted	Pearson Correlation	-.534**	.019
	Sig. (2-tailed)	.000	.890
	N	53	53
Riskperformance	Pearson Correlation	1	.298*
	Sig. (2-tailed)		.030
	N	53	53
Riskperception	Pearson Correlation	.298*	1
	Sig. (2-tailed)	.030	
	N	53	53

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Frequencies

Statistics

ClientClassification

N	Valid	53
	Missing	0

ClientClassification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pbh	8	15.1	15.1	15.1
	Pbl	8	15.1	15.1	30.2
	Prh	15	28.3	28.3	58.5
	Prl	22	41.5	41.5	100.0
	Total	53	100.0	100.0	

Descriptives

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean
	Statistic	Statistic	Statistic	Statistic	Statistic
HRAdjusted	53	12.4	4.6	17.0	9.970
Osadjusted	53	14.1	4.2	18.3	9.479
IPAdjusted	53	14.3	2.1	16.4	9.628
RMAdjusted	53	12.7	7.3	20.0	10.853
Riskperformance	53	4.4	4.6	9.0	6.091
Valid N (listwise)	53				

Descriptive Statistics

	Mean	Std. Deviation	Variance	Skewness	
	Std. Error	Statistic	Statistic	Statistic	Std. Error
HRAdjusted	.4253	3.0962	9.586	.242	.327
Osadjusted	.4317	3.1431	9.879	.625	.327
IPAdjusted	.4746	3.4553	11.939	.032	.327
RMAdjusted	.3328	2.4232	5.872	1.535	.327
Riskperformance	.1193	.8683	.754	1.106	.327
Valid N (listwise)					

Descriptive Statistics

	Kurtosis	
	Statistic	Std. Error
HRAdjusted	-.673	.644
Osadjusted	.121	.644
IPAdjusted	-.679	.644
RMAdjusted	3.265	.644
Riskperformance	2.439	.644
Valid N (listwise)		

RationalModel

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
Riskperformance	6.091	.8683	53
HRAdjusted	9.970	3.0962	53
Osadjusted	9.479	3.1431	53
IPAdjusted	9.628	3.4553	53
RMAdjusted	10.853	2.4232	53

Correlations

		Riskperformance	HRAdjusted	Osadjusted
Pearson Correlation	Riskperformance	1.000	.320	.112
	HRAdjusted	.320	1.000	.380
	Osadjusted	.112	.380	1.000
	IPAdjusted	-.534	-.013	.171
	RMAdjusted	.760	.488	.312
Sig. (1-tailed)	Riskperformance	.	.010	.212
	HRAdjusted	.010	.	.002
	Osadjusted	.212	.002	.
	IPAdjusted	.000	.462	.110
	RMAdjusted	.000	.000	.011
N	Riskperformance	53	53	53
	HRAdjusted	53	53	53
	Osadjusted	53	53	53
	IPAdjusted	53	53	53
	RMAdjusted	53	53	53

Correlations

		IPAdjusted	RMAdjusted
Pearson Correlation	Riskperformance	-.534	.760
	HRAdjusted	-.013	.488
	Osadjusted	.171	.312
	IPAdjusted	1.000	-.102
	RMAdjusted	-.102	1.000
Sig. (1-tailed)	Riskperformance	.000	.000
	HRAdjusted	.462	.000
	Osadjusted	.110	.011
	IPAdjusted	.	.233
	RMAdjusted	.233	.
N	Riskperformance	53	53
	HRAdjusted	53	53
	Osadjusted	53	53
	IPAdjusted	53	53
	RMAdjusted	53	53

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted	.	Enter

a. All requested variables entered.

b. Dependent Variable: Riskperformance

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889[a]	.790	.773	.4141

a. Predictors: (Constant), RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted

b. Dependent Variable: Riskperformance

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.975	4	7.744	45.160	.000[a]
	Residual	8.231	48	.171		
	Total	39.205	52			

a. Predictors: (Constant), RMAdjusted, IPAdjusted, Osadjusted, HRAdjusted

b. Dependent Variable: Riskperformance

Coefficients[a]

Model		Unstandardized Coefficients	
		B	Std. Error
1	(Constant)	4.486	.332
	HRAdjusted	-.010	.022
	Osadjusted	-.007	.020
	IPAdjusted	-.114	.017
	RMAdjusted	.265	.028

Coefficients[a]

Model		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		Beta			Lower Bound	Upper Bound
1	(Constant)		13.524	.000	3.819	5.153
	HRAdjusted	-.037	-.471	.640	-.055	.034
	Osadjusted	-.027	-.366	.716	-.049	.034
	IPAdjusted	-.454	-6.671	.000	-.149	-.080
	RMAdjusted	.740	9.547	.000	.209	.321

Coefficients[a]

Model		Correlations		
		Zero-order	Partial	Part
1	(Constant)			
	HRAdjusted	.320	-.068	-.031
	Osadjusted	.112	-.053	-.024
	IPAdjusted	-.534	-.694	-.441
	RMAdjusted	.760	.809	.631

