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FACTORS AFFECTING PERFORMANCE OF BUILDING CONSTRUCTION PROJECTS AT LIDETA SUB-CITY: THE CASE OF COMMERCIAL BUILDING PROJECTS

BY

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This is to certify that the thesis prepared by Maerege Gebrehewot Gebremedhin entitled: **"Factors Affecting the Performance of Building Construction Projects At Lideta Sub-city: The Case of Commercial Building Projects"** and submitted in partial fulfillment of the requirements for degree of masters of project management complies the regulations of the university and meets the standards with respect to originality and quality.

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List of Acronyms

AEC	Architectural Engineering and Construction
DBB	Design-Bid-Build
DETR	Department of the Environment Transport and the Regions
E.C	Ethiopian Calendar
ECI	Early Contractor Involvement
ESI	Early Supplier Involvement
GNP	Gross National Product
HR	Human Resource
KPI	Key Performance Indicator
MOUDHD	Ministry of Urban Development Housing and Construction
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PPI	Project Performance Indicators
SPSS	Statistical Package for Social Science
UK	United Kingdom
US	United States

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Abstract

The purpose of this study is to examine the factors affecting the performance of commercial building projects at Lideta Sub-city. More specifically, the study aims to identify and describe the relationship between project cost management factors, project time management factors, project quality management factors, project scope management factors, project risk management factors and performance indicators of commercial building construction projects at Lideta Sub-city. The study employed a causal research design and used a quantitative research approach. A survey was conducted by using 174 structured close ended questions which were distributed to 58 contractors, 58 consultants and 58 owners of building construction projects. Descriptive and multiple regression statistical tools were used to examine the causal relationship between factors that affect project performance and project performance indicators (construction cost, construction time, construction quality and construction scope). The findings of the regression analysis showed that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors are positively and significantly affected performances of building construction projects at Lideta Sub-city. Thus, this study recommended that contractors, consultants and owners should really give emphasis on addressing the correlates of project performances so as to increase the efficiency, effectiveness and quality of building construction projects at the Sub-city.

Keywords*: project cost management factors, project time management factors, project quality management factors, project scope management factors, project risk management factors, project performance indicators, Lideta sub-city, Ethiopia.*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The construction industry is vital for the development of any nation. In many ways, the pace of the economic growth of any nation can be measured by the development of physical infrastructures, such as buildings, roads and bridges. Construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors, with the major aim being to bring the project to a successful conclusion (Navon, 2005).

Throughout the world, the business environment within which construction organizations operate continues to change rapidly. Organizations failing to adapt and respond to the complexity of the new environment tend to experience survival problems (Lee et al. 2001). With increasing higher users' requirements, environmental awareness and limited resources on one side, and high competition for construction business marketplace on the other side, contractors have to be capable of continuously improving their performance (Samson and Lema, 2005).

Construction is one of the largest industries and contributes to about 10% of the gross national product (GNP) in industrialized countries (Navon, 2005). Construction industry has complexity in its nature because it contains large number of parties as clients, contractors and consultants. The success of construction project depend on its performance, which is measured based on timely completion, within the budget, required quality standards and customers satisfaction (Omran, 2012). Performance is measured in several ways as time, cost, quality, client satisfaction; productivity and safety. The most important factors affecting project performance are: delays because of materials shortage; unavailability of resources; low level of project leadership skills; escalation of material prices; unavailability of highly experienced and qualified personnel; and poor quality of available equipment and raw materials (Enhassi, 2009).

According to Kibuchi and Muchungu (2012) research paper on performance of building construction projects in Nairobi, Kenya, discovered that despite the high quality of training of consultants in the building industry and regulation of the industry in major urban areas, construction projects do not always meet their goals. This is manifested by myriad projects that have cost overrun, delayed completion period and poor quality resulting to collapsed buildings in various parts of the country, high maintenance costs, dissatisfied clients and even buildings which are not functional.

Previous studies on factors affecting performance of construction projects in Palestine show that the failure of any project is mainly related to failure in performance (Karim and Marosszeky 1999, DETR KPI Report 2000, Lehtonen 2001, Samson and Lema 2002, Kuprenas 2003, Cheung 2004, Iyer and Jha 2005, Navon 2005, Ugwa and Haupt 2007). While individual organizations have been measuring their performance for many years, there has been little consistency in the data, and the way it has been published. The performance can be measured by key indicators for evaluation. The purpose of Key performance indicators (KPIs) is that clients want their projects delivered: on time, on budget, free from defects, efficiently, right first time, safely, by profitable companies. So, Regular clients expect continuous improvement from their construction team to achieve year-on-year: reductions in project costs and time.

Chan and Kumaraswamy (2002) stated that construction time is increasingly important because it often serves as a crucial benchmarking for assessing the performance of a project and the efficiency of the project organization. Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. It is obtained by Navon (2005) that a control system is an important element to identify factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) is needed. Pheng and Chuan (2006) obtained that human factors played an important role in determining the performance of a project. Ugwu and Haupt (2007) remarked that both early contractor involvement (ECI) and early supplier involvement (ESI) would minimize constructability-related performance problems including costs associated with delays, claims, wastages and rework, etc.
KPIs are one of the factors that constitute the project success criteria. Swan and Kyng (2005) view KPIs as the measure of a process that is critical to the success of an organization and/or project. According to a publication by Price Waterhouse Coopers (PWC), KPIs means actors by

reference to which the development, performance or position of the business of the company can be measured effectively. Thoor and Ogunlana (2010), together with Humaidi and Said (2011), suggested that KPIs are helpful to compare the actual and estimated project performance in terms of effectiveness, efficiency, and quality of workmanship and product. KPIs can be used to measure the performance of project operation and are usually used in construction projects. Moreover, performance measurement can be carried out by establishing KPIs which offer objective criteria to measure project success. The formal definition for KPIs according to Public Record Office Victoria (2010) is Key Performance Indicators (KPIs) are quantitative and qualitative measures used to review an organizations progress against its goals.

In addition, the Key Performance Indicators (KPIs) can be used for benchmarking purposes, and will be a key component of any organization move towards achieving best practice. Clients, for instance, assess the suitability of potential suppliers or contractors for a project, by asking them to provide information about how they response to a range of indicators. Some information will also be available through the industry's benchmarking initiatives, so clients observe how potential suppliers compare with the rest of industry in a number of different areas. Construction supply chain companies will be able to benchmark their performance to enable them to identify strengths and weaknesses, and assess their ability to improve over time. The KPIs framework consists of seven main groups: time, cost, quality, client satisfaction, client changes, business Performance, health and safety (DETR, 2000).

According to Mbugua (1999) performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. In other words, when indicators can be measured with some degree of precision and without ambiguity they are called measures. However, when it is not possible to obtain a precise measurement, it is usual to refer to performance indicators. Performance measures are the numerical or quantitative indicators (Sinclair and Zairi, 1995).

Project management knowledge areas of PMBOK guide of project management institute (PMI, 2013) and its construction extension (PMI, 2005) are adopted as the main factors determining the performance of projects: (1) project integration management (2) project scope management (3) project time management (4) project cost management (5) project quality management (6) project human resources management (7) project communications management (8) project risk management (9) project procurement management and (10) project stakeholder management.

Therefore, identifying factors that affect the performance of construction projects is very important to connect industry and project goals and objectives for improvement of process and method of doing things and administering projects. In addition to identification of performance factors, investigation of performance of projects should have to be done in project and industry level along with their respective process and method.

1.2 Statement of the problem

Understanding the performance or progress of a construction project can help to know and improve the projects future. A failed project can be described as one delayed, over budget, out of scope or ultimately canceled. On the other hand, a project is said to be successful when the project is on time and within budget, within scope, within the satisfaction of the customers or project stakeholders, meeting of its objectives, quality specification, project risk, safety standards, health, environmental, cultural and security requirement (Storm and Janssen, 2004; Schwalbe, 2010).

In developing countries, the construction industry is a key barometer of economic performance. Despite construction industry's significant contribution to the economy of developing countries and the critical role it plays in those countries' development, the performance of the industry still remains generally low. Idoko (2008) noted many projects in developing countries encounter considerable time and cost overruns fail to realize their intended benefit or even totally terminated and abandoned before or after their completion.

According to Enhassi (2009) the factors affecting the performance of construction projects in Palestine are delays because of materials shortage; unavailability of resources; low level of project leadership skills; escalation of material prices; unavailability of highly experienced and qualified personnel; and poor quality of available equipment and raw materials.

In Ethiopia, 79.06 percent of projects had failed to meet their objectives (Getachew, 2015).
Abadir (2011) found out that among the management knowledge areas of project in Ethiopia which determine the performance of the project, project time management is considered the critical one with only 24% projects managed well.

The execution of most of the construction projects were not completed on time, within budget and desired quality Becker and Behailu (2006). Such problems lead to loss of profits, increasing cost and leading to technical and managerial problems between project parties. Abebe and Ayalew (2009) also revealed a gap in practice of basic project management body of knowledge areas. Change in defined scope, lack of proper planning, lack of proper evaluation of tender documents by contractors at tendering phase and contractor's financial problems were identified as major causes which affect the performance of the construction project. Abebe and Jemal (2015) stated that the most common effects of cost over run identified are delay, supplementary agreement, adverse relations among stake holders and budget shortfall of project owners.

