

**THE IMPACT OF CLIENT INVOLVEMENT ON  
PUBLIC BUILDING PROJECT PERFORMANCE  
IN SRI LANKAN CONSTRUCTION INDUSTRY**

**MASTER OF SCIENCE  
IN  
CONSTRUCTION PROJECT MANAGEMENT**

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“This dissertation was submitted to the Department of Civil Engineering of the University of Moratuwa in partial fulfilment of the requirements for the Master of Science in Construction Project Management”

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September 2021

## DECLARATION

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## **ABSTRACT**

The clients are most important contributor and main participant for the successful construction project completion which depending on client's behaviors and play major role that cannot be avoided. Client involvement is linked to the achievement of a project on performance. Therefore, the level of client involvement should be increased to minimize the negative impact of project performance. Therefore, this study was aimed to investigate the impact level of client involvement on the Public Building project performances during the construction process in Sri Lanka.

This research has been conducted through literature reviews and questionnaire survey (quantitative method). The results from the survey were analyzed using descriptive analysis. Following this, inferential statistical analysis of testing was conducted on the data results of the survey.

The Findings revealed that over all the current client had neutral or low involvement in 27 out of 40 tasks. Pearson's correlation coefficient was used assess whether there is significant relationship between client involvement stages and performance and; all involvement of five construction stages is positively linked to performance of Time, Cost and Quality. Linear regression analysis used to calculate the impact level of client involvement on project performance. The level of client involvement in the planning stage, design stage and construction stage were found to be the most significant and had a high level of impact on the project outcomes.

The study recommended the clients need to have progressed information to review the documents, should give consideration to tasks prior to construction of the project and conduct regular site visits during construction. And assign a special O&M representative to advise the project team on how to complete the product in a manner that best achieves the project's O&M needs.

### **Keywords**

Sri Lanka, Clients, Construction Project Stages, Performance

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## **Abbreviation**

CI- Client Involvement

## CHAPTER ONE

### 1. INTRODUCTION

#### 1.1 Background

The construction industry alive due to client (Boyd 2006; Masaterman, 2002); and, the most important construction industry contributor is client, because clients are initiator of the construction process (Lopes 2011). Further, Gwaya (2014) and Cox (2006) agreed that clients are the originators of projects. Kamara (2002) research reveals that clients are center of the construction process as well as the motivator of the construction industry. In addition to that, clients have the ability to overcome the stress of the construction industry (Manley, 2010). This ability allows them to control and improve the point of view, performances and method of other parties which must be declared to reach sustainability of the built environment (Ryd, 2004).

Generally, the businesses are not conducting in rigid way by clients but are varied, have great approaches and options in project implementation and construction (Boyd, 2006). The participation of individuals may change throughout the project due to project complexity is increased and different roles and responsibilities of clients (Blyth, 2010). Further, client's influence or responsibility on a project are varied throughout the project life cycle (Alharthi, 2014), and having a highest influence in the early stages of the project (Sivunen, 2014).

Client Satisfaction plays a vital role in any business (Pries 2004) to fulfill their interests and perspectives (Alvesson, 2009). The general project delivery expectations are desired quality, within the budget; and completed on time of the client (Forgues, 2006) as 3 predominant performance factors. However, the global construction industry is concerning the increasing dissatisfaction of client (CIDB, 2011). Further, it is important to identify and understand the client's value to fulfill their expectation to decrease their dissatisfactions among projects participants (Thyssen, 2010). Therefore, the success or failure of the construction projects is depending on client's behaviors which play major role that cannot be avoided (Ryd, 2014; Boyd 2006). Moreover, Client interference has been seen as a obstruct of project achievement (Odeh, 2002).

Ahmed and Kangari (1995) study stressed that, Client will be more satisfied when they are appropriately involved in projects with their desires are typically met or exceeded. Therefore, client involvement (CI) and client control are linked to the accomplishment of a project as far as of time performance in construction projects (Chigangacha, 2016)

According to Boyd (2006) and Thyssen (2010), client has been identified by which sector they worked in term of Private or Public Sector in two-way classification. Further, the clients' understanding and experience of the construction process is varied with their classification (Boyd, 2006) and project performance is critically influenced on it (Cox 2006).

The standard of public sector has been diversified due to using different method within government organization (Aljarosha, 2010; Althynian, 2010). Further, Althynian (2010) study revealed that there are many problems initiated such as cost and time overruns, disagreements, misconception, unpredictability in plans and specifications, and increasing maintenance cost due to weak client involvement (CI) in public projects. Furthermore, Al-Khalil (1999) and Ashworth, (2006) discovered that when delay in their decision in construction task, mostly in the beginning stages will bring about a disagreement between parties in later stages. Love (1998) emphasized that these factors must be taken account to consider to finish the project on time, within the budget and accomplish the desired quality.

For instance, Palaneeswaran (2006) listed several reasons for client associated rework, including lack of practice and understanding of the design and construction method in projects. Further, Ndiokubwayo (2008) indicated that clients were regularly associated the rework instructions because their mind has been changed regularly, project requirements was not clearly defined, or in the event of financial problems. Moreover, notably design related rework can be reduced when good correspondence and association between client and their design teams, and involvement of client in design work (Love 2004). Jayalath (2011) and Kesavan (2015) study revealed that client in project stages such as input in planning and design, and delay in decisions and delay to give approval, modify the design, interruption of works is identified as causes of client related delay in Sri Lanka. Further, Al-Solaiman (2006) study concluded that low client involvement (CI) has negative impact on projects outcomes such time

completion of construction projects and quality problems in construction public project in Saudi Arabia.

## **1.2 Research Problem**

The client is main participant for the successful project completion (Chua 1999; Ryd, 2004; Xu 2010). Further, the activities of client in projects are crucial for project procedure and project completion (Briscoe 2004; Xu 2010). The proper decision at the proper time is depend on the level of client involvement (CI) though out the project process. Further, Althynian (2010) proposed that client's low involvement in public projects is root of many problems in performance in Saudi Arabia. Moreover, Al-Kharashi, (2009) study of public sector projects concluded that the client (the government) usually does not understand the technical issues and simply transfers their tasks to the consultant, which leads to the client unaware the construction process and what happened during the construction process. Therefore, there is a necessity of construction procedure to be based on client by fully target on client requirement (Latham, 1994). The client should take effort to perform their duties such as appropriate involvement on projects for success of project (Kometa 1995; and, Kamara 2002). Therefore, henceforth clients cannot be seen as inactive performer in construction project processes in Sri Lanka.

There should be constructive client involvement (CI) in their projects to accomplish a successful project and, many researchers studied about factors contributing to affect the construction projects performance. However, clear understanding is not defined as well as not proven existing study about impact of client involvement (CI) on public project performance in Sri Lankan context. Therefore, there is a necessity to conduct the survey on client involvement (CI) and project performance to overcome the impact on project performance in construction process.

### **Aim**

This survey focuses investigate the impact of client involvement (CI) on the Public Building project performances during the construction process.

### **Objective**

1. To identify the roles and responsibilities of clients in construction projects

2. To investigate the current practice of client involvement (CI) in Sri Lankan projects.
3. To explore the impact of current client involvement (CI) practices on project performance in terms of time, cost and quality.

### **1.3 Hypothesis**

The subsequent hypotheses were formulated to analyse relationship of client involvement (CI) and project performance.

H1: There is a relationship between client involvement (CI) and project performance of Time.

H2: There is a relationship between client involvement (CI) and project performance of Cost.

H3: There is a relationship between client involvement (CI) and project performance of Quality.

### **1.4 Limitations**

The effort of this study was on client involvement (CI) in building projects in Sri Lanka. Subsequently, it is imperative to perceive the accompanying constraint:

1. The investigation was limited to the function of government organization that incorporate project management team with various duty engineers in various fields who represent to the public authority (client) in public building project.

### **1.5 Research Methodology**

To accomplish the key objective of this study, the method consists sub-divisional techniques are as follows:

#### ***Literature review***

A Literature review was conducted to get the more data to recognize a concise of construction industry in Sri Lanka, concentrate on the idea of the client, and the clients' jobs and duties and the impact of the client involvement (CI) in term of Time, Cost

and Quality. The literature was incorporated examples from numerous journals, periodical articles, and textbooks.

### ***Preliminary survey***

The sources of collecting and validate the information during the study was carried out through the Preliminary survey with the relevant practitioners and was used to develop the questionnaire.

### ***Questionnaire survey***

A questionnaire survey was done by the construction industry practitioners who are involved in the Public Building projects by ranking the level of involvement and Statement of Performance factors which are validated from a Preliminary survey. Statistical analysis was used to find out those current levels of involvement and impacts on performance with given ranks

## **1.6 Chapter Arrangement**

### **Chapter one: Introduction**

Incorporates basis of the study question statement, aim, objective, constraint and philosophies proposed to accomplish the destinations of the study.

### **Chapter two: Literature review**

Primarily emphasis on basic review on perception of client, and the clients' jobs and responsibilities as well as performance of projects. This section is a hypothetical foundation for research

### **Chapter three: Research technique**

Examine research philosophy of the research and clarifies about the importance of the research, research plan and approach, information assortment and report surveys.

### **Chapter four: Data Analysis and discussion**

Findings and examination of gathered information was be comprised for this part

### **Chapter five: Conclusions and suggestions**

Expounds the conclusion and suggestion, it finishes up with research findings, proposal and heading for the future investigation

## CHAPTER TWO

### 2. LITERATURE SURVEY

#### 2.1 Introduction

The previous chapter provides a brief introduction of the study. Detailed evaluation of the research literature was provided in this chapter. It is categorized to identify research aims and problems by three sections. In the initial chapter, Sri Lanka's construction industry concise outline is introduced. Subsequent chapters center around the perception of the client, and the clients' jobs and responsibilities. The third chapter centers around recognizing significant construction project stages and performance factors of the construction Projects and Importance of client involvement (CI) links to achieve goals in terms of project performance.

#### 2.2 Construction Projects

Construction industry is one of the important areas to the economy in numerous nations. The construction industry consistently been viewed as capricious regarding plans as well as costs, quality norm of the construction projects and time consuming (Hernandez, 2005), precariousness of site condition, less profitability of outputs, insufficient quality usage and absence of communication and legitimate acquisition framework. Each project has distinctive site conditions, staff qualities, cost and time, project plan, material types, climate conditions (Deffenbaugh, 1993; Metri, 2005). Further, the construction industry has one of unique features identified with the nature of ambiguity, for example natural ambiguity, task ambiguity, organizational ambiguity, and contract ambiguity. These ambiguities have brought disappointment from the public and private organizations to clients (Hernandez, 2005; Walker, 2002).

#### **Status of Construction Sector in Sri Lanka**

The construction industry has remained as a huge beneficiary in Sri Lanka's financial improvement over the time of the latest six years. Since the time the common war reached a conclusion in 2009, Sri Lanka has rushing in to putting resources in to building and development exercises that incorporate business spaces, sumptuous private lodging, to give some examples. As indicated by the NDBS, a business in Colombo, the construction sector in Sri Lanka has extended by over 20% and the

business has developed twice as quick as the nation's GDP. More information uncovers that the development business has represented almost 10% of Sri Lanaks' GDP just in 214 and this speaks to bigger extent of the economy when contrasted with numerous different nations in Asia.



**Figure 2-1 Sri Lanka GDP from construction**

Nonetheless, there are still a few issues to be illuminated. With the public project construction sector pushing ahead, numerous potential difficulties may emerge, one of which incorporates arranging the island's organization of covering guidelines. The temporary worker likewise suggested that it must get endorsement from the the Federal level Urban Development Authority, The Ministry of Housing and Construction, and numerous other nearby elements.

The main challenge is the land and acquisition issues, and the high deals and lease levels show that the market is as yet beneficial for some constructors, this isn't generally, in light of the fact that other market fragments may grow quickly in the following not many years. Besides, Due to confronting a deficiency of aptitudes and all-around prepared work and different issues, development costs are extremely high attributable to the expense of materials, laborers and guidelines.

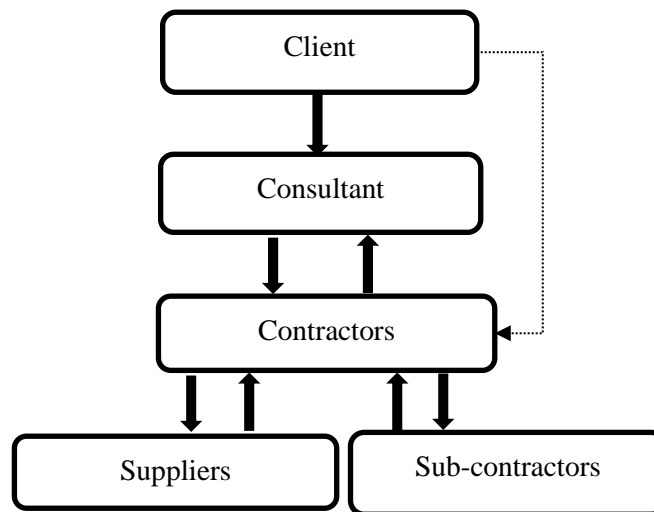
Notwithstanding to local entities, many major foreign companies have likewise gone to this field and this incorporates Chinese state possessed China communications construction company, China Merchant Holdings International, a Hong Kong based

aggregate and Indian state-claimed organization, National Thermal Power Corporation. Numerous foreign companies working in Sri Lanka have set up joint ventures with local or domestic entities or contractors

Indeed, since 2009, the state has invested heavily in infrastructure development, but there is still a great deal of work to be done, particularly in road improvement. Furthermore, with the expansion in per capita pay and population development, Sri Lanka now needs moderate lodging. Subsequently, there is an immense interest for different new offices, including houses, office spaces and inns, which shows that the development business will keep on developing, giving more possibilities to contractual workers and Sri Lanka's economy

### **2.3 Stakeholders and Stages in construction**

Construction project management practices vary depending on the nationality of industry professionals. But the main players are clients, consultants and contractors. In the connection between the major parts in construction projects, consultant has usually been measured as the significant part in the construction projects and this methodology has served to detach the contractors from the clients (Kometa, 1996). Truth be told, there must be irrefutable connection between client and consultant who will work in the client's wellbeing unquestionable connection between the client and the consultant who will operate in the clients' requirements. The disengagement between the contractor and client decreases clients' effect on the projects and creates the clients reliant on the consultant (Assaf, 2006). Besides, there is an observation among the clients in tasks that the specialists (consultant) are right regardless of whether the offered goal is different in relation to the client's inclination (Alnuaimi, 2009). Further, direct connection between the client and consultant, and the indirect connection between the client and contractor in projects is delineates Figure 2-2 (Bubshait A. , 1994).



