THE IMPACT OF STRATEGIC DECISIONS ON CONSTRUCTION CLIENT SATISFACTION: AN ASSESSMENT FRAMEWORK

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Date……………05/11/2008………………..

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Finally my heart is with my family, who always stand alongside and provide me with enormous courage to complete the project.

ABSTRACT

For some considerable time, client satisfaction has been a problematic issue in the UK construction industry with many projects failing to satisfy the client needs and meet or exceed the client expectations. Client satisfaction is, however, a key performance measure and a major determinant of project success. There is a common belief that strategic decisions made by clients have a significant impact on the levels of client satisfaction. Strategic decisions in the context of construction projects are often associated with project stages including pre-design, design, tender, construction, occupancy & maintenance and disposal and vary in nature. Consequently the impact of strategic decisions on client satisfaction depends as much on timing as on the subjects of the decisions. While such findings are useful to facilitate the industry's focus on addressing the failure in achieving client satisfaction, and point to the route for improvement, they are arbitrary and do not provide a systematic basis for investigating the real impact on client satisfaction. The nature of strategic decisions and the significance of its impact on client satisfaction have not been clearly identified and client satisfaction has remained an elusive issue for a majority of construction professionals. This research was hence undertaken to seek empirical evidence of an interrelationship between strategic decisions and client satisfaction.

Defining strategic decisions, often associated with project stages, as ones that are complex and made under uncertainty and have a long-term impact on project success, a quantitative research methodology combined with qualitative approaches, was adopted in investigating the interrelationship between strategic decisions and client satisfaction. Findings of a detailed literature review revealed that client satisfaction at any stage depends as much on the service quality attributes of service providers including overall service delivery, people of service providers and communications with clients as on the influence of strategic decisions and the client itself. These performance attributes and the groups of strategic decisions, referred as strategic decision cluster (SDC), were further assessed and the relationships between these measures and strategic decisions were examined using factor analysis and multiple regression modelling techniques. Analyses revealed SDCs including *Design Approach*, *Procurement* and *Implementation* predict better the outcomes of service

quality and hence higher levels of client satisfaction. *Service delivery* and *communications with clients* have a positively significant correlation with the levels of client satisfaction. Of these two attributes, *communications with clients* makes the largest unique contribution to the variance and is considered the better predictor for client satisfaction.

The developed models is validated via external and internal validation and the findings support the thesis that strategic decisions have a impact on client satisfaction by strongly influencing the performance of service quality although causality cannot be assumed. It is recommended that service providers including contractors and consultants devote more efforts to improve their performance on the attributes of service quality identified as having significant association with client satisfaction, particularly service delivery and communications with clients. Further research efforts focusing on providing a practical tool or expert system so as to address the practical issues for a wider range of clients and service providers are also recommended.

Dedicated to my family whom I have dearly missed while undertaking this research project.

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CHAPTER 1 INTRODUCTION

1.1 OVERVIEW

The satisfaction phenomenon is regarded as an important aspect of life. In the construction domain, satisfaction and client satisfaction in particular, plays a fundamental role in determining the perceived success of a project and represents the bottom line of successful project implementation (Ashley *et al*, 1987; Bresnen and Haslam, 1991; OGC, 2002). Identifying and satisfying the needs of clients is critical for the existence and competitiveness of the global construction industry. It was found that it is five times more expensive to develop a new construction client than to maintain an existing one and companies could increase their profits by almost 100% by retaining just 5% more of their clients (Reichheld and Sasser, 1990; BSRIA, 2003). Client satisfaction is therefore a fundamental issue for construction participants who must constantly seek to improve their performance if they are to survive in the global marketplace. The concept of globalisation has added a greater impetus to the importance of client satisfaction, to the effect, that it is now essential for the survival of service providers, for example, consultants and contractors.

In the UK construction industry, client satisfaction has been a problematic issue for some considerable time (Banwell, 1964; Latham, 1994; Egan, 1998; Egan, 2002; McMeeken, 2008), and is an aspect of business that until now has been given little priority (Johnston, 2004). Dissatisfaction is widely experienced by clients of the construction sector and there may be many aspects to blame but it is largely attributable to overrunning project costs, delayed completion, inferior performance of service providers including contractors and consultants (Egan, 1998; NAO, 2000; HSE, 2002).

Previous research findings indicated that strategic decisions made by clients, especially at the early stages of a project, for example, regarding the procurement route, have a significant impact on the levels of client satisfaction (Naoum, 1994; Soetanto and Proverbs, 2001; Soetanto, 2002). A client's strategic decisions on the business case such as development scale and revenue targets for projects with a limited life should take into account the costs of closure, decommissioning and, where appropriate, eventual sale. Poorly informed strategic decisions made by a client such as choosing a contractor without appropriate consultation or consideration could result in an under-performed project and ultimately cause client dissatisfaction.

Soetanto (2002) suggested that strategic decisions such as long-term relationship-based partnering and strategic alliances might have advantages over traditional competitive tendering for the client to achieve higher levels of satisfaction. Some lessons have been learned from previous project failures such as the Millennium Dome, which has lost millions of pounds due to the failure to achieve its strategic targets (NAO, 2000). These findings are 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 (Chinyio and Olomolaiye, 1999). Obviously, the effectiveness of such strategic decisions is a cause for concern, given the uncertainty that exists and their influence on satisfaction levels.

The UK Government, the largest public sector client in the construction industry, has endorsed a commitment to continuous improvement of the construction process towards better management of the supply chain (Latham, 1994; Egan, 1998; Egan 2002). A number of policies, guidance and research initiatives exist, established by the government, to encourage the construction industry towards radical improvement and best value for money (OGC, 2003; CE, 2004). The development of strategy on procurement was considered fundamental to achieve targets identified in those initiatives.

While such findings are useful to facilitate the focus on addressing the failure of the industry in achieving client satisfaction, and point to the route for improvement, they are arbitrary and do not provide a systematic basis for investigating the real impact on client satisfaction. The nature of strategic decisions is believed to vary across the whole life cycle of a construction project and the significance of the impact on client satisfaction has not been clearly identified (Soetanto *et al*, 2001; Cheng and Proverbs, 2004). Issues such as, what are strategic decisions clients have to make throughout the project life cycle, and whether or not client satisfaction levels are dependent on project stages, have yet to be addressed. To the extent that strategic decisions, as will be demonstrated in the subsequent chapters, potentially have a significant influence on these elements and by extension the performance of construction projects and the industry as a whole, it merits systematic research to explore the nature and significance of such influence.

Furthermore, there exists a range of models which may be employed in studying the levels of satisfaction of various members of the construction supply chain (Walker, 1995; Gable, 1996). Only few have been identified as being particularly applicable to the assessment of the satisfaction of construction clients. There has been little published on the use of formal models of service quality in association with the investigation of client satisfaction (Gunning, 2000) and, client satisfaction, as an important aspect of business success, has remained as an elusive issue in the construction sector (Cheng and Proverbs, 2004).

This highlights both the need for investigation of client strategic decisions, the client satisfaction phenomenon and its assessment, and in underpinning such assessment, the need for further research in the performance domain focusing on client strategic decisions and their impact on client satisfaction. The answers will help bridge the clearly identified gap in knowledge that has informed this investigation. Such an empirical study of the interrelationship between strategic decisions and client satisfaction will provide a significant contribution to the body of knowledge on strategic decisions associated with construction and project performance.

1.2 AIM AND OBJECTIVES

The aim of the research is to develop a predictive model identifying the impact of strategic decisions on client satisfaction and towards developing an improved understanding of the satisfaction phenomena.

The fundamental questions to be addressed therefore are:

- What are the strategic decisions which clients have to make across the project life cycle?
- What is the definition of client satisfaction in the context of construction projects?
- How are client satisfaction levels measured and what are the criteria of measurement?
- Are client satisfaction levels dependent on project stages?
- What impact do strategic decisions have on client’s satisfaction levels?
- What is the correlation between strategic decisions and client satisfaction?

In pursuit of the aim and above research questions, the research objectives consist of:

- To identify and categorise strategic decisions which clients have to make across the project life cycle.
- To define the concept of client satisfaction and identify the criteria of measurement
- Identification of appropriate criteria for the measurement of satisfaction throughout the project life cycle.
- Development of a principal data collection instrument, for example, survey questionnaires.
- Development of a model using correlation analysis and regression techniques to reveal the impact of strategic decisions and to predict client satisfaction.
- Validation of the model using appropriate techniques including a hold back sample.

1.3 METHODOLOGY AND RESEARCH STAGES

A combination of qualitative and quantitative research methods, involving questionnaire surveys, case studies and secondary desk study techniques, will be employed to address the research questions (refer to Chapter 5). Quantitative and qualitative research approaches can be seen as complementary, providing different perspectives and answering different questions within any one broad area. There exist questions not easily answered by quantitative research designs, although they are used commonly in the field of construction research. In the context of this study, it would be difficult to carry out a meaningful quantitative study before developing an understanding of the criteria for assessing service quality in this context. While qualitative research methods are chosen to investigate the softer issues of "Client characteristics and satisfaction", which are best measured by descriptive criteria, quantitative methods will be employed in the data analysis and model development stages.

The study will commence with an in-depth literature review and case studies focusing on the area of clients' strategic decisions, the definition of satisfaction and measuring criteria of the levels of satisfaction in the context of construction projects.

This will form the framework for the following initial survey that will be conducted with experienced construction clients to confirm and validate the categories of strategic decisions and criteria of measuring client satisfaction identified in the literature review.

Findings of the literature review and case studies will form a basis for a conceptual model of the relationship between dependent (client satisfaction) and independent (strategic decisions) variables. In order to test and validate the conceptual model, a UK-wide major questionnaire survey of clients will be followed. The question of whether or not satisfaction levels are dependent on project stages will also be addressed at this stage.

A three-stage approach is adopted for this research as illustrated in Figure 1.1.

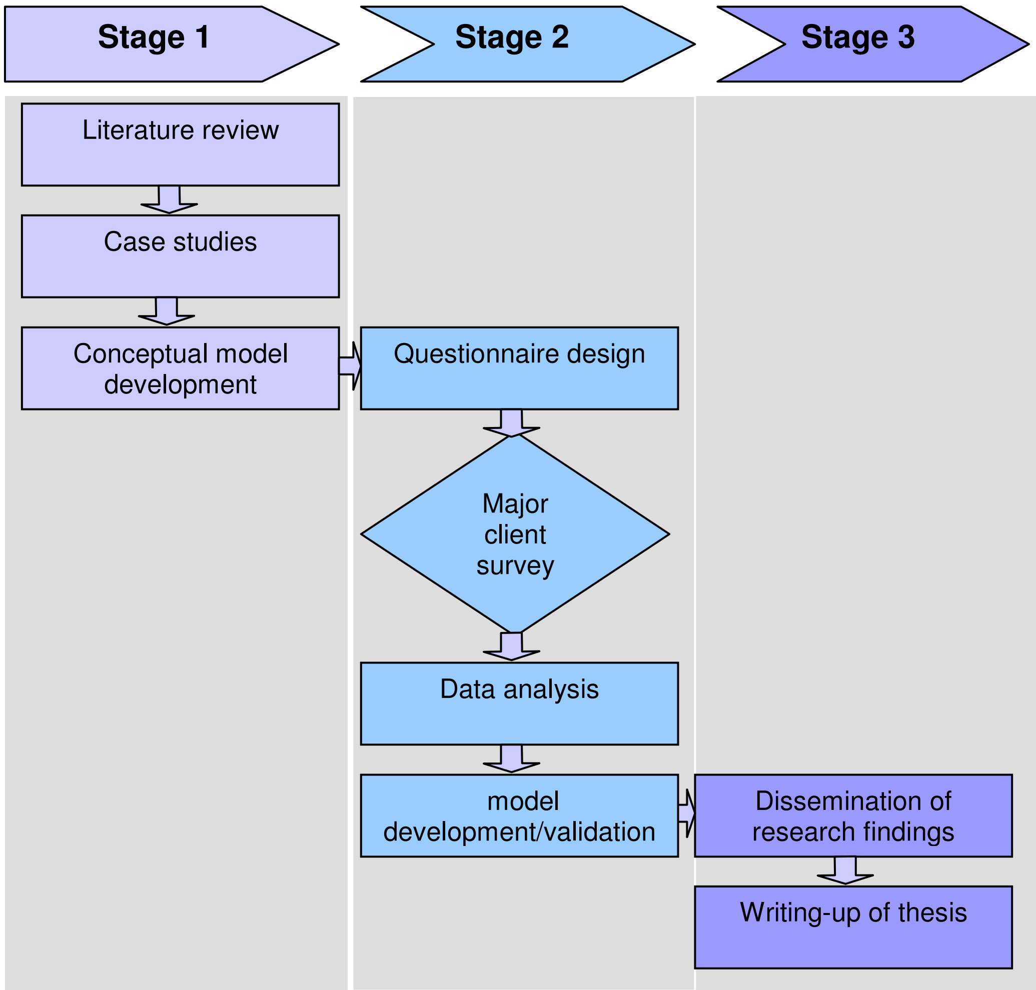


Figure 1.1 Research work flow

Stage 1 comprises literature review, case studies in the field and development of a conceptual model. Stages 2 and 3 consists of questionnaire design, a UK-wide questionnaire survey of clients, in-depth data analysis and development and validation of a predictive model, and using desk study techniques to examine research findings and present them into a PhD thesis and disseminate to academia and practitioners in stage 3.

Data analysis will initially apply exploratory techniques to gain good understanding of the nature of the collected data. It is anticipated that the feedback from clients will vary from one client to another due to the various nature of clients' characteristics including size and sector. Considering the nature of variations, subsequent modelling techniques including correlation analysis and multiple regressions will be employed as the main technique to develop the predictive model. However, depending on the nature of the collected data, at the final stage more complicated modelling technique may be considered to depict the nature of correlation between dependent (client satisfaction) and independent (strategic decisions) variables.

1.4 ORGANISATION OF THE THESIS

The thesis comprises ten chapters, each reporting an important research stage, as shown in Figure 1.2. A brief outline of each chapter now follows:

Chapter 1 outlines the context within which the research is undertaken, and sets out the aim and objectives. The scope and the research methodology applied are also briefly outlined, and then the organisation of the thesis and the contributions of the research to knowledge are introduced.

Chapter 2 investigates the definitions of client strategic decisions and reviews the theory of strategic decision making, general modelling of the decision process and categorising of strategic decisions. Implications of impact on client satisfaction are also reviewed.

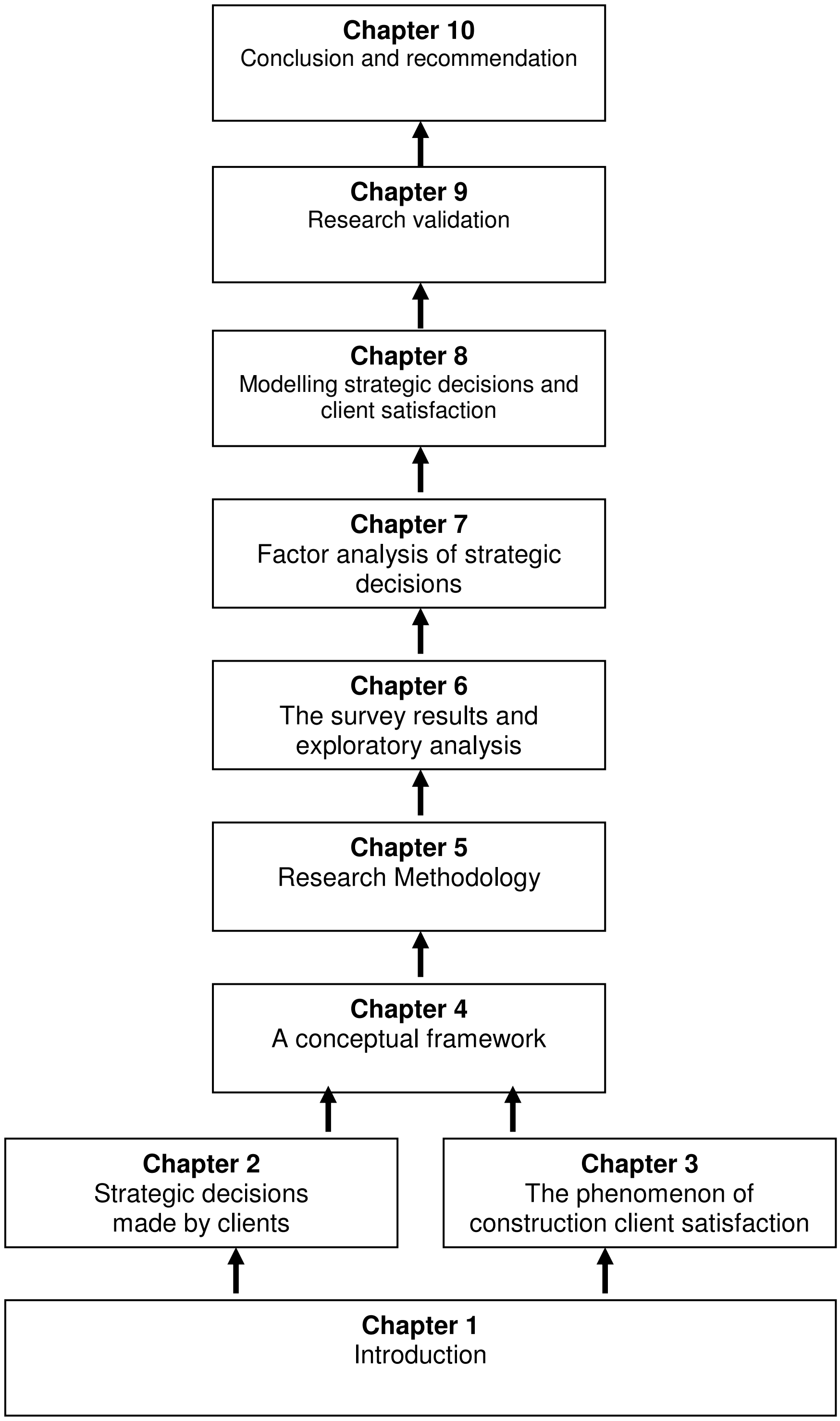


Figure 1.2 Organisation of the thesis

Chapter 3 examines the concepts of customer satisfaction and construction client satisfaction and the existing association between these two concepts in the context of satisfaction measurement. The measurement of client satisfaction is also investigated. The criteria identified in practice to measure construction client satisfaction are discussed and the implications of client strategic decisions on their levels of satisfaction are explored.

After a thorough literature review undertaken, a conceptual framework investigating the interrelationship between strategic decisions and client satisfaction is developed and presented in Chapter 4. This chapter synthesises two fundamental concepts, namely, strategic decisions and client satisfaction to inform the development of a conceptual model.

Chapter 5 details the research approach adopted to collate the data required to satisfy the research objectives. A combined research approach consisting of both qualitative and quantitative research methods is discussed. The specific research methods applied to collect data are depicted. The design and development of the research instrument including questionnaire design, scale, sampling and piloting are described. Data analysis and subsequent model development techniques to be adopted are discussed.

Chapter 6 reports the results of a major survey of construction clients in the UK construction industry and presents an exploratory analysis the results in three main sections. The characteristics of clients including client individuals, client organisations and client case projects are first discussed. The second part presents the results of strategic decisions made by clients at various project stages from the pre-design to disposal stage. The final section discusses the criteria of measuring client satisfaction on the service quality provided by their service providers.

Following the establishment of clear differences in strategic decisions and levels of client satisfaction on construction projects, Chapter 7 continues analysing the factors influencing strategic decisions using statistical techniques including principle component analysis (PCA). This chapter also investigates the assessment of client satisfaction in the context of service quality provided to clients by service providers.

Chapter 8 focuses on the examination of the data for evidence of relationships between strategic decisions and client satisfaction. This chapter seeks to explore the potential relationships between strategic decisions and client satisfaction and determine whether or not any significant association exists and also addresses the research questions raised at early chapters and tests the hypotheses. Predictive models are developed using statistical techniques.

Following the development of predictive models, the robustness and appropriateness of these models are subsequently validated using hold-back samples. Whether or not the findings reported in a research study can be trusted relies on the process of validation undertaken. The validation process is therefore undertaken in respect of this research and reported in Chapter 9, and the subsequent conclusions drawn from the findings.

Having regarded the entire research, Chapter 10, the final chapter, outlines the main findings of the research, conclusions and recommendations. It is a critical reflection of the entire research process, highlighting the limitations of the research and aspects where there is potential for improvement. The chapter provided some practical observations and some recommendations for construction industry practitioners and future research.

1.5 CONTRIBUTION TO KNOWLEDGE

The main contribution of the research will be to establish a predictive model identifying the correlation between strategic decisions and client satisfaction, which will positively assist in improving the understanding of the interrelationship between strategic decisions, service quality and client satisfaction. The developed model will facilitate clients' optimum decisions, which will enhance their own satisfaction levels to a certain extent. Contractors and consultants, as service providers, will be pointed to directions towards improving their performance and better satisfy their clients which ultimately will help to derive repeat work.

It is also envisaged that the outcomes of the research will lead towards an improved understanding of the satisfaction phenomenon, which will benefit clients and service providers including contractors and consultants involved in the supply chain. Ultimately, the outcomes will also contribute to knowledge in the performance domain, where there has been little on the use of predictive models comprising strategic decisions, service quality and client satisfaction.

A list of publications based on this research is attached at the Appendix.

1.6 SUMMARY

This chapter has introduced the research context of strategic decisions and client satisfaction and examined the problematic issues the construction industry faces. Dissatisfaction is widely experienced by construction clients and client satisfaction has remained an elusive issue for a majority of construction professionals.

The research needs were identified and the methodology has been outlined to satisfy the established research aim and objectives. A combination of qualitative and quantitative research methods, involving questionnaire surveys, case studies and secondary desk study techniques, will be employed to address the research questions.

The organisation of the thesis and the dissemination of research findings were discussed. The thesis comprises ten chapters in total, each reporting an important research stage from Chapter 1- Introduction to Chapter 10 – Conclusion and recommendations.

The anticipated contribution to knowledge embedded in this research has also been depicted. The developed model will facilitate clients' optimum decisions, which will enhance their own satisfaction levels to a certain extent. The outcomes of the research will lead towards an improved understanding of the satisfaction phenomenon and ultimately contribute to knowledge in the performance domain, where there has been little on the use of predictive models of strategic decisions, service quality and client satisfaction.

CHAPTER 2
STRATEGIC DECISIONS MADE BY CLIENTS

2.1 INTRODUCTION

There is a common belief that strategic decisions made by clients have a significant impact on the levels of client satisfaction and strategic decisions in the context of construction projects are often associated with project stages and vary in nature (Rowlinson, 1988; Naoum, 1994; Langford and Male, 2001). The concept of strategic decisions therefore needs to be clearly defined so as to explore the potential impact it may have on client satisfaction.

This chapter will first review the concept of strategic decisions in the context of construction projects. The decision-making theory and general models of the strategic decision-making process within different construction stages will then be discussed.

Strategic decisions that a client has to make throughout the project life cycle will be broadly categorised. Construction clients and their characteristics, which may have an impact on their strategic decision-making process and outcomes, will be reviewed. The significance and the implications of strategic decisions on client satisfaction will also be discussed.

2.2 DEFINITIONS OF STRATEGIC DECISIONS

The Oxford dictionary (2005) defined "strategic" as: "done as part of a plan that is meant to achieve a particular purpose or to gain an advantage, for example, strategic planning, strategic decision, and strategic means "helping to achieve a detailed plan for achieving success in situations such as war, politics, business, industry or sport, or the skill of planning for such situations" (Cambridge dictionary, 2005).

The term "strategic" is used to describe decisions about activities and resources that critically affect the performance of the organisation/project (Papadakis and Barwise, 1997). Strategic decisions may have five characteristics according to Papadakis and Barwise (1997):

- Usually big, risky and hard to reverse and have significant long –term impact;
- Are the bridge of deliberate and emergent strategy;

- Can be a main source of organisational learning;
- Play an important role in development of individual managers;
- Cut across functions and disciplines.

Researchers have attempted to model the strategic decision-making process and identify the major characteristics of strategic decisions. This has proven to be a difficult task since strategic decisions are often described as "unstructured", "unprogrammed" and "messy" (Schwenk, 1995).

A subject which is closely related to strategic decision-making is strategic issue diagnosis (Dutton *et al* , 1983; Dutton & Duncan, 1987; Dutton & Ashford, 1993). Strategic issue diagnosis deals with the early phases of the strategic decision-making process, including identification of issues and the assessment of the characteristics of issues. This process is linked to the later stages of strategic decision-making and the creation of momentum for changes.

In the context of construction projects, a number of strategic issues need to be identified and assessed properly before appropriate decisions can be made by the client (Cox and Townsend, 1998; Miller and Lessard, 2000; Langford and Male, 2001). Strategic issues involved in a project may include (refer to Figure 2.1):

- project quality (Arditi and Lee, 2003),
- time (Davenport, 1993; Chan,1999; Proverbs and Holt, 2000),
- cost (Bartlett and Howard, 2000),
- client altitude to risks and risk management (Akintoye *et al*, 1998; Baker and Smith, 1999),
- finance/funding (Brownlie and Harris, 1987; Wang *et al*, 1996),
- legal/regulations,
- health & safety (Bishop, 1994; Meacham, 2005),
- sustainability (Aye *et al*, 2000; Bon and Hutchinson, 2000; Fergusson and Langford, 2006),
- whole life value (Kishk *et al*, 2002) and
- roles of the client and consultants (Cherns and Bryant, 1984; Hodgson and Jeffrey, 1999; Lim and Ling, 2002; Boyd and Chinyio, 2007).

Due to the various issues involved in a decision-making process, the definition of strategic decision understandably varies from one source to another (Schwenk, 1995; Papadakis and Barwise, 1997; Cambridge dictionary, 2005; Oxford dictionary, 2005). Nevertheless, there exists a common understanding of the concept of strategic decisions and towards what strategic decisions could impact on organisational performance and the success of a project (Armstrong 1982; Schwenk, 1988; Eisenhardt and Zbaracki, 1992). Strategic decisions made by a construction firm/client are usually complex and under uncertainty (Mintzberg *et al.*, 1976; Schwenk, 1984) and the strategic management process will affect its operational and competitive environment (Langford and Male, 2001).

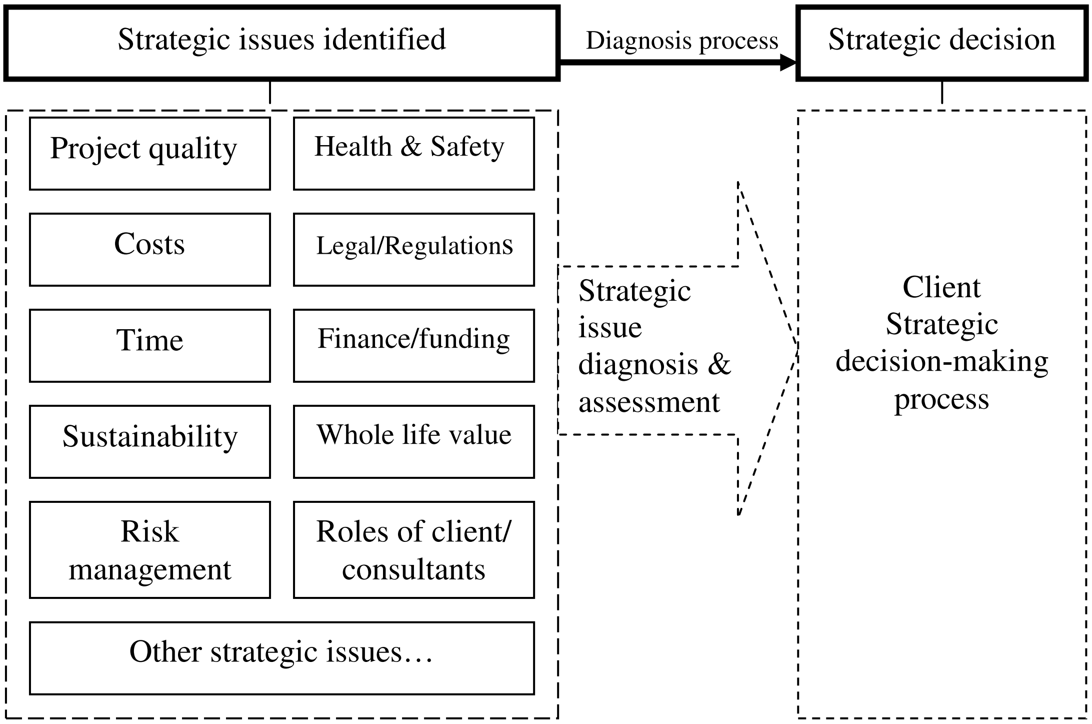


Figure 2.1 Strategic issues diagnosis and strategic decisions

In the context of this research, strategic decisions made by clients are defined as:

> *"Any complex decision made by the client under uncertainty during a project life cycle that is meant to achieve a particular objective and has a long-term impact on the successful delivery of a project".*

2.3 GENERAL MODELS OF CLIENT STRATEGIC DECISION PROCESS

The strategic decision-making process in construction involves different levels of interaction and comprises a complicated mechanism (Quinn *et al*., 1988; Smith and Wyatt, 1998; 2003; Bartlett and Howard, 2000). There exists computer-aided models developed to help capture uncertainties and interactions among project variables which influence decisions and both internal and external expert knowledge have been integrated into the decision-making process (Alarcon and Bastias, 2000; Wilson, 2001). The following sections will depict the theory of decision-making and review relevant models of the strategic decision-making process.

2.3.1 Theory of strategic decision-making

Strategic decision-making can be viewed as a special kind of decision-making under uncertainty (Schwenk, 1984). Mintzberg *et al.* (1976) defined the characteristics of strategic decisions as novel, complex and open ended with decisions not so much made under uncertainty but within a continuous state of ambiguity, where almost nothing was given or easily determined. Their field study of twenty-five Strategic Decision Processes across a range of organisations suggested that there was a basic structure underlying those unstructured processes. A general model of the strategic decision process was constructed, which intended to show that whilst strategic decisions were immensely complex and dynamic, it was possible to give them conceptual structuring. It was found that the structure could be described as a matrix comprising three "central phases" which were:

- Identification
- Development and
- Selection

and three sets of supporting routines which included:

- decision control,
- decision communication and
- political.

Six sets of dynamic factors (interrupt, scheduling delays, timing delays and speedups, feedback delays, comprehension cycles and failure recycles) were also identified and integrated into their model. The general model described the interrelationships among its dynamic factors and gave the impression of a relatively straightforward, iterative and systematic decision (Saaty, 1990; Cheng and Proverbs, 2004).

However, the conceptual model of strategic decisions from Mintzberg *et al.* (1976) confused reaching a decision with implementing a decision. The identification of the numerous subsequent interrelated decisions becomes difficult (Wilson, 2001). Furthermore, the complexity of the decision process is not well represented in the model if it is applied by construction organizations such as clients. The model in itself does not explicitly identify "dynamic factors" or the "supporting routines" that in the case of strategic decisions were critical issues and as such requires further development.

Schwenk (1984) identified strategic decision-making to involve the activities of goal formulation, problem identification, alternatives generation and evaluation/selection. Researchers in cognitive psychology and behavioural decision theory have identified a number of cognitive simplification processes which may affect the way decision-makers perform these tasks.

Hitt and Tyler (1991) examined hypothesized effects of factors associated with three perspectives on strategic acquisition decisions, namely:

- rational normative,
- external control and
- strategic choice models

It was found that industry and executive/decision-maker characteristics also produced main effects on decision outcomes. The strategic decision models were found to vary by industry and executive/decision-maker characteristics of age, educational degree type, amount and type of work experience and level (position). It was suggested that strategic decision models are quite complex with significant implications for future research of strategic decision-making.

When examining the rationality of strategic decision-making procedures, Dean and Sharfman (1993) found in a study of 57 strategic decisions in 24 companies using a multiple-informant, structured interview protocol that, environmental competitive threat, perceived external control of the organization, and the uncertainty of the strategic issues being addressed are related to procedural rationality which was linked to managerial discretion.

Woodhead (1999) investigated how large and experienced clients in the UK construction industry arrived at their strategic decisions to build. Clients divided the decision-making process among managerial roles as decision-approvers (e.g. main board members), decision-takers (e.g. senior managers), decision-shapers (e.g. expert focus group with construction-related expertise) and decision-influencers (e.g. other internal or external people who influence). By understanding the complex process of the strategic decisions to build, it becomes possible for client organisations to question their underlying assumptions. Rather than seeing buildings as expenditure to be minimised in terms of cost and time, the construction industry could help clients to increase value.

However, Woodhead's (2000; 2002) research failed to examine why this complex process of decisions typically took place within client organisations and the implication and significance of such decisions remains unexplained.

2.3.2 Models of the strategic decision-making process

The Office of Government Commerce (OGC) (2003a) Procurement Guide outlines the processes and decision points involved in the delivery of construction projects. Successful delivery requires an integrated process in which different stages of a project including design, construction, occupancy and maintenance are considered as a whole. Figure 2.2 demonstrates the key stages in the life cycle of a construction project on the basis of which strategic decisions are made.

Landmark reports have identified a lack of properly structured processes and client focus amongst other aspects as key inhibitors to the performance of the construction industry and recommended taking a holistic view of the construction process to help eliminate these inhibitors and improve performance (Latham, 1994; Egan, 1998; Egan, 2002; PP, 2005).

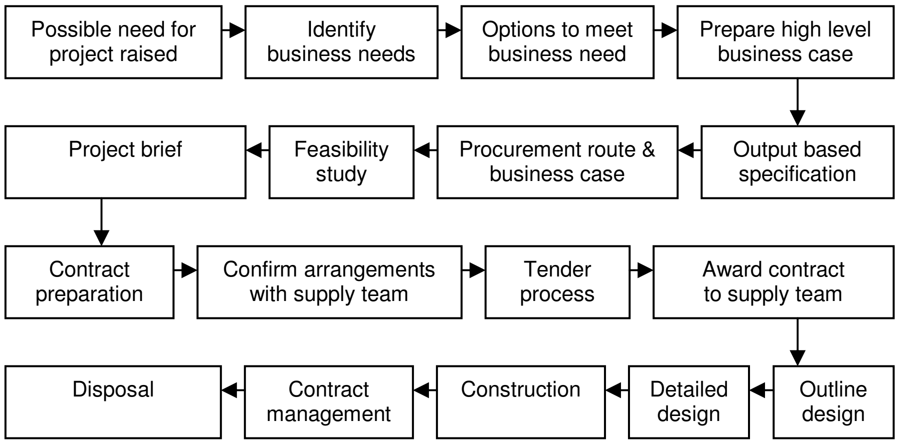


Figure 2.2 Framework for construction process

(Source: OGC, 2003a)

Some client organisations such as the British Airport Authority (BAA, 1995), the British Aerospace and the London Underground have now started to develop their own construction processes, and a number of research initiatives, for example, Process Protocol (PP, 2005) and Structured Process Improvement for Construction Enterprises (SPICE) (Sarshar *et al,* 1998) were launched aiming at these improvements. These have highlighted a common and integrated structure including pre-design development management, design, procurement, delivery and maintenance.

BAA's (1995) projects are developed within a defined project process which includes:

- development management,
- design definition,
- procurement and
- delivery and maintenance.

The process is intended to ensure a consistent approach to project development across BAA and to ensure that business needs and opportunities are met by optimal business solutions (Morris, 2002). As far as the preparation and evaluation of projects are concerned, the key issues addressed by the process include:

- Project Boards established to manage the development of the project and take responsibility for the execution of individual projects costing more than £250,000;
- Development Manager reporting to the Project Board is responsible for the development strategy, project brief, stakeholder management and development of the business case, including obtaining financial approval
- Gateways are used to challenge and assess proposals and authorize the approval. These include Evaluation Gateways and Approval Gateways projects usually must pass at the end of the feasibility stage and the final design stage.

The Process Protocol (Fleming *et al*, 2000; PP, 2005) uses manufacturing principles as a reference point and presents a framework of common definitions, documents and procedures to help construction project participants to work together seamlessly. The project process was mapped into four broad stages:

- Pre-Project,
- Pre-Construction,
- Construction and
- Post-Construction

and eight sub-processes/activities including Development, Project, Resource, Design, Production, Facilities, Health & Safety, Statutory and Legal, and Process Management.

The SPICE model was established to demonstrate an evolutionary step-wise process improvement framework (Sarshar *et al*, 1998). The framework is based on the maturity of an organisation's processes. Each level comprises a set of key processes that, when satisfied, stabilise an important part of the construction process and lays successive foundations for the next level. The model enables effective and continuous improvement to be achieved based on evolutionary steps. The project concentrated on the lower levels of the model and tested this aspect of the framework in a series of case studies on live construction projects.

In meeting the challenges of the Latham (1994) and Egan (1998; 2002) reports, the SPICE model aimed to address the following issues:

- The construction industry does not have a recognised methodology/framework on which to base a process improvement initiative.
- The absence of guidelines has meant that any improvements are isolated and benefits cannot be co-ordinated or repeated.
- The industry is unable to systematically assess construction process, prioritise process improvements, and direct resources appropriately.
- It is not possible for companies to benchmark and measure their performance relative to other organisations.

The above process models have been developed for the improvement of efficiency for the development of projects and associated strategic decision-making. However, those models were developed either under specific project circumstances or were conceived specifically for certain sectors and their practicality and wider acceptance by the construction industry have not yet been proven. The general application of those models in the construction industry is therefore limited.

The RIBA Outline Plan of Work, which describes the stages from appraising clients' requirements through to post construction, is well recognised throughout the construction industry as a model framework for managing a project and is a basis for project organisation procedures (Phillips, 2000). Table 2.1 presents the RIBA plan of work.

Table 2.1 RIBA plan of work

Stages	Activities
A	Appraisal of client's requirements
B	Strategic Briefing
C	Outline proposals
D	Detailed proposals
E	Final proposals.
F	Production information
G	Tender documentation
H	Tender action
J	Mobilisation
K	Construction to Practical Completion
L	After Practical completion

(Source: Phillips, 2000)

The Plan provides a basis for identifying the essential steps/stages through which any construction project must pass. The identification of stages helps in making judgments about organizational structure on construction projects although there may be changes to the sequence and importance of these stages. Although the RIBA Plan does not deal with controlling the output of individuals, leaving it as an internal matter for each participating organisation (Hughes, 1991; 2003) and has been criticised as being somewhat inflexible for a range of projects, it forms a common framework through which client strategic decisions can be made.

Appropriate strategic decision-making processes are intended to help construction project participants to work together seamlessly. A consistent approach across the client organisation will ensure business needs and opportunities are met by optimal decisions. Based on those processes, optimum strategic decisions then can be made by clients.

2.4 STRATEGIC DECISIONS MADE AT DIFFERENT STAGES

Strategic decisions made by a client throughout the project life cycle can be broadly categorised based on the timing/stages and the subject of the decisions (Phillips, 2000; Cheng and Proverbs, 2004; Cheng *et al,* 2005).

Although there are various versions of these construction project stages, the RIBA stages are well-known in the UK construction industry as a model framework, and can be broadly divided into pre-design, design, tender, construction, occupancy & maintenance and disposal stages (Hughes, 2003). A client usually has different priorities during each stage of a construction project. In each stage, the strategic decision-making process comprises project priority analysis, identification of the direction for the future of a project and high level planning of the implementation (Kumaraswamy and Dissanayaka, 1998; 2001).

Project priorities and the subject of client strategic decisions may change during the course of the project (Pinto and Prescott, 1988), which has been ignored in earlier research (Soetanto *et al*, 1999). The nature of strategic decisions varies across the whole life cycle of construction projects (Pinto and Prescott, 2001; Cheng and Proverbs, 2004). For example, the decision on a procurement route is the main focus of client strategic decisions at the pre-design stage of a project (Rowlinson, 1988; Naoum, 1994; Naoum and Mustapha, 1995; Kumaraswamy and Dissanayaka, 1998). As the project progresses, information sufficient to obtain tenders will need to be decided at the design stage and tender documentation required for tenders will have to be chosen at the tender stage. Each project stage requires different information input and by nature requires various strategic decisions to be made accordingly. The focus of client strategic decisions therefore will change onto different subjects based on the nature of each project stage works.

Hughes (1991) classified life cycle stages of project work in relation to client strategic decisions as illustrated in Table 2.2.

Table 2.2 Client decisions related to project stage

Stages	Client decisions
Inception:	Define need & determine financial implications and sources.
Feasibility:	Preliminary designs, costings & investigation of alternatives.
Scheme Design:	Programming, budgeting, briefing, outline design .
Detail Design:	Development of all subsystems within the design, detailed cost control, technical details .
Contract:	Contract specification, pricing mechanism, sufficient documentation for selection of contractor .
Construction:	Execution and control of all site work & associated activities, further contract documentation.
Commissioning:	Snagging, operating instructions, maintenance manuals, opening ceremonies, occupation, evaluation, managing the facility, staff training.

(Source: Hughes, 1991)

The stages may under different terms take place in a variety of sequences or overlap. However, the stages of work remain sequential and in common to all construction projects. Strategic decisions made by the client vary by nature across the project life cycle and are closely associated with these stages.

The RIBA Outline Plan of Work defines a project by different stages and it is recognised in the construction industry as a robust process protocol (Phillips, 2000;

RIBA, 2004). The project stages are also used in the appointing documents to help identify client strategic decisions made across the project life cycle from inception to completion.

Table 2.3 presents client strategic decisions/decision points at each stage across the project life cycle based on the RIBA Outline Plan of Work (RIBA, 2004) and other findings of previous research:

Table 2.3 Strategic decisions across different project stages

Stages	Sub-stages	Output	Client strategic decisions/ decision points
Pre-design	Appraisal	Client needs and requirements, constraints	Build or No build
			If build, probable procurement
	Strategic briefing	Confirm client needs/requirements/ constraints	Organisational structure
			Procedures
			Consultants to be engaged
			Others to be engaged
	Proposals	Outline proposal: project brief	Outline of project
			Estimated costs
			Review of procurement route
		Detailed proposal: complete project brief	Details of project
			Full development control approval
		Final proposal	Co-ordination of elements of the project
Design	Product information	Preparation of production information	Information sufficient to obtain tenders
		Preparation of further production information	Balance required under the building contract
Tender	Tender documentation	Preparation and collation of tender documentation in sufficient detail	Documentation required for tenders
	Tender action	Appraising tenders and submission of recommendations to the client	Identification and evaluation of potential contractors
	Mobilisation	Letting the building	Appointing the contractor

Stages	Sub-stages	Output	Client strategic decisions/ decision points
		contract	
		Issuing of production information to the contractor	Arranging site handover to the contractor
Construction	Construction to Practical Completion	Administration of the building contract	Cost management strategy
		Provision of further information as and when required	People strategy
	After Practical completion	Administration of the building contract	Settling the final account
		Final inspections	
Occupancy & Maintenance	Occupancy	Life cycle strategy	Life cycle costing
	Maintenance	Maintenance strategy	Maintenance strategy
Disposal		Disposal of project	Demolition of project
			Transfer of project

(Source: RIBA, 2004; Cheng and Proverbs, 2004)

2.4.1 Pre-design stage decisions

The very first strategic decision is at the pre-design stage and concerns the decision to build for the client. If a no-build decision has been made, then the project terminates (Keeney and Nair, 1975; Simpson, 2001). Based on the assumption that a project will proceed, client decisions subsequently lead to the process of building procurement. It is during this stage that the need for the project is identified, in terms of corporate planning and funding limits (Hughes, 1991).

After preliminary designs, investigations of alternatives and costing of the possible solutions, the client needs to make a decision that the preferred solution is feasible and the project can proceed forward. The client will then be interacting with the designers, briefing and identifying user needs, and approving sketch designs. The designers will be interpreting in detail the client's requirements. The client will decide at the detailed design stage if the design is acceptable and is an adequate interpretation of the client's requirements. Choosing a procurement route therefore becomes one of the most important decisions a client has to make at this stage which will subsequently have an impact on project performance at later stages.

2.4.1.1 Procurement strategy

The establishment of an appropriate procurement strategy is a key decision if project success is to be achieved (CE, 2004). Most clients will want to ensure as far as possible from the outset that they can achieve the solution they require within affordable cost and by an acceptable date in the future. Establishing an appropriate procurement strategy will reduce the risk of disappointment and hence increase the levels of satisfaction.

There are four main construction procurement methods in the UK (Love et al., 1998; Materman, 2002; CE, 2004), namely:

- Traditional/Lump Sum
- Management Fee Contracts
- Construction Management
- Design & Build

Several major factors could affect the successful procurement of a project including (CE, 2004):

- The amount of information available regarding the site conditions
- "Unknowns" which can appear during the currency of the construction works
- The necessity for ongoing/phased occupation of the building during the construction work.
- Physical constraints
- Statutory Authority Approvals
- Variations or changes introduced during the construction works

However, all above procurement routes have advantages and disadvantages, as shown in Table 2.4:

OGC (2003b) recommended the use of three primary procurement routes as:

- Private Finance Initiative (PFI)
- Prime Contracting and
- Design and Build

Table 2.4 Advantages and Disadvantages of procurement routes

Procurement	Advantages	Disadvantages
Traditional	Commonly used definitive cost most competitive tender	No contractor input in design Can't obtain tender until design finished Success depends on a full design
Management Contracting	Early appointed contractor who can input in design Early start before design finished Flexible programme to suit client	No chance to obtain a fixed price Increased financial risk to client
Construction Management	Early appointed contractor who can input in design Early start before design finished Flexible programme to suit client Competitive price is obtained	Financial uncertainty to client Effective co-ordination and integration required between trade packages
Design and Build	Provision for fixed contract sum Likely to save time Single line responsibility non-adversarial form of contract	Reduced competition of tenders Less client control over design Difficult to compare tenders Design changes are difficult/expensive

(Source: *ibid*)

It was recommended that central government should limit their procurement strategies to these three routes for the delivery of new construction and all refurbishment and maintenance contracts, with traditional and non-integrated strategies being used where it can be shown they offer best value for money (CE, 2004). Delivering a quality product and achieving the best relationship between the client and the supply chain is very largely dependant on the procurement route that is adopted.

Reporting to Parliament about PFI procurement strategy Sir John Bourn, Head of the National Audit Office (NAO, 2003), said:

> *"Most construction work under the Private Finance Initiative (PFI) is being delivered on time and at the cost expected by the public sector. Central government has generally obtained a much higher degree of price certainty and timely delivery of good quality built assets, compared to previous conventional government building projects"*.

The prime contracting route is in effect an extension of the design and build route adding tighter controls on the whole process, requiring high levels of performance to be achieved throughout the life cycle of a project. The initiative, launched originally by the Ministry of Defense in 1999, was to give a single contractor full responsibility for a project from the beginning and aimed to achieve major savings both on capital costs and whole life costs.

Morton (2002) argued that the prime contract demands a high level of supply chain management but does not require any kind of partnering agreements, imposes too much risk on contractors and would lead to further conflicts, far from following Egan (1998) principles. Some major clients in the private sector such as Sainsbury's have adopted a similar route but instead based on long-term relationships with contractors. However, it remains unclear how prime contracting will impact on the implementation of projects and furthermore on client satisfaction levels.

Public sector clients are advised to use one of the three primary procurement strategies, namely PFI, prime contract and design & build (OGC, 2003b). Delivering a quality product and achieving the best relationship between the client and the supply chain is very largely dependant on the procurement route that is adopted. However, these procurement strategies may not be suitable for all clients (Morton, 2002). Abrahams and Farrell (2003) also suggested that a competitive design & build approach in which tenders were developed from clients' briefs /sketch drawings would give clients greater success. A procurement strategy should be developed, which balances the risks against those project objectives established at an early stage (Materman, 2002, CE, 2004).

The establishment of an appropriate procurement strategy can achieve the following objectives:

- Match prioritised project objectives with an appropriate procurement strategy.
- Establish primary parameters including budgets and time constraints.
- Identify key elements associated with project design functions to be accommodated, such as specific design needs in space layout, internal environment and appearance.

The procurement strategy should enable the development of a strategic brief for the project that identifies how the project will be designed, what the parameters are and how project delivery will be implemented. A key role for the client is to ensure that the strategy established at the beginning is not lost sight of when the priorities of design and construction processes are being progressed. Because the strategy is based upon the unique needs of the client, the key parameters should be clearly communicated to the project team.

2.4.1.2 Other strategic decisions

Other strategic decisions made by clients at the pre-design stage include outline of project, details of project, estimated costs and coordination (refer to Table 2.3). These decisions require the client to define specifically the client needs and objectives. Clients who set down clearly their project objectives are more likely to contribute to project success. Conflicting objectives leading to unsatisfactory project performance can arise because of differences in aspirations of the various parties involved in the project (Masterman, 2002). This is consistent with Ward's (1991) finding that the client must clearly define and specify his project objectives as it is used as a basis for assessing project performance. Cleland (1994) also suggested that project success was dependent upon the client's effectiveness in discharging his strategic planning and management responsibility.

Furthermore, a client's strategic briefing practice could be improved by using soft systems methodology (SSM) to provide the basis for a significant enhancement of the effectiveness of the briefing and offer a rigorous framework for modelling of client business process (Green and Simister, 1999). The briefing process comprises two stages, which are concerned with understanding of the clients' business process and the conceptualisation of built solutions and issues of performance specification. It has been recognized that the first stage understanding of the client's business process is the most problematic, where the terminology of SSM also is likely seen as a barrier to those construction professionals who are unwilling to make the necessary intellectual investment (Green and Simister, 1999).

Risks related to such strategic decisions cannot be ignored. These risks include completing a project which does not meet the functional needs of the business, a project which is delivered later than the initial programme or a project which costs more than the client's ability to pay or fund. All these risks are potentially of high impact to the client's core business and again their satisfaction levels. A procurement strategy should be developed, which balances the risks against those project objectives established at an early stage.

2.4.2 Design stage decisions

It is at the final proposal and design stage that all various sub-systems of a building need to be well co-ordinated. These sub-systems include architectural, structural and M&E disciplines. During this stage, the consultants develop the design and achieve coordination with all technical design problems resolved and statutory consents checked.

Strategic decisions /decision points the client faces at this stage are to provide product information sufficient to enable the subsequent tender process and the balance of information required under the building contract.

2.4.3 Tender stage decisions

At the tender stage, the ultimate strategic decision for the client is to prepare the documentation, send out tender invitation and ultimately appoint a contractor.

The design has been sufficiently advanced for the specifications and tender documentations to be prepared and issued. Potential contractors have been identified and evaluated and the tendering process can commence. The project site hand-over arrangement will also be decided by the client at this stage.

2.4.4 Construction stage decisions

The construction stage includes works from site start, all construction activities, any further design work and variations to practical completion of the project.

Strategic decisions at this stage for the client are to ensure an appropriate cost management strategy established and has a right project team in place and a strategy of people. At practical completion, the client will decide on the settlement of the final account.

2.4.4.1 Cost management strategy

The cost management approach chosen has a significant impact on the performance of projects and hence will affect levels of client satisfaction. Whole life costing (WLC) is currently used extensively in PFI projects and public sector procurement (Clift and Bourke, 1999). Kishk *et al* (2003) suggested that the WLC approach could facilitate effective decision-making among a number of competing alternatives across different stages of a project and recommended a conceptual framework allowing feedback of information from occupied buildings to the design process. The framework has most potential during the design stage as almost all options were open to consideration (Griffin, 1993).

In general, about 75-95% of a building's running, maintenance and repair costs are determined at the design stage of a project (Khanduri *et al*., 1993, 1996; Mackay, 1999). The ability to influence construction cost decreases continuously as the project progresses forward as the decision to own or to purchase a building normally commits the client to most of the total cost of ownership (HMSO, 1992; Khanduri *et al*., 1993).

It has been recognized that the WLC approach in practice faces a number of substantial barriers, in particular, the difficulty to obtain appropriate levels of reliable cost data from different sources including historical data, expert opinions, manufacturers and suppliers. The concept of WLC provides an ideal framework to clients' decision-making among various options and the WLC approach remains a fundamental decision towards client satisfaction.

In the report entitled "Modernising Construction", the National Audit Office (2001) agreed that lowest cost tendering did not give best value for money on construction projects. OGC, NHS Estate, the Environment Agency and other key public sector clients support the toolkit developed by the Strategic Forum for Construction (2003) because they are convinced that it will achieve predictable delivery, continuous improvement and value for money for construction projects.

2.4.4.2 People strategy for the project team

Lim and Ling (2002) found that the establishment of an appropriate project team to deliver the project on time and to budget, is a vital role for the client, whose management competency and construction experience may have significant effects upon the attainment of project success. The nature of the client's business and the business case underpinning the project will enable consideration to be given to which of the criteria: time certainty, price or function, is of the greatest importance. Client drivers for construction projects and their ability to influence the project outcomes should be recognised, and the need to involve constructors and manufacturers early, although fewer actually achieve this (Gibb and Isack, 2001).

Furthermore, the selection of a capable client's representative and the development of the project alliance are essential for higher levels of client satisfaction (Soetanto, 2002). Cooperation/participation, task/team conflict and goal commitment have been identified as critical factors influencing the levels of satisfaction in the complicated management process (Leung *et al*, 2004).

2.4.5 Occupancy and maintenance stage decisions

The RIBA plan of work only defines stages from stage A- Appraisal to stage L – After practical completion (RIBA, 2004). However, Occupancy & Maintenance (O&M) stages which form a significant part of a complete project life cycle accommodate crucial client strategic decisions and need to be explored further.

Building maintenance accounts for over half the UK construction industry's output and two thirds of the total contracts let (Lee and Wordsworth, 2001). Increasing pressure to prolong the useful life of a building without compromising the objectives of maintenance has led to great interests in methods of integrated maintenance management. Horner *et al*.(1997) developed a new approach to selecting an appropriate maintenance strategy which relies on determining the consequences of failure of every item in the building, and determining a suitable strategy for each one as an alternative to budget-driven maintenance strategies. By analysing the relative advantages and disadvantages of corrective, preventive and condition-based strategies and developing a novel, systematic approach to the management of building maintenance, this method will help to reduce the cost of maintenance while preserving the health & safety and satisfaction of the client (ibid).

Client decisions on maintenance strategy at this stage are to determine the maintenance policy that ensures a specified average quality level on building elements, for example, masonry, pointing, window frames, painting of buildings and mechanical & electrical equipments, at minimal cost (Van and Dekker, 1998). The decisions will enable the client to produce a trade-off curve between overall quality level and the minimum required level of maintenance costs. Further developed decision models can be adoped for rationalising building maintenance at a strategic level and as management instrument to determine and allocate budgets (*ibid*).

Life cycle costing technique was often employed by clients at the O&M stage to facilitate the development of a best case maintenance strategy (Kishk *et al*, 2003).

2.4.6 Disposal stage decisions

At the end of a project life cycle, clients need to make a decision to close a project by means of either demolition or transfer of project. Strategies for converting construction/demolition landfills into successful waste recycling operations are increasingly under pressure and waste recycling economics including levying landfill tax are assessed to demonstrate the essential ingredients for successful operations (Peng *et al*, 1997; Martin and Scott, 2003).

Secondary materials markets have not yet matured and solid waste landfill operations become increasingly restrictive and the landfill sites as a whole are declining. High tipping fees due to the scarcity of landfill sites and growing concerns from the regulator and the public, have placed construction and demolition waste recycling operations under intense scrutiny.