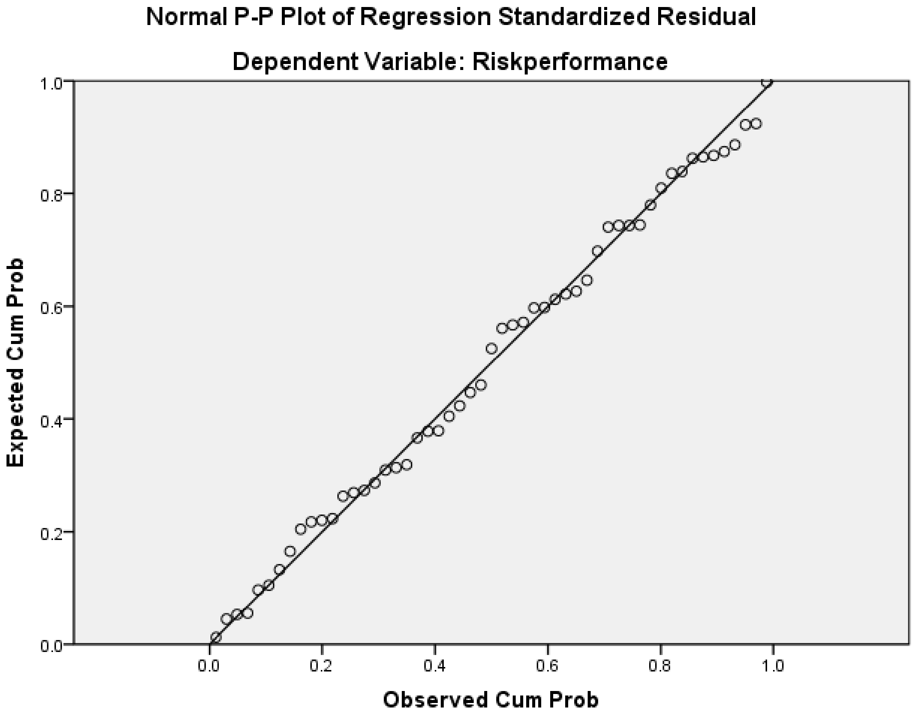
a. Dependent Variable: Riskperformance

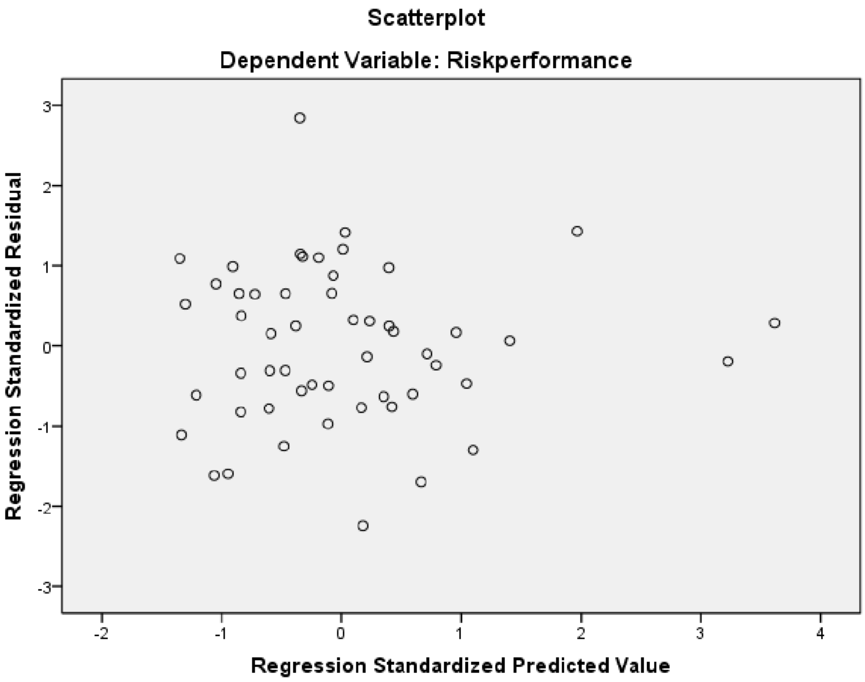
Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	5.049	8.882	6.091	.7718	53
Std. Predicted Value	-1.349	3.617	.000	1.000	53
Standard Error of Predicted Value	.063	.264	.122	.038	53
Adjusted Predicted Value	4.943	8.801	6.087	.7656	53
Residual	-.9293	1.1776	.0000	.3978	53
Std. Residual	-2.244	2.844	.000	.961	53
Stud. Residual	-2.378	2.968	.003	1.015	53
Deleted Residual	-1.0433	1.2826	.0031	.4449	53
Stud. Deleted Residual	-2.505	3.250	.005	1.043	53
Mahal. Distance	.226	20.146	3.925	3.417	53
Cook's Distance	.000	.177	.024	.040	53
Centered Leverage Value	.004	.387	.075	.066	53