**Figure 2-2 Conventional connection between the clients and others**

Construction projects in Sri Lanka experience major delays. A few investigations have been completed on reasons of this delays in Sri Lankan construction project. Jayalath (2011) and Kesavan (2015) found that the one of most significant reasons for delay were identified with client in project processes delay in reply of settling on choices and conceding endorsements for materials in planning and design.

Besides, Ryd (2004) identified that the reasons for disappointment in construction projects in Saudi Arabia were identified with clients' absence of involvement and powerless inclusion in undertaking exercises. Additionally, Al-hajji (2006) study reveals that delays in projects began generally in clients connected activities. Subsequently, the low degree of client involvement (CI) during project activities was major reason of the issues experienced in construction projects apparently. Additionally, Ashworth, (2006) discovered that when delay in their decision in construction task, mostly in the beginning phases will bring about a contention between parties in later phases. Love (1998) emphasized that these factors must be taken account to consider to finish the project on time, gain the forecast amount and accomplish the ideal quality.

The accomplishment of a projects begins with right planning and design involvement in the beginning stage of projects and client has a huge impact in this stage (Shen, 2004). According to Al-Sedairy (1994) disagreement in public sector construction

stakeholders and identify the disagreement in public sector construction happened often in the vital connections between the contractor and consultant, and the client and contractor in projects. Discovered that, the disagreement was the most serious in the later stages of the project. Moreover, inexperienced, the economy and construction industry are developing rapidly, and there is basically no an ideal opportunity to set up standards for clients(Assaf, 2006). Hence, issues brought about by unfinished or mistaken engineering particulars are typically serious and expensive, and are usually discovered after the project is completed or used. Such issues incorporate cost and time overruns, disputes between clients and contractors, errors, mistakes, uncertainties in plans and specifications, diminished lifespan expectancy, and expanded maintenance cost (Al-Kharashi, 2009).

As stated previously, notwithstanding, there is none of study has investigated on constructive client involvement (CI) in public projects stages in Sri Lanka. The construction sequence is a progression of interrelated and composed exercises that happen at various phases of the construction project (Sunjka, 2013). Chigangacha (2016) studied about effectiveness in client involvement (CI) in three stages in construction project namely Pre construction, construction and post construction in public and private sectors, Pre construction stage to be a priority stage for the client involvement, and post by contractor's perspective.

Further, According to Bubshaite and Al-musaid (1992), study revealed that the nature of client involvement (CI) in three stages such planning, design and construction stages in public projects. The investigation showed that the construction stage contained the most involvement by the client. Concerning the significant stages, the study identified that the main stage was construction, succeeded by planning, and then design. The research determined that categorizing significant responsibilities during the construction project stage assists with gaining the best client involvement (CI) and increase the value of quality at lower costs.

Furthermore, according to Al-Solaiman,(2006) study demonstrated that the client involvement (CI) in construction projects in five stages specifically planning stage, design stage, construction stage, handover stage and operation and maintenance stage, among the five task periods of the project cycle, the design stage was positioned as the need stage for client involvement (CI) throughout the project.

Similarly, the point of the current research is to investigate the enhance the client involvement (CI) in the project methods in construction. This is finished by perceiving the performance of client involvement (CI) with all the five stages which are planning stage, design stage, construction stage, handover stage and O&M stage and finding the most critical effect of client involvement (CI) in projects.

## **2.4 Clients in Construction Projects**

The client is main participant for the successful project completion (Chua 1999; Ryd, 2004; Xu 2010). Further, the activities of client in projects are crucial for project procedure and project completion (Briscoe 2004; Xu 2010). This chapter of the literature assessment centers around the comprehension of the client perception and their jobs and duties in construction project processes.

### **Definition, Types and Duties of the Client**

Building up an obviously characterized hypothesis or observational grouping is an essential advance in any type of deliberate investigation (McCarthy, 1995). In order to understand the identity of the clients, their requirements and their involvement in the project cycle, there is necessity to suitably classified the construction cycle to make the client clearer.

#### **CLIENT DEFINITION**

Various techniques are utilized to characterize client individuality in construction projects. Hence, the presently lack of comprehending with the construction client is starts from the absence of lucidity with respect to the meaning of the expression “client” (Boyd, 2006). The International Council for Research and Innovation in Building and Construction (2005) in Helsinki recommended the accompanying significance of the client:

"A client is an individual or association who, at a specific point as expected, has the ability to start and commission plan and development action with the expectation of improving the performance of an association's social or business destinations"

#### **CLIENT TYPES**

Obviously, there are different construction clients in the construction field. However, Regardless, it is hard to recognize the client. For example, Green (1996) battled that construction professionals need to develop a pleasant connection with their clients to have the choice to fathom their necessities, tendencies and requirements.

Therefore, recognizing construction client's types are a fundamental stage in accomplishing such understanding. Taking into account the client's specific work establishment, it can similarly help by illustrative the positions and obligations of express sorts of clients. Considerate the client's category and interests is vital to enable construction professionals to take suitable action on each and measure the client's objectives. Brandon (2008) recognized six standards to describe the clients in Table 2.1

**Table 2-1 -Client type summary (Brandon 2008)**

<b>Client type</b>	<b>Terms used to refer to the type</b>
paying clients and users	Apparent client and users
	Paying clients and end users
	Identifiable client and virtual client
level of experience of the clients with construction (and level of experience with specific building type)	Sophisticated, partially informed and native
	On-going portfolios and one-off projects
	Unitary and pluralistic
nature of the client organization (sector)	Public (national and local)
	Private (industry and service)
	Mixed (mix of public and private enterprise; not for profit and private regulated)
type of client business	Property developers(primary) and those who build to perform some business activity (secondary)

Product type	Building form type, building use types, ownership types
Rate of change in environment	Static versus dynamic environment
size of the client organization	Small, medium or large companies

Indeed, the extremely spending sector is in the public sector projects in developed countries compared with the others (Boyd, 2006). Among the standards set out in Table 2.1, the current investigations centers around the idea of the client's association (sector) to group the client. A part of the public authority organization examined in this study are a blend of public and private undertakings. Besides, research centers around the government organizations that incorporate engineering management crews with various of project engineers in various fields who denote the government(client) in the public construction projects.

## **2.5 Client Involvement and Responsibility in Construction Projects**

An effectively constructed starts with the client. Clients who are firmly identified with overseeing projects are generally happy with the nature of the project (Bubshait A. A.-M., 1992). Nevertheless, the client should take charge of duties during of involvement in the construction, Clients ought to decide and receive successful practices to assist them with including in the elite of the construction process (Al-jarosha, 2010; Xu, 2010).

As construction projects become bigger and more complex, client actions are getting increasingly more essential to the achievement of the project. Alharthi (2014) separated client functions into essential jobs and auxiliary jobs. They accepted that all client's ought to ployout the essential functions at some stage inside the project cycle and they acknowledged nine of these roles. Then again, Jawahar-Nesan (1997) discovered 12 significant client headings/parts for improving the project outcomes. Formulation of these roles in following Table 2-2

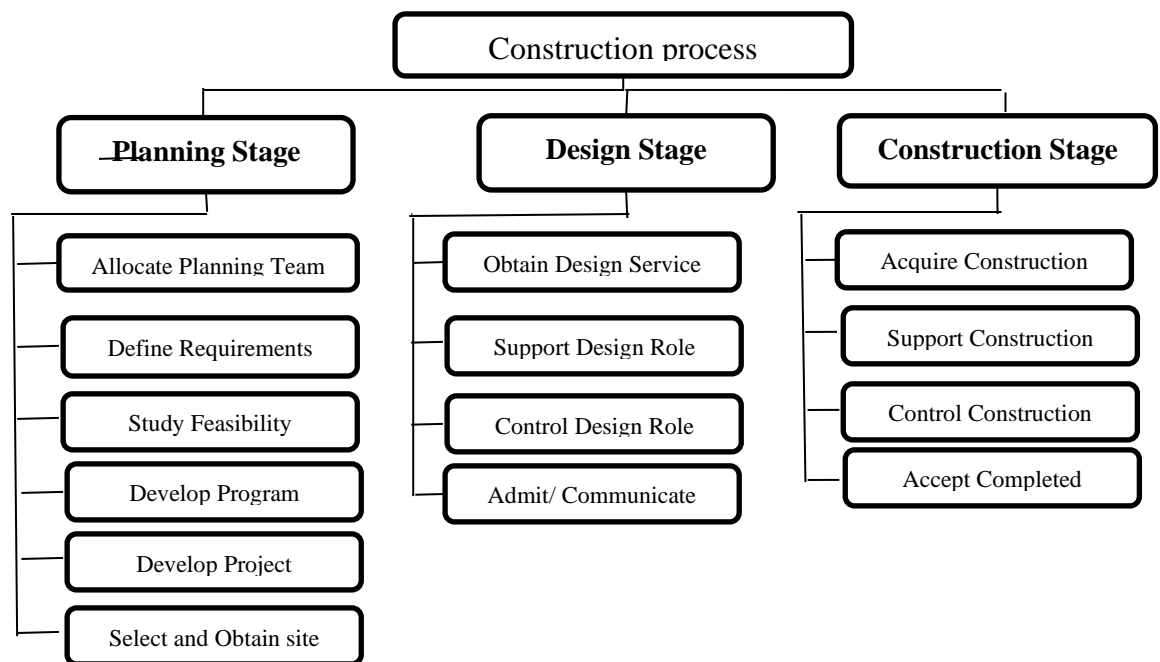
**Table 2-2-significant roles and directions to improve the client performance**

<b>Performance Improvement</b>	
(Jawahar-Nesan & Price, 1997)	Alharthi (2014)
Preparing and organizing	Procurement strategy Development
Developing project definition	Initiation of Procurement
Procurement	Preparation of the project brief
Organizing a joint management team	Procurement method selection
Design management	Business case Development
Safety management	Risk management
Measuring and reviewing performance	Tendering and award
Communications	Performance management
Motivation	Change control
Coordination	
Documentation	
Project Evaluation	

The activities and conclusions of the client at all steps of the project will have a positive or negative impact on the project. Asolaiman (2014) agree with the view point that the activities of clients affect an agreement as they sway on project consequence. It is vital that clients play out their jobs viably and effectively at the opportune time, simultaneously using the right strategies to have their ideal involvement over all the construction project stages (Alsolaiman, 2014). In order to get positive project results, CI should raise as the multifaceted nature of the task raises

Client's dynamic capacity will influence the construction process (Chan, 2004), and the degree of legitimate dynamic decides the project outcome (Aiyetan, 2010). Similarly, clients who are uncertain or require a third party to give significant decisions may obstruct the timely delivery of the project. The role of the client and its level of involvement vary according to the project phase (Alharthi, 2014).

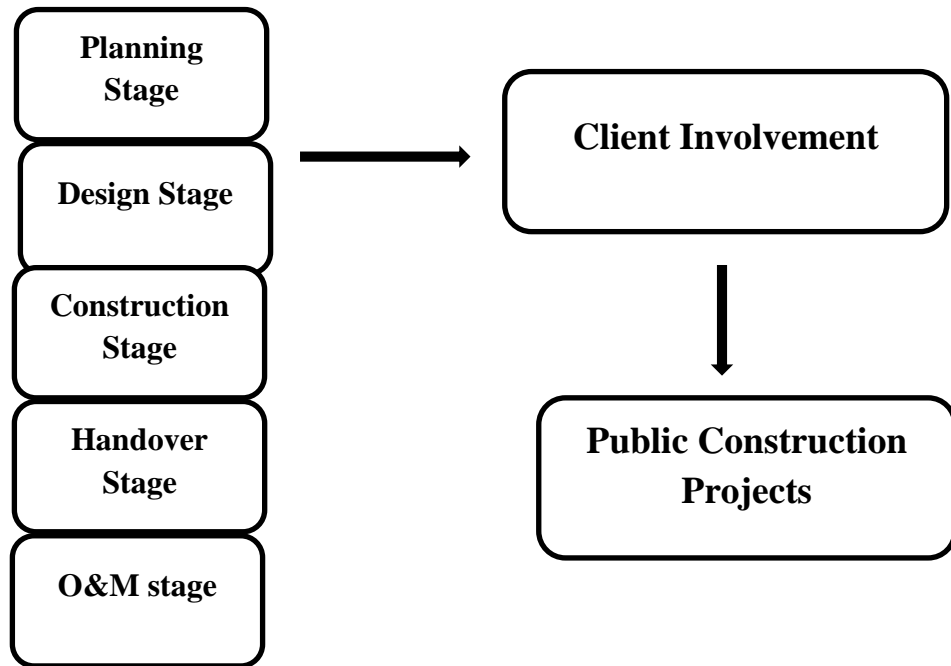
The degree of involvement depends on the extent to which the project crew satisfies its obligations at each stage of the whole construction process (Bubshait, 1994; Chan, 2004; Parker, 2005). The overall project stages, from the most beginning stage of the task thought through its startup, was delineated in the Quality in the Constructed Project Manual appropriated by ASCE (2012). The manual gives rules and proposals which lead to quality in construction project. Each stage of the project cycle is of identical important. Each factor impacts the achievement of resulting stages. Figure 2.3 summarizes these activities in three stages of the projects as recognized.



**Figure 2-3- Construction process(ASCE, 2012)**

There are another two stages that are no less significant than the past stages, in particular, the handover stage and operation and maintenance stage. The handover of a project to the client toward the finish of the construction stage is a significant stage of the project is basic to the accomplishment of the facility's operation (Hassan, 2010). An efficient, productive and successful exchange of data from the contractor to the client is crucial. The handover of the project from to client will affect wellbeing and security, working norms, support and client working cost proficiency. On the off chance that it isn't overseen in an organized way, the exchanging and tweaking of activities will significantly affect the core business of the client

Clients need to play out their obligations in the correct manner at the ideal chance to get the best involvement in the construction project stages, namely, Planning Stage, Design Stage, Construction Stage, Handover Stage, and operation and maintenance stage. The scope of this research, as shown in Figure 2.4 is the CI in public construction projects at each stage of the project process.