Overall, the stages of project work may under different terms take place in a variety of sequences or overlap, they however remain sequential and in common to all construction projects. Although strategic decisions made by the client are closely associated with these stages and may vary by nature across the project life cycle, the majority of strategic decisions by nature is made or predetermined by the client at early stages of the project. Decisions/options strategically are very limited because they are heavily influenced or predetermined by decisions made earlier, once the project progresses to later stages, for example, the construction stage. This makes the pre-design stage the most important stage where a majority of strategic decisions is made by the client.

2.5 CHARACTERISTICS OF CONSTRUCTION CLIENTS

The characteristics of decision-makers such as construction clients including their experience, education levels, background and positions make a significant impact on their strategic decisions outcomes (Mintzberg *et al,* 1976; Schwenk, 1984; Hitt and Tyler, 1991; Dean and Sharfman 1993). The type of client therefore plays an important role in the client strategic decision-making process.

There are a number of approaches to differentiate construction clients depending on the criteria adopted and the purpose of client studies. For example, clients can be grouped as on-going, on-off and one-off as per the nature of their projects (Naoum and Mustapha, 1995) or primary and secondary clients in accordance with their roles in the industry (Morledge, 1987; Masterman and Gameson, 1994; Masterman, 2002). Chinyio *et al* (1998, 1999) divided clients into five needs-based groups in an attempt to satisfy clients' needs.

The Construction Client Group (2005) broadly classify UK construction clients as public and private clients according to the project fund sources; or repeat/frequent clients and small/occasional clients according to their procurement experience.

Public clients are sponsors of construction work and also part of a local authority or central public-funded body where there are particular constraints affecting procurement practices, including EU procurement regulations. Private clients are non-public sector buying organisations of construction work and adopt the widest range of procurement strategies when buying from the construction industry, unconstrained by the need for public accountability or by EU regulations regarding public expenditure.

Typically public clients such as local authorities initiate capital expenditure where local standing orders or EU rules restrict some of the procurement strategies which can be adopted and explore improvements to current practice. Private commercial sector clients seek to investigate practices which can offer best value or continuous improvement.

Repeat/frequent clients are regular purchasers of construction and construction-related services and are largely confident in their ability and capacity to manage the procurement process. Small/occasional clients are infrequent buyers from the construction industry and therefore less confident in approaching the procurement process.

Repeat/frequent clients may well be national organisations who have in-house skills and a regular demand for construction and therefore wish to assure good practice or achieve continuous improvement in terms of construction spend. Small/occasional clients are unlikely to initiate a significant building project more often than, say, three times in ten years. Such clients will wish to be offered advice of a wide-ranging nature through all stages of the procurement process (CCG, 2005).

2.6 IMPACT ON CLIENT SATISFACTION

Previous research found that a client's strategic decisions have a significant impact on their levels of satisfaction. The findings however have mainly focused on decisions at the early stage of projects such as procurement route (Rowlinson, 1988; Naoum, 1994; Naoum and Mustapha, 1995; Kumaraswamy and Dissanayaka, 1998). However, client strategic decisions and relevant management process may change and the impact on client satisfaction varies during the course of the project (Pinto and Prescott, 1988; Langford and Male, 2001).

It was found the nature of strategic decisions varies across the whole life cycle of construction projects. A client usually has different priorities during each stage of a construction project. Clients' strategic decision-making process in different stages comprises different project priorities and consequently the impact of the decisions on client satisfaction depends as much on timing as on the subjects of the decisions (Cheng and Proverbs, 2004).

2.7 SUMMARY

This chapter has introduced the concept of client strategic decisions in the context of construction projects. The strategic decision-making theory and general models of decision processes have been reviewed. Strategic decisions categorised by project stages have been discussed. They comprise stages from the pre-design stage to disposal stage.

Client characteristics have also been reviewed and client characteristics may make a significant impact on strategic decision outcomes. The establishment of an appropriate procurement strategy was identified as a key strategic decision that a construction client has to make during the early stages of a project and one that has substantial impact on project success and client satisfaction. Clients' strategic decision-making process in different stages comprises different project priorities and consequently the impact of the decisions on client satisfaction depends as much on timing as on the subjects of the decisions.

CHAPTER 3

THE PHENOMENON OF CONSTRUCTION CLIENT SATISFACTION

3.1 INTRODUCTION

Satisfaction is a complex phenomenon as it concerns psychological issues and difficult to measure. For some considerable time, client satisfaction has been a problematic issue in the UK construction industry with many projects failing to satisfy the client needs and meet or exceed the client expectations (Banwell, 1964; Latham, 1994; Egan, 1998; 2002; McMeeken, 2008). Client satisfaction is, however, a key performance measure and a major determinant of project success. It is important to understand how these concepts are developed so as to investigate their implications.

This chapter will introduce the concept of satisfaction, customer satisfaction in the context of business and client satisfaction in the context of construction projects. Construction client satisfaction, in particular, which is developed based on the concept of customer satisfaction in the context of business, will be fully reviewed. The existing association amongst these concepts in the context of satisfaction measurement will be explored.

There are a number of most commonly referred models in the development of measurement of client satisfaction in the construction industry, which are employed to measure quality of services, excellence and performance. These associated theories/models used in the assessment of client satisfaction will be investigated.

Adopted criteria of measuring construction client satisfaction in the literature will be reviewed and categorised. The implication of client strategic decisions on levels of client satisfaction is also explored and the phenomenon of client satisfaction in the context of construction projects is discussed.

3.2 THE CONCEPT OF SATISFACTION

From the earliest human existence, satisfaction has been a main concern of human beings. It is evident in the pursuit of personal achievement, recognition and future development (Oliver, 1997). Satisfaction is a complex phenomenon because it concerns psychological issues within individual human beings and its complex latent nature makes it very difficult to measure.

Locke (1970) suggested satisfaction was a function of comparison between an individual's perception of an outcome and its expectation for that outcome. Levels of satisfaction achieved hence are dependent on an individual's perceptive thinking. Therefore, it is subjective in nature in the context of satisfaction measurement.

3.2.1 Customer satisfaction

Oliver (1997) found that customer satisfaction has three variants, that is,

- Satisfaction with individual elements of product and service delivery,
- Final outcome satisfaction and
- Satisfaction with satisfaction.

It was further defined that satisfaction was the customer's fulfilment response and was a judgement that a product or service provided pleasurable levels of fulfilment. A satisfaction judgement hence involves a comparison between an outcome and a comparison reference.

Churchill and Serprenant (1982) explained satisfaction for a customer as a function of pre-purchase expectations and post-purchase product or service performance. The pre-purchase expectation held might be conscious, active or sub-conscious, passive expectations. Customer satisfaction is a value dependant phenomenon whereby value is the ratio of perceived quality relative to price (Zeithaml, 1988).

Quality is often seen as an antecedent of customer satisfaction (Fornell, 1992). The literature shows that an individual's expectations and perceptions of performance levels have a direct effect on his levels of satisfaction. The presumption that a customer's pre-purchase expectations determine customer satisfaction is based on the assumption that the expectations are formed on the basis of past experience. In cases where customers have no experience, customer expectations are believed to be more an artefact of the service production process and to have no effect on satisfaction (Gable, 1996). There are two general conceptualisations of customer satisfaction. One is transaction-specific which represents specific and individual experience satisfaction, the other is cumulative satisfaction that is based on current experience, past experience and all anticipated future experience (Gable, 1996).

Fornell (1992) suggested that loyalty was one of the key benefits of customer satisfaction as loyal customers could create a steady stream of future cash flow for a firm. The greater the satisfaction the more willing the customer will be to pay for the benefits and to tolerate any price increases from the service provider. This principle has great potential to be applied to the construction sector. Satisfied construction clients are more likely to recommend partnerships, strategic alliances and long-term relationships for their service providers (for example, consultants and contractors) thus in turn promoting their image and reputation.

Satisfaction is therefore difficult to define and in fact there is little consensus towards its definition (Oliver, 1981; 1997). The existing literature mainly focuses on the concept that the customer or client will make a comparison between the product or service and a certain standard (Smith *et al*, 1969; Churchill and Serprenant, 1982).

Satisfaction is often regarded as a function of comparison between an individual's perception of an outcome and its expectation for that outcome (Locke, 1970), or a comparison of pre-purchase expectations and post-purchase product or service performance (Churchill and Serprenant, 1982), as illustrated in Figure 3.1.

Satisfaction thus can be achieved (for example, Sat 2 in Figure 3.1) or exceeded (for example, Sat 3 in Figure 3.1) if the outcome of a product or service meets or exceeds the customer's expectation. The levels of satisfaction achieved or exceeded by the customer/client are dependent on the outcome of the comparison and the customer's perceptive thinking. Satisfaction is hence a highly subjective and complex matter that is challenging to measure reliably and objectively. Figure 3.1is developed based on Locke (1970) and Churchill & Serprenant (1982)'s theories that customer satisfaction is a function of comparison between outcome and expectation.

Furthermore, a customer's background and experiences play important roles in providing the relevant standards of comparison, or frame of reference and hence influencing the outcome of satisfaction assessment (Smith *et al*, 1969). The comparison involves what the customer believes will happen with what is actually provided (Parasuraman *et al*, 1985; 1988).

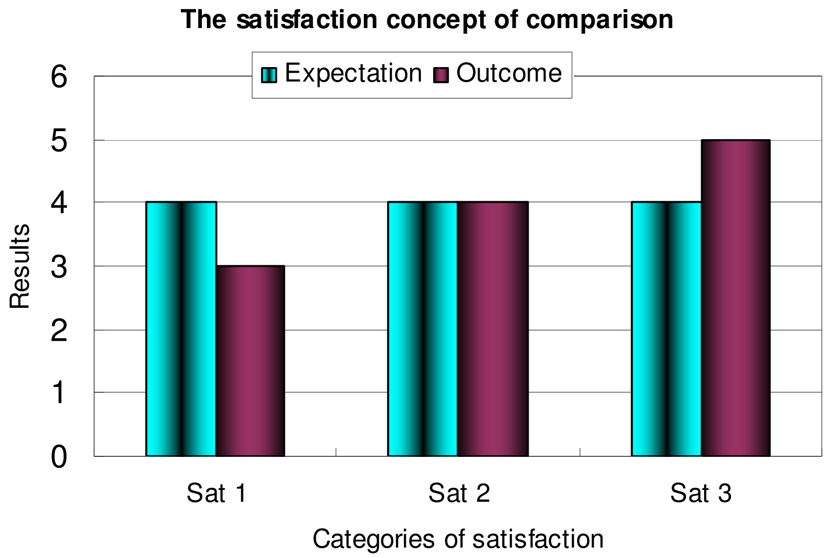


Figure 3.1 The satisfaction concept of comparison

Where
Sat 1 - represents a dissatisfaction result
Sat 2 – represents an optimal satisfaction result
Sat 3 – represents an exceeded satisfaction result

Different customers are likely to have different standards/expectations, which are pertinent to their judgement to the products or services. Customer services literature suggests that a customer's expectations and perceptions of performance have a direct effect on their satisfaction (Locke, 1970; Oliver, 1981; Parasuraman *et al*, 1985).

When the standard or the frame of reference a customer refers to is likely to change, for example, towards a higher level, shown as the dotted line in Figure 3.2, then their current expectation is likely to change too , for example, towards a higher level. The outcome of a production or a service therefore will have to be better than before to meet the increased expectation, demanding a better performance from the product or a service provider. In comparison to Figure 3.1, the same outcomes will now only result in an achieved /exceeded satisfaction as shown in Sat 3 but dissatisfactions for both Sat 1 and Sat 2 due to increased expectations.

A different frame of reference used by customers/clients, for example, due to different background and experience, will hence result in a different outcome of satisfaction assessment.

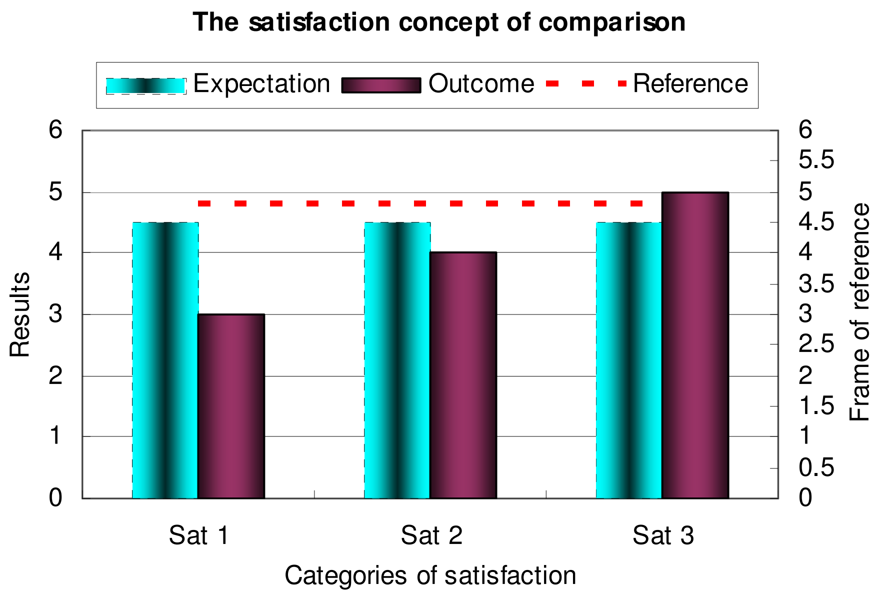


Figure 3.2 The satisfaction concept of comparison with a frame of reference

Where
Sat 1 - represents a dissatisfaction result
Sat 2 – represents a dissatisfaction result
Sat 3 – represents an exceeded satisfaction result

3.2.2 Construction client satisfaction

Construction clients are individuals or organisations who commission a building project (Byrant *et al.*, 1969) and are viewed as the initiators of projects and those who contract with other parties for the supply of construction goods or services (Atkin and Flanagan, 1995). Although construction clients are heterogeneous they can be viewed as the customers who purchase or invest in construction goods, projects or services (Boyd and Chinyio, 2007).

The concept of client satisfaction in the context of the construction industry is generally adapted from principles of customer satisfaction in the context of business. Construction client satisfaction was therefore defined as the measurement of the extent to which a client's expectations for a service or a project overall are met

(Parasuraman *et al*, 1988; Siu *et al*, 2001; BSRIA, 2003; Samwinga and Proverbs, 2003; Soetanto and Proverbs, 2004). Thus, it is essential to distinguish clearly the two components of satisfaction - client expectations and the actual or perceived quality of the service offered. And satisfaction should not be considered as a global entity due to the various expectations from clients and the quality of services perceived. A proper measure of satisfaction includes a separate assessment of both client expectations and the quality of service provided.

Client satisfaction measurement may be contributing to reinforce the current status of client satisfaction more than they are helping managers to pinpoint areas of client satisfaction and discontent. The measurement may also facilitate finding innovative solutions to improve project delivery (Office of the Comptroller General, 1991). For service providers such as consultants and contractors in the construction industry, client satisfaction assessment is a means of improving services to the client and their own performance, for example, being awarded repeat or additional projects. Knowledge of clients' expectations and of the extent to which these are met may prove really beneficial indeed to those service providers. This knowledge in general can serve two purposes:

1. Identifying areas of improvement in the quality of the services offered; and
2. Highlighting the need for corrective actions when clients' expectations exceed what the organisation can afford to offer or what a particular measure is meant to be taken.

A majority of the satisfaction measurement approaches involve subjective perceptions based on objective issues. In the construction industry, the measurement of client satisfaction is often associated with performance and quality assessment in the context of products or services received by the client (Parasuraman *et al*, 1985, 1988; Preece and Tarawneh, 1997; Gunning, 2000; Soetanto and Proverbs, 2004).

3.3 SATISFACTION MEASUREMENT AND ASSOCIATED MODELS

An increasing appreciation of the need to satisfy clients of the construction industry has prompted a great deal of initiatives to investigate their satisfaction (Egan 1998;

2002). A number of models have been developed to facilitate the measurement of client satisfaction including:

- ServeQual: measuring the quality of service and related client satisfaction via defined various dimensions (Parasuraman *et al*, 1988; Zeithaml *et al*., 1990; Siu *et al*, 2001; Yasamis *et al*., 2002)
- Performance assessment model: measuring input and out attributes of performance and related satisfaction assessment (Oliver, 1997; Soetanto and Proverbs, 2004).
- EFQM Business Excellence model: measuring an organisation's excellence in all aspect of performance via a structured approach with customer satisfaction focus as a major component (EFQM, 2002; 2005; Cheng *et al,* 2006) and
- Application models in practice: applied models adopted in the construction industry to measure client satisfaction based on concepts of the above models (DETR, 2000; BSRIA, 2003; RICS, 2004).

A review of these various models now follows:

3.3.1 Service quality and the ServQual model

Quality is viewed as the degree and direction of discrepancy between customer or clients' expectations and their perceptions and is often seen as an antecedent of client satisfaction (Fornell, 1992). Quality of service refers to the quality of both the transaction and the outcome of the service and is a multi-dimensional concept (Zeithaml *et al*, 1990).

Parasuraman *et al* (1988) argued that, although any service industry is unique in some aspects, there were five broad dimensions of service quality that are applicable universally, which include:

1. Tangibles,
2. Reliability,
3. Responsiveness,
4. Assurance and
5. Empathy

Those dimensions formed the basis on which the ServQual model was developed and followed the results of previous studies (for example, Oliver, 1981; Churchill and Serprenant, 1982; Parasuraman *et al,* 1985).

Zeithaml *et al*. (1990) further defined ten most common dimensions cited by clients in judging quality, as follows:

1. Tangibles: Appearance of physical facilities, equipment, personnel, and communication materials.
2. Reliability: Ability to perform as promised, dependably and accurately.
3. Responsiveness: Willingness to help clients and provide prompt service.
4. Competence: Possession of the required skills and knowledge to perform the service.
5. Courtesy: Politeness, respect, consideration and friendliness of contact personnel.
6. Credibility: Trustworthiness, believability, honesty of the provider.
7. Security: Freedom from danger, risk or doubt.
8. Access: Approachability and ease of contact.
9. Communication: Keeping clients informed in language they can understand and listening to them.
10. Understanding the Client: Making the effort to know clients and their needs.

An honest portrait of client satisfaction implies that variation for each of the major dimensions has been measured. The following sections describe a few applications based on the ServQual model principles:

3.3.1.1 Disconfirmation Model

A developed Disconfirmation Model demonstrates how satisfaction is affected by the combination of the performance of the good /service and the level of expectation (Parasuraman *et al*., 1985; Anderson *et al*., 1994). Satisfaction is therefore a function of the difference between performance and expectations.

As discussed earlier, the ServQual approach developed for measuring perceived service quality consists of several determinants of perceived service quality including tangible, reliability, responsiveness, assurance and empathy (Parasuraman *et al.*, 1988). Perceived service quality relates to the gap between customer expectations and perceptions of performance. Where the performance that a customer perceives is deemed to be greater than the expectations held, satisfaction will increase. A perceived performance that is lower than the customer's level of expectation will result in a decrease in satisfaction.

The services provided to the customer provide varying degrees of satisfaction for the recipient at the end. Dis-confirmed expectations pre-dominate the degree of customer satisfaction with a particular service.

However, the Disconfirmation Model focuses on the negative aspects of expectations rather than on the positive. It suggests that those involved in managing customer expectations should try to lower expectations. A service provider who manages customer expectations in this way could also inadvertently lower performance levels. The end result would then be lower levels of customer satisfaction (Cheng *et al*, 2005).

Spreng and Mackey (1996) found that the notion of satisfying a customer's needs and desire is fundamental to the marketing concept. However, this fundamental idea is not sufficiently taken into account by the Disconfirmation Model, nor does it utilise it as a determinant of satisfaction. Therefore the Disconfirmation Model may not be appropriate for the evaluation of services provided by contractors/consultants to a construction client (Jayanti and Jackson, 1991).

3.3.1.2 Multi-dimensional model

Gable (1996) developed a multi-dimensional model empirically through a series of case studies and a survey of clients and consultants to assess client satisfaction when engaging an external consultant to help with the selection of a computer based information system. The descriptive model identified six important dimensions of success. Dimensions comprising three objective measures and three subjective measures were also applied to each of the three objective areas in the form of the client's level of satisfaction, that is to say:

Three objective measures/dimensions:

1. Acceptance of consultants' recommendations
2. Improvement of clients' understanding and
3. Consultants' performance/service quality.

Three subjective measures/dimensions:

1. Client satisfaction on consultants' recommendations
2. Client satisfaction on improvement of clients' understanding
3. Client satisfaction on consultants' performance/service quality

This multi-dimensional model was recognised as most appropriate for application to the "construction client - project manager" relationship (Gunning, 2000). The subjective dimensions were proven to have the highest association with and influence on the perception of overall satisfaction. The objective dimensions however had a limited influence on and association with satisfaction. Nevertheless, the model itself failed to examine how client satisfaction could be improved through the process of assessment.

Several other conceptual models have also been developed based on the ServQual principles to measure service quality in general (Anderson *et al.*, 1994; Gable, 1996) and to reveal the interrelationship with client satisfaction in the construction industry (Hoxley, 1998; Love *et al*, 2000; Siu *et al*, 2001). Quality is perceived to be higher when clients take care of pre-selection of tenders and adequate weighting was given to ability in the final selection process (Hoxley, 1998). Client satisfaction is generally seen as the difference between perceived quality and actual quality performance. The level of satisfaction is also related positively to the service quality and service quality gap (Hoxley, 1998; Siu, *et al.*, 2001).

Although there are many similarities between service quality and client satisfaction, they distinguish themselves from each other. In practical terms, service providers need to know the distinction between having an objective of a client who is "satisfied" with the perceived performance and an objective of achieving the maximum level of "service quality" (Cronin and Taylor, 1992). Satisfaction is a value-dependent phenomenon representing the ratio of perceived quality relative to price and therefore dependent on price (Zeithaml, 1988). However, service quality is not in general dependent on price and often viewed as antecedent of client satisfaction (Cronin and Taylor, 1992; Fornell, 1992).

The series of developed models based on the ServQual concepts either tell the story of an organisation's efforts to improve service quality, or reveal a series of findings and recommendations. They have important value in some aspects as the findings can be effectively translated into application for organisations. However, these models seldom show how to apply these diverse ideas to organisations.

Moreover, the frame of reference or the standard of comparison used by clients to determine their satisfaction levels (Smith *et al*, 1969), has been somewhat ignored in these models. Without a close analysis of the frame of reference, the outcome of the measurement of client satisfaction could distinctively differ from the one which has (Smith *et al*, 1969; Parasuraman *et al,* 1985; 1988). Hence the applicability of these models to predict levels of client satisfaction is somewhat limited (Cheng *et al*, 2005).

3.3.2 The performance assessment model

There exists a relationship between performance and satisfaction in the context of performance assessment (Oliver, 1997; Soetanto, 2002). Performance outcomes are the input and levels of satisfaction are the output. Between the input and the output, a process of psychological interpretation which is not visible exists, as shown in Figure 3.3:

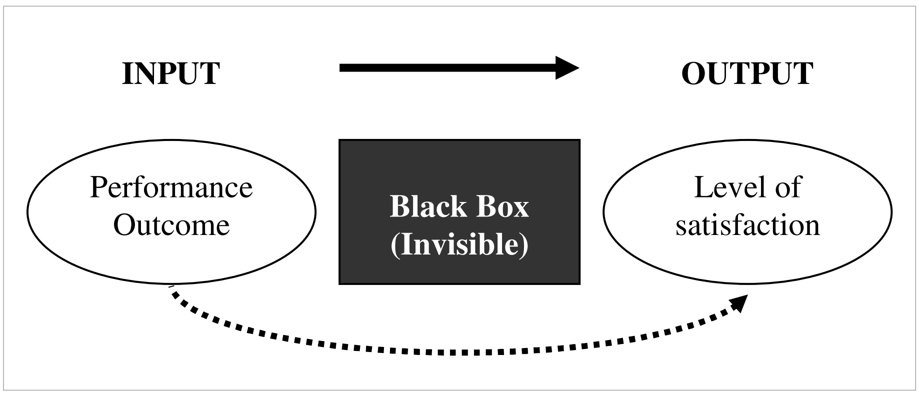


Figure 3.3 Performance assessment process

(Source: Oliver, 1997)

This psychological process is subjective and difficult to interpret and hence satisfaction measurement is regarded as an internal frame of mind, tied to mental interpretations of performance levels (Oliver, 1997). A client's internal frame of mind, mainly concerned with the individual, that is to say, the client's background, experience and perceptions, are likely to have an impact on the assessment of performance.

Smith *et al* (1969) argued that satisfaction could be specifically defined as a function of the perceived characteristics of a performer in relation to an assessor's frame of reference - defined as the internal standards an assessor uses, which could be different from one assessor to another subject to their professional background. Expectations and experiences also play important roles in providing the relevant frame of reference. Satisfaction results when levels of performance accord with levels of importance, that is to say, optimum performance (Soetanto and Proverbs, 2004). The concept of optimum performance suggests that levels of importance and performance should be the same so that a performer (for example, the consultant) is satisfying the assessor (for example, the client) but not wasting undue efforts and resources.

An assessor's satisfaction attributes are likely to have an impact on the assessment of performance. These attributes are mainly concerned with their individual background, experience and perceptions. Experience may influence an assessor's judgment of performance, that is to say, satisfaction, in two ways. The greater the experience, the more alternatives the assessor will have to compare the current performance. Individual background may cause bias in the assessment and consequently may influence their levels of satisfaction. These satisfaction attributes capture an assessor's perceptions based on his experience in relevant projects.

Soetanto and Proverbs (2004) developed intelligent models to predict levels of construction client satisfaction using the artificial neural network technique based on the view of clients on contractors' performance. The adopted satisfaction measurement criteria consisted of:

- Quality of service and attitude of contractor

- Main performance criteria and completion
- Performance in preliminary stage
- Performance of site personnel
- Performance of resource management

The models identified that a well-established working relationship at site personnel level and method of contractor selection are fundamental factors that have significant impact on client satisfaction. Long-term, relationship-based procurement such as partnering and strategic alliances are revealed to have advantages over traditional competitive tendering and hence lead towards higher client satisfaction levels.

However, the models failed to make efforts to identify practical measures and recommendations which could be developed to enhance client satisfaction levels. Furthermore, in the context of project life cycle, the models also failed to discuss corrective actions which could be taken to remedy problems in different stages to ensure predicted client satisfaction levels can be achieved.

3.3.3 The EFQM Business Excellence model

The European Foundation of Quality Management (EFQM) (2005) Business Excellence model recognises there are many approaches to achieving sustainable excellence in all aspects of performance. The Business Excellence model identifies customer satisfaction focus as a major component of measurement and is a practical tool that can be used in self-assessment or as a guide to identify areas for improvement and provides organisations with a guideline to achieve and measure their success. There are different ways of carrying this out, and the degree of comprehensiveness can vary (Medhurst and Richards, 2006).

The model is based on nine criteria, of which five are 'Enablers' - what an organisation does, and four are 'Results' - what an organisation achieves, as shown in Figure 3.4:

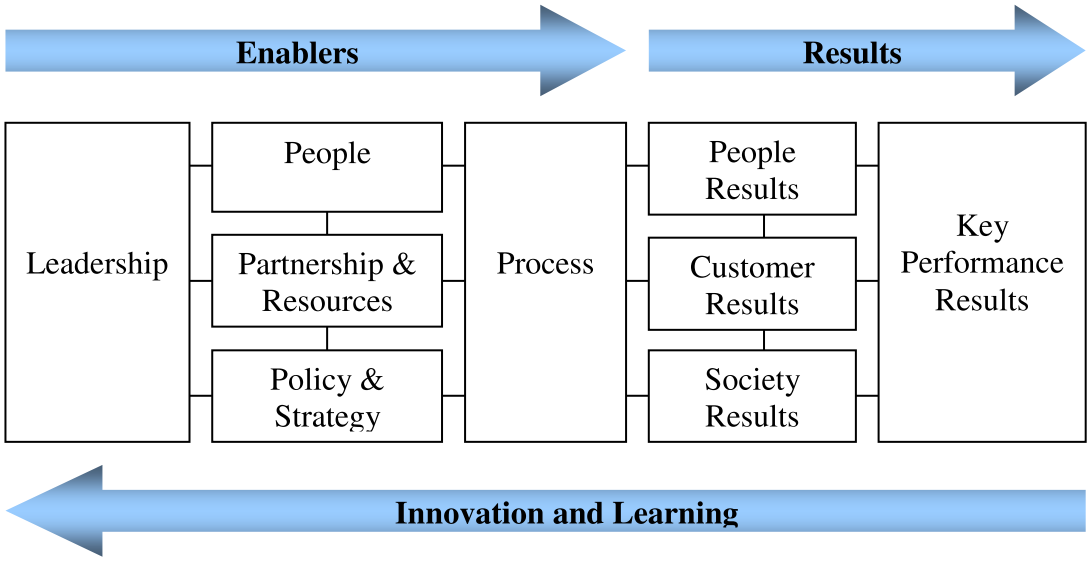


Figure 3.4 EFQM excellence model

(Source: EFQM, 2002)

The EFQM model is a primary source for organisations throughout Europe looking for more than quality, but are also striving to excel in their market and in their business regardless of sector, size, structure or maturity. To be successful, organisations need to establish an appropriate management framework. The EFQM model is part of an overall strategy that aims at being the best and will facilitate an improved understanding that an organisation's internal satisfaction would create external satisfaction, that is to say, satisfaction of their clients (Medhurst and Richards, 2006). It has been a way to open minds and help to improve business performance.

The boxes in Figure 3.4 represent the criteria against which to assess an organisation's progress towards excellence. Each of the nine criteria has a definition, which explains the high level meaning of that criterion (EFQM, 2002). A summary of these criteria now follows:

- Leadership - Excellent leaders develop and facilitate the achievement of the mission and vision. Where required, such leaders are able to change direction of the organisation and inspire others to follow.

- Policy and Strategy - Policies, plans, objectives and processes are developed and deployed to deliver strategy.
- People - Excellent organisations manage, develop and release the full potential of their people and promote fairness and equality and involve and empower their people.
- Partnerships and Resources – The management of external partnerships, suppliers and internal resources in order to support policy and strategy and the effective operation of processes is well planned.
- Processes - design, manage and improve processes in order to fully satisfy, and generate increasing value for, customers and other stakeholders.
- Customer Results - comprehensively measure and achieve outstanding results with respect to their customers and their satisfaction.
- People Results - comprehensively measure and achieve outstanding results with respect to their people.
- Society Results - comprehensively measure and achieve outstanding results with respect to society.
- Key Performance Results - comprehensively measure and achieve outstanding results with respect to the key element of their policy and strategy.

However, the EFQM model does not tell an organisation exactly what it must do and how it must do it, but rather it says that what the organisation does should be effective for its own needs (Medhurst and Richards, 2006).

The EFQM (2005) Business Excellence model is based on eight fundamental concepts:

- Customer Focus:
- Results Orientation
- Partnership Development
- Leadership & Constancy of Purpose
- People Development & Involvement
- Continuous Learning, Innovation & Improvement

- Management by Processes & Fact
- Corporate Social Responsibility

The management team can conduct a simple evaluation as part of developing a common understanding of these fundamental concepts and providing a catalyst for actions leading towards excellence, as shown in Table 3.1 below:

Table 3.1 The EFQM Model Evaluation Tool

CONCEPT	START UP	ON THE WAY	MATURE
Results Orientation	All relevant stakeholders are identified	Stakeholder needs are assessed in a structured way	Transparent mechanisms exist to balance stakeholder expectations
Customer Focus	Customer satisfaction is assessed	Goals & targets are linked to customer needs & expectations. Loyalty issues are researched	Business drivers of customer satisfaction needs & loyalty issues are understood, measured & actioned
Leadership and Constancy of Purpose	Vision and Mission, are defined	Policy, People and Processes are aligned; A leadership "Model" exists	Shared Values and Ethical role models exist at all organisational levels
Management by Processes and Facts	Processes to achieve desired results are defined	Comparative data and information is used to set challenging goals	Process capability is fully understood and used to drive performance improvements
People Development & Involvement	People accept ownership and responsibility to solve problems	People are innovative and creative in furthering organisational objectives;	People are empowered to act and openly share knowledge and experience
Continuous Learning, Innovation and Improvement	Improvement opportunities are identified and acted on	Continuous improvement is an accepted objective for every individual	Successful innovation and improvement is widespread and integrated
Partnership Development	A process exists for selecting and managing suppliers	Supplier improvement and achievements are recognised and key external partners are identified	The organisation and its key partners are interdependent. Plans and policies are co-developed on the basis of shared knowledge
Corporate Social Responsibility	Legal and regulatory requirements are understood and met	There is active involvement in 'society'	Societal expectations are measured and actioned

(Source: EFQM, 2002)

By measuring the variables of Enablers and Results, excellence with respect to Performance, Customers/Clients, People, Society and Process that ultimately underpins client satisfaction may be achieved.

The implication of the EFQM model in the context of measurement of construction client satisfaction is highly significant. The identified concepts of measuring excellence within the Model, for example, focusing on customer/client needs and expectation to achieve satisfaction, people development and involvement and partnership development, are widely being referred to further model development in many organisations' assessment of their client satisfaction (BSRIA, 2003; RICS, 2004; Cheng *et al*, 2006). The Model's customer/client focus has prompted service-providing construction organisations such as consultants and contractors to take proactive measures to treat client satisfaction and focus on performance improvement and excellence.

Nevertheless, the EFQM model generally concentrates on managerial points such as effectiveness and improvement. There seems to be little evidence towards identifying the significance of the criteria identified in the model and their impact on client satisfaction and therefore on a theoretical level the model is not wholly suitable for the assessment of construction client satisfaction.

3.3.4 Application of client satisfaction models in practice

Client satisfaction in regard to the performance of their service providers including construction consultants (for example, project managers, chartered surveyors, architects and engineers) and contractors on construction projects has been measured by assessing key performance indicators (KPI) in the UK construction industry (DETR, 2000; BSRIA, 2003; RICS, 2004; CE, 2005). During which issues such as what levels of performance service providers should aim to achieve in order to satisfy their clients and what performance criteria should be prioritised so as to make most efficient use of resources and efforts in this regard can be addressed. KPIs for construction projects have become an effective tool for measuring the success of schemes (ACE, 2003).

Within the concept of client satisfaction, the measurement of satisfaction plays a core role (RICS, 2004). The criteria adopted in the measurement of client satisfaction comprise various aspects of service providers' performance and their characteristics such as profitability, productivity and repeat business. The key indicators of measuring client satisfaction are illustrated in Figure 3.5 as below:

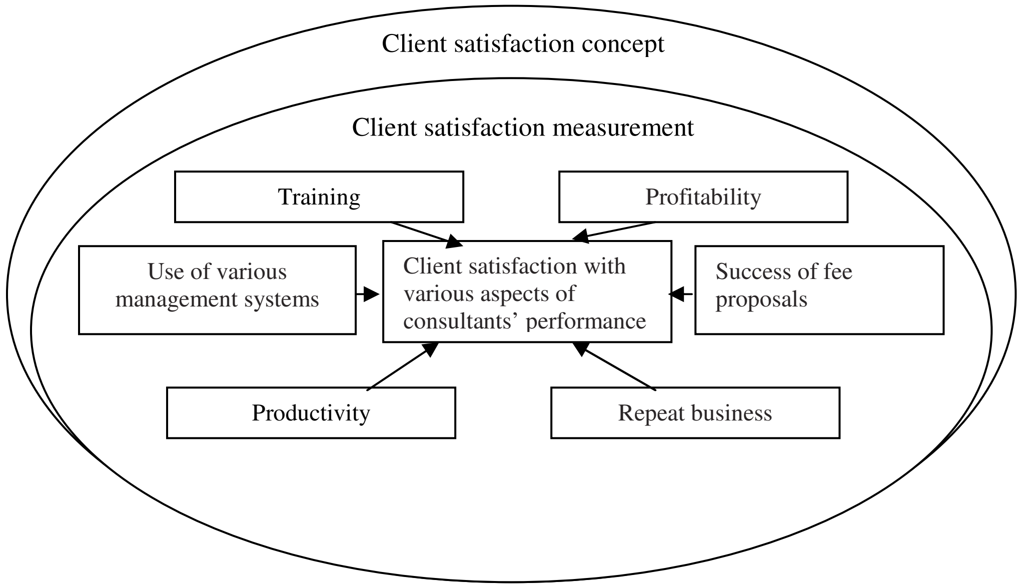


Figure 3.5 Client satisfaction measurement criteria

(Source: RICS, 2004)

It was reported that client satisfaction grows significantly in relation to the performance of construction consultants in terms of understanding and responding to clients' needs (RICS, 2004).

The Building Services Research and Information Association (BSRIA) (2003) developed a pragmatic model for client satisfaction assessment which identified core aspects that will be assessed for Mechanical & Electrical (M&E) contractors by interviewing their most recent clients. The methodology adopted in this model revealed that companies in the construction industry chose interviews as the main means of collecting KPI data, and twenty of most recent clients will be sufficient for a basic client satisfaction study for most companies as research suggested that many firms complete around twenty large projects per annum. The model itself also tied in with the client satisfaction KPIs.

Key indicators of contractor performance from overall design to predictability of cost were identified and measured against client satisfaction levels which are demonstrated in Figure 3.6 as below:

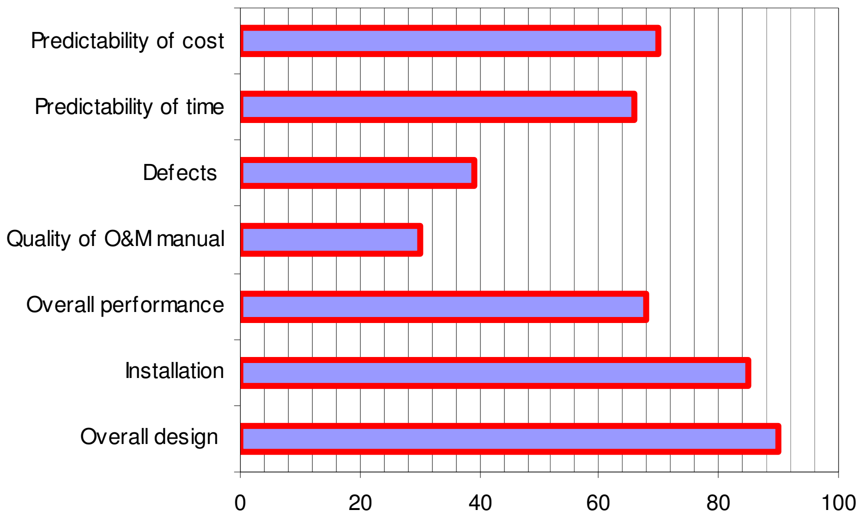


Figure 3.6 Client satisfaction - M&E contractor performance KPI

(Source: BSRIA, 2003)

The model provides clear benchmarking of contractors' performance against peer group, that is to say, major competitors in the very aspects of service that are most important to them and to satisfy their clients' needs.

However, there is often a mismatch between how a client perceives the service provider, that is to say, the M & E contractor and how a service provider regards their own performance on a project. Furthermore, client satisfaction measurement often goes beyond the objective aspects, for example, contractor performance and also considers the feeling of the assessor, that is to say, the satisfaction levels of the client, which by nature is dependent on the assessor's background and hence is considered subjective. Therefore, independent feedback from various clients on a range of projects which will identify areas of strength and potential weakness need to be addressed in the BSRIA model.

Notwithstanding the above, the majority of satisfaction measurement models in the literature somewhat failed to make efforts to identify practical measures and recommendations which could be developed to enhance client satisfaction levels. Furthermore, in the context of the project life cycle, corrective actions which could be taken to remedy problems in different stages to ensure predicted client satisfaction levels can be achieved, are also ignored.

Key service providers in the UK construction industry such as large consultancy and contractor firms have developed their own specific models to measure their clients' satisfaction adopting the key criteria identified in the client satisfaction models including ServQual, EFQM and KPI models (Mott MacDonald, 2003; Balfour Beatty, 2005; Atkins, 2005; LBC, 2005; Cheng *et al.*, 2006). Their own approaches were adopted to capture clients' views and feedback, either when a project is completed or at key stages of a project's development.

Seeking client feedback is an integral component of such organisations' quality and customer care management systems, aiming for continual improvement. Through those management systems formal client satisfaction questionnaires, or by interview or through other means, are completed to collect clients' views on the level of services being provided and are utilised in further discussions, thus activating processes to respond to feedback. The client satisfaction measurement process remains one of the key mechanisms for ensuring client expectations are met, and it provides the service providers the means to develop effective improvement initiatives (Mott MacDonald, 2003; Atkins, 2005). Client feedback, measurement of client satisfaction and benchmarking are the key to strong performance of service providers. The objective of these specific models were to undertake an in-depth study on levels of client satisfaction and then to use these findings to identify ways of improving the services provided by such consultants and contractors.

OCG (1991) further suggested that client satisfaction indicators for a particular type of satisfaction assessment should be limited in number, and selected in accordance with the nature and objectives of the assessment and with key satisfaction issues of clients, as identified in the assessment of their expectations. Any indicators identified should not mean to be exhaustive, neither should they be seen as universal. The indicators given for a specific type of client are not all adequate for every organisation that has specific needs.

Major criteria suitable for client satisfaction measurement in general can be categorised into three groups, namely service delivery/quality, people (service providers' personnel) and communications with clients. Each category contains further detailed criteria of measurement. The following examples represent a preliminary list of client satisfaction indicators, as shown in Table 3.2 below:

Table 3.2 Criteria of measuring client satisfaction

Criteria of measurement	Zeithaml et al. (1990)	Parasuraman et al (1988)	Soetanto & Proverbs (2004)	EFQM (2005)	Cheng et al (2006)	Leung et al (2004)	Liu et al (1999)	RICS (2004)	BSRIA (2003)	ACE (2003)	OCG (1991)
Service delivery											
Overall quality of service and advice	X	X	X		X				X	X	X
Comparing with other service providers client use	X	X		X	X				X		
Understanding client needs and business	X			X	X			X		X	X
Problem solving	X	X		X	X			X		X	X
Responsiveness, speed of response	X	X			X			X		X	X
Reliability, technical accuracy, low defects	X	X			X				X		X
Innovation in methods and approach				X	X					X	
Meeting client expectations	X			X	X			X			X
Security, health and safety awareness	X									X	
Delivering value for money				X	X					X	X
Predictability of cost, time									X		
Whole life performance issues										X	
Repeat business									X		X
People of service providers											
Qualification of people	X		X								X
Competence, professional experience of people	X		X			X					X
Providing right level of staffing, resource management	X		X		X						X

Level of commitment team/central management, ownership and responsibility to solve problems				X	X	X	X				X
Working with client team			X		X						X
Friendliness	X	X	X		X						X
Accessibility	X	X	X		X						X
Amount of time spent with client											X
Communications with the client											
Quality and timing of reports produced, tangible communication materials, ease of filling out forms.	X				X						X
Regular dialogue on progress of the project, meetings	X	X			X	X					X
Regular dialogue to establish dynamics of client business					X						
Good at listening	X				X						X
Informing client on business issues which may affect you	X	X			X						X
Regular mailings advising client of latest news/information					X						X
Quality/usefulness of corporate entertainment				X	X						
Quality/use of the service provider's corporate literature					X						X
Quality/use of the service provider's website/intranet					X						
Making client understand of the service provider's capability					X						X
The service provider's overall performance on service quality?			X						X	X	X

It was proven that understanding client needs and responding to their needs are identified as the most important criteria adopted in client satisfaction measurement. Moreover, satisfaction levels are dependent on performance attributes and subjectivity is to some extent prevalent in the context of satisfaction measurement. The variety of clients' characteristics, for example, their background and experience, sectors and sizes of their organisations will also have a significant impact on their satisfaction levels (Chinyio *et al*, 1998; Soetanto and Proverbs, 2004). Clients also considered key performance attributes for service providers including overall quality of services, people (their personnel) and communications with client as the main client satisfaction measurement criteria (Leung *et al*., 2004; Cheng *et al*, 2006).

3.4 IMPACT OF STRATEGIC DECISIONS

Previous research has linked clients' strategic decisions with project performance and client satisfaction and has mainly focused on the choice of the procurement route (Naoum, 1994; Naoum and Mustapha, 1995; Kumaraswamy and Dissanayaka, 1998). A client's strategic decisions such as the establishment of an appropriate procurement strategy and the adoption of a whole life cost approach during the early stages of a project have been shown to have a substantial impact on project success and client satisfaction (Soetanto *et al*, 2001; Cheng and Proverbs, 2004).

Clients' needs play a vital role in the strategic decision-making process, as they are the basis upon which clients will judge their satisfaction with project outcomes. Clients' needs are often multiple and different decision-making techniques require different techniques for scoring clients' goals. A client's strategic decisions in the preliminary stage such as the procurement of long-term partnership, strategic alliance may encourage better performance of service providers (Soetanto and Proverbs, 2004) and hence have a positive impact on satisfaction levels.

Macmillan *et al* (2001) also highlighted that decisions taken at the conceptual design stage of a building project can significantly reduce costs and increase client satisfaction. It's critical to make the correct strategic decisions in the early stages, as it becomes increasingly expensive and unrealistic to make any significant changes as a project progresses (Bartolo, 2002). As a consequence, it may be difficult at later stages to take any corrective actions to satisfy clients' needs and hence enhance levels of client satisfaction.

Cheng and Proverbs (2004) found that strategic decisions made by a client throughout the project life cycle could be broadly categorised as a few functioning groups based on the timing and the subject of the decisions. The categories consist of procurement strategy, cost management approach, people issues and life cycle strategy. Strategic decision-making process in different stages comprises project priority analysis, identification of the direction for the future of a project and high level planning of the implementation.

However, the nature of strategic decisions varies across the whole life cycle of a construction project and the impact these have on client satisfaction depends as much on timing as on the subject in question (Pinto and Prescott, 1988; Cheng and Proverbs, 2004). Issues such as, how these strategic decisions impact on client satisfaction levels and the influence of the varying project stages, have yet to be addressed. Further in-depth research focusing on the significance of strategic impact on client satisfaction across the project life cycle is therefore fundamental to reveal the impact of strategic decisions on client satisfaction.

3.5 SUMMARY

This chapter has reviewed the concepts of customer satisfaction and construction client satisfaction and the existing association between these two concepts in the context of satisfaction measurement. Customer satisfaction mainly focuses on the concept that the customer will make a comparison between the product or service and a certain standard. The concept of construction client satisfaction is generally adapted from principles of customer satisfaction in the context of business and measures the extent to which a client's expectations for a service or a project overall are met. The levels of satisfaction achieved or exceeded by the customer/client are dependent on the outcome of the comparison and the customer/client's perceptive thinking. Satisfaction is hence a highly subjective and complex matter that is challenging to measure reliably and objectively.

The measurement of satisfaction of clients has also been investigated. Measurement models employed to measure quality of services, excellence and performance including the ServQual model, the performance assessment model and the EFQM business excellence models are the most commonly referred models in the development of measurement of client satisfaction in the construction industry.

The criteria identified in practice to measure construction client satisfaction have been discussed. Various key performance indicators (KPI) used as one of the most common criteria to measure client satisfaction were reviewed. Understanding client needs and responding to their needs are identified as the most important criteria/indicators adopted in client satisfaction measurement. The variety of clients' characteristics, for example, their background and experience, will also have a significant impact on their satisfaction levels. Clients considered key performance attributes for service providers including overall quality of services/delivery, people (their personnel) and communications with client as the main client satisfaction measurement criteria.

The implication of client strategic decisions on their levels of satisfaction has also been explored. The nature of strategic decisions varies across the whole life cycle of a construction project and the impact these have on client satisfaction depends as much on timing as on the subject in question. The phenomenon of client satisfaction in the context of construction projects in general has been depicted.

CHAPTER 4

STRATEGIC DECISIONS AND CLIENT SATISFACTION - A CONCEPTUAL FRAMEWORK

4.1 INTRODUCTION

The preceding chapters have shown that there are evidences for hypothesising that strategic decisions have a significant impact on client satisfaction, and that the interrelationship between them can be captured. In order to investigate systematically the relationship between strategic decisions and client satisfaction, it is necessary to have a conceptual framework that brings together the essential aspects to be investigated in a logical manner, and provides appropriate parameters and points of reference within the context of construction projects.

This chapter will first draw upon findings of the literature review (refer to Chapters 2 and 3) and propose a conceptual model of the interrelationship between strategic decisions and client satisfaction. A discussion of the overall concepts at the structural level will be presented first, which is based on the findings of the literature review on performance of service providers and the assessment of service quality. Two basic concepts are presented, namely, strategic decisions and client satisfaction, followed by a discussion of the determining factors of client satisfaction.

The interrelationships between strategic decisions and client satisfaction will then be discussed. The influence of client strategic decisions on the performance of service providers and their service quality, which are viewed as the major determinants of client satisfaction, will be reviewed. Upon the basis of which, a conceptual model will be established.

The implications for data collection arising from the conceptual model are then discussed. The developed conceptual model will inform the methodology to be employed for further data collection and the refinement of the model at later stages.

4.2 BASIC CONCEPTS UNDERLYING THE CONCEPTUAL MODEL

The concepts of strategic decisions and client satisfaction are complex in nature (refer to Chapters 2 and 3); let alone the interrelationship between them. The interrelationship therefore needs to be thoroughly explored and modelled so as to reveal the interdependence of these two complex concepts.

An extensive literature review has been undertaken to explore and understand at the theoretical level two broad however fundamental concept areas for this research, namely, strategic decisions and client satisfaction, as outlined in Figure 4.1:

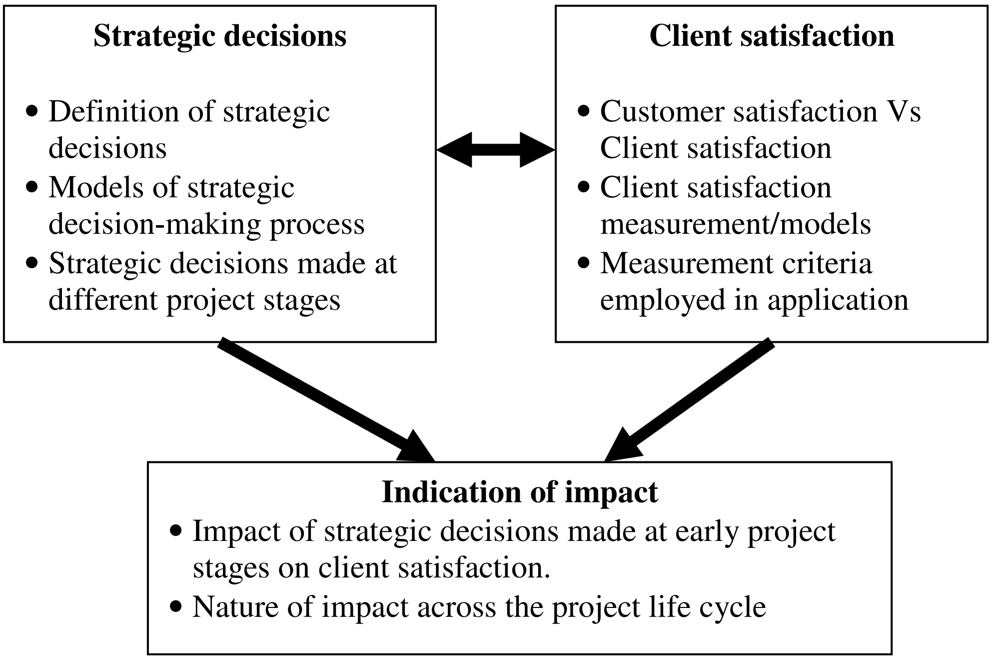


Figure 4.1 The outline of literature review

Strategic decisions are decisions made at various stages of the project by the client and they will have a long-term impact on the performance and success of the project. Strategic decisions vary in nature and significance. There exist a number of decision-making process models available to facilitate optimum decision-making.

The concept of client satisfaction in the construction industry is generally adapted from principles of customer satisfaction in the context of business. It usually refers to the measurement of the extent to which a client's expectations for a service or a project overall are met based on the client’s perception of the service provider’s performance and service quality. There are indications that strategic decisions made at early project stages have a significant impact on client satisfaction. Nevertheless, the nature of the impact has not been thoroughly examined and the significance throughout the project life cycle requires further investigation.

In the context of construction projects, when a strategic decision is made by a client, the service provider has to respond to the decision, for example, to understand the client needs and meet the client expectations associated with the decision (Zeithaml *et al*., 1990; Morris, 2002; RIBA, 2004). The response provided by the service provider will form the basis of their performance and service quality.

In the construction industry, performance and service quality of service providers are widely seen as the antecedent and pre-requisites of client satisfaction and the criteria for the measurement of client satisfaction are generally based on the attributes of performance and service quality (Parasuraman *et al*, 1985, 1988; Fornell, 1992; Soetanto and Proverbs, 2004). Thus the influence of strategic decisions on client satisfaction is built through affecting the performance of service providers and their service quality.

A comprehensive review was also conducted to investigate the interrelationship between these two concepts and to inform the development of a conceptual model which is presented in later sections of this chapter. Detailed reviews for these two individual concepts have been presented in Chapters 2 and 3 respectively. The major attributes of these concepts underlying the conceptual model are however outlined in the following sections based on the review of salient literature.

4.2.1 Strategic decisions made by construction clients

Strategic decisions made by a construction organisation/client are usually complex and made with some uncertainty (Mintzberg *et al.*, 1976; Schwenk, 1984). They also vary across the whole life cycle of a construction project (Pinto and Prescott, 1988; Cheng and Proverbs, 2004), and are viewed as serving a particular purpose and in the long-term critically affect the performance of the organisation/project (Papadakis and Barwise, 1997).

There exist a number of strategic decision-making models in the construction industry which outline the processes and decision points involved in the delivery of construction projects (BAA, 1995; Sarshar *et al.*, 1998; OGC, 2003a). Landmark reports (Latham, 1994; Egan, 1998; Egan, 2002; PP, 2005) have identified a lack of properly structured processes and client focus amongst other aspects as key inhibitors to the performance of the construction industry. Those reports also recommended taking a holistic view of the construction process to help eliminate these inhibitors and improve performance, for example, of construction consultants and contractors. Successful delivery requires an integrated process in which different stages of a project including design, construction, occupancy and maintenance are considered as a whole.

Strategic decisions made by a client throughout the project life cycle can be broadly categorised based on the timing/stages and the subject of the decisions (Phillips, 2000; Cheng and Proverbs, 2004; Cheng *et al,* 2005). Although there are various versions of these construction project stages, the RIBA (2004) stages are well-known in the UK construction industry as a model framework, and can be broadly divided into pre-design, design, tender, construction, occupancy & maintenance and disposal stages (Hughes, 2003).

Each project stage requires the input of different information and by nature requires various strategic decisions to be made by the client accordingly. The focus of a client's strategic decisions will therefore change as the project progresses through the different stages. For example, after preliminary designs, investigations of alternatives and costing of the possible solutions, the client needs to make a decision that the preferred solution is feasible and the project can proceed forward. The client will then be interacting with their consultants, for example, the designers, briefing and identifying user needs, and approving sketch designs. The designers will be interpreting in detail the client's requirements before proceeding with the detail design.

Although the definition of strategic decisions varies from one source to another (Schwenk, 1995; Papadakis and Barwise, 1997; Cambridge dictionary, 2005; Oxford dictionary, 2005), there exists a common understanding of the concept of strategic decisions and towards what strategic decisions could impact on organisational performance and the success of a project (Armstrong 1982; Schwenk, 1988; Eisenhardt and Zbaracki, 1992). Macmillan *et al* (2001) and Bartolo (2002) found that decisions taken at earlier stages can significantly reduce costs and increase client satisfaction. In general, the impact of strategic decisions on client satisfaction depends as much on timing as on the subject of the decision (Cheng and Proverbs, 2004).