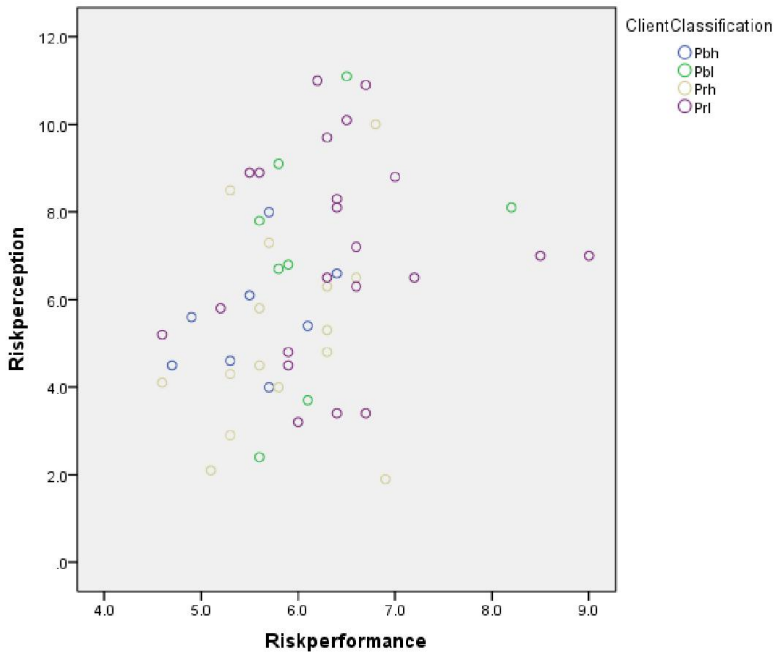
a. Dependent Variable: Riskperformance

Charts

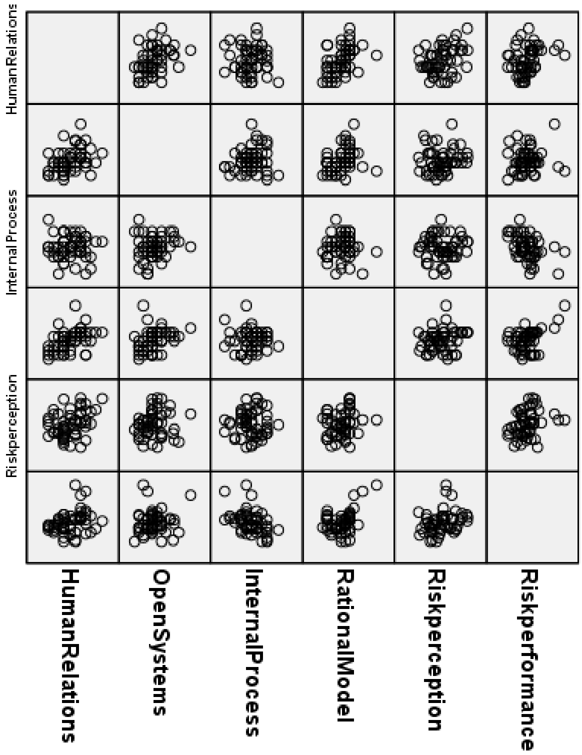

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Riskperformance
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: Riskperformance
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
4

Graph


ClientClassification
Pbh
Pbl
Prh
Prl
12.0
10.0
8.0
6.0
4.0
2.0
.0
Riskperception
4.0
5.0
6.0
7.0
8.0
9.0
Riskperformance

Graph



Curve Fit

Riskperformance

Linear

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.760	.578	.569	.570

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.642	1	22.642	69.717	.000

Residual	16.563	51	.325		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
RMAdjusted	.272	.033	.760	8.350	.000
(Constant)	3.135	.363		8.649	.000

Logarithmic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.716	.512	.502	.612

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.072	1	20.072	53.504	.000
Residual	19.133	51	.375		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
ln(RMAdjusted)	3.057	.418	.716	7.315	.000
(Constant)	-1.133	.991		-1.143	.258

Inverse

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.659	.434	.423	.659

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	17.031	1	17.031	39.169	.000
Residual	22.175	51	.435		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 / RMAdjusted	-31.500	5.033	-.659	-6.259	.000
(Constant)	9.113	.491		18.545	.000

Quadratic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.793	.628	.614	.540

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	24.638	2	12.319	42.284	.000
Residual	14.567	50	.291		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
RMAdjusted	-.253	.203	-.706	-1.246	.219
RMAdjusted ** 2	.021	.008	1.483	2.618	.012
(Constant)	6.270	1.246		5.033	.000

Cubic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.806	.650	.628	.530

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.466	3	8.489	30.274	.000
Residual	13.739	49	.280		
Total	39.205	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
RMAdjusted	-2.297	1.206	-6.410	-1.904	.063
RMAdjusted ** 2	.182	.094	12.981	1.933	.059
RMAdjusted ** 3	-.004	.002	-5.925	-1.718	.092
(Constant)	14.544	4.968		2.927	.005

Power

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.685	.469	.459	.100

The independent variable is RMAdjusted.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.455	1	.455	45.135	.000
Residual	.515	51	.010		
Total	.970	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(RMAdjusted)	.460	.069	.685	6.718	.000
(Constant)	2.033	.330		6.152	.000

The dependent variable is ln(Riskperformance).

S

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.636	.405	.393	.106

The independent variable is RMAdjusted.