The findings of the study conducted by Memon et al. (2012) revealed that 92% of construction projects of Malaysia were facing time overrun and only 8% of project could achieve completion within contract duration and 89% of respondents agreed that their projects were facing the problem of cost overrun with average overrun at 5-10% of contract price. The same is true for Nigeria and Kenya. The research made by Auma (2014) was an evidence that the performance of the construction in Kenya is poor. Majority of the projects escalated with a magnitude of over 50% and over 50% of the projects likely to escalate in cost with a magnitude of over 20%. Construction projects in Nigeria are also facing the same problem concerning cost and time. According to Akinsiku (2014) 42.3% of construction projects' time and cost performance is between 5-10% of the time scheduled and budgeted cost.

Fetene (2008) examined factors that cause cost overrun during construction and their effects on public building construction projects in Ethiopia. Utilizing questionnaire survey of 70 completed public building construction projects in Ethiopia. The authors identified, and assessed the impact of cost overrun on the delivery of construction projects. From the results it was found that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects.

According to a report by Federal Democratic Republic of Ethiopian, Ministry of Urban Development, Housing and Construction (2014) on project performance status evaluation stated that among 14 public building projects under construction 8 projects, i.e. 57%, have failed to meet the planned percentage, (MOUDHD, 2014).

In Lideta sub-city, Addis Ababa, building construction projects performance problem appears through different directions. There are many constructed building projects fail in time performance, others fail in cost performance, others fail in scope performance, others fail in quality performance and others fail in other performance indicators (Unpublished report, 2017). In Lideta sub-city, Addis Ababa, According to a report from lideta sub-city building permit and control office, from 2006-2010 E.C, 43 residential buildings and 58 commercial buildings construction license was given to owners. As per lideta sub-city building permit and control office report, most commercial building construction projects are not finished on time, scope, cost and quality (Unpublished report, 2017). They are always asking and taking building extension permit from the office which is failing in performance. In addition, performance measurement systems are not effective or efficient to overcome this problem.

The above facts indicate there is building construction project performance problem in lideta sub-city, Addis Ababa. Therefore, this research was identified the factors affecting the performance of commercial building construction projects and suggests ways to owners, consultants and contractors to improve performance problem and to improve their performances.

1.3 Basic research questions

1. What are the most significant factors affecting performance of commercial building construction projects at Lideta sub-city?
2. What are the cost management practices implemented in commercial building construction projects at Lideta sub-city?
3. What are the time management practices implemented in commercial building construction projects at Lideta sub-city?
4. What are the quality management practices implemented in commercial building construction projects at Lideta sub-city?
5. What are the scope management practices implemented in commercial building construction projects at Lideta sub-city?
6. What are the risk management practices implemented in commercial building construction projects at Lideta sub-city?

1.4 Objectives of the study

1.4.1 General objectives

- ✓ To identify the factors affecting performance of commercial building construction projects at Lideta sub-city.

1.4.2 Specific objectives

1. To identify the most significant factors affecting performance of commercial building construction projects at Lideta sub-city
2. To identify cost management practice in commercial building construction projects at Lideta sub-city.
3. To identify time management practice in commercial building construction projects at Lideta sub-city.
4. To identify quality management practice in commercial building construction projects at Lideta sub-city.
5. To identify scope management practice in commercial building construction projects at Lideta sub-city.
6. To identify risk management practice in commercial building construction projects at Lideta sub-city.

1.5 Hypothesis of the Research

Hypothesis 1

H_{01}: construction cost performance indicator has no significant relationship with project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at Lideta sub-city

Hypothesis 2

H_{02}: construction time performance indicator has no significant relationship with project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at Lideta sub-city

Hypothesis 3

H_{03}: construction quality performance indicator has no significant relationship with project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at Lideta sub-city

Hypothesis 4

H_{04}: construction scope performance indicator has no significant relationship with project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at Lideta sub-city

Hypothesis 5

H_{05}: construction performance indicators has no significant relationship with project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at Lideta sub-city

1.6 Significance of the study

It is hoped that the lessons to be drawn from the factors affecting the performance of building construction projects in Lideta sub-city will help to take corrective actions to the existing problems and gaps in a project success for building construction projects in Lideta sub-city.

Therefore, the researcher strongly believes that the findings of this study

1. It will provide valuable information to the owners, contractors and consultants towards achieving the project within the specified time, within budget, within required quality standards and scope.
2. It will give policy makers and higher officials clear insight into the reality of the project success in the Ethiopian standards.
3. It serves as a spring board for those people who want to conduct further study in the area.

1.7 Scope of the Study

There are many factors that affect the performance of building construction projects but this research was only limited to time management, cost management, quality management and scope management factors from project management knowledge areas. Because in project management the above factors are the iron triangle for performance of any project. This means without performing one factor it is too difficult to perform the other. In addition, many studies which are conducted in this area of study ignore to study the above factors together. In addition, risk management factor from project management knowledge area are also included in the study.

The study area was limited to 58 under construction commercial building projects those received building permit license in the past five years from 2006-2010 E.C in Lideta sub-city, Addis Ababa. Hence, the target respondents were owners, contractors and consultants involved in commercial building construction projects at time bounded in lideta sub-city. The study examined project time management, project cost management, project quality management, project scope management and project risk management factors as independent variable and building construction projects performance (cost, time, quality and scope) as dependent variables.

1.8 Organization of the Research Report

The paper consisted of five chapters. The first chapter deals with introduction, statement of the problem, basic research questions, objectives of the study, definition of terms, significance of the study, scope of the study and organization of the paper. Chapter two presents review of related literatures. Chapter three described the methodology of the study. The empirical findings of the study were presented in chapter four. Chapter five deal with summary, conclusions and recommendations. Finally, references were listed; appendices and annexes were attached at the end.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1 Definition and Concepts

For many people it is still unclear the distinction between criteria and factors. The Oxford Advanced Learner's Dictionary describes the criterion as "a standard or principle by which something is judged, or with the help of which a decision is made" while a factor is explained as "a fact or situation which influences the result of something".

- Performance means carrying out a task, the progress of which can be measured and compared using a set of stated requirements.
- Therefore, performance factor is a fact or situation which influences a progress of work which can be measured and compared using a set of stated requirements.

Performance can be considered as an evaluation of how well individuals, groups of individuals or organizations have done in pursuit of a specific objective (Ankrah and Proverbs, 2005). These objectives vary significantly, but from an industry or organizational perspective, they generally revolve around satisfying the key stakeholders such as customers, employees, shareholders, the various suppliers, government and society as a whole. Mullins (1993) described performance as relating to such factors as increasing profitability, improved service delivery or obtaining the best results in important areas of organizational activities. In construction, because of the numerous participants who contribute towards the achievement of project objectives, performance has been defined in one sense as a participant's (client, consultant or contractor) contribution to the execution of the task required to complete the project (Mullins, 1995).

The characteristics of the construction industry are such that a project is often a major business endeavor representing a major investment by the client, however the most research published in the construction management literature on performance in the construction context mainly focus attention on the contractor's role (Hobday, 2000). This implies that ultimately it is the project performance that determines overall business performance. These characteristics make project performance critical.

Because the client is the principal stakeholder in the construction process, good performance has been defined typically in terms of the delivery of projects on time, to specification and within budget, providing good service and achieving reasonable life-cycle costs. More recently, the requirements of the other stakeholders such as employees and society have come into focus with the need to promote sustainable construction and corporate social responsibility, and this is reflected in a more comprehensive set of industry. Key Performance Indicators (KPIs) of project performance covering such issues as environmental protection and respect for people (Hobday, 2000).

According to Kingsley (2010) performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. In other words, when indicators can be measured with some degree of precision and without ambiguity they are called measures. However, when it is not possible to obtain a precise measurement they are usually referred to as performance indicators.

KPIs enable a comparison between different projects and enterprises to identify the existence of particular patterns (Karim and Marosszeky, 1999) sited in Shaban (2008). Samson and Lema (2002) sited in Shaban (2008) stated that KPIs are very important in order to deliver value to stakeholders. So, companies must be sure they have right processes and capabilities in place. The KPIs also allow to suggest which processes and capabilities must be competitively and distinctive, and which merely need to be improved or maintained.

The key performance indicators are identified by Hobday (2000) as an applicable indication of project and/or company levels. In some cases the company indicator is the average value of that company’s project indicators. Shaban (2008) stated that the owner satisfaction for performance can be defined as the gap between what the owner expects and the level of performance they believe is being delivered by the contractors.

In order to define the KPIs throughout the lifetime of a project in Design-Bid-Build (DBB) project procurement system, five key stages have been identified as shown below (Hobday, 2000):

A. **Commit to Invest:** the point at which the client decides in principle to invest in a project sets out the requirements in business terms and authorizes the project team to proceed with the conceptual design.
B. **Commit to construct**: the point at which the client authorizes the project team to start the construction of the project.
C. **Available for Use:** the point at which the project is available for substantial occupancy or use. This may be in advance of the completion of the project.
D. **End of Defect Liability Period:** the point at which the period within the construction contract during which the contractor is obliged to rectify defects ends (often 12 months from point C).
E. **End of Lifetime of Project**: the point at which the period over which the project is employed in its original or near original purpose ends. As this is usually many years after the project's completion, this is a theoretical point over which concepts such as full life costs can be applied.

2.2 Problem of Performance in Construction Industry

The failure of any construction project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such problem. Shaban (2008) stated that the construction industry performance problems in developing economies can be classified in three layers: problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients and consultants and problems caused by contractor incompetence/inadequacies.

The subject of performance measurement or assessment has become a matter of concern to several countries at different levels of socio-economic development which have realized the need to improve the performance of their construction industry (Kingsley, 2010). Navon (2005) identified in various forms as low productivity, delays, cost overrun, poor, and quality and so on. Poor project performance has been noted as the bane of construction industries of several countries, particularly, developing countries.

Ling et al (2007) remarked that architectural, engineering and construction (AEC) firms may face difficulties managing construction projects performance in China because they are unfamiliar with this new operating environment. International construction projects performance is affected by more complex and dynamic factors than domestic projects; frequently being exposed to serious external uncertainties such as political, economical, social, and cultural risks, as well as internal risks from within the project.

2.2.1 Time and Cost Overrun in Ethiopian Construction

Time and cost overruns in construction projects in Ethiopia is one of the most significant problems in the field construction management. Research and studies in this field in Ethiopia are few compared to the problem of time and cost overrun. Having this in to consideration this research is done on factors affecting performance in university building construction projects. Despite the importance and the significant of the construction sector in Ethiopia, it is noted that the parties of project (owner, consultant, and contractor) didn’t give sufficient evaluation for time and cost overruns at the end of the project.

Fetene (2008) examined factors that cause cost overrun during construction and their effects on public building construction projects in Ethiopia. Utilizing questionnaire survey of 70 completed public building construction projects in Ethiopia. The authors identified, and assessed the impact of cost overrun on the delivery of construction projects. From the results it was found that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects. The most important causes of cost overrun were found to be inflation or increase in the cost of construction materials, poor planning and coordination, change orders due to enhancement required by clients, excess quantity during construction.

2.2.2 Quality in Ethiopian Construction

In Ethiopia Quality is an important issue in building construction projects. The objective of any construction project is to finish the construction within the estimated budget, time and according to the quality requirements. Poor quality of work leads to loss of money and time. The owner has the right to ask for rework when the executed job is not complying with the agreed quality standards. But if the required quality standards are not clearly defined in the contract, the client might overstate the quality requirement which will create problems with the contractor.

2.3 The Theory of Performance

The Theory of Performance develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements. A performer can be an individual or a group of people engaging in a collaborative effort. Developing performance is a journey, and level of performance describes location in the journey. Current level of performance depends holistically on 6 components: context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. Three axioms are proposed for effective performance improvements. These involve a performer mindset, immersion in an enriching environment, and engagement in reflective practice.

Performance advancing through levels where the labels "Level 1," "Level 2," etc. are used to characterize effectiveness of performance. That is, a person or organization at Level 3 is performing better than a person or organization at Level 2. Performing at a higher level produces results that can be classified into categories: (i) quality increases; results or products are more effective in meeting or exceeding the expectations of stakeholders produce a result goes down; amount of waste goes down, (ii) capability increases; ability to tackle more challenging performances or projects increases,(iii) capacity increases; ability to generate more throughput increases, (iv) knowledge increases ; depth and breadth of knowledge increases,(v) skills increase; abilities to set goals persist, maintain a positive outlook, etc. increase in breadth of application and in effectiveness and(vi) identity and motivation increases ; individuals develop more sense of who they are as professionals; organizations develop their essences.

2.4 Performance Measurement Theory

Mbugua (1999) and Love (2000) have identified a distinction between performance indicators, performance measures and performance measurement.

According to Mbugua (1999) performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. In other words, when indicators can be measured with some degree of precision and without ambiguity they are called measures.

However, when it is not possible to obtain a precise measurement, it is usual to refer to performance indicators. Performance measures are the numerical or quantitative indicators (Sinclair and Zairi, 1995).

On the other hand, performance measurement is a systematic way of evaluating the inputs and outputs in manufacturing operations or construction activity and acts as a tool for continuous improvements (Sinclair and Zairi, 1995; Mbugua, 1999). In response to calls for continuous improvement in performance, many performance measurements have emerged in management literature. Some examples include: the financial measures Kangari, 1992; Kay 1993; Brown and Lavenrick 1994; and Kaka, (1995) client satisfaction measures (Walker, 1984; Bititci, 1994; Kometa, 1995; Harvey and Ashworth, 1997; and Chinyio, 1998), employee measures (Bititci, 1994; Shah and Murphy, 1995; and Abdel-Razek, 1997), project performance measures (Belassi and Tukel, 1996) and industry measures (Latham, 1994; Egan, 1998; Construction Productivity Network, 1998; and Construction Industry Board, 1998); as cited in (Mbugua, 1999).

2.5 The Goals of Performance Measurement

1. **Informing strategy and policy development.** Performance measurement is used to inform Overall strategic planning and direction-setting as well as the ongoing development and implementation of policy and plans. Evidence gained about the difference the agency made through the services it has provided, and the interventions chosen can be used to make informed, targeted changes to policies and plans.

2. **Informing capability and service development.** Performance measures are used to identify areas where capabilities and services need to be developed to enhance core outcomes. For instance, the agency should use performance measurement information to inform workforce planning, recruitment, HR development and organizational planning, which all contribute to enhancing the design, delivery and impact of core services.

3. **Reporting achievements.** Performance measurement should also be used to report coherently and concisely on their achievements. If the performance measurement process is followed it is possible to produce clear, coherent performance stories around the aimed priorities to be achieved. These can clearly explain how one is progressing towards achieving its outcomes.

2.6 Performance Measurement Process

US department of defense (2012), on its book how to measure performance stipulated the process of measuring performance as the following

1. **Identify the process flow.** This is the first and perhaps most important step. If your employees cannot agree on their processes, how can they effectively measure them or utilize the output of what they have measured?

2. **Identify the critical activity to be measured.** The critical activity is that culminating activity where it makes the most sense to locate a sensor and define an individual performance measure within a process.

3. **Establish performance goal(s) or standards.** All performance measures should be tied to a predefined goal or standard, even if the goal is at first somewhat subjective. Having goals and standards is the only way to meaningfully interpret the results of your measurements and gauge the success of your management systems.

4. **Establish performance measurement(s).** In this step, you continue to build the performance measurement system by identifying individual measures. Identify responsible party(s). A specific entity (as in a team or an individual) needs to be assigned the responsibilities for each of the steps in the performance measurement process.

5. **Collect data.** In addition to writing down the numbers, the data need to be pre-analyzed in a timely fashion to observe any early trends and confirm the adequacy of your data collection system.

6. **Analyze/report actual performance.** In this step, the raw data are formally converted into performance measures, displayed in an understandable form, and disseminated in the form of a report.

7. **Compare actual performance to goal(s).** In this step, compare performance, as presented in the report, to predetermined goals or standards and determine the variation (if any).

8. **Are corrective actions necessary?** Depending on the magnitude of the variation between measurements and goals, some form of corrective action may be required. Make changes to bring back in line with goal. This step only occurs if corrective action is expected to be necessary. The actual determination of the corrective action is part of the quality improvement process, not the

performance measurement process. This step is primarily concerned with improvement of your management system.

9. Are new goals needed? Even in successful systems, changes may need to be revised in order to establish ones that challenge an organization's resources, but do not overtax them. Goals and standards need periodic evaluation to keep up with the latest organizational processes.

2.7 Construction Projects and Performance

Success of construction projects depends mainly on success of performance. Many previous researches had been studied performance of construction projects. Dissanayaka and Kumaraswamy (1999) remarked that one of the principle reasons for the construction industry's poor performance has been attributed to the inappropriateness of the chosen procurement system. Reichelt and Lyneis (1999) remarked three important structures underlying the dynamic of a project performance which are: the work accomplishment structure, feedback effects on productivity and work quality and effects from upstream phases to downstream phases. Thomas (2002) identified the main performance criteria of construction projects as financial stability, progress of work, standard of quality, health and safety, resources, relationship with clients, relationship with consultants, management capabilities, claim and contractual disputes, relationship with subcontractors, reputation and amount of subcontracting.

Chan and Kumaraswamy (2002) stated that construction time is increasingly important because it often serves as a crucial benchmarking for assessing the performance of a project and the efficiency of the project organization. Cheung et al (2004) identified project performance categories such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. It is obtained by Navon (2005) that a control system is an important element to identify factors affecting construction project effort. For each of the project goals, one or more Project Performance Indicators (PPI) is needed. Pheng and Chuan (2006) obtained that human factors played an important role in determining the performance of a project. Ugwu and Haupt (2007) remarked that both early contractor involvement (ECI) and early supplier involvement (ESI) would minimize constructability-related performance problems including costs associated with delays, claims, wastages and rework, etc.

Ling et al (2007) obtained that the most important of practices relating to scope management are controlling the quality of the contract document, quality of response to perceived variations and extent of changes to the contract. It was recommended for foreign firms to adopt some of the project management practices highlighted to help them to achieve better project performance in China.

2.8 Project Management and Project Performance

Management in construction industry is considered as one of the most important factors affecting performance of works. Ugwu and Haupt (2007) stated that documenting and archiving performance data could be useful for future reference, such as for settling disputes on claims, and in maintenance and repair works. Kuprenas (2003) remarked that quantification of the impacts of the project management processes are identified through three steps of analysis: comparison of summary statistics of design performance, proof of statistical significance of any differences and calculation of least squares regression line of a plot of design performance measurement versus amount/application of project management as a means to quantify management influence to design phase cost performance.

Kuprenas (2003) stated that while project management is only one of the many criteria upon which project performance is contingent, it is also arguably the most significant as people formulating the processes and systems who deliver the projects. Ugwu and Haupt (2007) remarked that an adequate understanding and knowledge of performance are desirable for achieving managerial goals such as improvement of institutional transformations, and efficient decision making in design, specification and construction, at various project-level interfaces, using appropriate decision-support tools. Ling et al (2007) investigated project management (PM) practices adopted by Singaporean construction firms. It was determined that the performance level of their projects in China; identifies PM practices that led to better performance; and recommended key PM practices that could be adopted by foreign construction firms in China to improve project performance.

Since the client is the principal stakeholder in the construction process, by managing him/her, good performance has been defined typically in terms of the management of delivery of projects on time, to specification and within budget, providing good service and achieving reasonable life-cycle costs. More recently, managing the requirements of the other stakeholders such as employees and society has come into focus with the need to promote sustainable construction and corporate social responsibility (Ankrah and Proverbs, 2005).

2.9 Factors Affecting Project Performance

Chan and Kumaraswamy (2002) remarked that studies in various countries appear to have contributed significantly to the body of knowledge relating to time performance in construction projects. Iyer and Jha (2005) remarked that project performance in term of cost is studied since 1960s. These studies range from theoretical work based on experience of researcher on one end to structured research work on the other end. Moreover, Pheng and Chuan (2006) stated that there have been many past studies on project performance according to cost and time factors. Chan and Kumaraswamy (1996) stated that a number of unexpected problems and changes from original design arise during the construction phase, leading to problems in cost and time performance.

It is found that poor site management, unforeseen ground conditions and low speed of decision making involving all project teams are the three most significant factors causing delays and problems of time performance in local building works. Okuwoga (1998) stated that cost and time performance has been identified as general problems in the construction industry worldwide. Dissanayaka and Kumaraswamy (1999) remarked that project complexity, client type, experience of team and communication are highly correlated with the time performance; whilst project complexity, client characteristics and contractor characteristics are highly correlated with the cost performance. Reichelt and Lyneis (1999) obtained that project schedule and budget performance are controlled by the dynamic feedback process. Those processes include the rework cycle, feedback loops creating changes in productivity and quality, and effects between work phases.

Chan (2001) identified that the best predictor of average construction time performance of public sector projects. This relationship can serve as a convenient tool for both project managers and clients to predict the average time required for delivery of a construction project. Kuprenas (2003) stated that process of a design team meeting frequency and the process of written reporting of design phase progress were found to be statistically significant in reducing design phase costs. Otherwise, the use of project manager training and a project management based organizational structure were found to be processes that do not create a statistically significant in reducing design phase costs.

Iyer and Jha (2005) remarked that the factors affecting cost performance are: project manager's competence; top management support; project manager's coordinating and leadership skill; monitoring and feedback by the participants; decision making; coordination among project participants; owners' competence; social condition, economical condition and climatic condition. Coordination among project participants was as the most significant of all the factors having maximum influence on cost performance of projects. Love et al (2005) examined project time-cost performance relationships by using project scope factors for 161 construction projects that were completed in various Australian States. It is noticed that gross floor area and the number of floors in a building are key determinants of time performance in projects.

Furthermore, the results indicate that cost is a poor predictor of time performance. Chan and Kumaraswamy (2002) proposed specific technological and managerial strategies to increase speed of construction and so to upgrade the construction time performance. It is remarked that effective communication, fast information transfer between project participants, the better selection and training of managers, and detailed construction programs with advanced available software can help to accelerate the performance. Jouini (2004) stated that managing speed in engineering, procurement and construction projects is a key factor in the competition between innovative firms. It is found that customers can consider time as a resource and, in that case, they will encourage the contractor to improve the time performance.

2.10 Factors Affecting Construction Project Performance

A number of studies have been conducted to examine factors impacting on project performance in developing countries. Mohammed Bader (2004) reported that shortage of skills of manpower, poor supervision and poor site management, unsuitable leadership; shortage and breakdown of equipment among others contribute to construction delays. Mohammed Bader (2004) examined causes of client dissatisfaction in the South African building industry and found that conflict, poor workmanship and incompetence.

Project performance can be measured and evaluated using a large number of performance indicators that could be related to various dimensions (groups) such as time, cost, quality, client satisfaction, client changes, business performance, health and safety (Cheung et al. 2004).

Mohammed Bader (2004) found in his report the cause for the failure of performance of construction contractors. These are; Lack of experience in the line of work, replace key personnel, assigning project leader in the site, labor productivity and improvement, use of project management techniques, procurement practices, claims, internal company problems, owner's absence from the company, using computer applications, frauds, neglect, low margin profit due to competition, cash flow management, bill and collecting effectively, poor estimation practices, employee benefits and compensations, controlling equipment cost and usage, increased number of projects, increased size of projects, change in the type of work, lack of managerial maturity, national slump in the economy, construction industry regulation and bad weather.

Owusu Tawiah (1999) identified two main factors affecting contractor performance. The two factors were financial and managerial capacities of the firm. Under the financial factors contractor's financial stability in terms of access to credit was questionable and that has gone a long way to affect their performance over the years. Again under the managerial capacities, he identified site management practices, lack of technical expertise among others as factors influencing contractor performance in Ghana.

Ankrah (2007) classifies the factors that influence the project performance in to uncontrollable and controllable. From a project perspective, uncontrollable factors include the external constraints and industry factors. By definition, these are beyond the control of project participants and hence may be difficult, if not impossible to influence at a project level in trying to improve performance, whereas the controllable factors which include project and organization-related factors.

The controllable factors include procurement route, contracts, variations, project complexity, project duration and cost, design time, plant and equipment, personnel, interaction between project participants, some process related issues, skills and capability, health and safety, quality and specific company programmer.

Generally, performance dimensions may have one or more indicators, and could be influenced by various project characteristics. For example, Dissanayaka and Kumaraswamy (1999) found that project time and cost performances get influenced by project characteristics, procurement system, project team performance, client representation's characteristics, contractor characteristics, design team characteristics, and external conditions. Similarly, Iyer and Jha (2005) identified many factors as having influence on project cost performance, these include: project manager's competence, top management support, project manager's coordinating and leadership skills, monitoring and feedback by the participants, decision-making, coordination among project participants, owners' competence, social condition, economic condition, and climatic condition. Coordination among project participants the most significant of all the factors, having maximum influence on cost performance.

2.11 Project Success and Project Performance

Al-Momani (2000) stated that the success of any project is related to two important features, which are service quality in construction delivered by contractors and the project owner's expectations. Managing the construction so that all the participants perceive equity of benefits can be crucial to project success. It is obtained that the complete lack of attention devoted to owner's satisfaction contributes to poor performance. Declining market shares, low efficiency and productivity, and the rapid construction cost escalation also lead to poor performance.

Nitithamyong (2004) remarked that the success of construction projects depends up on technology, process, people, procurement, legal issues, and knowledge management which must be considered equally.

Pheng and Chuan (2006) defined project success as the completion of a project within acceptable time, cost and quality and achieving client's satisfaction. Project success can be achieved through the good performance of indicators of the project. So, success refers to project success and performance refers to performance of indicators such as project managers. Wang and Huang (2006) stated that Project success has been widely discussed in the project management literature. The focus of most studies of project success is on dimensions of project success (how to measure it) and factors influencing project success.

Wang and Huang (2006) studied that how the engineers evaluate project success and to what extent key project stakeholders' performance correlates with project success. It is obtained that project owners play the most important role in determining project success, and project management organizations' performance as the single point of project responsibility has significant correlations with project success criteria. Lam et al (2007) stated that the allocation of risk among the contracting parties in a construction contract is an important decision leading to the project success.

2.12 Performance of Construction Projects

To perform is to take a complex series of actions that integrate skills and knowledge to produce a valuable result (Elger, 2008). Project performance has been defined as the degree of achievement of certain effort or undertaking which relates to the prescribed goals or objectives that form the project parameters (Ahmad, Ismail, Nasid, Rosli, Wan & Zainab, 2009). The key requirements of suitable performance measures and measurement frameworks are identified as including, having a few but relevant measures, being linked with critical project objectives, providing accurate information, and comprising financial and non- financial measures (Ankrah & Proverbs, 2005). There are many potential measures of performance for evaluating the success of a construction project. All address performance in three key areas: scope, schedule and budget (Alvarado, Silverman & