PERFORMANCE EVALUATION OF CLIENTS & CONSULTANTS THROUGH CONTRACTOR SATISFACTION ON BUILDING PROJECTS

By

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DEDICATED

TO

MY FAMILY, TEACHERS AND COLLEAGUES

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(Jahan Zaib)

TABLE OF CONTENTS

ACKNOWLEDGEMENT ..... **iv**

TABLE OF CONTENTS ..... **v**

LIST OF TABLES ..... **viii**

LIST OF FIGURES ..... **ix**

ABSTRACT……. ..... **x**

Chapter 1…….. ..... **1**

INTRODUCTION **1**

1.1 BACKGROUND **1**

1.2 PROBLEM STATEMENT **2**

1.3 RESEARCH OBJECTIVES **3**

1.4 RESEARCH SIGNIFICANCE **3**

1.5 SCOPE OF THE THESIS **4**

1.6 ORGANIZATION OF THE THESIS **4**

1.7 SUMMARY **5**

Chapter 2…….. ..... **6**

LITERATURE REVIEW **6**

2.1 INTRODUCTION **6**

2.2 TRADITIONAL PROCUREMENT METHOD **6**

2.2.1 Introduction 6

2.2.2 Project participants 8

2.2.2.1 Client 8

2.2.2.2 Consultant 9

2.2.2.3 Contractor 9

2.2.2.4 Subcontractors and suppliers 9

2.2.3 Contractual relationships and responsibilities of key project participants 10

2.2.3.1 Client responsibilities 10

2.2.3.2 Consultant responsibilities 11

2.2.3.3 Contractor responsibilities 12

2.3 PROJECT PERFORMANCE MEASURES 12
2.3.1 General 12
2.3.2 Traditional performance measures 13
2.3.3 Importance of participant's satisfaction 14
2.3.4 Satisfaction in project performance evaluation 17
2.3.5 Contractor satisfaction framework 20
2.4 SUMMARY 21
***Chapter 3*…….. ..... 22**
RESEARCH METHODOLOGY 22
3.1 INTRODUCTION 22
3.2 RESEARCH DESIGN 22
3.3 THE SURVEY DESIGN PROCESS 24
3.3.1 Identification of research unit of analysis 24
3.3.2 Sampling 25
3.3.3 Design of a research instrument 26
3.3.3.1 Selection of measurement scale 26
3.3.3.2 Attitude measurement 26
3.3.3.3 Ranges of response category 27
3.3.3.4 Pilot study 27
3.3.3.5 Layout of a questionnaire 28
3.3.4 Data collection 29
3.3.4.1 Full scale survey 29
3.3.5 Strategy for data analysis 30
***Chapter 4*…… 31**
DATA ANALYSIS AND RESULTS 31
4.1 INTRODUCTION 31
4.2 DEFINING VARIABLES 31
4.3 RELIABILITY ANALYSIS 32
4.3.1 Contractor satisfaction factors for client performance 33
4.3.2 Contractor satisfaction factors for consultant performance 34
4.4 DESCRIPTIVE ANALYSIS 35
4.4.1 Information of the respondents 35

4.4.2 Scores of factors and indicators 36
4.4.2.1 Client performance 36
4.4.2.2 Consultant performance 38
4.5 TESTS OF NORMALITY 40
4.6 ONE-WAY REPEATED MEASURES ANOVA 42
4.7 MULTIPLE LINEAR REGRESSION ANALYSIS 43
4.7.1 Multicollinearity 44
4.7.2 Values of R 44
4.7.3 Coefficients of regression 45
4.7.4 Regression analysis results 45
4.8 SUMMARY 47
***Chapter 5*…….. ..... 48**
CONCLUSIONS AND RECOMMENDATIONS 48
5.1 CONCLUSIONS & RECOMMENDATIONS 48
5.2 FUTURE DIRECTIONS 50
REFERENCES…. 51
APPENDIX: I List of Building Projects Based on Traditional Procurement Method 60
APPENDIX: II Questionnaire Covering Letter 63
APPENDIX: III Questionnaire 64
APPENDIX: IV Respondents List with Designation & Experience in the Construction Industry……. 70
APPENDIX: V : Reliability Analysis in SPSS Ver.18.0 74
APPENDIX: VI : Normality Tests Using Explore Command in SPSS Ver.18.0 80
APPENDIX:VII: One-Way Repeated ANOVA in SPSS Ver.18.0 85
APPENDIX:VIII: Multiple Regression Analysis in SPSS Ver.18.0 87

LIST OF TABLES

Table 3.1: Contractor Satisfaction Attributes/Factors…….....29

Table 4.1: Contractor Satisfaction Factors for Client & Consultant Performance 31

Table 4.2: Guideline for Assessing Reliability Results 32

Table 4.3: Original & Retained Indicators for Client Performance..... 33

Table 4.4: Original & Retained Indicators for Consultant Performance 34

Table 4.5: Mean Scores and Ranking for Client Performance 37

Table 4.6: Mean Scores and Ranking for Consultant Performance..... 39

Table 4.7: Tests of Normality 42

Table 4.8: Within-Subjects ANOVA Test Results 43

Table 4.9: Regression on Client Performance 45

Table 4.10: Regression on Consultant Performance..... 46

LIST OF FIGURES

Figure 1.1: (Objective – Subjective) Project performance measures relationship..... 1

Figure 2.1: Construction project procurement systems 7

Figure 2.2: Project members for construction undertaking 8

Figure 2.3: Process of traditional procurement method over project life cycle..... 10

Figure 2.4: Traditional project performance parameters 13

Figure 2.5: Project success parameters 15

Figure 2.7: Micro and macro aspects of project success 16

Figure 2.8: Performance vs. satisfaction attributes..... 20

Figure 3.1: Research methodology flow chart..... 23

Figure 3.2: Research survey design process 24

Figure 4.1: Distribution of respondents based on PEC category..... 35

Figure 4.2: Experience of respondents in the construction industry..... 36

Figure 4.3: Distribution of respondent's satisfaction on client performance..... 37

Figure 4.4: Distribution of respondent's satisfaction on consultant performance..... 38

Figure 4.5: Three approaches to check normality of the quantitative data..... 41

ABSTRACT

Performance of building projects is generally evaluated on the basis of in time completion, within allocated cost, and achieving required quality standards. In recent years, satisfaction has also been established as an important indicator of project performance. Satisfaction and participant's feeling of fulfillment from the performance of other project members. This research is based on the survey of 57 building projects based on traditional procurement method to acquire the contractor's feedback regarding performance of clients and consultants, in Islamabad and Rawalpindi region. From past literature review, the contractor's satisfaction factors and their indicators are adopted.

Three important factors, (a) scope and deliverables, (b) communication and coordination, and (c) financial control and issues handling are introduced to evaluate client's performance. The results reveal that 23% of contractors are overall dissatisfied with the performance of clients on building projects. The critical factors came out for the contractors are communication and coordination of the client with other stakeholders, and client's financial stability and their project issues handling at building sites. Other significant areas of concern are client's authority to relax specifications, overall project site conditions, client flexibility towards project issues, and frequent changes in the project scope. Consultant's performance is assessed for (a) competency and experience, (b) availability and quality of drawings, (c) cooperation of site staff, (d) verification of the bills, and (e) issues and disputes avoidance. The statistics showed that 19% contractors have shown overall dissatisfaction. Consultant's timely availability and quality of drawings received low satisfaction level from the contractors. They have shown lack of satisfaction with the consultant's supervisory staff acceptance of mistakes, their approval procedures of submittals and shop drawings, and timely verification of variations and escalation claims. Additionally, multiple linear regression was carried out to establish the relationship between overall contractor satisfaction level (i.e., dependent variable) and satisfaction factors (i.e., independent variables). The results showed that the client's financial control and issues handling, and consultant's site staff cooperation were the significant factors to achieve an overall contractor high degree of satisfaction. Finally, the approach of this research is useful to the clients and engineering consulting firms for identifying and improving on their weak areas to enhance the quality of services for their contractors.

Chapter 1

INTRODUCTION

1.1 BACKGROUND

Construction Industry plays a key role in the development of any country. There is a French dictum "where the construction industry prospers, everything prospers". Globally considered as the largest fragmented and complex nature of industry, it not only contributes a huge chunk to the country's Gross Domestic Product (GDP) but also offers employment opportunities to the labor force. Performance and success of this sector is very important for country's economic uplift and financial growth (Ali and Goraya 1998). The primary aim of any construction project is to achieve success. Different performance measures have been established to examine the project success (or failure). Time, cost and quality commonly known as an "Iron Triangle" have been extensively used in the past to evaluate performance of the construction projects; however these three are failed to provide sufficient project performance outcomes. Satisfaction i.e. participants feelings or perceptions has been introduced recently and being considered a more effective indicator to evaluate the projects performance (Liu and Walker 1998, Leung et.al, 2004 and Karna 2004). Toor and Ogulana (2009) also advocated that satisfaction is considered a more useful parameter than objective measures (time, cost and quality).It is argued that satisfaction, a subjective measure of project performance is directly linked with objective measures i.e. if project participants degree of satisfaction is high, the projects can be successfully delivered on time, within cost and as per required quality standards as shown in the Figure 1.1.

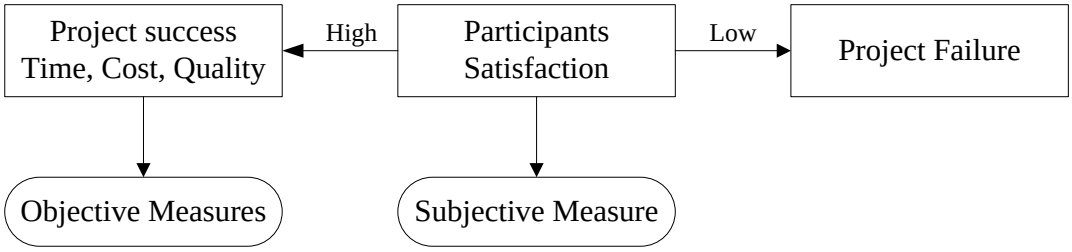

Figure 1.1: (Objective – Subjective) Project performance measures relationship

Construction Industry in Pakistan is generally classified into buildings, highways, railroads, bridges, canals, dams, tunnels and airport projects. With such diverse nature of projects, variety of project players or stakeholders is imperative. Clients, consultants, contractors, sub-contractors and suppliers are the stakeholder's involved having their own objectives and priorities. Among them, key project participants are clients, consultants, and contractors. Contractor is the one who plays an important role and converts the drawing lines on to the ground by providing physical resources. Their level of satisfaction is very important for successful completion of the projects as it is strongly believed that highly satisfied contractors can deliver projects on time, within budget and meeting technical specifications. However, they are mostly suffered and dis-satisfied due to bad performance of clients and consultants on the construction projects. For example, non-availability of funds, changes in design and drawings, lack of timely release of payments, lack of attention to the site problems, negative attitude/behavior, non-acceptance of the mistakes and lack of communication and coordination with the contractors. It is therefore important to take contractor's viewpoint in order to improve the performance of clients and consultants as well as performance of the construction projects. The next section briefly describes the main reasons of conducting this research.

1.2 PROBLEM STATEMENT

In the past, researchers have contributed a lot to evaluate the performance of consultants and contractors by getting clients perceptions on the construction projects. However, very limited study has been done in investigating the satisfaction levels of contractors. Soetanto and Proverbs (2002) have explored the satisfaction of contractors relative to the clients' performance and found that clients' capability, past performance and project management knowledge is key to high contractor's satisfaction levels. Masrom and Skitmore (2010) have developed a conceptual model for satisfaction of contractors identified by contractors themselves. It is worth mentioned that no research has been done so far to evaluate the performance of both clients and consultants in view of the contractors. In Pakistan, no single comprehensive research has been done to examine the

satisfaction level of contractors for the performance of other key stakeholders i.e. clients and consultants involved in the projects, therefore it is important to address this area.

1.3 RESEARCH OBJECTIVES

The key objectives of this research study are to:

1. Identify a comprehensive list of factors/attributes and their indicators for measuring contractor satisfaction in the context of client and consultant performance on the building projects.

2. Conduct a five-point anchored survey of building projects and get contractor's view point.

3. Use the survey data to establish a priority list of contractor satisfaction/dis-satisfaction factors/attributes and their indicators that receive from clients and consultants.

4. Study the relationships between overall contractor satisfaction level (dependent variable) and satisfaction factors (independent variables) using multiple linear regression analysis.

5. Derive strategies for clients and consultants to achieve overall contractor satisfaction from survey results.

1.4 RESEARCH SIGNIFICANCE

This research study shall be valuable for academicians, clients, consultants, contractors and practitioners. Identifying the contractor dissatisfaction in building projects can help in reducing ever disturbing factors i.e. Cost-overrun, time overrun, bad quality, claims and variations, bad communication and coordination between the project participants, bad working relationship and lack of experience of the project participants. Also contractor's view point could result in improving the weak areas of clients and consultants so that they can provide better services and performance on the construction projects.

1.5 SCOPE OF THE THESIS

The research focus is on building projects on-going or completed recently in twin cities i.e. Islamabad & Rawalpindi. The area is selected because of its closeness to the researcher and considering time and resource constraints. Building projects of public and private nature are selected based on traditional method of procurement. Fifty two (52) valid responses out of total projects population of fifty seven (57) have been collected from the contractors registered in Pakistan Engineering Council.

1.6 ORGANIZATION OF THE THESIS

Chapter 1 provides a background and problem statement that developed the need of this research. Study objectives, its significance and scope are also presented.

Chapter 2 is devoted to the literature survey. In the first part, key project participants i.e. clients, consultants and the contractors with their relation and responsibilities are elaborated. In the later part of the chapter, project performance measures are discussed in detail to develop a concept and better understanding of satisfaction measure.

Chapter 3 is concerned with the research methodology employed in the study. The process of survey design, selecting a study sample, sample size, development of a questionnaire, method of data gathering and conducting full scale survey is presented for quantitative phase of the study.

Chapter 4 describes the quantitative data analysis and results. The chapter is devoted to the testing of study intentions that arise from the research objectives. The purpose of tests are used to determine the degree of performance influence of two main participants i.e. clients and consultants on contractor satisfaction, targeted in the questionnaire survey.

Chapter 5 is concerned with the conclusions and future recommendations. Conclusions and recommendations are drawn from key research findings. Future directions are also identified.

Survey questionnaires with list of building projects used in the administration of the survey can be found in the appendices. The appendices also contain copies of the tests done on Statistical Package for the Social Sciences (SPSS Ver. 18.0) for data analysis.

1.7 SUMMARY

Brief summary of the research is introduced in this chapter. Starting by reviewing the past literature that developed a need of this research is highlighted. Significance and important aims & objectives are presented. Scope with outline of the thesis chapters is also discussed.

Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, survey of the literature is presented and divided in to two sections. In the first section, widely used and most popular procurement method for construction projects in Pakistan i.e. traditional procurement method from definition to its importance has been examined. Traditional, also known as 'design-bid-build' method of procurement involves clients, consultants and contractors as three major stakeholders with their relationships and responsibilities are discussed in detail. Second part provides an insight about construction project performance and its parameters. Generally, time, cost and quality are extensively used parameters to evaluate performance of the construction projects in the world. However, measuring project performance on the basis of satisfaction has been recently more accepted soft measure of project performance, as more the project participants are satisfied, more the projects will be successful. Due to limited research in this area and lack of knowledge in Pakistan, this section is presented in detail to discuss the concept of satisfaction and its importance in the performance measurement of the construction projects. The frame work for measuring satisfaction of contractors developed for this research is also highlighted.

2.2 TRADITIONAL PROCUREMENT METHOD

2.2.1 Introduction

When a decision is made to build a new construction project, a feasibility study is carried out by the client for the assessment of pros and cons and evaluation of several alternatives to undertake the project. The client also known as the owner/promoter/principal may be government agency or any private sector. Generally client appoints a project management team composed of technical staff with project manager/project director as a team head from in-house or from external organization. The project management team is selected for organizing and

coordinating the project appraisal studies including making a decision to build, defining the project scope and financing of the construction project after a detailed analysis of cash flow forecasts. (Eldosouky 2001). Eldosouky (2001) further pointed out that after having selected the project management team and completing the project brief and feasibility, organization structure for the construction project is considered on the basis of size and nature of the project, client in-house capability and experience in the construction industry. Project procurement systems (also called Project delivery methods) are used to define the project organization structure. Organization structures for a construction project are a framework of contractual and communication relationships between project players. They are designed to deliver construction projects within time, cost and quality (Uher & Davenport 2002). Different procurement systems are normally used for the construction projects as shown in the Figure 2.1 (Uher & Davenport 2002).

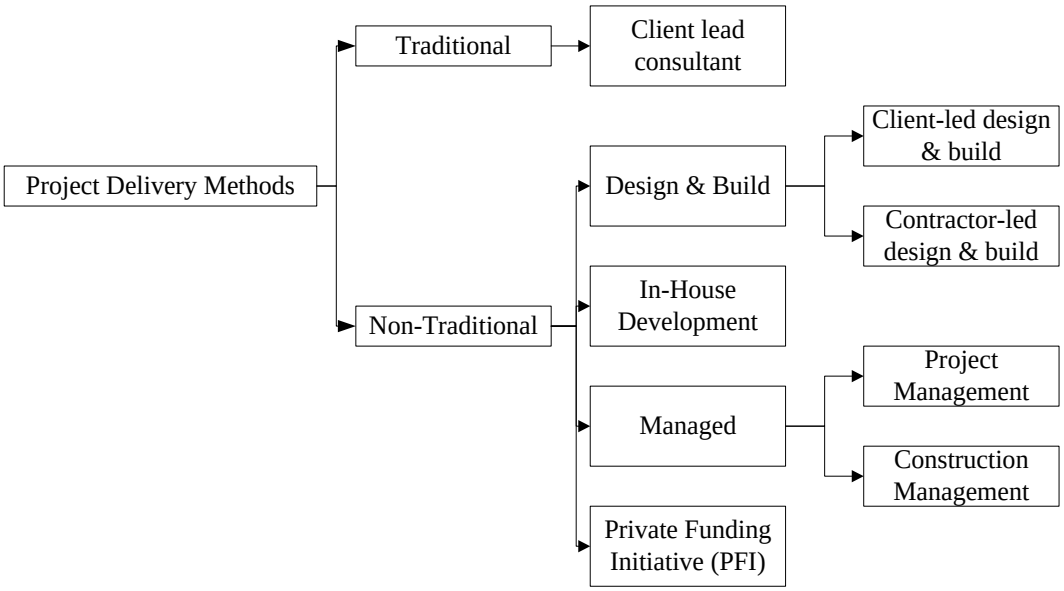

Figure 2.1: Construction project procurement systems

The traditional method of procurement has been widely used since 1960 and even today the most popular construction projects delivery method (Uher & Davenport 2002). It is generally preferred for public funded projects. Also referred to as "end-on' or 'design-bid-build' or 'sequential' method of procurement, it separates the construction stage from design stage with a condition that the design should be fully completed before the tender stage. In Pakistan, this method is most

commonly used for public work projects and especially for building projects as it is mandatory to select this type of procurement method in order to ensure clear accountability and cost monitoring (Lodi et.al, 2008).