4.2.2 Client satisfaction and service quality

The concept of satisfaction is often viewed as a function of comparison, either between an individual's perception of an outcome and its expectation for that outcome (Locke, 1970), or a comparison of pre-purchase expectations and post-purchase product or service performance (Churchill and Serprenant, 1982). As the levels of satisfaction to be achieved are dependent on the outcome of the comparison and perceptive thinking, that is to say, the standard of comparison and the balance of expectations and perceptions (Zeithaml *et al,* 1990), it is hence subjective in nature in the context of satisfaction measurement. The significance of the standard of comparison used, which is influenced by a client's characteristics including background, sector, experience and so on, can not be ignored.

Although Oliver (1981; 1997) suggested that satisfaction is difficult to define and there is little consensus towards its definition, in the context of satisfaction of construction clients, it is widely viewed as the measurement of the extent to which a client's expectations for a service or a project overall are met (Parasuraman *et al*, 1988; Siu *et al*, 2001; BSRIA, 2003; Samwinga and Proverbs, 2003; Soetanto and Proverbs, 2004).

A majority of the satisfaction measurement approaches involve subjective perceptions based on objective issues. In the construction industry, the measurement of client satisfaction is often associated with performance and service quality assessment in the context of projects or services received by the client (Parasuraman *et al*, 1985, 1988; Soetanto and Proverbs, 2004). The focus of construction client satisfaction is hence commonly kept on satisfying clients' needs on projects and that their expectations are met by their service providers including consultants and contractors.

An increasing appreciation of the need to satisfy clients in the construction industry has prompted some research efforts to investigate the phenomenon of client satisfaction. A number of models and techniques have been developed to facilitate the measurement of client satisfaction such as ServQual (Parasuraman *et al*, 1985; 1988; Gunning, 2000), performance assessment (Soetanto and Proverbs, 2004), Business Excellence models (EFQM, 2005; Cheng *et al,* 2006) and key performance indicators (KPIs) (RICS, 2004; CE, 2005). Amongst those models, service quality, as part of the overall service delivery, is a critical element of satisfaction measurement (Gunning, 2000).

The people involved in the delivery of services to the client, their skills and experience, goals and commitments will strongly influence the quality of services and overall service delivery and ultimately client satisfaction. Organisations, for example, consultants and contractors in the construction industry that strive for excellence, may communicate, reward and recognise, in a way that motivates staff and builds commitment to using their skills and knowledge for the benefit of the organisation and to achieve the full potential of their people at an individual, team-based and organisational level (EFQM, 2005). The people issue hence has a crucial impact on service delivery and is seen as a key criterion of measuring client satisfaction.

Effective communications between the client and service providers also play an important role in the overall satisfaction of the client (Tavistock, 1965; Ahmed and Kangari, 1995; Wild, 2004; Dainty *et al.,* 2006). Communication within project-based environments presents special challenges and different perspectives highlight the diversity of communication problems facing those working within the project-based environments (Dainty *et al,* 2006). Previous research showed interactions between research professionals and project teams were limited and often inhibited project success (Gorse and Emmitt, 2004). Some communication techniques such as the use of advertising consultants and the media can help to achieve enhanced communication with clients and increased efficiency (Namo and Fellows, 1993). It is suggested that clients will only achieve higher levels of satisfaction when their service providers achieve higher levels of performance on communications.

4.3 CONCEPTUAL MODEL DEVELOPMENT

Models are considered as simplified designs for visualising objects, processes, systems or concepts too complex to grasp (Fellows and Liu, 1997). Previous research found that strategic decisions made by a client at early stages (such as procurement strategy) have been found to have a significant impact on their levels of satisfaction (Rowlinson, 1988; Naoum, 1994). The interrelationship between strategic decisions and client satisfaction is built through the impact of strategic decisions on the performance of service providers and their service quality. Service quality forms the basis on which client satisfaction is measured and determines levels of client satisfaction.

The service provider, for example, a consultant or a contractor, has to provide responses when strategic decisions have been made by the client in the context of construction projects. Through these responses the service provider will need to understand client needs and meet client expectations which are embedded in the strategic decisions made by the client to serve the project. The understanding of client needs, and the meeting of, and/or exceeding client expectations, along with the service delivery, people and communications with the client (details refer to Chapter 3), will form the service provider's overall performance and service quality. The literature suggests that the assessment of client satisfaction is generally determined by the performance and service quality of service providers. Thus the interrelationship between strategic decisions and client satisfaction exists and a conceptual model can be developed.

4.3.1 Determining factors of client satisfaction

Previous research has identified a number of factors that determine client satisfaction. Many of those are associated with service providers' performance /service quality and client strategic decisions, which include:

- Inability of consultants to accurately determine client requirements and transform into reality (Ahmed and Kangari, 1995);

- Understanding of the client needs, client orientation, communication skills and response to consultants' feedback (Gorse and Emmitt, 2004; Cheng *et al*, 2005; Dainty *et al*., 2006);
- Service quality factors and cooperation of service providers (Karna, 2004);
- Role of individuals in terms of interests and goals and performance (Leung *et al*, 2004);
- Strategic decisions and the process of decision-making, decision mechanism (Naoum, 1994; Macmillan *et al*., 2001; Bartolo, 2002; Cheng and Proverbs, 2004; Leung *et al*, 2004).

These factors vary in terms of their nature and extent of impact on client satisfaction. However, a majority are closely associated with either one or both of the two major categories of project participants – the client and the service provider. The impact of strategic decisions on client satisfaction, in fact, is measured through the assessment of the service provider's performance and service quality.

4.3.2 Interrelationship between strategic decisions and client satisfaction

Once a strategic decision is made at each stage by the client, there will be interactions between the client and their service providers, for example, consultants (including designers) and/or contractors. These interactions form a crucial process of the implementation of client strategic decisions through which project requirements, imbedded in the strategic decision made, are communicated between the client and their service providers (including consultants and contractors). Client needs are understood through this communication process (Dainty *et al*., 2006) and service providers will have to respond to meet the client's expectations.

Figure 4.2 presents a conceptual structure of the interrelationship amongst client strategic decisions, service providers' response, service providers' service quality and client satisfaction.

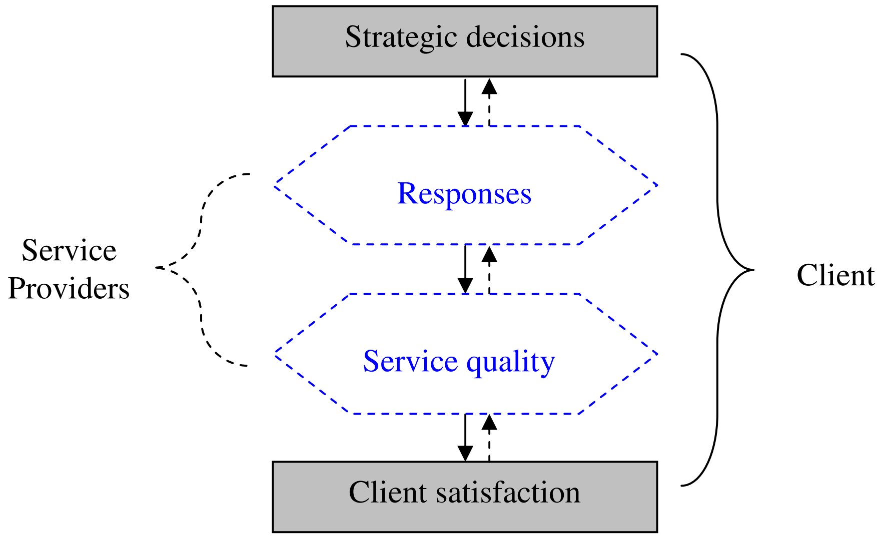


Figure 4.2 The conceptual structure of strategic decisions – satisfaction interrelationship

(Adapted from Cheng & Proverbs, 2006)

The responses to a client's decisions from the service provider comprise the understanding of the client's business needs and the meeting (and exceeding) of client expectations which form the basis of their services provided to the client. Uninformed decisions, which are made by the client in the context of lacking sufficient support information and without appropriate consultation to service providers including consultants and contractors, can lead to expensive mistakes and unfortunate consequences (Hassell, 2000). Consultants and contractors generally are not part of the client organisation that makes strategic decisions, so they might not see the logic behind those decisions. For example, they might not know that a particular area is set aside for a particular purpose in the design, or that a wall has to be a certain dimension to accommodate a special piece of equipment. Service providers might therefore see only what they understand about the decisions from their perspective, which are not necessarily the same as those the client decisions meant to achieve.

If an uninformed decision has been made by the client in which project requirements and client needs are not properly addressed, the service provider will not be able to understand the client needs sufficiently and will therefore unable to provide an appropriate response. The real opportunity during early stages of the projects is to explore the client needs and to reach a decision and project definition that more accurately represents these needs (Smith *et al.*, 1998). Inappropriate responses from the service provider will have a negative impact on their services provided to the client and will form a defective and inferior service quality.

The client, in turn, will assess the quality of the services being provided based on their own perception. The measurement of service quality forms a very significant part of the assessment of client satisfaction and service quality is often seen as an antecedent of, and related positively to client satisfaction (Fornell, 1992; Cheng *et al.*, 2006). Uninformed strategic decisions made by clients therefore will have a negative impact on client satisfaction.

Nevertheless, these interactions between the service providers and the client need to be clearly understood. Appropriate strategic decision-making processes within the client organisation are intended to help construction project participants, for example, the client and service providers including consultants and contractors to work together seamlessly. A consistent approach across the client organisation will ensure business needs and opportunities are met by optimal decisions. Based on those processes, optimum strategic decisions then can be made by clients, which will positively influence the performance of service providers and their service quality. As a consequence, improved performance and service quality from service providers will ultimately lead to improved client satisfaction.

4.3.2 The conceptual model

Literature review have identified individual factors affecting the interactions between strategic decisions and client satisfaction (refer to Chapters 2 and 3). The conceptual structure illustrated in Figure 4.2 can be further expanded to develop a conceptual model which provides a detailed picture of the influence of strategic decisions on client satisfaction, as shown in Figure 4.3.

When a strategic decision, as part of the project life cycle strategies (LCS), is made by the client at a stage of a project, several key aspects, as discussed in previous sections, will form the basis of the client's decision-making function and make significant contribution to the decision itself. These key aspects include client characteristics, for example, decision-making mechanism and process (refers to Box A.1); client expectations, that is to say, importance of decisions (refers to Box A.2) and client perceptions, that is to say, effectiveness of decisions (refers to Box A.3).

A client's characteristics, for example, including decision-making process and mechanism at the decision-making phase (Box A.1) and size/sector/experience at the satisfaction measurement phase (Box A.7), have significant influence in providing the quality standard, or frame of reference (Smith *et al*, 1969) (refers to Box A.4), which is used by the client to judge the performance and service quality of their service providers. The satisfaction determinants are linked with the frame of reference as well as its characteristics, expectations and perceptions which represent different means in the decision-making and the satisfaction measurement phase (refer to Box A.5, A.6 and A.7).

In response to the client's strategic decisions construction service providers including consultants and contractors will need to obtain a proper understanding of client business and needs. The understanding of, and response to the client needs, illustrated as Box B.1 and B.2, have a fundamental impact on the overall performance/service quality of the service provider. Service providers' service delivery, people and communications with the client (refer to Chapter 3 for details of attributes of performance) are the fundamental issues of their overall performance. Service providers' overall performance then provides the basis of their service quality, as shown in Box B.3.

Service quality is usually seen as an antecedent and pre-requisite of client satisfaction. A service provider's key performance attributes, for example, service delivery (refers to Box B.4), people (refers to Box B.5) and communications (refers to Box B.6), forms the overall performance output (refers to Box B.3) which determines the service quality and represents the criteria for the measurement of client satisfaction (refer to Chapter 3 – client satisfaction).

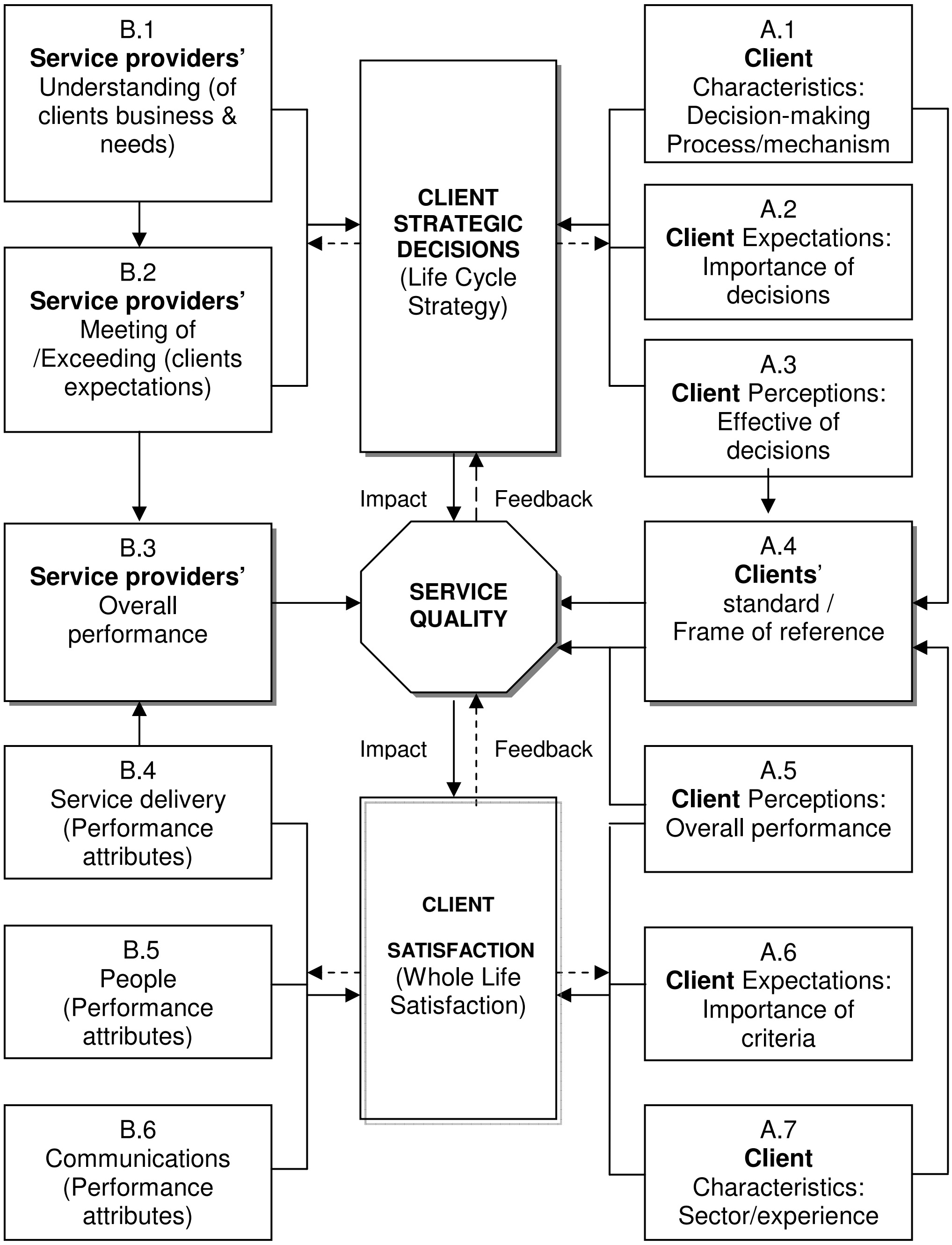


Figure 4.3 Conceptual model of the influence of strategic decisions on client satisfaction

The impact of strategic decisions on client satisfaction thus takes effect through the service provider's response to client decisions and their overall performance. The service provider's performance will result in their perceived service quality, which ultimately determines the levels of client satisfaction. Considering the subjective nature of satisfaction assessment, the influence of the client itself, which consists its characteristics, that is to say, its decision-making mechanism, experience, size, location, sector and so on, cannot be ignored. Clients' expectations, perceptions and the frame of reference will dominate the results of client satisfaction assessment. Clients will be able to make optimum decisions by carefully taking into account their characteristics, expectations and perceptions, which make significant contribution towards their own satisfaction.

Consultants and contractors, as service providers to clients, can improve their quality performance to enhance client satisfaction levels, and in the context of project life cycle, take corrective actions to remedy problems in different stages to ensure predicted client satisfaction levels can be achieved. This refers to the feedback process which is initiated from the outcome of client satisfaction assessment (from Box Client satisfaction to Box B.5, B.6 and B.7).

Overall, a client's strategic decisions across the project life cycle, namely, life cycle strategies (LCS), have a major impact on the overall performance of the service providers (Macmillan *et al*, 2001; Soetanto and Proverbs, 2004) and their service quality and ultimately on client satisfaction (Cheng *et al,* 2005). Client satisfaction at a particular project stage will make significant contribution towards clients' whole life satisfaction (WLS). Client satisfaction at any project stage, as part of a client' WLS, depends as much on the performance attributes of service providers as on the influence of strategic decisions and the client itself.

4.4 IMPLICATIONS FOR DATA COLLECTION

The nature of strategic decisions made by clients varies across the project life cycle and the measurement of client satisfaction is often associated with performance and quality assessment. The developed conceptual model reveals the interrelationship between strategic decisions and client satisfaction and identifies practical measures for both clients and service providers. Clients can make optimum decisions by looking into their characteristics, expectations and perceptions. Consultants and contractors, as service providers to the client, can improve their performance/service quality to enhance client satisfaction levels, and take corrective actions to remedy problems in different stages to ensure predicted client satisfaction levels can be achieved. A client's life cycle strategies (LCS) and the service providers' overall performance in those criteria make significant contribution towards clients' whole life satisfaction (WLS).

However, the nature and significance of the impact require further investigation. The conceptual model will need to be further developed and tested. Research into the impact of strategic decisions requires the collection of data on the various attributes of performance of service providers. Generally, the contextual data associated with strategic decisions and client satisfaction can be derived from the literature. However, detailed information, still needs to be obtained. Those detailed data will be most useful in explaining the nature and significance of the impact of strategic decisions on client satisfaction.

Data will need to be collected to test this conceptual model and reveal the nature and significance of the impact of strategic decisions on client satisfaction. Detailed data, for example, what strategic decisions a client has to make a particular stage, the types of strategic decisions made by clients across the project life cycle, and what determine a client's perception on service quality, will need to be collected. This data will need to be collected through appropriately designed research methodology.

The subsequent chapter provides a detailed rationale and justification for the research design, including a description of the research methods and techniques adopted.

4.5 SUMMARY

This chapter has reviewed two fundamental concept areas for this research, namely, strategic decisions and client satisfaction to inform the development of a conceptual model. The determining factors of client satisfaction and strategic decisions have been discussed. A conceptual structure of strategic decision - satisfaction interrelationship has been presented. This has demonstrated that there will be interactions between the client and their service providers including consultants and contractors when a strategic decision is made at a project stage by the client. The impact of strategic decisions on client satisfaction, in fact, is measured through the assessment of the service provider's performance and service quality.

The conceptual structure has been further expanded to develop a conceptual model which provides a detailed picture of the interrelationship between strategic decisions and client satisfaction. The service provider's understanding of, and response to the client needs, have a fundamental impact on the overall performance/service quality of the service provider in terms of their service delivery, people and communications with the client.

The conceptual model reveals that client strategic decisions have a significant impact on client satisfaction. The impact of strategic decisions on client satisfaction takes effect through the service provider's response to client decisions and their overall performance. The service provider's performance will result in their perceived service quality, which ultimately determines the levels of client satisfaction.

A client's life cycle strategies (LCS) and the service providers' overall performance in those criteria make significant contribution towards clients' whole life satisfaction (WLS). Client satisfaction at any project stage, as part of a client's WLS, depends as much on the performance attributes of service providers as on the influence of strategic decisions and the client itself.

However, the nature and significance of the impact require further investigation. The conceptual model will need to be further developed and tested. Data regarding these strategic decisions and quality of service needs to be collected.

The following chapter will present a detailed description and rationale of the data collection techniques adopted to satisfy this requirement.

CHAPTER 5

RESEARCH METHODOLOGY

5.1 INTRODUCTION

This chapter will discuss in detail the research approach adopted to collate the empirical data required to satisfy the objectives of the research. The research approach adopted consists of both qualitative and quantitative research methods and is discussed and justified. The specific research methods applied to collect data are also depicted. This research approach represents a significant contribution to the area of construction research concerning the impact of strategic decisions on client satisfaction which has so far involved the exclusive application of either qualitative or quantitative methods.

Following this, a detailed description of the questionnaire survey is then discussed. The design and development of the research instrument including questionnaire design, scale, sampling and piloting is then outlined. Subsequent data analysis and model development techniques will be depicted including using multiple regression and factor analysis techniques. Finally, methods for validating and refining the developed model are introduced.

5.2 RESEARCH DESIGN

Previous research on the impact of strategic decisions on client satisfaction has focused on decisions made by clients at an early stage of the design process such as which procurement route to adopt (Rowlinson, 1988; Naoum, 1994; Kumaraswamy and Dissanayaka, 1998) and has relied mainly on the application of quantitative criteria. There exist questions not easily answered by quantitative research designs, although they are used commonly in the field of construction research. Quantitative and qualitative research approaches can be seen as complementary, providing different perspectives and answering different questions within any one broad area. Qualitative research may be an essential forerunner to conducting a quantitative research and can facilitate the understanding of findings of quantitative research (Miles and Huberman, 1994). In the context of this study, it would be difficult to carry out a meaningful quantitative study before developing an understanding of the criteria for assessing service quality in this context.

This study adopts quantitative methods in data collection, analysis and model development stages, while qualitative research methods are chosen to investigate the criteria of service quality assessment and softer issues of "Client characteristics and satisfaction" (Cheng *et al.*, 2005). The following sections further describe and justify why this combined research design is adopted.

5.2.1 Qualitative methods

Qualitative research seeks to understand phenomena in context-specific settings and produces findings not arrived at by means of statistical procedures or other means of quantification (Strauss and Corbin, 1990). Qualitative research methods can be used to better understand and to gain new perspectives on issues about which much is already known, or to gain more in-depth information that may be difficult to convey quantitatively. The ability of qualitative data to more fully describe a phenomenon is an important consideration. The drawback of qualitative research is that data collection methods are often labour intensive and criticised for being subject to researcher bias. There also exist difficulties in analysing qualitative data rigorously and a lack of reproducibility and generalisability of the findings (Nicholas and Pope, 1995).

Qualitative methods are thus appropriate in situations where quantitative measures cannot adequately describe or interpret phenomena, for example, personal characteristics (Greene, 1994). In the context of this research, client characteristics which are difficult to quantitatively explore, will be investigated by qualitative means.

There are various methods for collecting data in qualitative research, including focus groups, observations, interviews, diary methods and case studies (Miles and Huberman, 1994). Analysis of documents which may include official records, diaries and reports, as well as published data is a useful data source and can be invaluable to qualitative research in addition to collected data (Hoepfl, 1994; Hansen, 1995). Previous research has successfully adopted specialised forms of qualitative research which rely solely on analysis of documents (Patton, 1990; Gagel, 1997).

Client characteristics including personal characteristics, their organisational details and their case project data, which prove to have a significant impact on client satisfaction （refer to Chapter 3） will be analysed qualitatively to support the findings from literature review and case studies conducted at the early stage of this research (see details in Cheng *et al.,* 2006).

5.2.2 Quantitative methods

The quantitative method as part of the research approach was considered necessary as empirical research has provided strong evidence for explaining phenomenon, enabling researchers to address the questions of "*how much*" or "*how many*" (Walker, 1997). More appropriately in the context of this investigation the approach enables the establishment of "which variables are significant, and to what extent, in a scientific way" (Walker, 1997). That is to say, to what extent strategic decisions impact on client satisfaction. The quantitative approach also allows the objective of explanatory assertions about the sample and the population to be achieved (Babbie, 1990; Czaja and Blair, 1996).

Fellows and Liu (1997) identified three main approaches typically employed in conducting research, including desk research, experimentation and surveys including via questionnaires and/or interviews. A summary of these approaches now follows.

5.2.2.1 Desk research

Desk research is usually cheap, time-saving and suitable for studies as such where data can not be obtained by any other viable alternatives (Fellows and Liu, 1997). This approach involves using data collected by others, perhaps analysing it in alternative ways to yield fresh insight and is therefore often problematic. The problems stem from the fact that the data, collected for other purposes, may not be well tailored for the particular research being undertaken. In addition, the sampling of data collected by others may also not be wholly appropriate to the requirements of this research, and the data may have inherent limitations due to the manner in which it was collected.

Nevertheless, in the context of this research, the criteria for measurement of service quality and client satisfaction in practice will need to be identified so as to facilitate the development of models which investigate the impact of strategic decisions on client satisfaction. Desk research in combination with case studies and interviews will be a particularly useful tool to be adopted for collection of such data, which has proven to be a successfully established approach currently being employed by many organisations in the construction industry (Atkins, 2005; Balfour Beatty, 2005; Cheng *et al*., 2006). Identification of the criteria for measurement of service quality and client satisfaction will be critical for the development of models to address the research hypotheses concerning the interrelationship between client satisfaction and strategic decisions.

5.2.2.2 Experimentation

Experimentation is a means of data collection in which results are sought by effecting incremental changes in the independent variable and measuring the effect, if any, on the dependent variable (Fellows and Liu, 1997; Creswell, 2003). However, this method may pose significant problems for research which relates to the amount of control over the variables. Fellow and Liu (1997) argued that society is dynamic and the number of variables operating is vast, making it difficult to hold constantly all the extraneous factors influencing the outcomes of the experiment.

In the context of this research, there is very limited control over the research environment, that is to say, the case projects within the client organisation which are being surveyed. The implementation of the experimentation research strategy will not produce the results as designed and is therefore inappropriate to be adopted for this research.

5.2.2.3 Survey research

The survey research approach builds on previous work which has already developed principles, laws and theories that help to decide the data requirements of the particular research project (Fellows and Liu, 1997) and is one of the foremost means of social investigation (Czaja and Blair, 1996). Survey research includes cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection, with the aim of generalising from a sample to a population (Babbie, 1990; Creswell, 2003). Although it also has limitations such as low response rates for questionnaire surveys and the risk of bias, this strategy offers the opportunity to explore a broad range of issues such as strategic decisions made by construction clients at various project stages and the identification of client satisfaction measurement criteria needed for this research.

In this study therefore, the survey research design was adopted to provide a quantitative or numeric description of trends, attitudes, or opinions of the population (construction clients) by studying a sample (respondents of the survey) of that population (Creswell, 2003). A cross-sectional questionnaire survey of construction clients was adopted with the unit of analysis as a construction project. The questionnaire was designed to elicit information about a construction project (referred to as a Case Project) in respect of the characteristics of client/project, client perceptions on importance/effectiveness of strategic decisions made by clients and importance/performance of service quality provided by service providers including consultants and contractors.

5.2.3 Combined research design

Although each research method represents a fundamentally different inquiry paradigm, qualitative and quantitative research can be effectively combined in the same research project (Strauss and Corbin, 1990; Patton, 1990). This combined design gave insights that neither type of analysis could provide alone (Russek and Weinberg , 1993).

In the context of this research, client characteristics-related data collected can only be measured and analysed qualitatively and data concerning client strategic decisions and service quality will be capable of being quantified. A combination of qualitative and quantitative research methods was therefore chosen to address the research questions (refer to Chapter 1). This approach was employed in response to a need to clarify the intent of mixing qualitative and quantitative data in a complex study and to meet the need to help a researcher to create understandable designs out of complex data and analyses (Root *et al,* 1997; Creswell, 2003; Tashakkori and Teddie, 2003).

5.3 DATA COLLECTION AND QUESTIONNAIRE DESIGN

Data collection for this research was divided into two phases. The first phase (refer to Chapter 3), involved primarily a desk study, combined with case studies which have been reported in a published paper (Cheng *et al.,* 2006), was designed to collect preliminary data for measurement criteria of service quality and client satisfaction and to identify potential clients who would take part in the second phase (the major survey) of the data collection process.

The case study was conducted based on the results of a UK-wide client satisfaction survey and follow-up interviews measuring the performance of a large engineering and management consultancy organisation whom they employed. The questionnaire was designed as a research instrument to examine the levels of client satisfaction as perceived by clients on the basis of consultant performance using a series of satisfaction determinants, as developed in earlier satisfaction assessment models (Parasuraman *et al*, 1985; Soetanto and Proverbs, 2004; EFQM, 2005). Analyses results indicated that key attributes of service quality for consultants as a service provider including technical accuracy; overall quality of services and people of service providers, are identified as the main measurement criteria of client satisfaction (see Cheng *et al.,* 2006). Clients also consider effective communications with their service providers as being most important in determining their satisfaction levels. Furthermore, it is revealed that clients' strategic decisions and the overall performance of consultants in those key areas make a significant contribution towards client satisfaction.

During this first phase, key service providers in the UK construction industry, for example, large construction/engineering consultants and contractors whose clients cover almost all sectors of the construction industry, are studied (refer to Chapter 3). This is to explore those key service providers' approaches to the measurement of service quality and client satisfaction and identify the criteria of measurement.

Based on the data collected, a conceptual model was developed which identified the criteria for the assessment of client satisfaction and the interrelationship between strategic decisions and client satisfaction (refer to Chapter 4). The developed conceptual model provided the basis of rationale that further data are to be collected to refine and test the model, and the research instrument design of the second phase of data collection sought to help achieve this purpose.

The second phase of data collection involved an in-depth semi-structured questionnaire in order to collect the data needed to develop, refine and further test this model. The questionnaire was designed to address the following principal research questions:

- What are the strategic decisions which clients have to make across the project life cycle?
- What is the definition of satisfaction in the context of construction projects?
- How client satisfaction levels are measured and what the criteria of measurement are?
- Are client satisfaction levels dependent on project stages?
- What impact do strategic decisions have on client's satisfaction levels?
- What is the correlation between strategic decisions and client satisfaction?

In order to obtain reliable industry feedback in the context of investigating factors influencing client satisfaction, a UK-wide questionnaire survey of construction clients from both public and private sectors was conducted. A semi-structured format was adopted to enable flexibility in questionnaire design, and to avoid monotony and make the questionnaire more interesting for respondents (Babbie, 1990). The majority of questions, however, consist of close ended questions with ordinal scales so as to make the questionnaire as easy to complete as possible (Yammarino *et al*., 1991).

A random sampling technique was adopted to reduce the likelihood for bias, as with this technique, each sample is chosen entirely by chance and each member of the population has a known chance of being included in the sample (Yates *et al*, 2003). Compared to the first phase data collection, this major survey targeted a large random sample of clients. The sampling of the main survey included clients from all construction sectors including building, infrastructure, energy and utilities (see detailed explanation in Section 5.5).

5.3.1 Questionnaire design

The questionnaire for this research was designed to be 'respondent-friendly' in order to maximise the response rate, which is widely recognised as being particularly low in the area of construction management research (Andrea *et al*., 1996; Xiao, 2002). It is well known that proper questionnaire design is vital for successful data collection (Babbie, 1992; Fellows and Lui, 1997; Creswell, 2003).

As indicated earlier, the unit of analysis in this research is the Case Project. In order to obtain all the data required to address the research hypotheses, information on already completed projects was required. The questionnaire was therefore developed with an invitation to participants to use their most recently completed construction project as the reference (the Case Project) for responding to the survey. Collecting data from most recently completed projects was intended to result in a more complete set of data and enable a reasonably accurate assessment of performance to be made especially as some of the performance measures are output based and retrospective (Dainty *et al*., 2003).

Furthermore, it was hoped that respondents would find it relatively easier to recall their experiences and memories on most recently completed projects. This approach would also minimise the potential data distortions (Borman, 1978; Tsui and Ohlott, 1988). Questions were therefore directed towards unearthing facts and views of respondents about their case projects. The questionnaire survey was designed primarily to elicit information on strategic decisions made by clients and their levels of satisfaction primarily related to service quality so that relationships between strategic decisions and client satisfaction could be explored using appropriate statistical techniques.

The questionnaire (refer to Appendix) was divided into three main sections, namely,
(1). Client characteristics,
(2). Client strategic decisions and
(3). Service quality provided by service providers (including consultants and contractors).

Each section contained a series of interrelated questions. Each question required the respondent to provide a score against two categories, the importance of the issue to the client and, the effectiveness (in the case of strategic decisions made by the client) or the performance (in the case of perception on services quality provided by service providers including consultants and contractors). This approach was adopted from studies undertaken by Martilla and James (1977) and Soetanto *et al* (2001), using average satisfaction scores and importance-performance analysis. This approach is well documented and has been applied to a diverse range of contexts, including banking (Ennew *et al*., 1993), health care (Dolinsky & Caputo, 1991) and construction (Soetanto *et al.,* 2001; Cheng *et al*, 2006). It has also shown the capability to provide valuable information for both satisfaction measurement and the efficient allocation of resources, all in an easily applicable format (Wade and Eagles, 2003).

Average satisfaction represents the discrepancy between perceived levels of performance (P) and importance (I), that is, the subtraction of I from P (P - I). The value of average satisfaction may be positive (indicating high levels of satisfaction but possibly excessive effort), zero (indicating optimally satisfied) and negative (indicating dissatisfaction) (Cheng *et al*, 2006). The analysis of importance and performance, as well as the subsequent measures calculated, provides a sound basis for the development of industry-wide performance assessment.

The first section of the questionnaire concerned general personal information about the respondent (without identification information due to confidentiality), details of the client organisation and information about the most recently completed construction project on which they had direct operational involvement. This section was based on the findings of the literature review and desk studies in respect of client characteristics which have a significant impact on client strategic decisions and their satisfaction (refer to Chapter 2). Table 5.1 shows the dimensions of client characteristics and performance measures derived from the literature and desk studies and included in the questionnaire.

In exploring the various aspects of client characteristics, this section intended to provide data for contextualising and categorising the various factors being identified which are viewed to have a significant impact on strategic decisions and client satisfaction.

Table 5.1 Dimension of client characteristics

Dimensions of Client Characteristics	Criteria of Measurement
Years in construction	1. <5 years; 2. 5-10 years; 3. 11-20 years; 4. >20 year
Years in the organisation	1. <5 years; 2. 5-10 years; 3. 11-20 years; 4. >20 year
Vocational background	1. Architect; 2. Designer/Engineer; 3. Quantity Surveyor; 4. Project Manager; 5. Others
Position in the organisation	1. Director/senior; 2. Manager/medium; 3. Engineer/low
Managerial role	1. Decision-approvers (e.g. main board members) ; 2. Decision-takers (e.g. senior managers) ; 3. Decision-shapers (e.g. expert focus group) ; 4. Decision-influencers (e.g. internal/external people who influence)
Type of organisation	1. Private sector; 2. Central government; 3. Local government; 4. Other public sector; 5. Others
Number of employees	1. < 10; 2. 11-50; 3. 51-249; 4. 250-500; 5. >500
Sector mainly procure in	1. Building; 2. Infrastructure; 3. Energy; 4. Utilities; 5. Others
Number of similar projects	1. 0; 2. 1-2; 3. 3-5; 4. >5
Type of projects	1. Building; 2. Infrastructure; 3. Energy; 4. Utilities; 5. Others
Procurement route	1. Traditional; 2. Design & Build; 3. PPP/PFI; 4. Management Contract; 5. Others

Dimensions of Client Characteristics	Criteria of Measurement
Type of contract	1. JCT; 2. ICE; 3. GC works; 4. NEC; 5. Others
Contract value comparison	1. Original value < Outturn value; 2. Original value = Outturn value; 3. Original value > Outturn value
Contract duration comparison	1. Original value < Outturn value; 2. Original value = Outturn value; 3. Original value > Outturn value

The second section requested details about strategic decisions made by clients across the project life cycle. That is to say, from pre-design to disposal stage. Table 5.2 shows the specific indicators assessed at various project stages and included in the survey questionnaire. These indicators were chosen in accordance with the RIBA plan of work (RIBA, 2004; Cheng and Proverbs, 2004) and the theory of task performance that posits that measures of performance must reflect the desired goals/objectives (Ankrah, 2007). By identifying strategic issues which need to be considered by clients in different project stages, it is possible to identify specific strategic decisions made by clients as indicators which then form the basis of the questions in this section of the questionnaire.

Table 5.2 Dimensions of strategic decisions

Dimensions of Strategic Decisions	Criteria of Measurement
At Pre-design Stage	
How important and effective are these decisions to your project/business?	
Decision of "Build/No build" after the project appraisal	Importance (1~5);Effectiveness (1~5)
Probable procurement method after decision of "Build"	Importance (1~5);Effectiveness (1~5)
Organisational structure	Importance (1~5);Effectiveness (1~5)
Work procedures	Importance (1~5);Effectiveness (1~5)
Consultants to be engaged	Importance (1~5);Effectiveness (1~5)
Other service providers to be engaged	Importance (1~5);Effectiveness (1~5)
Outline of project	Importance (1~5);Effectiveness (1~5)
Estimated costs	Importance (1~5);Effectiveness (1~5)
Review of procurement route	Importance (1~5);Effectiveness (1~5)
Details of project	Importance (1~5);Effectiveness (1~5)
Full development control approval	Importance (1~5);Effectiveness (1~5)
Co-ordination of elements of the project	Importance (1~5);Effectiveness (1~5)

Dimensions of Strategic Decisions	Criteria of Measurement
Any other strategic decisions you have to make at this stage?	Importance (1~5);Effectiveness (1~5)
The decision-making mechanism and process	Importance (1~5);Effectiveness (1~5)
The objectives of your decisions	Importance (1~5);Effectiveness (1~5)
The service provider's understanding of your needs/business	Importance (1~5);Effectiveness (1~5)
The service provider's responses to your decisions/needs	Importance (1~5);Effectiveness (1~5)
At Design Stage	
How important and effective are these decisions to your project/business?	
Information sufficient to obtain tenders	Importance (1~5);Effectiveness (1~5)
Balance required under the building contract	Importance (1~5);Effectiveness (1~5)
Any other strategic decisions you have to make at this stage?	Importance (1~5);Effectiveness (1~5)
The decision-making mechanism and process	Importance (1~5);Effectiveness (1~5)
The objectives of your decisions	Importance (1~5);Effectiveness (1~5)
The service provider's understanding of your needs/business	Importance (1~5);Effectiveness (1~5)
The service provider's responses to your decisions/needs	Importance (1~5);Effectiveness (1~5)
At Tender Stage	
How important and effective are these decisions to your project/business?	
Documentation required for tenders	Importance (1~5);Effectiveness (1~5)
Identification and evaluation of potential contractors	Importance (1~5);Effectiveness (1~5)
Appointing the contractor	Importance (1~5);Effectiveness (1~5)
Arranging site handover to the contractor	Importance (1~5);Effectiveness (1~5)
Any other strategic decisions you have to make at this stage?	Importance (1~5);Effectiveness (1~5)
The decision-making mechanism and process	Importance (1~5);Effectiveness (1~5)
The objectives of your decisions	Importance (1~5);Effectiveness (1~5)
The service provider's understanding of your needs/business	Importance (1~5);Effectiveness (1~5)
The service provider's responses to your decisions/needs	Importance (1~5);Effectiveness (1~5)
Criteria of choosing a contractor/consultant at this stage?	
Their reputation	Importance (1~5);Effectiveness (1~5)
Knowledge of your sector	Importance (1~5);Effectiveness (1~5)
Knowledge of your business	Importance (1~5);Effectiveness (1~5)
Delivering value for money	Importance (1~5);Effectiveness (1~5)
Their business/office location	Importance (1~5);Effectiveness (1~5)
Producing the most competitive bid	Importance (1~5);Effectiveness (1~5)
Specialisation	Importance (1~5);Effectiveness (1~5)
Innovation	Importance (1~5);Effectiveness (1~5)
Others (Please specify)	Importance (1~5);Effectiveness (1~5)
At Construction Stage	
How important and effective are these decisions to your project/business?	
Cost management strategy	Importance (1~5);Effectiveness (1~5)
People strategy	Importance (1~5);Effectiveness (1~5)

Dimensions of Strategic Decisions	Criteria of Measurement
Settling the final account	Importance (1~5);Effectiveness (1~5)
Any other strategic decisions you have to make at this stage?	Importance (1~5);Effectiveness (1~5)
The decision-making mechanism and process	Importance (1~5);Effectiveness (1~5)
The objectives of your decisions	Importance (1~5);Effectiveness (1~5)
The service provider's understanding of your needs/business	Importance (1~5);Effectiveness (1~5)
The service provider's responses to your decisions/needs	Importance (1~5);Effectiveness (1~5)
At Occupancy & Maintenance Stage	
How important and effective are these decisions to your project/business?	
Life cycle costing	Importance (1~5);Effectiveness (1~5)
Maintenance strategy	Importance (1~5);Effectiveness (1~5)
Any other strategic decisions you have to make at this stage?	Importance (1~5);Effectiveness (1~5)
The decision-making mechanism and process	Importance (1~5);Effectiveness (1~5)
The objectives of your decisions	Importance (1~5);Effectiveness (1~5)
The service provider's understanding of your needs/business	Importance (1~5);Effectiveness (1~5)
The service provider's responses to your decisions/needs	Importance (1~5);Effectiveness (1~5)
At Disposal Stage	
How important and effective are these decisions to your project/business?	
Demolition of project	Importance (1~5);Effectiveness (1~5)
Transfer of project	Importance (1~5);Effectiveness (1~5)
Any other strategic decisions you have to make at this stage?	Importance (1~5);Effectiveness (1~5)
The decision-making mechanism and process	Importance (1~5);Effectiveness (1~5)
The objectives of your decisions	Importance (1~5);Effectiveness (1~5)
The service provider's understanding of your needs/business	Importance (1~5);Effectiveness (1~5)
The service provider's responses to your decisions/needs	Importance (1~5);Effectiveness (1~5)

In the analysis of the relationships between strategic decisions and client satisfaction, measures of client satisfaction will be considered as the dependent variables, which are to be considered as being correlated with strategic decisions, that is to say, the independent variables.

The final section of the questionnaire requested respondents' perceived service delivery/quality provided by their service providers including consultants and contractors. The questions addressed the key dimensions of service quality identified in the literature review and data collected via desk study. This section consists of three sub-sections, namely, service delivery, quality of service providers' people (Parasuraman *et al*., 1988; EFQM, 2002) and communications with clients based on the identified criteria of measurement (Higgin and Jessop, 1965; Tavistock, 1966; O'Brien and Al-Soufi, 1994; Gorse and Emmitt, 2004; Dainty *et al,* 2006). Table 5.3 presents the key dimensions of service delivery/quality, as used in the questionnaire.

Table 5.3 Dimension of service delivery and quality

Dimensions of Service Delivery/Quality	Criteria of Measurement
About Service Delivery	
Overall quality of service delivery and advice	Importance (1~5);Performance (1~5)
Comparing with other service providers you use	Importance (1~5);Performance (1~5)
Understanding your needs and business	Importance (1~5);Performance (1~5)
Problem solving	Importance (1~5);Performance (1~5)
Speed of response	Importance (1~5);Performance (1~5)
Technical accuracy	Importance (1~5);Performance (1~5)
Innovation in methods and approach	Importance (1~5);Performance (1~5)
Meeting your expectations	Importance (1~5);Performance (1~5)
Health and safety awareness	Importance (1~5);Performance (1~5)
Delivering value for money	Importance (1~5);Performance (1~5)
About People of Service Providers	
Qualification of people	Importance (1~5);Performance (1~5)
Professional experience of people	Importance (1~5);Performance (1~5)
Providing right level of staffing	Importance (1~5);Performance (1~5)
Level of commitment team/central management	Importance (1~5);Performance (1~5)
Working with your staff and other consultants	Importance (1~5);Performance (1~5)
Friendliness	Importance (1~5);Performance (1~5)
Accessibility	Importance (1~5);Performance (1~5)
About Communications with Client	
Quality and timing of reports produced to you	Importance (1~5);Performance (1~5)
Regular dialogue on progress of the project with you	Importance (1~5);Performance (1~5)
Regular dialogue to establish dynamics of your business	Importance (1~5);Performance (1~5)
Good at listening	Importance (1~5);Performance (1~5)
Informing you on business issues which may affect you	Importance (1~5);Performance (1~5)
Regular mailings advising you of latest news/information	Importance (1~5);Performance (1~5)
Quality/usefulness of corporate entertainment	Importance (1~5);Performance (1~5)
Quality/use of the service provider's corporate literature	Importance (1~5);Performance (1~5)
Quality/use of the service provider's website/intranet	Importance (1~5);Performance (1~5)
Making you understand of the service provider's capability	Importance (1~5);Performance (1~5)
The service provider's overall performance on service quality?	Importance (1~5);Performance (1~5)

Indices will be developed for the data collected in each dimension of service delivery integrating all aspects of the concept of service quality related to client satisfaction. These indices will then be employed as measures of service quality and used as the independent variables in the statistical analysis of the relationships between service quality and client satisfaction.

Questions were deliberately designed to include both close ended and open ended questions, and measurements also include the range of nominal, ordinal, and scale measurements (Tabachnick and Fiddell, 2001; Pallant, 2005). This variety was to provide flexibility in questionnaire design, and to avoid monotony and make the questionnaire more interesting for respondents as suggested by Babbie (1990).

The majority of questions, however, consisted of close ended questions with ordinal scales so as to make the questionnaire as easy to complete as possible. The layout and format of the questionnaire was also given careful consideration to maximise response and to ensure that respondents did not inadvertently miss questions (Yu and Cooper, 1983; Yammarino *et al.*, 1991). Brief but accurate instructions were provided at the beginning of each section of the questionnaire as guidance notes for respondents.

5.3.2 Questionnaire scaling

The scale is composed of a set of attitudinal items intended to capture empirically the meaning of subjects to be measured. Uni-dimensional scaling techniques are used broadly in those disciplines that study attitudes, preferences and perceptions (McIver and Carmines, 1981). In the context of this research, the subjects to be measured are clients' perceptions on the performance of their service providers and service quality being provided and the effectiveness of their own strategic decisions.

A five-point Likert scale from one (indicating the least effective/worst performance or least important) to five (indicating the most effective/best performance or most important) was adopted to measure respondents' attitude to the questions. The 5-point Likert scale is simple to construct, likely to produce a highly reliable scale and commonly employed in the research field (Dawis, 1987; Bernard, 2000).

The questionnaire was designed as a research instrument to examine the impact of strategic decisions on client satisfaction within which factors influencing satisfaction levels were investigated, as developed in earlier satisfaction assessment models (Parasuraman *et al*, 1988; Soetanto and Proverbs, 2004; EFQM, 2005; Cheng *et al*, 2006). The performance criteria of consultants and contractors were defined as those used to measure the overall performance of the services based on the views of clients. The criteria were developed on the basis of various satisfaction measurement models supported by a literature review in the domain of performance and client satisfaction measurement (refer to Chapter 3). Once developed, the questionnaire was ready for testing by means of a pilot survey.

5.4 THE PILOT SURVEY

In order to evaluate the clarity and comprehensiveness of the questionnaire, as well as the feasibility of the survey as a whole, a pilot survey was conducted. In a pilot survey, a small, but representative sample of respondents are asked to complete the survey to find out their views while answering the questions (Fowler, 1995). As argued by researchers such as Munn and Drever (1990), such test run surveys are necessary to demonstrate the methodological rigour of a survey.

Pilot surveys also provide the opportunity to identify any problems with the design of the instrument including the use of terms or phrases, the design of particular questions, and to verify that different respondents are interpreting the questions in the same way (Dillman, 1978; Fowler, 1995). Researchers can also test questions for bias by asking respondents to guess what the researchers are predicting or expecting the survey results to show. If substantially more respondents than would be expected by random chance can guess the researchers' hypothesis, it is highly likely that the survey contains biased or leading questions (*ibid*). On the basis of the above, a feedback sheet (refer to Table 5.4) was designed to be attached to the questionnaire for completion by the pilot survey respondents.

The sample used in the pilot survey was drawn at random from both the Municipal Year Book (MYB) (2006) which consists of all UK public sector clients including local governments (councils) and central government departments, and the UK Top 100 client published in the Building magazine (Building, 2005), which represents the majority of the private sector clients.

Table 5.4 Pilot survey feedback sheet

Subject of Feedback	Description
What do you think about the time you took to complete the questionnaire?	1.Just about right; 2. Too short; 3.Too long; 4. Not sure
Are most of the questions easy to understand?	1.Yes; 2. No (please specify).
Is there any question causing confusion and hence difficult to answer?	1.No; 2.Yes (please specify).
Is the design of the questionnaire suitable to be completed on-screen?	1.Yes; 2. No (please specify).
Which type of questionnaire survey do you prefer to respond?	1.Hardcopy; 2.Via email; 3.On-line; 4.Other (please specify)
Any other comment you have about the questionnaire?	please specify

5.4.1 Pilot survey respondents' characteristics

A total of 50 clients were included in the survey, of which six were returned, representing a response rate of 12%. Table 5.5 illustrates the characteristics of the respondents.

The results show that four client individuals (out of six) have more than 20 years experience in the construction industry, and all of them hold medium or senior positions in their organisations. Five out of the six respondents are decision-takers or approvers, indicating a majority of the clients (respondents) are experienced construction professionals who understand their organisations' decision-making mechanism and process, for example, half of the clients (respondents) have worked in their current organisations for more than 10 years.

Table 5.5 Characteristics of pilot survey respondents

Dimensions of Client Characteristics	Criteria of Measurement	Nos of Respondents
Years in construction	< 5 years	0
	5-10 years	0
	11-20 years	2
	>20 years	4
Years in organisation	< 5 years	1
	5-10 years	2
	11-20 years	2
	>20 years	1
Vocational background	Architect	2
	Designer/Engineer	1
	Quantity Surveyor	2
	Project Manager	1
	Others	0
Position in organisation	Senior (Directors)	4
	Medium (Managers)	2
	Low (Engineers)	0
Managerial role in decision-making	Decision-approvers	1
	Decision-takers	4
	Decision-shapers	1
	Decision-influencers	0

5.4.2 Impact of pilot survey analysis

The analysis of data collected from the pilot survey resulted in a review of the questionnaire and necessary revisions to make it more suitable for the purpose of the major survey. According to the feedback provided by respondents, the average time taken to complete the questionnaire was approximately 25-30 minutes, which seemed to be rather too long for an academic research survey. Targeted respondents of this research (construction clients) are mostly executives and managers, to whom time is of the essence. Thus to limit the length of the questionnaire where possible is of great importance to encourage the respondent to complete the survey and increase the response rate (Goyder, 1982). It was therefore considered necessary to reduce the overall number of questions in the questionnaire to make it more appropriate and quicker to complete (Fowler, 1995).

Five particular questions were removed to avoid undue repetition, as respondents gave feedback that the questions were repeated at every stage and were not really appropriate to some of the stages.

The wording of a few questions was fine-tuned based on feedback from respondents suggesting some ambiguity. Having satisfied the requirement to pre-test the questionnaire (Munn and Drever, 1990; Fowler, 1995; Czaja and Blair, 1996) and having completed the revisions, the questionnaire was deemed ready for deployment in the main survey.

5.5 SAMPLING AND THE MAJOR QUESTIONNAIRE SURVEY

The goal of all surveys is to enable the researcher to predict accurately the characteristics or thoughts of a predefined group of people (Salant and Dillman, 1994). It sometimes makes sense to attempt to survey the entire population of interest, for example, when this population is small. However, in the great majority of cases, surveying the entire population is impractical and unnecessary. A relatively small sample or subset of a population, if chosen wisely, can yield highly accurate predictions. Sampling is therefore necessary because of the constraints of time and cost (Henry, 1990; Babbie, 1990).

5.5.1 Sampling frame and size

In order to choose a sample, a list of people (the sampling frame) from which a sample can be drawn must be found or constructed. The sampling frame that was adopted for the selection of the sample was the list of construction clients from both the public and private sectors. Each questionnaire was sent to a named individual in a client organisation so as to increase the probability of responses.

In this study, the target population is UK construction clients (as defined in Chapter 3) from both public and private sectors. Public sector clients, the largest client group in the UK construction industry, were chosen from the Municipal Year Book (MYB) (2006) which consists of all UK local councils, central government departments and other public bodies. Private sector clients were selected from the UK Top 100 client list of the Building magazine (Building, 2005), which represents a majority of the UK's private sector construction clients in terms of output.

The exact population size in many surveys, for example, the number of construction clients in this research, is often unknown. The mathematics of probability proves the size of the population is irrelevant and can be ignored when it is "large" or unknown (Survey System, 2004). Population size is only likely to be a factor when works with a relatively small and known group. This means that a sample of 500 is equally useful in examining the opinions of a population of 15,000,000 as it would a population of 100,000 (ibid).

Nevertheless, there is not a simple rule of thumb for determining sample size (Goyder, 2004). The question of how large a sample to draw depends on how a researcher answers the following two questions:

1) How much sampling error is acceptable?
2) How much variation is there in the population on answers to the most important survey question?

The answer to the first question partly depends on the available resources: every increase in sample size will increase accuracy, but will also increase the amount of time and cost necessary to complete the project. This trade-off between accuracy and cost is unavoidable. The answer also depends on the consequences associated with making an error. As the population variances are not possible to be precisely known, the answer to the second question can only be estimated. This estimate might come from a literature review of similar studies or from the results of a survey pre-test (Doyle, 2004).

Once these questions are resolved, the necessary sample size – n, can be calculated from the following formula (ibid):

$$n = (SD)^2 / (SE)^2,$$

where,

SD - estimated standard deviation (the square root of the mean squared error) of the variable in the population.

SE - size of the acceptable standard error (the standard deviation of the set of all possible sample means).

A confidence level of 95% was assumed as in most commonly adopted approaches (Munn and Drever, 1990; Creative Research Systems, 2003). The phrase "95% confident" means that the sample mean will fall within a range of two standard errors at 95% of the time.

Czaja and Blair (1996) and Creative Research Systems (2003) further recommended the following formula to determine a suitable size of the sample:

$$ss = \frac{z^2 \times p(1-p)}{c^2}$$

Where:

ss = sample size

z = z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal

c = confidence interval, expressed as decimal

For a 95% confidence level, that is to say, significance level of $\alpha = 0.05$, z value is 1.96. Confidence interval (c) is the plus-or-minus figure that gives an estimated range of values which is likely to include an unknown population and represents how uncertain we are about the population. It is an interval in which a measurement falls corresponding to a given probability (confidence level at 95%). The 95% level is adopted in most academic publications, where a theory usually has to have at least a 95% chance of being true to be considered worth telling people about. In the business world if something has a 90% chance of being true (probability =0.1), it can not be considered proven, but it is probably better to act as if it were true rather than false. A confidence interval (c) of 12% was deemed acceptable and assumed for this research (Survey System, 2004).

When determining the sample size for a given level of accuracy, the worst case percentage picking a choice (*p*) should be assumed, that is to say, it is given as 50% or 0.5. Based on these assumptions, the sample size was computed as follows:

$$ss = \frac{1.96^2 \times 0.5\,(1 - 0.5)}{0.12^2}$$
$$= 67$$

Furthermore, the UK construction industry is notoriously known for poor responses to questionnaire surveys. Although a 20 – 30% of response rate is believed to be the norm (Takim *et al.*, 2004), it is not unusual to report a response rate in the region of 9% -15% for comprehensive questionnaires (Soetanto *et al,* 2001; Sutrisna, 2004). For this reason it was necessary to adjust the sample size to account for non-response. Considering the comprehensive nature of the questionnaire for this research, a conservative response rate of 11% was assumed. The appropriate sample size to be surveyed was calculated as follows:

$$sss = ss / rr$$
$$= 67 / 11\%$$
$$= 609$$

Where:

sss = survey sample size

ss = sample size

rr = response rate (%)

Previous research has shown that the only effective way to achieve survey response rates of 50% or higher is to make repeated, personalized attempts to contact and encourage potential respondents to participate (Doyle, 2004). It is therefore critically important to develop a realistic implementation plan that takes these costs and delays into account.