ANOVA

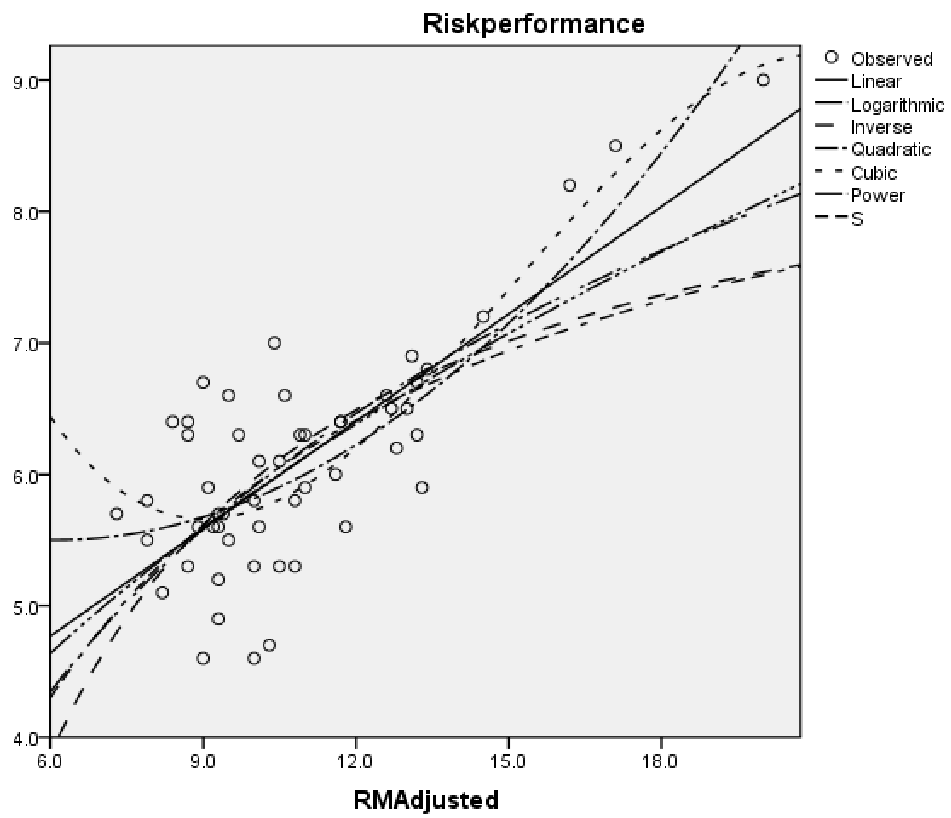
	Sum of Squares	df	Mean Square	F	Sig.
Regression	.393	1	.393	34.708	.000
Residual	.577	51	.011		
Total	.970	52			

The independent variable is RMAdjusted.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / RMAdjusted	-4.784	.812	-.636	-5.891	.000
(Constant)	2.256	.079		28.463	.000

The dependent variable is ln(Riskperformance).



Curve Fit

HRAdjusted

Linear

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.320	.102	.085	2.962

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	50.999	1	50.999	5.812	.020
Residual	447.493	51	8.774		
Total	498.492	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	1.141	.473	.320	2.411	.020
(Constant)	3.023	2.910		1.039	.304

Logarithmic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.312	.098	.080	2.970

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	48.606	1	48.606	5.510	.023
Residual	449.886	51	8.821		
Total	498.492	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(Riskperformance)	7.079	3.016	.312	2.347	.023
(Constant)	-2.754	5.436		-.507	.615

Inverse

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.298	.089	.071	2.985

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	44.203	1	44.203	4.962	.030
Residual	454.289	51	8.908		
Total	498.492	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 / Riskperformance	-41.442	18.604	-.298	-2.228	.030
(Constant)	16.900	3.138		5.386	.000

Quadratic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.320	.103	.067	2.991

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	51.162	2	25.581	2.859	.067
Residual	447.329	50	8.947		
Total	498.492	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.567	4.265	.159	.133	.895
Riskperformance ** 2	.044	.323	.162	.135	.893
(Constant)	4.859	13.892		.350	.728

Cubic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.324	.105	.069	2.988

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	52.177	2	26.088	2.923	.063
Residual	446.315	50	8.926		
Total	498.492	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance ** 2	.207	.335	.766	.619	.539
Riskperformance ** 3	-.012	.033	-.448	-.362	.719
(Constant)	4.977	4.958		1.004	.320

Excluded Terms

	Beta In	t	Sig.	Partial Correlation	Minimum Tolerance
Riskperformance[a]	-23.611	-2.198	.033	-.300	.000

a. The tolerance limit for entering variables is reached.

Compound

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.324	.105	.088	.313

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.588	1	.588	5.990	.018
Residual	5.003	51	.098		
Total	5.590	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	1.130	.057	1.383	19.992	.000
(Constant)	4.498	1.384		3.250	.002

The dependent variable is ln(HRAdjusted).

Power

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.313	.098	.081	.314

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.

Regression	.549	1	.549	5.553	.022
Residual	5.041	51	.099		
Total	5.590	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(Riskperformance)	.752	.319	.313	2.357	.022
(Constant)	2.452	1.411		1.738	.088

The dependent variable is ln(HRAdjusted).