2.2.2 Project participants

Construction projects require maximum utilization of manpower and construction materials. A variety of participants are responsible for the successful execution of construction projects as shown in the Figure 2.2 (reproduced from Schexnayder and Mayo 2003).

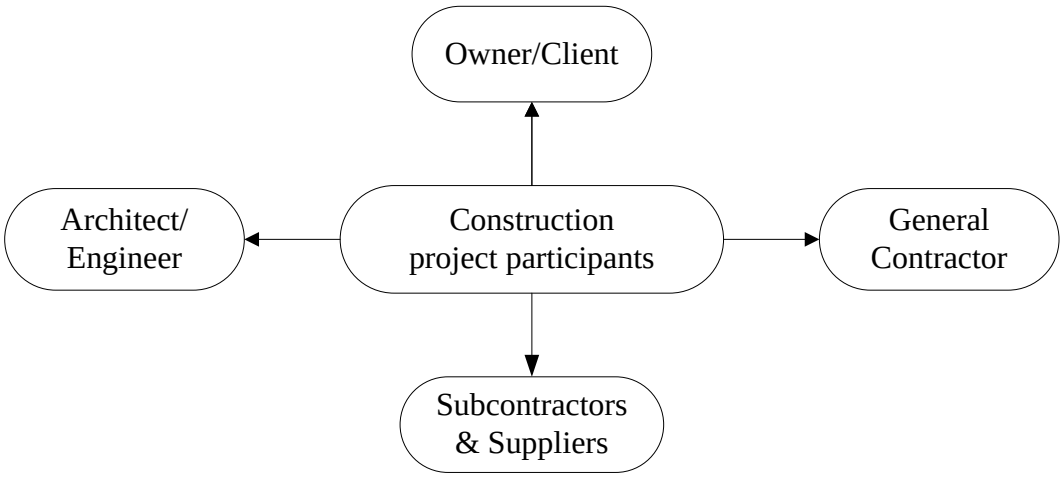

Figure 2.2: Project members for construction undertaking

In Pakistan, main project players involved in the construction industry are: clients, consultants, contractors, subcontractors and suppliers and their roles and responsibilities have been explained by Sengupta & Guha (2002) and Schexnayder & Mayo (2003).

2.2.2.1 Client

Client, also known as the owner is an individual or authority or corporate body (government department). The client make a decision to undertake the project and responsible for funding the project by preparing the payment schedule. Sometimes, the client is expected to arrange supply of power and water to the construction site. The client defines the purpose/need and scope of the work and retains the overall control of the construction projects.

2.2.2.2 Consultant

Consultants, generally are designers/architects or engineers (private or public organization). The consultants are selected based on knowledge and experience by the owner to prepare construction documents (bidding documents, drawings, technical specifications, and cost calculations) of the construction project. The involvement of the consultants during construction phase will depend on the project delivery method adopted by the owner. In design-bid-build, the owner generally designates the consultant to oversee the construction work at site. He is full in charge of designing and supervising the project on behalf of the client. He should be well trained in quality and workmanship requirements and assess quality of construction work. The consultant also verifies the progress payments submitted by the general contractor. The consultant should acts a professional and independent judge and provides technical advice and solutions to the client and contractor on the potential project problems.

2.2.2.3 Contractor

A person/individual or organization or group of people, assumes the responsibility of execution of construction activities based on required skills and competency. The contractor should control the construction costs, keep the project on schedule and interact with all project members on all matters and issues.

2.2.2.4 Subcontractors and suppliers

Sub-contractors also called specialty contractors. The contractors mostly sub-contract a large portion of work to the sub-contractors under a contract. Sub-contractors may be electrical, mechanical, steel fabrication, dry wall, painting and carpeting works specialists. They have no links with other project members. On the building projects, 10 to 15 subcontractors are generally required. On the other hand, suppliers in the construction industry provide construction materials and have a contact with the contractors and subcontractors. They assist the general contractors in preparing the bids, shop drawings and fabrications. Material suppliers may be electrical whole sellers, lumberyards, ready mixed concrete

suppliers, plumbing supply stores etc. The project quality is highly dependent on quality of the suppliers used by the contractors.

2.2.3 Contractual relationships and responsibilities of key project participants

Clients, consultants and the contractors are the three main parties in traditional procurement method and their responsibilities and duties over the project life cycle are shown in the Figure 2.3 (Rashid et.al, 2006).

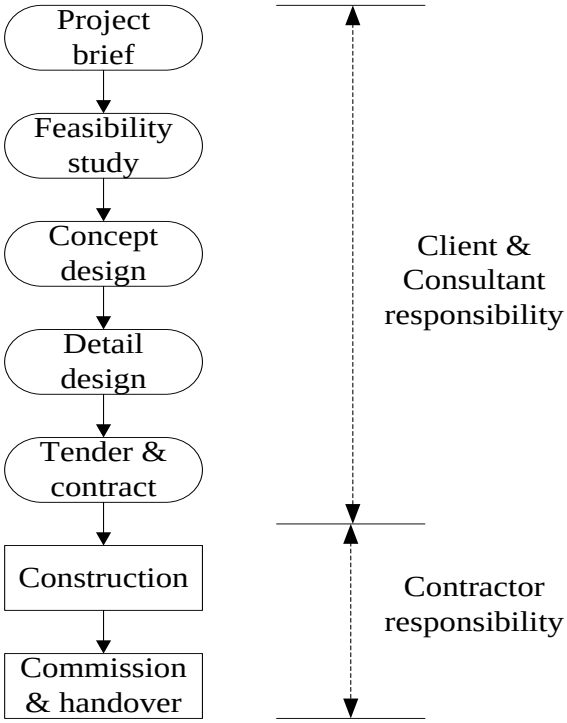

Figure 2.3: Process of traditional procurement method over project life cycle

2.2.3.1 Client responsibilities

The client develops a project brief and feasibility, defines the project scope, assumes the responsibility of funding the project and manages the construction process (Schexnayder & Mayo 2003). The client selects a best, qualified and experienced design consultant to provide design and supervision services on the basis of some negotiated fee. After completing the design and accepted by the client, the client then selects a contractor through competitive tendering process. The client enters in to two contracts: one with a design consultant and other with a

selected a contractor to build the project as designed. There is no contractual relationship between the consultant and the contractor (a characteristic of traditional procurement method); however a communication link exists between the two key project participants (Uher & Davenport 2002).

2.2.3.2 Consultant responsibilities

In traditional procurement method, the client selects a design consultant through competitive selection process so as to provide design, tendering and supervision services. The consultant should acts as an agent of the client and administers the project on behalf of the client as a superintendent; however he must administer the contract as an impartial judge between the client and the contractor (Uher & Davenport 2002).

Main responsibilities of the design consultant defined by Eldosouky (2001) are as follows:

1. Review of the Master plan prepared by the client.
2. Planning and conducting Topographic survey and geotechnical investigations of the proposed site.
3. Preparation of conceptual & detail design.
4. Develop a project cash flow estimate.
5. Preparation and administration of tendering process including tender documentation, bids evaluation and recommendation for the selection of suitable contractors.
6. Preparation of construction drawings showing adequate technical details.
7. Provide adequate consultation and advice to the client during execution of the works.
8. Review and approval of Contractor's submission plan and shop drawings.
9. Quality assurance and control of construction activities carried out by the contractor.

10. Verification and submission of contractor's interim payment certificates.
11. Evaluation and approval of variations and claims.
12. Final inspection and evaluation of the completed work.

2.2.3.3 Contractor responsibilities

The 'main or head' contract is in between the client and the contractor with contractor manages and undertakes the responsibility to build the project within stipulated time, cost and required quality standards. It is worth mentioned that contractor is not involved in the design process (Uher & Davenport 2002).

Main responsibilities of the contractor defined by Eldosouky (2001) are as follows:

1. Arrangement and organizing skilled site staff, plant, labor and all other resources to execute construction activities.
2. Fulfilling the contractual obligations and execute the construction activities as per planned programme and technical specifications.
3. Maximum cooperation and communication among site staff members.
4. Identifying potential problems early to negate project time and cost delays.
5. Supply and arrangement of construction materials and other services.
6. Coordination with specialty contractors/subcontractors and suppliers.
7. Ensuring site safety.
8. Inspection/tests of construction materials delivered to the project site.
9. Updating of site records and other necessary documentation required by the consultant.

2.3 PROJECT PERFORMANCE MEASURES

2.3.1 General

Success is an ultimate goal of any construction project. It is highly complex to describe whether a project is a success or failure (Chan et.al. 2002a). However,

success of the construction projects can be evaluated through different performance indicators. Measuring success of a construction project through different performance parameters serves two important functions as defined by Shuwei (2009).

1. Whether the construction project meets its predefined intended objectives.
2. Helps the project members (especially clients, consultants and the contractors) to identify and improve their weak areas.

Evaluating the project performance with right measure is more important than understanding the purpose of measuring it (Kagioglou et.al. 2001). The following section explores the performance measures widely used in the construction industry and highlights the importance of satisfaction measure in detail.

2.3.2 Traditional performance measures

Time, cost and quality are three traditional parameters extensively used to evaluate performance and judging success of the construction projects. (Mohsini & Davidson 1992; Kerzner 2003; Takim et.al. 2003; Ankrah & Proverbs 2005 and Altmann 2005). These three measures are commonly known as “Iron Triangle” defined by Atkinson (1999) as shown in the Figure 2.4.

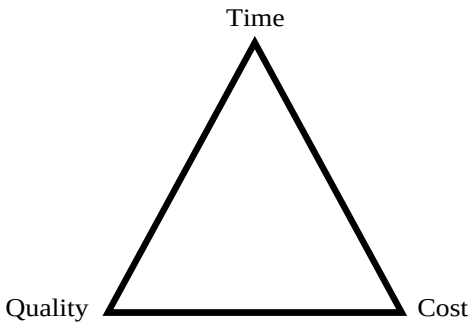

Figure 2.4: Traditional project performance parameters

Wright (1997) has considered time and cost as only two performance measures from customer’s point of view. However, many researchers (Ward et.al. 1991; Mohsini & Davidson 1992; Atkinson 1999 and Kerzner 2003) have included

quality, as these three can provide hard and easy to collect data (Ankrah and Proverbs 2005). Walker (1995), Belassi and Tukal (1996) and Hatush and Skitmore (1997) also mentioned time, cost and quality as important project indicators. Several efforts have been carried out to improve performance of the construction projects. Performance evaluation made on iron triangle parameters has been failed to improve the performance as due to economic and technological changes in the construction industry (Chan and Chan 2004; Bryde and Robinson 2005; Ling et.al. 2008 and Toor and Ogulana 2009). Ward et.al. (1991) and Atkinson (1999) argued that time, cost and quality are not enough to provide a true picture and balanced outcome of the project. Ward et.al. (1991) explained that time; cost and quality are implemented at the later stage of the construction projects and referred these measures as 'lagging' rather than 'leading' measures. Further after completion of the project, an individual does not remember the financial success or early completion, but memories of relationship of trust, harmony, conflicts and disputes with others always remained. A more effective performance measure i.e. participants' satisfaction has been introduced to judge the project success, as it is believed that more satisfied participants can deliver better and successful construction projects (Liu and Walker 1998, Leung et.al. 2004 and Karna 2004).

2.3.3 Importance of participant's satisfaction

Time, cost, technical specification and meeting client satisfaction are important parameters in assessing success of the construction projects (Baker et.al. 1983; Slevin & Pinto 1986; Morris & Hough 1987 and Turner 1993). However, Atkinson et.al. (1997) and Wateridge (1998) believed that a criterion for project success is much wider aspect and should incorporate the stakeholders' performance and understanding of their feelings and perceptions. Atkinson et.al. (1997) defined project a success, when all the project participants fulfills their responsibilities, individually and collectively. In addition, Atkinson et.al. (1997) explored the satisfaction levels of every stakeholder and argued that the client will not be satisfied if the project fails to meet quality, time frame and required performance standards. Consultants on the other hand will not be happy if client fails to provide their required employment opportunities and favorable conditions. Contractors and

suppliers will be dis-satisfied if the client or any company fails to deliver the return on their investment of time and working capital. Therefore, it is important to measure each participant performance in order to ensure and deliver successful construction projects. If a construction project is completed on time, within budget and as per required quality standards but project participants are not satisfied, the project is not considered to be successful (Baker et.al. 1974). They also argued that if the project meets the technical performance specifications and/or mission to be performed, and if there is a high level of satisfaction concerning the project performance amongst key participants, the project can be considered an overall success' after investigated over 650 projects. Particular attention has been emphasized on participant's satisfaction. Further Shenhar, Levy & Dvir (1997) discussed that the projects will be considered failed if they were not met the participants expectations irrespective of completed on time, within budget and required technical specifications. Cordero (1990) has developed a model to assess the effectiveness and efficiency of projects; however he failed to highlight stakeholder's needs and interest. Pinto and Slevan's (1994) believed that project is considered to be successful if it satisfies the stakeholders' expectations and needs. They have also identified efficiency and effectiveness as important measures of project success. Efficiency relates to organization strong management and its structures (adhere to time, cost and quality) and effectiveness measures relate to user satisfaction and project intended use. Figure 2.5 shows elements of project success defined by Pinto & Slevin (2004).

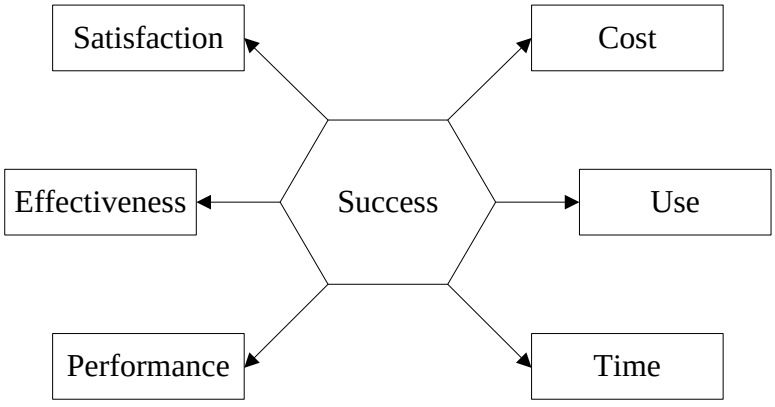

Figure 2.5: Project success parameters

Larson (1995) has argued that project is considered to be successful if delivered on time, within cost and with required quality and failed if over budget, behind schedule and with bad quality. However, Larson further supports that if project participants are not satisfied with the project outcomes, the project should considered to be failed irrespective of achieving time, cost and quality objectives. Satisfaction is considered as an important project performance indicator and helps in gauging whether the projects are delivered successfully (Ashley et.al. (1987), De Wit (1988), Pinto & Slevin (1988), Savindo et.al. (1992), Liu and Walker (1998), Hughes et.al. (2004) and Leung et.al. (2004)). Figure 2.7 shows two different aspects of project success i.e. micro and macro viewed from different stakeholder's perspectives (Lim & Mohamed 1999) and recognize that satisfaction of project participants is an important attribute of project success at completion.

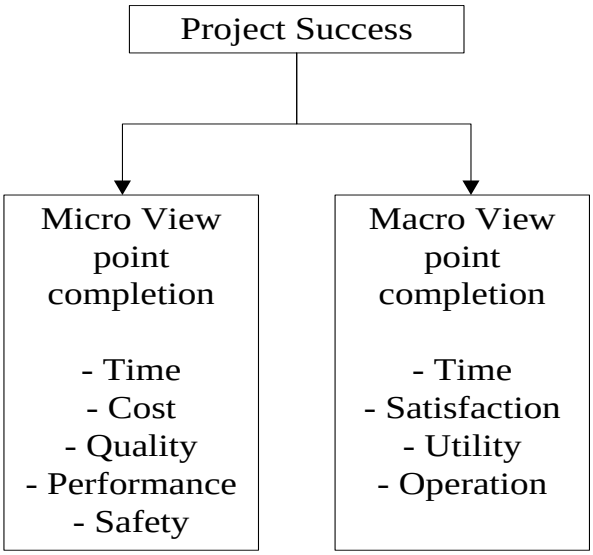

Figure 2.7: Micro and macro aspects of project success

In 1998, Liu and Walker argued that overall construction project performance is primarily based on individuals' performance involved in a construction project and emphasized that performance of each participant should be measured to assess whether a project has been successful. They also consider satisfaction as an attribute of project success and defined a relationship between satisfaction and project success. They believed that satisfaction is positively related to project success as per Expectancy Theory of Vroom (1954). Under this theory, if project participants are satisfied with the project outcomes i.e. their level of

aspiration exceeds project performance, the project success is achieved and if they are not satisfied and performance falls short of aspiration level, project will be considered to be failed, so success of projects is definitely based on participant's perceptions and feelings. Perceptions and expectations are subjective matters and directly related to satisfaction, so getting participants feelings or perceptions about the project outcomes can be considered as a parameter of project performance.

Takim and Akintoye (2002) have reviewed project performance measures and argued that organizational performance and satisfaction of the project participants is important to project success. Pillai et.al. (2002) believed that project success is mainly dependent on the stakeholder's satisfaction and their relationships and coordination is necessary in order to negate any conflicts and disputes on the construction projects. Cooke-Davies (2002) has also highlighted the importance of stakeholders' performance on the construction projects. Love et.al. (2000) underlies that for construction organizations to remain in the market, they need to develop a better relationship and understanding with other project participants.

2.3.4 Satisfaction in project performance evaluation

Success is the main objective of any construction project. Murphy et.al. (1974) referred project success as a perceived success. Parfitt and Savindo (1993) also argued that success is an intangible perspective feeling that varies from individual to individual.

Perception of the project participants differ due to their varied experience and judgement (Chan and Chan 2004). In construction industry, fulfilling the participants expectations of time, cost and quality results in project success (Ward et.al. 1991).

Satisfaction is the most suitable performance measure since it is a psychological outcome of the project delivery (Pinto and Pinto 1991). Wuellner (1990) also in his work included satisfaction as a measure of project success. They

have also described participants' satisfaction as a subjective measure and emphasized to consider when evaluating project performance.

Perception measures can be leading or lagging measures. Satisfaction mostly can be assessed after project completion so it can be lagging measure; however if project key stakeholders (clients, consultants and the contractors) have continuous relationship with each other and have an impact on future projects, it can be a leading measure of project performance, as the participants can get opportunities to improve their weak performances (Shuwei 2009). Baker et.al. (1988); Smith and Wilkins (1996) and Egan (1998) believed that harmonious working relationship between the project participants is essential for successful projects.

Time and cost as hard and satisfaction as soft measure of evaluating project performance is identified by Stevens (1996). Freeman & Beale (1992) and Riggs et.al. (1992) termed time and cost as tangible and satisfaction as non-tangible aspects of project performance measures. Toor and Ogulana (2009) explained that the subjective indicator of the performance measurement i.e. satisfaction is considered to be more useful than objective measures (time, cost and quality). Karna (2004) advocated that participants' satisfaction has been used as an improvement parameter.