5.5.2 Major survey and response rate

The questionnaire survey was accompanied by a "cover letter" which briefly introduced the study and explained why it was important and useful. The letter also included aspects which are known to be important for encouraging people to respond:

(a) A promise that the respondent's answers will be kept confidential;

(b) A statement that describes why their responses, specifically, are necessary for the success of the study; and

(c) An accurate estimate of the time it will take to complete the survey (which should generally be no more than 10-15 minutes) (Salant and Dillman, 1994).

Essential steps were followed in administering the survey to encourage a good response, as suggested by Yammarino *et al* (1991) and Doyle (2004), that personalisation and repeat contact can increase response rates. In that sense, each questionnaire was sent to a named individual in a client organisation in order to form a personalised style of contact. This also means to contact respondents in the form of pre-contact, or through follow-up mailings (Goyder, 1982).

The first mailing involved an introductory letter informing targeted respondents that they will be asked to participate in a survey and explaining the research project. Then the second mailing was sent out including a cover letter, the survey questionnaire and a stamped return envelope (Creswell, 2003).

Considering the confidentiality of the questions and the comprehensive nature of the research instrument, the name of individuals, projects and any other project participants were not requested. However, respondents were given the opportunity to provide their contact details on a separate slip if they were interested in the research project and wanted to be kept updated on the future development of the research.

The questionnaire was professionally presented and addressed for the personal attention of a named individual. Three weeks later a follow-up mailing, including another copy of the survey, was sent to those people who had not yet responded to the survey.

A total of 600 questionnaires were distributed to randomly selected clients as sourced from the MYB (2006) and the Building magazine's (2005) Top 100 clients list. 66 valid responses were received, representing a response rate of 11%. This was considered acceptable given the sensitivity of the data subject involved in the research. An overall response rate of 11.1% was achieved when this was combined with the responses from the pilot survey, as shown in Table 5.6:

Table 5.6 Response rate of the questionnaire survey

	Distribution	Response	Response rate %
Pilot	50	6	12.0
Major Survey	600	66	11.0
Overall	650	72	11.1

As previously discussed, the response rate of 11.1% obtained in this research survey appears to be on the low side compared with other surveys. However, this should be weighed against the comprehensiveness of the questionnaire which contained almost 80 questions. Indeed, lower response rates in the region of 11.6% and 14.7% have been described as the "norm" for comprehensive questionnaires (Soetanto *et al.*, 2001) and Sutrisna (2004) even reported a response rate of 8.82%. Only fully completed questionnaires were counted and included in the subsequent data analysis process.

5.5.3 Margin of error

The margin of error is a statistic expressing the amount of random sampling error in a survey's results. Sampling error can not be avoided, however, it can be reduced by obtaining a sample of sufficient size (Goyder, 2004). It is widely recognised that for inferential statistical analysis to be undertaken, a large sample is required. It is also generally accepted that as a rule of thumb, any sample with size greater than the threshold of 30 ($n > 30$) should be considered as a large sample (Munn and Drever, 1990; Sutrisna, 2004). Therefore the sample size of 72 obtained in total in this survey was considered adequate for the purpose of inferential statistical analysis.

The margin of error is a measurement of the accuracy of the results of a survey. When the margin of error based on all the responses was computed (refer to the Appendix), an estimate of 12.06% margin of error due to sampling was obtained at 95% confidence level. This can be interpreted as that there is a 95% probability that results obtained from this survey lie within a ± 12.06% range, which falls into the standard error range and was therefore considered acceptable (Survey System, 2004).

5.5.4 Respondent profile

Of the respondents (construction clients), 77% represented public sector clients including central governments, local governments and other public sectors and 20% were from the private sector, as shown in Figure 5.1.

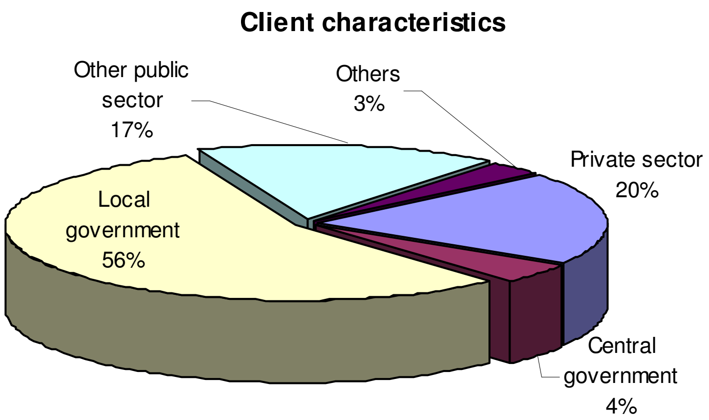


Figure 5.1 Profile of respondents' characteristics

Designations of respondents in their organisations reported mainly included senior directors and managers and their roles were considered to be decision-approvers and decision-takers among others, demonstrating that the respondents are in the position to provide the information requested and suitable for responding to the questionnaire and that the information collected via the survey would be reliable. Details of these characteristics are reported in Chapter 6.

5.6 DATA ANALYSIS AND MODELLING

The Statistical Package for the Social Sciences (SPSS) application software was employed as the principal tool to analyse the data collected from the major survey. Data analysis involved using statistical tools including correlation analysis and multiple regression techniques to provide the basis for model development. Correlation analysis was adopted to identify the relationship between strategic decisions and client satisfaction, whereas the multiple regression technique was used to explore the predictive ability of the independent variables, that is to say, strategic decisions, on the dependent measure of client satisfaction.

Where relationships were found to exist between strategic decisions and client satisfaction, the multiple regression technique was used to develop a predictive model(s) depicting the nature and extent to which client strategic decisions influence their levels of satisfaction. This will form the basis for identifying key decision attributes which lead to good performance and ultimately improved client satisfaction.

The continuation of the modelling process also involved validating the model focusing on predicting client satisfaction levels and the impact of strategic decisions using a hold back sample obtained from the major survey.

5.6.1 Data screening and preliminary analyses

The responses received from participants inevitably contained some missing data. LoPresti (1998) reported it was the exceptional study that has no missing data. Missing data can be problematic in analysis and occurs for many reasons. Analysis of missing data is required to improve the validity of the study in reputable research (*ibid*). It is worth to investigate and resolve the missing data problem so as to collate a valid data set which aims to include all the data collected for the analysis.

The SPSS V12.0 was used to analyse the patterns of missing data by using the Missing Values Analysis option (refer to the Appendix). According to Hair *et al.* (1998), where missing data levels were not excessively high (in the order of 50% or less), cases and variables should not be excluded from analysis. The Replace Missing

Values involved the replacing of missing values with the mean of all valid responses and was adopted where appropriate. This approach is one of the most widely used (Xiao, 2002) and is considered as the best single replacement value (Hair *et al.*, 1998) as it is easy to calculate and effect the replacement.

Further editing of the data was also required to organise it in a format suitable for analysis, for example, nominal or ordinal. A set of data is said to be nominal if the values / observations belonging to it can be assigned a code in the form of a number where the numbers are simply labels. Nominal data can be counted but not ordered or measured. For example, data on client characteristics are set as nominal, in which their background Architect set as 1, Engineer as 2 and so on.

A set of data is said to be ordinal if the values / observations belonging to it can be ranked (put in order) or have a rating scale attached. Ordinal data can be counted and ordered, but not measured. The categories for an ordinal set of data have a natural order, for example, suppose construction clients were asked to mark their perception on the service quality of their consultants and contractors and classify each aspect of service quality on a rating scale of 1 to 5, representing worst performance to best performance. A rating of 5 indicates better performance than a rating of 4, for example, so such data are ordinal. However, the distinction between neighbouring points on the scale is not necessarily always the same. For instance, the difference in performance expressed by giving a rating of 2 rather than 1 might be much less than the difference in performance expressed by giving a rating of 4 rather than 3.

5.6.2 Factor analysis

Factor analysis refers to a family of statistical techniques used extensively by researchers involved in the development and evaluation of tests and scales (Pallant, 2005). It can also be used to reduce a large number of related variables to a more manageable number, prior to application in other analyses, for example, multiple regression or multi- variance analysis of variance. Horn’s (1965) parallel analysis by using the SPSS software will be employed as a means of factor extraction which involves comparing the size of the eigenvalues with those obtained from a randomly generated data set of the same size.

In the context of this research, the factor analysis technique will be adopted to determine the smallest number of factors that can be used to best present the interrelations among variables of strategic decisions made by clients and factors of service quality provided by service providers.

5.6.3 Using multiple regression for modelling

Multiple regression is a set of techniques that can be used to explore the relationship between one continuous dependent variable and a number of independent variables or predictors and can tell how well a set of variables is able to predict a particular outcome (Tabachnick and Fiddell, 2001). In the context of this research, client satisfaction is the dependent variable (the outcome) and client strategic decisions and service quality represent the various independent variables or predictors which are able to predict levels of client satisfaction.

Multiple regression can be used to address the main types of research questions including:

- How well a set of independent variables (client strategic decisions and service quality) is able to predict a particular outcome (client satisfaction).
- Which variable in a set of variables is the best predictor of an outcome.

Standard Multiple Regression was adopted as this approach explains how much unique variance in the dependent variable each of the independent variables explained (Pallant, 2005).

Different researchers tend to give different guidelines concerning the number of cases required for multiple regression. Stevens (1996) recommended about 15 subjects per predictor (independent variable) for reliability of the model developed, whilst Tabachnick and Fiddell (2001) recommended a formula that will calculate sample size required taking into account the number of independent variables as below:

$$N = 50 + 8*m$$

Where,

N = minimum sample size required

m = number of independent variables;

In the context of this research, client strategic decisions and perception of service quality are the two main independent variables (predictors) which will be used to predict the dependent variable (client satisfaction). The minimum sample size required, according to Stevens (1996), would be:

$$\begin{aligned} N &= 15 \text{ per predictor x } 2 \text{ predictors} \\ &= 30 \text{ samples} \end{aligned}$$

Or,

according to Tabachnick and Fiddell (2001):

$$\begin{aligned} N &= 50 + 8*2 \\ &= 66 \text{ samples} \end{aligned}$$

Therefore any number of samples between 30 and 66 will be deemed sufficient and satisfactory for the purpose of data analysis and modelling in the context of this research.

5.6.4 Samples for validation

Good and Hardin (2003) specified the splitting of the samples and using one part for calibration and the other part for verification. A proportion of the data collected was selected and held back for the purposes of validation. Snee (1977) described this approach as an effective method of validation when it is not practical to collect new data to test the model due to time and cost constraints.

The proportion of samples to be held for validation appeared to be rather mixed (Xiao, 2002; Omoregie, 2006; Ankrah, 2007), varying from 9% to 25%. Picard and Berk (1990) and Good and Hardin (2003), however, recommended that between a quarter (1/4) and a third (1/3) should be set aside for validation purposes. In this research, a quarter (1/4) of the samples was therefore randomly chosen from the pool and excluded from the main analysis. The held-back samples were equivalent to 18 cases as shown in Table 5.8.

Table 5.7 Number of cases held back for validation purposes

	Questionnaires received	%
Analysed sample	54	75
Held-back sample	18	25
Total	72	100

The report of the major survey results and subsequent data analysis and modelling will be presented in the following chapters.

5.7 SUMMARY

This chapter has detailed the research approach adopted to collate the data required to satisfy the research objectives. A combined research approach consisting of both qualitative and quantitative research methods was developed. The specific research methods applied to collect data have been depicted. This research design represents a contribution to this area of research.

The methods of data collection have been presented. The design and development of the research instrument including questionnaire design, scale, sampling and piloting have been described. Data analysis and subsequent model development techniques have been depicted. Multiple regression and factor analysis techniques have been chosen as the tools of analysis. Finally, methods for validating and refining the developed model have been described.

The report of the major survey results and subsequent data analysis and modelling will be presented in the following chapters.

CHAPTER 6

THE SURVEY RESULTS AND EXPLORATORY ANALYSES

6.1 INTRODUCTION

This chapter reports the results of the major questionnaire survey conducted to collect detailed data from clients in the UK construction industry and presents an exploratory analysis of the data collected.

The analyses of results are divided into three major parts. The first part consists of the analyses of characteristics of clients as individuals, client organisations and projects (the Case Project) from which information were collected during the survey. The second part analyses the results of strategic decisions made by clients at various project stages from pre-design to disposal stages. The third part analyses the criteria for measuring client satisfaction based on the service quality provided by their service providers.

Following these exploratory analyses, a model for evaluating the interrelationship between strategic decisions and client satisfaction is outlined and will be discussed in detail in the next chapter.

6.2 RESULTS AND EXPLORATORY ANALYSES

A total of 600 questionnaires were distributed to randomly selected clients as sourced from the MYB (2006) and the Building magazine's (2005) Top 100 clients list. Sixty six (66) valid responses were received, representing a response rate of 11%. This was considered a relatively satisfactory response given the sensitivity of the information requested in the survey.

6.2.1 Client characteristics

Characteristics of the individual, the organisation and the project (the Case Project on which all provided information should be based) were collected in this part of the questionnaire.

6.2.1.1 Personal characteristics

Previous research suggests that when the survey topic is not relevant to an individual's background, this will cause non-response error (Groves *et al*, 2004). The background of the respondents is an important aspect of a survey.

Figure 6.1 shows that about 85% of the clients had more than 20 years experience in the construction industry, and only 2% had worked in the industry for less than five years, indicating the vast majority of the surveyed clients are individuals with significantly rich experience.

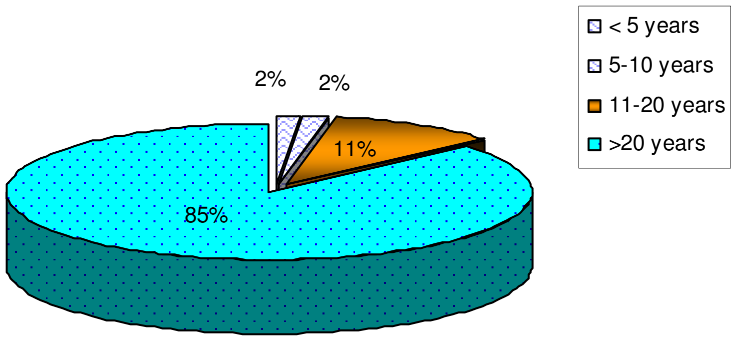


Figure 6.1 Client experience in the construction industry

More than half of the clients have worked in their current organisations for more than 10 years (refer to Figure 6.2) and about 90% hold medium and above to senior positions in their organisations (refer to Figure 6.3).

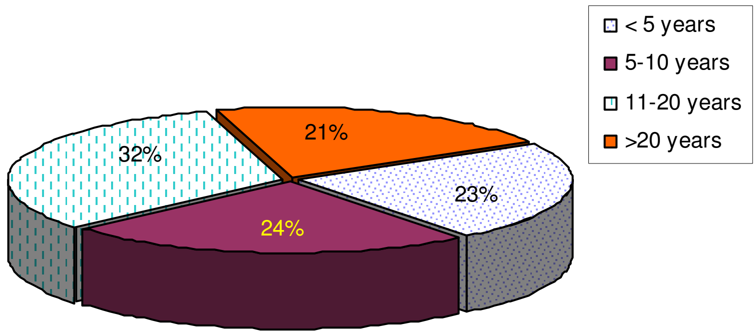


Figure 6.2 Years of clients worked for the organisation

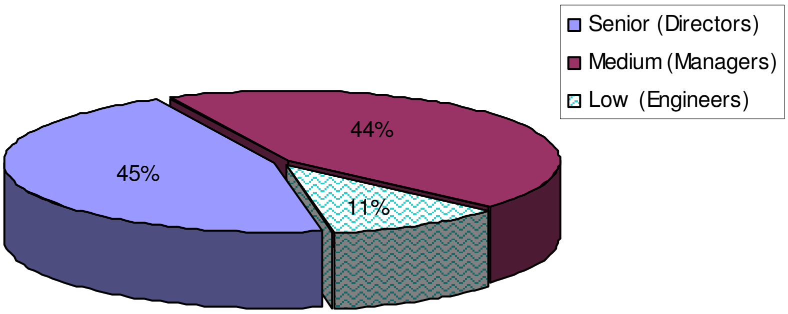


Figure 6.3 Clients' position in their organisations

In respect of clients' vocational background, 28% of respondents are from a quantity surveyor (QS) background, followed by engineers at 24% and architects and project managers at 18% respectively, indicating clients' vocational background covers almost all major disciplines involved in the construction industry (refer to Figure 6.4). This discipline will inevitably introduce bias into their decision-making process (Mintzberg *et al,* 1976; Schwenk, 1984; Dean and Sharfman 1993).

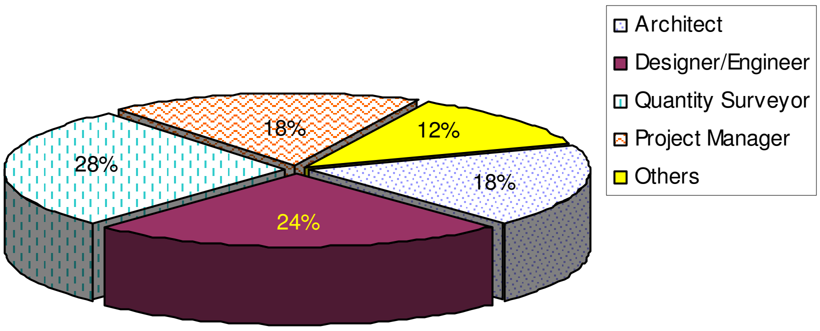


Figure 6.4 Clients' vocational background

Eighty eight per cent of respondents regard themselves as decision-takers or approvers, meaning a majority of the clients were highly experienced construction professionals who understand their organisations' decision-making mechanisms and processes with responsibilities for making strategic decisions (refer to Figure 6.5).

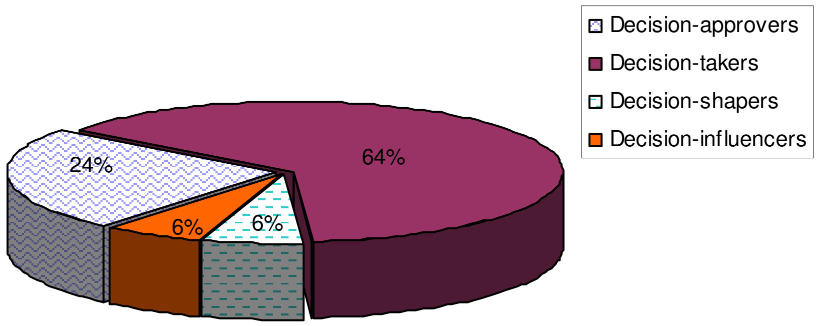


Figure 6.5 Clients' roles in decision-making

6.2.1.2 Characteristics of client organisations

Public sector clients represent 78% of the respondents including central government departments, local governments and other public sector clients, for example, universities, with private sector and other sectors clients representing the rest of the respondents. Figure 6.6 illustrates the sectors represented by the client organisations.

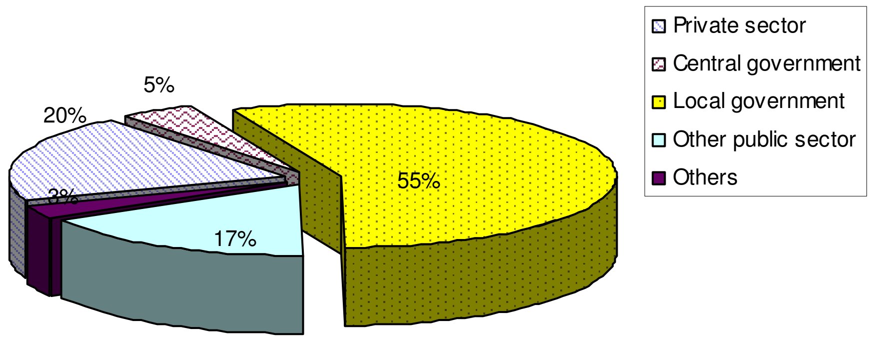


Figure 6.6 Sectors of client organisations

Amongst the respondents, more than 77% client organisations employed more than 250 staff (refer to Table 6.1), indicating a majority of clients being large organisations which have a mature management system in place and a sophisticated decision-making structure (DTI, 2006).

Table 6.1 Number of employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<10	3	4.5	4.5	4.5
	11-50	6	9.1	9.1	13.6
	51-249	6	9.1	9.1	22.7
	250-500	20	30.3	30.3	53.0
	>500	31	47.0	47.0	100.0
	Total	66	100.0	100.0	

The Buildings sector including houses, schools, hospitals and offices, is the largest sector (62%) of client procurement captured in the survey, followed by the infrastructure sector (18%) including roads and railways (refer to Table 6.2).

Table 6.2 Client procurement sectors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Building	41	62.1	62.1	62.1
	Infrastructure	12	18.2	18.2	80.3
	Energy	4	6.1	6.1	86.4
	Utilities	3	4.5	4.5	90.9
	Other	6	9.1	9.1	100.0
	Total	66	100.0	100.0	

Over 59% of clients reported they have completed more than five projects similar to the case project, indicating clients have rich experience on the projects for which information was provided (refer to Table 6.3).

Table 6.3 Number of similar projects completed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	3	4.5	4.5	4.5
	1-2	8	12.1	12.1	16.7
	3-4	16	24.2	24.2	40.9
	>5	39	59.1	59.1	100.0
	Total	66	100.0	100.0	

6.2.1.3 Details of the Case Project

Building projects (80.3%) was the predominant project type captured in the survey (refer to Table 6.4). This is in line with the results previously reported (refer to Table 6.2) that, the building sector is the largest sector in which clients procure and building projects is the main type of projects clients manage.

Table 6.4 Type of case projects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Building	53	80.3	80.3	80.3
	Infrastructure	6	9.1	9.1	89.4
	Energy	3	4.5	4.5	93.9
	Utilities	2	3.0	3.0	97.0
	Other	2	3.0	3.0	100.0
	Total	66	100.0	100.0	

Infrastructure projects represented 9% of the case projects captured. These results are in line with the construction statistics that buildings and infrastructure project are the two largest types of project in the UK construction industry and more than 65% of all new works are building projects including housing, offices and factories (DTI, 2006).

Approximately 41% of clients' projects are procured via traditional route, followed by Design & Build route of 30% (refer to Table 6.5). However, only 10% of clients procure their projects via PPP/PFI route, reflecting a lack of understanding of and clients' reluctance to partnering procurement.

Table 6.5 Procurement route of case projects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Traditional	27	40.9	40.9	40.9
	Design & build	20	30.3	30.3	71.2
	PPP/PFI	7	10.6	10.6	81.8
	Management contract	2	3.0	3.0	84.8
	Other	10	15.2	15.2	100.0
	Total	66	100.0	100.0	

More than half of the clients employed Joint Contracts Tribunal (JCT) contracts for their projects (refer to Table 6.6), reflecting the fact that they are the most common forms of building contract being used in the construction industry (Chappell, 2000) and the predominant project type being buildings as previously reported in Table 6.4.

Table 6.6 Type of contract used for case projects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	JCT	34	51.5	51.5	51.5
	ICE	7	10.6	10.6	62.1
	GC works	6	9.1	9.1	71.2
	NEC	8	12.1	12.1	83.3
	Other	11	16.7	16.7	100.0
	Total	66	100.0	100.0	

Although 53% of clients (refer to Table 6.7) reported overrun project costs and nearly half of clients experienced delayed completion (refer to Table 6.8), clients still scored a highly satisfactory 4 out of 5 for the overall quality of their projects (refer to Table 6.9).

Table 6.7 Comparison of case projects contract value

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	original < outturn/actual	35	53.0	53.0	53.0
	original = outturn/actual	25	37.9	37.9	90.9
	original > outturn/actual	6	9.1	9.1	100.0
	Total	66	100.0	100.0	

Table 6.8 Comparison of case projects contract duration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	original < outturn/actual	31	47.0	47.0	47.0
	original = outturn/actual	28	42.4	42.4	89.4
	original > outturn/actual	7	10.6	10.6	100.0
	Total	66	100.0	100.0	

The results suggest factors influencing client satisfaction are not limited to overrun costs and delays. There seems to be somewhat inconsistency of clients' perception on the assessment of satisfaction. This indicates a possible mismatch that client satisfaction may only be partly affected by performance (Soetanto and Proverbs, 2004), and there exists a lack of clear understanding of the satisfaction concept (Cheng *et al.,* 2006).

Table 6.9 presents the details of the overall assessment on service quality. The results vary from 2 (minimum) to 5 (maximum) (out of 5) and report an average performance score (Mean) of 4.02 on the quality of the project (the case project), indicating a very good performance of the project. Clients considered quality of the service provided by their service providers including consultants and contractors and their competence were good too, by giving an average score of 3.59 and 3.67 respectively (Mean = 3.59; Mean = 3.67; out of 5). Standard deviations (SD=.644) suggest within the range of variations clients consider the performance of the project as good.

Table 6.9 Overall assessment of quality

	N	Minimum	Maximum	Mean	Std. Deviation
Quality of the project	66	2	5	4.02	.644
Quality of the service	66	2	5	3.59	.744
Competence of consultants /contractors	66	2	5	3.67	.709
Valid N (listwise)	66				

6.2.2 Client strategic decisions

Clients were asked to indicate the importance and effectiveness of their strategic decisions made at various project stages. The importance factor means how important a client considers a particular decision issue is to the project and business. The importance factor represents a client's expectation and priority on decision objectives to be achieved. The effectiveness factor reflects how effective a client perceives a particular decision they have made.

6.2.2.1 Decisions at the pre-design stage
From the results, it is shown that clients in general considered “procurement method” (Importance Mean = 4.50) and “estimated costs” (Importance Mean = 4.62) are the most important strategic decisions to make at the pre-design stage (refer to Table 6.10). These results confirm previous research findings that what procurement route has a significant impact on client satisfaction (Naoum, 1994; Kumaraswamy and Dissanayaka, 1998) and are consistent with previous research findings about importance of cost issues (Macmillan *et al*, 2001; Bartolo, 2002; Soetanto, 2002).

The Effectiveness Mean (EM), Importance Mean (IM) and Average Satisfaction (AS) scores for strategic decisions made at the pre-design stage with standard deviations which demonstrate the range of variations are presented in Table 6.10.

Clients also perceived “procurement route” (Effectiveness Mean = 4.09) and “service providers engaged” (Effectiveness Mean = 4.0) as the most effective decisions made at this stage.

The results show that the Effectiveness Mean of the decisions are all above 3 (out of 5), indicating they are effective decisions made by clients. However, the effectiveness scores of the decisions are not as high as the importance scores, that is to say, EM < IM. These results are further calculated using the formula below to illustrate average satisfaction levels:

AS = EM – IM

Where,
AS – Average satisfaction
EM – Effectiveness mean
IM – Importance mean

Table 6.10 Strategic decisions at the pre-design stage

Strategic Decisions	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the pre-design stage					
Decision of "Build/No build"	3.79	0.903	3.70	0.841	-0.09
Probable procurement method	**4.50**	0.707	**4.09**	0.972	-0.41
Organisational structure	4.21	0.645	3.88	0.795	-0.33
Work procedures	3.65	0.868	3.39	0.926	-0.26
Consultants to be engaged	3.83	0.852	3.73	0.735	-0.10
Other service providers engaged	4.29	0.76	**4.00**	0.804	-0.29
Outline of project	4.14	0.892	3.67	0.997	-0.47
Estimated costs	**4.62**	0.651	3.85	1.011	-0.77
Review of procurement route	3.79	0.92	3.59	0.859	-0.20
Details of project	4.18	0.763	3.79	0.814	-0.39
Full development control approval	4.21	0.851	3.79	0.969	-0.42
Co-ordination of elements of the project	4.21	0.755	3.80	0.915	-0.41

Where EM < IM, that is to say, client expectations on a strategic decision made are not being met by its effectiveness, this will lead to negative client satisfaction. The negative satisfaction scores shown in Table 6.10 indicate that clients are slightly dissatisfied with the strategic decisions made at the pre-design stage.

6.2.2.2 Strategic decisions at the design stage

Clients in general considered "Information sufficient to obtain tenders" (Importance Mean = 4.45) as the most important strategic decision to make at the design stage (refer to Table 6.11).

As the scores of EM – IM are negative, meaning client expectations on a strategic decision made are not being met by its actual effectiveness, the results suggest that clients are slightly dissatisfied with the strategic decisions made at this stage.

Table 6.11 Strategic decisions at the design stage

Strategic Decisions	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the design stage					
Information sufficient to obtain tenders	4.45	0.845	3.88	0.832	-0.57
Balance required under the building contract	3.92	0.882	3.53	0.845	-0.39

6.2.2.3 Strategic decisions at the tender stage

At the tender stage, "Documentation required for tenders" (Importance Mean = 4.55) and "Identification and evaluation of potential contractors" (Importance Mean = 4.38) are considered as the most important strategic decisions to make at this stage (refer to Table 6.12).

As the score of EM – IM for "Arranging for site handover" is positive (Average Satisfaction =0.03), meaning client expectations on a strategic decision made are met by its actual effectiveness, it indicates clients are satisfied with the strategic decisions made at this stage. However, Satisfaction scores for the rest of strategic decisions yet show negative, indicating clients' dissatisfaction on those decisions.

Table 6.12 Strategic decisions at the tender stage

Strategic Decisions	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the tender stage					
Documentation required for tenders	**4.55**	0.768	3.92	0.791	-0.63
Identification and evaluation of potential contractors	**4.38**	0.799	**3.95**	0.849	-0.43
Appointing the contractor	4.35	0.903	**4.14**	0.762	-0.21
Arranging site handover to the contractor	3.70	1.022	3.73	0.869	0.03

In respect to the criteria of choosing a contractor/consultant, clients consider deliver value for money (IM=4.53, EM=3.95) the most important and the most effective criterion in the tender stage. Clients also regard sector knowledge (IM=4.12) a very important criterion to choose a preferred bidder with competitive bid as an effective aspect to consider (refer to Table 6.13).

Table 6.13 Criteria for choosing contractors/consultants

Criteria of choosing a contractor/consultant	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the tender stage					
Reputation	**3.94**	0.926	3.55	0.915	-0.39
Sector knowledge	**4.12**	0.920	**3.86**	0.742	-0.26
Business knowledge	**3.97**	0.928	3.64	0.922	-0.33
Delivering VFM	**4.53**	0.749	**3.95**	0.902	-0.58
Office location	2.94	1.094	3.12	0.985	0.18
Competitive bid	3.85	1.011	**3.59**	0.976	-0.26
Specialisation	3.76	0.946	3.61	0.839	-0.15
Innovation	3.85	0.899	3.45	0.748	-0.39

6.2.2.4 Strategic decisions at the construction stage

At the construction stage, "Cost management strategy" (Importance Mean = 4.67) and "Settling the final account" (Importance Mean = 4.35) are considered as the most important strategic decisions to make (refer to Table 6.14). Clients also considered "Cost management strategy" and "People strategy" as the most effective decisions made at the construction stage.

However, average satisfaction scores all showed negative figures, suggesting clients' expectations on these strategic decisions not being met, therefore there is a need to improve the effectiveness of decision-making.

Table 6.14 Strategic decisions at the construction stage

Strategic Decisions	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the construction stage					
Cost management strategy	**4.67**	0.564	**3.92**	0.882	-0.75
People strategy	3.92	0.933	**3.65**	0.832	-0.27
Settling the final account	**4.35**	0.868	3.59	0.96	-0.76

6.2.2.5 Strategic decisions at the occupancy & maintenance stage

At the occupancy and maintenance stage, "Maintenance strategy" (Importance Mean = 4.26) is considered as the most important strategic decisions to make at this stage (refer to Table 6.15). Clients in the meantime also recorded "Maintenance strategy" as the most effective decision they have made at the occupancy and maintenance stage.

The negative scores of average satisfaction suggest that clients are slightly dissatisfied with the strategic decisions made at this stage. There is a need to improve the effectiveness of strategic decisions so that the actual effectiveness of decisions can meet or exceed client expectations.

Table 6.15 Strategic decisions at the occupancy & maintenance stage

Strategic Decisions	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the O&M stage					
Life cycle costing	4.08	0.966	3.53	1.084	-0.55
Maintenance strategy	**4.26**	0.933	**3.65**	1.088	-0.61

6.2.2.6 Strategic decisions at the disposal stage

Clients considered "Transfer of project" (Importance Mean = 3.23) as the most important strategic decisions to make at the disposal stage (refer to Table 6.16). "Transfer of project" (Effective Mean = 3.02) was also regarded as the most effective decisions made by the clients at this stage.

The negative average satisfaction scores suggest that clients' are slightly dissatisfied with the strategic decisions made at this stage and clients should therefore look at ways of improving the effectiveness of strategic decision-making.

Table 6.16 Strategic decisions at the disposal stage

Strategic Decisions	Importance (I)		Effectiveness(E)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(EM -IM)
At the disposal stage					
Demolition of project	2.97	1.163	2.95	1.129	-0.02
Transfer of project	**3.23**	1.225	**3.02**	1.116	-0.21

Overall, the results indicate that clients tend to have different strategic priorities at various project stages. These priorities are reflected in the Importance (I) scores clients provided. Importance (I) and Effectiveness (E) scores indicate that some strategic decisions are not meeting their expectations and hence there is a need for clients to review their decision-making process and improve the effectiveness of decisions being made.

6.2.3 Service quality

Service quality is usually seen as an antecedent and pre-requisite of client satisfaction. Performance factors were assessed through a range of quality criteria involving key aspects of the services provided by contractors/consultants to clients (Cheng *et al,* 2006), including service delivery, people of service providers and communications.

6.2.3.1 Service delivery to the clients

The results show that clients consider "Health & Safety awareness" (Importance Mean = 4.76), "Delivering value for money" (Importance Mean= 4.67) and "Meeting client expectations" (Importance Mean = 4.53) are the most important criteria of service delivery for a service provider (refer to Table 6.17).

Service providers' performance on "Health & Safety awareness" (Performance Mean= 4.2), "Technical accuracy" (Performance Mean= 3.92) and "Delivering value for money" (Performance Mean= 3.87) were regarded by the clients as the best performance criteria. Table 6.17 demonstrates clients' perception on services delivery by their service providers.

Clients generally perceive their service providers' performance on service delivery as very good (approximately 4 out of 5). However, as clients' expectations are not met by the performance of the service providers, clients are slightly dissatisfied with the services they received from the service providers. The performance mean score, for example, for "Health & Safety awareness" (PM = 4.20), is slightly lower than the importance mean score (IM = 4.76), suggesting clients' quality expectations are not being met by the performance of service providers who should seek improvement approaches to better satisfy their clients.

Table 6.17 Client perception on service delivery

Criteria of service quality	Importance (I)		Performance(P)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(PM -IM)
Overall quality of service delivery and advice	4.47	0.684	3.80	0.827	-0.67
Comparing with other service providers you use	4.00	0.765	3.58	0.860	-0.42
Understanding your needs and business	4.26	0.810	3.80	0.769	-0.46
Problem solving	4.33	0.865	3.83	0.834	-0.50
Speed of response	4.29	0.799	3.55	1.010	-0.74
Technical accuracy	4.52	0.638	**3.92**	0.771	-0.60
Innovation in methods and approach	3.94	0.782	3.44	0.947	-0.50
Meeting your expectations	**4.53**	0.728	3.64	0.888	-0.89
Health and safety awareness	**4.76**	0.556	**4.20**	0.789	-0.56
Delivering value for money	**4.67**	0.641	**3.87**	0.834	-0.80

6.2.3.2 Service providers' people

The people employed by service providers play an important role in forming the service quality provided to the client. Clients regard "work with client staff and other consultants" (IM = 4.59) and "Level of commitment" (IM = 4.48) as the most important criteria of the people issue (refer to Table 6.18).

Table 6.18 Client perception on service providers' people

Criteria of service quality	Importance (I)		Performance(P)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(PM -IM)
Qualification of people	3.71	0.907	3.85	0.707	0.14
Professional experience of people	4.42	0.860	**4.09**	0.696	-0.33
Providing right level of staffing	**4.45**	0.706	3.74	0.900	-0.71
Level of commitment team/central management	**4.48**	0.662	**3.92**	0.847	-0.56
Working with your staff and other consultants	**4.59**	0.632	3.88	0.903	-0.71
Friendliness	3.74	0.900	3.79	0.851	0.05
Accessibility	4.21	0.795	**3.89**	0.806	-0.32

"Professional experience" (PM = 4.09) and "Level of commitment" (PM = 3.92) along with "Accessibility" (PM = 3.89) are considered to have the best performance in terms of service quality.

Clients regard the overall performance of service providers' people as very good (average score 3.88 out of 5). For example, clients perceived service providers' "Professional experience" (PM = 4.09) are very good. However, clients consider service providers' "professional experience" as one of the most important characteristics of a quality service provider, albeit there is scope to improve on their performance in this regard (Average satisfaction = -0.33).

The results show client expectations are not being met by the performance of service providers in terms of their people, indicating that service providers should seek ways to improve their performance against these criteria.

6.2.3.3 Communications with clients

Communication within project-based environments presents special challenges and different perspectives highlight the diversity of communication problems facing those working within such environments (Gorse and Emmitt, 2004; Dainty *et al,* 2006). Limited interactions amongst project team members often inhibit project success.

Results reveal that clients consider "Regular dialogue on project" (IM = 4.42) and "Report timing" as the most important and effective communication means in a project environment (refer to Table 6.19). While service providers performed well on the same aspects (PM = 3.83 and 3.58 for "Regular dialogue on project" and "Report timing" respectively), service providers need to take improvement actions to meet and exceed if possible client expectations.

Table 6.19 demonstrates the results of client perception on various communications criteria.

Table 6.19 Client perception on communications

Criteria of service quality	Importance (I)		Performance(P)		Average Satisfaction (AS)
	Mean	Std.Dev	Mean	Std.Dev	(PM -IM)
Quality and timing of reports produced to you	**4.30**	0.784	**3.58**	0.912	-0.72
Regular dialogue on progress of the project with you	**4.42**	0.681	**3.83**	0.815	-0.59
Regular dialogue to establish dynamics of your business	3.68	0.931	3.27	0.953	-0.41
Good at listening	4.00	0.911	3.50	1.011	-0.50
Informing you on business issues which may affect you	3.91	0.890	3.38	1.034	-0.53
Regular mailings advising you of latest news/information	2.92	1.057	2.91	0.924	-0.01
Quality/usefulness of corporate entertainment	1.95	1.115	2.33	1.155	0.38
Quality/use of the service provider's corporate literature	2.44	1.125	2.55	1.098	0.11
Quality/use of the service provider's website/intranet	2.53	1.140	2.64	1.132	0.11
Making you understand of the service provider's capability	3.52	1.026	3.32	0.963	-0.20
The service provider's overall performance on service quality?	**4.41**	0.701	**3.79**	0.920	-0.62

Clients also consider service providers' overall performance on service quality as one of the most important criteria to achieve satisfaction (IM = 4.41) and their actual performance on this criterion are very good (PM = 3.79).

Overall, service providers' performance in terms of service delivery, their people and communications with clients is regarded as very good (average performance score 3.55 out of 5). However, clients perceived service providers' performance on a majority of the service quality criteria slightly lower than they expected. These results indicate clients are slightly dissatisfied and service providers should seek to improve their performance and satisfy their clients.

Understanding client business and satisfying their needs are the key issues for service providers to address so as to improve their service quality (Ashley *et al*, 1987; Cheng *et al*, 2006). Improved service quality from service providers will positively underpin project performance and lead to heightened client satisfaction and perceived project success, which will benefit both clients and their service providers.

Having established clear differences in strategic decisions at various project stages and levels of client satisfaction on construction projects, the next phase of this research focuses on the examination of the data for evidence of relationships between strategic decisions and client satisfaction. The next chapter addresses these aspects of the research.

6.3 SUMMARY

This chapter has reported the results of a major survey of construction clients in the UK construction industry and presented an exploratory analysis of the results in three main sections. The characteristics of clients, their organisations and client case projects have been first discussed.

The results show that a vast majority of clients surveyed are experienced construction professionals who understand their organisations' decision-making mechanism and process and are capable of making strategic decisions. Public sector clients represent the majority of respondents and building projects as the main type of projects clients procure.

Results of strategic decisions made by clients at various project stages from the pre-design to disposal stage indicate that clients tend to have different priorities at various project stages. These priorities are reflected in the Importance (I) scores clients provided. Results of client strategic decisions are not meeting clients' expectations and hence certain issues need to be addressed more effectively during the decision-making and implementation process. Therefore there is a need for clients to review their decision-making process and improve the effectiveness of decisions being made.

Overall, service providers' performance in terms of service delivery, their people and communications with clients is regarded as very good. However, clients perceived service providers' performance on a majority of the service quality criteria are slightly lower than their expectations. These results indicate clients are slightly dissatisfied and service providers should seek to improve their performance and better satisfy their clients.

Following these exploratory analyses and having established clear differences in strategic decisions and levels of client satisfaction on construction projects, the next phase of this research focuses on the examination of the data for evidence of relationships between strategic decisions and client satisfaction.

CHAPTER 7

FACTOR ANALYSIS OF STRATEGIC DECISIONS AND THE ASSESSMENT OF CLIENT SATISFACTION

7.1 INTRODUCTION

Previous chapters (refer to Chapter 6) have established that strategic decisions vary across the project cycle and client satisfaction depends as much on the subject as on the timing of the decisions. It is therefore necessary to explore the extent to which strategic decisions at different project stages coincide with the levels of client satisfaction. This chapter investigates the potential relationships between strategic decisions and client satisfaction to determine whether or not any significant association exists.

Principle component factor analysis techniques are adopted to investigate the scales of strategic decisions at various project stages. Strategic decisions made by clients at different project stages will be categorised into smaller representative groups. This will provide the basis on which models of the relationships between strategic decisions, service quality and client satisfaction can then be developed using statistical techniques including multiple regression.

The levels of client satisfaction will be assessed and the findings then will be used to identify ways of improving the services provided by service providers. The approach will identify key performance attributes for service providers and the results also facilitate the development of more detailed models that will investigate relationships between strategic decisions and client satisfaction and may provide practical solutions to client satisfaction problems in the construction industry.

7.2 RESEARCH HYPOTHESIS AND STATISTICAL ANALYSIS TECHNIQUES

The main aim of this research is to establish empirically whether or not strategic decisions made by clients across project life cycle have an impact on levels of client satisfaction, and to investigate the nature of any relationship(s) that exist. Two fundamental hypotheses were established (refer to Chapter 5) as below so as to achieve the aim of this research:

- Hypothesis 1 – There is no correlation between strategic decisions and client satisfaction.

- Hypothesis 2 - Strategic decisions have no impact on the clients' satisfaction levels.

These hypotheses can be interpreted as that there is no difference in levels of client satisfaction regardless various strategic decisions made by a client at different project stages. The task of testing these hypotheses is thus simplified to an examination of the data for evidence of significant associations between the dimensions of strategic decisions and the measures of client satisfaction, whereas in this research, the measures of service quality.

7.2.1 Statistical techniques

Statistical techniques including correlation, factor analysis and multiple regression, which are widely used in this area of research, were adopted to facilitate these analyses (Horn, 1965; Denison and Mishra, 1995).

Factor analysis is used as a "data reduction" technique and attempts to identify a small set of factors that represents the underlying relationships among a group of related variables (Tabachnick and Fiddell, 2001). That is to say, this technique can be adopted to identify a smaller set of groups representing strategic decisions made by clients at various project stages. Various strategic decisions made by a client at a particular project stage will be analysed using factor analysis to look for a way that those decisions may be "reduced" or summarised using a smaller set or group of decisions.

Multiple regression is a family of techniques that is adopted to explore the relationships between one continuous dependent variable, that is to say, client satisfaction in this research, and a number of independent variables, for example, strategic decisions, service quality and client characteristics in the context of this study (Pallant, 2005). Standard multiple regression is employed to reveal how well strategic decisions are able to predict client satisfaction.

The Statistical Package for Social Science (SPSS) software was chosen as a useful tool to undertake the analyses. A codebook was developed to convert data collected from the major survey into a format that SPSS can understand. Preparing a codebook involves deciding how to define and label each of the variables and assign numbers to each of the responses. This allows researchers to see the whole process from questionnaire development through to the creation of the final data file ready for analysis (Pollant, 2005). The codebook developed for the purpose of data analysis using SPSS is attached at the Appendix.

7.2.2 Normality of data

A fundamental assumption of multiple regression is the assumption of normality of the predictor and outcome variables, and sometimes is the most frequently violated assumption (Hair *et al.*; 1998). Normal means a symmetrical, bell-shaped curve which has the greatest frequency of data in the middle with smaller frequencies towards the extremes (Gravetter and Wallnau, 2000).

The diagnostic tools available for the test of the normality of data include the histogram of residuals, indicated as a bell-shape if normally distributed, or the use of the normal probability plot (P-P plots) which compares the standardised residuals with a normal distribution. The standard residuals are often represented by a straight diagonal line. If the distribution is normal, then the residual line must closely follow this diagonal line (*ibid*). It is only when all these assumptions are met that the model can be accurately applied to the population (Field, 2000). All the assumptions were thus tested as each multiple regression model was generated. Figure 7.1 shows results of the normality test histogram of variable Q80P - service providers' overall performance on service quality.

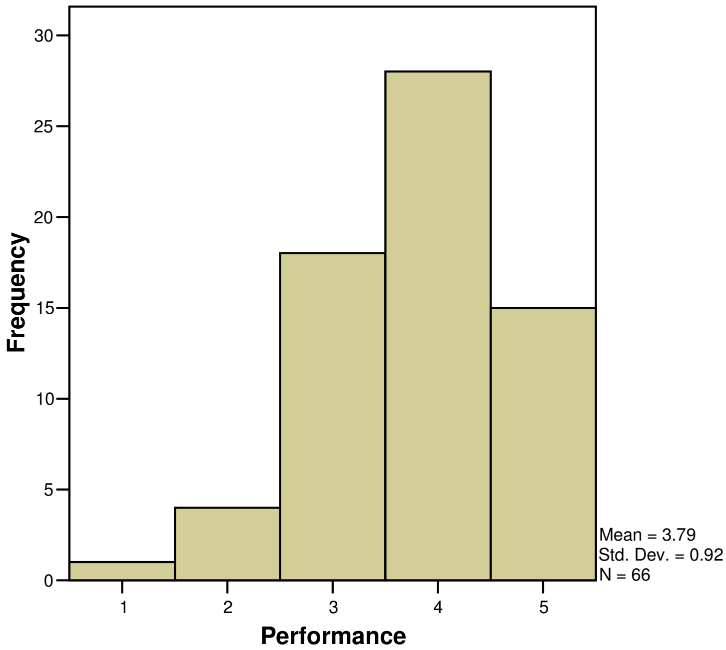


Figure 7.1 Histogram for performance of overall service quality

For the data in this variable, scores appear to be reasonably normally distributed as it is indicated as a bell shape in the histogram.

This is also supported by an inspection of the normal probability plots (refer to Figure 7.2 as indicated in the P-P plot). A reasonably straight line suggests this is a normal distribution. The rest of the results of normality tests for all variables is attached at the Appendix.

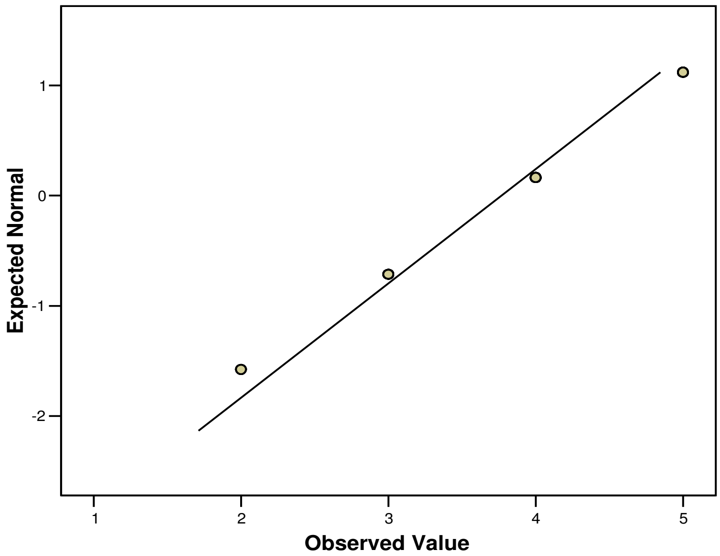


Figure 7.2 Q-Q plot for performance of overall service quality

7.3 FACTOR ANALYSIS OF STRATEGIC DECISIONS

The assessment of importance and effectiveness of strategic decisions made by clients at different project stages intends to address a number of issues for the client. For example, when the client has made an important decision at a particular project stage, if the actual effectiveness of the decision matches the client's expectation, the client's satisfaction is achieved. Otherwise, the client may need to look to improve the effectiveness of their decision-making process. The client's priorities vary at different project stages, so are the nature of strategic decisions made.

In the construction industry, the variety of strategic decisions made by the client to serve different purpose of project needs is noted (refer to Chapter 2). However, there are similarities by nature within the large set of strategic decisions. If these decisions can be 'reduced' or grouped according to their nature using a smaller set of representative decisions, it will help to identify the key decisions made by the client and facilitate the modelling process which aims to explore the interrelationship between strategic decisions and client satisfaction.

Factor analysis is a useful statistical technique that is commonly adopted as a ‘data reduction’ tool. It takes a large set of variables, for example, strategic decisions in this research, and seeks to reveal a way that the data can be ‘reduced’ or summarised using a smaller set of representative factors or components. It does this by looking for ‘clumps’ or groups amongst the inter-correlations of a set of variables. It is used extensively by researchers involved in the development and evaluation of various test and scales (Pallant, 2005).

In order to identify representative strategic decisions made by client and then use the results for the development and evaluation of models exploring interrelationships between strategic decisions and client satisfaction, factor analysis technique was applied. Principle components analysis (PCA) was adopted to identify the representative strategic decisions made by the client at different project stages.

The process of factor analysis involves the following key steps (Stevens, 1996; Tabachnick and Fiddell, 2001):

- Selection of variables and correlation matrix
- Minimum factors to be extracted
- Identification of terminal solution via factor rotation
- Construction of factor scales

Correlation analysis was employed to establish any relationship among the variables and served as an initial step in the exploratory factor analysis. Correlation analysis is a useful tool in establishing whether or not any association exists between variables, the strength and the direction of the relationships and the proportion of the variability in one variable that could be explained by the relationship with the other variable. The outcomes of these analyses will result in the classification and reduction of variables into appropriate groups. Only factors which have absolute values of greater than 0.300 are considered in the final solutions (Sharma and Subhash, 1996; Tabachnick and Fiddell, 2001). The outcomes and rotated solutions for variables, that is to say, strategic decisions at various project stages, are presented in the following sections.

7.3.1 Strategic decisions at the pre-design stage

Various strategic decisions are made by clients at early project stages where the client needs for the project are identified, in terms of corporate planning and funding limits (Hughes, 1991; RIBA, 2004).

To be considered suitable for factor analysis the correlation matrix is expected to show at least some correlations, which means the coefficient r is 0.3 or greater, and the Bartlett's test of sphericity should be statistically significant ($p < 0.05$) and the Kaiser-Meyer-Olkin (KMO) value should be 0.6 or greater (Bartlett, 1954; Kaiser, 1974; Pallant, 2005).

As indicated in Table 7.1, only correlation coefficients at 0.3 and above are considered relevant to the analysis. The results indicate some factors are correlated. For example, "Procurement" with "Consults" and "Other service providers" are correlated ($r = .385$ and $r = .359$ respectively). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value is above 0.6 (KMO =.801) and the Barlett's Test of Sphericity value is below 0.05 ($p = .000$), therefore factor analysis is deemed appropriate and valid.

Table 7.1 Correlation matrix of strategic decisions at the pre-design stage

Correlation	Eff of Decision to build	Eff of Procurement	Eff of Org structure	Eff of Work procedure	Eff. of consultants	Eff. of other service providers	Eff. of outline of project	Eff. of estimated costs	Eff. of procurement review	Eff. of details of project	Eff. of control approval	Eff. of coordination
Eff. of Decision to build	1.000	.194	.062	.208	.098	-.022	.048	.343	.193	.394	.102	.211
Eff. of Procurement	.194	1.000	.275	.206	.385	.359	.220	.341	.197	.150	.166	.221
Eff. of Org structure	.062	.275	1.000	.138	.062	.077	.228	.180	.206	.235	.249	.383
Eff. of Work procedure	.208	.206	.138	1.000	.339	.238	.231	.275	.284	.519	.285	.422
Eff. of consultants	.098	.385	.062	.339	1.000	.592	.326	.284	.357	.282	.217	.314
Eff. of other service providers	-.022	.359	.077	.238	.592	1.000	.428	.325	.273	.242	.392	.241
Eff. of outline of project	.048	.220	.228	.231	.326	.428	1.000	.407	.305	.310	.292	.466
Eff. of estimated costs	.343	.341	.180	.275	.284	.325	.407	1.000	.353	.484	.249	.449
Eff. of procurement review	.193	.197	.206	.284	.357	.273	.305	.353	1.000	.424	.171	.424
Eff. of details of project	.394	.150	.235	.519	.282	.242	.310	.484	.424	1.000	.469	.501
Eff. of control approval	.102	.166	.249	.285	.217	.392	.292	.249	.171	.469	1.000	.369
Eff. of coordination	.211	.221	.383	.422	.314	.241	.466	.449	.424	.501	.369	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.801
Bartlett's Test of Sphericity	Approx. Chi-Square	219.816
	df	66
	Sig.	.000

Principle component analysis (PCA) was undertaken to determine how many factors (components) to be 'extracted', and only components that have an eigenvalue of 1 or more will be considered (Tabachnick and Fiddell, 2001). As indicated in Table 7.2, only the first four components recorded eigenvalues greater than 1 (4.226, 1.376, 1.091 and 1.004). These four components explain a total of 64.14% of the variance (see the "Cumulative %" column).

Table 7.2 Eigenvalues for strategic decisions at the pre-design stage

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.226	35.214	35.214	4.226	35.214	35.214
2	1.376	11.467	46.682	1.376	11.467	46.682
3	1.091	9.091	55.773	1.091	9.091	55.773
4	1.004	8.368	64.141	1.004	8.368	64.141
5	.861	7.172	71.313			
6	.794	6.614	77.927			
7	.649	5.408	83.336			
8	.514	4.281	87.616			
9	.442	3.680	91.297			
10	.427	3.557	94.853			
11	.334	2.783	97.637			
12	.284	2.363	100.000			

Extraction Method: Principal Component Analysis (PCA).

To further determine the numbers of factors to be retained for analysis, a screeplot produced by SPSS (refer to the Appendix) was inspected to check the results derived from using the Kaiser criterion (Catell, 1966). Only those components above the clear break point in the plot shape are retained. The results show there is a clear break between the second and the third component, and the first two components explain much more of the variance than the remaining components. Based on the screeplot, retaining only two components is therefore recommended.