S

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.295	.087	.069	.316

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.487	1	.487	4.871	.032
Residual	5.103	51	.100		
Total	5.590	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / Riskperformance	-4.351	1.972	-.295	-2.207	.032
(Constant)	2.977	.333		8.951	.000

The dependent variable is ln(HRAdjusted).

Growth

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.324	.105	.088	.313

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.588	1	.588	5.990	.018
Residual	5.003	51	.098		
Total	5.590	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.122	.050	.324	2.447	.018
(Constant)	1.504	.308		4.887	.000

The dependent variable is ln(HRAdjusted).

Exponential

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.324	.105	.088	.313

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.588	1	.588	5.990	.018
Residual	5.003	51	.098		
Total	5.590	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	.122	.050	.324	2.447	.018
(Constant)	4.498	1.384		3.250	.002

The dependent variable is ln(HRAdjusted).

Logistic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.324	.105	.088	.313

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.324	.105	.088	.313

The independent variable is Riskperformance.

ANOVA

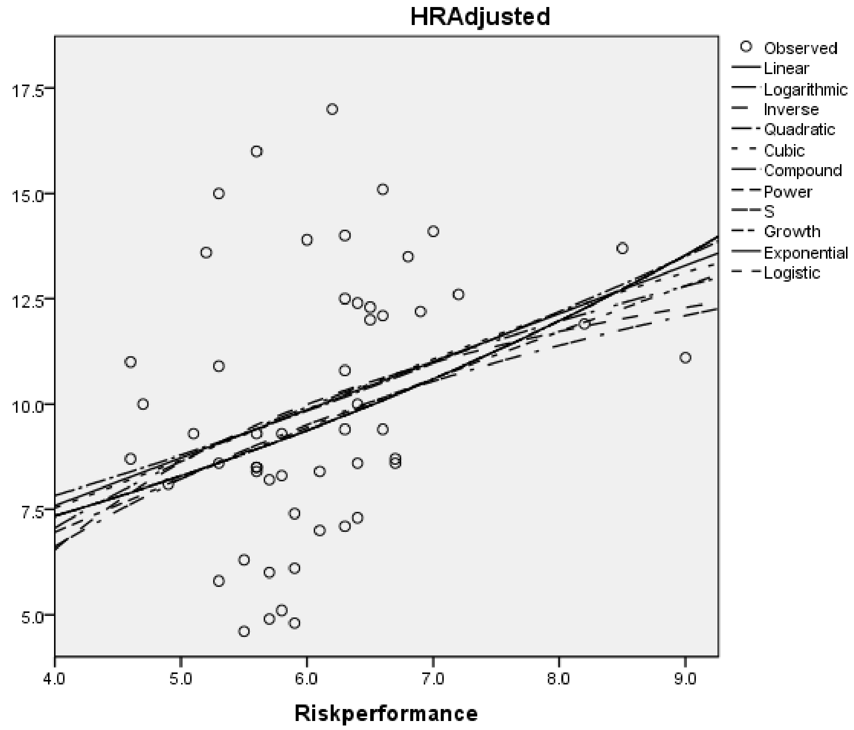
	Sum of Squares	df	Mean Square	F	Sig.
Regression	.588	1	.588	5.990	.018
Residual	5.003	51	.098		
Total	5.590	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	.885	.044	.723	19.992	.000
(Constant)	.222	.068		3.250	.002

The dependent variable is ln(1 / HRAdjusted).



Osadjusted

Linear

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.112	.013	-.007	3.154

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.448	1	6.448	.648	.424
Residual	507.279	51	9.947		
Total	513.727	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.406	.504	.112	.805	.424
(Constant)	7.009	3.098		2.262	.028

Logarithmic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.116	.013	-.006	3.152

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	6.924	1	6.924	.697	.408
Residual	506.803	51	9.937		
Total	513.727	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(Riskperformance)	2.672	3.201	.116	.835	.408
(Constant)	4.677	5.770		.811	.421

Inverse

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.117	.014	-.006	3.152

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.004	1	7.004	.705	.405
Residual	506.723	51	9.936		
Total	513.727	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 / Riskperformance	-16.497	19.648	-.117	-.840	.405
(Constant)	12.238	3.314		3.693	.001

Quadratic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.127	.016	-.023	3.179

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	8.327	2	4.163	.412	.665
Residual	505.400	50	10.108		
Total	513.727	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	2.348	4.533	.649	.518	.607
Riskperformance ** 2	-.148	.344	-.540	-.431	.668
(Constant)	.787	14.766		.053	.958

Cubic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.132	.017	-.022	3.177

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	8.942	2	4.471	.443	.645
Residual	504.786	50	10.096		
Total	513.727	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	1.532	2.322	.423	.660	.513
Riskperformance ** 3	-.009	.017	-.319	-.497	.621
(Constant)	2.199	10.169		.216	.830

Excluded Terms

	Beta In	t	Sig.	Partial Correlation	Minimum Tolerance
Riskperformance ** 2[a]	28.834	1.229	.225	.173	.000

a. The tolerance limit for entering variables is reached.