**Figure 2-4 Scope of the research**

## **2.6 Client Involvement**

The effective and proper involvement of clients in projects can affect great results, and making the correct decisions at the appropriate project stages has been affected by level of involvement (Alsolaiman, 2014). Al-Kharashi (2009) recommended a connection between inadequate involvement of project stakeholders and helpless project results. Powerful CI in their projects requires adaptable direction all through the project life cycle (Alsolaiman, 2014). In addition, in order to expand the effectiveness of CI in projects, the crew's commitment to the construction process should be accentuated, for example, trade of thoughts.

Since clients affect the project outcomes, they should target on their involvement in the project which will help to improve the overall project quality (ASCE, 2012).

Alsolaiman (2014) showed that client ought to have sufficient information and abilities of the construction process with the end goal for clients to be viably and effectively associated with their activities. Since construction projects are confronted with various complex circumstances influencing project accomplishment (Sweis, 2007), effective CI has been perceived as one of the answers for improving construction sector performance (Boyd, 2006).

Baccarini (1999) characterizes effective as the level of accomplishment of project goals. Takim (2008) summarized that effectiveness includes procedures to accomplish project objectives, client fulfillment and project use. Taking the correct decision is depending on the level of CI during the construction project processes. Effectiveness of CI alludes to estimating the achievement of a project as a because of client involvement.

The client divides the project stages and the stages are divided in to items. With the method picked, the client conveys the project as per what was standard. Hence, great contribution creates great results so the decisions are taken basically dependent on sufficient data, rich information, and proper aptitudes to utilize information and data. In an intricate environment, questionable outside data as contribution during the projects may trigger deficient and unsuccessful outcomes (Sauter, 2005). Generally, the whole CI method depends on the heaviness of the client's experience (Nutt, 2006). Subsequently, making correct and timely determination is not certifiably not a simple task to achieve for many construction projects. Making the correct determination is typically not a straightforward issue, as most determination problems in construction projects are exceptionally perplexing in nature. This complication is due to a numerous variable, either in the construction process or in management, which influence the project accomplishment and cause project failure. Consequently, understanding these variables may help break down the likely reasons for of project accomplishment or failure (Low, 2006).

## **2.7 Performance of the Construction Projects**

Construction industry is unique in nature, and includes numerous participants; performance measurement would practice various appraisals when deciding on various exercises of various participants (Yang, 2010). Expanding rivalry and significant

changes power construction professionals ceaselessly improve the performance of the construction industry (Ali, 2013).

Several objectives have been established in the performance standards to be achieved between the main stakeholders of the contract including the contractor, the client and the consultant in the early stages of the construction project. However, every stakeholder has their individual ideas in several performance criteria. These stakeholders are execution in various manners identifying with their own perspectives (Lai, 2010). Chan (2004) express that each stakeholder has explicit goals related their field and rules for assessing accomplishment. Wang (2006) demonstrate that standards of project success pointedly interconnected to the performance of clients and contractors. Therefore, to have better performance there should be positive requirement for the client of contractors in the construction industry.

Performance measurement is noted as core of continuous development (Luu, 2008). Yu, and Chin (2007) and LaBarre & El-adaway (2014) Introduction of Performance evaluation is a tool used to evaluate performance management, human resource management and formulate company strategy. According to Neely, Mills, Gregory, & Platts (1995), performance measurement is a definite requirement for the client “the process of quantifying effectiveness and efficiency of actions”.

Numerous studies have demonstrated that many projects are not to complete on time and budget, or not to satisfy client and company expectations. Nevertheless, different elements can likewise make the project to fail, such as deficiencies in project tasks and plans, insufficient project knowledge, communication interruption, insufficient resources, political issues, control issues, support from senior management, absence of specialized skill, and so forth. (Sauser 2009; Humaidi 2011). Therefore, the foundation of KPIs assumes a significant part in project delivery.

An enormous number of performance indicators that that might be identified with each measurement (group) can be utilized to quantify and assess project performance, such as time, cost, quality, client fulfilment, professional performance, health & safety (Cheung, 2004). According to Abushaban (2009) Performance factors are identified as performance group such Cost, Time, Quality, Efficiency, Client fulfillment, community fulfillment, Health & safety, Innovation and education, Environment,

People. However, Time, cost and quality are, however, the 3 predominant performance evaluation dimensions also called as the “iron triangle”. In any case, on the opposite Garbharran (2013) states that a supposition that is made if a project is finished on time within the approved budget and as indicated by the set quality, the project is taken as a success. Proof proposes that this is a long way from reality. Consequently, the construction industry needs to focus on basic success factors, other than the golden/iron triangle Toor (2010). Ogunsanmi (2013) indicated that KPIs can likewise be alluded to as Key success indicators, measuring a project’s success is more than ensuring it's finished. Conventionally, success is characterized as how much task objectives and desires are met (Elattar, 2009; Garbharran 2013). It should be seen from alternate points of view of people and the objectives identified with an assortment of components, including technical, financial, education, social, and professional issues. perplexing assignment since progress is theoretical and can barely be settled upon. Such a marvel likewise exists in the construction industry where various parties are involved, including the client, the architect, the contractor, and various surveyors and engineers. Each project participant will have their perspective on progress.

Garbharran (2013) recognized 13 critical success factors for building projects in Malaysia from the contractors’ viewpoint. These models included: cost, time, quality: safety, achieving scope, technical specifications, client fulfillment, functional necessities, competitive advantage, reputation, market share, income and profits, and benefit to stakeholder. Therefore, this research will explore the most important construction projects’ key performance indicators.

In project delivery, the construction sector has endured a time of poor design and construction performance (Flores 2005; Post, 1998). The client highly affects the construction project, which much of the time may decide the project’s success or failure. Subsequently, the client's goal is to get an excellent high-quality facility through good planning, good design and good construction.

However, the client has three regular desires for the project a) high quality, (b) low cost; and (c) finished on time (Forgues, 2006) as 3 predominant performance factors.

### **Time Performance**

In project management, time is the immaterial asset since it is totally restricted, and the time accessibility of the project is characterized as the time needed to finish the allocated work. Project time overrun demonstrates that the project finish time is longer than the arranged construction period

### **Clients' responses to Time Performance**

Modification in the scope of the project

Delay payment by client

Financial difficulties

Slow decisions

Client interference

Impractical contract duration and requirements imposed

### **Cost Performance**

Cost is the essential idea in the entire endeavor project management life cycle. It might be seen as one of the primary limits of the endeavor and besides the central purpose for the accomplishment of the project" (Azhar, 2008). Gido (2003) mentioned cost performance It is a suitable strategy in project management and commonly recognized in the composition and industry.

By looking mathematical perspective, Lin recommends that each activity has a duration and contrasting cost characteristics. Lin further stressed that activity costs increase with the shortening of the construction period, and in case we diminish the activity costs, the construction period will increase.

Cost overruns are a very common phenomenon, and many projects in the construction industry handled this issue. When the final cost or expenditure of the project exceeds the original estimated cost, a cost overrun occurs, Avots (1983). Angelo (2002)highlighted that cost overrun is the key issues in construction industry.

### **Clients' responses to Cost Performance**

Delay payments

Delay in authorize access of site  
variation orders  
Delay in approving design documents  
Impracticable contract duration  
Work suspension  
Slow decision  
Poor financial control mechanism

### **Quality Performance**

The success of project management focuses on the successful completion of the project process and cost and time targets, while product accomplishment includes the quality of the final product of the project and the quality goal of the project. Iyer, brought up that the successful commercialization of great items needs due thoughtfulness regarding the whole flexibly chain (including suppliers and distributors).

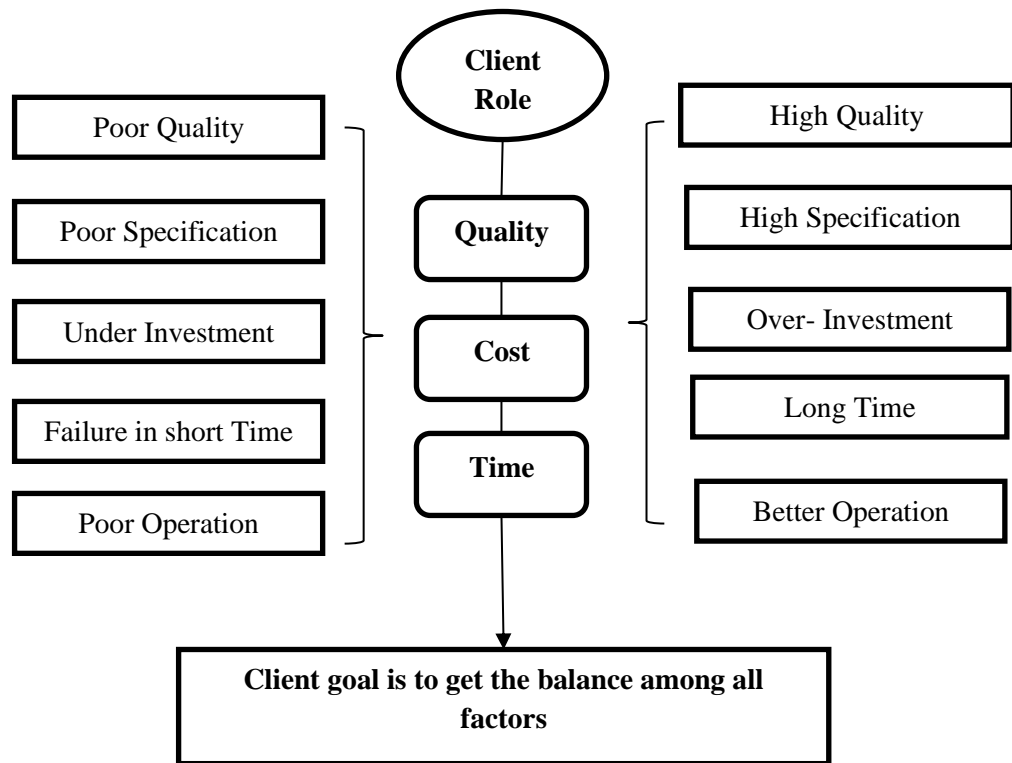
### **Clients' responses to quality Performance**

Conformance to Specification  
Unavailability of experienced staff  
Quality of equipment and raw materials  
Quality assessment system  
Quality training/ meeting

To design and deal with an effective project, the three boundaries of time, cost and quality should be thought of and characterized by the client. Ignoring one boundary will have a relating troublesome impact on the other two (Bowen, 2012). High quality has defined as high specifications with quality. The high quality sometimes tends to high cost with additional time and with the risk of over-budget in the project.

Therefore, the client's goal is to get the equilibrium directly between every one of these components to live up to their project delivery expectations as illustrated in Figure 2-5. The significance of the client job was featured in the ASCE Quality in the Constructed Project Manual (2012). The manual depicts the client's serious level of effect on the construction project, which as a rule may decide the success or failure of the project. Consequently, the client's involvement in the beginning stages comprises

the underlying stage of the construction process and gives the association between the client and the project (Institution of Civil Engineering, 1996)



**Figure 2-5 Clients role in Performance of the project**

Whelton (2002) featured the significance of the planning and design which they considered as basic in light of the fact that however much that 80% of a task can be indicated in this beginning stage. For clients to act successfully and effectively in the beginning phase of a task, they should have rich information and satisfactory data about the issues just as capable aptitudes to utilize this information and data.

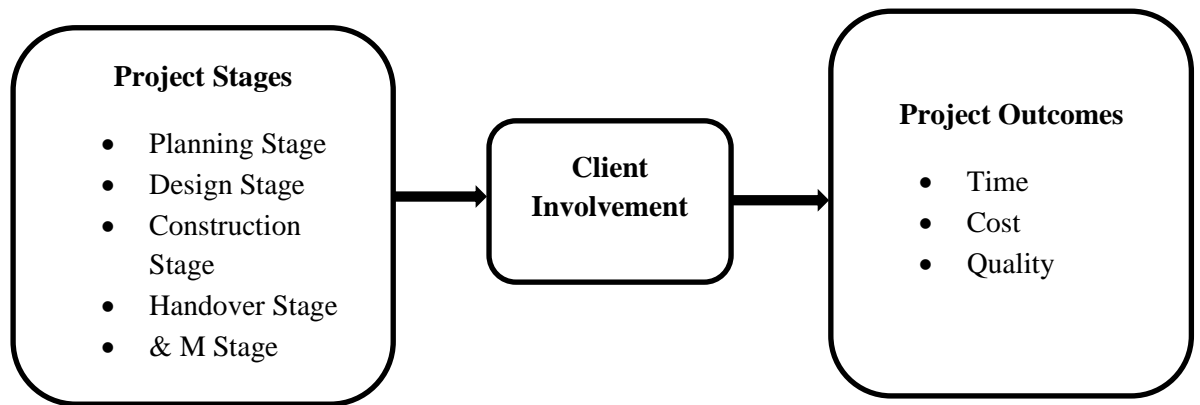
It is significant that from the first day of the project, designers should set aside some effort to comprehend the client's business needs and necessities, on the grounds that most key decisions will influence economy, effectiveness, time, functional content, appearance, and in prominently, Project value (Barrett, 1999; Boyd 2006). This burdens the hugeness of the early involvement of the client during the early stage of a task, and the prerequisite for client command over the entire construction measure to enhance the task quality, cost and time. Kamara (2001) the prerequisite for in the current system in the early stages of projects can move the concentrate away from the necessities of the client, and can achieve issues during the projects.

The need to deal with the client's necessities moreover rises out of the prerequisite for merged frameworks inside the project cycle, and the necessity for community working relations among the project members (Shelbourn, 2007). Integration and cooperation are basic to improve the adequacy of the construction industry. Projects with compelling correspondence strategies are routinely more effective than helpless correspondence (Kalla, 2005; Tourish, 2004). Great correspondence between all members in the projects make great collaboration: otherwise, the task is upset with the issues related with crack in project measure.