By further checking the component matrix (refer to Table 7.3), it is found that most of the variables load quite strongly (absolute value above .4) on the first and the second component only and very few variables load strongly on components 3 and 4. These results underpin the results from the screeplot that suggests retaining only two factors for further investigation.

Table 7.3 Component matrix for pre-design stage strategic decisions

	Component			
	1	2	3	4
Effectiveness of coordination	.730			
Effectiveness of details of project	.728	.401		
Effectiveness of estimated costs	.678			
Effectiveness of outline of project	.621			
Effectiveness of consultants	.613	-.492	.309	
Effectiveness of procurement review	.603			
Effectiveness of Work procedure	.599			-.321
Effectiveness of control approval	.565		-.327	-.335
Effectiveness of other service providers	.599	-.629		
Effectiveness of Decision to build	.362	.563	.499	
Effectiveness of Org structure	.404		-.641	.465
Effectiveness of Procurement	.498			.628

Extraction Method: Principal Component Analysis.
a .4 components extracted.

An alternative parallel analysis was undertaken to further investigate factors to be retained (Watkins, 2000). The results (refer to Table 7.4) showed one component with egienvalues exceeding the corresponding criterion values from parallel analysis for a randomly generated data matrix of the same size (12 variables x 60 samples). Details of Monte Carlo PCA for parallel analysis are attached at the Appendix. However, factor analysis is used as a data exploration technique, interpretation and its use are subject to judgement rather than any hard and fast statistical rules (Tabachnick and Fiddell, 2001; Pallant, 2005). Retaining two components for further investigation was therefore recommended.

Table 7.4 Comparison of eigenvalues and criterion value for decisions at the predesign stage

Component No.	Actual eigenvalue for PCA	Criterion value from parallel analysis	Decision
1	4.226	1.7857	**Accept**
2	1.376	1.4643	Reject
3	1.091	1.3821	Reject
4	1.004	1.2316	Reject
5	.861	1.1164	Reject

To correctly interpret the factors which had been determined, factor 'rotation' techniques were employed. This is to present the pattern of loadings in a manner for easier interpretation. The output from Oblimin rotation (details see the Appendix) indicated the correlation between the two components was quite low (r = -.365). It is therefore reasonable to assume that the two components are not correlated which underlies the use of Varimax rotation.

By performing the Varimax rotation, the rotated solution revealed the presence of a simple structure, with two components showing a number of strong loadings and all variables loading substantially on only one component (refer to Table 7.5). The two-component solution explained a total of 46.68% of the variance, with Component 1 contributing 25.07% and Component 2 contributing 21.61%.

The interpretation of the two components was consistent with previous research on strategic decisions (refer to Chapter 2), with "design approach" related decisions loading on Component 1 and "procurement" related decisions loading on Component 2. The results of this analysis support the use of strategic decisions scale by project stages as suggested in previous research (Fleming *et al*, 2000; Hughes *et al.*, 2001; RIBA, 2004; PP, 2005).

7.3.1.1 Discussions

"Design approach" related decisions cover various stages of the RIBA plan of work (RIBA, 2004). In the appraisal and briefing stages, design approach related decisions including build or no-build, preliminary designs, investigations of alternatives and costing of the possible solutions are of great importance to the client. The results of these stages enable the client to decide that the preferred solution is feasible and the

Table 7.5 Patern/structure for coefficients of Varimax rotation for strategic decisions at the predesign stage

Items	Component 1	Component 2
	Design Approach	**Procurement**
Effectiveness of details of project	.813	.172
Effectiveness of coordination	.688	.320
Effectiveness of Decision to build	.642	-.189
Effectiveness of estimated costs	.604	.337
Effectiveness of Work procedure	.570	.256
Effectiveness of procurement review	.506	.337
Effectiveness of control approval	.422	.375
Effectiveness of Org structure	.418	.135
Effectiveness of other service providers	.042	.867
Effectiveness of consultants	.142	.773
Effectiveness of outline of project	.321	.579
Effectiveness of Procurement	.193	.538
% of variance explained	25.07%	21.61%

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

project can go ahead (Hughes, 1991). A client's decision to adapt to external influences acts as the trigger to the process of building procurement. During these stages the need for the project is identified in terms of corporate planning and funding limits.

Strategic decisions at the scheme design stage are that the design is acceptable within cost limits and is an adequate interpretation of the client's requirements. During the scheme design stage (RIBA, 2004) the client will be interacting with the designers, briefing and identifying user needs, and approving sketch designs. The designers will be interpreting in detail the client's requirements which will be subject to unavoidable changes.

During the detail design stage the consultants develop the design and achieve integration of all of the various subsystems of the building including structural, services, circulation and coordination exercises undertaken. The technical problems of design mean to be largely addressed and statutory consents checked.

"Procurement" related strategic decisions including consultants to be engaged, procurement routes and briefing at the pre-design stage are made on the basis of the fact that clients' requirement will be interpreted in details and to a sufficient extent.

7.3.2 Strategic decisions after the pre-design stage

Each project stage requires different information input and by nature requires various strategic decisions to be made accordingly. Although strategic decisions made by the client are closely associated with project stages and may vary by nature across the project life cycle, the majority of strategic decisions is made or predetermined by the client at early stages of the project, for example, the pre-design stage (Cheng and Proverbs, 2004). Decisions/options strategically are very limited once the project progresses to later stages because they are heavily influenced or predetermined by decisions made earlier.

Strategic decisions made by clients after the pre-design stage, including project stages from design, tender, construction, occupancy & maintenance and disposal, are largely influenced by or inter-linked with decisions made at the pre-design stage (refer to Chapter 5). Specific strategic decisions at these project stages, chosen in accordance with the RIBA plan of work (RIBA, 2004; Cheng and Proverbs, 2004) are included in the major survey questionnaire and assessed.

Factor analysis techniques were applied to identify representative decisions made by the client after the pre-design stages up to the disposal of the project. Only correlation coefficients at 0.3 and above are considered relevant to the analysis. The initial solution indicates that there are many factors being strongly correlated (details see the Appendix). For example, “Documentation for tender” is strongly correlated with “Potential contractors” (r = .614); “Life cycle costing” is closely correlated with “Maintenance strategy” (r = .876). Furthermore, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value is above 0.6 (KMO = .780) and the Barlett’s Test of Sphericity value is below 0.05 (p =.000), therefore factor analysis is deemed appropriate and valid.

By inspecting the total variance explained (refer to Table 7.6), principle component analysis revealed that only the first three components recorded eigenvalues greater than 1 (5.355, 1.585, and 1.442), which suggest three factors (components) are to be ‘extracted’. These three components explain a total of 64.48% of the variance (see the “Cumulative %” column).

Table 7.6 Total variance explained for strategic decisions made after the pre-design stage

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.355	41.190	41.190	5.355	41.190	41.190
2	1.585	12.195	53.385	1.585	12.195	53.385
3	1.442	11.095	64.480	1.442	11.095	64.480
4	.918	7.062	71.543			
5	.845	6.498	78.041			
6	.723	5.565	83.606			
7	.521	4.007	87.613			
8	.425	3.266	90.879			
9	.337	2.591	93.470			
10	.318	2.447	95.917			
11	.253	1.944	97.861			
12	.187	1.440	99.302			
13	.091	.698	100.000			
Extraction Method: Principal Component Analysis.						

The screeplot produced by SPSS (details see the Appendix) showed that there is a clear break between the third component and the fourth component, and the first three components explain much more of the variance than the remaining components. Retaining three components is therefore recommended. By further checking the component matrix (details see the Appendix), it is found that most of the variables load quite strongly (absolute value above .4) on the first component and some variables load strongly on the second and the third components only.

The results of parallel analysis undertaken to further investigate factors to be retained (refer to Table 7.7) reported three components with egienvalues exceeding the corresponding criterion values from parallel analysis for a randomly generated data matrix of the same size (13 variables x 65 samples). These results underpin the recommendations from previous tests including the screeplot that suggests retaining only three factors for further investigation.

Table 7.7 Comparison of eigenvalues and criterion value for decisions made after the pre-design stage

Component No.	Actual eigenvalue for PCA	Criterion value from parallel analysis	Decision
1	5.355	1.8246	**Accept**
2	1.585	1.5272	**Accept**
3	1.442	1.4178	**Accept**
4	.918	1.2838	Reject
5	.845	1.1639	Reject

The results of Component Correlation Matrix (details see the Appendix) via Oblimin rotation for the extracted components indicated a strong correlation between Component 1 and Component 3 (r = .445). It is therefore necessary to use and report the more complex Oblimin rotation, which does not assume components are uncorrelated, to interpret the outcome (Tabachnick and Fiddell, 2001).

To aid in the interpretation of these three components, Oblimin rotation was performed. The rotated solution revealed that three components showed a number of strong loadings and a majority of variables loading substantially on only one component (refer to Table 7.8). The three-component solution explained a total of 64.48% of the variance.

Table 7.8 Pattern matrix for strategic decisions after the pre-design stage

	Component		
	1	2	3
Effectiveness of people strategy	.872		
Effectiveness of life cycle costing	.831	.336	
Effectiveness of maintenance strategy	.757	.321	
Effectiveness of cost management	.756		
Effectiveness of settling final account	.737		
Effectiveness of documentation for tender	.528		
Effectiveness of demolition		.804	
Effectiveness of transfer of project		.663	.393
Effectiveness of info for tender	.431	-.453	
Effectiveness of appointing contractors			.876
Effectiveness of site handover			.815
Effectiveness of balance required			.634
Effectiveness of potential contractors	.307		.632

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 9 iterations.

The Pattern Matrix showed Component 1 with the highest loading items (.872, .831, .757, .756 and .737), which suggest these variables are project implementation related strategic decisions (labelled as 'Implementation'). The highest loadings on Component 2 (.804 and .663) indicated these items are strategic decisions about the disposal of a project (labelled as 'Disposal'), with Component 3 having highest variable loadings (.876 and .815) which suggest tender-related strategic decisions including decisions of 'appointing contractors' and 'site hand over' (labelled as 'Contracts').

The output of Oblimin rotation also provides details about the correlation between variables and components (refer to Table 7.9). Details of both the Pattern matrix and

Structure matrix table with full loadings on all variables (for example, including values < .300) is attached at the Appendix.

Table 7.9 Structure matrix for strategic decisions made after the pre-design stage

	Component		
	1	2	3
Effectiveness of cost management	.823		.489
Effectiveness of life cycle costing	.819	.363	.334
Effectiveness of people strategy	.804		
Effectiveness of maintenance strategy	.781	.350	.383
Effectiveness of settling final account	.770		.402
Effectiveness of documentation for tender	.654		.523
Effectiveness of info for tender	.501	-.427	.360
Effectiveness of demolition		.812	
Effectiveness of transfer of project		.688	.471
Effectiveness of appointing contractors	.360		.861
Effectiveness of site handover			.764
Effectiveness of potential contractors	.581		.757
Effectiveness of balance required	.383		.680

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

The Structure Matrix revealed Component 1 and Component 3 are closely correlated, each with a significant number of loadings on variables. These results suggest that client strategic decisions after the pre-design stage are not distinctive for the purpose of factor analysis. 'Implementation' strategic decisions are overlapped with 'Contracts' strategic decisions and there is no distinction between these two groups of decisions.

7.3.2.1 Discussions

When the design is sufficiently advanced for the specifications and bills of quantities and tender drawings are to be issued, the tendering process is ready to commence.

“Contracts” related decisions by the client are that the contractor can be selected and contract documents can be signed (Hughes, 1991; RIBA, 2004). During this stage the project may be subject to the most variation between procurement methods. For example, if buildability is a key requirement, then the contractor may well have been selected at a much earlier point in the process.

The project then progresses to be ready for commencement on site. “Implementation” related decisions at this stage reflect what a project has achieved. This stage simply contains all site-related activities, including further documentation and design work brought about as a result of the emergence of further information.

When the building is ready for commissioning, “Implementation” related decisions including maintenance strategy, occupancy issues and settling final account by a client resolve the problem of identifying the completion date, with the associated issue of settling final account which can continue for many years.

When the project is finally complete, the stage is regarded as the decision point by the client that the project is concluded. The result is dependent on the particular client and the particular project.

7.3.3 Summary of strategic decisions

The results of principle components factor analysis indicated that strategic decisions across the project life cycle, that is, life cycle strategies (LCS) as indicated in the conceptual model (refer to Chapter 4), are correlated and their effectiveness and importance perceived by clients vary in nature. The interpretation of the final solution was consistent with previous research findings. Based on the results of PCA analysis, strategic decisions made by clients can be presented as a smaller group of decisions, being referred as Strategic Decisions Clusters (SDC).

Various strategic decisions at the pre-design stage are ‘reduced’ (re-categorised) to underlying groups of decisions, that is to say, Strategic Decisions Clusters (SDC). According to the nature of decisions and the results of factor analyses, strategic decisions at the pre-design stage are interpreted and labelled as ‘Design approach’ SDC and ‘Procurement’ SDC (refer to Figure 7.3).

After the pre-design stage, strategic decisions made by the client at various stages are either limited by nature, or predetermined and influenced by decisions made at earlier stages. Results from factor analysis revealed that strategic decisions at the design stage and tender stage including ‘Balance required’, ‘Potential contractors’, ‘Appointment of contractor’ and ‘Site handover’ are in a similar nature and are largely contract-related issues. These strategic decisions are therefore interpreted and labelled as ‘Contracts’ SDC.

Strategic decisions at the construction and occupancy & maintenance (O&M) stages including ‘Cost Management’, ‘People strategy’, ‘Settling final account’, ‘Life cycle costing’ and ‘Maintenance’ were found as project implementation-related strategic decisions and are therefore interpreted and labelled as ‘Implementation’ SDC. The results however showed that ‘Implementation’ strategic decisions were overlapped with ‘Contracts’ strategic decisions and there seems no distinction between these two SDCs.

Strategic decisions at the disposal stage including ‘Demolition of project’ and ‘Transfer of project’ were found to have the highest loadings on one component in factor analysis terms. The results indicated these decisions are a stand alone group of decisions and are mainly project disposal-related and therefore labelled as ‘Disposal’ SDC (refer to Figure 7.3).

Overall, ‘Contracts’, ‘Implementation’ and ‘Disposal’ SDCs represent strategic decisions made by clients after the pre-design stage.

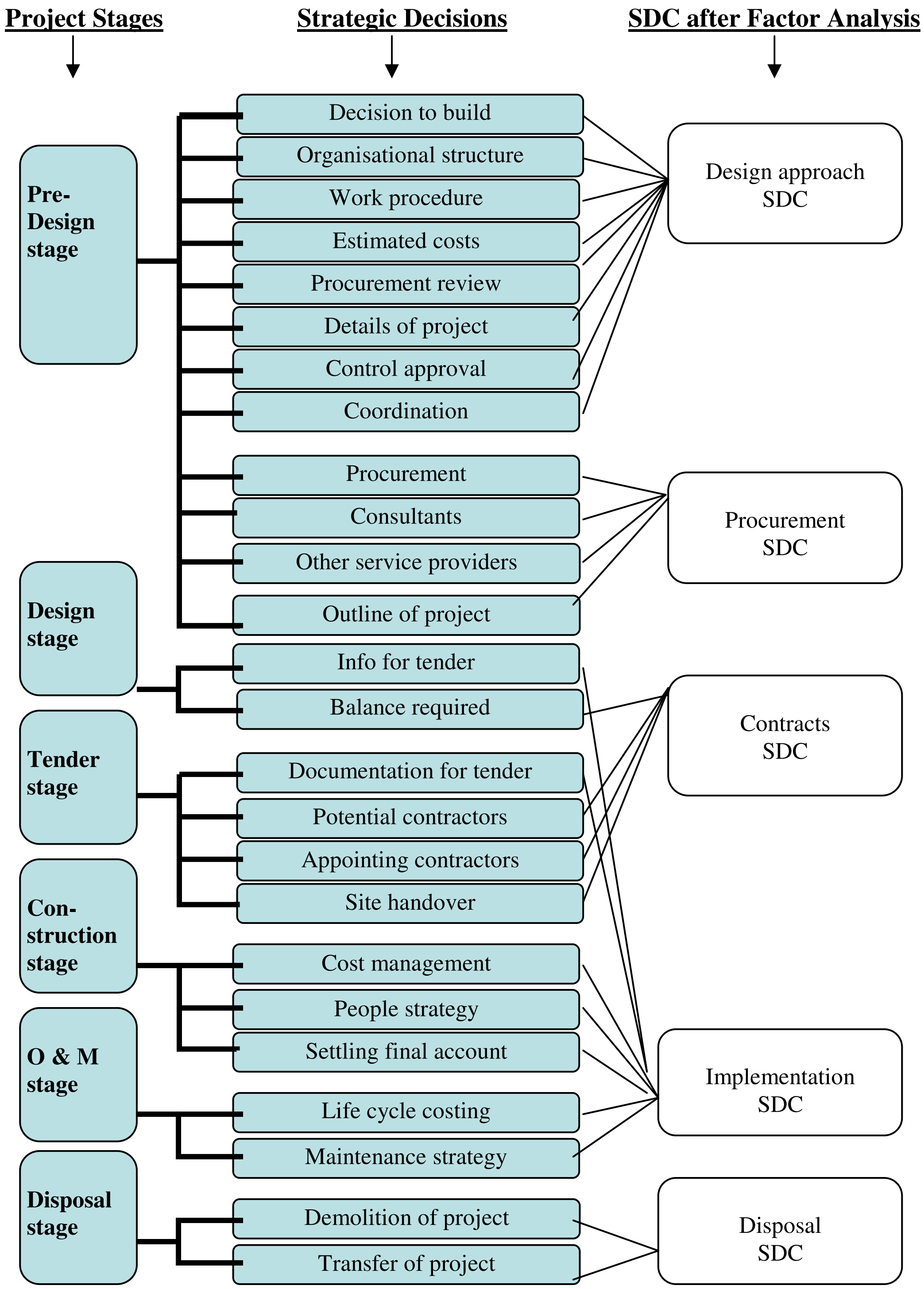


Figure 7.3 Summary of strategic decisions

7.4 THE OUTCOMES OF CLIENT SATISFACTION ASSESSMENT

The assessment of importance and performance of various issues in respect of service quality and consequently the measurement of client satisfaction will address important issues for the service providers including construction consultants and contractors. For example, what levels of performance should consultants aim to achieve in order to satisfy their clients and what performance criteria should be prioritised so as to make most efficient use of resources and efforts in this regard. It is indicated that service providers should focus on those performance criteria that are considered by clients to be of high importance but are currently perceived to be of poor or low level of performance. This will result in client dissatisfaction, as expectations are higher than perceived outcomes (Martilla and James, 1977).

Satisfaction results when levels of performance accord with levels of importance, that is to say, optimum performance. The concept of optimum performance suggests that levels of importance and performance should be the same so that a performer (for example, the service provider) is satisfying the assessor (for example, the client) but not wasting undue efforts and resources.

The analyses of importance-performance adopted the similar approach developed in Martilla and James (1977) and Soetanto *et al* (2001)'s work, using average satisfaction scores and priority ranking. Average satisfaction represents the discrepancy between perceived levels of performance (P) and importance (I), that is, the subtraction of I from P (P - I). The value of average satisfaction may be positive (indicating high levels of satisfaction but possibly excessive effort), zero (indicating optimally satisfied) and negative (indicating dissatisfaction). The priority rank represents the ranking of average satisfaction values (lower the value, higher the rank). An assigned high rank indicates the criterion has the potential for improvement in order to attain higher satisfaction levels.

7.4.1 Client characteristics and perceptions

Client characteristics including sector, size or location may have a significant impact on satisfaction levels (refer to Chapter 6). Figure 7.4 provides the client satisfaction mean scores by client sectors.

The results revealed that both public and private sector clients are slightly dissatisfied with the service quality across all three categories provided by their service providers. This is in line with the latest evidence from Construction Excellence KPI zone which shows overall client satisfaction is not high enough and sometimes still at an appallingly low level (McMeeken, 2008). The UK construction industry has missed almost all targets set by Egan (1998) although it is moving in the right direction and slowly making progress (McMeeken, 2008).

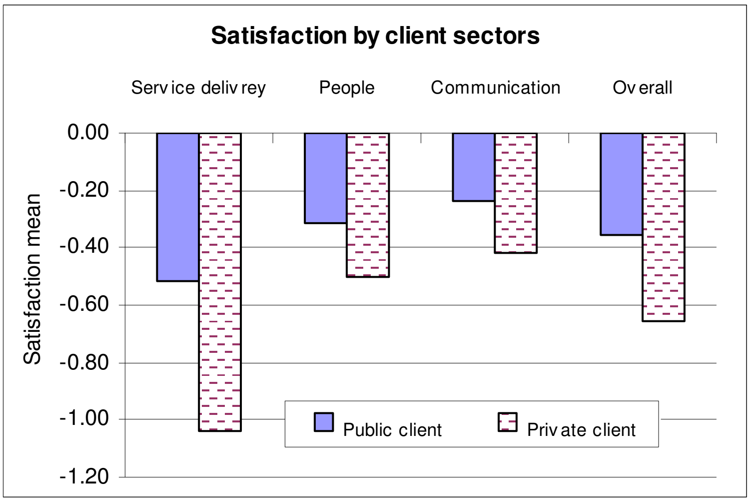


Figure 7.4 Satisfaction by client sectors

Public sector clients (S = -0.35) overall are slightly better satisfied than private ones (S = -0.65). An independent-samples t-test was conducted to compare the satisfaction levels of public and private sector clients (Cohen, 1988). There was no statistically significant difference for public and private sector client satisfaction (p= 0.093; t-test, 2-tailed, equal variances assumed). Nevertheless, the gaps between public and private client satisfaction vary across categories. For example, the gap in the category of communications is much smaller than in the category of service delivery.

These results are however slightly contrary to previous research findings which argued that public sector clients were less satisfied than private ones (Egan, 1998, 2002; Karna, 2004; Cheng *et al*., 2006). It was reported previously that public sector projects were not achieving what was expected and in contrast to private sector clients who could have more established partners, public sector clients operated in a situation where they had to follow legislative procurement that essentially narrows the criteria for selecting contractors (Al-Momani, 2000; Karna, 2004). These results may be due to the bias introduced by the samples of clients being surveyed.

Nevertheless, the industry wide shortage of suitably skilled and experienced people and the lack of sufficiently rigorous challenge to project issues and risks associated with strategic decisions made by the client in the early stages of projects are undermining the ability of clients from both public and private sector to improve their construction performance and may ultimately compromise the validity of their perceived satisfaction and project success.

7.4.2 The assessment of performance and importance

Factors of service quality provided by contractors and consultants to the clients were assessed through a range of criteria involving key aspects of the services provided. Mean values of importance (referred as 'Importance Mean (IM)' as in Table 7.11) and performance (referred as 'Performance Mean (PM)' as in Table 7.11) for the criteria as considered by the clients were assessed and priority ranks (PR) were provided (refer to Table 7.11). Average satisfaction represents the discrepancy between perceived levels of performance (P) and importance (I), that is, the subtraction of I from P (P - I). The value of average satisfaction may be positive (indicating high levels of satisfaction but possibly excessive effort), zero (indicating optimally satisfied) and negative (indicating dissatisfaction) (Martilla and James, 1977).

The results revealed the criteria which achieve the lowest scores of satisfaction mean (SM), that is to say, highest priority ranks (PR). Clients regarded ‘Meeting/exceeding client expectations’ (PR = 1) and ‘Delivery value for money’ (PR = 2) are the two most critical areas in need of improvement to satisfy clients, with ‘Speed of response’ (PR = 3) and effective communications with clients such as ‘Quality/timing of reports produced’ (PR = 4) being considered as top priorities amongst those with the highest rankings.

Table 7.11 Assessment of performance and importance

Criteria of service quality	Importance Mean (IM)	Performance Mean (PM)	Ave Satisfaction (SM)	Priority Rank (PR)
Service delivery				
Overall quality of service delivery and advice	4.47	3.80	-0.67	7
Comparing with other service providers you use	4.00	3.58	-0.42	18
Understanding your needs and business	4.26	3.80	-0.46	17
Problem solving	4.33	3.83	-0.50	14
Speed of response	4.29	3.55	-0.74	3
Technical accuracy	4.52	**3.92**	-0.60	9
Innovation in methods and approach	3.94	3.44	-0.50	14
Meeting/exceeding your expectations	**4.53**	3.64	-0.89	1
Health and safety awareness	**4.76**	**4.20**	-0.56	11
Delivering value for money	**4.67**	**3.87**	-0.80	2
People of service providers				
Qualification of people	3.71	3.85	0.14	27
Professional experience of people	4.42	**4.09**	-0.33	20
Providing right level of staffing	**4.45**	3.74	-0.71	5
Level of commitment team/central management	**4.48**	**3.92**	-0.56	11
Working with your staff and other consultants	**4.59**	3.88	-0.71	5
Friendliness	3.74	3.79	0.05	24
Accessibility	4.21	**3.89**	-0.32	21
Communications with clients				
Quality and timing of reports produced to you	**4.30**	**3.58**	-0.72	4
Regular dialogue on progress of the project with you	**4.42**	**3.83**	-0.59	10
Regular dialogue to establish dynamics of your business	3.68	3.27	-0.41	19
Good at listening	4.00	3.50	-0.50	14
Informing you on business issues which may affect you	3.91	3.38	-0.53	13
Regular mailings advising you of latest news/information	2.92	2.91	-0.01	23
Quality/usefulness of corporate entertainment	1.95	2.33	0.38	28
Quality/use of the service provider's corporate literature	2.44	2.55	0.11	25
Quality/use of the service provider's website/intranet	2.53	2.64	0.11	25
Making you understand of the service provider's capability	3.52	3.32	-0.20	22
The service provider's overall performance on service quality?	**4.41**	**3.79**	-0.62	8

The results represent key areas which have the highest potential for the service providers to improve their performance. That is, clients consider these to be of high importance while the performance of the service quality in these areas is lower than expected.

7.4.3 Client satisfaction

Satisfaction mean scores across the categories of assessment including service delivery, people and communications were calculated (refer to Table 7.12).

Table 7.12 Satisfaction mean scores

Categories of assessment	Importance Mean (IM)	Performance Mean (PM)	Satisfaction Mean (SM)
Service delivery	4.38	3.76	-0.61
People of service providers	4.23	3.88	-0.35
Communications	3.37	3.13	-0.24
Overall	4.41	3.79	-0.62

In general, the results revealed that clients were marginally dissatisfied (SM = -0.62) with the service quality being provided. However, the results of service providers' overall performance on service quality (PM = 3.79, out of 5) indicates that clients perceive the service quality as good and to be of a very high standard.

Nevertheless, it is recognised that the performance mean scores in all three categories (PM = 3.76, 3.88, 3.13 and 3.79 respectively) are slightly lower than the importance mean scores (IM = 4.38, 4.23, 3.37 and 4.41 respectively), which implies services are not meeting clients' expectations and hence there exists certain issues that have not been addressed properly by the service providers in terms of importance criteria. In particular, those with high importance mean scores but low performance mean scores, have a considerable impact on the client's perceived level of satisfaction. In general, the results are consistent with the results for levels of client satisfaction previously assessed (Cheng *et al*, 2006).

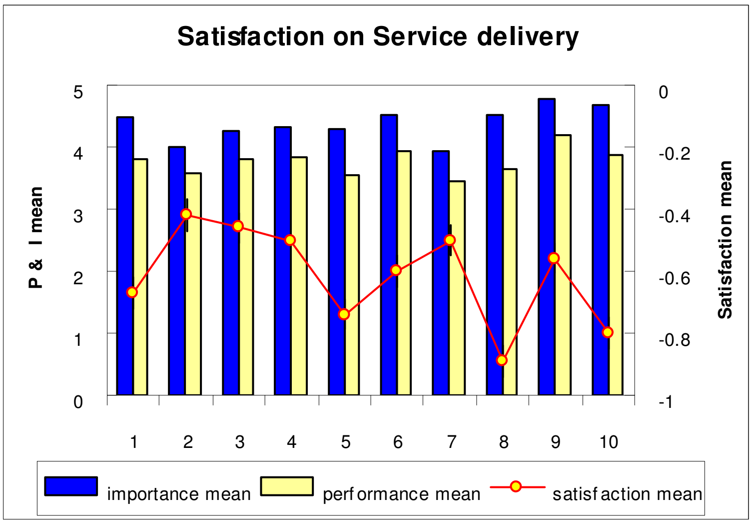
The relationship between perceived importance and performance of service quality was investigated using Pearson's product-moment Correlation Analysis. The analysis of overall service quality performance indicated there was a strong positive correlation between the two variables (r = 0.399, p= 0.01; two-tailed), with high levels of importance associated with high levels of performance that determines levels of client satisfaction.

The results suggested that only those criteria that are perceived as achieving both higher importance scores and higher performance scores would lead to higher satisfaction levels. Higher performance levels do not necessarily lead to higher levels of client satisfaction unless the client's perception on importance is appropriate. For example, 'Health & safety awareness' achieved the highest performance score (PM = 4.02), and yet a relatively very high importance score (IM = 4.76), leading to a marginal dissatisfaction (SM = -0.56) (refer to Table 7.11).

The following sections illustrate the results of the performance-importance analyses and satisfaction assessments under each category, namely, service delivery, people (of consultants) and communications. The left axis presents results of performance (P) and importance (I) means with the right axis presenting results of satisfaction mean (SM).

7.4.3.1 Service delivery

Figure 7.5 illustrates the satisfaction mean scores derived from the results of the service delivery sub-questions. 'Meeting/exceeding client expectations', that is to say, performance scores are equal or greater than those importance scores, and 'Delivering value for money' (for example, clients' believing or concluding that the goods/services received are worth the price paid and the combination of whole life costs and quality that meet the client's requirements) are identified as the most important aspects recognised by the clients in the assessment of service delivery. It is suggested that only those criteria associated with higher levels of performance will contribute to higher levels of client satisfaction.

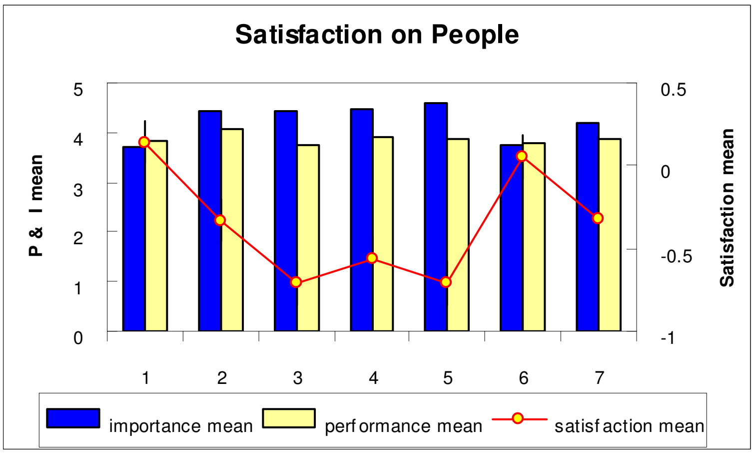


Keys:
1. Overall quality of service delivery and advice
2. Comparing with other service providers you use
3. Understanding your needs and business
4. Problem solving
5. Speed of response
6. Technical accuracy
7. Innovation in methods and approach
8. Meeting/exceeding your expectations
9. Health and safety awareness
10. Delivering value for money

Figure 7.5 Client satisfaction on service delivery

7.4.3.2 People of service providers

Satisfaction mean scores were derived from the results of the category of 'People of service providers' sub-questions (refer to Figure 7.6). 'Providing right level of staffing', for example, establish a team with appropriate qualification, experience and personal effectiveness and 'Levels of commitment' are the most important criteria recognised by clients. However, only those criteria that have high importance scores and higher levels of performance will lead to relatively higher levels of client satisfaction, for example, 'Professional experience'(IM = 4.42; PM = 4.09).



Keys:

1. Qualification of people
2. Professional experience of people
3. Providing right level of staffing
4. Level of commitment team/central management
5. Working with your staff and other consultants
6. Friendliness
7. Accessibility

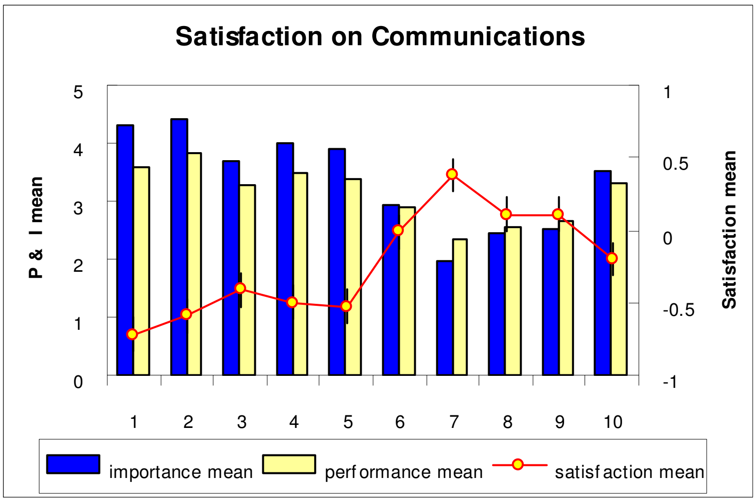
Figure 7.6 Client satisfaction on People of service providers

7.4.3.3 Communications with clients

Figure 7.7 showed the satisfaction mean scores derived from the results of the category of communications. Under this category, 'quality / timing of reports produced' (IM = 4.30; PM = 3.58) and 'Regular dialogue on progress with clients' (IM = 4.42; PM = 3.83) are regarded as the most critical criteria by the clients.

Communication has been a problematic issue for some time amongst project participants and has led to coordination problems in the UK construction industry (Tavistock, 1965; O'Brien and Al-Soufi, 1994; Wild, 2004). Previous research showed interactions between research professionals and project teams were limited and often inhibited project success (Gorse and Emmitt, 2004). Communication within project-based environments presents special challenges and different perspectives highlight the diversity of communication problems facing those working within the project-based environments (Dainty *et al,* 2006).

Some communication techniques such as the use of advertising consultants and the media can help to achieve enhanced communication with clients and increased efficiency (Namo and Fellows, 1993).



Keys:

1. Quality and timing of reports produced to you
2. Regular dialogue on progress of the project with you
3. Regular dialogue to establish dynamics of your business
4. Good at listening
5. Informing you on business issues which may affect you
6. Regular mailings advising you of latest news/information
7. Quality/usefulness of corporate entertainment
8. Quality/use of the service provider's corporate literature
9. Quality/use of the service provider's website/intranet
10. Making you understand of the service provider's capability

Figure 7.7 Client satisfaction on Communications

It was found that communication skills and client orientation play an important role in the overall satisfaction of the client (Ahmed and Kangari, 1995). Clients will only achieve higher levels of satisfaction when service providers achieve higher levels of performance against these criteria.

7.4.4 Impact of strategic decisions

A client's strategic decisions such as 'procurement' related strategic decisions cluster (SDC) including procuring an external consultant have been shown to have a significant impact on a client's own satisfaction (Kumaraswamy and Dissanayaka, 1998). Selecting a procurement route to suit a particular project is a key decision in the 'procurement' SDC (refer to Figure 7.3). The criteria clients adopt for choosing a consultant/contractor indicate that 'Deliver value for money' (IM = 4.53, EM = 3.95) was considered as the most important and the most effective criterion in the tender stage (refer to Chapter 6, Table 6.13), with 'Sector knowledge' (IM = 4.12) and

‘Business knowledge’ (IM = 3.97) being regarded very important criteria used to choose a preferred bidder.

Clients consider value for money as the most important aspect when procuring a consultant/contractor, which surprisingly showed somewhat discrepancy to the results of the assessment of client satisfaction on service delivery (refer to Table 7.11). Clients provided a relatively lower score of importance (IM = 4.53) for the former, compared to the results of the assessment of service delivery (IM = 4.67; refer to Table 7.11), indicating a lack of consistency and underlying subjective nature of client satisfaction assessment.

As previously discussed, importance has a strong correlation with performance which determines levels of client satisfaction. Higher level of importance meaning higher expectations, on strategic decisions, for example, procurement cluster, may lead to a higher level of performance and hence bring about a positive impact on client satisfaction.

7.4.5 Summary of client satisfaction assessment

Client satisfaction is a fundamental issue for construction participants who must constantly seek to improve their performance if they are to survive in the marketplace.

From the results of a UK-wide survey of construction clients, it is revealed that ‘Meeting/exceeding client expectations’, ‘Deliver value for money’ and ‘Health & safety awareness’ are the key performance attributes for service providers as perceived by clients. Clients consider effective communications including ‘Quality/timing of reports produced’ and ‘Regular dialogue with clients’ as being the most important criteria in determining their satisfaction levels. Moreover, the overall performance of service quality provided by service providers in these key areas and client strategic decisions make a significant contribution towards client satisfaction.

Aiming at an in-depth study of client satisfaction levels and then to use these findings to identify ways of improving the services provided by such service providers, the approach of this research has identified key performance attributes for service providers.

The results also facilitate the development of more detailed models that will investigate relationships between strategic decisions and client satisfaction and may provide practical solutions to client satisfaction problems in the construction industry and improve mutual communications between clients and their service providers and the project performance.

7.5 SUMMARY

This chapter has analysed various strategic decisions made by clients at different project stages. Statistical techniques including factor analysis and Pearson's correlation coefficients were employed for this purpose. Principle component analysis (PCA) has been undertaken to determine underlying representative strategic decisions.

The results of PCA indicated that strategic decisions across the project life cycle or life cycle strategies (LCS), are correlated and their effectiveness and importance perceived by clients vary in nature. The interpretation of the final solution was consistent with previous research findings. Based on the results of PCA analysis, strategic decisions made by clients can be presented as a smaller group of decisions. Various strategic decisions are re-categorised to an underlying group of decisions (strategic decision clusters), including Design approach SDC, Procurement SDC, Contracts SDC, Implementation SDC and Disposal SDC.

This chapter has also analysed the levels of client satisfaction. Results revealed that 'Meeting/exceeding client expectations', 'Deliver value for money' and 'Health & safety awareness' are the key performance attributes for service providers as perceived by clients. Clients consider effective communications including 'Quality/timing of reports produced' and 'Regular dialogue with clients' as being the most important criteria in determining their satisfaction levels. Moreover, the overall performance of service quality provided by service providers in these key areas and client strategic decisions make a significant contribution towards client satisfaction.

CHAPTER 8

MODELLING STRATEGIC DECISIONS AND CLIENT SATISFACTION

8.1 INTRODUCTION

As previously discussed, there is a strong correlation between strategic decisions and service quality and client satisfaction. However, the extent of the relationship between these variables and the predictability of one variable to another need further investigation. Multiple regression techniques will be adopted to explore the relationship between client satisfaction (the dependent variable) and strategic decisions (the independent variable) (refer to Chapter 5).

This chapter intends to explore the possible relationships between strategic decisions at each project stage and the levels of client satisfaction, and to develop models that relate strategic decisions and client satisfaction. Previous chapters (refer to Chapter 6) have established that strategic decisions vary across the project cycle and client satisfaction depends as much on the subject as on the timing of the decisions.

It is therefore necessary to explore the extent to which strategic decisions at different project stages coincide on the levels of client satisfaction. This chapter investigates the potential relationships between strategic decisions and client satisfaction to determine whether or not any significant association exists.

Models of the relationships are then developed using statistical techniques including multiple regression and presented in this chapter.

The purpose of these models is to help identify best practice in client strategic decision-making as well as the approach to improvement of service quality provided by service providers to the client.

8.2 MULTIPLE REGRESSION TECHNIQUES

Multiple regression is a family of multivariate techniques that is widely used in construction management related research and based on correlation but allows a more sophisticated exploration of the interrelationship among a set of variables (Edwards *et al*., 1999; Soetanto and Proverbs, 2002; Blyth *et al*., 2004). Correlation analysis is a very common statistical tool used in the field of construction research and has been utlised as an important step towards the development of regression model(s) (Hair *et al.*, 1998; Liu, 1999; Cheung *et al.* 2003). Pearson's product-moment correlation coefficient, represented by *r*, is usually computed. These statistics are appropriate when both variables are measured at an interval level (Trochim, 2006). The multiple regression equation takes the form:

$$y = b_1x_1 + b_2x_2 + ... + b_nx_n + c.$$

Where

Y – dependent variables

X – independent variables

b's - regression coefficients, representing the amount the dependent variable y changes when the corresponding independent changes 1 unit.

C - the constant, where the regression line intercepts the y axis, representing the amount the dependent y will be when all the independent variables are 0.

The standardised version of the B coefficients is the beta weights, and the ratio of the beta coefficients is the ratio of the relative predictive power of the independent variables. Associated with multiple regression is R^2, multiple correlation, which is the percent of variance in the dependent variable explained collectively by all of the independent variables.

Multiple regression can be used to address a variety of research questions and will provide information about the models developed as a whole (all sub-scales) and the relative contribution of each of the variables that make up the models (individual subscales). The results of the calculations indicate how well the prediction is and approximately how much of the variance of the outcome is accounted for by the 'best' linear combination of the predictors (Kerlinger and Lee, 2000). This is what makes the multiple regression model particularly appropriate in this research which seeks to examine the influence of various dimensions of strategic decisions (the independent variables) on each of client satisfaction factors (the dependent variable).

There are a number of different types of multiple regression analyses available depending on the nature of the research questions that need to be addressed, mainly including (Tabachnick and Fiddell, 2001):

- Standard or simultaneous
- Hierarchical or sequential
- Stepwise

Standard multiple regression is the most commonly used type of analysis (Pallant, 2005). With standard multiple regression all the independent variables (predictors) are entered into the equation simultaneously and each independent variable is evaluated in terms of it predictive power, over and above that offered by all the other independent variables. This approach is suitable when answers are sought on how much variance in a dependent variable the independent variable is able to explain as a group. This type of analysis will be used for modelling in this study as it addresses the research questions as discussed early in this Chapter.

Hierarchical multiple regression allows the independent variables to be entered into the equation in steps or blocks, with each independent variable being assessed in terms of what it adds to the predicted outcome of the dependent variable, after the previous variables have been controlled for. Both the overall model' predictability and the relative contribution of each block of variables are assessed. This type of analysis will be used to develop models which explore the impact of client characteristics on client satisfaction that was argued in previous research findings (Egan, 1998, 2002; Karna, 2004; Cheng *et al.*, 2006).

In Stepwise multiple regression a list of independent variables is provided and the SPSS programme will select which variable and decide the order it will enter into the equation based on a set of statistical criteria. There are some controversies in literature concerning its use and a number of problems reported with this type of analysis (Tabachnick and Fiddell, 2001). Stepwise approach is therefore not used in this research.

Multiple regression makes a number of key assumptions about the data and is one of the most stringent techniques about data violation. These assumptions must be met for the regression analysis to guarantee a model in which the actual errors in prediction are as a result of the real absence of a relationship among the variables (Hair *et al.*, 1998). These assumptions are mainly given as follows (Tabachnick and Fiddell, 2001):

- Sample size: should not be a small size e.g. minimum 15 subjects per predictor (Stevens, 1996)
- Multicollinearity and singularity: should not exist
- Outliers: should be removed if the numbers of outliers are substantial
- Normality, Linearity, Homoscedasticity, independence of residuals: residuals should be normally distributed and a reasonably straight line relationship

The aim of the developed models in this research is to address the questions that how well strategic decisions are able to predict service quality and hence client satisfaction, and /or if strategic decisions are the best predictors of client satisfaction amongst others including client characteristics and service quality.

8.3 MODELLING STRATEGIC DECISIONS AND SERVICE QUALITY

Standard multiple regression was adopted to develop models for exploration of relationships between strategic decisions and service quality which determines the levels of client satisfaction. Service quality comprises three main categories of criteria including service delivery, people of service providers and communications with client. A model will be developed for each category of service quality to reveal the interrelationships with strategic decisions.

Two research questions will be addressed in these models (refer to Chapter 5):

- What impact do strategic decisions have on service quality (client satisfaction)?
- What is the correlation between strategic decisions and service quality (client satisfaction)?

The results of these multiple regression models will reveal how well strategic decisions clusters (SDC) predict the perceived performance of service delivery and which the best predictor is among those independent variables.

8.3.1 Impact on service delivery

To identify which factors influence the service delivery outcomes, correlation analysis was applied to the data collected. Only those variables which show strong correlations were chosen to be put into the multiple regression models. Based on the results of correlation analysis, two strategic decisions which comprised 'Estimated costs' and 'Outline of project' were included as predictors (independent variables) and performance of overall service delivery (including 'Meeting client expectations') as the outcome variable (dependent variable). The standard multiple regression method was used and output was obtained (refer to Table 8.1).

Table 8.1 Correlations of performance of service delivery

		Performance of meeting client expectations	Effectiveness of estimated costs	Effectiveness of outline of project
Pearson Correlation	Performance of meeting client expectations	1.000	.464	.496
	Effectiveness of estimated costs	.464	1.000	.349
	Effectiveness of outline of project	.496	.349	1.000
Sig. (1-tailed)	Performance of meeting client expectations	.	.000	.000
	Effectiveness of estimated costs	.000	.	.005
	Effectiveness of outline of project	.000	.005	.
N	Performance of meeting client expectations	54	54	54
	Effectiveness of estimated costs	54	54	54
	Effectiveness of outline of project	54	54	54

8.3.1.1 Analyses of results

The results of correlation analyses suggested that 'Meeting client expectations' (representative subscale of 'Service delivery', dependent variables) showed a significant correlation (for example, when $p< .05$) with 'Effectiveness of outline of project' ($r = .496$, $p = .0005$) and 'Effectiveness of estimated costs' ($r = .464$, $p = .0005$) (independent variables). Where the relationship is positive, an increase in one variable will correspond with an increase in the other variable, and where the relationship is negative, an increase in one variable will correspond with a decrease in the other variable. These results indicate 'Outline of project' and 'Estimated costs' have a positively significant relationship with 'Service delivery', one of the key criteria in terms of client satisfaction assessment.

In certain cases, a correlation can be taken as evidence of a causal relationship, although even then it does not indicate precisely what the causal relationship might be. Causality can be assumed where there is a priori theory to suggest such a relationship. In the case of this research, such theories do exist as previously discussed. The correlation between the two independent variables ($r = .349$, $p = .005$) was less than 0.7 (Tabachnick and Fiddell, 2001), therefore the variables will be retained. It can further be inferred from the results that there exist sufficient evidence of linear relationships to proceed with the regression modelling.

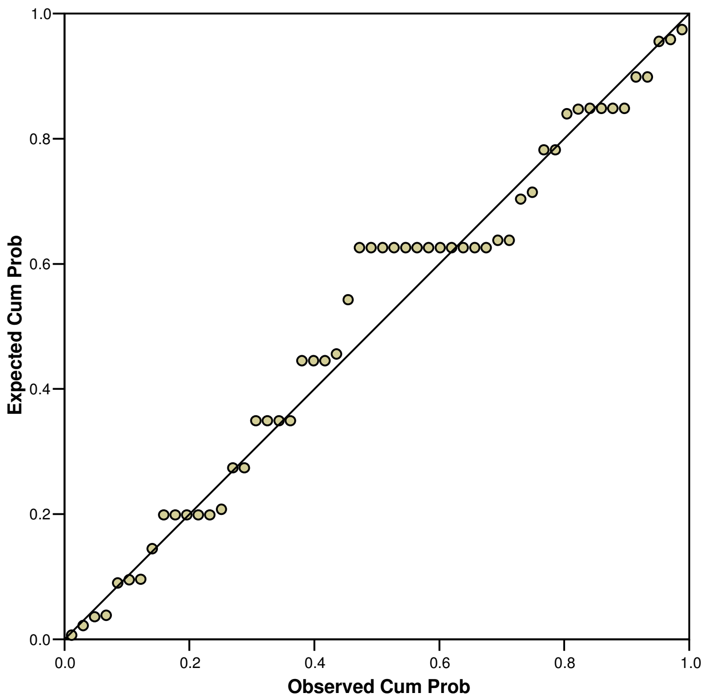
By performing 'collinearity diagnostics' on variables, problems with multi-collinearity that may not be evident in the correlation matrix can be picked up. The given Tolerance value, calculated using the formula $1- R^2$ for each variable, which indicates how much of the variability of the independent variables is not explained by the other independent variables in the model, should be greater than 0.10 to determine the non-presence of multicollinearity in the model (ibid). The Variance Inflation Factor (VIF) which is just the inverse of the Tolerance value should be accordingly less than 10 to satisfy the assumption. In the model the Tolerance value for each variable is .878 (> .10), and VIF value is 1.139 (< 10) (refer to Table 8.2), indicating that the data have not violated the multicollinearity assumption. These results are not surprising, as the Pearson's correlation coefficient between these two variables was only 0.349 as previously discussed (refer to Table 8.1)

Table 8.2 Coefficients (a) for service delivery

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.323	.468		2.827	.007	.383	2.262					
	Effectiveness of estimated costs	.294	.107	.331	2.734	.009	.078	.509	.464	.358	.311	.878	1.139
	Effectiveness of outline of project	.334	.107	.380	3.132	.003	.120	.548	.496	.402	.356	.878	1.139

a Dependent Variable: Performance of meeting client expectations

The assumption for normality and linearity of data can be checked by inspecting the residuals scatter plot and normal P-P plot of the regression standardised residuals. No major deviation from normality would see a reasonably straight diagonal line (for P-P plot) and a rectangular shape of distribution with most of scores concentrated in the centre (for scatter plot). The results from the model indicated a reasonably straight diagonal line and a normally distributed scatterplot (refer to Figure 8.1 and Figure 8.2). The max value for Cook's Distance is .211 (<1), suggesting no major problems with standardised residual values (refer to Table 8.3).



Dependent variable: Performance of 'Meeting client expectations'

Figure 8.1 Normal P-P plot of regression standardised residual for 'service delivery'

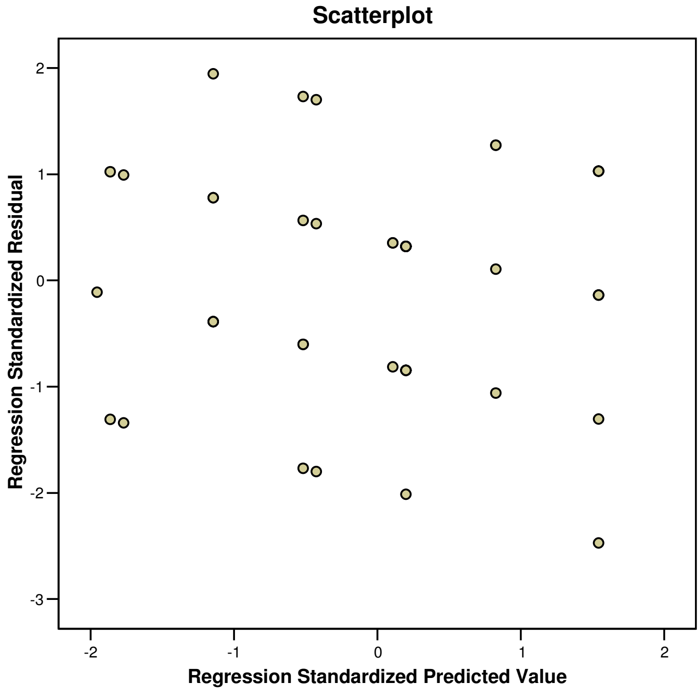


Figure 8.2 Scatterplot of regression standardised residuals for 'service delivery'

Table 8.3 Residuals Statistics (a) for service delivery

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.58	4.46	3.67	.521	54
Std. Predicted Value	-2.091	1.525	.000	1.000	54
Standard Error of Predicted Value	.106	.335	.165	.053	54
Adjusted Predicted Value	2.59	4.49	3.66	.528	54
Residual	-1.833	1.461	.000	.722	54
Std. Residual	-2.490	1.984	.000	.981	54
Stud. Residual	-2.517	2.025	.002	1.008	54
Deleted Residual	-1.872	1.522	.003	.763	54
Stud. Deleted Residual	-2.663	2.091	.001	1.027	54
Mahal. Distance	.123	9.976	1.963	2.083	54
Cook's Distance	.000	.212	.019	.035	54
Centered Leverage Value	.002	.188	.037	.039	54

a Dependent Variable: Performance of meeting client expectations

The selected predictors were ‘Effectiveness of outline of projects’ and ‘Effectiveness of estimated costs’ (representative subscales of ‘Design Approach’ strategic decisions cluster and ‘Procurement’ strategic decisions cluster). The value of R^2 for the model generated is .342, implying that the model generated (which includes ‘Effectiveness of outline of projects’ and ‘Effectiveness of estimated costs’) explains 34.2% of the variance in the performance of service delivery (which includes performance of meeting client expectations) (details see the Appendix). The value of R^2 includes the unique variance explained by each variable and also that shared. In this model the two independent variables are reasonably strongly correlated ($r = .349$ as shown in the correlation table); therefore there is a lot of shared variance that is statistically removed when the two variables are both included in the model. This R^2 value indicates a quite respectable result when compared to some of those reported in previous research (Pallant, 2005; Ankrah, 2007).

Considering a relatively small sample involved and the optimistic overestimation of the true value in the population the R^2 value presented, the Adjusted R^2 value provides a ‘corrected’ figure and better estimate of the true population value (Tabachnick and Fiddell, 2001). The results shows the Adjusted R^2 value is .316, indicating ‘Design Approach’ and ‘Procurement’ strategic decisions clusters explain 31.6% of the variance of the performance of service delivery. The results from the analysis of variance (ANVOA) statistics showed the model reached statistical significance (Sig. $p = .0005$).

The standardised coefficients Beta values, which compares the contribution of each independent variable on the basis of which values for each of the different variables have been converted to the same scale so that comparison can be done, are .380 for ‘Effectiveness of’ outline of project’ and .331 for ‘Effectiveness of estimated costs’ (Refer to Table 8.3). This means that ‘Effectiveness of’ outline of project’ makes the stronger contribution than ‘Effectiveness of estimated costs’ to explaining the dependent variable (performance of service delivery).

The squared value of the Part correlation coefficients indicates the contribution of a variable to the total R^2 value and tells how much of the total variance in the dependent variable is uniquely explained by the variable (ibid). The variables of

‘Effectiveness of outline of projects’ and ‘Effectiveness of estimated costs’ have a Part correlation coefficient of .356 and .311 respectively (refer to Table 8.2), which squared give .127 and .097 accordingly, indicating a unique contribution of 13% and 10% to the explanation of variance in perceived performance of service delivery.

8.3.1.2 Discussions

The results of the analyses presented above allow answers to the two questions raised at the beginning of this section. The developed model, which includes ‘Effectiveness of outline of projects’ (of the ‘Design Approach’ strategic decisions cluster) and ‘Effectiveness of estimated costs’ (of the ‘Procurement’ strategic decisions cluster), explain 34.2% (or 31.6% if R^2 adjusted) of the variance in perceived performance of service delivery, a key category of service quality being provided to the client (Question 1). The variables are statistically strongly correlated (refer to Table 8.1) (Question 2). Of these two independent variables, ‘Effectiveness of outline of project’ makes the largest unique contribution (beta = .380) than ‘Effectiveness of estimated costs’ (beta = .331).

In practical terms, the decision on a procurement route is the main focus of client strategic decisions at the pre-design stage of a project (Naoum, 1994; Kumaraswamy and Dissanayaka, 1998). ‘Outline of project’ (one of the key subscales of ‘Procurement’ SDC) specifies client needs and requirements via developed project briefing and outline design. After preliminary designs and costing of the possible solutions, the client needs to make a decision that any preferred solution is feasible and involves briefing and identifying user needs/ expectations, and approving outline designs. The designers who are delivering design services to, and interacting with the client will be interpreting in detail the client's requirements. The client decides later on if the design is acceptable and is an adequate interpretation of the client's requirements. ‘Procurement’ SDC (including ‘Outline of project’) therefore becomes one of the most important decisions a client has to make at the pre-design stage which has the strongest impact on service delivery of service providers including designers (CE, 2004).

The results are also supported by Zeithaml’s (1988) findings that satisfaction is a value-dependent phenomenon representing the ratio of perceived quality (for example, 'Service delivery') relative to price (for example, 'Estimated costs') and therefore dependent on price. 'Estimated cost' of a project is one of the key decisions a client has to make at the early stage and a factor that significantly affects the levels of client satisfaction (BSRIA, 2003; RICS, 2004).

8.3.2 Impact on performance of service providers' people

To identify which factors influence the service delivery outcomes, correlation analysis was applied to the data collected. Only those variables which show strong correlations were chosen to be put into the multiple regression models.

Based on the results of correlation analysis, two strategic decisions which comprised 'Details of project' and 'Life cycle costing' were included as predictors (independent variables) and performance of service providers' people (including 'Experience') as the outcome variable (dependent variable).

The standard multiple regression method was used and output was obtained (refer to Table 8.4).

Table 8.4 Correlations of performance of service providers' people

		Performance of experience	Effectiveness of details of project	Effectiveness of life cycle costing
Pearson Correlation	Performance of experience	1.000	.450	.479
	Effectiveness of details of project	.450	1.000	.228
	Effectiveness of life cycle costing	.479	.228	1.000
Sig. (1-tailed)	Performance of experience	.	.000	.000
	Effectiveness of details of project	.000	.	.048
	Effectiveness of life cycle costing	.000	.048	.
N	Performance of experience	54	54	54
	Effectiveness of details of project	54	54	54
	Effectiveness of life cycle costing	54	54	54

8.3.2.1 Analyses of results

Correlation analyses suggested that 'Professional experience of people' (representative subscale of 'People of service providers', dependent variables) showed a large correlation with 'Effectiveness of life cycle costing' ($r = .479$, $p = .0005$) and 'Effectiveness of details of project' ($r = .450$, $p = .0005$) (independent variables). These results indicate 'Implementation' strategic decisions cluster (SDC) (including 'Life cycle costing') and 'Design Approach' SDC including 'Details of project' have a positively significant relationship with the 'People of service providers' dimension of service quality which ultimately determines client satisfaction.

In certain cases, a correlation can be taken as evidence of a causal relationship, although even then it does not indicate precisely what the causal relationship might be. The correlation between the two independent variables ($r = .228$, $p = .048$) was less than 0.7 (Tabachnick and Fiddell, 2001), therefore the variables will be retained. It can further be inferred from the results that there exist sufficient evidence of linear relationships to proceed with the regression modelling.

By performing 'collinearity diagnostics' on variables, the given Tolerance value, calculated using the formula $1- R^2$ for each variable, which indicates how much of the variability of the independent variables is not explained by the other independent variables in the model, should be greater than 0.10 to determine the no presence of multicollinearity in the model (ibid). The Variance Inflation Factor (VIF) which is just the inverse of the Tolerance value should be accordingly less than 10 to satisfy the assumption. In the model the Tolerance value for each variable is .948 (> .10), and VIF value is 1.055 (< 10) (refer to Table 8.5), indicating that the data have not violated the multicollinearity assumption. These results are in line with the Pearson's correlation coefficient between these two variables was only 0.228.

Table 8.5 Coefficients (a) for service providers' people

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.064	.410		5.028	.000	1.240	2.888					
	Effectiveness of details of project	.308	.099	.359	3.100	.003	.108	.507	.450	.398	.349	.948	1.055
	Effectiveness of life cycle costing	.239	.070	.397	3.433	.001	.099	.379	.479	.433	.387	.948	1.055

a Dependent Variable: Performance of professional experience

The assumption for normality and linearity of data can be checked by inspecting the residuals scatter plot and normal P-P plot of the regression standardised residuals. No major deviation from normality would see a reasonably straight diagonal line (for P-P plot) and a rectangular shape of distribution with most of scores concentrated in the centre (for scatter plot). The results from the model indicated a reasonably straight diagonal line (refer to Figure 8.3) and a normally distributed scatterplot (refer to Figure 8.4). The maximum value for Cook's Distance is .155 (<1), suggesting no major problems with standardised residual values (refer to Table 8.6).

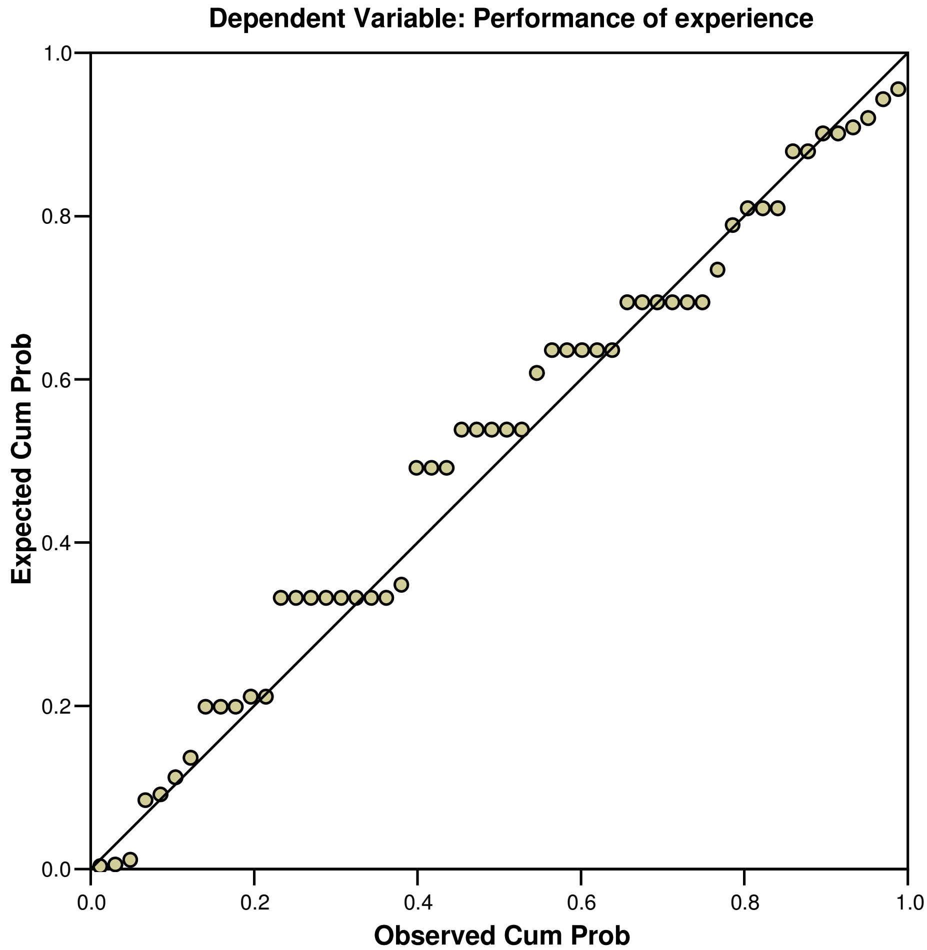


Figure 8.3 Normal P-P plot of regression standardised residual for 'service providers' people'

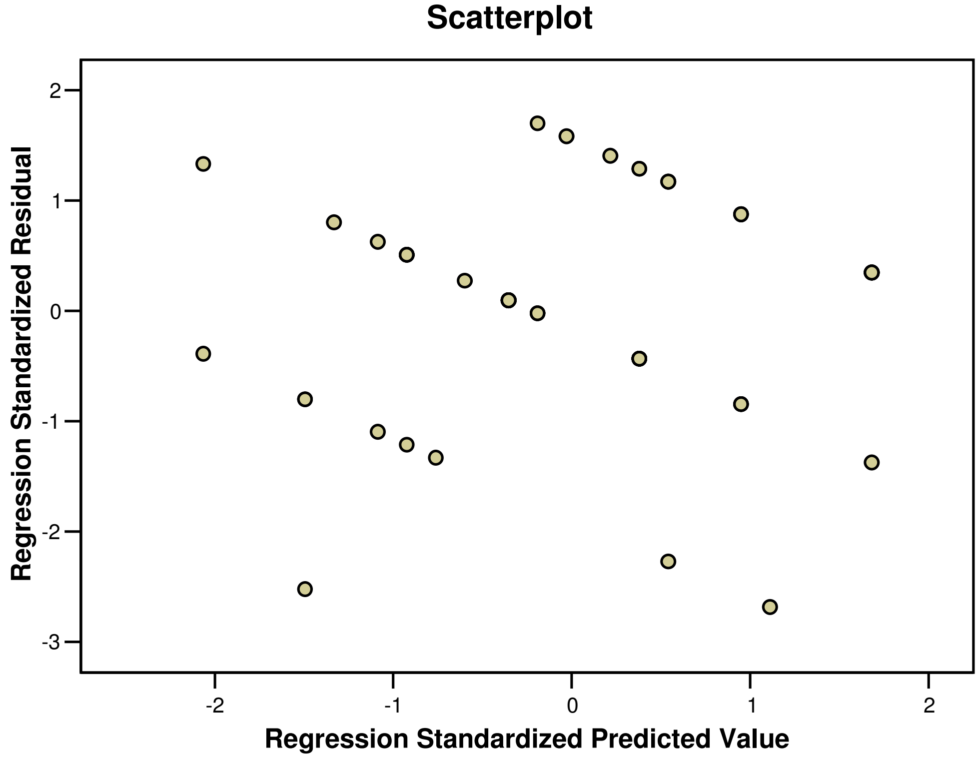


Figure 8.4 Scatterplot of regression standardised residuals for 'service providers' people'

Table 8.6 Residuals Statistics (a) for 'service providers' people'

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.23	4.80	4.09	.420	54
Std. Predicted Value	-2.064	1.681	.000	1.000	54
Standard Error of Predicted Value	.085	.249	.131	.039	54
Adjusted Predicted Value	3.13	4.86	4.09	.423	54
Residual	-1.559	.988	.000	.570	54
Std. Residual	-2.685	1.701	.000	.981	54
Stud. Residual	-2.765	1.723	.002	1.013	54
Deleted Residual	-1.654	1.036	.002	.608	54
Stud. Deleted Residual	-2.970	1.758	-.006	1.041	54
Mahal. Distance	.152	8.747	1.963	1.809	54
Cook's Distance	.000	.155	.023	.039	54
Centered Leverage Value	.003	.165	.037	.034	54

a Dependent Variable: Performance of experience

‘Effectiveness of life cycle costing’ and ‘Effectiveness of details of project’ were the selected predictors (representing subscales of the ‘Implementation’ SDC and the ‘Design Approach’ SDC respectively). The value of R^2 for the model generated is .352, implying that the model generated (which includes ‘Effectiveness of life cycle costing’ and ‘Effectiveness of details of project’) explains 35.2% of the variance in the performance of service delivery (which includes performance of meeting client expectations) (details see the Appendix). The value of R^2 includes the unique variance explained by each variable and also that shared. In this model the two independent variables are reasonably strongly correlated (r = .228); therefore there is a lot of shared variance that is statistically removed when the two variables are both included in the model. This R^2 value of .352 indicates a quite respectable result when compared to some of those reported in previous research (Pallant, 2005; Ankrah, 2007).

Considering a relatively small sample involved and the optimistic overestimation of the true value in the population the R^2 value presented, the Adjusted R^2 value provides a ‘corrected’ figure and better estimate of the true population value (Tabachnick and Fiddell, 2001). The results shows the Adjusted R^2 value is .327, indicating ‘Implementation’ and ‘Design Approach’ strategic decisions clusters explain 32.7% of the variance of the performance of service delivery. The results from the ANVOA statistics showed the models were statistically significant (Sig. p = .0005).

The standardised coefficients Beta values, which compares the contribution of each independent variable on the basis of which values for each of the different variables have been converted to the same scale so that comparison can be done, are .397 for ‘Effectiveness of’ life cycle costing’ and .359 for ‘Effectiveness of details of project’ (refer to Table 8.5). This means that ‘Effectiveness of life cycle costing’ makes a stronger contribution than ‘Effectiveness of details of project’ to explaining the dependent variable (performance of People of service providers).

The squared value of the Part correlation coefficients indicates the contribution of a variable to the total R^2 value and tells how much of the total variance in the dependent variable is uniquely explained by the variable (ibid). The variables have a Part correlation coefficient of .387 and .349 respectively (refer to Table 8.5), which squared give .150 and .122 accordingly, indicating a unique contribution of 15% and 12% to the explanation of variance in perceived performance in terms of service providers' people.

8.3.2.2 Discussions

The results of the analyses presented above allow answers to the two questions raised at the beginning of this section. The developed model, which includes 'Effectiveness of life cycle costing' and 'Effectiveness of details of project' (representing the Implementation strategic decisions cluster and the Design Approach strategic decisions cluster), explain 35.2% (or 32.7% if R^2 adjusted) of the variance in perceived performance of service providers' People, a key category of service quality being provided to the client (Question 1). The variables are reasonably strongly correlated (refer to Table 8.4) (Question 2). Of these two independent variables, 'Life cycle costing' makes the largest unique contribution (beta = .397) than 'Details of project' (beta = .350).

The consideration of 'Life cycle costing' by a client could facilitate effective decision-making among a number of competing alternatives across different stages of a project and an established framework will allow feedback of information from occupied buildings to the design process (Kishk *et al.*, 2003). The framework has most potential during the early project stage as almost all options were open to consideration (Griffin, 1993). The performance of service providers' people (including their professional experience) plays an important role in the process of feedback. These results are further supported by the fact that the life cycle costing approach is currently used extensively in PFI projects and public sector procurement in which experienced professionals are more likely to provide a satisfactory service to the client (Clift and Bourke, 1999).

Client decisions on 'Details of project' set down clearly their project objectives and the consultants accordingly develop the design and achieve coordination with all technical design problems resolved and statutory consents checked. It is at the final proposal and design stage that all various sub-systems of a building including architectural, structural and M&E disciplines need to be well co-ordinated. Conflicting objectives leading to unsatisfactory performance of service quality can arise because of differences in aspirations of the various parties involved in the project (Masterman, 2002). It is evident that the client must clearly define and specify their project objectives and the performance of service providers' people and the project success was dependent upon the client's effectiveness in discharging their strategic planning and management responsibility (Ward, 1991; Cleland, 1994). Strategic decisions on 'Detail of project' by the client are to provide product information sufficient to enable the subsequent tender process and the balance of information required under the building contract.

8.3.3 Impact on communications

Standard multiple regression was adopted to develop models for exploration of relationships between strategic decisions and service quality. To identify which factors influence the service delivery outcomes, correlation analysis was applied to the data collected. Only those variables which show strong correlations were chosen to be put into the multiple regression models.

Based on the results of correlation analysis, two strategic decisions which comprised 'Coordination' and 'Maintenance strategy' were included as predictors (independent variables) and performance of 'Communications with clients' (including 'Reports') as the outcome variable (dependent variable). The standard multiple regression method was used and output was obtained (refer to Table 8.7).

8.3.3.1 Analyses of results

The results of correlation analyses suggested that 'Performance of reports to client' (representative subscale of 'Communications with client', dependent variables) showed a significant correlation with 'Effectiveness of maintenance strategy' ($r = .542$, $p = .0005$) and 'Effectiveness of Coordination' ($r = .445$, $p = .0005$)

(independent variables). Where the relationship is positive, an increase in one variable will correspond with an increase in the other variable, and where the

Table 8.7 Correlations for performance of communications

		Performance of reports	Effectiveness of coordination	Effectiveness of maintenance strategy
Pearson Correlation	Performance of reports	1.000	.445	.542
	Effectiveness of coordination	.445	1.000	.312
	Effectiveness of maintenance strategy	.542	.312	1.000
Sig. (1-tailed)	Performance of reports	.	.000	.000
	Effectiveness of coordination	.000	.	.011
	Effectiveness of maintenance strategy	.000	.011	.
N	Performance of reports	54	54	54
	Effectiveness of coordination	54	54	54
	Effectiveness of maintenance strategy	54	54	54

relationship is negative, an increase in one variable will correspond with a decrease in the other variable. These results indicate 'Implementation' strategic decisions cluster (including 'Maintenance strategy') and 'Design Approach' SDC (including 'Coordination') have a positively significant relationship with the 'Communications with client' dimension of service quality which ultimately determines client satisfaction.

Causality can be assumed where there is a priori theory to suggest a correlation exists. In the context of this research, such theories do exist as previously discussed. According to Tabachnick and Fiddell (2001), if the correlation between two independent variables was less than 0.7, the variables can be retained. In this research, the coefficient r is .312 ($p = .011$), the variables are therefore retained. It is further inferred from the results that there exist sufficient evidence of linear relationships to proceed with the regression modelling.

Problems with multi-collinearity that may not be evident in the correlation matrix can be picked up by performing ‘collinearity diagnostics’ on variables. The given Tolerance value, calculated using the formula 1- R^2 for each variable, should be greater than 0.10 to determine the non-presence of multicollinearity in the model (ibid). The Variance Inflation Factor (VIF) which is just the inverse of the Tolerance value should be accordingly less than 10 to satisfy the assumption. In this model the Tolerance value for each variable is .903 (> .10), and VIF value is 1.103 (< 10) (refer to Table 8.8), indicating that the data have not violated the multicollinearity assumption. These results are supported by the Pearson’s correlation coefficient between these two variables which was only 0.312 (refer to Table 8.7).

The assumption for normality and linearity of data can be checked by inspecting the residuals scatter plot and normal P-P plot of the regression standardised residuals. No major deviation from normality would see a reasonably straight diagonal line (for P-P plot) and a rectangular shape of distribution with most of scores concentrated in the centre (for scatter plot). The results from the model indicated a reasonably straight diagonal line and a normally distributed scatterplot (refer to Figure 8.5 and Figure 8.6). The max value for Cook’s Distance is .198 (<1), suggesting no major problems with standardised residual values (refer to Table 8.9).

The selected predictors were ‘Effectiveness of maintenance strategy’ and ‘Effectiveness of coordination’ (representative subscales of the ‘Implementation’ strategic decisions cluster and the ‘Design Approach’ strategic decisions cluster). The value of R^2 for the model generated is .378, implying that the model generated (which includes ‘Effectiveness of maintenance strategy’ and ‘Effectiveness of coordination’) explains 37.8% of the variance in the performance of service delivery (which includes performance of meeting client expectations) (details see the Appendix).

Table 8.8 Coefficients (a) for communications with clients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.096	.490		2.239	.030	.113	2.079					
	Effectiveness of coordination	.310	.118	.305	2.625	.011	.073	.547	.445	.345	.290	.903	1.108
	Effectiveness of maintenance strategy	.369	.096	.447	3.847	.000	.177	.562	.542	.474	.425	.903	1.108

a Dependent Variable: Performance of reports

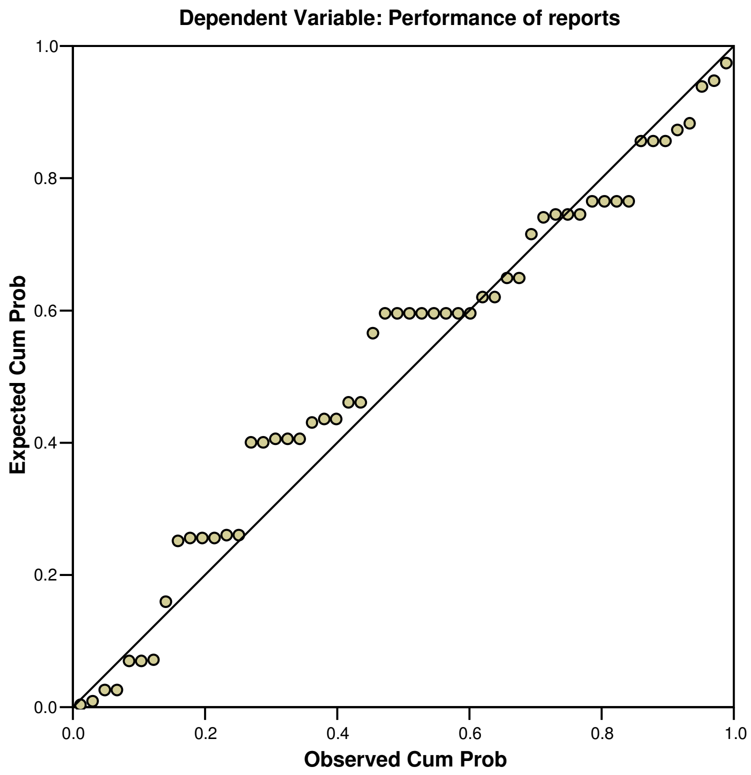


Figure 8.5 Normal P-P plot of regression standardised residual for 'communications'

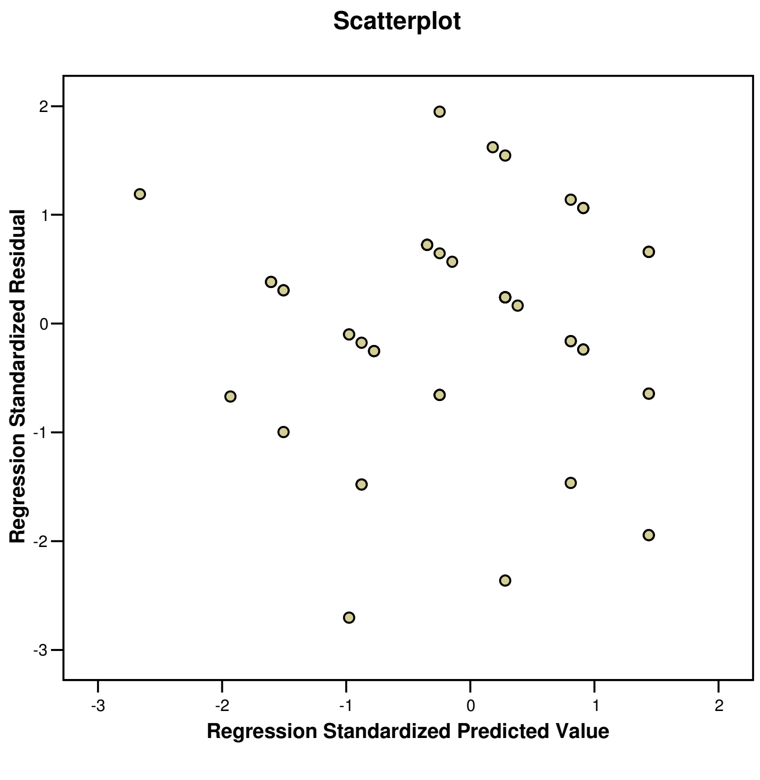


Figure 8.6 Scatterplot of regression standardised residuals for 'communications'

Table 8.9 Residuals Statistics (a) for communications

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.09	4.49	3.65	.587	54
Std. Predicted Value	-2.661	1.440	.000	1.000	54
Standard Error of Predicted Value	.109	.333	.173	.054	54
Adjusted Predicted Value	1.92	4.59	3.65	.594	54
Residual	-2.075	1.496	.000	.753	54
Std. Residual	-2.704	1.949	.000	.981	54
Stud. Residual	-2.804	1.987	.000	1.008	54
Deleted Residual	-2.232	1.554	.000	.796	54
Stud. Deleted Residual	-3.019	2.048	-.008	1.035	54
Mahal. Distance	.080	8.965	1.963	2.002	54
Cook's Distance	.000	.198	.019	.034	54
Centered Leverage Value	.002	.169	.037	.038	54

a Dependent Variable: Performance of reports

Considering a relatively small sample involved and the optimistic overestimation of the true value in the population the R^2 value presented, the Adjusted R^2 value provides a 'corrected' figure and better estimate of the true population value (Tabachnick and Fiddell, 2001). The results shows the Adjusted R^2 value is .354, indicating 'Design Approach' and 'Implementation' strategic decisions clusters explain 35.4% of the variance of the performance of service delivery. The results from the ANVOA statistics showed the model reached statistical significance (Sig. p = .0005).

The standardised coefficients Beta values, which compares the contribution of each independent variable on the basis of which values for each of the different variables have been converted to the same scale so that comparison can be done, are .447 for 'Effectiveness of' maintenance strategy' and .305 for 'Effectiveness of coordination' (Refer to Table 8.8). This means that 'Effectiveness of' outline of project' makes a stronger contribution than 'Effectiveness of estimated costs' to explaining the dependent variable (performance of Communications with client).

The squared value of the Part correlation coefficients indicates the contribution of a variable to the total R^2 value and tells how much of the total variance in the dependent variable is uniquely explained by the variable (ibid). The variables of 'Effectiveness of maintenance strategy' and 'Effectiveness of coordination' have a Part correlation coefficient of .425 and .290 respectively (refer to Table 8.8), which squared give .181 and .084 accordingly, indicating a unique contribution of 18% and 8% to the explanation of variance in perceived performance of reports produced to the client.

8.3.3.2 Discussions

The results of the analyses presented above allow answers to the two questions raised at the beginning of this section. The developed model, which includes 'Effectiveness of maintenance strategy' and 'Effectiveness of coordination' (representing the 'Implementation' SDC and the 'Design Approach' SDC), explain 37.8% (or 35.4% if R^2 adjusted) of the variance in perceived performance of Communications with clients, one of the key category of service quality being provided to the client (Question 1). The results shows the variables are statistically strongly correlated (refer to Table 8.8) (Question 2). Of these two independent variables, 'Effectiveness of maintenance strategy' makes the largest unique contribution (beta = .447) than 'Effectiveness of coordination' (beta = .305).

Building maintenance accounts for over half the UK construction industry's output and two thirds of the total contracts let (Lee and Wordsworth, 2001). Increasing pressure to prolong the useful life of a building without compromising the objectives of maintenance has led to great interests in methods of integrated maintenance management. Client decisions on maintenance strategy are to determine the maintenance policy that ensures a specified average quality level on building elements, for example, masonry, pointing, window frames, painting of buildings and mechanical & electrical equipments, at minimal cost and enable the client to produce a trade-off curve between overall quality level and the minimum required level of maintenance costs (Van and Dekker, 1998). Developed decision models can be adopted for rationalising building maintenance at a strategic level and as management instrument to determine and allocate budgets.

As an alternative to budget-driven maintenance strategies, a new approach to selecting an appropriate maintenance strategy, which relies on determining the consequences of failure of every item in the building and determining a suitable strategy for each one, was developed (Horner *et al*., 1997). This method will help maintenance service providers to reduce the cost of maintenance while preserving thehealth & safety and satisfaction of the client.

The quality of communications with client (for example, reports and other services document), is regarded as the most important service quality (and satisfaction) criteria by the clients (Wild, 2004; Cheng *et al,* 2006). Communication has led to coordination problems in the UK construction industry and has remained a problematic issue amongst project participants (Tavistock, 1965; Dainty *et al,* 2006). Whenever maintenance strategy is being established and coordination issues are being addressed, effective communications need to take place between the client and the service providers. Limited communication interactions between the project team (for example, between the client and the service provider) often inhibited the quality of services and hence the project success (Gorse and Emmitt, 2004). Clients will only achieve higher levels of satisfaction when service providers achieve higher levels of performance on communications with client (Ahmed and Kangari, 1995). Communication skills and client orientation play an important role in the overall satisfaction of the client.

8.4 MODELLING SERVICE QUALITY AND CLIENT SATISFACTION

The contribution of strategic decisions clusters to explaining the variance of service quality and client satisfaction vary on different aspects. As discussed in previous sections, subscales of the SDC have been identified which have showed to have a significant impact on various criteria of service quality and satisfaction (refer to Section 8.3).

8.4.1 Impact of strategic decisions on overall service quality

Standard multiple regression analysis was applied to the data with overall perceived service quality as dependent variable and all key strategic decisions clusters (SDC) identified previously as predictors, including:

- ‘Outline of project’,

- ‘Estimated costs’,
- ‘Life cycle costing’,
- ‘Details of project’,
- ‘Maintenance strategy’ and
- ‘Coordination’

8.4.1.1 Analyses of results

Results revealed that ‘Details of project’ showed only a small correlation (r = .285) with the ‘Overall service quality’, with ‘Maintenance strategy’ and ‘Estimated costs’ showing standardised beta values of .052 and .094 respectively (details see the Appendix). These results suggest that the above three variables are not suitable to be retained as independent variables to predict the variance of the perceived overall service quality (the dependent variable) and therefore were removed from the list of independent variables.

Modified models were then developed using standard multiple regression on the basis of which three independent variables including ‘Coordination’, ‘Life cycle costing’ and ‘Outline of project’ were entered with ‘Overall service quality’ as dependent variable. Table 8.10 showed the correlation matrix.

Correlation analyses indicated that ‘Performance of overall service quality’ (representative subscale of ‘service quality’, dependent variables) showed a large correlation with ‘Effectiveness of coordination’ (r = .574, p = 0.0005), ‘Effectiveness of life cycle costing’ (r = .527, p = .0005) and ‘Effectiveness of outline of project’ (r = .552, p = .0005) (independent variables). These results revealed that ‘Design Approach’ SDC (including Coordination), ‘Procurement’ SDC (including Outline of project) and ‘Implementation’ SDC (including ‘life cycle costing’) have a positively significant relationship with the ‘Overall service quality’ which ultimately determines client satisfaction.

Table 8.10 Correlations for overall service quality

		Performance of overall service quality	Effectiveness of coordination	Effectiveness of life cycle costing	Effectiveness of outline of project
Pearson Correlation	Performance of overall service quality	1.000	.574	.527	.552
	Effectiveness of coordination	.574	1.000	.347	.419
	Effectiveness of life cycle costing	.527	.347	1.000	.601
	Effectiveness of outline of project	.552	.419	.601	1.000
Sig. (1-tailed)	Performance of overall service quality	.	.000	.000	.000
	Effectiveness of coordination	.000	.	.005	.001
	Effectiveness of life cycle costing	.000	.005	.	.000
	Effectiveness of outline of project	.000	.001	.000	.
N	Performance of overall service quality	54	54	54	54
	Effectiveness of coordination	54	54	54	54
	Effectiveness of life cycle costing	54	54	54	54
	Effectiveness of outline of project	54	54	54	54

The correlation amongst the three independent variables (r = .347, .419, .601) was less than 0.7 therefore the variables will be retained and considered appropriate to proceed with the regression modelling (Tabachnick and Fiddell, 2001).

The Tolerance values given by 'collinearity statistics' for variables are greater than .10, and VIF values are less than 10 (refer to Table 8.11), indicating that the data have not violated the multicollinearity assumption.

Results from inspection of the residuals scatter plot and normal P-P plot of the regression standardised residuals showed that a reasonably straight diagonal line (for P-P plot) and a rectangular shape of distribution (details see the Appendix) with most of scores concentrated in the centre (for scatter plot). The maximum value for Cook's Distance is .424 (<1), suggesting no major problems with standardised residual values (refer to the Appendix).

'Coordination', 'Life cycle costing' and 'Outline of project' were the selected predictors (representing subscales of the Design Approach SDC, the Implementation SDC and the Procurement SDC respectively). The value of R^2 for the model generated is .485, implying that the model generated explains 48.5% of the variance in the perceived overall service quality (details see the Appendix), a respectful result.

Considering a relatively small sample involved and the optimistic overestimation of the true value in the population the R^2 value presented, it is appropriate to report the Adjusted R^2 value which provides a 'corrected' figure and better estimate of the true population value (Tabachnick and Fiddell, 2001). The results shows the Adjusted R^2 value is .455, indicating the Design Approach SDC, the Implementation SDC and the Procurement SDC explain 45.5% of the variance of the performance of overall service quality. The ANVOA statistics showed the models were statistically significant (Sig. $p = .0005$).

Table 8.11 Coefficients (a) for overall service quality

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.827	.438		1.887	.065	-.053	1.707					
	Effectiveness of coordination	.377	.110	.387	3.436	.001	.157	.598	.574	.437	.349	.810	1.235
	Effectiveness of life cycle costing	.193	.100	.248	1.940	.058	-.007	.394	.527	.265	.197	.628	1.593
	Effectiveness of outline of project	.217	.120	.240	1.813	.076	-.023	.457	.552	.248	.184	.588	1.700

a Dependent Variable: Performance of overall service quality

Results of standardised coefficients Beta values (.387, .248 and .240 for three variables respectively) (Refer to Table 8.11) report the contribution of each variable. It is revealed that 'coordination' makes a stronger contribution than 'life cycle costing' and 'outline of project to explaining the dependent variable (performance of overall service quality).

The squared value of the Part correlation coefficients indicates the contribution of a variable to the total R^2 value and tells how much of the total variance in the dependent variable is uniquely explained by the variable (ibid). The variables have a Part correlation coefficient of .349, .197 and .184 respectively (refer to Table 8.11), which squared give .122, .039 and .034 accordingly, indicating a unique contribution of 12% (coordination), 4% (life cycle costing) and 3% (outline of project) to the explanation of variance in perceived performance of overall service quality.

8.4.1.2 Discussions

The results of the analyses presented above allow two questions to be addressed. The developed model(s), which includes 'Coordination', 'Life cycle costing' and 'Outline of project' (representing the 'Design Approach' strategic decisions cluster (SDC), the 'Implementation' SDC), explain 48.5% (or 45.5% if R^2 adjusted) of the variance in perceived performance of overall service quality. All of these variables are closely correlated (refer to Table 8.11). Of these independent variables, 'Coordination' makes the largest unique contribution (beta = .387) than 'outline of project' (beta = .240) and 'life cycle costing' (beta = .248).

Client strategic decisions, for example, coordination, life cycle costing and outline of projects, will have a significant impact on the performance of service quality being provided by service providers (refer to Chapter 4 – the Conceptual model). Services being provided to the client vary in terms of quality and provide varying degrees of satisfaction for the recipient at the end. Dis-confirmed expectations pre-dominate the degree of satisfaction with a particular service (Parasuraman *et al.*, 1985; Anderson *et al.*, 1994).

All various disciplines including architectural, structural and M&E engineering need to be well co-ordinated and conflicting objectives leading to unsatisfactory performance of service quality can arise because of differences in aspirations of the various parties involved in the project (Masterman, 2002). The client must clearly define and specify their project objectives at the outset and the project success was dependent upon the client's effectiveness in discharging their strategic planning (Cleland, 1994). Client decisions of 'Outline of project' set down project objectives at a strategic level and the designers (service providers) accordingly develop the design and achieve coordination with all technical design problems resolved and statutory consents checked at the detail design stage.

As previously discussed (refer to Section 8.3.2), life cycle costing approach has most potential during the early project stage as almost all options were open to consideration and allows feedback of information from the supply chain including the service providers (Griffin, 1993). The quality of services will be influenced by the life cycle costing framework set up by the client.

Overall service quality provided by service providers is perceived to be higher when the client takes care of tender selection and weighting issues, addresses details of project and coordination issues and adequately establish life cycle costing strategies (Hoxley, 1998; Masterman, 2002; Kishk *et al*., 2003).

8.4.2 Modelling service quality and client satisfaction

Standard multiple regression was adopted to explore the relationship between service quality and client satisfaction. Correlation analysis was adopted to select appropriate variables and only highly significantly correlated service quality factors were entered as independent variables with satisfaction on overall performance as the dependent variable (details see the Appendix).

8.4.2.1 Analyses of results

Results of correlation analyses indicated that all independent variables including 'Speed of response', 'Meeting client expectation', 'Reports' and 'Informing client on business' have coefficients value greater than .50, indicating a significantly strong correlation. These results implied that service quality has a positively significant relationship with client satisfaction.

The correlation amongst the four independent variables (r = .560, .594, .518, .563) (details see the Appendix) was less than 0.7 therefore the variables will be retained and considered appropriate to proceed with the regression modelling (Tabachnick and Fiddell, 2001).

The Tolerance values given by 'collinearity statistics' for variables are greater than .10, and VIF values are less than 10 (refer to Table 8.12), indicating that the data have not violated the multicollinearity assumption. Moreover, results from inspection of the residuals scatter plot and normal P-P plot of the regression standardised residuals showed that a reasonably straight diagonal line (for P-P plot) and a rectangular shape of distribution (details see the Appendix) with most of scores concentrated in the centre (for scatter plot). The maximum value for Cook's Distance is .448 (<1), suggesting no major problems with standardised residual values (refer to the Appendix).

With 'satisfaction on overall performance of service quality' as the dependent variable, 'Meeting client expectations', 'Informing clients on business issues', 'Quality/timing of reports to clients' and 'Speed of response' were the selected predictors (independent variables). The value of R^2 for the model generated is .487, implying that the model explains 48.7% of the variance in the perceived overall client satisfaction (refer to Table 8.13), a very respectful result.

Considering a relatively small sample involved it is appropriate to report the Adjusted R^2 value which provides a 'corrected' figure and better estimate of the true population value (Tabachnick and Fiddell, 2001). The results shows the Adjusted R^2 value is .445, indicating the service quality factors explain 44.5% of the variance of the satisfaction on overall performance of service quality. The ANVOA statistics showed the models were statistically significant (Sig. p = .0005).

Results of standardised coefficients Beta values reported the contribution of each variable. It is revealed that 'Performance of quality/timing of reports' makes the

Table 8.12 Coefficients (a) for client satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-3.554	.458		-7.757	.000					
	Performance of speed of response	.241	.126	.256	1.922	.060	.560	.265	.197	.591	1.691
	Performance of meeting client expectations	.013	.163	.012	.079	.938	.518	.011	.008	.456	2.193
	Performance of reports	.345	.140	.345	2.465	.017	.594	.332	.252	.536	1.866
	Performance of informing clients	.214	.124	.236	1.731	.090	.563	.240	.177	.564	1.773

a Dependent Variable: Satisfaction on overall performance

Table 8.13 MR Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698(a)	.487	.445	.71133

a Predictors: (Constant), Performance of informing clients,
Performance of reports,
Performance of speed of response,
Performance of meeting client expectations
b Dependent Variable: Satisfaction on overall performance

strongest contribution (beta = .345) (refer to Table 8.12) than the rest of the variables to explaining the dependent variable (client satisfaction).

The squared value of the Part correlation coefficients indicates the contribution of a variable to the total R^2 value and tells how much of the total variance in the dependent variable is uniquely explained by the variable (ibid). The variables have a Part correlation coefficient of .197, .008, .252 and .177 respectively (refer to Table 8.12), which squared give a unique contribution of 4% (speed of response), 0.1% (meeting client expectations), 6% (quality/timing of reports to clients) and 3% (informing clients on business) to the explanation of variance in perceived level of client satisfaction.

8.4.2.2 Discussions

The results of the analyses presented above provide responses to address the research hypotheses as discussed earlier in this Chapter. The developed model(s), which includes 'Speed of response', 'Meeting client expectations', 'Reports to clients' and 'Informing clients on business' explain 48.7% (or 44.5% if R^2 adjusted) of the variance in perceived level of client satisfaction. All the variables are significantly correlated (refer to the Appendix). Of these independent variables, 'Quality/timing of reports to clients' makes the largest unique contribution (beta = .345).

The results revealed that a service provider's service delivery (including 'Speed of response' and 'Meeting client expectations') and communications with client (including 'Reports to client' and 'Informing client on business issues') have the most fundamental impact on client satisfaction. Key criteria of service quality, for example, 'Meeting client expectations' and 'Speed of response', were found to be true and are in line with the previous research findings (Parasuraman *et al*, 1988; Siu *et al*, 2001; BSRIA, 2003; Soetanto and Proverbs, 2004). The assessment of client satisfaction is all about the extent to which client expectations are met and the way that their service providers respond to the strategic decisions made by the client (refer to Chapter 4 – the conceptual model). Meeting and exceeding client expectations is therefore one of the key predictors to the levels of client satisfaction. The client satisfaction measurement process for many organisations in the construction industry remains one of the key mechanisms for ensuring client expectations are met, and it provides the service providers the means to develop effective improvement initiatives (Mott MacDonald, 2003; Atkins, 2005).

Initiatives are usually developed by service providers to capture clients' views and feedback on the service quality provided. Seeking client feedback is an integral component of such organisations' quality and customer care management systems aiming for continual improvement. Through those management systems clients' views on the level of services being provided are collected, analysed and utilised in further discussions, thus activating processes to respond to feedback. This response and feedback process can only be realised by means of communications with client (including 'Reports to client' and 'Informing client on business issues'), regarded as the main client satisfaction measurement criteria, as reported in Leung *et al*. (2004) and Ahmed and Kangari (1995). Limited communication interactions between the client and the service provider often inhibited the quality of services and hence client satisfaction and the project success (Gorse and Emmitt, 2004). Clients will only achieve higher levels of satisfaction when service providers achieve higher levels of performance on communications with client.

For service providers including consultants and contractors, client satisfaction assessment is also a means of improving services quality to the client and their own performance, for example, being awarded repeat or additional projects.

8.5 SUMMARY

This chapter has sought to explore the relationships between strategic decisions, service quality and client satisfaction and determine whether or not any significant association exists. Statistical techniques including correlation analysis and multiple regression were employed for this purpose.

It was found that significant associations exist between strategic decisions, service quality and client satisfaction. The developed models, which use various strategic decisions as the independent variables and performance of service quality or client satisfaction as the dependent variables, have produced significantly respectable R^2 values indicating a reasonable level of predictability. It has been found Design

Approach, Procurement and Implementation strategic decisions clusters predict better the outcomes of service quality hence higher levels of client satisfaction than other SDCs including Contracts and Disposal. Service quality criteria including service delivery and communications have a positively significant correlation with client satisfaction levels. Of these two variables, Communications makes the largest unique contribution to the variance and is considered the better predictor for client satisfaction.

This chapter has addressed the final two research questions which sought to explore the possible relationships between strategic decisions and client satisfaction and to develop models that relate these two variables, being linked to the main research hypothesis which posited that there is no relationship between strategic decisions and client satisfaction.

CHAPTER 9

RESEARCH VALIDATION

9.1 INTRODUCTION

The aim of this research was to develop a predictive model identifying the impact of strategic decisions on client satisfaction and towards developing an improved understanding of the satisfaction phenomena (refer to Chapter 1). This aim has now been achieved and the preceding chapters have presented the model(s) for this purpose. The model(s) however need to be validated.

This chapter seeks to validate the developed model(s) via means of using hold back samples and internal validation by reviewing the dissemination of research findings. Statistical techniques including multiple regression was applied to the hold back samples to validate the developed model(s) and results of the validation are presented.

9.2 VALIDITY OF RESEARCH

The generalisability and transferability of the results derived from the developed models to a wider population of construction projects will need to be further tested. Since validity is not a feature of a particular methodology including both quantitative and qualitative, the real issues are how representative the description is and how justifiable the research findings are. Validation is often to check the scientific value of the findings.

9.2.1 Definition of validity

The term validity is commonly referred to and associated with discussions of reliability and accuracy of research (Black and Champion, 1976; Hammersley, 1987; Simoco and Warin, 1997). That is to say, whether the means of measurement are accurate, and/or whether they are measuring what they intended to measure (Winter, 2000).

It was suggested, although arguable, that the aggregated definition of validity could be of accuracy, associated with reliability which is of replicability. It is the concepts of accuracy and replicability that underpin the validity of research findings.

However, in the real world, for example, in the construction sector, there are constant changes involved and the needs and demands change in tune with those of the markets they serve and the sector they operate in. Replicating research findings derived from surveys may not be always possible.

9.2.2 Type of validation approaches

There are various types of validation approaches in the literature which include face, content, criterion, construct, internal, statistical inference, and external validity (Black and Champion, 1976; Reason and Rowan, 1981; Babbie, 1990; Kerlinger and Lee, 2000). During the research process, some of these would have already been undertaken (Garson, 2007). Pilot study is often regarded as a means of face and content validation (refer to Chapter 5) and the statistical analyses including factor analysis presented in the preceding chapters (refer to Chapters 7 and 8) as a means of construct validation (Kerlinger and Lee, 2000). This leaves mainly two types of research validation approaches to be undertaken, namely, external and internal validation.

9.2.2.1 External research validation

Brinberg and McGrath (1985) argued that there are three aspects of external research validation including replication, convergence analysis and boundary search and it is this process of validation that transforms research information into knowledge.

Given that no two occasions are ever the same as argued by Brinberg and McGrath (1985) and Rosenthal and Rosnow (1991), it is not possible to have an exact replication of an research completed. Furthermore, besides that it is beyond the logistical constraints of repeating this survey, it was also unrealistic to expect that the same respondents would be willing to complete the same survey again taking into account the comprehensiveness of the survey instrument. The replicability of research therefore may be neither useful nor possible in certain highly complex circumstances (Wilson, 1999). For these reasons it was not possible for this survey to be directly replicated. It must however be emphasised that the questionnaire was developed and pilot-tested to ensure that the data collected was reliable.

Convergence analysis, also referred to as triangulation, is the key aspect of assessing the robustness of research and it is achieved only when there is an agreement of substantive outcomes derived from the use of different and independent models, methods, and/or occasions (Brinberg and McGrath, 1985). It is about determining the broad range of conditions under which the findings will hold (that is to say, the scope of the findings). The hold-back samples can be regarded as the factors varied to suit and were utilised at this study to serve this purpose in the first instance. In this study, the hold back samples will be analysed to compare the outcomes of the developed models.

Boundary search is one of the aspects of external validation. Rosenthal and Rosnow (1991) suggested boundary search is the attempt to identify, differentiate or discriminate the boundaries associated with the findings of a research. It was noted by Brinberg and McGrath (1985) that going beyond replication and convergence analysis to deliberately search for the boundaries of findings is not typical. Moreover, it was also not possible to progress to the boundary search stage purely due to the constraints (for example, time and costs) associated with undertaking this research project. Nevertheless, it was recognised that there are some potential boundaries to the findings reported in this research, for example, the specific location and industry in which the study was being undertaken (that is to say, the UK construction industry in the context of this research). These potential boundaries represent potential areas for further study to be extended.

9.2.2.2 Internal research validation

Internal validity was defined as the degree of validity of statements made about whether *X* causes *Y* – the primary concern being to rule out plausible rival hypotheses, as suggested by Rosenthal and Rosnow (1991), Fellows and Liu (1997) and Garson (2007). The importance of good research design for achieving good internal validity was particularly emphasised in their research. However, they failed to identify appropriate procedures for checking whether or not good internal validity has been achieved.

Proverbs (1998) and Xiao (2002) adopted a strategy which involves the search for convergence between the three aspects of research findings, published research (the literature) and academic validation. If convergence is demonstrated, then arguments made on the basis of the findings of this research are valid, indicating that good internal validity was achieved through the research design.

This strategy provided an opportunity to weigh the findings of this study against other published studies examining the same issues, and to subject it to expert scrutiny, and therefore is particularly useful for the purpose of internal validation for this research.

9.3 VALIDATION OF MODELS

The validity of research resides with the representation, the purpose of the research and the appropriateness of the process involved. The validity measures can be applied differently depending on the nature of the research process that requires validation. Validity of research also concerns the serving target for whom the research is valid and in whose interest this claim is to be true.

In the context of this study, the construction client, who assesses the performance of their service providers including consultants and contractors, is the ultimate research subject. Validity of research is therefore for the interests of construction clients, whose perception will influence the levels of satisfaction and the performance of their service providers.

The external validation approach of convergence analysis for this research was using hold back samples, which compared findings with the real-life feedback from the subjects being studied. It is argued that this form can be more confident of the validity of the research (Silverman, 1993).

The internal validation approach for this research concerns the demonstration of convergence between research findings, published research and academic validation (Proverbs, 1998; Xiao, 2002).

9.3.1 External validation

The hold-back samples are regarded as the factors varied to suit and were utilised in this study to serve the purpose of convergence analysis. The hold back samples were analysed to compare the outcomes of the developed models. In this study, 18 samples that had been held back from the main analysis were used as an independent sample of cases. The models' effectiveness will be reflected by the observed error rate in this test samples (Tam and Harris, 1996). Where appropriate, the missing values were replaced with the mean of all valid responses, as in the case of the original analysis.

The multiple regression analyses gave respectable R^2 values ranging from 31.6% to 45.5% (refer to the Appendix). It was suggested that the predictive use of these developed models is significant. The models were therefore validated by attempting directly to predict the exact project performance of the new cases. However, to confirm the validity of the models, such predicted results should give the same general indication of performance as the actual performance outcomes. It is recognised that for the models to be considered valid, they should be able to give a reasonable indication of prediction.

Table 9.1 presents a comparison of R^2 values and Residuals statistics between predicted outcomes and the actual outcomes in the held-back samples standardised in the same way as the original sample. Validity of Model 1 and 4 showed negative R^2 values, indicating some inconsistence existing in the hold-back test samples rather than a premature conclusion of invalidity of the models. Model 1 and 4 however produced good predictions in terms of predicted values, measured by mean standard error (= .165 and .174) and mean standard residuals (=.000). Model 2, 3 and 5 explain well the variance of the dependent variables and were identified as the preferred model to predict performance of service quality and levels of satisfaction.

The results revealed that the developed models do provide a good prediction in terms of performance outcomes or satisfaction levels and results can be predicted better with the models than without it. Considering the respectable R^2 values these models have produced, the results suggest a strong evidence of model validity (Omoregie, 2006).

It is evident that some sources of potential invalidity in measurement and manipulation of variables were successfully reduced during the course of the research (Brinberg and McGrath, 1985). The validation results suggested that the findings of the main survey are an accurate reflection of the situation within the construction industry, and to that extent, generalisations can be made for construction projects across the UK.

9.3.2 Internal validation

The internal validation approach for this research intends to demonstrate convergence between research findings, published research (the literature) and academic validation (Proverbs, 1998; Xiao, 2002).

9.3.2.1 Convergence between research findings and the literature

Brinberg and McGrath (1985) argued that only when the results of a single study have been compared with other studies that examine the same field is the knowledge about the problem arisen. The outcome of a single study by itself contributes little to the body of knowledge. In the preceding chapters the findings of this research have been presented and that the findings are largely supported by the literature. A summary of these findings are reported below again to highlight the convergence between the research findings and the literature.

- Strategic decisions with ‘Service delivery’ model

The developed model, which includes ‘Effectiveness of outline of projects’ (of the ‘Design Approach’ SDC) and ‘Effectiveness of estimated costs’ (of the ‘Procurement’ SDC), demonstrates these two SDCs have an significant impact on the perceived performance of service delivery, a key category of service quality being provided to the client.

Table 9.1 Prediction and validity of the multiple regression models

	model 1*		model 2*		model 3*		model 4*		model 5*	
	predicted	validity	predicted	validity	predicted	validity	predicted	validity	predicted	validity
R^2 Adjusted	0.316	-0.056	0.327	0.292	0.354	0.236	0.455	-0.051	0.445	0.378
Predicted Value	3.670	3.720	4.090	4.110	3.650	3.560	3.740	3.940	-0.648	-0.556
Mean Std. Predicted Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mean Standard Error of Predicted Value	0.165	0.375	0.131	0.207	0.173	0.339	0.174	0.467	0.205	0.346
Adjusted Predicted Value	3.660	3.790	4.090	4.120	3.650	3.570	3.730	3.980	-0.668	-0.513
Mean Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mean Std. Residual	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mahal. Distance	1.963	1.889	1.963	1.889	1.963	1.889	2.944	2.833	3.926	3.778
Cook's Distance	0.019	0.135	0.023	0.104	0.019	0.077	0.027	0.083	0.038	0.093
Centered Leverage Value	0.037	0.111	0.037	0.111	0.037	0.111	0.056	0.167	0.074	0.222
Model Validation Results			valid		valid				valid	

Model 1: a Predictors: (Constant), Effectiveness of outline of project, Effectiveness of estimated costs; b Dependent Variable: Performance of meeting client expectations
Model 2: a Predictors: (Constant), Effectiveness of life cycle costing, Effectiveness of details of project; b Dependent Variable: Performance of experience
Model 3: a Predictors: (Constant), Effectiveness of maintenance strategy, Effectiveness of coordination; b Dependent Variable: Performance of reports
Model 4: a Predictors: (Constant), Effectiveness of life cycle costing, Effectiveness of coordination, Effectiveness of outline of project; b Dependent Variable: Performance of overall service quality
Model 5: a Predictors: (Constant), Performance of informing clients, Performance of meeting client expectations, Performance of speed of response, Performance of reports; b Dependent Variable: Satisfaction on Overall service quality

The decision on procurement is the main focus of client strategic decisions at the pre-design stage of a project (Naoum, 1994; Kumaraswamy and Dissanayaka, 1998). The results are also supported by Zeithaml's (1988) findings that satisfaction is a value-dependent phenomenon representing the ratio of perceived quality (for example, 'Service delivery') relative to price (for example, 'Estimated costs') and therefore dependent on price. 'Estimated cost' of a project is one of the key decisions a client has to make at the early stage and a factor that significantly affects the levels of client satisfaction (BSRIA, 2003; RICS, 2004).

- Strategic decisions with 'People of service provider' model

The developed model, which includes 'Effectiveness of life cycle costing' and 'Effectiveness of details of project' (of the 'Implementation' SDC and 'Design Approach' SDC), demonstrates these two SDCs have an significant impact on the performance of the service providers' people, a key category of service quality being provided to the client.

'Implementation' SDC including life cycle costing will lead to the establishment of a framework which will allow feedback of information from occupied buildings to the design process (Kishk *et al*., 2003). The framework has most potential during the early project stage as almost all options were open to consideration (Griffin, 1993). The performance of service providers' people (including their professional experience) plays an important role in the process of feedback. It is evident that the client must clearly define and specify their project objectives ('Design approach' SDC) and the performance of service providers' people and the project success was dependent upon the client's effectiveness in discharging their strategic planning and management responsibility (Ward, 1991; Cleland, 1994).

- Strategic decisions with 'Communications' model

The developed model, which includes 'Effectiveness of maintenance strategy' and 'Effectiveness of coordination' (representing the 'Implementation' SDC and the 'Design Approach' SDC), showed these two SDCs have a significant impact on the perceived performance of Communications with clients, one of the key category of service quality being provided to the client.

Whenever maintenance strategy is being established and coordination issues are being addressed, effective communications need to take place between the client and the service providers. Limited communication interactions between the project team (for example, between the client and the service provider) often inhibited the quality of services and hence the project success (Gorse and Emmitt, 2004). Clients will only achieve higher levels of satisfaction when service providers achieve higher levels of performance on communications with client (Ahmed and Kangari, 1995). Communication skills and client orientation play an important role in the overall satisfaction of the client. These results were further supported in research by Wild (2004), Cheng *et al.* (2006) and Dainty *et al.* (2006).

- Strategic decisions with 'Overall service quality' model

The developed model, which includes 'Coordination', 'Life cycle costing' (the 'Implementation' SDC) and 'Outline of project' (representing the 'Design Approach' SDC), illustrated these two SDCs have a highly significant impact on the perceived performance of overall service quality which is the major determinant of client satisfaction.

Services being provided to the client vary in terms of quality and provide varying degrees of satisfaction for the recipient at the end. Dis-confirmed expectations pre-dominate the degree of satisfaction with a particular service (Parasuraman *et al.*, 1985; Anderson *et al.*, 1994). Overall service quality provided by service providers is perceived to be higher when the client takes care of tender selection and weighting issues, addresses details of project and coordination issues and adequately establish life cycle costing strategies (Hoxley, 1998; Masterman, 2002; Kishk *et al.*, 2003).

- Service quality with 'client satisfaction' model

The developed model, which includes 'Speed of response', 'Meeting client expectations', 'Reports to clients' and 'Informing clients on business', demonstrates these key service quality criteria are the main determinants of the perceived levels of client satisfaction.