Compound

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.129	.017	-.003	.336

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.097	1	.097	.860	.358
Residual	5.768	51	.113		
Total	5.866	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	1.051	.056	1.137	18.618	.000
(Constant)	6.629	2.190		3.027	.004

The dependent variable is ln(Osadjusted).

Power

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.140	.020	.000	.336

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.115	1	.115	1.020	.317
Residual	5.751	51	.113		
Total	5.866	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(Riskperformance)	.344	.341	.140	1.010	.317
(Constant)	4.835	2.971		1.627	.110

The dependent variable is ln(Osadjusted).

S

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.148	.022	.003	.335

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.128	1	.128	1.136	.291
Residual	5.738	51	.113		
Total	5.866	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / Riskperformance	-2.229	2.091	-.148	-1.066	.291
(Constant)	2.568	.353		7.281	.000

The dependent variable is ln(Osadjusted).

Growth

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.129	.017	-.003	.336

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.097	1	.097	.860	.358
Residual	5.768	51	.113		
Total	5.866	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.050	.054	.129	.928	.358
(Constant)	1.891	.330		5.725	.000

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.050	.054	.129	.928	.358
(Constant)	1.891	.330		5.725	.000

The dependent variable is ln(Osadjusted).

Exponential

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.129	.017	-.003	.336

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.097	1	.097	.860	.358
Residual	5.768	51	.113		
Total	5.866	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.050	.054	.129	.928	.358
(Constant)	6.629	2.190		3.027	.004

The dependent variable is ln(Osadjusted).

Logistic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.129	.017	-.003	.336

The independent variable is Riskperformance.

ANOVA

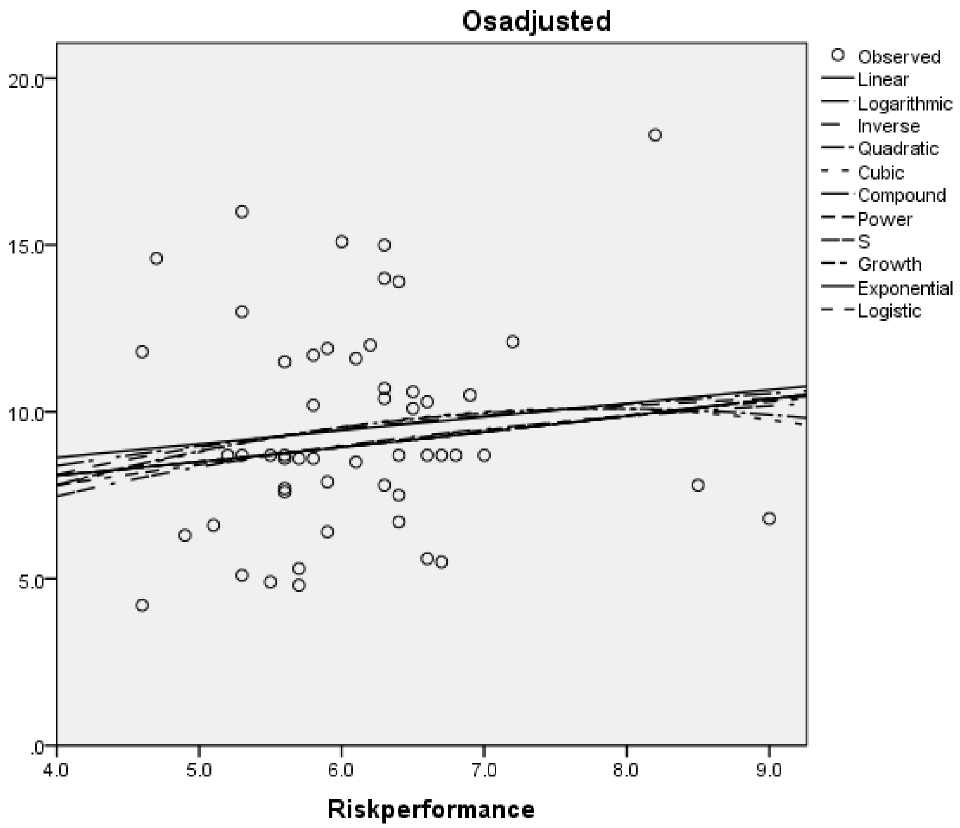
	Sum of Squares	df	Mean Square	F	Sig.
Regression	.097	1	.097	.860	.358
Residual	5.768	51	.113		
Total	5.866	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.951	.051	.879	18.618	.000
(Constant)	.151	.050		3.027	.004

The dependent variable is ln(1 / Osadjusted).