A few researchers have seen the issues achieved by discontinuity in the construction business (Brandon 1995; Evbuomwan, 1996). Discontinuity in the construction business shows to a condition whereby experts who are locked in with 'downstream' works out (e.g contractor) are not related with 'upstream' decisions(design) that are passed between different controls during the activities. Regardless, the applied of joined methods, for example, design and build or simultaneous designing, necessitates that client's requirements are prepared and introduced in a way that will encourage simultaneous/team up working relationship. The client's key obligations are to frame the tasks group as right on time as conceivable to relegate obligations and to make elevated levels of execution (ASCE, 2012). Subsequently, client who manage the project group must assign obligations, power, duty, legally binding connections and compensation plan. This comprise choosing the necessary degree of value by conveying the prerequisites from clients.

To close this part, it will in general be summarized that clients ought not be seen as commonly inactive performers in the project cycle. Client practices have gotten logically huger for the project cycle and project results (Briscoe, 2004).

Figure 2.6 shows how the clients assumes a significant function between the project process and project outcomes.



**Figure 2-6 Project stages and Outcomes**

Therefore, CI is crucial to diminish issues, for example, bad quality, design disappointment and litigation, which come from choices and activities taken during the project. These issues much of the time become blocks for various equities in the project to achieve acceptable execution in their movement. In case the client grasps reasonable best practice, which gives a positive working environment in the projects, this will be reflected in the quality consequences of the project. In addition, effectiveness will be extended in all project stages. The client's absence of sufficient association in the project is related to various issues experienced during the project cycle, for example, cost and time overwhelms and enquiries (Alsolaiman, 2014; Assaf ,2006).

## **2.8 Importance of Client Involvement in Projects**

Despite the many efforts people have made to comprehend the construction industry clients and their needs, there is still plenty of evidence that they have generally misjudged the performance of consultants and contractors and are dissatisfied with their performance

Perceptions of absence of performance may not only be credited to consultants. Clearly, how the client sorts out and deals with the undertaking will have an effect upon ensuing project performance (Simon, 1994).

It has been recognized those clients ascribes specifically and their overall methodology towards project management can have huge impacts upon the accomplishment of project objectives from the perspectives of the relative multitude of gatherings engaged in the project (NEDO, 1983). The client's significance towards the construction

industry can't be overemphasized. A specialist/client relationship has developed significant with the ever-growing rivalry in the construction industry environment.

Clients roles has developed logically important in immense and complex exercises, for example, mechanical and petrochemical buildings. It is overviewed by the development business institution (1990) that some project managers who employed for clients need solid administration aptitudes and experience. Its simply judicious that to the business should mean to improve by and overall project performance and perceive the changing idea of clients from traditional unpracticed clients to advanced and experienced property create clients.

## **2.9 Summary**

This chapter evaluated and introduced the exploration literature. It gave a foundation diagram of the construction area and status of client practices in construction area in Sri Lanka. Its found that Sri Lanka has an exceptionally solid economy and construction area in Sri Lanka has extended by over 20% and the business has developed twice as quick as the nation's GDP. In any case, a few issues that should be tended to with the public project construction to pushing ahead.

Further To improve and recognize the degree of CI in critical stages to assurance more confident results projects, present survey examines that the client has significant role to the connection between the project cycle and performances in term of Time, budget and quality. Furthermore, Studies identified impact and Importance of CI in Projects in terms of project performances

The following section presents a persistent discussion on the study methodology applied in this exploration dependent on the finding from literature review.

### 3. RESEARCH METHODOLOGY

#### 3.1 Introduction

Theoretical background has been done related to the CI and performances factors in the previous chapter. CI is a significant factor in enhancing performance of the construction project. Client is connected between project process and performance. This research on CI in project process and target to develop the situation and obtain more positive results in construction projects outcome. The chapter gives a layout perspective on the survey process that was applied to accomplish the aim and objective of the current investigation and for that research design consist of research approach, sample design with data collection and techniques of analysis are described in detail

#### 3.2 Research Process

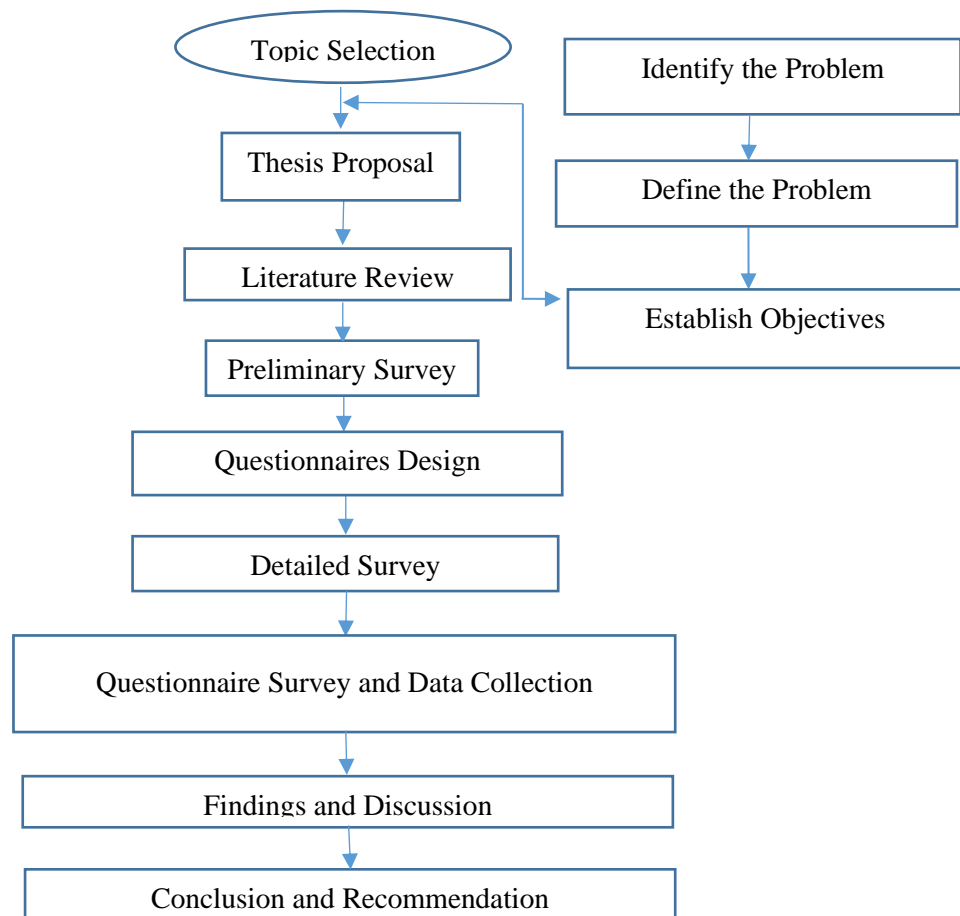


Figure 3.1 Research Process

### **3.3 Research Design**

Research design is simple and structured method to adopt to resolve the research problems with research plan consist of assumption, data collection and analysis (Mingers, 2010).

#### **3.3.1 Research Approach**

Research approach can be categorized in two part, namely, quantitative and qualitative approach which is included survey method, experimental, document review, ethnography and case study. According to Fellows (2003), Quantitative approach in consider real factor and how these factors associate with theories and data collection. Generally quantitative approach includes survey and experiment with grounded theory. Other approach method such as case study and ethnography are categorized under qualitative approach

Generally, to collect data from individual sample in commercial and academic sector, survey approach method will be adopted (Janes, 2001). Further this survey approach can be applied to large sample size which is gives more significant cost effective as large number samples involved in this survey. Furthermore, research questions begin with what, where, who and how many types of research question can be conducted in quantitative approach. And the current study aims to identify the impact level of CI in public sector building project in Sri Lanka. Therefore, this study is followed quantitative approach. In addition to that independent variable and dependent variables are not possible or not acceptable level to control, these situation survey approach can be adopted. (Kraemer, 2002)

Finally, similar survey approaches have used by Chigangacha (2016) to identify the effectiveness of client involvement in construction project in South Africa and Al-Solaiman (2006) identify the impact of client involvement of project performance in Saudi Arabia. This is also evident for the aptness of selected approach in this research.

#### **3.3.2 Survey Approach**

##### **Preliminary survey**

The preliminary survey is the administration of a questionnaire as defined by Zikmund (2010) to a small collection of respondents, which lead the researchers to identify

uncertainty in the questions. The questionnaire questions should be in realistic situation which is important to confirm that the information collection is workable. In this research, the survey form should be simple, the detailed and lengthy survey form might reduce the participant replying survey (De Vaus, 2002b).

The sample of the preliminary survey should be obtained from same target respondents' group in order to avoid too divergent from the actual respondents (Creswell, 2008; Zikmund, 2010). This preliminary survey was conducted to evaluate lucidity and practicality of survey. This was done with five selected respondents to assess the validity of the survey form. They were represented of government client organization who have technical and experiences in engineering project management. The identified CI task in literature review was adjusted and combined with a consideration of the comments of the respondent.

Participants were informed clearly the purpose of the research and suitable materials were given to them to access the questionnaire successfully. Further assurance was given to them that the information provided is confidential, and also observed their voluntary, time taken to complete the survey and feedback from them. The questionnaire was modified in few items to improve it from the preliminary survey.

### **Questionnaire Design and Survey**

To analysis and study this research, a questionnaire was designed from the previous study by forming the suitable items to fulfill the aim of this study. The objective and structure of the response are important to be recognized for an effective questionnaire (De Vaus, 2002b).

The questionnaire in this research is developed as per Leedy's (1997) guideline which is to be simple language, aims should be met, arrangement of circulation and collection

Multiple choice questions have used to make the survey as easy to complete as could be expected under the circumstances. Directions were given toward the start of each part for finishing the questionnaire.

The questions of the questionnaire should connect to the research problem identified with the field of study. It had more items or measurements in each part depend on related literature review. This questionnaire was categorized into section, Demographic details

of the respondents such as type of organization you work for whether public or semipublic organization to evaluate CI in Possession Type, Designation, Experience and ask them to specify contract sum of public building project where contract sum should be more than 100 million to avoid small projects of the research.

Next questions are fulfilled the second objective of this research and aim of identify CI was to review existing CI practices in project assignments public constructing projects in Sri Lanka. Further, CI in project stages with task based on client's duties and responsibilities were found in the literature review and modified in preliminary survey by using Likert scale. Additionally, rank the important level according to their knowledge and experience is added to compare priority level and practice.

The final objective is to identify impact of CI in public building projects in Sri Lanka regards to performance aspects of Time, cost and quality. To achieve this objective, survey form consist of question of to what extent were the projects implemented: 1) Implemented in compliance with the work schedule and finish on time [Time], 2) Implemented within the contract price [Cost] 3) Implemented with the specifications and expected quality [Quality] in Likert scale as described below

### **Scale**

Likert scale is a rating system usually used in study which occupy survey method. It is extensively applying analysis method in the questionnaire. Five level responses commonly applied (Dawes, 2008). The questionnaire in this study, used multiple choice Likert scale with five response levels. The response levels which used in the questionnaire is five-point Likert scale that ranging from "very low involved=1" to "Very high involved =5" to identify the involvement and also, a five-point likert scale ranking from "Strongly disagree=1" to 'Strongly agree=5' was applied to identify the impact level and project implementation.

### 3.4 Sampling Size and Design

Sampling size and design are crucial method of research design. In determination of a considerable and effective model for the flow of research, Zikmund (2010) has divided this sampling technique in seven parts and was followed and changed in this survey.

Sampling technique is beginning with **Target population** which is specific particular complete group related to this survey as stage one. Meanwhile, current research considers and limited to the public building projects in Sri Lanka, the target population of this study was characterized as public organization who engaged with public building projects. The surveys were distributed in head office (HO) of government associations and services who engaged with the public building projects in Sri Lanka.

**Sample frame** is determined as stage two after identification of target population of this survey. Sekaran (2003) stated that sample frame is components of the target population with sample of study. It is generally called working population. The clients who employed for technical of constructing the building purpose in public organisation, are sample frame of this survey

In stage three, it is imperative to decide the **sampling method** subsequent to define sample frame. Probability and non- probability approaches are considered as two strategies to sampling method. Probability method is every individual has a known from the population. Non- probability is where sample elements are chosen based in close judgment or convenience; and specific individual being picked is unknown in sampling method.

The current study was done in sample of target population as constraints of time and cost. **Convenience sampling technique** has applied to respondents who were included in sample frame and available and ready for contribute to this survey. convenience sampling is included in a **non- probability** method where subjects are chosen as a result of their convenience openness and proximity to the researcher. Researcher for the most use convenience sample to get more finished questionnaire rapidly and economically (Zikmund, 2010). Target sample is client who are from government organization of public building projects in Sri Lanka in this survey.

Subsequent to characterizing target population, sample frame and the non- probability sampling method and convenience sample, sampling plan is included in stage four. In stage five, to decide sample size, and techniques in gathering information from samples are need to be considered in the **sampling plan** which are timing and precision. Ten-week collection time has taken for data collection in this survey. And those data were checked and modified with intention of completeness, precision and reliability prior to analysis. The sample size of individuals should be picked to represent the population of the survey. The sample size to be more sufficient to solve the survey problems (Zikmund, 2010).

In stage six, the **sampling unit** to be chosen prior to get direct the data collection by the researcher. Focus of selection in the sample, the sampling unit is a single component or group of components (Zikmund, 2010). Since the current research focused on the clients who represented to government organization in the public building projects in Sri Lanka, the questionnaire form of 140 is the sample units for the current research to clients.

Finally, conduct a field work by distribute the questionnaire to the identified the population (data collection) in stage seven by the researcher.

### **3.5 Ethical Considerations**

Ethical considerations are significant due to human movement in academic research (Creswell, 2008). Ethical considerations as far as respectability, privacy and obscurity were tended to in the current investigation. For instance, the reason for the overview was disclosed to the participants, together with affirmations with respect to the secrecy of the responses.

### **3.6 Analysis of the Data**

To address research investigations, Raw data can't apply with information might be changed over into a configuration that can be evaluated (Zikmund, 2010). This chapter present about the connection between the finding and the research problems. It's recognized whether the wanted output were accomplished to build up a conclusion with

study problems. Preliminary analysis, descriptive analysis and inferential statistical analysis are mainly adopted in this section.