The results revealed that a service provider's service delivery (including 'Speed of response' and 'Meeting client expectations') and communications with client (including ‘Reports to client’ and ‘Informing client on business issues’) have the most fundamental impact on client satisfaction. Key criteria of service quality, for example, ‘Meeting client expectations’ and ‘Speed of response’, were found to be true and are in line with the previous research findings (Parasuraman *et al*, 1988; Siu *et al*, 2001; BSRIA, 2003; Soetanto and Proverbs, 2004). The client satisfaction measurement process for many organisations in the construction industry remains one of the key mechanisms for ensuring client expectations are met, and it provides the service providers the means to develop effective improvement initiatives (Mott MacDonald, 2003; Atkins, 2005).

9.3.2.2 Convergence between research findings and academic validation

Findings of this research have been disseminated to a wider range of academia and practitioners for review via means of publications of the research work in conferences and journals. The publication of articles in international academic journals and conference proceedings involved a review and assessment of the validity of the research and its findings by independent referees. In all cases the referees provide feedback on the merit of the research, any issues associated with which can be incorporated in the research to improve its validity, and outline the basis of their decision to accept or reject.

Runeson and Loosemore (1999) and Xiao (2002) suggested peer review in this manner provides an opportunity for the methodologies, meanings and interpretation of the research to be questioned and it is a process of critical inquiry which is meant in theory to provide an informed, fair, reasonable and professional opinion about the merits of research work. Peer review is used as the gold-standard throughout academia in the UK and feedback from such a process serves to enrich research work and potentially improves its findings (Fenn, 1997; Alkass et al., 1998).

Seven conference papers in total plus one journal paper have been developed and published during the course of this research (refer to the Appendix). A majority of the publications have been refereed and peer reviewed. The conference papers have been presented at the following conferences:

- Annual international conferences of the Association of Researchers in Construction Management (ARCOM) (2004, 2005 & 2008),
- Conference for Postgraduate Researchers of the Built and Natural Environment (PROBE) (2005)
- World Conference for Accelerating Excellence in the Built Environment (2006).
- International Conference in the Built Environment in the 21st Century (ICiBE) (2006)
- Construction Management and Economics 25th Anniversary Conference (2007).

One journal paper has also been published and another is in the review process. The journals targeted with these papers include Construction Management and Economics (CME), Engineering Construction and Architectural Management (ECAM) and/or the International Journal of Construction Management. These journals were specifically targeted for their rigorous peer review procedures.

This research has been improved significantly by making the findings more robust and reliable via means of incorporating the challenges and feedback from the academic community into the research. Acceptance of the articles for publication indicates that this research is scholarly and academically valid and therefore it can be argued that there is convergence between the research findings and academic validation.

9.3.2.3 Convergence between academic validation and the literature

It was noted the key arguments and findings of the research reported in the publications described earlier were supported by comprehensive literature by means of citing key references in the field. Extensive literature supporting alternative views were also cited where divergent findings were reported.

A total of 310 references have been cited in the publications indicating an average of approximately 39 references per paper, as shown in Table 9.2.

Table 9.2 References cited in publications

No.	Authorship	Year	No. of references cited
1	Cheng and Proverbs	2004	46
2	Cheng *et al.*	2005a	37
3	Cheng *et al.*	2005b	22
4	Cheng and Proverbs	2006a	44
5	Cheng and Proverbs	2006b	21
6	Cheng *et al.*	2006	56
7	Cheng *et al.*	2007	41
8	Cheng *et al.*	2008	43
Total			310
Average			39

Due to the similarity of the research context, some of these references are duplicated. However, there were also many distinctive and paper-specific references cited to support the specific findings reported in each paper. It therefore can be argued that the acceptance of these papers (and the cited references) for publication indicated the demonstration of the convergence of academic validation and the literature (published research) following the precedent of Proverbs (1998) and Ankrah (2007).

9.4 SUMMARY

This chapter has explored the importance of research validation and discussed the type of validation approaches. The research findings derived on the basis of the preceding chapters have been reviewed and tested for the purpose of validation. The efforts have been made to validate the findings of this research within the areas of external and internal validation.

For external validation, 18 hold back samples were analysed and the results compared with the main analyses. Statistical techniques including multiple regressions were applied to the hold back samples to validate the developed model(s). The results revealed that the models do provide a good prediction in terms of service quality performance outcomes or satisfaction levels and results can be predicted better with the models than without it. Considering the respectable R^2

values these models have produced, the results suggest a strong evidence of model validity.

Internal validation has sought to find convergence between research findings, the literature and academic validation. From the results it is argued that the relationships between strategic decisions and service quality (and client satisfaction) revealed in the analyses are largely supported by the literature. Seven conference papers in total plus one journal paper have been developed and published during the course of this research. A majority of the publications have been refereed and peer reviewed. A total of 310 references have been cited in the publications indicating an average of approximately 39 references per paper. The acceptance of the articles for publication indicates that this research is scholarly and academically valid and therefore it can be argued that there is convergence between the research findings, the literature and academic validation.

From the above results it is concluded that the hypotheses that there is no relationship between strategic decisions and client satisfaction, and strategic decisions have no impact on client satisfaction, cannot be supported. Whilst not all the components/factors of strategic decisions assessed are significant, and not all the measures of service quality and satisfaction show an association with those components/factors of strategic decisions, there is significant evidence and support that strategic decisions have a significant impact on client satisfaction by strongly influencing the performance of service quality.

Based on the analyses and research validation efforts completed, the conclusions of this research will be presented in the next chapter. The limitation of this research and recommendations for future research will also be put forward.

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 INTRODUCTION

This research has undertaken a study of clients in the UK construction sector aiming to investigate strategic decisions made by the client at various project stages, the phenomenon of client satisfaction and the impact of strategic decisions on client satisfaction. This has led to the development of a number of predictive models concerning strategic decisions, service quality and client satisfaction.

After summarising the entire research, this final chapter outlines the main findings and the limitations of the research. This chapter will summarise the findings derived from the study and limitations coherently associated with the results. Recommendations for further in-depth research in the domain and potential commercial value and applications of the developed models are proposed.

10.2 OVERVIEW OF THE RESEARCH

The aim of this research was to develop a predictive model identifying the impact of strategic decisions on client satisfaction and towards developing an improved understanding of the satisfaction phenomena.

To help achieving the aim, a number of objectives were put forward, including:

1. To identify and categorise strategic decisions which clients have to make across the project life cycle.
2. To define the concept of client satisfaction and identify the criteria of measurement
3. Identification of appropriate criteria for the measurement of satisfaction throughout the project life cycle.
4. Development of a principal data collection instrument.
5. Development of a model using correlation analysis and regression techniques to reveal the impact of strategic decisions and to predict client satisfaction.
6. Validation of the model using appropriate techniques including a hold back sample.

The following sections outline the extent to which these objectives were achieved.

10.2.1 Categories of strategic decisions made by clients

Although the definition of strategic decision varies from one source to another (Schwenk, 1995; Papadakis and Barwise, 1997), there exists a common understanding of the concept of strategic decisions and towards what strategic decisions could impact on organisational performance and the success of a project (Armstrong 1982; Schwenk, 1988; Eisenhardt and Zbaracki, 1992).

Strategic decisions made by a client throughout the project life cycle can be broadly categorised based on the timing/stages and the subject of the decisions (Phillips, 2000; Cheng *et al,* 2005). By adopting the well-known RIBA stages as a model framework, client strategic decisions are broadly divided into pre-design, design, tender, construction, occupancy & maintenance and disposal stages (Hughes, 2003). Project priorities and the subject of client strategic decisions may change during the course of the project (Pinto and Prescott, 1988). Each project stage requires different information input and by nature requires various strategic decisions to be made accordingly. The focus of client strategic decisions therefore will change onto different subjects based on the nature of each project stage works.

Based on the RIBA framework, client strategic decisions/decision points at each stage across the project life cycle were identified. The first objective which required an investigation of strategic decisions made by construction clients at different project stages (project life cycle) was therefore achieved.

10.2.2 The concept of client satisfaction and criteria of measurement

The second and third objective which required a definition of client satisfaction and the identification of measurement criteria were achieved as reported in Chapter 3. The concept of client satisfaction in the context of the construction industry is generally adapted from principles of customer satisfaction in the context of business. The assessment of client satisfaction measures the extent to which a client's expectations for a service or a project overall are met. The levels of satisfaction achieved or exceeded by the customer/client are dependent on the outcome of the comparison and the client’s perceptive thinking. Satisfaction is hence a highly subjective and complex matter that is challenging to measure reliably and objectively.

Measurement models employed to measure quality of services, excellence and performance including the ServQual model, the performance assessment model and the EFQM business excellence models are the most commonly referred models in the development of measurement of client satisfaction in the construction industry.

The criteria of measuring construction client satisfaction were identified including various key performance indicators (KPI) used as one of the most common criteria to measure client satisfaction. Understanding client needs and responding to their needs are identified as the most important criteria/indicators adopted in client satisfaction measurement. The variety of clients' characteristics, for example, their background and experience, will also have a significant impact on their satisfaction levels. Clients considered key performance attributes for service providers including overall quality of services/delivery, people (their personnel) and communications with clients as the main client satisfaction measurement criteria.

10.2.3 Development of data collection instrument

Two fundamental concepts for this research, namely, strategic decisions and client satisfaction, were reviewed to inform the development of a conceptual model (refer to Chapter 4). A conceptual structure of strategic decision - satisfaction interrelationship demonstrated that there are interactions between the client and their service providers including consultants and contractors when a strategic decision is made at a project stage by the client. The impact of strategic decisions on client satisfaction, in fact, is measured through the assessment of the service provider's performance and service quality.

The conceptual structure was further expanded to develop a conceptual model/ framework which provided a detailed picture of the interrelationship between strategic decisions and client satisfaction. The service provider's understanding of, and response to the client needs, have a fundamental impact on the overall performance/service quality of the service provider in terms of their service delivery, people and communications with the client. The conceptual model provided a basis on which data collection required for further analysis.

This research design addressed the fourth research objective of development of a principal data collection instrument, as detailed in Chapter 5. The methods of data collection via a major questionnaire survey of construction clients were presented. The design and development of the research instrument including questionnaire design, scale, sampling and piloting were described.

10.2.4 Model development using statistical techniques

Data collected from a UK-wide client survey was initially analysed and exploratory analyses results indicated that strategic decisions across the project life cycle or life cycle strategies (LCS), are correlated (refer to Chapter 6 and 7) and their effectiveness and importance perceived by clients vary in nature. Results revealed that 'Meeting/exceeding client expectations', 'Deliver value for money' and 'Health & safety awareness' are the key performance attributes for service providers as perceived by clients. Clients consider effective communications including 'Quality/timing of reports produced' and 'Regular dialogue with clients' as being the most important criteria in determining their satisfaction levels. Moreover, the overall performance of service quality provided by service providers in these key areas and client strategic decisions make a significant contribution towards client satisfaction. The interpretation of the final solution was consistent with previous research findings. Various strategic decisions were re-categorised to underlying groups of decisions, referred as "strategic decision clusters (SDC), including Design approach SDC, Procurement SDC, Contracts SDC, Implementation SDC and Disposal SDC.

Following exploratory analyses and having established clear differences in strategic decisions and levels of client satisfaction on construction projects, this research then focused on the examination of the data for evidence of relationships between strategic decisions and client satisfaction.

It was found that significant associations exist between strategic decisions, service quality and client satisfaction. The developed models, which use various strategic decisions as the independent variables and performance of service quality or client satisfaction as the dependent variables, produced significantly respectable R^2 values indicating a reasonable level of predictability. Design Approach, Procurement and

Implementation strategic decisions clusters predict better the outcomes of service quality hence higher levels of client satisfaction than other SDCs including Contracts and Disposal. Service quality criteria including service delivery and communications has a positively significant correlation with client satisfaction levels. Of these two variables, Communications makes the largest unique contribution to the variance and is considered the better predictor for client satisfaction.

As reported in Chapter 8, the research objective that to develop a model using correlation analysis and regression techniques to reveal the impact of strategic decisions and to predict client satisfaction was addressed.

10.2.5 Research validation

The importance of research validation and the type of validation approaches were explored in this research (refer to Chapter 9). The efforts have been made to validate the findings of this research within the areas of external and internal validation. For external validation, 18 hold back samples were analysed and the results compared with the main analyses. The results revealed that the models do provide a good prediction in terms of service quality performance outcomes or satisfaction levels and results can be predicted better with the models than without it. Considering the respectable R^2 values these models have produced, the results suggest a strong evidence of model validity.

Internal validation sought to find convergence between research findings, the literature and academic validation. From the results it is argued that the relationships between strategic decisions and service quality (and client satisfaction) revealed in the analyses are largely supported by the literature. Seven conference papers in total plus one journal paper have been developed and published during the course of this research. A majority of the publications have been refereed and peer reviewed. A total of 310 references have been cited in the publications indicating an average of approximately 39 references per paper. The acceptance of the articles for publication indicates that this research is scholarly and academically valid and therefore it can be argued that there is convergence between the research findings, the literature and academic validation.

From the above results it is concluded that the hypotheses that there is no relationship between strategic decisions and client satisfaction, and strategic decisions have no impact on client satisfaction, cannot be supported. Whilst not all the components/factors of strategic decisions assessed are significant, and not all the measures of service quality and satisfaction show an association with those components/factors of strategic decisions, there is significant evidence and support that strategic decisions have a significant impact on client satisfaction by strongly influencing the performance of service quality.

The last research objective that the developed models are to be validated using appropriate techniques was therefore addressed.

10.3 CONCLUSIONS

Client satisfaction is a major determinant of project success and a fundamental issue for service providers who must constantly seek to improve their performance if they are to survive in the marketplace. Strategic decisions made by the client at different project stages have been found to have a significant impact on client satisfaction.

10.3.1 Strategic decisions

Strategic decisions made by the client across the project life cycle, or life cycle strategies (LCS), are correlated and their effectiveness and importance perceived by clients vary in nature. From the results of factor analysis, strategic decisions in general can be presented as a smaller group of strategic decision clusters (SDC), including:

- Design approach SDC,
- Procurement SDC,
- Contracts SDC,
- Implementation SDC and
- Disposal SDC.

10.3.2 Client satisfaction

The results revealed service providers' service quality in terms of service delivery, service providers' people and communications with clients is regarded as very good. However, clients perceived service providers' performance on a majority of the service quality criteria are slightly lower than they expected, indicating that clients are slightly dissatisfied and service providers should seek action to improve their performance and satisfy their clients.

Key criteria of service quality provided to the client including 'Deliver value for money', 'Health & safety awareness' and 'Meeting/exceeding client expectations' are the key performance attributes for service providers and criteria of client satisfaction assessment as perceived by clients. Clients also consider effective 'communications with clients' as being the most important criteria in determining their satisfaction levels.

10.3.3 Impact of strategic decisions on client satisfaction

It was found that significant associations exist between strategic decisions, service quality and client satisfaction. The developed models, using statistical techniques including multiple regression and correlation analysis, have produced significantly respectable R^2 values, indicating a reasonable level of predictability.

'Design Approach', 'Procurement' and 'Implementation' strategic decisions clusters predict better the outcomes of service quality hence higher levels of client satisfaction than other SDCs including 'Contracts' and 'Disposal'. Service quality criteria including service delivery and communications have a positively significant correlation with client satisfaction levels. Of these two variables, Communications makes the largest unique contribution to the variance and is considered the better predictor for client satisfaction.

These models have been subsequently validated via external and internal validation. The results revealed that the research hypotheses that there is no relationship between strategic decisions and client satisfaction, and strategic decisions have no impact on client satisfaction, cannot be supported. There is significant evidence and support that strategic decisions have a significant impact on client satisfaction by strongly influencing the performance of service quality.

The principles of these findings could have a significant implication when applies in practice. The analysis results showed the effectiveness of strategic decisions does not always meet clients' expectation, indicating certain issues that need to be addressed more effectively during the decision-making and implementation process. Therefore, there is a need for clients to review their decision-making process taking into account the potential impact any decision made by clients may have on the performance of service quality and their own satisfaction.

To service providers including contractors and consultants, an improved understanding of the phenomenon of client satisfaction and associated measurement criteria would help to improve their service quality and overall performance and to better satisfy their clients. Service providers are therefore encouraged to devote more efforts into improving their performance on the attributes of service quality identified as having significant association with client satisfaction, particularly service delivery and communications with clients. Improved service quality from service providers will positively underpin project performance and lead to heightened client satisfaction and perceived project success, which will benefit both clients (project needs satisfied) and their service providers (potentially repeated work from satisfied clients).

10.4 RECOMMENDATIONS

The research work to date has provided a sound basis on which clients and service providers can refer to. Aiming at an in-depth study on the levels of client satisfaction and then to use these findings to identify ways of improving the services provided by such service providers, the approach of this research has identified key performance attributes for service providers.

The results may facilitate to develop a commercial model that will provide practical solutions to client satisfaction problems and improve mutual communications between service providers and clients and hence the project performance.

The client organisations surveyed, however, have their own characteristics and may introduce some bias into the survey results, which may not accurately reflect the overall performance of their service providers. As the data subject of this research is based on the perception of clients only, generalised application of the findings may be limited when service providers want to apply the model(s). The survey itself may also have limitations due to its coverage and responses received.

Therefore, further research efforts focusing on developing a practical tool, or expert system, so as to address the practical issues on the basis of a wider range of respondents, for example, both clients and service providers, are recommended.

Moreover, this research can be further developed to explore the commercial value of the findings so as to establish practical tools/systems to facilitate clients' strategic decision-making and service providers' client satisfaction improvement strategy in the real world.

10.5 SUMMARY

This chapter has summarised the entire research undertaken aiming to investigate strategic decisions made by the client at various project stages, the phenomenon of client satisfaction and develop a predictive model to reveal the impact of strategic decisions on client satisfaction.

The main findings and conclusions derived from the study have been presented. It was found that significant associations exist between strategic decisions, service quality and client satisfaction. The developed multiple regression models have produced significantly respectable R^2 values, indicating a reasonable level of predictability. These models have been subsequent validated and the results revealed that the research hypotheses that there is no relationship between strategic decisions and client satisfaction, and strategic decisions have no impact on client satisfaction, cannot be supported. There is significant evidence and support that strategic decisions have a significant impact on client satisfaction by strongly influencing the performance of service quality.

The limitations coherently associated with the results of the research have also been acknowledged and discussed. As the data subject of this research is based on the perception of clients only, generalised application of the findings may be limited when service providers want to apply the model(s). The survey itself may also have limitations due to its coverage and responses received.

The need for further in-depth research in the domain and potential commercial value and applications of the developed models for practices in the construction industry and future research has been recommended.

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APPENDIX

Appendix 1.A List of publications

Cheng, J and Proverbs, D (2004) The impact of strategic decisions on clients' satisfaction, In: Khosrowshahi, F (ed). Proceedings of Twentieth ARCOM Annual Conference, Edinburgh, 1-3 September, Vol 2, pp931-938.

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Cheng, J X; Proverbs, D; Oduoza, C and Fleming, C (2005b) Towards green and intelligent buildings: the economic and environmental impact – a UK perspective, In Egbu, C and Tong, M (ed). Proceedings of the 2nd Scottish Conference for Postgraduate Researchers of the Built and Natural Environment (PROBE), Glasgow, 16-17 November 2005, pp583-592.

Cheng, J., Proverbs, D. and Oduoza, C. (2006) The satisfaction levels of UK construction clients based on the performance of consultants: results of a case study, Engineering Construction and Architectural Management, Vol 13, No.6, pp567-583. ISSN 0969-9988, Emerald: UK.

Cheng, J.X. and Proverbs, D. (2006a) Modelling strategic decisions and satisfaction: a conceptual model for construction clients. In: (Ed.), Proceedings of World Conference for Accelerating Excellence in the Built Environment, 2-4 Oct 2006, Birmingham.

Cheng, J.X. and Proverbs, D (2006b) The economic and environmental impact of sustainable construction – the UK experience, In Adnan, H (ed). Proceedings of International Conference in the Built Environment in the 21st Century (ICiBE), Universiti Teknologi MARA, KL, Malaysia, 13-15 June 2006, Vol 2, pp953-962.

Cheng, J., Proverbs, D., Oduoza, C. (2007) Exploring key attributes influencing construction client satisfaction: a questionnaire survey, CME 25 Conference,

Construction Management and Economics, University of Reading, UK, 16th-18th, July, 2007.

Cheng, J; Proverbs, D; Oduoza, C and Potts, K. (2008) Investigating the interrelationship between strategic decisions and client satisfaction: a conceptual framework, In: Dainty, A.R. (ed). Proceedings of 24th Annual ARCOM Conference, Cardiff, 1-3 September, Vol 2, pp931-938.

Appendix 5.A Main survey cover letter and questionnaire

UNIVERSITY OF WOLVERHAMPTON

School of Engineering and the Built Environment
University of Wolverhampton
Wulfruna Street
Wolverhampton WV1 1SB

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

Strategic Decisions and Client Satisfaction_Questionnaire

This questionnaire represents part of a doctoral research project which aims to develop a predictive tool to reveal the impact of client strategic decisions on their own satisfaction. This developed tool will enable both the client and their service providers (e.g. contractors and consultants) to improve their understanding of the client satisfaction phenomenon and facilitate clients' optimum decisions, which will enhance project performance and clients' own satisfaction levels at all project stages. Contractors and consultants will be able to make prompt responses to client decisions and improve their performance so as to better satisfy their clients.

I would like to invite you to participate in the above project as you have been identified in a publicly available list, the Building magazine UK construction client survey. Completion of the questionnaire is entirely voluntary and returning the completed questionnaire will be considered as your consent to participate in the survey.

The questionnaire will take you approximately 15 minutes to complete by following the simple instructions. You need to consider a recent construction project (e.g. within the last 3-4 years) that you have completed (Hereafter referred to as the "Case project") and, if appropriate, link all your responses/answers to the Case project. The questionnaire consists of two sections:

Section A - information about you, your organisation and the Case project.

Section B - information about strategic decisions made by you across different stages of the project life cycle, your expectations (expressed as "Importance" scores) and perceptions (expressed as "Effectiveness" or "Performance" scores) of the service provider's performance on a series of issues.

Due to the nature of the comprehensive information requested in the survey, we have deliberately designed the questionnaire to avoid identifying individuals, projects and naming other organisations. <u>All data held are purely for research purposes and will be treated as strictly confidential.</u>

If you wish to receive feedback on the research findings, please fill in the slip below and return it together with your questionnaire.

If you have any questions or queries, please do not hesitate to contact us. Thank you for your time and kind help in advance.

Yours faithfully,

Mr. Jianxi Cheng MSc
Doctoral Researcher
Email: j.cheng@wlv.ac.uk
Mobile: +44 (0)7751 710 561

Prof. David Proverbs PhD
Professor of Construction Management

I wish to receive feedback on the research findings, please find my contact details below:

Name:	Email:
Tel:	Fax:
Address:	

Appendix 5.A Main survey cover letter and questionnaire

Strategic Decisions and Client Satisfaction_Questionnaire

Section A Your characteristics

A majority of the questions requires you to indicate your response to a question by just a tick.
Please choose the most appropriate answer and try to complete as possible as you can.

Details about you

1 How many years have you been involved in construction? ________ years

2 How many years have you been working in this organisation? ________ years

3 What is your vocational background (Please tick "√ " if appropriate)?
Architect ☐ Designer/Engineer ☐ Quantity surveyor ☐
Project management ☐ Other, please specify ________

4 Your position in your organisation? ________

5 Which managerial role do you play in the project decision-making process?
Decision-approvers (e.g. main board members) ☐
Decision-takers (e.g. senior managers) ☐
Decision-shapers (e.g. expert focus group) ☐
Decision-influencers (e.g. other internal or external people who influence) ☐

Details of your organisation

6 What type of organisation are you?
Private sector ☐ Central government ☐ Local government ☐
Other public sector ☐ Others, please specify ________

7 How many employees does your organisation have ?
<10 ☐ 11-50 ☐ 51-249 ☐
250-500 ☐ >500 ☐

8 Which construction sector does your organisation mainly procure in?
Building ☐ Infrastructure ☐ Energy ☐
Utilities ☐ Other, please specify ________

9 How many projects similar to the Case project type have you completed during the past 10 years?
0 ☐ 1-2 ☐ 3-4 ☐
>5 ☐

Details of the Case Project

10 What type of project is it?
Building ☐ Infrastructure ☐ Energy ☐
Utilities ☐ Other, please specify ________

11 What procurement route did you adopt for this project?
Traditional ☐ Design & build ☐ PPP/PFI ☐
Management contract Other, please specify ________

12 What type of contract does the project use (Please tick "√ " if appropriate)?
JCT ☐ ICE ☐ GC works ☐
NEC ☐ Other, please specify ________

13 What are the <u>original</u> contract value and the <u>outturn</u> value (e.g. £ millions)?
Original value ______ (£million) Outturn value ________ (£million)

14 What are the <u>planned</u> and the <u>actual</u> duration from inception to completion?
Planned duration ______ (months) Actual duration ________ (months)

15 What is your overall assessment about (*Please specify, from 1- worst to 5- best*):
The quality of the project ? ________
The quality of the services provided by your consultant/contractor? ________
The competence of your consultant/contractor? ________

Please return the questionnaire in the self-addressed envelope by:
30 Nov 2006

Appendix 5.A Main survey cover letter and questionnaire

Strategic Decisions and Client Satisfaction_Questionnaire

Section B Your strategic decisions and satisfaction

STRATEGIC DECISIONS

The following questions are about strategic decisions made by you across project stages. Please tick for both importance and effectiveness. Importance - how important the issue to your project/business;
Effectiveness - your perception of the real effect/impact of a particular issue on the project
(1= least important/lowest effectiveness; 5 = most important/highest effectiveness)

No.	Item	Importance 1	Importance 2	Importance 3	Importance 4	Importance 5	Effectiveness 1	Effectiveness 2	Effectiveness 3	Effectiveness 4	Effectiveness 5
	AT PRE-DESIGN STAGE										
16	How important and effective are these decisions to your project/business?										
	Decision of "Build/No build" after the project appraisal	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Probable procurement method after decision of "Build"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Organisational structure	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Work procedures	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Consultants to be engaged	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Other service providers to be engaged	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Outline of project	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Estimated costs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Review of procurement route	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Details of project	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Full development control approval	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Co-ordination of elements of the project	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17	Any other strategic decisions you have to make at this stage?										
	Please specify:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18	The decision-making mechanism and process	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19	The objectives of your decisions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20	The service provider's understanding of your needs/business	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21	The service provider's responses to your decisions/needs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	AT DESIGN STAGE										
22	How important and effective are these decisions to your project/business?										
	Information sufficient to obtain tenders	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Balance required under the building contract	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23	Any other strategic decisions you have to make at this stage?										
	Please specify:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24	The decision-making mechanism and process	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25	The objectives of your decisions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26	The service provider's understanding of your needs/business	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27	The service provider's responses to your decisions/needs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	AT TENDER STAGE										
28	How important and effective are these decisions to your project/business?										
	Documentation required for tenders	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Identification and evaluation of potential contractors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Appointing the contractor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Arranging site handover to the contractor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Appendix 5.A Main survey cover letter and questionnaire

Strategic Decisions and Client Satisfaction_Questionnaire

		Importance 1 2 3 4 5	Effectiveness 1 2 3 4 5
29	Any other strategic decisions you have to make at this stage?		
	Please specify: ______	☐☐☐☐☐	☐☐☐☐☐
30	The decision-making mechanism and process	☐☐☐☐☐	☐☐☐☐☐
31	The objectives of your decisions	☐☐☐☐☐	☐☐☐☐☐
32	The service provider's understanding of your needs/business	☐☐☐☐☐	☐☐☐☐☐
33	The service provider's responses to your decisions/needs	☐☐☐☐☐	☐☐☐☐☐
34	What are your criteria of choosing a contractor/consultant at this stage?		
	Their reputation	☐☐☐☐☐	☐☐☐☐☐
	Knowledge of your sector	☐☐☐☐☐	☐☐☐☐☐
	Knowledge of your business	☐☐☐☐☐	☐☐☐☐☐
	Delivering value for money	☐☐☐☐☐	☐☐☐☐☐
	Their business/office location	☐☐☐☐☐	☐☐☐☐☐
	Producing the most competitive bid	☐☐☐☐☐	☐☐☐☐☐
	Specialisation	☐☐☐☐☐	☐☐☐☐☐
	Innovation	☐☐☐☐☐	☐☐☐☐☐
	Others (Please specify) ______	☐☐☐☐☐	☐☐☐☐☐
	AT CONSTRUCTION STAGE		
35	How important and effective are these decisions to your project/business?		
	Cost management strategy	☐☐☐☐☐	☐☐☐☐☐
	People strategy	☐☐☐☐☐	☐☐☐☐☐
	Settling the final account	☐☐☐☐☐	☐☐☐☐☐
36	Any other strategic decisions you have to make at this stage?		
	Please specify: ______	☐☐☐☐☐	☐☐☐☐☐
37	The decision-making mechanism and process	☐☐☐☐☐	☐☐☐☐☐
38	The objectives of your decisions	☐☐☐☐☐	☐☐☐☐☐
39	The service provider's understanding of your needs/business	☐☐☐☐☐	☐☐☐☐☐
40	The service provider's responses to your decisions/needs	☐☐☐☐☐	☐☐☐☐☐
	AT OCCUPANCY & MAINTENANCE STAGE		
41	How important and effective are these decisions to your project/business?		
	Life cycle costing	☐☐☐☐☐	☐☐☐☐☐
	Maintenance strategy	☐☐☐☐☐	☐☐☐☐☐
42	Any other strategic decisions you have to make at this stage?		
	Please specify: ______		
43	The decision-making mechanism and process	☐☐☐☐☐	☐☐☐☐☐
44	The objectives of your decisions	☐☐☐☐☐	☐☐☐☐☐
45	The service provider's understanding of your needs/business	☐☐☐☐☐	☐☐☐☐☐
46	The service provider's responses to your decisions/needs	☐☐☐☐☐	☐☐☐☐☐
	AT DISPOSAL STAGE		
47	How important and effective are these decisions to your project/business?		
	Demolition of project	☐☐☐☐☐	☐☐☐☐☐
	Transfer of project	☐☐☐☐☐	☐☐☐☐☐

Appendix 5.A Main survey cover letter and questionnaire

Strategic Decisions and Client Satisfaction_Questionnaire

		Importance 1 2 3 4 5	Effectiveness 1 2 3 4 5
48	Any other strategic decisions you have to make at this stage? Please specify:		
49	The decision-making mechanism and process		
50	The objectives of your decisions		
51	The service provider's understanding of your needs/business		
52	The service provider's responses to your decisions/needs		

SERVICE QUALITY

The following questions are about the perceived quality of services provided by your consultants/contractors. Importance - how important the issue to your project/business; Performance - your perception of the consultants/contractors' actual performance (1= least important/lowest performance; 5 = most important/highest performance)

		Importance 1 2 3 4 5	Performance 1 2 3 4 5
	ABOUT SERVICE DELIVERY		
53	Overall quality of service delivery and advice		
54	Comparing with other service providers you use		
55	Understanding your needs and business		
56	Problem solving		
57	Speed of response		
58	Technical accuracy		
59	Innovation in methods and approach		
60	Meeting your expectations		
61	Health and safety awareness		
62	Delivering value for money		
	ABOUT PEOPLE OF CONSULTANTS/CONTRACTORS		
63	Qualification of people		
64	Professional experience of people		
65	Providing right level of staffing		
66	Level of commitment team/central management		
67	Working with your staff and other consultants		
68	Friendliness		
69	Accessibility		
	ABOUT COMMUNICATIONS WITH YOU		
70	Quality and timing of reports produced to you		
71	Regular dialogue on progress of the project with you		
72	Regular dialogue to establish dynamics of your business		
73	Good at listening		
74	Informing you on business issues which may affect you		
75	Regular mailings advising you of latest news/information		
76	Quality/usefulness of corporate entertainment		
77	Quality/use of the service provider's corporate literature		
78	Quality/use of the service provider's website/intranet		
79	Making you understand of the service provider'scapability		
80	The service provider's overall performance on service quality?		

The End of the Questionnaire. Thank you.

Appendix 5.B Calculation of the margin of error

The margin of error is given by the expression:

$$m = z^{*}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Where:

m = margin of error
z^{*} = standard random variable
$\hat{p}$ = estimated variance
n = sample size

For a significance level of α = 0.05, z^{*} = 1.96.

When estimating the margin of error, it was assumed that maximum variance occurs when p = 0.5 which provides the worst case scenario.

Based on this assumption, the margin of error was computed as follows:

m = 1.96*SQRT{[0.05-(1-0.05)]/66]}*100%
= 12.06%

where
“SQRT” represents “square root”.

Appendix 5.C Missing Value Analysis (Univariate Statistics)

	N	Mean	Std. Deviation	Missing		No. of Extremes(a,b)	
				Count	Percent	Low	High
ID							
Q1yrscon	66	3.82	.524	0	.0	.	.
Q2yrsorg	66	2.52	1.070	0	.0	0	0
Q3backgrd	66	2.82	1.276	0	.0	0	0
Q4position	66	1.65	.668	0	.0	0	0
Q5manrole	66	1.94	.742	0	.0	.	.
Q6typeorg	66	2.79	1.045	0	.0	.	.
Q7employ	66	4.06	1.162	0	.0	9	0
Q8sectorg	66	1.80	1.292	0	.0	0	9
Q9pronum	66	3.38	.873	0	.0	3	0
Q10typepro	66	1.39	.943	0	.0	.	.
Q11procure	66	2.21	1.409	0	.0	0	0
Q12typecon	66	2.32	1.590	0	.0	0	0
Q13convalu	66	1.56	.659	0	.0	0	0
Q14duration	66	1.64	.671	0	.0	0	0
Q151qtypro	66	4.02	.644	0	.0	.	.
Q152qtyser	66	3.59	.744	0	.0	0	0
Q153compe	66	3.67	.709	0	.0	0	0
Q161I	66	4.50	.707	0	.0	1	0
Q161E	66	4.09	.972	0	.0	0	0
Q162I	66	4.21	.645	0	.0	1	0
Q162E	66	3.88	.795	0	.0	0	0
Q163I	66	3.65	.868	0	.0	1	0
Q163E	66	3.39	.926	0	.0	3	0
Q164I	66	3.83	.852	0	.0	0	0
Q164E	66	3.73	.735	0	.0	0	0
Q165I	66	4.29	.760	0	.0	1	0
Q165E	66	4.00	.804	0	.0	0	0
Q166I	66	3.79	.903	0	.0	1	0
Q166E	66	3.70	.841	0	.0	1	0
Q167I	66	4.14	.892	0	.0	4	0
Q167E	66	3.67	.997	0	.0	2	0
Q168I	66	4.62	.651	0	.0	1	0
Q168E	66	3.85	1.011	0	.0	0	0
Q169I	66	3.79	.920	0	.0	0	0
Q169E	66	3.59	.859	0	.0	1	0
Q1610I	66	4.18	.763	0	.0	1	0
Q1610E	66	3.79	.814	0	.0	0	0
Q1611I	66	4.21	.851	0	.0	2	0
Q1611E	66	3.79	.969	0	.0	1	0
Q1612I	66	4.21	.755	0	.0	2	0
Q1612E	66	3.80	.915	0	.0	1	0
Q17I	13	4.92	.277	53	80.3	.	.
Q17E	13	4.15	1.068	53	80.3	0	0
Q18I	66	4.98	6.326	0	.0	1	2

	N	Mean	Std. Deviation	Missing		No. of Extremes(a,b)	
				Count	Percent	Low	High
Q18E	66	3.71	.907	0	.0	2	0
Q19I	66	4.17	.776	0	.0	1	0
Q19E	66	3.70	.803	0	.0	1	0
Q20I	66	4.21	.832	0	.0	3	0
Q20E	66	3.70	.911	0	.0	1	0
Q21I	66	4.20	.769	0	.0	2	0
Q21E	66	3.65	.813	0	.0	0	0
Q221I	66	4.45	.845	0	.0	3	0
Q221E	66	3.88	.832	0	.0	0	0
Q222I	66	3.92	.882	0	.0	0	0
Q222E	66	3.53	.845	0	.0	1	0
Q23I	10	4.60	.966	56	84.8	.	.
Q23E	10	4.00	.943	56	84.8	1	0
Q24I	66	4.14	.699	0	.0	1	0
Q24E	66	3.80	.684	0	.0	0	0
Q25I	66	4.20	.661	0	.0	1	0
Q25E	66	3.79	.668	0	.0	0	0
Q26I	66	4.32	.660	0	.0	0	0
Q26E	66	3.80	.808	0	.0	0	0
Q27I	66	4.35	.668	0	.0	1	0
Q27E	66	3.76	.878	0	.0	1	0
Q281I	66	4.55	.768	0	.0	2	0
Q281E	66	3.92	.791	0	.0	.	.
Q282I	66	4.38	.799	0	.0	2	0
Q282E	66	3.95	.849	0	.0	0	0
Q283I	66	4.35	.903	0	.0	3	0
Q283E	66	4.14	.762	0	.0	0	0
Q284I	66	3.70	1.022	0	.0	0	0
Q284E	66	3.73	.869	0	.0	1	0
Q29I	10	4.80	.632	56	84.8	.	.
Q29E	10	4.20	.919	56	84.8	0	0
Q30I	66	4.02	.850	0	.0	0	0
Q30E	66	3.80	.808	0	.0	0	0
Q31I	66	4.21	.775	0	.0	1	0
Q31E	66	3.83	.776	0	.0	0	0
Q32I	66	4.14	.875	0	.0	3	0
Q32E	66	3.61	.892	0	.0	1	0
Q33I	66	4.12	.920	0	.0	4	0
Q33E	66	3.52	.827	0	.0	0	0
Q341I	66	3.94	.926	0	.0	0	0
Q341E	66	3.55	.915	0	.0	1	0
Q342I	66	4.12	.920	0	.0	6	0
Q342E	66	3.86	.742	0	.0	.	.
Q343I	66	3.97	.928	0	.0	6	0
Q343E	66	3.64	.922	0	.0	2	0
Q344I	66	4.53	.749	0	.0	1	0
Q344E	66	3.95	.902	0	.0	3	0
Q345I	66	3.27	2.810	0	.0	0	1

	N	Mean	Std. Deviation	Missing		No. of Extremes(a,b)	
				Count	Percent	Low	High
Q345E	66	3.09	.988	0	.0	5	0
Q346I	66	3.85	1.011	0	.0	0	0
Q346E	66	3.59	.976	0	.0	2	0
Q347I	66	3.76	.946	0	.0	2	0
Q347E	66	3.61	.839	0	.0	1	0
Q348I	66	3.85	.899	0	.0	0	0
Q348E	65	3.46	.752	1	1.5	0	0
Q349I	16	4.81	.403	50	75.8	.	.
Q349E	16	4.31	.793	50	75.8	0	0
Q351I	66	4.67	.564	0	.0	0	0
Q351E	66	3.92	.882	0	.0	0	0
Q352I	66	3.92	.933	0	.0	0	0
Q352E	66	3.65	.832	0	.0	1	0
Q353I	66	4.35	.868	0	.0	3	0
Q353E	66	3.59	.960	0	.0	1	0
Q36I	10	4.80	.422	56	84.8	.	.
Q36E	10	4.30	.823	56	84.8	0	0
Q37I	66	4.08	.686	0	.0	1	0
Q37E	66	3.80	.769	0	.0	1	0
Q38I	66	4.17	.756	0	.0	1	0
Q38E	66	3.88	.691	0	.0	0	0
Q39I	66	4.14	.782	0	.0	2	0
Q39E	66	3.73	.775	0	.0	1	0
Q40I	66	4.23	.780	0	.0	1	0
Q40E	66	3.80	.863	0	.0	1	0
Q411I	66	4.08	.966	0	.0	3	0
Q411E	66	3.53	1.084	0	.0	4	0
Q412I	66	4.26	.933	0	.0	3	0
Q412E	66	3.65	1.088	0	.0	3	0
Q42I	7	4.57	.535	59	89.4	0	0
Q42E	7	4.14	.690	59	89.4	0	0
Q43I	66	3.85	.846	0	.0	0	0
Q43E	66	3.47	.845	0	.0	1	0
Q44I	66	3.92	.791	0	.0	0	0
Q44E	66	3.48	.808	0	.0	1	0
Q45I	66	3.92	.917	0	.0	0	0
Q45E	66	3.50	.770	0	.0	0	0
Q46I	66	3.91	.924	0	.0	0	0
Q46E	66	3.47	.863	0	.0	1	0
Q471I	66	2.97	1.163	0	.0	0	0
Q471E	66	2.95	1.129	0	.0	0	0
Q472I	66	3.23	1.225	0	.0	8	0
Q472E	66	3.02	1.116	0	.0	9	0
Q48I	8	3.50	1.690	58	87.9	0	0
Q48E	8	3.38	1.302	58	87.9	0	0
Q49I	66	3.53	1.084	0	.0	4	0
Q49E	66	3.15	.965	0	.0	5	0
Q50I	66	3.71	1.120	0	.0	4	0

	N	Mean	Std. Deviation	Missing		No. of Extremes(a,b)	
				Count	Percent	Low	High
Q50E	66	3.35	1.030	0	.0	5	0
Q51I	66	3.64	1.132	0	.0	5	0
Q51E	66	3.11	1.040	0	.0	6	0
Q52I	66	3.71	1.134	0	.0	5	0
Q52E	66	3.15	1.085	0	.0	6	0
Q53I	66	4.47	.684	0	.0	2	0
Q53P	66	3.80	.827	0	.0	0	0
Q54I	66	4.00	.765	0	.0	.	.
Q54P	66	3.58	.860	0	.0	0	0
Q55I	66	4.26	.810	0	.0	3	0
Q55P	66	3.80	.769	0	.0	0	0
Q56I	66	4.33	.865	0	.0	3	0
Q56P	66	3.83	.834	0	.0	0	0
Q57I	66	4.29	.799	0	.0	4	0
Q57P	66	3.55	1.010	0	.0	2	0
Q58I	66	4.52	.638	0	.0	0	0
Q58P	66	3.92	.771	0	.0	.	.
Q59I	66	3.94	.782	0	.0	0	0
Q59P	66	3.44	.947	0	.0	3	0
Q60I	66	4.53	.728	0	.0	2	0
Q60P	66	3.64	.888	0	.0	0	0
Q61I	66	4.76	.556	0	.0	.	.
Q61P	66	4.20	.789	0	.0	1	0
Q62I	66	4.67	.641	0	.0	1	0
Q62P	66	3.83	.834	0	.0	0	0
Q63I	66	3.71	.907	0	.0	2	0
Q63P	66	3.85	.707	0	.0	0	0
Q64I	66	4.42	.860	0	.0	2	0
Q64P	66	4.09	.696	0	.0	1	0
Q65I	66	4.45	.706	0	.0	1	0
Q65P	66	3.74	.900	0	.0	0	0
Q66I	66	4.48	.662	0	.0	1	0
Q66P	66	3.92	.847	0	.0	0	0
Q67I	66	4.59	.632	0	.0	1	0
Q67P	66	3.88	.903	0	.0	0	0
Q68I	66	3.74	.900	0	.0	1	0
Q68P	66	3.79	.851	0	.0	0	0
Q69I	66	4.21	.795	0	.0	2	0
Q69P	66	3.89	.806	0	.0	0	0
Q70I	66	4.30	.784	0	.0	2	0
Q70P	66	3.58	.912	0	.0	1	0
Q71I	66	4.42	.681	0	.0	1	0
Q71P	66	3.83	.815	0	.0	0	0
Q72I	66	3.68	.931	0	.0	0	0
Q72P	66	3.27	.953	0	.0	3	0
Q73I	66	4.00	.911	0	.0	4	0
Q73P	66	3.50	1.011	0	.0	2	0
Q74I	66	3.91	.890	0	.0	0	0

	N	Mean	Std. Deviation	Missing		No. of Extremes(a,b)	
				Count	Percent	Low	High
Q74P	66	3.38	1.034	0	.0	3	0
Q75I	66	2.92	1.057	0	.0	0	0
Q75P	66	2.91	.924	0	.0	0	3
Q76I	66	1.95	1.115	0	.0	0	0
Q76P	66	2.33	1.155	0	.0	0	0
Q77I	66	2.44	1.125	0	.0	0	3
Q77P	66	2.55	1.098	0	.0	0	3
Q78I	66	2.53	1.140	0	.0	0	4
Q78P	66	2.64	1.132	0	.0	0	4
Q79I	66	3.52	1.026	0	.0	2	0
Q79P	66	3.32	.963	0	.0	2	0
Q80I	66	4.41	.701	0	.0	1	0
Q80P	66	3.79	.920	0	.0	1	0

Appendix 7.A Codebook for the SPSS

Variables	SPSS Variable Name	Coding Instructions
Identification number	ID	Number assigned to each questionnaire
years in construction	Q1yrscon	1. <5 years; 2. 5-10 years; 3. 11-20 years; 4. >20 year
Years in organisation	Q2yrsorg	1. <5 years; 2. 5-10 years; 3. 11-20 years; 4. >20 year
Vocational background	Q3backgrd	1. Architect; 2. Designer/Engineer; 3. Quantity Surveyor; 4. Project Manager; 5. Others
Position in the organisation	Q4position	1.Director/senior;2.Manager/medium; 3.Engineer/low
Managerial role	Q5manrole	1. Decision-approvers (e.g. main board members) ;2. Decision-takers (e.g. senior managers) ;3. Decision-shapers (e.g. expert focus group) ;4. Decision-influencers (e.g. internal/external people who influence)
Type of organisation	Q6typeorg	1. Private sector;2. Central government;3. Local government;4. Other public sector;5. Others
Number of employees	Q7employ	1. < 10;2. 11-50;3. 51-249;4. 250-500;5. >500
Sector mainly procure in	Q8sectorg	1. Building;2. Infrastructure;3. Energy;4. Utilities;5. Others
Number of similar projects	Q9pronum	1. 0; 2. 1-2; 3. 3-5; 4. >5
Type of projects	Q10typepro	1. Building;2. Infrastructure;3. Energy;4. Utilities;5. Others
Procurement route	Q11procure	1. Traditional;2. Design & Build;3. PPP/PFI;4. Management Contract;5. Others
Type of contract	Q12typecon	1. JCT;2. ICE;3. GC works;4. NEC;5. Others
Contract value comparison	Q13convalu	1. Original value < Outturn value;2. Original value = Outturn value;3. Original value > Outturn value
Contract duration Comparison	Q14duration	1. Original value < Outturn value;2. Original value = Outturn value;3. Original value > Outturn value
Quality of the project	Q151qtypro	1. Worst; 2. Very bad; 3. Average 4. Very good; 5. Best
Quality of the service	Q152qtyser	1. Worst; 2. Very bad; 3. Average 4. Very good; 5. Best
Competence of Consultant/contractor	Q153compe	1. Worst; 2. Very bad; 3. Average 4. Very good; 5. Best
Importance of Decision to build	Q161I	1. Least important - 5. Most important
Effectiveness of Decision to build	Q161E	1. Least effective - 5. Most effective
Importance of Procurement	Q162I	1. Least important - 5. Most important
Effectiveness of Procurement	Q162E	1. Least effective - 5. Most effective
Importance of Org structure	Q163I	1. Least important - 5. Most important
Effectiveness of Org structure	Q163E	1. Least effective - 5. Most effective
Importance of Work procedure	Q164I	1. Least important - 5. Most important
Effectiveness of Work procedure	Q164E	1. Least effective - 5. Most effective
Importance of consultants	Q165I	1. Least important - 5. Most important

Variables	SPSS Variable Name	Coding Instructions
Effectiveness of consultants	Q165E	1. Least effective - 5. Most effective
Importance of other service providers	Q166I	1. Least important - 5. Most important
Effectiveness of other service providers	Q166E	1. Least effective - 5. Most effective
Importance of outline of project	Q167I	1. Least important - 5. Most important
Effectiveness of outline of project	Q167E	1. Least effective - 5. Most effective
Importance of estimated costs	Q168I	1. Least important - 5. Most important
Effectiveness of estimated costs	Q168E	1. Least effective - 5. Most effective
Importance of procurement review	Q169I	1. Least important - 5. Most important
Effectiveness of procurement review	Q169E	1. Least effective - 5. Most effective
Importance of details of project	Q1610I	1. Least important - 5. Most important
Effectiveness of details of project	Q1610E	1. Least effective - 5. Most effective
Importance of control approval	Q1611I	1. Least important - 5. Most important
Effectiveness of control approval	Q1611E	1. Least effective - 5. Most effective
Importance of coordination	Q1612I	1. Least important - 5. Most important
Effectiveness of coordination	Q1612E	1. Least effective - 5. Most effective
Importance of other decisions	Q17I	1. Least important - 5. Most important
Effectiveness of other decisions	Q17E	1. Least effective - 5. Most effective
Importance of decision mechanism	Q18I	1. Least important - 5. Most important
Effectiveness of decision mechanism	Q18E	1. Least effective - 5. Most effective
Importance of decision objectives	Q19I	1. Least important - 5. Most important
Effectiveness of decision objectives	Q19E	1. Least effective - 5. Most effective
Importance of understanding	Q20I	1. Least important - 5. Most important
Effectiveness of understanding	Q20E	1. Least effective - 5. Most effective
Importance of responses	Q21I	1. Least important - 5. Most important
Effectiveness of responses	Q21E	1. Least effective - 5. Most effective
Importance of info for tender	Q221I	1. Least important - 5. Most important
Effectiveness of info for tender	Q221E	1. Least effective - 5. Most effective
Importance of balance required	Q222I	1. Least important - 5. Most important
Effectiveness of balance required	Q222E	1. Least effective - 5. Most effective
Importance of other	Q23I	1. Least important - 5. Most important

Variables	SPSS Variable Name	Coding Instructions
decisions		
Effectiveness of other decisions	Q23E	1. Least effective - 5. Most effective
Importance of decision mechanism	Q24I	1. Least important - 5. Most important
Effectiveness of decision mechanism	Q24E	1. Least effective - 5. Most effective
Importance of decision objectives	Q25I	1. Least important - 5. Most important
Effectiveness of decision objectives	Q25E	1. Least effective - 5. Most effective
Importance of understanding	Q26I	1. Least important - 5. Most important
Effectiveness of understanding	Q26E	1. Least effective - 5. Most effective
Importance of responses	Q27I	1. Least important - 5. Most important
Effectiveness of responses	Q27E	1. Least effective - 5. Most effective
Importance of documentation for tender	Q281I	1. Least important - 5. Most important
Effectiveness of documentation for tender	Q281E	1. Least effective - 5. Most effective
Importance of potential contractors	Q282I	1. Least important - 5. Most important
Effectiveness of potential contractors	Q282E	1. Least effective - 5. Most effective
Importance of appointing contractors	Q283I	1. Least important - 5. Most important
Effectiveness of appointing contractors	Q283E	1. Least effective - 5. Most effective
Importance of site handover	Q284I	1. Least important - 5. Most important
Effectiveness of site handover	Q284E	1. Least effective - 5. Most effective
Importance of other decisions	Q29I	1. Least important - 5. Most important
Effectiveness of other decisions	Q29E	1. Least effective - 5. Most effective
Importance of decision mechanism	Q30I	1. Least important - 5. Most important
Effectiveness of decision mechanism	Q30E	1. Least effective - 5. Most effective
Importance of decision objectives	Q31I	1. Least important - 5. Most important
Effectiveness of decision objectives	Q31E	1. Least effective - 5. Most effective
Importance of understanding	Q32I	1. Least important - 5. Most important
Effectiveness of understanding	Q32E	1. Least effective - 5. Most effective
Importance of responses	Q33I	1. Least important - 5. Most important
Effectiveness of responses	Q33E	1. Least effective - 5. Most effective
Importance of reputation	Q341I	1. Least important - 5. Most important
Effectiveness of reputation	Q341E	1. Least effective - 5. Most effective
Importance of sector knowledge	Q342I	1. Least important - 5. Most important
Effectiveness of sector	Q342E	1. Least effective - 5. Most effective

Variables	SPSS Variable Name	Coding Instructions
knowledge		
Importance of business knowledge	Q343I	1. Least important - 5. Most important
Effectiveness of business knowledge	Q343E	1. Least effective - 5. Most effective
Importance of delivering VFM	Q344I	1. Least important - 5. Most important
Effectiveness of delivering VFM	Q344E	1. Least effective - 5. Most effective
Importance of office location	Q345I	1. Least important - 5. Most important
Effectiveness of office location	Q345E	1. Least effective - 5. Most effective
Importance of competitive bid	Q346I	1. Least important - 5. Most important
Effectiveness of competitive bid	Q346E	1. Least effective - 5. Most effective
Importance of specialisation	Q347I	1. Least important - 5. Most important
Effectiveness of specialisation	Q347E	1. Least effective - 5. Most effective
Importance of innovation	Q348I	1. Least important - 5. Most important
Effectiveness of innovation	Q348E	1. Least effective - 5. Most effective
Importance of other criteria	Q349I	1. Least important - 5. Most important
Effectiveness of other criteria	Q349E	1. Least effective - 5. Most effective
Importance of cost management	Q351I	1. Least important - 5. Most important
Effectiveness of cost management	Q351E	1. Least effective - 5. Most effective
Importance of people strategy	Q352I	1. Least important - 5. Most important
Effectiveness of people strategy	Q352E	1. Least effective - 5. Most effective
Importance of settling final account	Q353I	1. Least important - 5. Most important
Effectiveness of settling final account	Q353E	1. Least effective - 5. Most effective
Importance of other decisions	Q36I	1. Least important - 5. Most important
Effectiveness of other decisions	Q36E	1. Least effective - 5. Most effective
Importance of decision mechanism	Q37I	1. Least important - 5. Most important
Effectiveness of decision mechanism	Q37E	1. Least effective - 5. Most effective
Importance of decision objectives	Q38I	1. Least important - 5. Most important
Effectiveness of decision objectives	Q38E	1. Least effective - 5. Most effective
Importance of understanding	Q39I	1. Least important - 5. Most important
Effectiveness of understanding	Q39E	1. Least effective - 5. Most effective
Importance of responses	Q40I	1. Least important - 5. Most important
Effectiveness of responses	Q40E	1. Least effective - 5. Most effective