IPAdjusted

Linear

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.534	.285	.271	2.950

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	177.014	1	177.014	20.340	.000
Residual	443.834	51	8.703		
Total	620.848	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	-2.125	.471	-.534	-4.510	.000
(Constant)	22.570	2.898		7.788	.000

Logarithmic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.551	.304	.290	2.912

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	188.522	1	188.522	22.239	.000
Residual	432.326	51	8.477		
Total	620.848	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
ln(Riskperformance)	-13.942	2.956	-.551	-4.716	.000
(Constant)	34.687	5.329		6.509	.000

Inverse

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.562	.315	.302	2.887

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	195.744	1	195.744	23.484	.000
Residual	425.104	51	8.335		
Total	620.848	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / Riskperformance	87.208	17.996	.562	4.846	.000
(Constant)	-4.955	3.035		-1.632	.109

Quadratic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.562	.316	.289	2.914

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	196.252	2	98.126	11.555	.000
Residual	424.595	50	8.492		
Total	620.848	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	-8.340	4.155	-2.096	-2.007	.050
Riskperformance ** 2	.474	.315	1.572	1.505	.139
(Constant)	42.480	13.534		3.139	.003

Cubic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.562	.316	.289	2.914

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	196.252	2	98.126	11.555	.000
Residual	424.595	50	8.492		
Total	620.848	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	-8.340	4.155	-2.096	-2.007	.050
Riskperformance ** 2	.474	.315	1.572	1.505	.139
(Constant)	42.480	13.534		3.139	.003

Excluded Terms

	Beta In	t	Sig.	Partial Correlation	Minimum Tolerance
Riskperformance ** 3[a]	-5.762	-.567	.573	-.081	.000

a. The tolerance limit for entering variables is reached.

Compound

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.542	.294	.280	.358

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.724	1	2.724	21.227	.000
Residual	6.544	51	.128		
Total	9.268	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	.768	.044	.582	17.479	.000
(Constant)	44.423	15.633		2.842	.006

The dependent variable is ln(IPAdjusted).

Power

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.549	.301	.288	.356

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.792	1	2.792	21.990	.000
Residual	6.476	51	.127		
Total	9.268	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
ln(Riskperformance)	-1.697	.362	-.549	-4.689	.000
(Constant)	188.312	122.816		1.533	.131

The dependent variable is ln(IPAdjusted).

S

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.549	.301	.288	.356

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.794	1	2.794	22.012	.000
Residual	6.474	51	.127		
Total	9.268	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / Riskperformance	10.420	2.221	.549	4.692	.000
(Constant)	.446	.375		1.191	.239

The dependent variable is ln(IPAdjusted).

Growth

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.542	.294	.280	.358

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.724	1	2.724	21.227	.000
Residual	6.544	51	.128		
Total	9.268	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	-.264	.057	-.542	-4.607	.000
(Constant)	3.794	.352		10.781	.000

The dependent variable is ln(IPAdjusted).

Exponential

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.542	.294	.280	.358

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.724	1	2.724	21.227	.000
Residual	6.544	51	.128		
Total	9.268	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	-.264	.057	-.542	-4.607	.000
(Constant)	44.423	15.633		2.842	.006

The dependent variable is ln(IPAdjusted).

Logistic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.542	.294	.280	.358

The independent variable is Riskperformance.

ANOVA

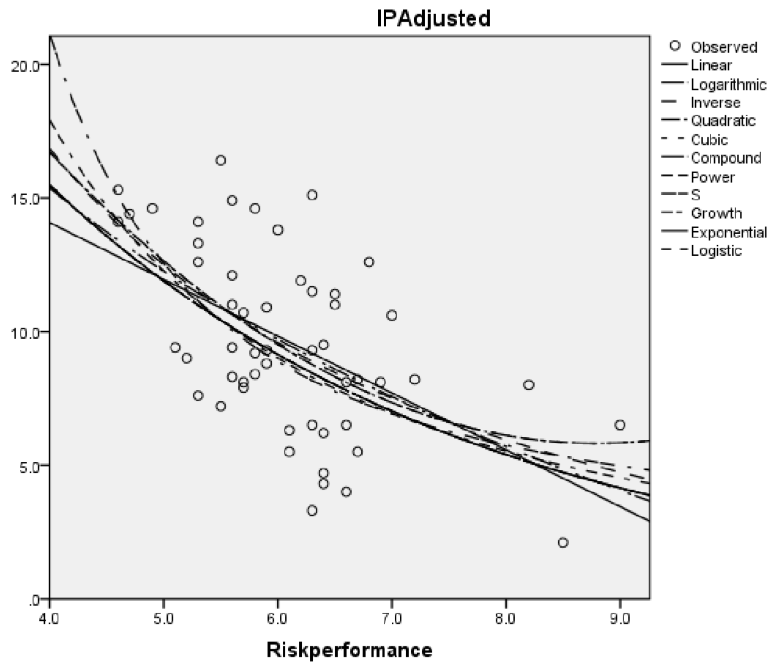
	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.724	1	2.724	21.227	.000
Residual	6.544	51	.128		
Total	9.268	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
Riskperformance	1.302	.074	1.720	17.479	.000
(Constant)	.023	.008		2.842	.006

The dependent variable is ln(1 / IPAdjusted).