Checking validity and reliability of the data is included in Preliminary analysis and reliability has been evaluated with a use of Cronbach's alpha which is generally applied (Gliem, 2003). Value 0.7 is minimum in Cronbach alpha as Kline (2013) and however, Malley (2003) stated that greater than 0.5 value of Cronbach alpha is considerable poor but acceptable. Therefore, greater than 0.9 value of Cronbach alpha is high, greater than 0.8 is very good and greater than 0.7 is good in current research

The descriptive analysis was applied to illustrate and conclude the data of qualities of the sample by use of graphs, charts, percentages and table. Demographic details are described by pie charts and tables. CI of each task is described in radar chart in each stage

T-Test is inferential statistical analysis to differentiate set of cases for contrasts in their means.it is used to test differences between the mean rank of public and semipublic organization. Pearson's Correlation Coefficient was applied to assess the bivariate correlation between project performance factors of Time (P1), Cost (P2) and Quality (P3) and construction project stages. Linear regression Analysis was carried out to calculate the impact of CI on project performance. Time, Cost and Quality were used as predictors for project performance.

### **3.7 Summary**

The methodology which applied for this research clearly described in this chapter. The data collection procedure with sample selection method was presented. The limitations and assumptions, date analyzed techniques were also described in this chapter.

The motivation behind the approach is to connect the question and results. The current investigation applied the quantitative technique to cover the research problem by conveying a survey through questionnaire. The date was analyzed through SPSS application.

### 4. ANALYSIS AND DISCUSSION

#### 4.1 Introduction

The earlier chapter presented an itemized discourse of the research methodology used in this research. Intentions of the research is to identify the level of CI and impact of performance in term of time, cost, quality and operation in construction projects. This chapter gives an explanation of data collected from the questionnaire survey detail manner by tables and graphs, and comprehensive analysis is given of the data by applying the statistical tools. Profile sample and the collected data is given in Chapter 4.2. The remaining parts explain descriptive analysis with findings including analyzing the relationship among variables. Respondence demographic profile is focus on Chapter 4.3. Following, existing CI in the construction industry in Sri Lanka is described Chapter 4.4 and Finally the impact of CI on project outcome is investigated in Chapter 4.5.

Further, incorporate with frequency distributions, central tendency and standard deviation is introduced by descriptive statistics in this chapter. Proper tests are additionally used on the findings to identify the significance. For instance, the T test is applied to test the differences between mean ranks to identify significance.

#### 4.2 Preliminary Data Results

The preliminary survey was undertaken to ensure the opinion to utilize all the information gathered in the analysis

##### **Validity and reliability of questionnaire**

Building up the questionnaire with the literature has inspected this research by the questionnaire was sent to group of sample respondents and check the lucidity which called content validity and preliminary survey. subsequently, modifications were made and the final questionnaire was thought to be valid

The consistency and reliability are assessed whether within the ranges allocated by Cronbach's alpha test in this research as clarified in Chapter 3.

## Reliability Test of Project Stages

The test of reliability was done for every five group of construction project stages such 1) planning stage, 2) design stage 3) construction stage 4) handover stage and 5) operations and maintenance stage with 40 items as one group. Table 4.1 has indicated the outcomes of the reliability test as nutshell. Overall, a “high” level of reliability is stated by the 0.963 of Cronbach’s alpha. Therefore, the gathered information/ data were measured reliable and acceptable for more investigation

**Table 4-1 Nutshell of reliability test and performance factors**

<b>Variables</b>	<b>Cronbach’s Alpha</b>	<b>Reliability</b>	<b>No. of Items</b>
A- Planning Phase:	0.901	High	9
B- Design Phase:	0.849	Very good	8
C-Construction Phase	0.913	High	13
D: Handover Phase	0.916	High	7
E: Operation and Maintenance Phase	0.847	Very good	3
<b>All Construction Phases</b>	<b>0.963</b>	<b>High</b>	<b>40</b>
Performance factors (P)	0.810	Very good	3

## 4.3 Demographic profile of the respondents

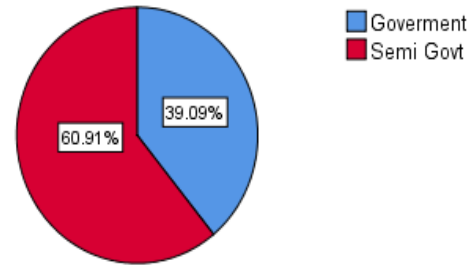
By investigating demographic profile of the respondents has provide comprehend and depict the attributes of them, such as whether the public or semi-public organization, designation, and experience level.

### Respondents’ Possession Type

Table 4.2 shows outline of the respondents which among the respondents, 39.09% employed in public(government) organization and 60.91% employed in semi government organization.

**Table 4-2 Frequency statistics**

	Frequency	Percent
Public	43	39.09
Semi public	67	60.91
Total	110	100

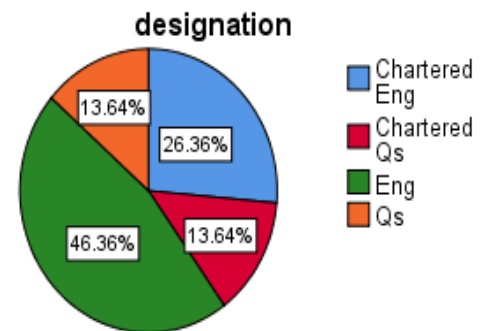


### Respondents' Designations

As Shown in Table 4.3, 46.4% respondent are engineers and 26.36% are chartered Engineers. Overall, this indicates high-level respondents are involved.

**Table 4-3 Frequency statistics for respondents' designation**

Respondents' Designation		
	Frequency	Percent
Chartered engineer	29	26.36
Chartered QS	15	13.64
Engineer	51	46.36
Qs	15	13.64
Total	110	100.00

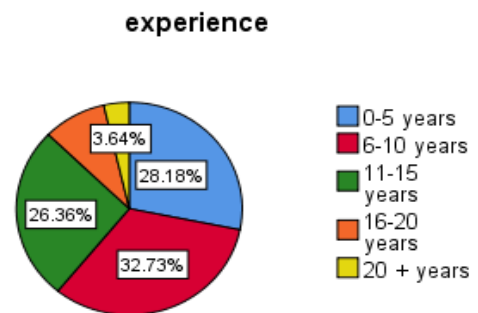


### Respondents' Experience

Prominent scope of information of the methods is considered by Experienced clients, tools and techniques associated with overseeing projects which gives positive outcome in a project. The respondents' profiles in according to their experience is shown in Table 4.4 which represent the groups of experience in 5, 10 and 15 years, which respectively stated 28.2%, 32.7% and 26.4% of the respondents.

**Table 4-4 Frequency statistics for respondents' Experience**

Respondents Experience		
	Frequency	Percent
0-5 years	31	28.2
6-10 years	36	32.7
11-15 years	29	26.4
16-20 years	10	9.1
20 + years	4	3.6
<b>Total</b>	<b>110</b>	<b>100.0</b>



## 4.4 Current Client Involvement

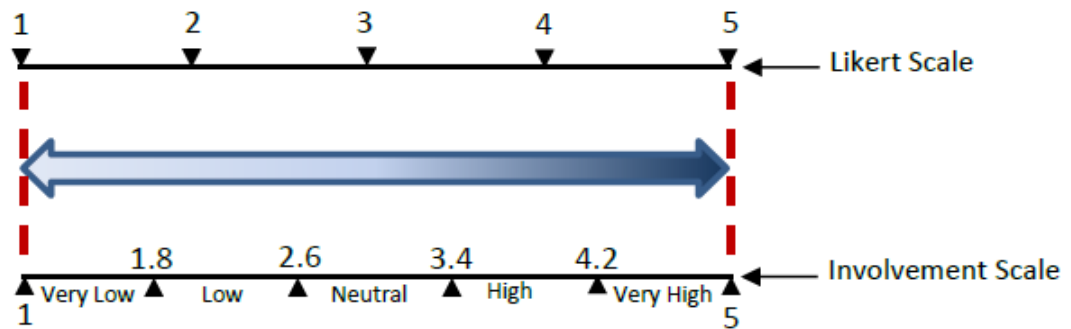
Questionnaire survey has provided the information assembled for an evaluation of this chapter. The second objective of the study is to comprehend the existing practices of CI in public projects in Sri Lanka. As client, the respondents' level of involvement in five stages of a project process, namely the planning stages, design stages, construction stages, handover stages and operation and maintenance stages has been explored in questionnaire survey. Current survey intends to recognize the existing status of CI managing day-by-day exercises in projects. Respondents' involvement as clients is investigated through three alternate points of view: (1) with on overall data; (2) with the project possession; and (3) with the Experience and other

The third aim of the investigation is to recognize the important stage in the project, to more readily comprehend where consideration must be engaged to enhance the CI and make sure project is effective.

### 4.4.1 Respondents' involvement

The respondents' involvement measures the mean was central tendency, while the median would hypothetically be more precise to measure on the grounds that the information was ordinal in descriptive statistics for as clients in project in five stages. Though, the mean was used due to nature of the data. The mean is additionally simpler to decide and decipher, and can be applied in different computations. To find the degree of involvement, As shown in Figure 4.1 the scale for involvement was created in five breaks such 1) very low 2) low 3) neutral 4) high and 5) very high. The five involvement intervals of the involvement scale were determined by segregating the four breaks in

the Likert scale. Each break has 0.8 result. In this manner, the “involvement scale” was made based on five-point Likert scale (figure 4.1)



**Figure 4-1 Likert scale and involvement scale**

As clarified above, CI with overall data and the project possession was investigated with the respondents’ involvement of the current position as clients for a profound comprehension of CI in construction projects.

The respondent’s average involvement is shown in Table 4.5 in each stage of a projects with the project possession and overall. The average involvement in projects in all stages is shown the bottom of the table. Neutral involvement range is the average CI in all stages for the types of project possession and overall.

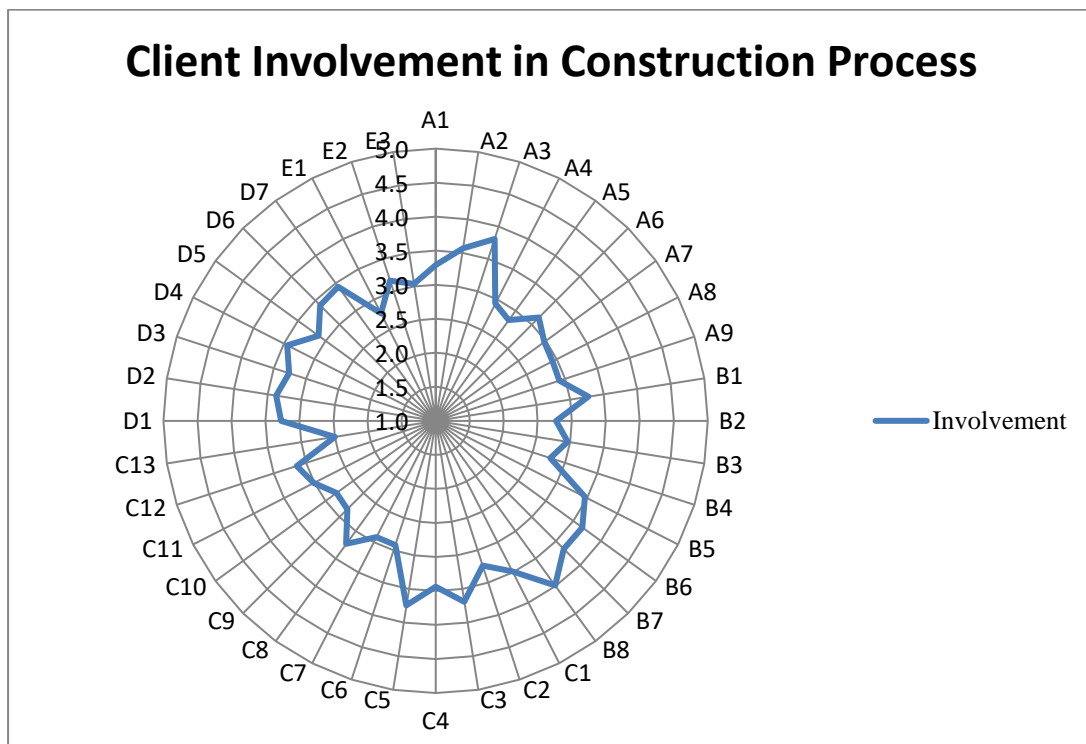
**Table 4-5 Respondents average involvement as clients**

Construction Stage	Average Involvement		
	Overall (N =110)	Public (N=43)	Semi Public (N=67)
Planning	3.154	2.845	3.352
Design	3.320	3.148	3.431
Construction	3.150	2.860	3.336
Handover	3.331	3.226	3.399
Operation and Maintenance	2.991	2.791	3.119
<b>Average involvement in all stages</b>	<b>3.189</b>	<b>2.974</b>	<b>3.327</b>

## Client Involvement Overall Data

The majority of the activities engaged with the project cycle to measure the five stages with 40 tasks. Over the questionnaire survey, the respondents have given the information on all task to recognize the position of their involvement as clients in the day-to-day activities in each stage of a projects.

Figure 4.2 is detailed the respondents' involvement outline in projects in comparable to the different task. The blue line has shown the degree of involvement. The respondents have a lower involvement has indicated where the blue line is nearer to the central point of graph as clients in the project. The respondents have a higher involvement which indicated where the blue line is closer to the perimeter of the graph as clients in the project.