Variables	SPSS Variable Name	Coding Instructions
Importance of life cycle costing	Q411I	1. Least important - 5. Most important
Effectiveness of life cycle costing	Q411E	1. Least effective - 5. Most effective
Importance of maintenance strategy	Q412I	1. Least important - 5. Most important
Effectiveness of maintenance strategy	Q412E	1. Least effective - 5. Most effective
Importance of other decisions	Q42I	1. Least important - 5. Most important
Effectiveness of other decisions	Q42E	1. Least effective - 5. Most effective
Importance of decision mechanism	Q43I	1. Least important - 5. Most important
Effectiveness of decision mechanism	Q43E	1. Least effective - 5. Most effective
Importance of decision objectives	Q44I	1. Least important - 5. Most important
Effectiveness of decision objectives	Q44E	1. Least effective - 5. Most effective
Importance of understanding	Q45I	1. Least important - 5. Most important
Effectiveness of understanding	Q45E	1. Least effective - 5. Most effective
Importance of responses	Q46I	1. Least important - 5. Most important
Effectiveness of responses	Q46E	1. Least effective - 5. Most effective
Importance of demolition	Q471I	1. Least important - 5. Most important
Effectiveness of demolition	Q471E	1. Least effective - 5. Most effective
Importance of transfer of project	Q472I	1. Least important - 5. Most important
Effectiveness of transfer of project	Q472E	1. Least effective - 5. Most effective
Importance of other decisions	Q48I	1. Least important - 5. Most important
Effectiveness of other decisions	Q48E	1. Least effective - 5. Most effective
Importance of decision mechanism	Q49I	1. Least important - 5. Most important
Effectiveness of decision mechanism	Q49E	1. Least effective - 5. Most effective
Importance of decision objectives	Q50I	1. Least important - 5. Most important
Effectiveness of decision objectives	Q50E	1. Least effective - 5. Most effective
Importance of understanding	Q51I	1. Least important - 5. Most important
Effectiveness of understanding	Q51E	1. Least effective - 5. Most effective
Importance of responses	Q52I	1. Least important - 5. Most important
Effectiveness of responses	Q52E	1. Least effective - 5. Most effective
Importance of overall quality	Q53I	1. Least important - 5. Most important
Performance of overall quality	Q53P	1. Worst performance - 5. Best performance
Importance of comparing	Q54I	1. Least important - 5. Most important

Variables	SPSS Variable Name	Coding Instructions
with others		
Performance of comparing with others	Q54P	1. Worst performance - 5. Best performance
Importance of understanding client needs	Q55I	1. Least important - 5. Most important
Performance of understanding client needs	Q55P	1. Worst performance - 5. Best performance
Importance of problem solving	Q56I	1. Least important - 5. Most important
Performance of problem solving	Q56P	1. Worst performance - 5. Best performance
Importance of speed of response	Q57I	1. Least important - 5. Most important
Performance of speed of response	Q57P	1. Worst performance - 5. Best performance
Importance of technical accuracy	Q58I	1. Least important - 5. Most important
Performance of technical accuracy	Q58P	1. Worst performance - 5. Best performance
Importance of innovation	Q59I	1. Least important - 5. Most important
Performance of innovation	Q59P	1. Worst performance - 5. Best performance
Importance of meeting client expectations	Q60I	1. Least important - 5. Most important
Performance of meeting client expectations	Q60P	1. Worst performance - 5. Best performance
Importance of health & safety	Q61I	1. Least important - 5. Most important
Performance of health & safety	Q61P	1. Worst performance - 5. Best performance
Importance of delivering VFM	Q62I	1. Least important - 5. Most important
Performance of delivering VFM	Q62P	1. Worst performance - 5. Best performance
Importance of qualification	Q63I	1. Least important - 5. Most important
Performance of qualification	Q63P	1. Worst performance - 5. Best performance
Importance of experience	Q64I	1. Least important - 5. Most important
Performance of experience	Q64P	1. Worst performance - 5. Best performance
Importance of level of staffing	Q65I	1. Least important - 5. Most important
Performance of level of staffing	Q65P	1. Worst performance - 5. Best performance
Importance of level of commitment	Q66I	1. Least important - 5. Most important
Performance of level of commitment	Q66P	1. Worst performance - 5. Best performance
Importance of working with client	Q67I	1. Least important - 5. Most important
Performance working with client	Q67P	1. Worst performance - 5. Best performance
Importance of friendliness	Q68I	1. Least important - 5. Most important
Performance of friendliness	Q68P	1. Worst performance - 5. Best performance
Importance of accessibility	Q69I	1. Least important - 5. Most important
Performance of accessibility	Q69P	1. Worst performance - 5. Best performance

Variables	SPSS Variable Name	Coding Instructions
Importance of reports	Q70I	1. Least important - 5. Most important
Performance of reports	Q70P	1. Worst performance - 5. Best performance
Importance of regular dialogue for progress	Q71I	1. Least important - 5. Most important
Performance of regular dialogue for progress	Q71P	1. Worst performance - 5. Best performance
Importance of dialogue for dynamics	Q72I	1. Least important - 5. Most important
Performance of dialogue for dynamics	Q72P	1. Worst performance - 5. Best performance
Importance of listening	Q73I	1. Least important - 5. Most important
Performance of listening	Q73P	1. Worst performance - 5. Best performance
Importance of informing clients	Q74I	1. Least important - 5. Most important
Performance of informing clients	Q74P	1. Worst performance - 5. Best performance
Importance of regular mailing	Q75I	1. Least important - 5. Most important
Performance of regular mailing	Q75P	1. Worst performance - 5. Best performance
Importance of corporate entertainment	Q76I	1. Least important - 5. Most important
Performance of corporate entertainment	Q76P	1. Worst performance - 5. Best performance
Importance of corporate literature	Q77I	1. Least important - 5. Most important
Performance of corporate literature	Q77P	1. Worst performance - 5. Best performance
Importance of website	Q78I	1. Least important - 5. Most important
Performance of website	Q78P	1. Worst performance - 5. Best performance
Importance of making client understand	Q79I	1. Least important - 5. Most important
Performance of making client understand	Q79P	1. Worst performance - 5. Best performance
Importance of overall service quality	Q80I	1. Least important - 5. Most important
Performance of overall service quality	Q80P	1. Worst performance - 5. Best performance

Appendix 7.B Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Importance of Decision to build	.366	66	.000	.701	66	.000
Effectiveness of Decision to build	.264	66	.000	.812	66	.000
Importance of Procurement	.311	66	.000	.765	66	.000
Effectiveness of Procurement	.273	66	.000	.851	66	.000
Importance of Org structure	.247	66	.000	.874	66	.000
Effectiveness of Org structure	.214	66	.000	.874	66	.000
Importance of Work procedure	.275	66	.000	.856	66	.000
Effectiveness of Work procedure	.266	66	.000	.841	66	.000
Importance of consultants	.280	66	.000	.790	66	.000
Effectiveness of consultants	.242	66	.000	.845	66	.000
Importance of other service providers	.229	66	.000	.871	66	.000
Effectiveness of other service providers	.232	66	.000	.860	66	.000
Importance of outline of project	.273	66	.000	.795	66	.000
Effectiveness of outline of project	.282	66	.000	.868	66	.000
Importance of estimated costs	.417	66	.000	.621	66	.000
Effectiveness of estimated costs	.272	66	.000	.852	66	.000
Importance of procurement review	.258	66	.000	.864	66	.000
Effectiveness of procurement review	.229	66	.000	.875	66	.000
Importance of details of project	.237	66	.000	.815	66	.000
Effectiveness of details of project	.228	66	.000	.849	66	.000
Importance of control approval	.247	66	.000	.790	66	.000
Effectiveness of control approval	.253	66	.000	.873	66	.000
Importance of coordination	.253	66	.000	.797	66	.000
Effectiveness of coordination	.282	66	.000	.860	66	.000
Importance of other decisions	.532	13	.000	.311	13	.000

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Effectiveness of other decisions	.324	13	.001	.776	13	.004
Importance of decision mechanism	.469	66	.000	.193	66	.000
Effectiveness of decision mechanism	.246	66	.000	.858	66	.000
Importance of decision objectives	.237	66	.000	.818	66	.000
Effectiveness of decision objectives	.268	66	.000	.849	66	.000
Importance of understanding	.278	66	.000	.763	66	.000
Effectiveness of understanding	.221	66	.000	.880	66	.000
Importance of responses	.247	66	.000	.805	66	.000
Effectiveness of responses	.228	66	.000	.863	66	.000
Importance of info for tender	.347	66	.000	.666	66	.000
Effectiveness of info for tender	.270	66	.000	.854	66	.000
Importance of balance required	.277	66	.000	.845	66	.000
Effectiveness of balance required	.241	66	.000	.874	66	.000
Importance of other decisions	.461	10	.000	.500	10	.000
Effectiveness of other decisions	.300	10	.011	.841	10	.045
Importance of decision mechanism	.274	66	.000	.807	66	.000
Effectiveness of decision mechanism	.295	66	.000	.819	66	.000
Importance of decision objectives	.299	66	.000	.779	66	.000
Effectiveness of decision objectives	.276	66	.000	.787	66	.000
Importance of understanding	.273	66	.000	.771	66	.000
Effectiveness of understanding	.219	66	.000	.851	66	.000
Importance of responses	.275	66	.000	.757	66	.000
Effectiveness of responses	.245	66	.000	.869	66	.000
Importance of documentation for tender	.374	66	.000	.617	66	.000
Effectiveness of documentation for tender	.311	66	.000	.824	66	.000
Importance of potential contractors	.327	66	.000	.745	66	.000
Effectiveness of potential contractors	.233	66	.000	.853	66	.000

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Importance of appointing contractors	.295	66	.000	.695	66	.000
Effectiveness of appointing contractors	.235	66	.000	.801	66	.000
Importance of site handover	.192	66	.000	.878	66	.000
Effectiveness of site handover	.275	66	.000	.864	66	.000
Importance of other decisions	.524	10	.000	.366	10	.000
Effectiveness of other decisions	.308	10	.008	.756	10	.004
Importance of decision mechanism	.235	66	.000	.845	66	.000
Effectiveness of decision mechanism	.248	66	.000	.859	66	.000
Importance of decision objectives	.254	66	.000	.809	66	.000
Effectiveness of decision objectives	.282	66	.000	.848	66	.000
Importance of understanding	.256	66	.000	.806	66	.000
Effectiveness of understanding	.231	66	.000	.883	66	.000
Importance of responses	.251	66	.000	.810	66	.000
Effectiveness of responses	.248	66	.000	.866	66	.000
Importance of reputation	.269	66	.000	.847	66	.000
Effectiveness of reputation	.236	66	.000	.889	66	.000
Importance of sector knowledge	.266	66	.000	.792	66	.000
Effectiveness of sector knowledge	.346	66	.000	.796	66	.000
Importance of business knowledge	.301	66	.000	.821	66	.000
Effectiveness of business knowledge	.320	66	.000	.835	66	.000
Importance of delivering VFM	.371	66	.000	.645	66	.000
Effectiveness of delivering VFM	.278	66	.000	.820	66	.000
Importance of office location	.307	66	.000	.412	66	.000
Effectiveness of office location	.236	66	.000	.897	66	.000
Importance of competitive bid	.241	66	.000	.861	66	.000
Effectiveness of competitive bid	.238	66	.000	.887	66	.000
Importance of specialisation	.283	66	.000	.855	66	.000

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Effectiveness of specialisation	.256	66	.000	.867	66	.000
Importance of innovation	.234	66	.000	.865	66	.000
Effectiveness of innovation	.269	65	.000	.847	65	.000
Importance of other criteria	.492	16	.000	.484	16	.000
Effectiveness of other criteria	.307	16	.000	.768	16	.001
Importance of cost management	.435	66	.000	.611	66	.000
Effectiveness of cost management	.216	66	.000	.848	66	.000
Importance of people strategy	.275	66	.000	.832	66	.000
Effectiveness of people strategy	.223	66	.000	.857	66	.000
Importance of settling final account	.304	66	.000	.727	66	.000
Effectiveness of settling final account	.241	66	.000	.891	66	.000
Importance of other decisions	.482	10	.000	.509	10	.000
Effectiveness of other decisions	.302	10	.010	.781	10	.008
Importance of decision mechanism	.289	66	.000	.807	66	.000
Effectiveness of decision mechanism	.298	66	.000	.824	66	.000
Importance of decision objectives	.276	66	.000	.775	66	.000
Effectiveness of decision objectives	.297	66	.000	.821	66	.000
Importance of understanding	.249	66	.000	.821	66	.000
Effectiveness of understanding	.334	66	.000	.809	66	.000
Importance of responses	.249	66	.000	.775	66	.000
Effectiveness of responses	.272	66	.000	.858	66	.000
Importance of life cycle costing	.226	66	.000	.811	66	.000
Effectiveness of life cycle costing	.198	66	.000	.889	66	.000
Importance of maintenance strategy	.302	66	.000	.767	66	.000
Effectiveness of maintenance strategy	.217	66	.000	.885	66	.000
Importance of other decisions	.360	7	.007	.664	7	.001
Effectiveness of other decisions	.296	7	.063	.840	7	.099

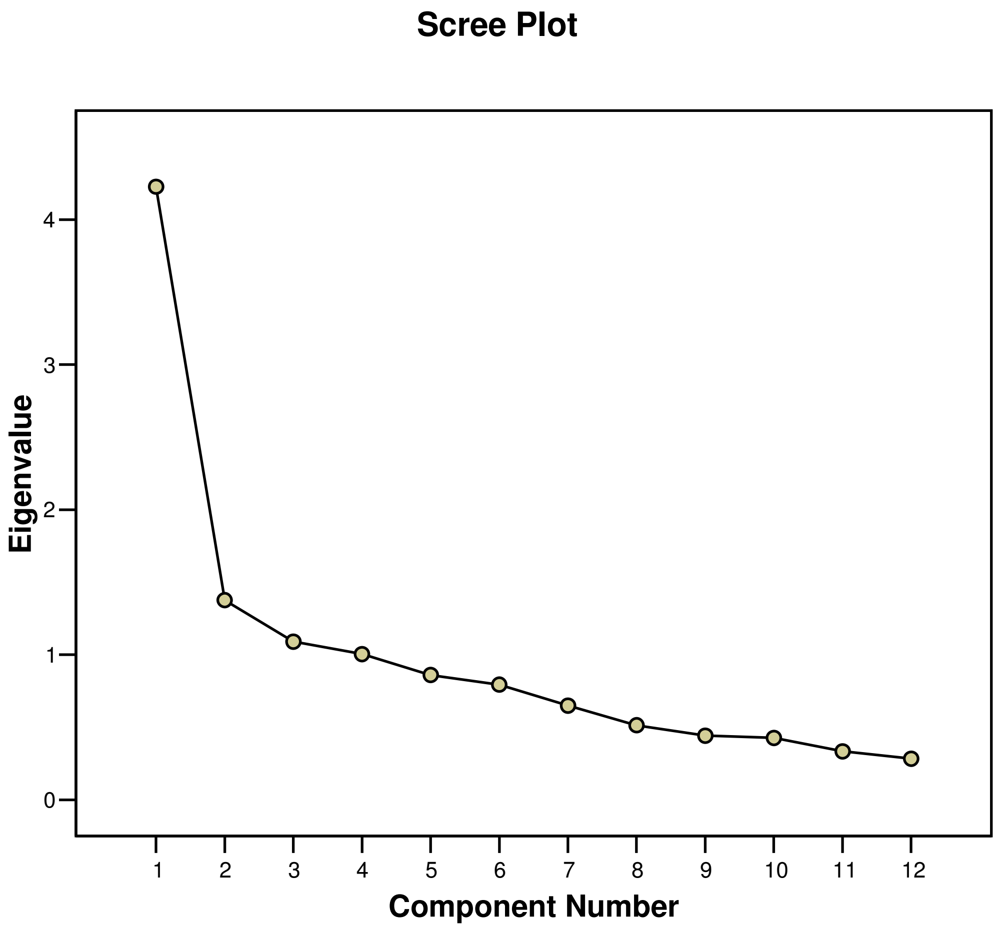
	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Importance of decision mechanism	.223	66	.000	.861	66	.000
Effectiveness of decision mechanism	.235	66	.000	.876	66	.000
Importance of decision objectives	.281	66	.000	.844	66	.000
Effectiveness of decision objectives	.283	66	.000	.849	66	.000
Importance of understanding	.215	66	.000	.855	66	.000
Effectiveness of understanding	.257	66	.000	.853	66	.000
Importance of responses	.236	66	.000	.860	66	.000
Effectiveness of responses	.246	66	.000	.879	66	.000
Importance of demolition	.223	66	.000	.902	66	.000
Effectiveness of demolition	.228	66	.000	.895	66	.000
Importance of transfer of project	.184	66	.000	.903	66	.000
Effectiveness of transfer of project	.252	66	.000	.889	66	.000
Importance of other decisions	.241	8	.189	.814	8	.041
Effectiveness of other decisions	.262	8	.114	.877	8	.178
Importance of decision mechanism	.228	66	.000	.887	66	.000
Effectiveness of decision mechanism	.241	66	.000	.878	66	.000
Importance of decision objectives	.314	66	.000	.831	66	.000
Effectiveness of decision objectives	.216	66	.000	.880	66	.000
Importance of understanding	.278	66	.000	.853	66	.000
Effectiveness of understanding	.217	66	.000	.897	66	.000
Importance of responses	.312	66	.000	.823	66	.000
Effectiveness of responses	.202	66	.000	.907	66	.000
Importance of overall quality	.326	66	.000	.685	66	.000
Performance of overall quality	.261	66	.000	.861	66	.000
Importance of comparing with others	.303	66	.000	.818	66	.000
Performance of comparing with others	.234	66	.000	.874	66	.000
Importance of understanding client needs	.260	66	.000	.779	66	.000

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Performance of understanding client needs	.283	66	.000	.848	66	.000
Importance of problem solving	.295	66	.000	.734	66	.000
Performance of problem solving	.261	66	.000	.860	66	.000
Importance of speed of response	.268	66	.000	.732	66	.000
Performance of speed of response	.265	66	.000	.884	66	.000
Importance of technical accuracy	.367	66	.000	.704	66	.000
Performance of technical accuracy	.327	66	.000	.809	66	.000
Importance of innovation	.258	66	.000	.847	66	.000
Performance of innovation	.223	66	.000	.877	66	.000
Importance of meeting client expectations	.347	66	.000	.607	66	.000
Performance of meeting client expectations	.265	66	.000	.868	66	.000
Importance of health & safety	.472	66	.000	.489	66	.000
Performance of health & safety	.250	66	.000	.785	66	.000
Importance of delivering VFM	.411	66	.000	.520	66	.000
Performance of delivering VFM	.261	66	.000	.860	66	.000
Importance of qualification	.276	66	.000	.854	66	.000
Performance of qualification	.252	66	.000	.800	66	.000
Importance of experience	.324	66	.000	.662	66	.000
Performance of experience	.281	66	.000	.810	66	.000
Importance of level of staffing	.341	66	.000	.728	66	.000
Performance of level of staffing	.234	66	.000	.873	66	.000
Importance of level of commitment	.342	66	.000	.711	66	.000
Performance of level of commitment	.263	66	.000	.852	66	.000
Importance of working with client	.393	66	.000	.649	66	.000
Performance working with client	.235	66	.000	.862	66	.000
Importance of friendliness	.249	66	.000	.874	66	.000

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Performance of friendliness	.265	66	.000	.863	66	.000
Importance of accessibility	.274	66	.000	.767	66	.000
Performance of accessibility	.234	66	.000	.852	66	.000
Importance of reports	.283	66	.000	.778	66	.000
Performance of reports	.224	66	.000	.889	66	.000
Importance of regular dialogue for progress	.286	66	.000	.654	66	.000
Performance of regular dialogue for progress	.278	66	.000	.854	66	.000
Importance of dialogue for dynamics	.300	66	.000	.843	66	.000
Performance of dialogue for dynamics	.232	66	.000	.886	66	.000
Importance of listening	.258	66	.000	.840	66	.000
Performance of listening	.205	66	.000	.901	66	.000
Importance of informing clients	.268	66	.000	.851	66	.000
Performance of informing clients	.204	66	.000	.903	66	.000
Importance of regular mailing	.210	66	.000	.912	66	.000
Performance of regular mailing	.236	66	.000	.896	66	.000
Importance of corporate entertainment	.258	66	.000	.800	66	.000
Performance of corporate entertainment	.179	66	.000	.879	66	.000
Importance of corporate literature	.182	66	.000	.895	66	.000
Performance of corporate literature	.206	66	.000	.898	66	.000
Importance of website	.190	66	.000	.895	66	.000
Performance of website	.171	66	.000	.909	66	.000
Importance of making client understand	.227	66	.000	.899	66	.000
Performance of making client understand	.205	66	.000	.903	66	.000
Importance of overall service quality	.315	66	.000	.748	66	.000
Performance of overall service quality	.243	66	.000	.874	66	.000

a Lilliefors Significance Correction

Appendix 7.C Screeplot of strategic decisions at the pre-design stage



Appendix 7.D Monte Carlo PCA for parallel analysis for strategic decisions at the pre-design stage

09/06/2007 11:55:01
Number of variables: 12
Number of subjects: 66
Number of replications: 60

++

Eigenvalue #	Random Eigenvalue	Standard Dev
1	1.7857	.1153
2	1.5643	.0712
3	1.3821	.0658
4	1.2316	.0563
5	1.1164	.0526
6	0.9965	.0532
7	0.8965	.0435
8	0.8064	.0426
9	0.7063	.0515
10	0.6046	.0483
11	0.5109	.0440
12	0.3987	.0566

++

09/06/2007 11:55:01
Monte Carlo PCA for Parallel Analysis

Appendix 7.E Output of Oblimin rotation

Pattern Matrix(a)

	Component	
	1	2
Effectiveness of details of project	.842	
Effectiveness of Decision to build	.711	.362
Effectiveness of coordination	.687	
Effectiveness of estimated costs	.595	
Effectiveness of Work procedure	.571	
Effectiveness of procurement review	.491	
Effectiveness of Org structure	.426	
Effectiveness of control approval	.397	
Effectiveness of other service providers		-.894
Effectiveness of consultants		-.770
Effectiveness of outline of project		-.521
Effectiveness of Procurement		-.511

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 9 iterations.

Total Variance Explained

Component	Rotation Sums of Squared Loadings(a)
	Total
1	3.639
2	2.970

Extraction Method: Principal Component Analysis.
a When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Structure Matrix

	Component	
	1	2
Effectiveness of details of project	.831	
Effectiveness of coordination	.744	-.408
Effectiveness of estimated costs	.667	-.414
Effectiveness of Work procedure	.615	-.329
Effectiveness of Decision to build	.578	
Effectiveness of procurement review	.572	-.401
Effectiveness of control approval	.500	-.428
Effectiveness of Org structure	.438	
Effectiveness of other service providers		-.865
Effectiveness of consultants	.323	-.785
Effectiveness of outline of project	.450	-.616
Effectiveness of Procurement	.316	-.559

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2
1	1.000	-.365
2	-.365	1.000

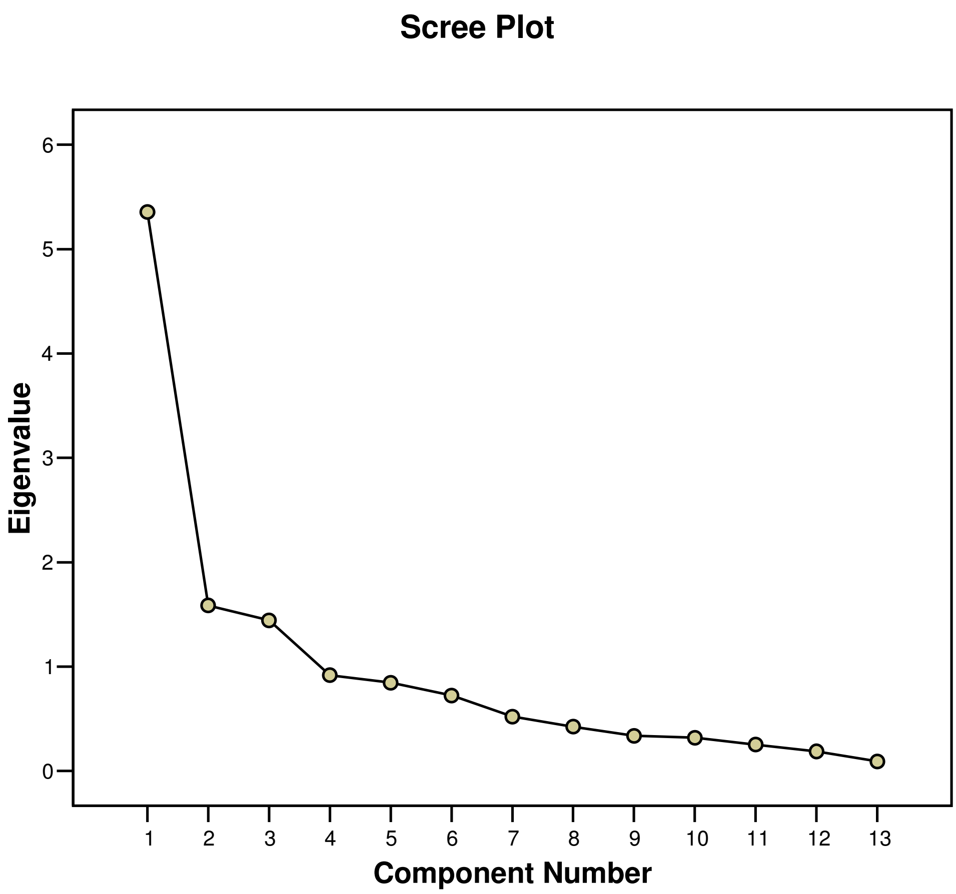
Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Appendix 7.F Correlation matrix of strategic decisions after the pre-design stage

	info for tender	balance required	documentation for tender	potential contractors	appointing contractors	site hand over	cost management	people strategy	settling final account	life cycle costing	maintenance strategy	demolition	transfer of project
info for tender	**1.000**	**.333**	**.477**	**.384**	**.245**	**.102**	**.322**	**.338**	**.226**	**.311**	**.224**	**-.039**	**-.031**
balance required	.333	**1.000**	**.314**	**.377**	**.435**	**.451**	**.323**	**.179**	**.423**	**.343**	**.321**	**.187**	**.220**
documentation for tender	.477	.314	**1.000**	**.614**	**.349**	**.193**	**.477**	**.404**	**.526**	**.353**	**.380**	**.134**	**.280**
potential contractors	.384	.377	.614	**1.000**	**.628**	**.379**	**.550**	**.391**	**.448**	**.327**	**.415**	**.030**	**.325**
appointing contractors	**.245**	.435	.349	.628	**1.000**	**.591**	**.473**	**.222**	**.245**	**.321**	**.355**	**.079**	**.341**
site handover	**.102**	.451	**.193**	.379	.591	**1.000**	**.274**	**.207**	**.251**	**.286**	**.305**	**.160**	**.322**
cost management	.322	.323	.477	.550	.473	**.274**	**1.000**	**.634**	**.689**	**.573**	**.565**	**.089**	**.267**
people strategy	.338	**.179**	.404	.391	**.222**	**.207**	.634	**1.000**	**.551**	**.583**	**.510**	**.130**	**.155**
settling final account	**.226**	.423	.526	.448	**.245**	**.251**	.689	.551	**1.000**	**.507**	**.465**	**.167**	**.250**
life cycle costing	**.311**	.343	.353	.327	.321	**.286**	.573	.583	.507	**1.000**	**.876**	**.384**	**.324**
maintenance strategy	**.224**	.321	.380	.415	.355	.305	.565	.510	.465	.876	**1.000**	**.300**	**.359**
demolition	-.039	**.187**	**.134**	**.030**	**.079**	**.160**	**.089**	**.130**	**.167**	.384	.300	**1.000**	**.562**
transfer of project	**-.031**	**.220**	**.280**	.325	.341	.322	**.267**	**.155**	**.250**	.324	.359	.562	**1.000**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.780
Bartlett's Test of Sphericity	Approx. Chi-Square	434.693
	df	78
	Sig.	.000

Appendix 7.G Screeplot of strategic decisions after the pre-design stage



Appendix 7.H Component matrix of strategic decisions after the pre-design stage

Component Matrix(a)			
	Component		
	1	2	3
Effectiveness of cost management	.795		
Effectiveness of life cycle costing	.768		-.402
Effectiveness of maintenance strategy	.761		-.319
Effectiveness of potential contractors	.729		.324
Effectiveness of settling final account	.726		
Effectiveness of documentation for tender	.678		
Effectiveness of people strategy	.672		-.417
Effectiveness of appointing contractors	.639		.578
Effectiveness of balance required	.579		.368
Effectiveness of demolition	.325	.751	
Effectiveness of transfer of project	.489	.645	
Effectiveness of info for tender	.467	-.509	
Effectiveness of site handover	.527		.549

Extraction Method: Principal Component Analysis
a 3 components extracted.

Appendix 7.I Oblimin rotation (3 factors) of strategic decisions after the pre-design stage

Pattern Matrix(a)

	Component		
	1	2	3
Effectiveness of people strategy	.872	-.049	-.147
Effectiveness of life cycle costing	.831	.336	-.054
Effectiveness of maintenance strategy	.757	.321	.028
Effectiveness of cost management	.756	-.076	.156
Effectiveness of settling final account	.737	-.006	.074
Effectiveness of documentation for tender	.528	-.197	.299
Effectiveness of demolition	.193	.804	.028
Effectiveness of transfer of project	.091	.663	.393
Effectiveness of info for tender	.431	-.453	.193
Effectiveness of appointing contractors	-.029	-.020	.876
Effectiveness of site handover	-.137	.179	.815
Effectiveness of balance required	.100	.019	.634
Effectiveness of potential contractors	.307	-.208	.632

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 9 iterations.

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total
1	5.355	41.190	41.190	4.683
2	1.585	12.195	53.385	1.677
3	1.442	11.095	64.480	3.727

Extraction Method: Principal Component Analysis.
a When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Structure Matrix

	Component		
	1	2	3
Effectiveness of cost management	.823	-.040	.489
Effectiveness of life cycle costing	.819	.363	.334
Effectiveness of people strategy	.804	-.026	.238
Effectiveness of maintenance strategy	.781	.350	.383
Effectiveness of settling final account	.770	.024	.402
Effectiveness of documentation for tender	.654	-.161	.523
Effectiveness of info for tender	.501	-.427	.360
Effectiveness of demolition	.234	.812	.159
Effectiveness of transfer of project	.290	.688	.471
Effectiveness of appointing contractors	.360	.027	.861
Effectiveness of site handover	.233	.219	.764
Effectiveness of potential contractors	.581	-.162	.757
Effectiveness of balance required	.383	.057	.680

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3
1	1.000	.036	.445
2	.036	1.000	.056
3	.445	.056	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Appendix 8.A MR model for strategic decisions with service delivery

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.585(a)	.342	.316	.736

a Predictors: (Constant), Effectiveness of outline of project, Effectiveness of estimated costs
b Dependent Variable: Performance of meeting client expectations

Appendix 8.B MR model for strategic decisions with People of service providers

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.593(a)	.352	.327	.581

a Predictors: (Constant), Effectiveness of life cycle costing, Effectiveness of details of project
b Dependent Variable: Performance of experience

Appendix 8.C MR model for strategic decisions with Communications

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.615(a)	.378	.354	.768

a Predictors: (Constant), Effectiveness of maintenance strategy, Effectiveness of coordination
b Dependent Variable: Performance of reports

Appendix 8.D Correlation analyses and coefficients for SDC with overall service quality

Correlations

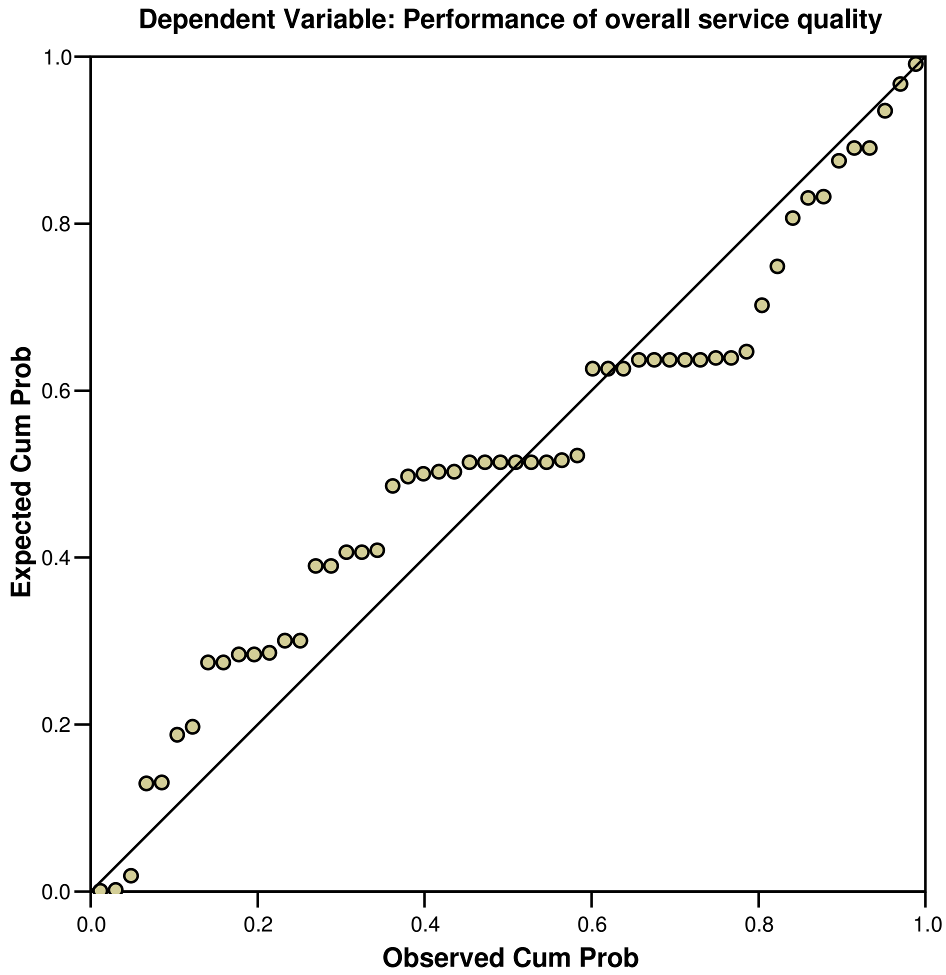
		Performance of overall service quality	Effectiveness of coordination	Effectiveness of maintenance strategy	Effectiveness of details of project	Effectiveness of life cycle costing	Effectiveness of outline of project	Effectiveness of estimated costs
Pearson Correlation	Performance of overall service quality	1.000	.574	.466	.285	.527	.552	.404
	Effectiveness of coordination	.574	1.000	.312	.461	.347	.419	.383
	Effectiveness of maintenance strategy	.466	.312	1.000	.222	.883	.479	.414
	Effectiveness of details of project	.285	.461	.222	1.000	.228	.237	.485
	Effectiveness of life cycle costing	.527	.347	.883	.228	1.000	.601	.466
	Effectiveness of outline of project	.552	.419	.479	.237	.601	1.000	.349
	Effectiveness of estimated costs	.404	.383	.414	.485	.466	.349	1.000
Sig. (1-tailed)	Performance of overall service quality	.	.000	.000	.018	.000	.000	.001
	Effectiveness of coordination	.000	.	.011	.000	.005	.001	.002
	Effectiveness of maintenance strategy	.000	.011	.	.054	.000	.000	.001
	Effectiveness of details of project	.018	.000	.054	.	.048	.043	.000
	Effectiveness of life cycle costing	.000	.005	.000	.048	.	.000	.000
	Effectiveness of outline of project	.000	.001	.000	.043	.000	.	.005
	Effectiveness of estimated costs	.001	.002	.001	.000	.000	.005	.
N	Performance of overall service quality	54	54	54	54	54	54	54
	Effectiveness of coordination	54	54	54	54	54	54	54
	Effectiveness of maintenance strategy	54	54	54	54	54	54	54
	Effectiveness of details of project	54	54	54	54	54	54	54
	Effectiveness of life cycle costing	54	54	54	54	54	54	54
	Effectiveness of outline of project	54	54	54	54	54	54	54
	Effectiveness of estimated costs	54	54	54	54	54	54	54

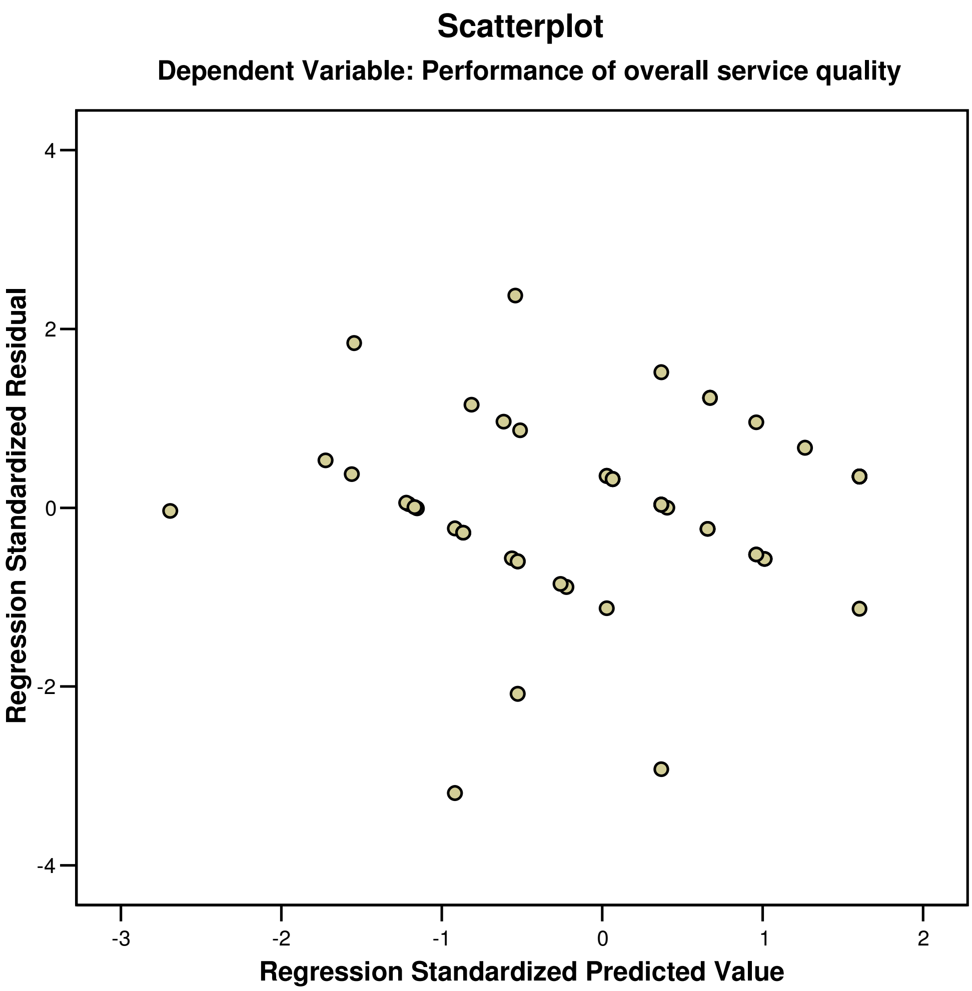
Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.765	.548		1.395	.169	-.338	1.867					
	Effectiveness of coordination	.372	.124	.382	3.012	.004	.124	.621	.574	.402	.313	.673	1.487
	Effectiveness of maintenance strategy	.041	.178	.052	.233	.817	-.316	.399	.466	.034	.024	.214	4.665
	Effectiveness of details of project	-.049	.141	-.044	-.349	.729	-.332	.234	.285	-.051	-.036	.671	1.491
	Effectiveness of life cycle costing	.131	.195	.169	.674	.504	-.261	.524	.527	.098	.070	.172	5.807
	Effectiveness of outline of project	.219	.124	.243	1.768	.084	-.030	.469	.552	.250	.184	.575	1.739
	Effectiveness of estimated costs	.085	.120	.094	.712	.480	-.156	.326	.404	.103	.074	.625	1.601

a Dependent Variable: Performance of overall service quality

Appendix 8.E Plots and residual statistics for overall service quality





Residual statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.02	4.76	3.74	.638	54
Std. Predicted Value	-2.692	1.604	.000	1.000	54
Standard Error of Predicted Value	.099	.343	.174	.059	54
Adjusted Predicted Value	2.03	4.82	3.73	.656	54
Residual	-2.156	1.604	.000	.656	54
Std. Residual	-3.191	2.374	.000	.971	54
Stud. Residual	-3.351	2.646	.009	1.018	54
Deleted Residual	-2.378	1.993	.013	.723	54
Stud. Deleted Residual	-3.768	2.825	.000	1.075	54
Mahal. Distance	.161	12.705	2.944	2.812	54
Cook's Distance	.000	**.424**	.027	.075	54
Centered Leverage Value	.003	.240	.056	.053	54

a Dependent Variable: Performance of overall service quality

Appendix 8.F MR model for strategic decisions with overall service quality

Model Summary(b)

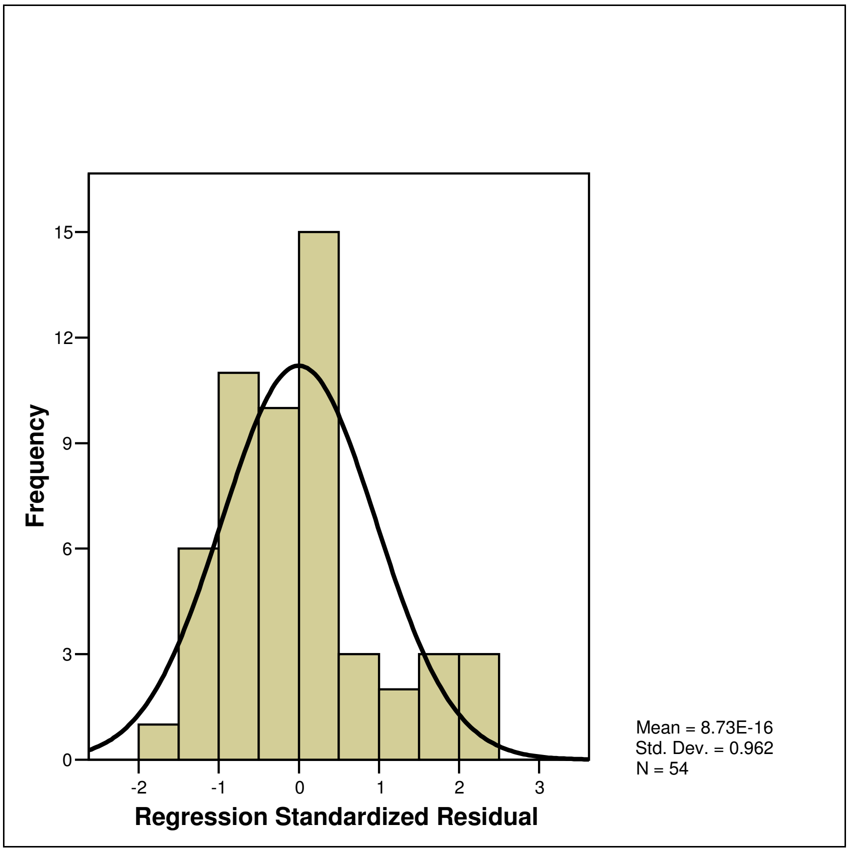
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.697(a)	.485	.455	.676

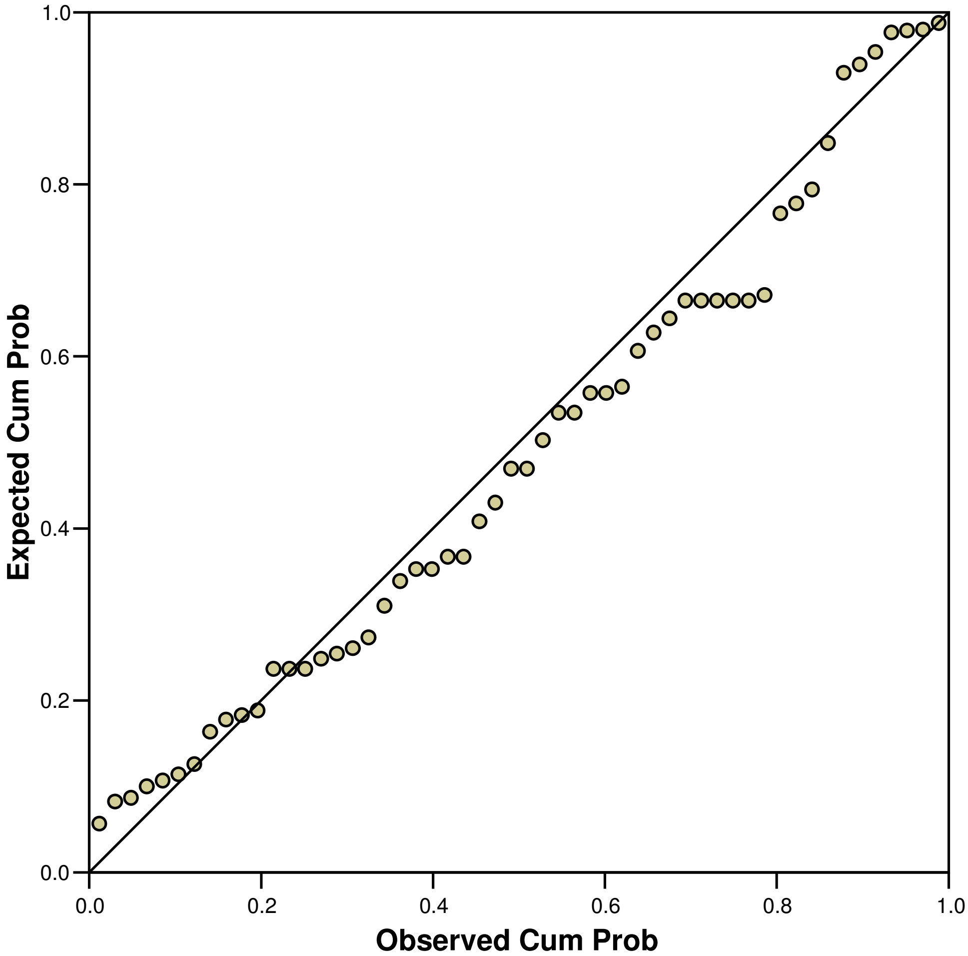
a Predictors: (Constant), Effectiveness of outline of project, Effectiveness of coordination, Effectiveness of life cycle costing
b Dependent Variable: Performance of overall service quality

Appendix 8.G Correlation analyses for service quality and client satisfaction

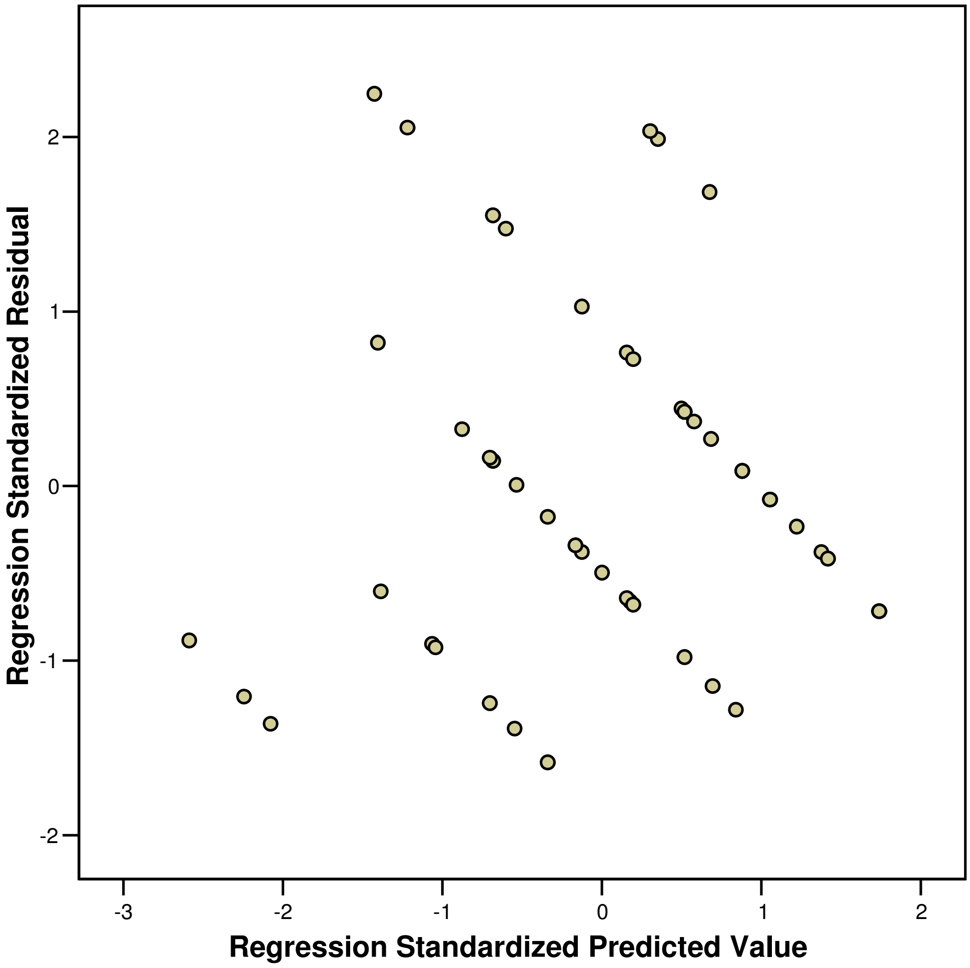
		Overall service quality performance	Performance of speed of response	Performance of meeting client expectations	Performance of reports	Performance of informing clients
Pearson Correlation	Overall service quality performance	1.000	.560	.518	.594	.563
	Performance of speed of response	.560	1.000	.558	.475	.568
	Performance of meeting client expectations	.518	.558	1.000	.659	.578
	Performance of reports	.594	.475	.659	1.000	.508
	Performance of informing clients	.563	.568	.578	.508	1.000
Sig. (1-tailed)	Overall service quality performance	.	.000	.000	.000	.000
	Performance of speed of response	.000	.	.000	.000	.000
	Performance of meeting client expectations	.000	.000	.	.000	.000
	Performance of reports	.000	.000	.000	.	.000
	Performance of informing clients	.000	.000	.000	.000	.
N	Overall service quality performance	54	54	54	54	54
	Performance of speed of response	54	54	54	54	54
	Performance of meeting client expectations	54	54	54	54	54
	Performance of reports	54	54	54	54	54
	Performance of informing clients	54	54	54	54	54

Appendix 8.H Plots and residual statistics for client satisfaction





1.0
0.8
0.6
0.4
0.2
0.0
Expected Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0
Observed Cum Prob



Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-2.3712	.5099	-.6481	.66618	54
Std. Predicted Value	-2.586	1.738	.000	1.000	54
Standard Error of Predicted Value	.113	.416	.205	.069	54
Adjusted Predicted Value	-2.1985	.5535	-.6680	.67469	54
Residual	-1.12553	1.59820	.00000	.68396	54
Std. Residual	-1.582	2.247	.000	.962	54
Stud. Residual	-1.623	2.490	.012	1.037	54
Deleted Residual	-1.18358	1.96303	.01986	.80090	54
Stud. Deleted Residual	-1.651	2.637	.021	1.061	54
Mahal. Distance	.364	17.135	3.926	3.545	54
Cook's Distance	.000	.448	.038	.086	54
Centered Leverage Value	.007	.323	.074	.067	54

a Dependent Variable: satisfaction on Overall service quality performance

Appendix 9.A MR models of validation and residuals statistics

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724(a)	.524	.378	.67492

a Predictors: (Constant), Performance of informing clients, Performance of meeting client expectations, Performance of speed of response, Performance of reports
b Dependent Variable: Satisfaction on Overall service quality performance

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-1.9777	.4526	-.5556	.61943	18
Std. Predicted Value	-2.296	1.628	.000	1.000	18
Standard Error of Predicted Value	.190	.518	.346	.087	18
Adjusted Predicted Value	-1.8701	.5802	-.5129	.59316	18
Residual	-1.02231	1.38153	.00000	.59020	18
Std. Residual	-1.515	2.047	.000	.874	18
Stud. Residual	-2.079	2.382	-.025	1.037	18
Deleted Residual	-1.92680	1.87006	-.04270	.84472	18
Stud. Deleted Residual	-2.446	3.047	-.009	1.179	18
Mahal. Distance	.400	9.065	3.778	2.238	18
Cook's Distance	.000	.765	.093	.192	18
Centered Leverage Value	.024	.533	.222	.132	18

a Dependent Variable: Satisfaction on Overall service quality performance

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.367(a)	.134	-.051	1.023

a Predictors: (Constant), Effectiveness of life cycle costing, Effectiveness of coordination, Effectiveness of outline of project
b Dependent Variable: Performance of overall service quality

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.25	4.53	3.94	.366	18
Std. Predicted Value	-1.902	1.605	.000	1.000	18
Standard Error of Predicted Value	.292	.699	.467	.126	18
Adjusted Predicted Value	3.32	4.84	3.98	.436	18
Residual	-2.061	1.410	.000	.929	18
Std. Residual	-2.014	1.377	.000	.907	18
Stud. Residual	-2.102	1.503	-.014	1.030	18
Deleted Residual	-2.421	1.679	-.036	1.216	18
Stud. Deleted Residual	-2.448	1.582	-.039	1.103	18
Mahal. Distance	.443	6.982	2.833	1.940	18
Cook's Distance	.000	.652	.083	.152	18
Centered Leverage Value	.026	.411	.167	.114	18

a Dependent Variable: Performance of overall service quality

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.486(a)	.236	.135	.858

a Predictors: (Constant), Effectiveness of maintenance strategy, Effectiveness of coordination
b Dependent Variable: Performance of reports

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.79	4.32	3.56	.448	18
Std. Predicted Value	-1.702	1.711	.000	1.000	18
Standard Error of Predicted Value	.214	.544	.339	.090	18
Adjusted Predicted Value	3.04	4.71	3.57	.456	18
Residual	-1.680	1.076	.000	.806	18
Std. Residual	-1.959	1.255	.000	.939	18
Stud. Residual	-2.023	1.369	-.009	1.033	18
Deleted Residual	-1.792	1.282	-.019	.982	18
Stud. Deleted Residual	-2.292	1.414	-.027	1.084	18
Mahal. Distance	.119	5.897	1.889	1.513	18
Cook's Distance	.000	.321	.077	.098	18
Centered Leverage Value	.007	.347	.111	.089	18

a Dependent Variable: Performance of reports

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.540(a)	.292	.197	.522

a Predictors: (Constant), Effectiveness of life cycle costing, Effectiveness of details of project
b Dependent Variable: Performance of experience

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.79	4.74	4.11	.315	18
Std. Predicted Value	-1.018	2.011	.000	1.000	18
Standard Error of Predicted Value	.152	.327	.207	.052	18
Adjusted Predicted Value	3.75	5.23	4.12	.379	18
Residual	-.814	.767	.000	.491	18
Std. Residual	-1.558	1.469	.000	.939	18
Stud. Residual	-1.828	1.760	-.006	1.058	18
Deleted Residual	-1.225	1.101	-.008	.629	18
Stud. Deleted Residual	-2.003	1.909	-.014	1.119	18
Mahal. Distance	.500	5.731	1.889	1.516	18
Cook's Distance	.007	.720	.104	.188	18
Centered Leverage Value	.029	.337	.111	.089	18

a Dependent Variable: Performance of experience

Model Summary(b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.261(a)	.068	-.056	.985

a Predictors: (Constant), Effectiveness of outline of project, Effectiveness of estimated costs
b Dependent Variable: Performance of meeting client expectations

Residuals Statistics(a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.12	4.06	3.72	.250	18
Std. Predicted Value	-2.399	1.346	.000	1.000	18
Standard Error of Predicted Value	.239	.755	.375	.149	18
Adjusted Predicted Value	3.38	4.72	3.79	.369	18
Residual	-2.059	1.311	.000	.925	18
Std. Residual	-2.091	1.331	.000	.939	18
Stud. Residual	-2.284	1.478	-.028	1.061	18
Deleted Residual	-2.720	1.616	-.073	1.225	18
Stud. Deleted Residual	-2.733	1.545	-.055	1.144	18
Mahal. Distance	.059	9.043	1.889	2.415	18
Cook's Distance	.000	1.494	.135	.350	18
Centered Leverage Value	.003	.532	.111	.142	18

a Dependent Variable: Performance of meeting client expectations