RMAdjusted

Linear

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.760	.578	.569	1.590

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	176.337	1	176.337	69.717	.000
Residual	128.995	51	2.529		
Total	305.332	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	2.121	.254	.760	8.350	.000
(Constant)	-2.064	1.562		-1.321	.192

Logarithmic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.721	.520	.510	1.696

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	158.703	1	158.703	55.199	.000
Residual	146.629	51	2.875		
Total	305.332	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(Riskperformance)	12.792	1.722	.721	7.430	.000
(Constant)	-12.139	3.103		-3.912	.000

Inverse

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.675	.455	.444	1.806

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	138.975	1	138.975	42.606	.000
Residual	166.357	51	3.262		
Total	305.332	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 / Riskperformance	-73.482	11.258	-.675	-6.527	.000
(Constant)	23.141	1.899		12.187	.000

Quadratic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.818	.669	.656	1.422

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	204.281	2	102.140	50.539	.000
Residual	101.051	50	2.021		
Total	305.332	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	-5.370	2.027	-1.924	-2.649	.011
Riskperformance ** 2	.572	.154	2.701	3.718	.001
(Constant)	21.932	6.603		3.322	.002

Cubic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.817	.668	.654	1.425

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	203.812	2	101.906	50.190	.000
Residual	101.520	50	2.030		
Total	305.332	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	-1.618	1.041	-.580	-1.553	.127
Riskperformance ** 3	.028	.008	1.373	3.679	.001
(Constant)	13.902	4.560		3.048	.004

Excluded Terms

	Beta In	t	Sig.	Partial Correlation	Minimum Tolerance
Riskperformance ** 2[a]	9.427	.683	.498	.097	.000

a. The tolerance limit for entering variables is reached.

Compound

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.716	.512	.502	.143

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.100	1	1.100	53.504	.000
Residual	1.048	51	.021		
Total	2.148	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	1.182	.027	2.045	43.677	.000
(Constant)	3.831	.539		7.101	.000

The dependent variable is ln(RMAdjusted).

Power

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.685	.469	.459	.149

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.008	1	1.008	45.135	.000
Residual	1.139	51	.022		
Total	2.148	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
ln(Riskperformance)	1.020	.152	.685	6.718	.000
(Constant)	1.699	.465		3.655	.001

The dependent variable is ln(RMAdjusted).

S

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.647	.418	.407	.156

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.899	1	.899	36.701	.000
Residual	1.249	51	.024		
Total	2.148	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 / Riskperformance	-5.909	.975	-.647	-6.058	.000
(Constant)	3.351	.165		20.368	.000

The dependent variable is ln(RMAdjusted).

Growth

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.716	.512	.502	.143

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.100	1	1.100	53.504	.000
Residual	1.048	51	.021		
Total	2.148	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.167	.023	.716	7.315	.000
(Constant)	1.343	.141		9.536	.000

The dependent variable is ln(RMAdjusted).

Exponential

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate

.716	.512	.502	.143

The independent variable is Riskperformance.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.100	1	1.100	53.504	.000
Residual	1.048	51	.021		
Total	2.148	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.167	.023	.716	7.315	.000
(Constant)	3.831	.539		7.101	.000

The dependent variable is ln(RMAdjusted).

Logistic

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.716	.512	.502	.143

The independent variable is Riskperformance.

ANOVA

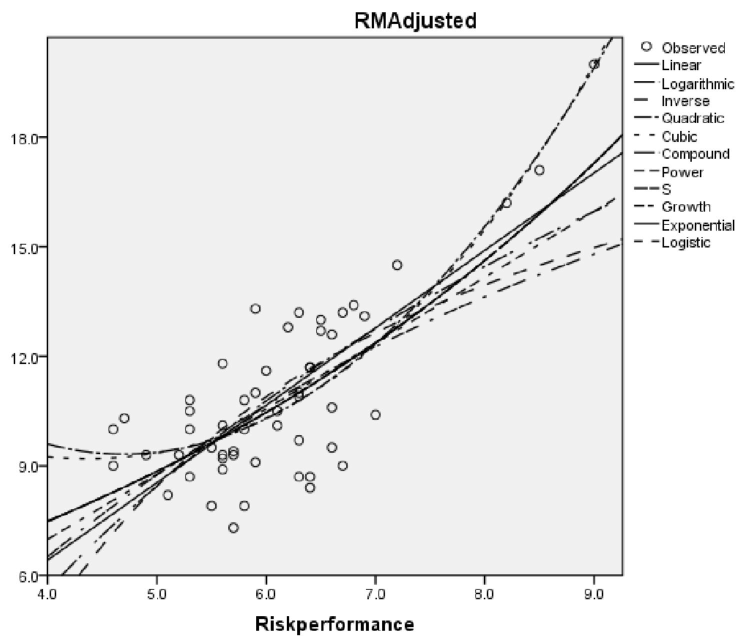
	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.100	1	1.100	53.504	.000
Residual	1.048	51	.021		
Total	2.148	52			

The independent variable is Riskperformance.

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Riskperformance	.846	.019	.489	43.677	.000
(Constant)	.261	.037		7.101	.000

The dependent variable is ln(1 / RMAdjusted).



10.6 Appendix F: Submitted papers

A Arabiat, FT Edum-Fotwe, and R McCaffer (2008) “Role of client behaviour in the risk environment in construction projects*” CIB Dubai conference*.

A Arabiat, FT Edum-Fotwe, and R McCaffer (2008) “Is there a need to re-evaluate the client’s approach toward risk in construction projects?” *AEC Antalya conference*.

A Arabiat, FT Edum-Fotwe, and R McCaffer (2007) “Does client behaviour actively induce risk in construction projects?” *Acrom Belfast conference*.