**Figure 4-2 Overall data on respondents' involvement as clients**

As shown Figure 4.2, in the planning stage, Construction stage and the operation and maintenance stage was lower than the design and handover stage of the respondents' involvement as clients. This may be because of various reasons. For instance: more significant level of decision making is need for few tasks (particularly in planning stage); the other team to manage the work is need for few tasks, for example, perform preliminary studies; and operation and maintenance stage, after project is handed over

by the contractor, the engineer undertakes the tasks from client. In practically, client have high level of involvement in design stage compared to other stages

Overall, 27 out of 40 tasks that discovered that respondent's level of involvement was neutral or low degree as clients in the whole five project stages. Negative impact on the project results may be expected to have with this neutral and low level of involvement. Each stage of construction process is to be discoursed in detail based on the findings on the respondents' involvement as clients as follows

### **Planning Stage**

As client, in the planning stage outcomes of the respondents' level of involvement is outlined above Table 4.5 and 3.154 was the average level of involvement, which is observed to be neutral involvement with the involvement Likert scale. The client has implemented the planning stage in a project usually. In the current research, 9 tasks were included in the planning stage and mean rank of the respondents' involvement as clients from low to high involvement as clients is shown in Table 4.6

**Table 4-6 Mean rank of respondents' involvement as client in planning stage**

<b>S/No</b>	<b>Planning Stage Task</b>	<b>Rank</b>	<b>N</b>	<b>Mean</b>
A4	Estimation and approval of the budget.	1	110	2.8273
A1	Developing Project Brief (Feasibility study)	2	110	2.9091
A8	Study impact on the Environment	3	110	2.9273
A9	Preparation and application of health & safety requirement	4	110	2.9364
A7	Preparation and application of Environment requirement	5	110	2.9727
A6	Preparation of preliminary design	6	110	3.1455
A5	Defining the technical specifications of the materials	7	110	3.2909
A2	Defining requirements of the beneficiary of the project	8	110	3.5636
A3	Estimation and agreement of project duration	9	110	3.8091

Level of involvement of the respondents was varied in the planning stage tasks as clients however neutral over all the tasks and high involvement has marked in two tasks such A2 and A3 and mean 3.56 and 3.80 respectively. The respondents' level of involvement as clients in defining the technical specifications of the materials, preparation and application of health and safety requirement, study impact on the environment of projects, estimation and approval of budget, preparation and application of environment requirement, preparation of preliminary design, developing Project Brief of proposed project was neutral. Significance of the planning tasks are demonstrating from these tasks. High level of authority is requiring to make decision in planning stage that includes activities, such as Estimation and approval of the budget. Normally government organization require to get formal confirmation from the Cabinet Ministries or Ministry of Finance prior to award the contract in any large project in Sri Lanka. The limitations which forced by Cabinet Ministries or Ministry of Finance reduce the ability of clients to innovate in construction due to limitations in the approval of project budget. Therefore, it has been suggested that the financial and monetary administration system should be improve and change in Sri Lanka.

Feasibility study is another significant task in the planning stage which is an investigation of the capacity to finish the project effectively, considering the legitimate, economic, technological, programme and different variables. Neglecting to do the feasibility study as precisely as conceivable can have negative outcomes which are sufficient to stop the projects. The neutral CI in this task had an evident of the risk of this outcomes. Neutral CI in the planning stage may interpretation for the increase of project delays in Sri Lanka.

These outcomes suggest that the importance of involvement was not known by respondents as clients in the planning stage. This is further revealed by the outcome of the neutral involvement of the respondents in the planning stage may be because of the way that a few tasks need a higher level of finalized the decision and few tasks need the other team to manage the work, for example to perform preliminary studies.

## Design Stage

Design stage involvement is higher than the planning stage by respondents as clients. As client, in the design stage outcomes of the respondents' level of involvement is outlined above Table 4.5 and 3.32 was the average respondents' involvement as clients, which is observed to be neutral involvement with Likert scale. Usually during design stage, clients and designers are work together. In the current research, 8 tasks were included in the design stage and Mean rank of respondents' involvement as clients was neutral involvement is shown in Table 4.7. The main task in the design stage is the review of drawings and specifications and settling on the essential approval as well as the endorsement of fundamental design stages (Whelton 2002); the respondents in this task as clients testified a neutral level involvement.

**Table 4-7 Mean rank of respondents' involvement as clients in design stage**

S/No	Design Stage Task	Rank	N	Mean
B4	Negotiation of Tender prices	1	110	2.7727
B2	Review/ update of drawings and specifications	2	110	2.7727
B3	Monitor and guarantee design quality.	3	110	2.9636
B1	Give all required information for the project to consultant	4	110	3.2727
B5	Selection of Procurement Strategy	5	110	3.4636
B7	Contractor appointment	6	110	3.6636
B6	Tendering	7	110	3.6636
B8	Preparation of construction drawings	8	110	3.9909

Whelton (2002) emphasized the importance of the design stage and defined it as serious that however much that 80% of the project can be indicated in this beginning stage. The outcomes show that the respondents didn't give a lot of consideration to various tasks that should be done before construction of the project during tender, specifically: negotiating the tender value with contractors qualified to manage the work; review and update the drawings and specification; monitor and guarantee design quality and give

all required information for the project to consultant. Dispute between the stakeholder is created with a low degree of involvement in these tasks. Al-Sedairy (1994) researched the administration dispute in public sector construction and identified that the dispute happens most habitually in the vital connections between contractor and consultant, and between contractor and client. The dispute was identified to happen mostly in the later stages of a project. The outcomes of the survey demonstrated that the task, preparation of construction drawings had highest level of involvement by respondent as clients in design stage. This research explored that the clients didn't give sufficient consideration to the activities during the tender process, which should be performed prior to construction of the project

### **Construction Stage**

As client, in the Construction stage outcomes of the respondents' level of involvement is outlined above Table 4.5 and 3.15 was the average level of involvement, which is observed to be neutral involvement with Likert scale. However, by comparing design stage, the construction stage level of involvement was low. Applying all the data that was set up during the design stage, clients, consultants and contractors normally cooperate in the construction stage. In the current research, 13 tasks were included in the construction stage and Mean rank of the respondents' involvement as clients varies: involvement in one task was ranked as low; involvement in eight tasks was ranked as neutral; and involvement of four tasks was ranked as high as clients is shown in Table 4.8

**Table 4-8 Mean rank of respondents' involvement as clients in construction stage**

<b>S/No</b>	<b>Construction stage task</b>	<b>Rank</b>	<b>N</b>	<b>Mean</b>
C13	Sub-contractor appointments	1	110	2.5
C10	Monitoring environmental management principles during project implementation.	2	110	2.8
C9	Monitoring health & safety ideologies during execution of the project	3	110	2.8364
C6	Quick decisions on design deviations or variations	4	110	2.9182

C7	Selection of materials	5	110	2.9182
C11	Conducting quality checks	6	110	3.0091
C12	Dispute resolution	7	110	3.1455
C2	Management and inspection of the site	8	110	3.2364
C8	Making payments to contractors for work done	9	110	3.2364
C4	Attending technical meetings	10	110	3.4364
C1	Contractors qualification competing to the project execution	11	110	3.4818
C3	Attending progress meetings	12	110	3.6909
C5	Attending site handover meetings	13	110	3.7455

The outcomes show that the respondents didn't give a lot of consideration to various tasks that should be included sub-contractor appointments, checking environmental management principles during project implementation, checking health & safety ideas during execution of the project, quick decisions on design deviations or variations and selection of materials which are very imperative and significant in the results of the construction stage. Clients have to conducting regular visits to the site which enable them to resolve any claims, and implement the environmental administration, quality and, health and safety control of the project during construction. Settling on the fundamental decisions while clients site visit enables the project team to be accomplished efficiently.

The outcomes in the current research show that the respondents knew about should be associated with the accompanying tasks in the construction stage: attending progress meetings, contractor's qualification competing the project execution, attending technical meetings and regularly visiting the project site during the implementation stage

It is critical to identify the link between design and construction stages. The design stage is a process of making a picture of a new project which described by detail drawings and specifications, while the construction stage is a process of finding the tasks and

acquire the resources needed to provide the design a physical reality. Conflict between client and contractor could be reduced by proper explanation in design documents (Al-Sedairy, 1994).

### **Handover Stage**

As client, in the Handover stage outcomes of the respondents' level of involvement is outlined above Table 4.5 and 3.331 was the average level of involvement, which is observed to be neutral involvement but near to high involvement with Likert scale. However highest level of respondent involvement among all other stages as clients. The handover stage can be systematized by the clients and consultants in joint with contractor and sub-contractor to acknowledge the work done in projects. In the current research, 7 tasks were included in the handover stage and Mean rank of the respondent's level of involvement was neutral and close to high as clients is shown in Table 4.9

**Table 4-9- Mean rank of the respondent's involvement as client in handover stage**

<b>S/No</b>	<b>Handover Stage tasks</b>	<b>Rank</b>	<b>N</b>	<b>Mean</b>
D5	Input into project appraisal and final report	1	110	3.1273
D3	Final account settlement	2	110	3.2636
D1	Formation of standards for acceptance of completed project	3	110	3.2727
D2	Involvement to collecting snagging or defects list	4	110	3.3727
D6	Release of guarantees and securities	5	110	3.4000
D7	Release of retentions where applicable	6	110	3.4364
D4	Issuing of final certification	7	110	3.4455

The handover of the projects is a significant stage of project procurement method and success of facility operation. Considering the importance of the handover stage, the level of CI in high in handover stage. Transfer the data from contractors to the client of

the project is crucial that data should be efficient and effective and structured way. If is not managed in organized way, it can be significantly impact on use of the project.

### **Operations and Maintenance stage**

As client, in the Operations and Maintenance stage outcomes of the respondents' level of involvement is outlined above Table 4.5 and 2.991 was the average level of involvement, which is observed to be neutral involvement with Likert scale. However lowest level of respondent among all other stages. In the current research, 3 tasks were included in the O&M stage and Mean rank of involvement of respondent's was neutral is shown in Table 4.10.

**Table 4-10 Mean rank of the respondent's level of involvement as clients in O&M stage**

<b>S/No</b>	<b>Operations and Maintenance stage tasks</b>	<b>Rank</b>	<b>N</b>	<b>Mean</b>
E1	Development of maintenance plan	1	110	2.7727
E3	Documentation of warranties and certificates	2	110	3.0364
E2	Observing the way toward testing and commissioning of all systems, plants and equipment in the projects	3	110	3.1636

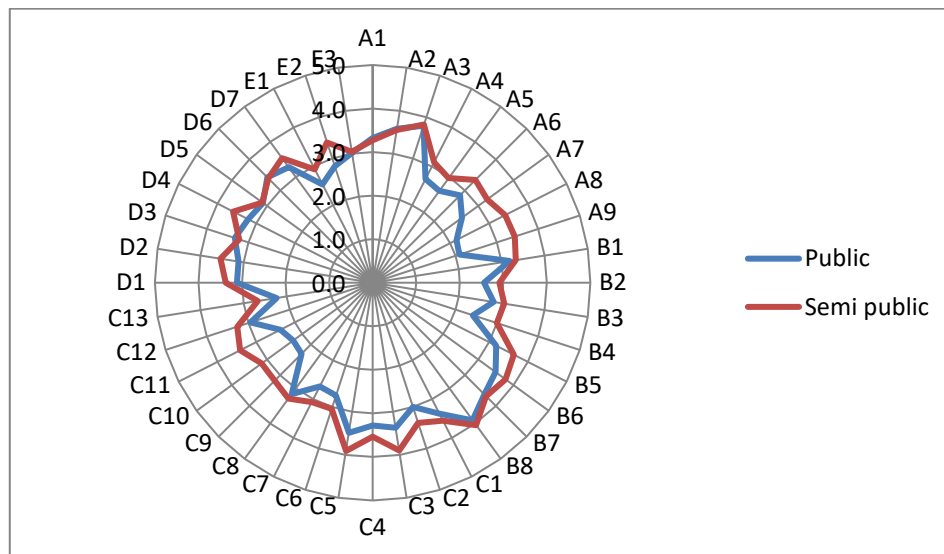
The degree of CI is firmly connected with the effective operation and maintenance of accomplished project. A project crew obtain benefits by providing cautious thought to the O&M aims throughout the projects planning, design and construction stages.

#### **4.4.2 Client Involvement (CI) based on project possession**

With collected data of the survey allows the degree of CI to be evaluated by reference of project possession (public or semipublic). The outcomes express that as client in few stages of semipublic projects more involved than public projects by the respondents

CI of project possession type of the public and semipublic demonstrates in figure 4.3. The difference between the level of CI in public and semipublic projects is clearly shows

in the chart. Some stages such as the Planning and construction stage that the clients in semipublic projects are more involved than the public projects clients.



**Figure 4-3 CI in public projects and semipublic projects.**

T- tests were used to test between the mean ranks of two different groups the differences (public and semipublic) to explore the differences in the degrees of CI. Significant changes were shown of the project stages between the two possession types in client involvement. In the possession type part, the current research discovered that the main important changes between the mean ranks of the public and semi-public were in planning, construction and operation and maintenance stages. There was a somewhat high level of involvement in semi-public projects and low-level involvement in the planning, construction stages in public projects. A potential clarification for this stage might be a few tasks need a final decision from higher level authorities and few tasks are duty of another team such as preliminary design studies in the planning stages and the attempt to receive consultancy services in the planning and design stage in public projects (Alnuaimi 2009). Whelton, (2002) mentioned the significance of the design stage which is viewed as critical fact that however much that 80% of a project can be determined in this beginning stage. This clarifies the several degrees of quality accomplished in various project in government organizations because of various level of CI in public projects (Assaf, 2006).

The deviations found in CI based on the project possession type are likely due to the diversities in the project management practices in construction and various methods used in government organization in Sri Lanka. General guidelines to define the role of

public organization is not established in construction project management. The changing level of CI in public projects can be an explanation behind the different degree of quality attained in various project of government organization (Assaf, 2006).