Satisfaction is something subjective and difficult to interpret. Every participant has his own feeling about the performance of other individuals. If participants' performance is good, the projects will be successful (Soetanto and Proverbs 2002). Performance measurement through satisfaction helps to improve project stakeholders' communication and coordination, relationships and final outcome of the project. Satisfaction of the individuals has been greatly emphasized on the construction projects in order to improve and produce performance enhancing environment (Masrom and Skitmore 2010).

Smith et.al. (1969) defined satisfaction as a *"function of the perceived characteristics of a performer in relation to an assessor's frame of reference".* This means that assessors (e.g. contractors) based on their experience and

judgement have their own perception/feeling about the performance of the performers (e.g. clients and consultants). Contractor defined satisfaction as fulfillment of 'contractual obligations and proper handing over' results to get successful construction projects (Springer 2001).

Several studies have been done to measure client/customer satisfaction levels but limited research has been conducted in carrying out contractors' satisfaction levels (Masrom and Skitmore (2010).

Objective measures (time and cost) and subjective measures (quality and satisfaction) approaches for measuring project performance have been used by Cheng et.al. (2006) in their research study. A conceptual model has been developed by Leung et.al. (2004) to measure participant's satisfaction and consider it as vital to the success of construction projects (Truman 1996 and Baccarini 1999). Xiaozhong and Haishaung (2009) have developed satisfaction evaluation model of main stakeholder's in the construction projects. They argued that different participants are involved in the construction projects and perception of every individual is different from the other. Satisfaction of all the stakeholders should be considered and if any one stakeholder does not satisfied, it will have an impact on overall project success.

Tang et.al. (2003) have conducted survey of 47 building projects to measure performance of consulting firms based in Hong Kong by taking client perceptions and found that overall performance of consulting firms are satisfactory. However, degree of innovation and quality of supervision needs improvement. Cheng et.al. (2006) investigated performance of consultants and also determined the key factors which have an impact on client satisfaction. From the study findings, technical accuracy and overall quality of services and people are main client satisfaction factors. Karna et.al. (2009) explored the customer satisfaction in construction by investigating the performance of Finnish construction companies in Finland. The findings of the research are: customers are satisfied with abilities to cooperate and skills of contractor's workers and supervisors. Quality assurance and handover procedures are the least satisfactory factors. Ahmed et.al. (2009) have carried out a

survey to study client dissatisfaction factors in Pakistan and found that political issues, law and order issues, contractor input in value engineering and constructability assessment and economic issues were the most critical dissatisfaction factors. On the other hand, Masrom and Skitmore (2010) have developed a conceptual model for satisfaction of contractors identified by contractors themselves only. Contractor plays a very important role in the construction projects and provides physical resources needed to build a new project. However they are always held responsible for projects failure due to their poor performance supposed by the clients and consultants. Soetanto and Proverbs (2002) suggested contractor satisfaction as one of the best parameter of construction project performance. They have explored the satisfaction of contractors relative to the clients' performance only and found that clients' capability, past performance and project management knowledge is key to high contractor's satisfaction levels.

2.3.5 Contractor satisfaction framework

Soetanto and Proverbs (2002) explained the conceptual model of performance assessment. They argued that performance measurement outcomes in terms of participants' satisfaction can be influenced by the performance attributes and satisfaction attributes as shown in the Figure 2.8.

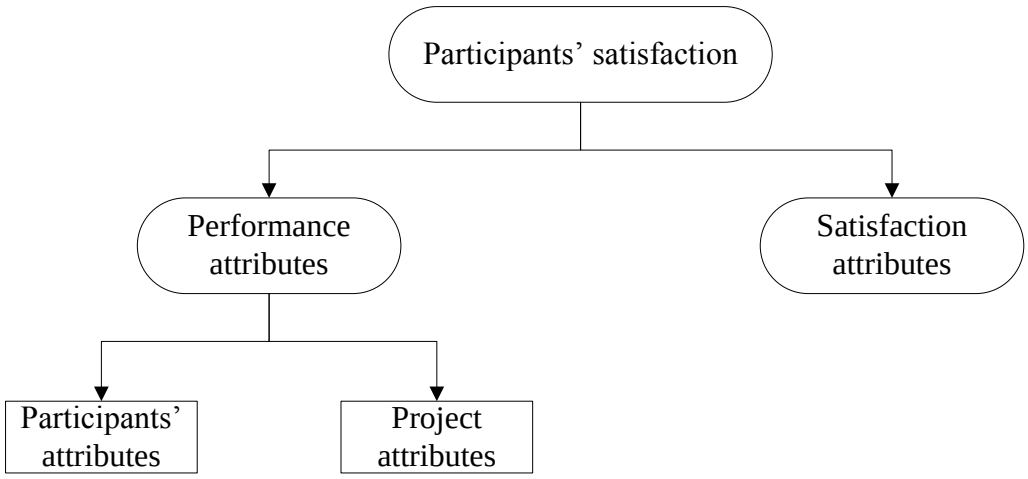

Figure 2.8: Performance vs. satisfaction attributes

Performance attributes consists of participants' attributes and project attributes. Participants'' attributes is concerned with participants' characteristics, nature and experience or their organization, its age and annual turnover. However, project attributes are associated with the characteristics and nature of the projects. It involves attributes that may or may not be controlled by the project participants.

Controllable attributes include procurement selection, contract conditions, design changes etc. Uncontrollable attributes are e.g. weather conditions, security issues, ground conditions, shortage and increase in cost of construction materials, type of structure etc.

Satisfaction attributes, on the other hand is different from the performance attributes. The satisfaction level of the assessors (e.g. contractors) is influenced by the performers (clients, consultants, sub-contractors and suppliers) on the construction projects. A participant shows his own assessment about the performers and also other project participants have no control over the feelings/expectations of the assessor.

In this research, contractor satisfaction attributes (as independent variables) are developed identified from a thorough literature review to measure the performance of clients and consultants on the building projects. The attributes (explained in Chapter 3) are selected only for construction phase as contractors are formally and fully get involved at this stage of the construction project in traditional method of procurement.

2.4 SUMMARY

This chapter firstly discusses the main stakeholders involved in the traditional procurement method and their roles and responsibilities. In the second part, different parameters used for the evaluation of project performance and importance of satisfaction as a measure of project performance has been elaborated in detail. Past studies already done using subjective measures i.e. satisfaction is illustrated in this section as well. The next chapter discusses the research methodology developed for this research.

Chapter 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The purpose of this chapter is to discuss the methodology used for this study in order to achieve research aim and objectives that were introduced in Chapter 1. Based on research questions, survey method is chosen as a research strategy with whole survey design process is extensively elaborated. The construction of a questionnaire, collection of data through field survey and data analysis strategy is also presented.

3.2 RESEARCH DESIGN

Research strategy defines the layout/design showing how the researchers are going to carry out their study to achieve and answering research questions (Saunders et.al. 2003). It comprises of sampling and questionnaire development, data collection sources and considering research constraints. The research strategy is selected on the basis of research aim/objectives. Three different approaches are considered acceptable for the research in construction management. These are: quantitative methods, qualitative methods and combination of both quantitative and qualitative commonly known as 'mixed mode approaches'. Quantitative research methods use deductive approach and associated with collection of data and statistical analysis. On the other hand, using inductive approach, qualitative methods draw the results from interviews or observations rather than using statistical procedures (Amjad 2004-2005). From 1983-1996, Construction, Engineering and Management (CEM) journals research papers showed that quantitative methods were dominated and used by fifty seven percent (57%) of the researchers. Only eight percent (8%) utilized qualitative research methods and thirteen percent (13%) used mixed methodology (Loose more et.al. 1996). Wing et.al. (1998) argued that quantitative approach of research in CEM produces more practical solutions. However, Association of Researchers for Construction

Management (ARCOM) proceeding from period 1991-2001 reveals that qualitative and mixed mode approaches have increased slightly. Seymour & Rooke (1995) and Seymour et.al. (1997) strongly supports the use of qualitative approach. Easterby-Smith et.al. (1991) believed that most research studies in management are based on mixed approach. Raftery et.al. (1997) despite of criticism also advocated the use of mixed approach. Root et.al. (1997) argued that the choice between quantitative or qualitative methods is highly dependent on the research aim/objectives. Based on the above, the aim of this research is to explore the satisfaction/dissatisfaction levels of the contractors on building projects by evaluating performance of clients and consultants in view of the contractors. For this purpose, data is required from different individual contractors working on building projects. Quantitative approach is used for this research and survey method is selected for data collection.

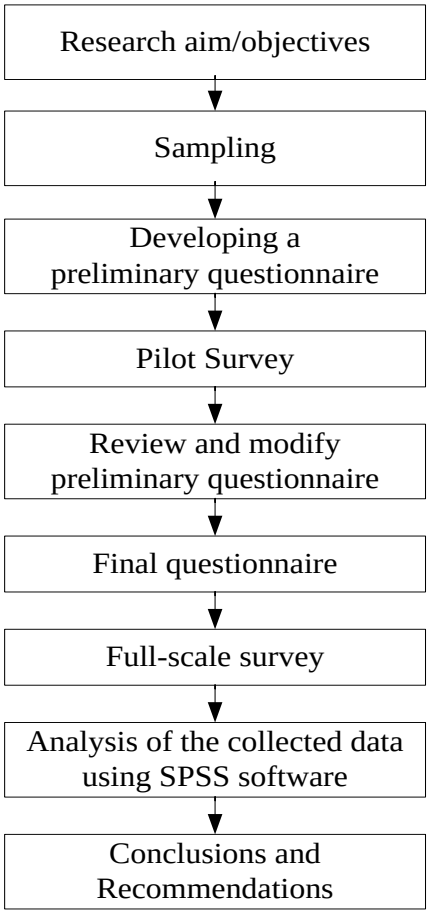

Figure 3.1: Research methodology flow chart

The research has been done on the steps shown in the Figure 3.1. To carry out the study, a contractor satisfaction questionnaire was developed. Pilot study was taken in to consideration and carried out for purpose of the questionnaire validation, refinement and improvement. Having done a feasibility survey, full scale (interview based) survey was conducted by visiting building projects to get the contractor's feedback. Finally, statistical analysis has been done from the collected data to explore the actual facts.

3.3 THE SURVEY DESIGN PROCESS

Survey is defined as "data collected from number of cases/projects through systematic measurement and then analyzed to yield the results (Marsh 1982). Trochim (1997) and Bryman (2004) argued that in applied social research, surveys are mostly carried out by questionnaire and interview surveys. Bryman (2004) referred surveys as cross-sectional studies and explained that the data collected from the surveys are generally quantitative in nature and can be used to correlate two or more variables. Trochim (1997) suggests that several issues should be kept in mind when a survey is chosen as a research strategy: a) population, b) sampling and c) question issues. The survey design selected for this research is shown in the Figure 3.2 (adopted from Shuwei 2009).

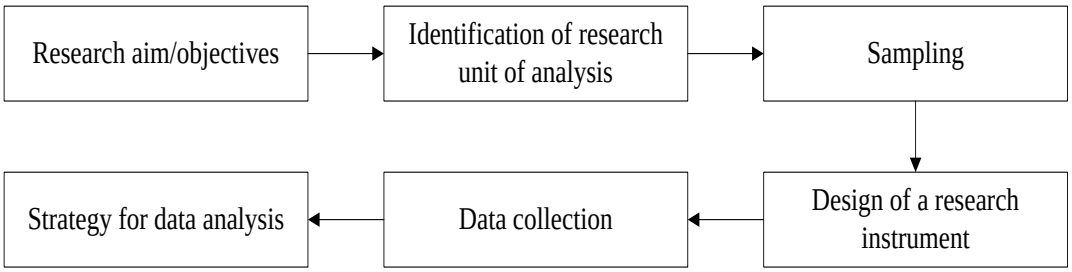

Figure 3.2: Research survey design process

3.3.1 Identification of research unit of analysis

The identification of unit of analysis is the central part of the survey design process and concerned with the data to be collected (Shuwei 2009). De Vaus (2002) has highlighted the importance of unit of analysis and argued that it is

directly associated with the aim/objectives of the research. The purpose of this research is to evaluate performance of clients and consultants in view of the contractors on building projects based on traditional procurement method and highlight least satisfactory factors. Each building project has been taken as a one case project. On each project, the performance of client and consultant affects the satisfaction level of the contractors and the project performance. Contractors are invited to provide their feedback about the performance of clients and consultants on each single building project. Sampling has been done to identify the building projects based on traditional method of procurement from where the data is to be collected.

3.3.2 Sampling

Fellows and Liu (2003) defined the purpose of sampling as "collection of data and carry out of the research components provided that the sample selected is a good representation of the study population. Trochim (1997) argued that the process of sampling moves from study population to the sampling frame from which the research sample is selected. Study population and sampling frame have been explained by Saunders et.al. (2003) as "*population is a full set of cases from which a sample is drawn and sampling frame refers to a complete list of all the cases in the population".* It is important that the list of the cases should be clear, current and accurate (Shuwei 2009). If list is not available, the researcher can develop and complete the sampling frame (De Vaus 2002). On the basis of the sampling frame, sample is selected from the study population (Shuwei 2009). Two types of sampling techniques widely used: probability and non-probability sampling. In probability sampling, the sample can be selected which is a true representative of a population. On the other hand, De Vaus (2002) argued that when sampling frame is not available or the population study is widely dispersed, non-probability sampling is suggested. Channels (1985) argued that if the data is to collect from a small and accessible population, it is advisable to use all the cases in the population rather than to draw a sample. Johnson and Christensen (2004) also advocated that if the researcher is quite confident that he knows the total population, the complete population can be taken in the study. In this research, the

study population is building projects (public and private) based on the traditional method of procurement on-going or recently completed from period of 2009 to 2011 in Islamabad and Rawalpindi region. It is also worth mentioned that feedback has been taken only for construction phase of the projects as the contractors are fully and formally involved at this stage in traditional procurement method. A list of fifty seven (57) building projects was developed and all of these were accessible to the researcher. Twenty two (22) projects were completed and construction work on thirty five (35) projects was more than twenty five percent (25%) completed. All the contractors working on these building projects were registered in Pakistan Engineering Council (PEC). Therefore, it was decided to survey all of them rather than draw a sample size from this study population. For complete building projects list, please see Appendix I.

3.3.3 Design of a research instrument

Based on the research aim/objectives i.e. to explore the degree of contractor's satisfaction about the performance of the clients and consultants, a questionnaire was developed for full scale survey based on thorough past review of a literature, researcher experience on the building projects and after conducting a pilot survey. Measurement scale selection, attitude measurement and ranges of response category were taken in to consideration for the design of a questionnaire.

3.3.3.1 Selection of measurement scale

Measurement scale is generally divided in to four different levels, namely nominal, ordinal, interval and ratio (Reaves 1992 and Trochim 1997). In this research, contractor's perception was to be measured, so it was suitable to select the ordinal scale (also called ranking scale) for its measurement.

3.3.3.2 Attitude measurement

Oppenheim (1992) argued that people's perception about some specific issue goes from low, through neutral to a degree of high level. Attitude measurement is suitable for measuring individuals' perception or feelings, called an attitude scale by Bell (2005). De Vaus (2002) and Saunders et.al. (2003) have

named attitude scale as numeric rating scale and semantic differential rating scale. There are four commonly used methods of attitude scaling in social research: the Bogardus, Thurstone, Likert and Guttmann (cumulative) scales (Oppenheim 1992; Trochim 1997 and De Vaus 2002). Among them, Likert scale is widely used as it provides better reliability and less laborious (Oppenheim 1992 and De Vaus 2002). Therefore, Likert scale was selected to measure contractor satisfaction in this research.

3.3.3.3 Ranges of response category

For the questionnaire design, possible ranges of response category are available. These include 2-category response, 3-category response, 4-5-category response, 6-7-category response, 9-category response and even 10-11-category response (Alwin 1997). According to De Vaus (2002), widely used response categories are 2, 5, 7 and 10. Kelly (1999) argued that points in excess of seven fails to provide sufficient information. Several researchers have recommended 7-point scale (Alwin 1997 and De Vaus 2002); however, the fine distinctions can confuse and requires precision with greater accuracy (Shuwei 2009). Therefore, based on the above, five point scale was adopted for the survey questionnaire to get contractor degree of satisfaction and defined scales as 1 for Very Low, 2-Low, 3-Medium, 4-High and 5-Very High degree of satisfaction.

3.3.3.4 Pilot study

The purpose of a pilot survey also known as feasibility survey is to test a questionnaire for its reliability, consistency and validity (Thompson 2010). De Vaus (2002) argued that while conducting a pilot survey, the emphasis should take on checking whether any problem exists with the questionnaire items, how long it will take to fill in and whether respondents are interested in filling the questionnaire. Another important issue is how many pilot surveys be carried out?. Shuwei (2009) believed that the number of pilot studies depends on research aim/objectives, size of the research study and available resources (time and money). For this purpose, a pilot survey has been carried out to test the questionnaire items as well as the whole questionnaire. A sample of four (4)

projects from the study population is selected. The questionnaires were delivered by hand to ensure maximum feedback. The responses provided by the respondents were helpful in refining and improving the questionnaire for conducting full scale survey. Also the results of the pilot surveys were also incorporated in the data analysis as well. As suggested by Saunders et.al. (2003), the questionnaire was also thoroughly discussed with colleagues and friends to pick any error and obtain the face validity of a questionnaire. After that, the questionnaire was refined and ready for carrying out a full scale survey. In the next section, questionnaire layout is presented.

3.3.3.5 Layout of a questionnaire

Shuwei (2009) suggested that the survey questionnaire should be clear, precise and attractive for the respondents to fill in and return it. In this research, the questionnaire was developed in easy and understandable form and also keeping in view the context of Pakistani construction industry environment. The questionnaire was attached with a covering letter (please see Appendix II and III), describing the main purpose of the study and ensuring the respondents that the information provided by them will be kept confidential and used for academic purposes only. The questionnaire starts with the respondent's general information. The questions included: project name, project duration, project cost, percent complete, respondents name, designation, qualification, cell number and e-mail address. The main body of the questionnaire was divided in to three parts. All the questions included were formulated as closed-ended and a note was provided to the respondents on how to fill the questionnaire. In the first part, the respondents were asked to provide their feedback about the overall performance of clients and consultants on the building projects. Second and third section of a questionnaire was concerned with contractor satisfaction factors/attributes and their indicators for client and consultant. Based on past literature, seventeen (17) satisfaction indicators/measures were identified for client and twenty six (26) for consultant as shown in the Appendix III. From these indicators, three (3) satisfaction factors/attributes were defined for client and five (5) for consultant and used for data analysis purposes as shown in the Table 3.1.

Table 3.1: Contractor Satisfaction Attributes/Factors

	For Client	**For Consultant**
Contractor satisfaction attributes/ factors	Scope and Deliverables	Competency and Experience
	Communication and Coordination	Availability and Quality of Drawings
	Financial Control and Issues Handling	Cooperation of Site Staff
		Verification of the Bills
		Issues and Disputes avoidance

3.3.4 Data collection

3.3.4.1 Full scale survey

Since all the building projects were accessible to the researcher, it was decided to deliver questionnaires to the respondents personally. Bell (2005) argued that delivering questionnaires to respondents by hand have distinct advantages: respondents can get a better understanding of the research purpose, questionnaires can be filled through face to face communication, any difficulty in the questionnaires can be sort out easily and high response rate can be obtained. Therefore, building project sites in Islamabad and Rawalpindi region were visited and delivered questionnaires to the contractor's representatives personally. Some questionnaires were delivered via e-mail and got full response. Out of fifty seven (57), fifty two (52) valid responses were collected. Five (5) respondents refused to provide feedback because of confidential nature of projects/showed no serious intention to fill the form. It is worth mentioned that fifty two (52) responses collected are more than the sample size if calculated as given below (Wison 2010).

$$n = [N / \{1 + N (e^2)\}] \quad \text{.....Equation.1}$$

Where,

n = Sample Size

N = Population Size = 57

e = Precision = 5 percent = 0.05

Putting values in Equation.1;

$$n = 57 / [1+ (57 \text{ X } (0.05^2))] = 50 \text{ Projects}$$

3.3.5 Strategy for data analysis

The survey data collected for this research is an ordinal one and uses a Likert scale; Cronbach's Alpha coefficient method is used to check the reliability of the collected data. The least satisfactory factors and their indicators are presented using charts and graphs. Comparison of mean scores of contractor satisfaction between client and consultant performance is made by One-Way repeated measures ANOVA design. Multiple linear regression analysis is adopted to correlate an overall contractor satisfaction level (dependent variable) with the factors (independent variables) identified for both clients and consultants. However, prior carrying out the one-way repeated measures ANOVA and multiple linear regression analysis, test of normality is done with ninety five percent (95%) confidence interval and found that the data established a normal distribution. All the analysis and results are presented in Chapter Four.

Chapter 4

DATA ANALYSIS AND RESULTS

4.1 INTRODUCTION

In this chapter, detailed analysis of the collected data is presented. For this purpose, the widely and most comprehensible software for practical statistical analysis was used i.e. SPSS Ver.18.0 (Statistical Package for the Social Sciences); since manual calculations cannot make an error-free analysis from a large amount of data (Gaur & Gaur 2009). In this research, the contractors have provided their degree of satisfaction; statistical tests were conducted separately to evaluate performance of clients and consultants. Different statistical tests such as reliability and normality tests, descriptive statistics (mean, frequency etc.) one-way repeated measures ANOVA and multiple linear regression analysis were used in SPSS to present the results.

4.2 DEFINING VARIABLES

First of all for conducting statistical analysis on SPSS, contractor satisfaction factors were abbreviated for client and consultant performances as shown in the Table 4.1 to save time.

Table 4.1: Contractor Satisfaction Factors for Client & Consultant Performance

For Client		
1	Scope and Deliverables	**SD**
2	Communication and Coordination	**CC**
3	Financial Control and Issues Handling	**FIH**
For Consultant		
1	Competency and Experience	**CE**
2	Availability and Quality of Drawings	**AQD**
3	Cooperation of Site Staff	**CSS**
4	Verification of the Bills	**VB**
5	Issues and Disputes avoidance	**IDA**

Before carrying out the descriptive statistics, ANOVA and multiple linear regression analysis, it is strongly recommended to assess the reliability of the collected data and discussed in the next section.

4.3 RELIABILITY ANALYSIS

Repeating any measurement that produces the same result is considered a reliable measurement (Gaur & Gaur 2009). Leech et.al. (2005) argued that the reliability test is done to check whether each item in the scale is free from error of measurement. Hinton et.al. (2004) have also defined reliability as a questionnaire tested to study any topic at different times and across different populations, if produces same results, the questionnaire is a 'reliable one'.

Different methods are used to assess the reliability. Test-retest method is used to ideally measure the reliability. In this method, the measurement is done on the same object twice and comparing the results. If the results are same, the measurement is reliable. However, practically this method is quite difficult to establish the reliability (Hinton et.al. 2004).

In SPSS, widely used methods for assessing reliability include Cohen's Kappa Coefficient for categorical data and Cronbach's Alpha for continuous data (Likert-scale type items). Among them, Cronbach's Alpha is most popular method (Hinton et.al. 2004 and Leech et.al. 2005). Hinton et.al. (2004) explained that Cronbach's Alpha value range from 0 (un-reliable) to 1 (reliable) with 0.75 being considered the most sensible value. They have also provided a guide line to assess the reliability of any data as shown in the Table 4.2.

Table 4.2: Guideline for Assessing Reliability Results

a.	0.9 & above	Excellent reliability	**b.**	0.7 to 0.9	High reliability
c.	0.5 to 0.7	Moderate reliability	**d.**	0.5 and below	Low reliability

In reliability analysis, un-dimensionality i.e. correlation of each item with the total scale can be checked as well. De Vaus (2002) and Hinton et.al. (2004)

argued that if the item-to scale coefficient is below 0.3, the item should be removed. Since the data gathered was based on Likert-scale; therefore Cronbach's Alpha method was used to check the reliability in this research. The summary of the reliability analysis conducted on SPSS is presented here and full results can be seen in the Appendix V.

4.3.1 Contractor satisfaction factors for client performance

SD: Scope and Deliverables

This factor comprises of seven items, after testing, an alpha coefficient of 0.727 was achieved showed high reliability. Also, item-to-scale coefficients were above 0.3. Therefore, all seven indicators were retained.

CC: Communication and Coordination

The second factor is composed of five items. The items were tested produces an alpha coefficient of 0.833 showed high reliability. Item-to-scale coefficients for all items were above 0.3. Thus, all the indicators were included.

FIH: Financial Control and Issues Handling

This factor also comprises of five items and after testing, an alpha coefficient of 0.822 was achieved showed high reliability. Item-to-scale coefficients were above 0.3. Therefore, all five indicators were retained.

The testing of all the items showed a good quality; therefore no further refinement has been done as shown in the Table 4.3.

Table 4.3: Original & Retained Indicators for Client Performance

Factors	No of original indicators	Alpha coefficient value	No of retained indicators
SD	7	0.727	7
CC	5	0.833	5
FIH	5	0.822	5

All the indicators have item-to scale coefficients above 0.3

4.3.2 Contractor satisfaction factors for consultant performance

Table 4.4: Original & Retained Indicators for Consultant Performance

Factors	No of original indicators	Alpha coefficient value	No of retained indicators
CE	9	0.914	9
AQD	4	0.867	4
CSS	7	0.902	7
VB	3	0.841	3
IDA	3	0.814	3

All the indicators have item-to scale coefficients above 0.3.

From the Table 4.4, all the items retained and no further refinement was required. The factors are discussed below.

CE: Competency and Experience

This factor comprises of nine items, after testing, an alpha coefficient of 0.914 was achieved showed excellent reliability. Also, item-to-scale coefficients were above 0.3. Therefore, all nine indicators were retained.

AQD: Availability and Quality of Drawings

The factor is composed of four items. The items were tested produces an alpha coefficient of 0.867 showed high reliability. Item-to-scale coefficients for all items were above 0.3. Thus, all the indicators were included.

CSS: Cooperation of Site Staff

This factor comprises of seven items and after testing, an alpha coefficient of 0.902 was achieved showed excellent reliability. Item-to-scale coefficients were above 0.3. Therefore, all indicators were retained.

VB: Verification of the Bills

This factor comprises of three items and after testing, an alpha coefficient of 0.841

was achieved showed high reliability. Item-to-scale coefficients were above 0.3. Therefore, all three indicators were retained.

IDA: Issues and Disputes avoidance

This factor also comprises of three items and after testing, an alpha coefficient of 0.814 was achieved showed high reliability. Item-to-scale coefficients were above 0.3. Therefore, all three indicators were retained.

4.4 DESCRIPTIVE ANALYSIS

Fifty seven (57) contractors on the building projects were approached in this research. Out of fifty seven (57), fifty two (52) valid responses were collected.

4.4.1 Information of the respondents

From the fifty two (52) contractors, thirty five (35) were C-A contractors (No-Limit contractors), seven (7) were C-B contractors (Construction cost limit up to 1000 million), five (5) were C-1 contractors (Construction cost limit up to 500 million) and six (5) were C-2 contractors (Construction cost limit up to 200 million) according to Pakistan Engineering Council as shown in the Figure 4.1.

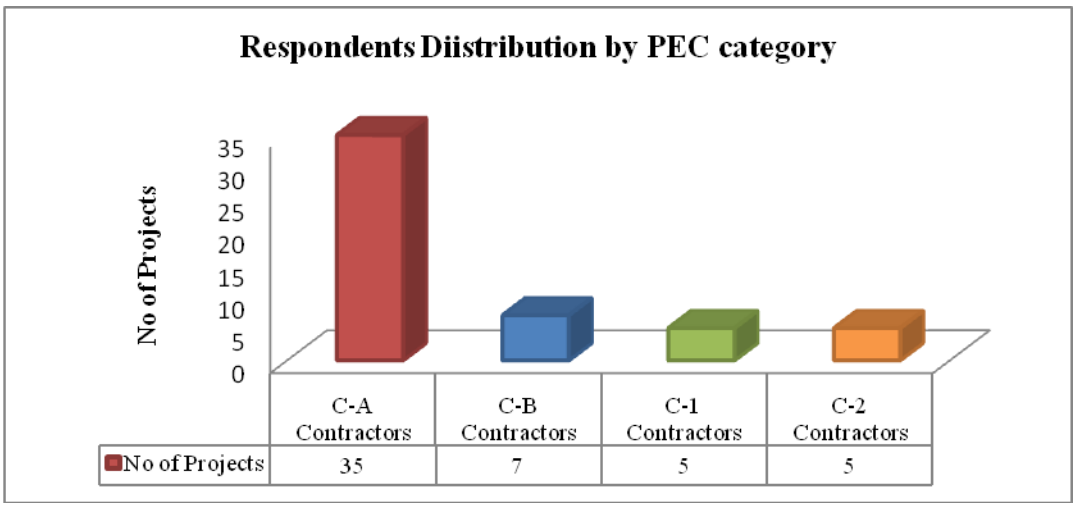

Figure 4.1: Distribution of respondents based on PEC category

The respondents were mostly project managers, site engineers, quantity surveyors and site superintendents. Twenty (20) respondents had an experience of

more than twenty (20) years in the construction industry as shown in the Figure 4.2. The complete list of respondents with their designation and experience in the construction industry is provided in the Appendix IV.

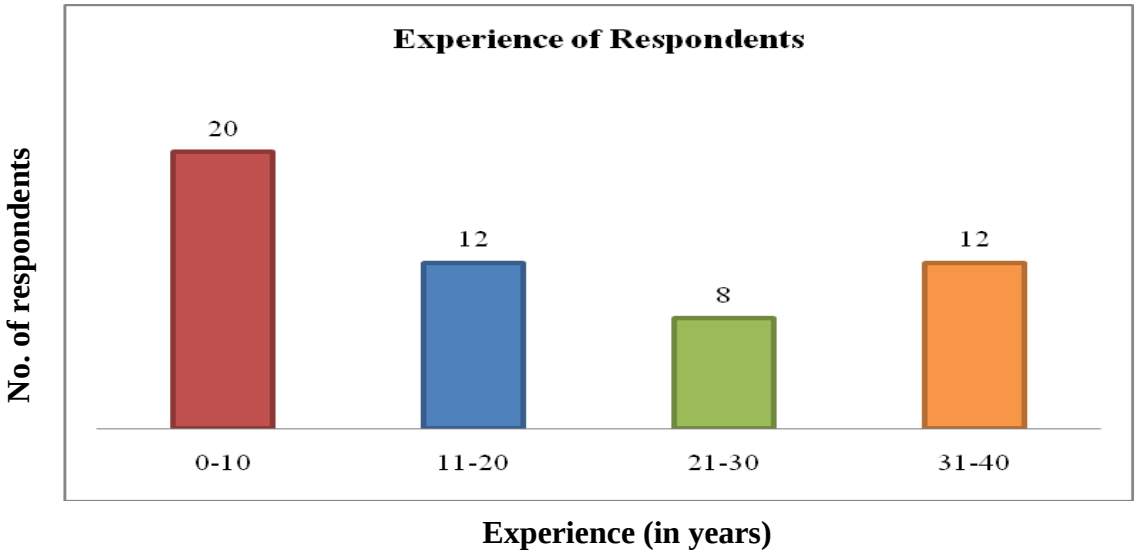

Figure 4.2: Experience of respondents in the construction industry

4.4.2 Scores of factors and indicators

As stated by Greenwood (2001), when descriptive statistics is employed for data analysis, it is appropriate to use average-item scores. Following this argument, in order to produce better and comprehensible results, the values of all the factors were based on average respondent's scores.

4.4.2.1 Client performance

In the first part, the percentage distribution of the fifty two (52) respondent's view related to three main factors is discussed. From the Figure 4.3, it is observed that FIH: Financial Control and Issues handling is the worst factor. Twenty nine percent (29%) of the contractors had low degree of satisfaction with the financial stability of the client for smooth running of the building projects. Involvement of the clients in resolving the project issues is considered low as well. SD: Scope and deliverables is very satisfactory factor to the contractors with only sixteen percent (16%) were less satisfied with the clients' performance. It is interesting to observe that FIH: Financial Control and Issues handling as a least satisfactory factor; forty one percent (41%) of the respondents showed high to very

high degree of satisfaction in this factor. The overall contractor satisfaction for client performance (OSLCL) ranges from high to very high degree of satisfaction with value of forty four percent (44%) to twenty three percent (23%) of low to very low degree of satisfaction. The OSLCL score is mostly equivalent to the percentages of the individual factors.

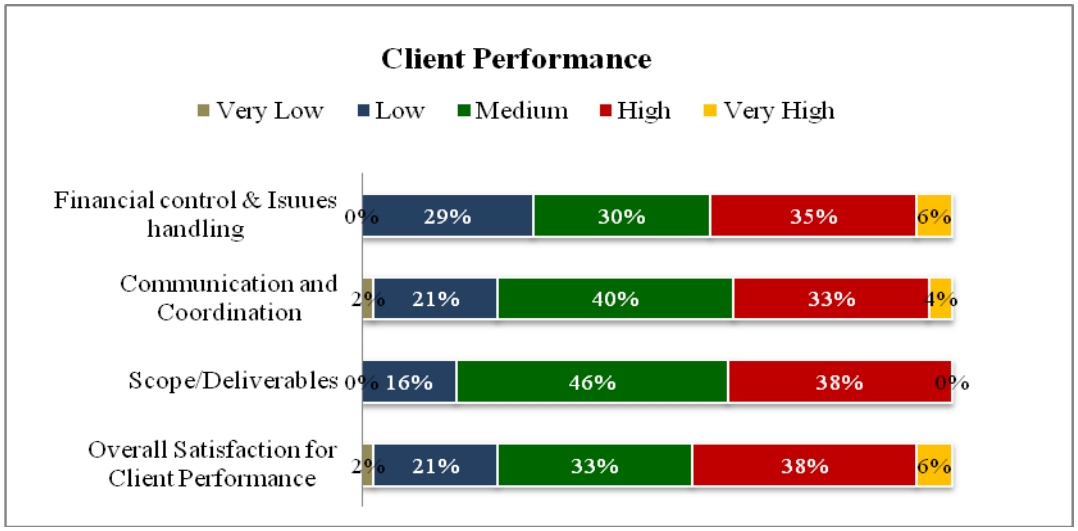

Figure 4.3: Distribution of respondent's satisfaction on client performance

In the second part, the ranking of the indicators based on mean scores after conducted on SPSS is illustrated in the Table 4.5. The contractor satisfaction level for client performance vary from 3.57 (SD6: timely site possession by the client at start of the project) to 2.88 (CC5: client ability to make timely and quick decisions).

Table 4.5: Mean Scores and Ranking for Client Performance

Variables	Mean	Rank
SD: Scope and Deliverables		
SD1: Client awareness and knowledge of project scope and objectives.	3.40	3
SD2: Clear and defined project scope/objectives.	3.50	2
SD3: Flexible contract conditions for the contractor.	3.13	10
SD4: Client effectively involved in the project.	3.32	6
SD5: Frequent changes in the project scope by the client.	3.03	11
SD6: Timely site possession by the client at start of the project.	3.57	1
SD7: Overall project site ground conditions.	2.94	13
CC: Communication and Coordination		
CC1: Communication and coordination of the client with the consultant.	3.30	7
CC2: Communication and coordination of the client with the contractor.	3.21	9
CC3: Client fair attitude & behavior in dealing with the contractor.	3.38	4

CC4: Client authority to relax specifications.	2.90	14
CC5: Client ability to make timely and quick decisions.	2.88	15
FIH: Financial Control and Issues Handling		
FIH1: Client flexibility towards project issues.	2.98	12
FIH2: Adequacy in problem solving and keeping good relations with the consultant and contractor.	3.34	5
FIH3: General dispute avoidance between consultant and contractor.	3.23	8
FIH4: Financial stability of the client.	3.40	3
FIH5: Client timely verifies and release payments.	3.13	10

The other least satisfactory indicators were: CC5: Client ability to make timely and quick decisions (2.88), CC4: client authority to relax specifications (2.90), SD7: overall project site conditions (2.94) and FIH1: client flexibility towards project issues (2.98).

4.4.2.2 Consultant performance

Performance of the consultants is evaluated on the same lines as made for client performance in the previous section.