#### 4.5 Construction Project Stage Ranking of Importance

To distinguish the main stage in a construction project dependent on the perspectives on the respondents. This would assist with recognizing the stage that needs more consideration regarding guarantee construction project is successful

A nutshell of the outcomes is shown in Table 4.11. Importance of the construction stages are ranked as follows. The most important stage is the planning stage and fifth as the least important stage is the operations and maintenance stage

**Table 4-11: Important rank of Construction project stage**

<b>Construction Project Stage</b>	<b>Mean</b>	<b>Rank</b>
Planning	1.31	1
Design	1.69	2
Construction	3.21	3
Handover	3.87	4
Operations and Maintenance	4.92	5

The Friedman test was also led to identify the distinctions over the connected factors and rank them. Table 4.12 shows the outcomes of the Friedman test. The mean rank values display clearly that the most important stage and ranked as the priority stage for clients was the planning stage for CI among the five project stages throughout construction project. Then followed by design stage. Notwithstanding, the investigation revealed that the respondents had neutral involvement as clients in both the planning and the design stages. It may be the reason of making poor decision in the beginning stage of the projects, which may lead to disagreements in later activities of the projects. In the design stage in semi-public projects client involvement, was a higher compared to in public projects client involvement. This may be because of the propensity of government organization to receive consultancy administrations in the design stage of

public projects. The remaining stages were ranked in importance as follows: (3) construction stage; (4) handover stage; (5) operation and maintenance stage. Further, there were differences between all five stage by indicate the p value was significant ( $p < 0.05$ )

**Table 4-12: Friedman test for project stage**

Test Statistics <sup>a</sup>	
N	110
Chi-Square	398.538
df	4
Asymp. Sig.	0.000

a. Friedman Test

## **4.6 Impact of Client Involvement (CI) on projects performance**

The Client's usual project output expectations are high quality, low cost: and finished on time (Forgues, 2006) as 3 predominant performance factors. These three expectations, notwithstanding, are seldom accomplished totally since they are partially fundamentally exclusive. The key research objective for the current research is target on the impact of CI on projects performance in public sector projects in Sri Lanka.

### **4.6.1 Pearson's Correlation Coefficient**

Hypothesis investigated the association and the idea of connections between project performance factors of Time (P1), Cost (P2) and Quality (P3) and construction project stages. The correlation between any variable summarizes a relationship, regardless of whether there is any certifiable association between the two factors. First Pearson's Correlation Coefficient was applied to assess the bivariate correlation between the variables under consideration. Table 4.13 shows the correlations found between the response's variable raised in the research and independent and dependent variable selected for analysis.

**Table 4-13 Correlations between dependent variable and independent variable**

**Correlations**

		<b>Avpl anin g</b>	<b>AvDesi gn</b>	<b>AveCo ns</b>	<b>AvHn dovr</b>	<b>AveO M</b>	<b>P_1</b>	<b>P_2</b>	<b>P_3</b>
<b>Avplan ning</b>	Pearson Correlation	1	.735**	.649**	.603**	.681**	.898* *	.657* *	.455**
	Sig-(2- tailed)		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	110	110	110	110	110	110	110	110
<b>AvDesi gn</b>	Pearson Correlation	.735* *	1	.569**	.695**	.625**	.577* *	.889* *	.499**
	Sig-(2- tailed)	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	N	110	110	110	110	110	110	110	110
<b>AveCo ns</b>	Pearson Correlation	.649* *	.569**	1	.678**	.557**	.644* *	.578* *	.356**
	Sig-(2- tailed)	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	N	110	110	110	110	110	110	110	110
<b>AveHa ndover</b>	Pearson Correlation	.603* *	.695**	.678**	1	.784**	.488* *	.595* *	.376**
	Sig-(2- tailed)	0.000	0.000	0.000		0.000	0.000	0.000	0.000
	N	110	110	110	110	110	110	110	110
<b>AveO M</b>	Pearson Correlation	.681* *	.625**	.557**	.784**	1	.582* *	.535* *	.406**
	Sig-(2- tailed)	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	N	110	110	110	110	110	110	110	110
<b>P_1</b>	Pearson Correlation	.898* *	.577**	.644**	.488**	.582**	1	.558* *	.426**
	Sig-(2- tailed)	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	N	110	110	110	110	110	110	110	110

<b>P_2</b>	Pearson Correlation	.657*	.889**	.578**	.595**	.535**	.558*	1	.578**
	Sig-(2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	N	110	110	110	110	110	110	110	110
<b>P_3</b>	Pearson Correlation	.455*	.499**	.356**	.376**	.406**	.426*	.578*	1
	Sig-(2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	N	110	110	110	110	110	110	110	110

\*\* . Correlation is significant at the 0.01 level (2-tailed).

When Time and cost as dependent variable, the analysis results showed high correlation values in construction project process. On the contrary, using quality as dependent variable, we obtain weak correlation values.

The outcomes reveal that there is a significant relationship between CI in Planning, Design, construction, handover and OM stages and Time performance of this study ( $r=.898^{**}$ ,  $.577$ ,  $.644$ ,  $.488$  and  $.582$  respectively with  $p=.000$ ). These results agree with results showed that CI in construction project stages of planning, design and construction stages had more impact on Time performance.

The outcomes reveal that there is a significant relationship between CI in Planning, Design, construction, handover and OM stages and cost performance of this study ( $r=.657^{**}$ ,  $.899$ ,  $.578$ ,  $.595$  and  $.535$  respectively with  $p=.000$ ). These results agree with results showed that CI in construction project phases had greater effect on Cost performance.

The outcomes reveal that there is a significant relationship between CI in Planning, Design, construction, handover and OM phases and quality performance of this study ( $r=.455^{**}$ ,  $.499$ ,  $.356$ ,  $.376$  and  $.406$  respectively with  $p=.000$ ).

A strong correlation is defined generally when greater than 0.8 correlation while a less than 0.5 correlation is generally defined as weak. Therefore, all involvement of five construction stages is positively linearly connected to performance of Time, Cost and Quality.

Additionally, the significant of the relationship and the strengths of the relationship between independent (construction project stage) and very strong dependent variables between performance and the five stages of client involvement are disclosed in the correlation analysis.

Though, it isn't definitive to differentiate every predictor variable by differentiate the correlation and coefficient as we have more predictor variable. In order to do assessments and evaluation of the strength relationship between each performance factor (predictor variable), beta regression coefficients test is performed

#### **4.6.2 Regression Analysis**

Linear regression Analysis was carried out to calculate the impact of CI on project performance. Time, Cost and Quality were used as predictors for project performance.

##### **Hypothesis Testing**

The final objective of this study was to identify the impact of CI on project performance. Time, Cost and Quality were used as predictors for project performance. Consequently, a simple linear regression method was done to test the hypothesis formed for this research. Further, the probability value (p-value) and the level of significance was to be 0.05 which is the decision rule for rejecting the null hypothesis (John, 2009). On the other hand, the p- value is not is less than or equivalent to  $\alpha$ -level, null hypothesis will be rejected and alternative hypothesis will be supported. However, when the p- value is greater than the  $\alpha$ -level, null hypothesis will not be rejected and alternative hypothesis will not be supported

##### **Hypothesis 1**

H1: There is a statistically significant impact of CI on Time Project Performance. The outcomes of testing of the hypothesis are detailed in Tables 4-14.

Table 4-14 : Model summary of time performance

Model Summary				
Model	R	R Square	Adjusted R Square	St. Error of the estimate
1	.915 <sup>a</sup>	0.837	0.829	0.27464

a. Predictors: (Constant), AveOM, AveCons, AveDesi, AvePl, AveHand

The outcomes of multiple regression analysis show that multiple regression coefficients (R) of CI in planning, design, construction, handover and OM stages on Time performance (P1) is 0.915 in the same direction and the adjusted R Square is 0.837. Hence, results concluded and recommended that five stages of CI have significantly described the overall 83.7% of the variance (adjusted R Square) in Time (P1) performance.

Table 4-15 Analysis of variance for the model

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig,
1	Regression	40.346	5	8.069	106.981	.000 <sup>b</sup>
	Residual	7.844	104	0.075		
	Total	48.191	109			

The overall significance of the ANOVA model evaluation shown in Table 4-15. The statistic F is equal to  $8.069/0.075 = 106.981$  in the ANOVA. The distribution of F (5, 104), and the probability is greater than or equal to 106.981 and significant is less than 0.05. The strong evidence is in contradiction of the null hypothesis. model is significant as  $p < 0.05$ . beta tests were performed to evaluate the contribution of each variable to the respective variable

A measure of contribution of every variable to the model is provided the standardized beta coefficients. the standard variable has been a largely effects on change in unit

variation in this predictor variable as indicated in large values. Rough suggestion of the impact of each predictor variable (independent variable) has given in t and si.(p) values - the criterion variable(dependent variable) has been a great affected by predictor variable when a big t-value and small p value

**Table 4-16 Impact of each variable on Time performance**

Coefficients <sup>a</sup>							
Model		Unstandardized coefficients		Standardized Coefficients	t	Sig.	Result of Hypothesis Testing
		B	Std. Error	Beta			
1	(Constant)	0.296	0.125		2.358	0.020	
	Planning	0.778	0.058	0.950	13.497	0.000	Accept the hypothesis
	Design	-0.128	0.053	-0.161	-2.425	0.017	Accept the hypothesis
	Construction	0.165	0.053	0.186	3.116	0.002	Accept the hypothesis
	Handover	-0.087	0.058	-0.119	-1.516	0.133	Reject the hypothesis
	O &M	0.019	0.052	0.026	0.366	0.715	Reject the hypothesis
a. Dependent Variable: P_1							

The response variable(performance) impact level is strongly indicated in every predictor variable by the beta values. The beta value is calculated with standard deviation. Greater impact on the predictor variable when beta value increases on the reaction variable. To evaluate and differentiate the strength of the relationship between every predictor variable to the response variable, beta regression coefficient is calculated.

Moreover, formula of the single linear regression as follows:

$$Y = \beta + \beta X + \epsilon$$

From the outcome presented in Table 4-16, the most grounded variable of CI in planning stage with standardized beta of 0.950. Regression coefficient of a t- test provides (t=13.497, p=.000) as the p<0.05, the regression coefficient is significant and CI in planning stage is a predictor of Time performance as a conclusion

Subsequently, Design and Construction standardized beta value is 0.161 and 0.186 respectively. Regression coefficient of a t- test provides (t=2.425 and 3.116, p=.000). as the p<0.05 the regression coefficient is significant and CI in Design and Construction stage is a predictor of Time performance as a conclusion

Handover and OM standardized beta value is 0.119 and 0.026 respectively. Regression coefficient of a t- test provides (t=1.516 and 0.366, p=.113 and 0.715). as the p>0.05 the regression coefficient is not significant predictor of Time performance and reject the hypothesis.

## Hypothesis 2

H2: There is a significant impact of CI on Cost Performance. The outcomes of testing of hypothesis are illustrated in Tables 4-17.

**Table 4-17; Model Summary**

Model Summary				
Model	R	R Square	Adjusted R Square	St. Error of the estimate
1	.898 <sup>a</sup>	0.807	0.797	0.36329

a. Predictors: (Constant), AveOM, AveCons, AveDesi, AvePl, AveHand

The outcomes of regression analysis show that multiple regression coefficients (R) of CI in planning, design, construction, handover and OM stages on Cost performance (P2) is 0.898 in the same direction and the adjusted R Square is 0.807. Hence, the results affirmed and recommended that five stages of CI have significantly described the overall 80.7% of the variance (adjusted R Square) in Cost (P2) performance

**Table 4-18 Analysis of variance for the model**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57.265	5	11.453	86.779	.000 <sup>b</sup>
	Residual	13.726	104	0.132		
	Total	70.991	109			

a. Dependent Variable: P\_2

b. Predictors: (Constant), AveOM, AveCons, AveDesi, AvePl, AveHand

The outcomes of the test in Table 4-18 above demonstration that (F= 86.779, p=0.000). Hence, null hypothesis. as  $p < 0.05$  we reject it and conclude that there is significant impact of CI on cost performance.

**Table 4-19 Impact of every variable on Cost Performance:**

Coefficients <sup>a</sup>							
Model		Unstandardized coefficients		Standardized Coefficients	t	Sig.	Hypothesis Testing Result
		B	Std. Error	Beta			
1	(Constant)	-0.016	0.166		-0.095	0.924	
	Planning	-0.058	0.076	-0.059	-0.766	0.445	Reject the hypothesis
	Design	0.894	0.070	0.921	12.755	0.000	Accept the hypothesis
	Construction	0.196	0.070	0.182	2.791	0.006	Accept the hypothesis
	Handover	-0.123	0.076	-0.138	-1.615	0.109	Reject the hypothesis
	O &M	0.006	0.069	0.007	0.084	0.933	Reject the hypothesis

a. Dependent Variable: P\_2

From the result presented in Table 4-19 the most grounded variable of CI in planning stage with standardized beta of -0.059. Regression coefficient of a t- test provides (t=-0.766, p=0.455). as the Since the  $p > 0.05$  we conclude that the regression coefficient is not significant predictor of cost performance and reject the hypothesis

Subsequently, Design and Construction standardized beat value is 0 .921 and 0.182 respectively. Regression coefficient of a t- test provides (t=12.755 and 2.791, p=.000). as the  $p < 0.05$  the regression coefficient is significant and CI in Design and Construction stage is a predictor of cost performance.

Handover and OM standardized beat value is -0.138 and 0.084 respectively. Regression coefficient of a t- test provides (t=-1.615 and 0.084, p=.109 and 0.933). as the  $p > 0.05$  we conclude that the regression coefficient is not significant predictor of cost performance and reject the hypothesis

### Hypothesis 3

H3: There is a significant impact of CI on Quality performance. outcomes of testing of the fundamental hypothesis s are illustrated in Tables 4-20.

**Tables 4-20 Model Summary**

Model Summary				
Model	R	R Square	Adjusted R Square	St. Error of the estimate
1	.524 <sup>a</sup>	0.275	0.240	0.54248

a. Predictors: (Constant), AveOM, AveCons, AveDesi, AvePl, AveHand

The outcomes of regression analysis show that multiple regression coefficients (R) of CI in planning, design, construction, handover and OM stages on Quality performance (P3) is 0.524 in the same direction and the adjusted R Square is 0.240. Consequently, the results affirmed and recommended that five stages of CI have significantly described the overall 24% of the variance (adjusted R Square) in Quality (P3) performance

**Table 4-21- Analysis of variance for the model**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11.586	5	2.317	7.874	.000 <sup>b</sup>
	Residual	30.605	104	0.294		
	Total	42.191	109			

a. Dependent variable: P\_3

b. Predictors: (Constant), AveOM, AveCons, AveDesi, AvePl, AveHand

The outcomes of the test of the table 4.21 above demonstration that ( $F= 7.874, p=0.000$ ). Hence, the null hypothesis as  $p < 0.05$  we reject it and conclude that there is significant impact of CI on Quality performance.

**Table 4-22 Impact of every variable on Quality Performance**

Coefficients <sup>a</sup>							
Model		Unstandardized coefficients		Standardized Coefficients	t	Sig.	Hypothesis Testing Result
		B	Std. Error	Beta			
1	(Constant)	2.207	0.248		8.916	0.000	
	Planning	0.080	0.114	0.105	0.706	0.482	Reject the hypothesis
	Design	0.269	0.105	0.360	2.574	0.011	Accept the hypothesis
	Construction	0.057	0.105	0.068	0.542	0.589	Reject the hypothesis
	Handover	-0.071	0.114	-0.104	-0.627	0.532	Reject the hypothesis
	O &M	0.105	0.103	0.153	1.019	0.311	Reject the hypothesis

a. Dependent Variable: P\_3

From the result presented in Table 4-22, involvement in Design stage standardized beta value is 0.360. Regression coefficient of a t-test provides ( $t=2.574$ ,  $p=.011$ ). as the  $p<0.05$  the regression coefficient is significant and CI in Design phase is a predictor of Quality performance.

Other than Design stage, The Planning, Construction, Handover and OM standardized beta values are 0.105, 0.068, -0.104 and 0.153 respectively. Regression coefficient of a t-test provides ( $t=0.706$ , 0.542, -0.627 and 0.366,  $p=.0482$ , 0.589, 0.532 and 0.311). as the  $p>0.05$  we conclude that the regression coefficient is not significant predictor of Quality performance and reject the hypothesis.

#### **4.6.3 Discussion of Impact of the Client Involvement on project performance**

The level of CI in planning, design and construction stages are significantly impact on time performance on building construction. For Instances change in the scope of the project, delay in progress payment, financial difficulties and delays in decisions making is affection on project completion on time.

The level of CI in design and construction stages is significantly impact cost performance on building construction. For instance, Palaneeswaran (2006) listed several reasons for client associated rework, including less of practice and comprehension of the design and construction process in the project. Further, Ndiokubwayo (2008) indicated that clients were regularly associated the rework instructions because their mind has been changed regularly, project requirements was not clearly defined, or in the event of financial problems. Moreover, notably design related rework can be reduced when good correspondence and connection between clients and design teams, and the involvement of client in design work (Love 2004).

CI in design stages is significantly impact quality performance on building construction. This can be ascribed to the absence of design stage which is brought about by the weakness of the clients' involvement in throughout the project (Althynian, 2010). Therefore, it can be presumed that performance and level of CI are positively linked.

## **4.7 Summary**

This chapter illustrated the purposes of the analysis to explore the current practice of CI throughout construction projects and to discover the impact of CI on performances. The results of the statistical analysis is detailed in this chapter and 140 questionnaires form has been distributed in Sri Lankan Public and semipublic organization, 110 were gotten back.

Checking validity and reliability of the data is included in Preliminary analysis and reliability has been evaluated with a use of Cronbach's alpha test. Descriptive statistics analysis for the respondents' demographic profile and current practices in construction as clients were presented. Clients had neutral involvement which could be expectable throughout the project tasks.

An inferential statistical analysis was directed to differentiate the mean rank of public and semipublic organization by T test. Pearson's Correlation Coefficient has used to find whether, there is a relationship between CI (planning, Design, construction, Handover and O&M) and building project performance in term of time, cost and quality. the outcomes shown that there is significant positive relationship between CI and project performance. A regression model was used to identify the most contributing CI concept. This proposes that CI through planning, Design, construction, Handover and O&M stages improves performance. Subsequently, performance and scopes of CI are positively related.

The following chapter detailed the conclusion of this study, limitation and recommendations for future study are identified.

### 5. CONCLUSION AND RECOMMENDATION

#### 5.1 Introduction

Analysis and discussion of the finding has been done related to the CI and performances factors in the previous chapter. Conclusions and recommendation from the analysis has been briefed in this chapter. Connection between the chapter of the research is identified, prior to making determinations and considering the ramifications of the research findings

As explained in Chapter 1, this study was initiated as need to explore the degree of CI in Sri Lankan construction project. the research was intended to distinguished the CI and impact on performance in the project cycle, to improve results in construction project output.

As explained in Chapter 2, the literature explained current information on the fact and tended to address some of the research problems. It assisted with coordinating the findings of the current research with the current collection of information as well. However, few researchers have investigated on effectiveness of CI in public projects.

Chapter 3, the research problems have been taken to answer in the research methodology. The data collected from the questionnaire was detailed and analyzed by the findings of the statistical analyses in Chapter 4. The respondents' demographic details were first presented in descriptive statistics analysis. The respondent's degree of CI as client was estimated though the five stages of project. The impacts of clients' involvement were evaluated on the project output results. This chapter is concluding the research and recommendation for upcoming research as well

#### 5.2 Conclusion

The clients are the most significant contributor in construction industry and who are main participant for the successful project completion. The success or failure of the construction projects is depending on client's behaviors which play major role that cannot be avoided. CI is connected to the accomplishment of a project on performance.

Therefore, the level of CI should be increased to minimize the negative impact of project performance in term of time, cost and quality though out the project. Therefore, this research is aimed to examine the impact of CI on the Public Building project performances during the construction process. Three objectives were established in order to achieve this aim. The first objective which was to recognize the roles and responsibilities of clients in projects and achieved through comprehensive literature review and the preliminary survey. It has done to further cross checked to improve the validity.

The second objective was to comprehend the existence practice of CI in Sri Lankan projects. In order to achieve this objective two type of analysis was done which analyses over all CI and compare current involvement by possession type (public and semipublic) and finally important stage of CI was ranked. the CI is explored over the five stages of construction project such as planning stage, design stage, construction stage, hand over and; operational & management stage

The current level CI is neutral and low involvement in 27 out of 40 tasks in projects in Sri Lanka and this is going to negatively affect the project out comes. The CI was neutral in the planning stage which may due to seeking high level authority party to the project budget approval and depending another team for feasibility study. the design stage is not less significant of the project because the majority of project could be stated in this stage. Neutral involvement in design stage has stated by average CI. Design document need to be progressively reviewed by the clients. Successful project output has been positive effect on client high involvement in design stage which gives extensive gratitude. Detail drawings and specifications gives a picture of new projects in design stage, while the acquire resources need for process of completing task to provide physical reality in construction stage. Conflict between client and contractor could be reduced by proper explanation in design documents. This research explored that the clients didn't give sufficient consideration to the activities during the tender process, which should be performed prior to construction of the project. The project procurement process and facility operation success are determined in handover stage of the project toward the finish of the construction. The CI level in handover activities was considered close to high involvement which is revealed the significant of the handover stage. Transfer the data from contractors to the client of the project is crucial that data should be efficient and effective and structured way. CI in operation and maintenance of projects

was to least level among other project stages. Effective operation and maintenance are linked with level of client involvement. Therefore, there is a necessity for giving a careful consideration during planning, design, and construction stages to fulfill for operation and maintenance objectives.

The project possession type comparison was done on the CI between the sectors by T tests. Significant changes were shown in the possession type part that the main important changes between the mean ranks between the two group (public and semi-public) were in planning, construction and operation and maintenance stages. Somewhat high level of CI in semi-public projects and low-level involvement in the planning, construction stages in public projects could be observed.

Priority level was ranked, the planning stage was first priority for CI among the five project stages of construction projects. Then followed by design stage. The remaining stages has been ranked as follows: (3) construction stage; (4) handover stage; (5) operations and maintenance stage.

Final objective of this research is to explore the impact of existent CI practices on project performance in terms of time, cost and quality. First pearson's correlation coefficient was used assess whether there is significant relationship between CI stages and performance and; all involvement of five construction stages is positively linearly connected to performance of Time, Cost and Quality. Then to evaluate the strength of the relationship between each performance factor leaner regression analysis was carried out to calculate the effect of CI on project performance. The level of CI in the planning stage, design stage and construction stage were most significant stages and had a high impact on the project outcomes. In the design stage, CI was important and significantly impact on Time cost and quality performance to found.

In the construction stage, CI were significantly impact on Time and Cost performance to be found which include: sub-contractor appointments, making quick decisions about design changes or change order and materials selection. Clients can resolve any claims, and enforce the environmental management, quality and, health and safety control of the project by conducting regular visits to the site during construction. In the handover stage and operational and management stages, CI was not significantly impact on time cost and quality.

There is a considerable positive connection between CI in building projects and project performance in term of time, cost and quality. This suggests that the high level of clients' involvement through the planning stage, design stage and construction stage, handover and O&M stages are enhancing the project performance.

### **Recommendations**

This research recommends that CI is neutral in planning stage due to delay in approval from cabinet ministers for project budget. Therefore, the financial and monetary administration system should be improved and modify in Sri Lanka. Further, clients need to have progressed information to review the design documents in design stage. Successful project output has been positive effect on client high involvement in design stage which gives extensive gratitude. Furthermore, during the tender selection process, client should give enough consideration to tasks that should be executed well prior to construction of the project.

In addition to that, clients can resolve any claims, and enforce the environmental management, quality and, health and safety control of the project by conducting regular visits to the site during construction. It will enhance the performance of the projects as well as reduce conflicts among stakeholders. Assigning special O&M representative during construction process to give best advice to project team to achieve O& M can be given as recommendation to client.

The deviations found in CI based on the project possession type may be diversities in the project management practices in construction and various methods used in government organization in Sri Lanka. Therefore, general guidelines to define the role of public organization should be established and implemented in construction project management.

### **Limitations**

The aim of this study was on impact of CI in building construction projects performances in Sri Lanka. Subsequently, it is imperative to perceive the accompanying constraint:

- The investigation was limited to the function of government organization that incorporate project management team with various duty engineers in various

fields who represent to the public authority (client) in the public building projects.

### **Recommendations for Future Research**

This research recommends that client give more attention to all the stage of projects in order to achieve success of projects. In view of the findings of the study various directions for future study can be recommended:

- Investigate the variables influencing the CI in construction projects in public projects such as project factors, individual factor, organizational cultures factors and etc.
- Investigate the function of the consultant and contractor and study the problems that they handle and managed according to client involvement.
- Since this research focused on engineering management team such as Engineers and Quantity Surveyor, the client in public organization not limited to engineering team. Therefore, future research respondents can be done with other team who influence on public construction projects.
- This research was done a quantitative methodology and Future research could also use a qualitative methodology

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## **APPENDIXES**

## Appendix- A Sample Questionnaire

### QUESTIONNAIRE SURVEY

#### DEMOGRAPHIC INFORMATION

The purpose of this part is to collect some demographic information about the participant

For the following items, please choose the item that best describes your demographics

1) Type of government organisation sector you work for?

- Government
- Semi government

2) Designation

- Chartered Engineer
- Chartered Quantity Surveyor
- Engineer
- Quantity Surveyor
- Other.....

3) Work Experience

- 0-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- 20+ years

4) Specify Contract Sum of the Building project which you have experience with public Client ( contract sum > 100 million)

.....

## Client Involvement

- 5) Consider above mention Project and identify the frequency of Client (Your) involvement in **PUBLIC** projects.

Very low	Low	Neutral	High	Very high
1	2	3	4	5

	DESCRIPTION	1	2	3	4	5
<b>A- Planning Phase:</b>						
A1	Developing Project Brief ( Feasibility study)					
A2	Studying the requirements of the beneficiary of the project.					
A3	Estimation and agreement of project duration					
A4	Estimation and approval of the project cost.					
A5	Studying and determining the technical specifications of the materials					
A6	Preparation of preliminary design					
A7	Preparation and application of Environment requirement					
A8	Study impact of the project on the Environment					
A9	Preparation of and application of health and safety requirement					
<b>B- Design Phase:</b>						
B1	Provide the consultant with all necessary information required for the project					
B2	Review of drawings and specifications					
B3	Monitor and guarantee design quality.					

B4	Negotiation of Tender prices					
B5	Selection of Procurement Strategy					
B6	Tendering					
B7	Contractor appointment					
B8	Preparation of construction drawings					

	DESCRIPTION	1	2	3	4	5
<b>C: Construction Phase</b>						
C1	Qualification of contractors competing to implement the project.					
C2	Management and inspection of the site					
C3	Attending progress meetings					
C4	Attending technical meetings					
C5	Attending site handover meetings					
C6	Making decisions quicker about design changes or variations					
C7	Selection of materials					
C8	Making payments to contractors for work done					
C9	Monitoring health and safety principles during project implementation.					
C10	Monitoring environmental management principles during project implementation.					
C11	Conducting quality checks					
C12	Dispute resolution					
C13	Sub-contractor appointments					
<b>D: Handover Phase</b>						
D1	Establishment of criteria for acceptance of completed project					
D2	Contribute to compiling snagging or defects list					
D3	Final account settlement					
D4	Issuing of certification acknowledging completion of the works					
D5	Input into project review and close out report					
D6	Release of guarantees and securities					

D7	Release of retentions where applicable					
<b>E: Operation and Maintenance Phase</b>						
E1	Development of maintenance plan					
E2	Monitoring the process of testing and commissioning of all systems, plant and equipment in the project.					
E3	Record the warranties and certificates information					

6) How do you rate the following project phases for Client Involvement in the order of **importance**, on a **5-point scale where 1 is important most important?**  
(you should select all three columns in order of importance)

<b>Project Stage</b>	<b>Rate</b>
Planning stage	
Design stage	
Construction stage	
Handover stage	
Operation and Maintenance stage	

**What Extent You Agree with the Following Statements about Impact of Client Involvement in Project Success**

7) In typical project, you are requested to Indicate (X) in the box the degree to which you agree with the following statements

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>In typical Project, to what extent were the projects implemented:</b>					
Implemented in compliance with the <b>work schedule</b> and <b>finish on time [Time]</b>					

Implemented within the <b>contract price</b> [Cost]					
Implemented with the specifications and expected quality [Quality]					

8) How would you rate your overall experience with the involvement of clients in their projects?

totally unsatisfactory	Unsatisfactory	neutral	Satisfactory	Totally satisfactory.

9) Do you consider that Client Involvement in construction projects can be improved? If so, please elaborate

.....  
.....  
.....