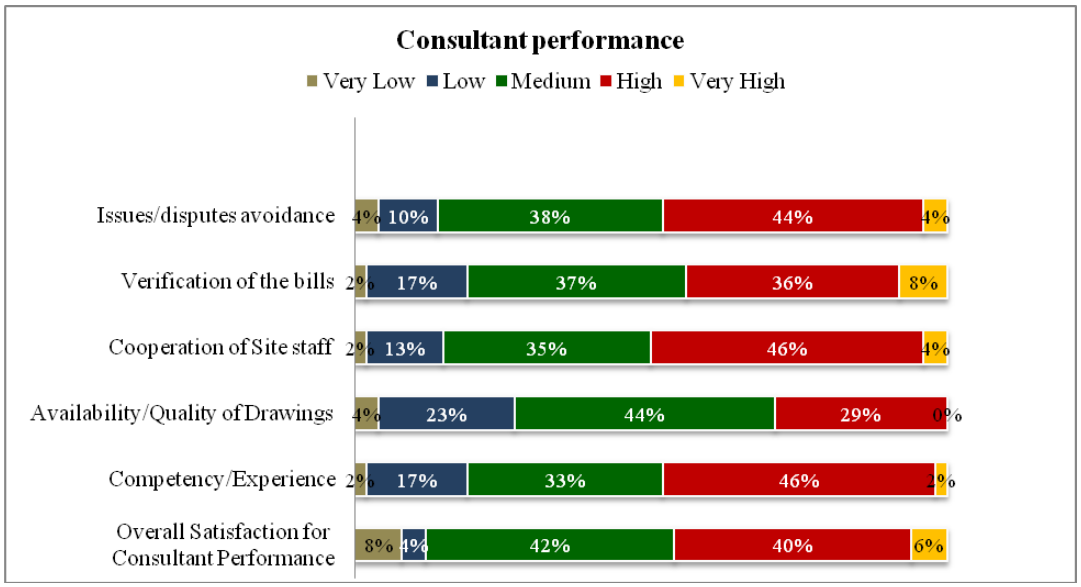

Figure 4.4: Distribution of respondent's satisfaction on consultant performance

From the Figure 4.4, the values for very low to low degree of satisfaction range from factor IDA: Issues and disputes avoidance with value of fourteen percent (14%) to factor AQD: Availability and Quality of drawings with value of twenty seven percent (27%). On the other hand, the factor CSS: Cooperation of Site staff has the

value of fifty percent (50%) for high to very high degree of satisfaction. The second satisfactory factors to the contractors were CE: Competency and Experience of the consultants and IDA: Issues and disputes avoidance with values of forty eight percent (48%). The overall contractor satisfaction for consultant performance (OSLCU) range from high to very high degree of satisfaction with value of forty six percent (46%) to only twelve percent (12%) of low to very low degree of satisfaction. In Table 4.6, twenty six indicators for consultant performance are prioritized based on mean scores after conducted on SPSS.

Table 4.6: Mean Scores and Ranking for Consultant Performance

Variables	Mean	Rank
CE: Competency and Experience		
CE1: Adequacy of consultant experience.	3.69	1
CE2: Adequate consultant supervisory staff available at site.	3.23	13
CE3: Adequate experience of consultant supervisory staff at site.	3.34	9
CE4: Consultant aware of his contractual obligations and supervised the project effectively and efficiently.	3.32	10
CE5: Performing and inspection of works by the consultant supervisory staff on time.	3.30	11
CE6: Consultant knowledge of project scope.	3.59	3
CE7: Use of project management techniques by the consultant.	3.09	15
CE8 Consultant risk attitude.	2.65	22
CE9: Quality control personnel (lab assistant) available at site.	3.07	16
AQD: Availability and Quality of drawings		
AQD1: Clear and adequate details provided in drawings and specifications.	3.13	14
AQD2: No frequent issue of supplementary drawings by the consultant.	2.69	21
AQD3: Consultant made available the construction drawings to the contractor well before the activity to be started.	2.73	20
AQD4: Timely approval of shop drawings and submittals by the consultant.	2.98	17
CSS: Cooperation of Site staff		
CSS1: Communication and coordination of the consultant with the client.	3.42	6
CSS2: Communication and coordination of the consultant with the contractor.	3.51	4
CSS3: Consultant held project status meetings on regular basis to evaluate project performance and progress.	3.65	2
CSS4: Friendly attitude/behavior of consultant supervisory staff at site.	3.48	5
CSS5: Adequacy of accepting mistakes by the consultant supervisory staff at site.	2.82	19
CSS6: Consultant ability to make timely and quick decisions.	3.07	16
CSS7: Quality and reliability of advice & feedback given by the consultant.	3.36	8
VB: Verification of the Bills		
VB1: Monthly bills being verified and forwarded to the client on time.	3.42	6

VB2: Issues managed effectively on the project without impacting project budget by the consultant.	3.28	12
VB3: Timely verification of variations & escalation claims by the consultant.	2.90	18
IDA: Issues and disputes avoidance		
IDA1: Consultant flexibility towards project issues.	3.17	13
IDA2: Adequacy in problem solving and keeping good relations with the client and contractor.	3.40	7
IDA3: General dispute avoidance with the contractor.	3.30	11

The contractor satisfaction level for consultant performance vary from 3.69 (CE1: Adequacy of consultant experience) to 2.65 (CE8: Consultant risk attitude). The other least contractor satisfaction indicators were: AQD2: issuance of frequent supplementary drawings (2.69), AQD3: made timely availability of drawings to the contractors for execution of activities (2.73), CSS5: acceptance of mistakes by the consultant supervisory staff (2.82), VB3: timely verification of variations and escalation claims (2.90) and AQD4: approval of submittals and shop drawings on time (2.98).

4.5 TESTS OF NORMALITY

In this research, One-way repeated measures ANOVA test and multiple regression analysis was adopted to study the relationship between overall contractor satisfaction level as dependent variable and the factors for both client and consultant performance as independent variables. Since these are parametric tests, several researchers have different arguments regarding using the Likert scaled data to parametric tests. Leech et.al. (2005) and Shuwei (2009) believed that for multiple-response type of data, parametric statistical tests (e.g. t-test, ANOVA, correlation analysis and multiple regression analysis) cannot be used and generally requires an interval data. However on the other hand, Bryman (2001) believed that multiple-indicator measures of concepts can be treated as interval/ratio data. Also Bryman & Cramer (1994), Nanna & Sawilowsky (1998) and Kelly (1999) have recommended the use of parametric statistical tests for likert-scaled data and now it is commonly accepted and used in social science research. Based on the above, the researcher prior to conduct the One-way repeated measures ANOVA test and multiple linear regression analysis carried out a test for normality on SPSS to check

whether the data establishes a normal distribution. Three ways are available to check normality of the quantitative data as shown in the Figure 4.5 (Chan 2003).

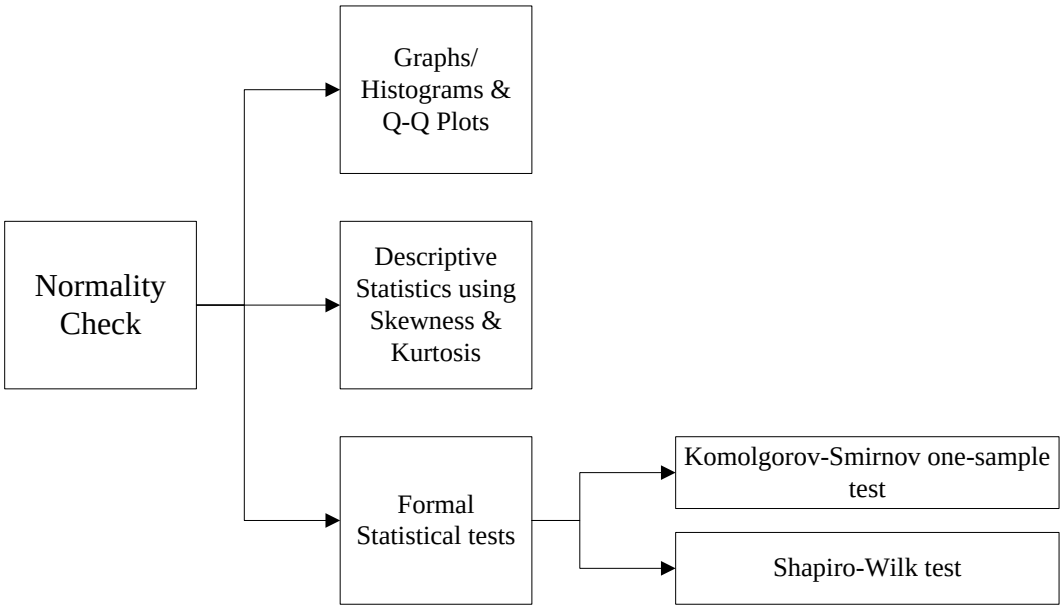

Figure 4.5: Three approaches to check normality of the quantitative data

In this research, formal statistical tests approach was adopted to check the normality. However, these tests are very sensitive to the population/ sample size of the variable being considered. Park (2008) argued that Shapiro-Wilk test to be considered when population size is less than 2000 (N<2000). Since the total building projects population defined was fifty seven (57), Shapiro-Wilk test has been adopted to check the normality of the survey data. The Null Hypothesis (H_o) for the test was that the quantitative data satisfies the assumptions of normality. Significance level (or p-value) is a criteria used for Null Hypothesis (H_o) to be accepted or rejected. A p-value of 0.05 with 0.01 being highly significant was used in SPSS (Gaur & Gaur 2009). Table 4.7 show that the significance value of Shapiro-Wilk is greater than 0.05, therefore Null Hypothesis (Ho) is to be accepted. The normality assumptions of the contractor satisfaction data for both client and consultant performances were satisfied.

Table 4.7: Tests of Normality

Client and Consultant		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Contractor Satisfaction	CLIENT	.082	52	.200*	.976	52	.390
	CONSULTANT	.103	52	.200*	.976	52	.360

a. Lilliefors Significance Correction

Other than formal statistical tests approach, histograms, normal Q-Q plots and outliers check results (all satisfied the normality assumptions) are also provided in the Appendix VI. Since the data fulfilled the normality requirements, the next section discusses the one-way repeated measures ANOVA and multiple linear regression analysis.

4.6 ONE-WAY REPEATED MEASURES ANOVA

When a comparison of means is to be made of one treatment factor for two or more different conditions or questions/items, One-way repeated measures ANOVA test is suggested by Leech et.al. (2004); Kinnear & Gray (2004) and Pallant (2007). Hinton et.al. (2004) also described this method as finding a significant difference of opinions of same participant on different situations. Therefore, in this research, to compare means of contractor satisfaction for the performance of two key stakeholders, within subjects ANOVA design is adopted. Covariances which can involve deviations from the means of each measure, several assumptions are required to satisfy by these covariances. As defined by Kinnear & Gray (2004), 'the covariances are the measures of degree of statistical association between two variables must be homogeneous, known as homogeneity of covariance (or sphericity)'. Mauchly's sphericity test is used to assess the homogeneity of covariance (Leech et.al. 2004; Hinton et.al. 2004; Kinnear & Gray 2004 and Pallant 2007). One should first check the Mauchly's W and Epsilon value (measures of degree of sphericity). If the value of Mauchly's W is greater than 0.05 and Epsilon value is greater than 1, the test is not significant and one can say that there is statistically significant difference between the means of any two conditions. On the other hand, if Mauchly's W is significant ($p<0.05$) and Epsilon value is less than 1, the assumption of sphericity is violated. In this case, the

multivariate tests or making correction of degrees of freedom is required (Leech et.al. 2004; Hinton et.al. 2004; Kinnear & Gray 2004 and Pallant 2007). Wilk's Lambda test (significance value should be less than 0.05) could be used if sphericity assumption is violated; however this test provide a fewer assumptions about the data (Hinton et.al. 2004). From the Table 4.8, it can be seen that none of the assumptions are satisfied and therefore, it is concluded that there is no significant difference of opinions of the contractors between client and consultant performances on the building projects.

Table 4.8: Within-Subjects ANOVA Test Results

CS	N	Mean		Wilk's Lambda		Mauchly's W		Epsilon		
		CL	CU	Value	Sig.	Value	Sig.	Greenhouse-Geisser	Huynh-Feldt	Lower bound
	52	3.21	3.19	0.99	0.86	1.00	0.00	1.00	1.00	1.00

CS=Contractor satisfaction CL=Client, CU=Consultant

4.7 MULTIPLE LINEAR REGRESSION ANALYSIS

Multiple regression analysis is widely used method in social sciences research to explore the correlation between one dependent (target, criterion) variable and more than two independent (regressors, predictors) variables. This statistical analysis tells how well a set of independent variables are able to predict the outcome of a dependent variable (Kinnear & Gray 2006; Pallant 2007 and Gaur & Gaur 2009). Kinnear & Gray (2006) defined multiple regression analysis as a 'construction of linear equation with two or more variables. Pallant (2007) explained that multiple linear regression analysis provides the model as a whole and the contribution of all variables that make up that model. Major types of multiple regression analysis defined by Hinton et.al. (2004), Pallant (2007) and Gaur & Gaur (2009) are:

1. Standard multiple regression.
2. Hierarchical multiple regression.
3. Stepwise multiple regression.

In this research, the overall contractor satisfaction level as a dependent variable is correlated with the satisfaction factors as independent variables identified for both clients and consultants by using the technique of standard multiple regression in SPSS. After analysis, the results can be helpful to devise important strategies in improving the overall contractor degree of satisfaction and weak areas of clients and consultants. Before going in to regression analysis, it is necessary to discuss some basic concepts.

4.7.1 Multicollinearity

When correlation between dependent and independent variables are high from some specified value, multicollinearity exists i.e. some of the variables are containing same type of information (Hinton et.al. (2004); Leech et.al. (2005) and Pallant 2007). Pallant (2007) argued that highly correlated variables does not show a good regression model and provides a maximum person correlation 'r' value of 0.9 for multicollinearity and for Hinton et.al. (2004), 0.8 is the recommended value of r. Tolerance and VIF (Variance Inflation Factor) values can also be used to assess the multicollinearity. If Tolerance is greater than 0.1 and VIF value is less than 10, there will be no concern about multicollinearity (Pallant 2007). Gaur & Gaur (2009) suggested that if condition index is above 30 and variance proportions are more than 0.9, there will be chance of multicollinearity.

4.7.2 Values of R

The R value is correlation between all entered independent variables and the dependent variable based on linear regression equation. R square value tells how much variance in the dependent variable that can be explained by the independent variables. The adjusted R square is taken in to account when a lot of variables are involved in the model or when sample size is smaller than 30 (Kinnear & Gray 2006; Pallant 2007; Tabachnick & Fidel 2007 and Gaur & Gaur 2009). The R square value also provides whether a model is a good fit. According to Singh (2007), values of above seventy five percent (75%) is very good; between fifty to seventy five percent (50-75%) is good; between twenty five to fifty percent (25-50%) is fair and below twenty five percent (25%) is a poor regression model.

4.7.3 Coefficients of regression

Coefficient of regression is a measure of how well the dependent variable is significantly predicted by the independent variables. Unstandardized and Standardized coefficients are two types of regression coefficients. Unstandardized coefficients are used to develop a regression equation from all the independent variables with their coefficients and a constant term (α) and error/residual (unexplained) factor 'ε'as shown in the Equation.2 (Gaur & Gaur 2009).

Dependent Variable = α + (Coefficient) Independent Variable 1+
(Coefficient) Independent Variable 2+
(Coefficient) Independent Variable 3+ ε.....Equation.2

On the other hand, standardized beta coefficients show which variable has the greatest influence on the dependent variable. Pallant (2007) argued that "if the significance value is less than 0.05, the variable is making a significant contribution to the prediction of the dependent variable and if the significance value is greater than 0.05, the variable fails to make a significant contribution to the prediction of the dependent variable". The results of the multiple linear regression analysis for this research are summarized in the next part.

4.7.4 Regression analysis results

For client performance, the dependent variable is OSLCL (overall contractor satisfaction for client performance) and independent variables are: SD: Scope and Deliverables, CC: Communication and Coordination and FIH: Financial Control and Issues Handling.

Table 4.9: Regression on Client Performance

Model No.	Variables Entered	Standardized Coefficients		Collinearity Statistics		Model Summary		ANOVA	
		β	Sig.	Tolerance	VIF	R^2	Adjusted R^2	F	Sig.
1	SD	0.032	0.824	0.512	1.953	0.495	0.464	15.695	0.000
	CC	0.328	0.080	0.312	3.205				
	FIH	0.392	0.025	0.366	2.730				

From the Table 4.9, there are no concerns regarding multicollinearity since Tolerance values are greater than 0.1 and VIF values are less than 10 (Pallant 2007). The dependent variable value will increase with the increase of values of all three independent variables. In this research, the focus is to compare the contribution of the independent variables; standardized beta coefficient 'β' is used. It can be seen that the beta 'β' value of factor FIH: Financial Control and Issues Handling is making a significant unique contribution (Sig. value less than 0.05) in predicting the dependent variable i.e. OSLCL (overall contractor satisfaction for client performance). As the sample size is more than 30, R square value is used to assess the overall fit of the model (Pallant 2007). In this case, R square value is 0.495. This means that the independent variables are making 49.5% variance in the dependent variable, showing a fair model (Singh 2007). Finally, in ANOVA analysis, this regression model has a high significance level.

For consultant performance, the dependent variable is OSLCU (overall contractor satisfaction for consultant performance) and independent variables are: CE: Competency and Experience; AQD: Availability and Quality of Drawings; CSS: Cooperation of Site Staff; VB: Verification of the Bills; and IDA: Issues and Disputes avoidance.

Table 4.10: Regression on Consultant Performance

Model No.	Variables Entered	Standardized Coefficients		Collinearity Statistics		Model Summary		ANOVA	
		β	Sig.	Tolerance	VIF	R^2	Adjusted R^2	F	Sig.
2	CE	0.122	0.415	0.281	3.565	0.718	0.687	23.391	0.000
	AQD	-0.025	0.839	0.416	2.406				
	CSS	0.422	0.017	0.21	4.757				
	VB	0.083	0.510	0.389	2.571				
	IDA	0.311	0.067	0.223	4.480				

From the Table 4.10, there are no concerns regarding multicollinearity since Tolerance values are greater than 0.1 and VIF values are less than 10 (Pallant 2007). The dependent variable value will increase with the increase of values of

four independent variables except for AQD: Availability and Quality of Drawings (-0.025). The value of dependent variable (OSLCU) will decrease with the increase of this independent variable. The reason for such trend can be explained as follows: the consultants are always failed to provide faultless drawings in the first attempt;. Low degree of attention in preparing the quality drawings, less experience of consultant's architects and engineers, excessive work load are several reasons of poor quality of project drawings. Consultants are also having a habit to prepare the project drawings and issued for construction to the contractor with an intention that contractors will look out the deficiencies during construction. As a result of this, frequent supplementary drawings are issued which cause the contractors a great loss.

The independent variable CSS: Cooperation of Site Staff is making a significant unique contribution (Sig. value less than 0.05) in predicting the dependent variable i.e. OSLCU (overall contractor satisfaction for consultant performance). R square value is 0.718 means that 71.8% of variance in the dependent variable by the independent variables, showing a good model (Singh 2007). Finally, in ANOVA analysis, this regression model has a high significance level. For complete test results of regression analysis, please see Appendix VIII.

4.8 SUMMARY

In this chapter, detailed statistical analysis has been presented. Following the pre-defined data analysis strategy, the data analysis carried out includes: descriptive statistics, one-way repeated measures ANOVA and multiple linear regression analysis. In the next chapter, the conclusions and recommendations are made based on results of the data analysis.

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS & RECOMMENDATIONS

Since contractors had provided their feedback to assess the performance of clients and consultants, separate conclusions have been drawn from the statistical analysis results. Firstly, results of the study show that twenty three percent (23%) contractors are overall dissatisfied with the performance of clients on the building projects. Financial stability, issues handling and decision making came out a critical factor with twenty nine percent (29%) contractors show very low to low degree of satisfaction. The main reason for such a trend is that in Pakistan, no proper mechanism is available for accountability and smooth circulation of the projects funds, as a result of this, the finances are not properly utilized on the construction projects. Further, clients are generally failed to forecast the cash flow estimate in an accurate manner at the start of any construction project that results in delaying or stoppage of work. Further, client's ability to resolve the project issues is also very weak due to non-availability of the technical and experienced construction staff and lack of professionalism at building project sites. In addition, twenty three percent (23%) contractors have also criticized the client's for their way of communication and coordination with the other key project stakeholder's.

As far as consultant's performance was concerned, contractors have shown nineteen percent (19%) overall dissatisfaction for their performances on the building projects. Availability and quality of project drawings being a major apprehension with twenty seven percent (27%) contractors are less than satisfied. Contractors have a view that consulting firms are always failed to provide error-free drawings and their mechanism of providing late approvals of submittals and shop drawings needs serious attention and improvement. Further, consultant's site staff cooperation and their dealing with the contractors also failed to get high degree of appreciation from the contractors.

From the above discussion, it can be concluded that client's communication and coordination with other project stakeholders; their financial position throughout the project life cycle; and their way of decision making are key to achieve high degree of contractor's satisfaction levels on the building projects. Consultants, on the other hand needs to pay attention and improves the timely availability and quality of project drawings and deal with the contractors in a fair manner.

Some recommendations are enlisted based on the research findings and conclusions. Both the key stakeholders i.e. clients and consultants are suggested to focus on these so as to make an improved contribution towards better projects performance.

1. Allocation of funds and timely release of progress payments to the contractors are key for smooth running of the construction projects. Client's cash flow should be sound enough and forecasted well in advance in order to ensure timely and successful completion of the projects.

2. It is recommended that client should focus on the issues and problems developed at project sites and solve them. He should acts as a solution provider rather than a problem creator.

3. Clients should employed experienced professionals having wide experience of the construction industry to make timely and quick decisions on the project issues.

4. Irrespective of having a vast consultancy experience in the construction industry, consultants are required to improve their technical skills in order to produce error-free project drawings and minimize issuance of revised drawings.

5. Consulting firms need to induct experienced and professional personnel at project sites to achieve and enhance contractor satisfaction.

6. Consultants should develop a framework to provide timely and quick approvals of contractor's submittals and shop drawings without delaying the project activities.

7. Consultants should be proactive and anticipate the site problems in advance of their occurrence. They must be risk-seekers rather than risk-takers.

8. Consultants site staff needs to improve their attitude and behavior in dealing with the contractors in order to maintain a friendly-site environment.

5.2 FUTURE DIRECTIONS

1. The scope of this thesis was to survey building projects based on traditional procurement method in twin cities i.e. Islamabad and Rawalpindi. Further study on these lines can be carried out in other parts of the country as well in order to get wider viewpoint of the contractors.

2. This study provides a basis to evaluate key stakeholders performances on infrastructure projects (roads, bridges, dams etc.) other than building projects.

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APPENDIX: I LIST OF BUILDING PROJECTS BASED ON TRADITIONAL PROCUREMENT METHOD

Sr.No.	Project Name	Client Name	Consultant Name	Contractor Name	No. of Projects
1	Construction of EOBI House, Mauve Area, G-10, Islamabad.	Employees Old-Benefit Institution, Islamabad.	NESPAK, Karachi.	Builders Associates (Pvt) Ltd.	1
2	Construction of Telecom Tower (PTET), Blue Area, Islamabad.	PTET, Islamabad.	NESPAK, Islamabad.	Izhar (Pvt) Limited.	1
3	Construction of PT-Tele House, Mauve Area, G-10, Islamabad.	PTET, Islamabad.	Naqvi & Siddiqui Associates.	Builders Associates (Pvt) Ltd.	1
4	Construction of Azad Jammu and Kashmir Council Building, F-5, Islamabad.	Azad Jammu & Kashmir Council, Islamabad.	Naqvi & Siddiqui Associates.	L.A.C (Pvt) Ltd (New Name)	1
5	Construction of Rawalpindi Education Board, Morgah, Rawalpindi.	Rawalpindi Education Board.	NESPAK, Islamabad.	Uni-Build Associates (Pvt) Ltd	1
6	Construction of Worker's Welfare Fund (WWF) Secretariat, Mauve Area, G-10, Islamabad.	WWF, Islamabad.	NESPAK, Islamabad.	Universal Corporation (Pvt) Ltd	1
7	Construction of National Monument of Pakistan.	Ministry of Culture and Tourism, Islamabad.	Naqvi & Siddiqui Associates.	Universal Corporation (Pvt) Ltd	1
8	Construction of FPCCI Building, G-8, Islamabad.	Chamber and Commerce Industry, Islamabad.	Zaheer alam Sheikh & associates.	Guarantee Engineers	1
9	Construction of Immigration Tower, Mauve Area, G-8, Islamabad.	Immigration Overseas Employment	NESPAK, Islamabad.	Guarantee Engineers	1
10	Construction of New Pakistan Secretariat Building, G-5, Islamabad.	PWD, Islamabad.	NESPAK, Islamabad.	Interhom (Pvt) Ltd	1
11	Construction of PPMI Building, H-8, Islamabad.	Pakistan Project Management Institute, Isl.	NESPAK, Lahore.	National Construction Limited	1
12	Construction of PITAD Building, Near Beacon House, I-8, Islamabad.	PITAD, Islamabad.	NESPAK, Islamabad.	National Construction Limited	1
13	Construction of Fauji Fertilizer House Building, Saddar, Rawalpindi.	Fauji Fertilizer	Meinhardt, Pakistan.	Guarantee Engineers	1
14	Construction of Apartment Blocks. Phase-I, Labor Complex, Taxila.	Ministry of Labor and Manpower, Isl.	NESPAK, Islamabad.	Khyber Grace (Pvt) Ltd	1
15	Construction of Cultural Complex, Near Shakarparian, Islamabad.	CDA, Islamabad.	Naqvi & Siddiqui Associates.	Builders Associates (Pvt) Ltd.	1
16	Construction of State Life Tower, Blue Area, Islamabad.	State Life Insurance, Islamabad.	NESPAK, Karachi.	MoinSons (Pvt) Ltd	1

Sr.No.	Project Name	Client Name	Consultant Name	Contractor Name	No. of Projects
17	Construction of Stock Exchange Tower, Blue Area Islamabad.	ISE, Islamabad	NESPAK, Islamabad.	Habib Rafiq (Pvt.) Limited	1
18	Construction of Petroleum House, G-5, Islamabad.	Ministry of Petroleum, Isl.	Engineer Associates	Abdul Sattar and Co.	1
19	Construction of National Electric Power Regulatory Authority Building, G-5, Islamabad.	NEPRA, Islamabad.	Nayyar Ali Dada, Lahore.	Recent Construction Company	1
20	Construction of High Security Block and Conference Hall, G-5, Islamabad.	Ministry of Foreign affairs, Isl.	NESPAK, Islamabad.	Recent Construction Company	1
21	Construction of AKC Lodges Building, F-5, Islamabad.	Azad Jammu & Kashmir Council, Islamabad.	Naqvi & Siddiqui Associates.	Matracon Pakistan Private Limited.	1
22	Construction of Islamabad Cultural Club, F-9 Park, Islamabad.	CDA, Islamabad.	ACE Consultants.	Expertise (Pvt) Ltd	1
23	Construction of Ladies Club, Near Islamabad High Court, G-10, Islamabad.	CDA, Islamabad.	Mansoor Mazhar & associates.	Expertise (Pvt) Ltd	1
24	Construction of Parking Plaza, Fawara Chowk, Rawalpindi.	RDA, Rawalpindi.	NESPAK, Lahore.	Amanat Hussain & Co. (Pvt) Ltd	1
25	Construction of PHA Apartments, G-11/3, Islamabad.	PHA, Islamabad.	SAMPAK, Lahore.	Abdul Majeed & Company	1
26	Construction of Federal Services Tribunal, G-5, Islamabad.	Ministry of law and Justice, Isl.	NESPAK, Islamabad.	Progressive International	1
27	Construction of Wafaqi Muhtasib Aala, G-5, Islamabad.	Ministry of law and Justice, Isl.	CDA, Islamabad.	M/s Red Co Construction (PVT) LTD.	1
28	Construction of Foreign Services Academy, F-5, Islamabad.	Ministry of Foreign affairs, Isl.	NESPAK, Islamabad.	A.S. Khan Construction Pvt Ltd	1
29	Construction of Rawalpindi Institute of Cardiology, Rawalpindi.	Ministry of Health, Govt. of Punjab.	NESPAK, Lahore.	United Builders	1
30	Construction of Transit Accommodation, F-6, Islamabad.	FBR, Islamabad.	NESPAK, Karachi.	Shahan Enterprises	1
31	Construction of Quaid-e-Azam International Hospital, Rawalpindi.	Quaid-e-Azam International, Rwp.	Arif and Brothers.	AGA Associates	1
32	Construction of Transit Accommodation, Rawalpindi.	FBR, Islamabad.	NESPAK, Karachi.	Quality (Pvt.) Limited.	1

Sr.No.	Project Name	Client Name	Consultant Name	Contractor Name	No. of Projects
33	Construction of Indian High Commission Residential Complex, Islamabad.	Indian High Commission, Isl.	Sachder Eggelstan associates, France.	Guarantee Engineers	1
34	Construction of PIPS Building, Islamabad.	PIPS, USAID, Pakistan.	Nayyar Ali Dada, Unicon Consulting Services Pvt. Ltd.	Habib Rafiq (Pvt) Limited.	1
35	Construction of Supreme court building, Phase-II, Islamabad.	CDA, Islamabad.	PEPAC, Pakistan.	Matracon Pakistan Private Limited.	1
36	Construction of SOS Village, H-11, Islamabad.	SOS, Islamabad.	NESPAK, Islamabad.	Shaheen Enterprises	1
37	Construction of Ministry of sciences and technology building, G-5, Islamabad.	Ministry of sciences and technology, Isl.	NESPAK, Islamabad.	Usmani associates	1
38	Construction of National Bank building, G-5, Islamabad.	National Bank, Isl.	NESPAK, Lahore.	Mughal Constructions	1
39	Construction of ISI Multi Functional Buildings, Chak Shehzad, Islamabad.	Confidential	Confidential	Confidential	1
40	Construction of COMSATS Campus, Park Road, Chak-Shehzad, Islamabad	COMSATS, Isl.	NESPAK, Islamabad.	National Construction Nawab Brothers.	4
41	Construction of IIUI Complex, H-10, Islamabad.	IIUI, Isl.	NESPAK, Islamabad.	AMC, Shalimar, Gulzari, Arif Brothers	4
42	Construction of NUST Campus, H-12, Islamabad.	NUST, Isl.	NESPAK, Islamabad.	National Construction, Buildfast, Izhar, Tameer associates	6
43	Construction Of FGEHF Apartments, G-11, Islamabad.	FGEHF, Isl.	NESPAK, Islamabad.	KKP, Interconstruct, AMC, Shahzaman.	4

SCHOOL OF CIVIL & ENVIRONMENTAL ENGINEERING (SCEE)

APPENDIX: II Questionnaire Covering Letter

Dear Sir,

Performance of building projects is generally evaluated on the basis of time, cost and quality commonly known as "iron triangle". However, satisfaction and safety measures have also been established as important indicators of project performance and several studies have been done recently on the same.

In partial fulfillment of the requirements for the degree of Master of Science in Construction, Engineering & Management from NUST, H-12, Islamabad, the undersigned intends to conduct a field survey and developed a questionnaire to achieve contractor's satisfaction level for the performance of clients and consultants on building projects. Contractor Satisfaction Level, i.e. contractor perception on the performance of the client and consultant working on the project. As a representative of the contractor, you are kindly requested to take few minutes from your valuable time to evaluate the performance of client and consultant by completing the attached form.

All the information provided in this regard will only be used for academic purposes and kept confidential.

Thanks for your support and cooperation in advance.

Yours Sincerely,

JAHAN ZAIB
Post Graduate Student- Construction Engineering & Management
Cell. No: 0334 501 5671
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Thesis Advisor
National Institute of Transportation (NIT)
School of Civil & Environmental Engineering (SCEE)
NUST, Islamabad.

APPENDIX: III Questionnaire

GENERAL INFORMATION
a. Project Name:
b. Project Duration (in Years):
c. Project Cost (in Millions):
d. Percent Complete (%):
e. Your Name:
f. Designation:
g. Qualification:
h. Experience in the Construction Industry (in Years):
i. E-mail address:
j. Cell No:

FIRST PART				
(OVERALL SATISFACTION LEVEL)				
Tick any one box indicate your satisfaction level regarding overall performance of the client and consultant on this project.				
Overall Client Performance:				
1	2	3	4	5
Very Low	Low	Medium	High	Very High
☐	☐	☐	☐	☐
Overall Consultant Performance:				
1	2	3	4	5
Very Low	Low	Medium	High	Very High
☐	☐	☐	☐	☐

SECOND PART					
(CLIENT PERFORMANCE)					
Below are a number of statements, please read each one and tick any one box for each statement.					
Questions	**Degree of Satisfaction**				
	Very Low	Low	Medium	High	Very High
(SCOPE AND DELIVERABLES)					
1. Client awareness and knowledge of project scope and objectives.					
2. Clear and defined project scope/objectives.					
3. Flexible contract conditions for the contractor.					
4. Client effectively involved in the project.					
5. Frequent changes in the project scope by the client.					
6. Timely site possession by the client at start of the project.					
7. Overall project site ground conditions.					
(COMMUNICATION AND COORDINATION)					
1. Communication and coordination of the client with the consultant.					
2. Communication and coordination of the client with the contractor.					
3. Client fair attitude & behavior in dealing with the contractor.					
4. Client authority to relax specifications.					
5. Client ability to make timely and quick decisions.					

Questions	Degree of Satisfaction				
	Very Low	Low	Medium	High	Very High
(FINANCIAL CONTROL AND ISSUES HANDLING)					
1. Client flexibility towards project issues.					
2. Adequacy in problem solving and keeping good relations with the consultant and contractor.					
3. General dispute avoidance between consultant and contractor.					
4. Financial stability of the client.					
5. Client timely verifies and release payments.					

Contd… (Consultant Performance Evaluation on next page)

THIRD PART					
(CONSULTANT PERFORMANCE)					
Below are a number of statements, please read each one and tick any one box for each statement.					
Questions	**Degree of Satisfaction**				
	Very Low	Low	Medium	High	Very High
(COMPETENCY AND EXPERINCE)					
1. Adequacy of consultant experience.					
2. Adequate consultant supervisory staff available at site.					
3. Adequate experience of consultant supervisory staff at site.					
4. Consultant aware of his contractual obligations and supervised the project effectively and efficiently.					
5. Performing and inspection of works by the consultant supervisory staff on time.					
6. Consultant knowledge of project scope.					
7. Use of project management techniques by the consultant.					
8. Consultant risk attitude.					
9. Quality control personnel (lab assistant) available at site.					
(AVAILABILITY AND QUALITY OF DRAWINGS)					
1. Clear and adequate details provided in drawings and specifications.					
2. No frequent issue of supplementary drawings by the consultant.					
3. Consultant made available the construction drawings to the contractor well before the activity to be started.					
4. Timely approval of shop drawings and submittals by the consultant.					

Questions	Degree of Satisfaction				
	Very Low	Low	Medium	High	Very High
(COOPERATION OF SITE STAFF)					
1. Communication and coordination of the consultant with the client.					
2. Communication and coordination of the consultant with the contractor.					
3. Consultant held project status meetings on regular basis to evaluate project performance and progress.					
4. Friendly attitude/behavior of consultant supervisory staff at site.					
5. Adequacy of accepting mistakes by the consultant supervisory staff at site.					
6. Consultant ability to make timely and quick decisions.					
7. Quality and reliability of advice & feedback given by the consultant.					
(VERIFICATION OF THE BILLS)					
1. Monthly bills being verified and forwarded to the client on time.					
2. Issues managed effectively on the project without impacting project budget by the consultant.					
3. Timely verification of variations & escalation claims by the consultant.					

Questions	Degree of Satisfaction				
	Very Low	Low	Medium	High	Very High
(ISSUES AND DISPUTES AVOIDANCE)					
1. Consultant flexibility towards project issues.					
2. Adequacy in problem solving and keeping good relations with the client and contractor.					
3. General dispute avoidance with the contractor.					

For any further comments/remarks, please specify below:

- **THANKS FOR YOUR CO-OPERATION** -

APPENDIX: IV RESPONDENTS LIST WITH DESIGNATION & EXPERIENCE IN THE CONSTRUCTION INDUSTRY

Sr.No.	Project Name	Company Name	PEC Category	Respondent's Designation	Experience in the Construction Industry
1	Construction of EOBI House, Mauve Area, G-10, Islamabad.	Builders Associates (Pvt) Ltd.	C-A	Project Manager (BSc Civil Engineering)	19 Years
2	Construction of Telecom Tower (PTET), Blue Area, Islamabad.	Izhar (Pvt) Limited.	C-A	Project Manager (BSc Civil Engineering)	9 Years
3	Construction of PT-Tele House, Mauve Area, G-10, Islamabad.	Builders Associates (Pvt) Ltd.	C-A	Project Manager (D.A.E. Civil)	36 Years
4	Construction of Azad Jammu and Kashmir Council Building, F-5, Islamabad.	L.A.C (Pvt) Ltd (New Name)	C-A	Site Supervisor (D.A.E. Civil)	8 Years
5	Construction of National Bank Building, G-5, Islamabad	Mughal Constructions	C-A	Planning Engineer (BSc Civil Engineering)	15 Years
6	Construction of Rawalpindi Education Board, Morgah, Rawalpindi.	Uni-Build Associates (Pvt) Ltd	C-A	Project Manager (BSc Civil Engineering)	33 Years
7	Construction of Worker's Welfare Fund (WWF) Secretariat, Mauve Area, G-10, Islamabad.	Universal Corporation (Pvt) Ltd	C-A	Executive Director(BSc Civil Engineering)	24 Years
8	Construction of National Monument of Pakistan.	Universal Corporation (Pvt) Ltd	C-A	Executive Director(BSc Civil Engineering)	24 Years
9	Construction of Academic Block I, CIIT, Chak-Shehzad, Islamabad.	National Construction Limited	C-A	Project Manager (BSc Civil Engineering)	30 Years
10	Construction of Central Library, CIIT, Chak-Shehzad, Islamabad.	National Construction Limited	C-A	Deputy General Manager (BSc Civil Engineering)	30 Years
11	Construction of FGEHF Apartments, Package-III, G-11/4, Islamabad.	KKP (Pvt) Ltd	C-A	Project Manager (BSc Civil Engineering)	35 Years
12	Construction of FGEHF Apartments, Package-I, G-11/3, Islamabad.	Shah Zaman (Pvt) Ltd	C-A	Project Manager (BSc Civil Engineering)	40 Years
13	Construction of FPCCI Building, G-8, Islamabad.	Guarantee Engineers	C-A	Project Manager (D.A.E. Civil)	20 Years
14	Construction of Immigration Tower, Mauve Area, G-8, Islamabad.	Guarantee Engineers	C-A	Project Manager (BSc Civil Engineering)	8 Years
15	Construction of New Pakistan Secretariat Building, G-5, Islamabad.	Interhom (Pvt) Ltd	C-A	Deputy Project Engineer (D.A.E. Civil)	12 Years
16	Construction of PPMI Building, H-8, Islamabad.	National Construction Limited	C-A	Project Manager (BSc Civil Engineering)	30 Years

Sr.No.	Project Name	Company Name	PEC Category	Respondent's Designation	Experience in the Construction Industry
17	Construction of PITAD Building, Near Beacon House, I-8, Islamabad.	National Construction Limited	C-A	Planning Engineer (BSc Civil Engineering)	4 Years
18	Construction of Fauji Fertilizer House Building, Saddar, Rawalpindi.	Guarantee Engineers	C-A	Site Engineer (BSc Civil Engineering)	4 Years
19	Construction of Apartment Blocks. Phase-I, Labor Complex, Taxila.	Khyber Grace (Pvt) Ltd	C-A	Project Manager (BSc Civil Engineering)	7 Years
20	Construction of NUST Institute of Management Sciences, H-12, Islamabad.	National Construction Limited	C-A	Site Engineer (BSc Civil Engineering)	6 Years
21	Construction of NUST Headquarters, H-12, Islamabad.	Taameer Associates	C-A	Site Engineer (BSc Civil Engineering)	2 Years
22	Construction of Cultural Complex, Near Shakarparian, Islamabad.	Builders Associates (Pvt) Ltd.	C-A	Manager Construction (MS Project Management)	7 Years
23	Construction of Staff Residences and Apartments, NUST, H-12, Islamabad.	Izhar (Pvt) Ltd	C-A	Construction Manager (D.A.E. Civil)	18 Years
24	Construction of State Life Tower, Blue Area, Islamabad.	MoinSons (Pvt) Ltd	C-A	Planning Engineer (BSc Civil Engineering)	3 Years
25	Construction of Stock Exchange Tower, Blue Area Islamabad.	Habib Rafiq (Pvt.) Limited	C-A	Senior Engineer (BSc Civil Engineering)	39 Years
26	Construction of Petroleum House, G-5, Islamabad.	Abdul Sattar and Co.	C-A	Project Manager (BSc Civil Engineering)	40 Years
27	Construction of UG Hostel, NUST, H-12, Islamabad.	Izhar (Pvt) Ltd	C-A	Manager Contracts (D.A.E. Civil)	18 Years
28	Construction of Construction of National Electric Power Regulatory Authority Building, G-5, Islamabad.	Recent Construction Company	C-A	Project Manager (D.A.E. Civil)	34 Years
29	Construction of High Security Block and Conference Hall, G-5, Islamabad.	Recent Construction Company	C-A	Construction Manager B.Tech (Civil)	14 Years
30	Construction of AKC Lodges Building, F-5, Islamabad.	Matracon Pakistan Private Limited.	C-A	Planning Engineer (BSc Civil Engineering)	3 Years
31	Construction of Islamabad Cultural Club, F-9 Park, Islamabad.	Expertise (Pvt) Ltd	C-A	Director (BSc Civil Engineering)	5 Years
32	Construction of Ladies Club, Near Islamabad High Court, G-10, Islamabad.	Expertise (Pvt) Ltd	C-A	Director (BSc Civil Engineering)	5 Years

Sr.No.	Project Name	Company Name	PEC Category	Respondent's Designation	Experience in the Construction Industry
33	Construction of Indian High Commission Residential Complex	Guarantee Engineers	C-A	Project Manager (BSc Civil Engineering)	21 Years
34	Construction of PIPS Building, Islamabad.	Habib Rafiq (Pvt) Limited.	C-A	Project Manager (BSc Civil Engineering)	30 Years
35	Construction of Supreme court building, Phase-II, Islamabad.	Matracon Pakistan Private Limited.	C-A	Planning Engineer (BSc Civil Engineering)	3 Years
36	Construction of Parking Plaza, Fawara Chowk, Rawalpindi.	Amanat Hussain & Co. (Pvt) Ltd	C-B	Chief Engineer (BSc Civil Engineering)	21 Years
37	Construction of PHA Apartments, G-11/3, Islamabad.	Abdul Majeed & Company	C-B	Construction Manager (D.A.E. Civil)	14 Years
38	Construction of Academic Block for Women, IIUI, Islamabad.	Abdul Majeed & Company	C-B	Project Manager (B.Tech Civil)	18 Years
39	Construction of FGEHF Apartments, Package-II, V, G-11/3-4, Islamabad.	Abdul Majeed & Company	C-B	Project Manager (BSc Civil Engineering)	35 Years
40	Construction of FGEHF Apartments, Package-IV, G-11/4, Islamabad.	Interconstruct (Pvt) Ltd	C-B	Managing Director (BSc Civil Engineering)	40 Years
41	Construction of Federal Services Tribunal, G-5, Islamabad.	Progressive International	C-B	Project Engineer (BSc Civil Engineering)	6 Years
42	Construction of Faculty Block of Science and Technology, IIUI, Islamabad.	Gulzari Associates	C-B	Project Manager (D.A.E. Civil)	5 Years
43	Extension of Men's Hostel, IIUI, Islamabad.	Abid Brothers Constor (Pvt) Ltd	C-1	Project Manager (B.Tech Civil)	12 Years
44	Construction of CCE & MS Building, H-12, Islamabad.	Shalimar Construction Co (Pvt) Ltd.	C-1	Project Manager (D.A.E. Civil)	34 Years
45	Construction of NIIT Building, H-12, Islamabad.	Build fast Countrywide (Pvt) Ltd	C-1	Construction Manager (BSc Civil Engineering)	35 Years
46	Construction of Wafaqi Muhtasib Aala, G-5, Islamabad.	M/s Red Co Construction (PVT) LTD.	C-1	Construction Manager (D.A.E. Civil)	12 Years
47	Construction of Foreign Services Academy, F-5, Islamabad.	A.S. Khan Construction Pvt Ltd	C-1	Contract Manager (D.A.E. Civil)	40 Years
48	Construction of Rawalpindi Institute of Cardiology, Rawalpindi.	United Builders	C-2	Project Engineer (BSc Civil Engineering)	2 Years
49	Construction of Transit Accommodation, F-6, Islamabad.	Shahan Enterprises	C-2	Director (MBA)	3 Years

Sr.No.	Project Name	Company Name	PEC Category	Respondent's Designation	Experience in the Construction Industry
50	Construction of SOS Village, H-11, Islamabad	Shaheen Enterprises	C-2	Project Manager (BSc Civil Engineering)	8 Years
51	Construction of Transit Accommodation, Rawalpindi.	Quality (Pvt.) Limited.	C-2	Project Manager (D.A.E. Civil)	12 Years
52	Construction of Quaid-e-Azam International Hospital, Rawalpindi.	AGA Associates	C-2	Chief Engineer (BSc Civil Engineering)	43 Years

APPENDIX: V : Reliability Analysis in SPSS Ver.18.0

CSCL = Contractor overall satisfaction level for client performance

CSCU = Contractor overall satisfaction level for consultant performance

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.546	.546	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CSCL	3.3269	.891	.376	.141	.[a]
CSCU	3.2500	.858	.376	.141	.[a]

FOR CLIENT

1. SD = Scope and Deliverables Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.727	.732	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SD1	19.5192	16.137	.655	.661	.646
SD2	19.4231	17.465	.498	.603	.683
SD3	19.7885	18.680	.332	.199	.718
SD4	19.5962	16.402	.501	.292	.679
SD5	19.8846	18.457	.338	.151	.717
SD6	19.3462	16.348	.431	.228	.699
SD7	19.9808	17.509	.357	.174	.717

2. CC = Communication and Coordination Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.833	.830	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CC1	12.3846	10.594	.654	.444	.793
CC2	12.4808	10.098	.730	.660	.771
CC3	12.3077	10.766	.687	.616	.786
CC4	12.7885	12.798	.337	.253	.873
CC5	12.8077	9.413	.778	.616	.754

3. FIH = Financial Control and Issues Handling Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.822	.829	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
FIH1	13.1154	10.692	.699	.647	.762
FIH2	12.7500	11.368	.710	.597	.766
FIH3	12.8654	11.766	.545	.590	.806
FIH4	12.6923	10.923	.555	.577	.807
FIH5	12.9615	10.469	.603	.625	.793

FOR CONSULTANT

1. CE = Competency and Experience Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.914	.915	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CE1	25.6346	41.962	.712	.723	.904
CE2	26.0962	38.912	.731	.664	.902
CE3	25.9808	39.627	.769	.646	.899
CE4	26.0000	40.196	.810	.746	.897
CE5	26.0192	40.098	.706	.534	.904
CE6	25.7308	41.299	.721	.691	.903
CE7	26.2308	40.887	.722	.630	.902
CE8	26.6731	43.832	.571	.480	.912
CE9	26.2500	41.799	.582	.434	.913

2. AQD = Availability and Quality of drawings Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.867	.870	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
AQD1	8.4038	7.304	.707	.510	.838
AQD2	8.8462	6.917	.695	.543	.840
AQD3	8.8077	6.158	.807	.662	.793
AQD4	8.5577	6.291	.686	.535	.848

3. CSS = Cooperation of site staff Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.902	.904	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CSS1	19.9231	23.367	.677	.608	.891
CSS2	19.8269	22.185	.779	.620	.879
CSS3	19.6923	23.629	.690	.517	.889
CSS4	19.8654	22.785	.693	.634	.890
CSS5	20.5192	23.980	.601	.509	.900
CSS6	20.2692	22.318	.774	.645	.880
CSS7	19.9808	24.058	.789	.653	.882

4. VB = Verification of the bills Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.841	.843	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
VB1	6.1923	3.021	.722	.555	.764
VB2	6.3269	3.126	.759	.591	.730
VB3	6.7115	3.229	.642	.417	.842

5. IDA = Issues and disputes avoidance Indicators

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.814	.818	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IDA1	6.7115	2.915	.591	.352	.822
IDA2	6.4808	2.960	.726	.548	.695
IDA3	6.5769	2.563	.695	.527	.715

APPENDIX: VI : Normality Tests Using Explore Command in SPSS Ver.18.0

CC = Client and Consultant

CS = Contractor Satisfaction

Case Processing Summary

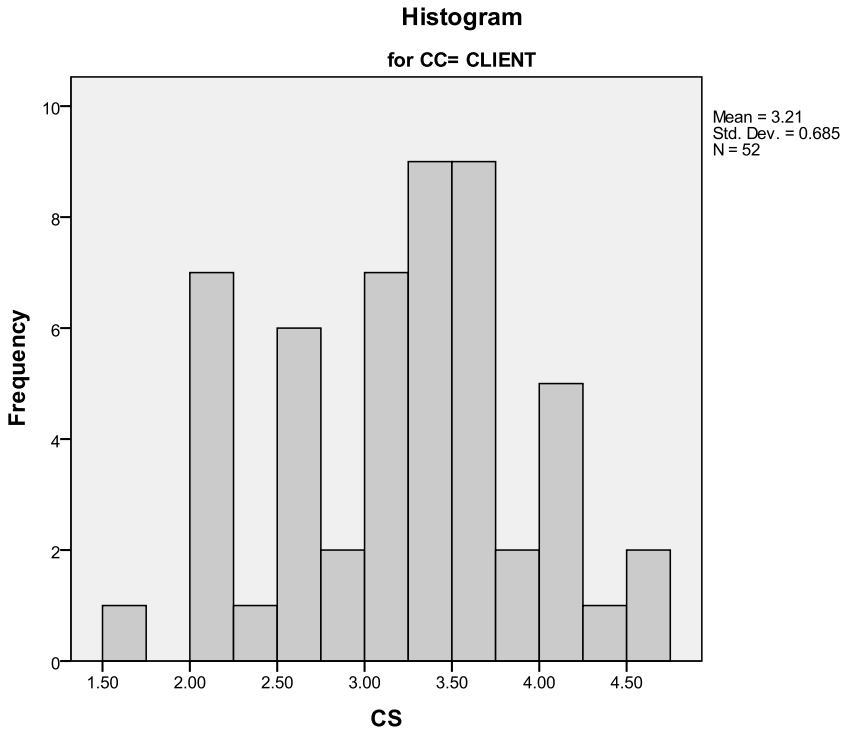
	CC	Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
CS	CLIENT	52	100.0%	0	.0%	52	100.0%
	CONSULTANT	52	100.0%	0	.0%	52	100.0%

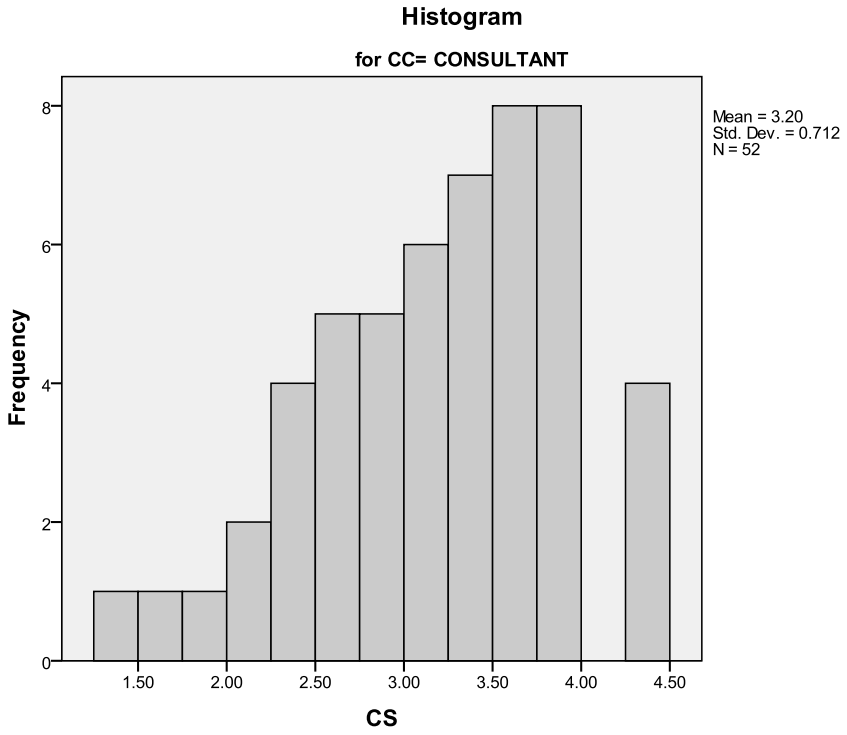
Tests of Normality

	CC	**Kolmogorov-Smirnov[a]**			Shapiro-Wilk		
		Statistic	**df**	**Sig.**	Statistic	df	Sig.
CS	CLIENT	**.082**	**52**	**.200***	.976	52	.390
	CONSULTANT	**.103**	**52**	**.200***	.976	52	.360

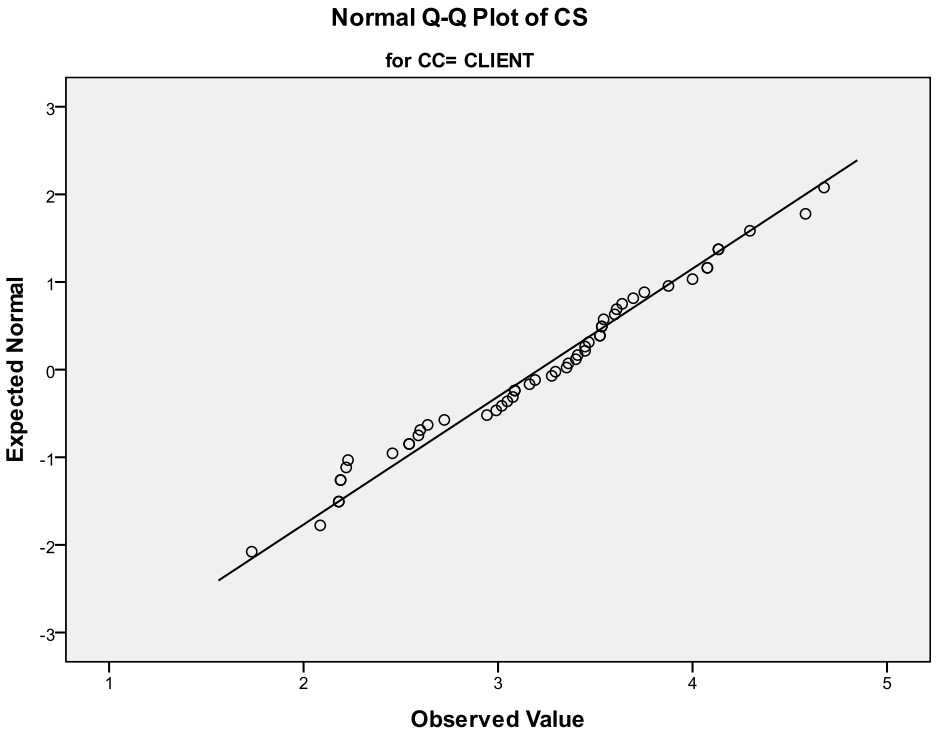
a. Lilliefors Significance Correction

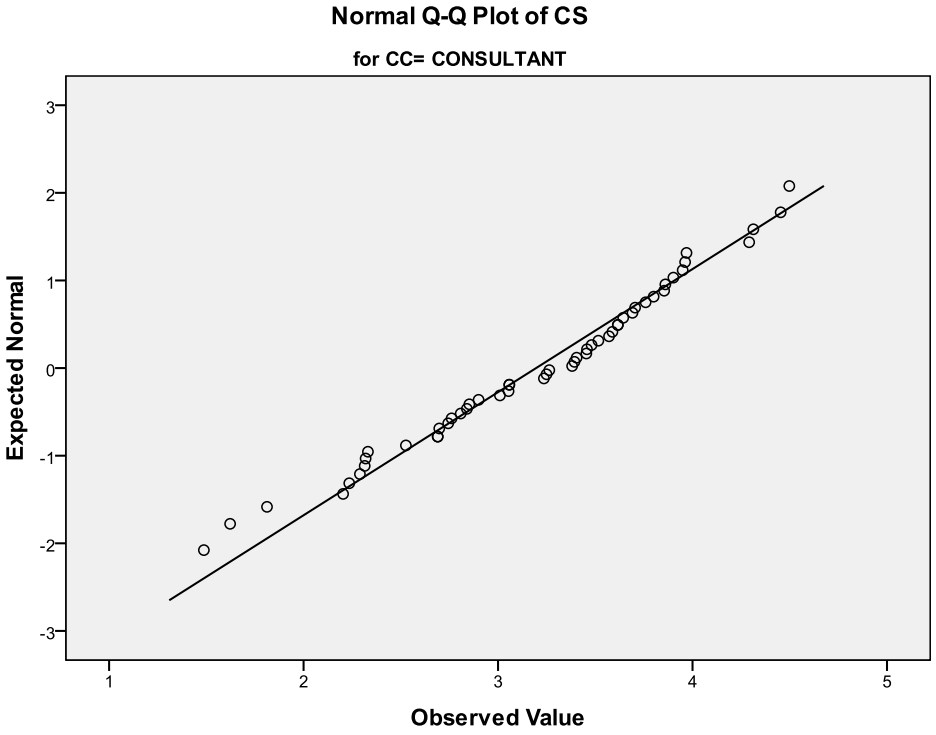
Contractor Satisfaction Histograms



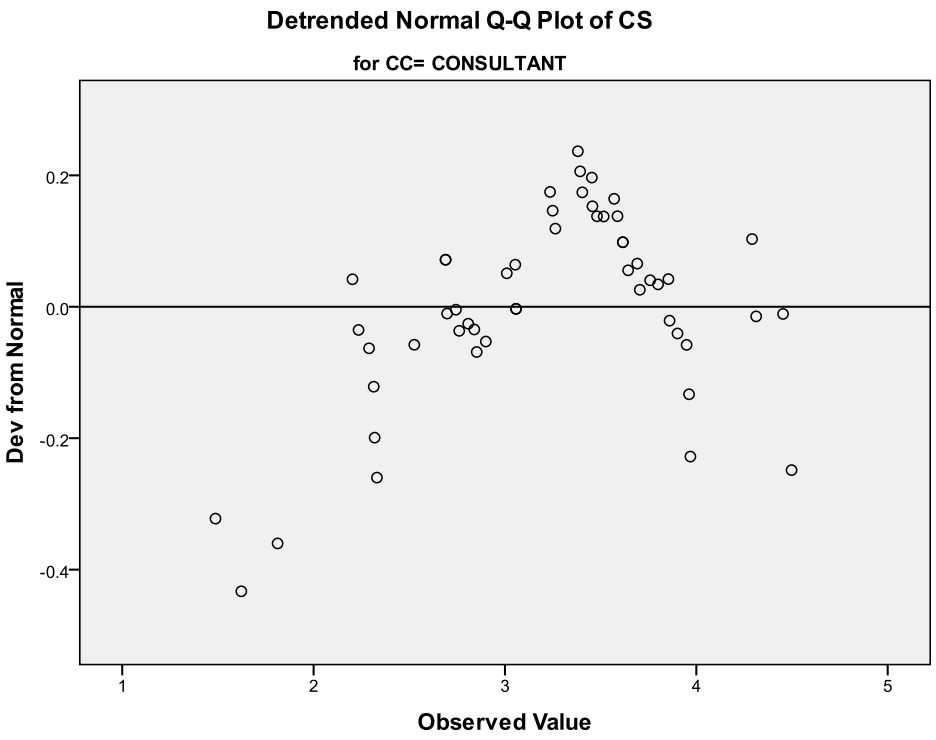


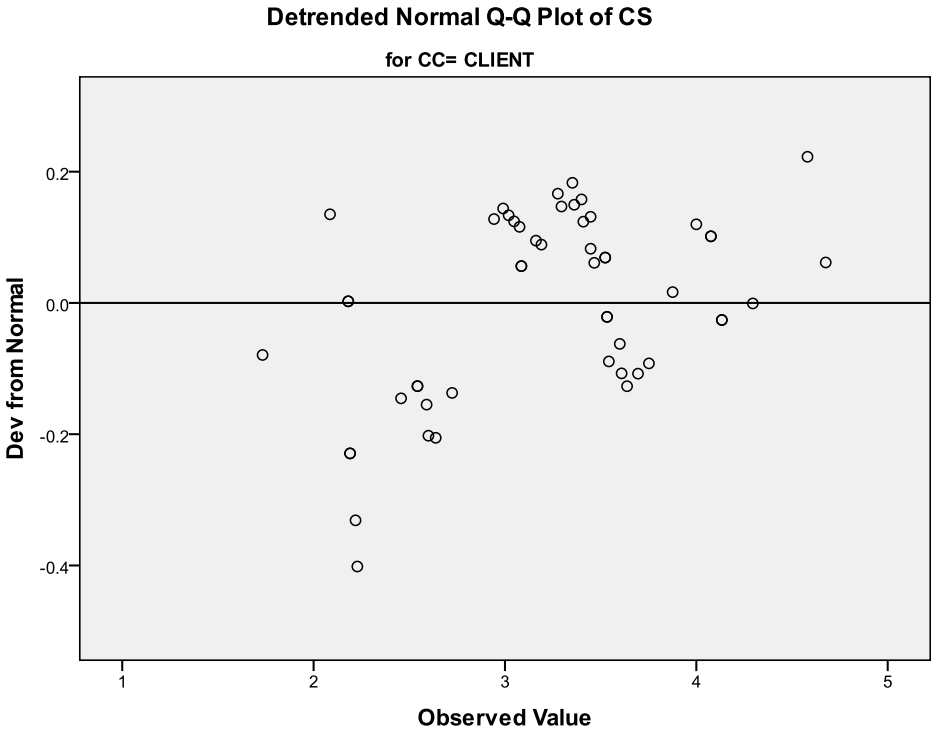
Normal Q-Q Plots



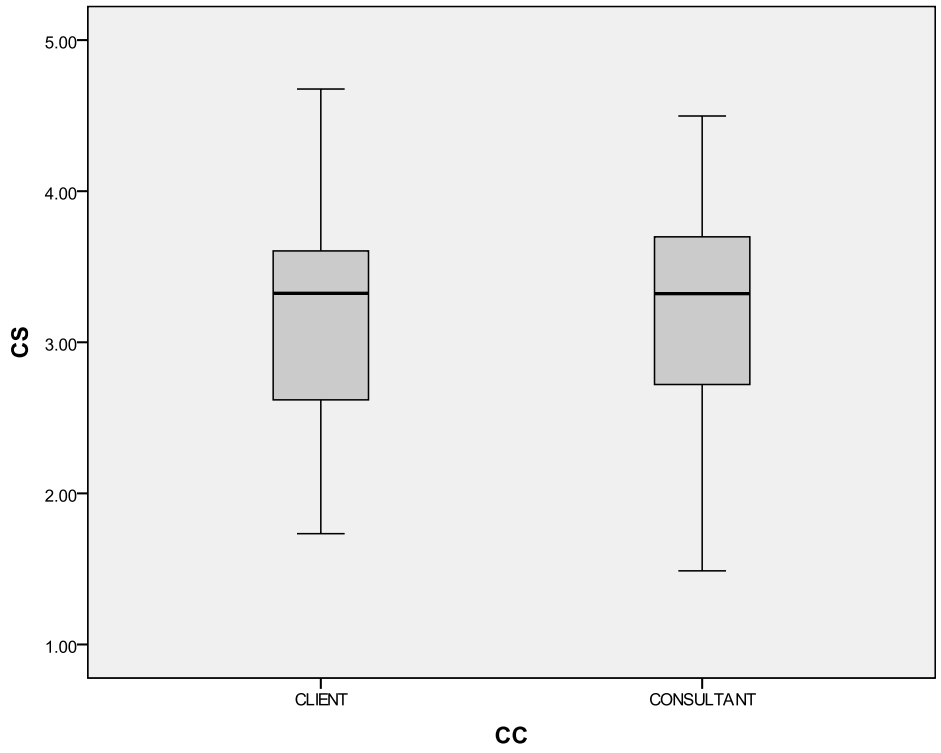


Detrended Normal Q-Q Plots





Check for Outliers



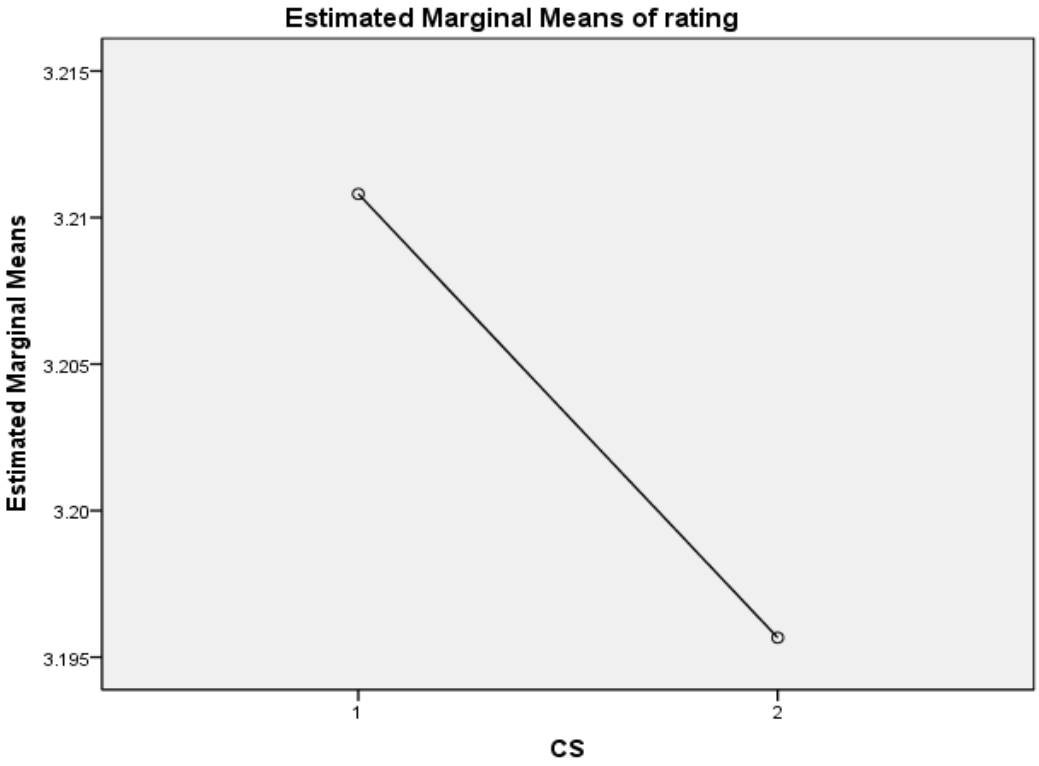
APPENDIX:VII: One-Way Repeated ANOVA in SPSS Ver.18.0

Within-Subjects Factors	
Measure: rating	
CS	Dependent Variable
1	client
2	consultant

Descriptive Statistics				
		Mean	Std. Deviation	N
Contractor Satisfaction	client	3.2108	.68497	52
	consultant	3.1957	.71179	52

Multivariate Tests						
Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's Trace	.001	.030[a]	1.000	51.000	.863	.001
Wilks' Lambda	.999	.030[a]	1.000	51.000	.863	.001
Hotelling's Trace	.001	.030[a]	1.000	51.000	.863	.001
Roy's Largest Root	.001	.030[a]	1.000	51.000	.863	.001
a. Exact statistic						
b. Design: Intercept Within Subjects Design: CS						

Mauchly's Test of Sphericity[b]								
Measure:rating								
Within Subjects Effect		Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[a]		
						Greenhouse-Geisser	Huynh-Feldt	Lower-bound
dimension1	CS	1.000	.000	0	0.000	1.000	1.000	1.000
Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.								
a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.								
b. Design: Intercept Within Subjects Design: CS								


Estimated Marginal Means of rating
Estimated Marginal Means
3.215
3.21
3.205
3.20
3.195
1
2
CS

APPENDIX:VIII: Multiple Regression Analysis in SPSS Ver.18.0

a. FOR CLIENT:

OSLCL = Overall Satisfaction Level for Client Performance

SD = Scope and Deliverables

CC = Communication and Coordination

FIH = Financial Control and Issues Handling

a. Predictors: (Constant), FIH, CC, SD
b. Dependent Variable: OSLCL

Descriptive Statistics

	Mean	Std. Deviation	N
OSLCL	3.2500	.92620	52
SD	3.2747	.67769	52
CC	3.1385	.80248	52
FIH	3.2192	.81290	52

Correlations

		OSLCL	SD	CC	FIH
Pearson Correlation	OSLCL	1.000	.500	.660	.671
	SD	.500	1.000	.688	.618
	CC	.660	.688	1.000	.789
	FIH	.671	.618	.789	1.000
Sig. (1-tailed)	OSLCL	.	.000	.000	.000
	SD	.000	.	.000	.000
	CC	.000	.000	.	.000
	FIH	.000	.000	.000	.
N	OSLCL	52	52	52	52
	SD	52	52	52	52
	CC	52	52	52	52
	FIH	52	52	52	52

Variables Entered/Removed[b] : All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.704[a]	.495	.464	.67831	.495	15.695	3	48	.000	1.875

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.665	3	7.222	15.695	.000[a]
	Residual	22.085	48	.460		
	Total	43.750	51			

a. Predictors: (Constant), FIH, CC, SD

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	.481	.483		.995	.325	-.491	1.452					
	SD	.044	.196	.032	.224	.824	-.350	.438	.500	.032	.023	.512	1.953
	CC	.379	.212	.328	1.788	.080	-.047	.805	.660	.250	.183	.312	3.205
	FIH	.446	.193	.392	2.311	.025	.058	.834	.671	.316	.237	.366	2.730

a. Dependent Variable: OSLCL

Coefficient Correlations[a]

Model			FIH	SD	CC
1	Correlations	FIH	1.000	-.168	-.639
		SD	-.168	1.000	-.415
		CC	-.639	-.415	1.000
	Covariances	FIH	.037	-.006	-.026
		SD	-.006	.038	-.017
		CC	-.026	-.017	.045

a. Dependent Variable: OSLCL

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	SD	CC	FIH
1	1	3.935	1.000	.00	.00	.00	.00
	2	.036	10.395	.63	.01	.10	.11
	3	.017	15.338	.27	.73	.01	.36
	4	.012	18.493	.10	.26	.89	.52

a. Dependent Variable: OSLCL

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.9021	4.6356	3.2500	.65177	52
Std. Predicted Value	-2.068	2.126	.000	1.000	52
Standard Error of Predicted Value	.098	.332	.181	.051	52
Adjusted Predicted Value	1.8891	4.7142	3.2437	.65669	52
Residual	-1.70564	1.36651	.00000	.65806	52
Std. Residual	-2.515	2.015	.000	.970	52
Stud. Residual	-2.675	2.192	.004	1.017	52
Deleted Residual	-1.93034	1.61824	.00626	.72455	52
Stud. Deleted Residual	-2.870	2.287	.001	1.040	52
Mahal. Distance	.082	11.240	2.942	2.240	52
Cook's Distance	.000	.236	.026	.048	52
Centered Leverage Value	.002	.220	.058	.044	52

a. Dependent Variable: OSLCL

b. FOR CONSULTANT:

OSLCU = Overall Satisfaction Level for Consultant Performance

CE = Competency and Experience

AQD = Availability and Quality of drawings

CSS = Cooperation of site staff

VB = Verification of the bills

IDA = Issues and disputes avoidance

a. Predictors: (Constant), IDA, VB, CSS, AQD, CE
b. Dependent Variable: OSLCU

Descriptive Statistics

	Mean	Std. Deviation	N
OSLCU	3.3269	.94394	52
CE	3.2585	.79569	52
AQD	2.8846	.84230	52
CSS	3.3352	.79609	52
VB	3.2051	.85087	52
IDA	3.2949	.80210	52

Correlations

		OSLCU	CE	AQD	CSS	VB	IDA
Pearson Correlation	OSLCU	1.000	.718	.591	.817	.647	.794
	CE	.718	1.000	.700	.815	.579	.713
	AQD	.591	.700	1.000	.638	.645	.668
	CSS	.817	.815	.638	1.000	.649	.829
	VB	.647	.579	.645	.649	1.000	.759
	IDA	.794	.713	.668	.829	.759	1.000
Sig. (1-tailed)	OSLCU	.	.000	.000	.000	.000	.000
	CE	.000	.	.000	.000	.000	.000
	AQD	.000	.000	.	.000	.000	.000
	CSS	.000	.000	.000	.	.000	.000
	VB	.000	.000	.000	.000	.	.000
	IDA	.000	.000	.000	.000	.000	.
N	OSLCU	52	52	52	52	52	52
	CE	52	52	52	52	52	52
	AQD	52	52	52	52	52	52
	CSS	52	52	52	52	52	52
	VB	52	52	52	52	52	52
	IDA	52	52	52	52	52	52

Variables Entered/Removed[b] : All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.847[a]	.718	.687	.52807	.718	23.391	5	46	.000	2.006

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.615	5	6.523	23.391	.000[a]
	Residual	12.828	46	.279		
	Total	45.442	51			

a. Predictors: (Constant), IDA, VB, CSS, AQD, CE

b. Dependent Variable: OSLCU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.232	.344		-.674	.504	-.925	.461					
	CE	.144	.175	.122	.822	.415	-.209	.497	.718	.120	.064	.281	3.565
	AQD	-.028	.136	-.025	-.204	.839	-.302	.246	.591	-.030	-.016	.416	2.406
	CSS	.500	.203	.422	2.469	.017	.092	.908	.817	.342	.193	.210	4.757
	VB	.092	.139	.083	.663	.510	-.188	.373	.647	.097	.052	.389	2.571
	IDA	.366	.195	.311	1.873	.067	-.027	.758	.794	.266	.147	.223	4.480

a. Dependent Variable: OSLCU

Coefficient Correlations[a]

Model			IDA	AQD	CE	VB	CSS
1	Correlations	IDA	1.000	-.135	-.010	-.450	-.522
		AQD	-.135	1.000	-.389	-.278	.061
		CE	-.010	-.389	1.000	.053	-.546
		VB	-.450	-.278	.053	1.000	-.026
		CSS	-.522	.061	-.546	-.026	1.000
	Covariances	IDA	.038	-.004	.000	-.012	-.021
		AQD	-.004	.019	-.009	-.005	.002
		CE	.000	-.009	.031	.001	-.019
		VB	-.012	-.005	.001	.019	-.001
		CSS	-.021	.002	-.019	-.001	.041

a. Dependent Variable: OSLCU

Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions					
				(Constant)	CE	AQD	CSS	VB	IDA
1	1	5.886	1.000	.00	.00	.00	.00	.00	.00
	2	.041	11.966	.79	.00	.19	.00	.02	.00
	3	.028	14.407	.01	.11	.16	.00	.51	.03
	4	.026	14.921	.19	.06	.48	.11	.03	.04
	5	.012	22.422	.01	.49	.12	.03	.40	.39
	6	.007	29.313	.00	.33	.05	.86	.04	.54

a. Dependent Variable: OSLCU

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1.2889	4.8073	3.3269	.79969	52
Std. Predicted Value	-2.549	1.851	.000	1.000	52
Standard Error of Predicted Value	.097	.295	.172	.052	52
Adjusted Predicted Value	1.3913	4.9450	3.3390	.79124	52
Residual	-1.13700	1.15057	.00000	.50152	52
Std. Residual	-2.153	2.179	.000	.950	52
Stud. Residual	-2.572	2.350	-.010	1.024	52
Deleted Residual	-1.62308	1.33889	-.01203	.58551	52
Stud. Deleted Residual	-2.750	2.478	-.014	1.047	52
Mahal. Distance	.740	14.908	4.904	3.632	52
Cook's Distance	.000	.472	.030	.071	52
Centered Leverage Value	.015	.292	.096	.071	52

a. Dependent Variable: OSLCU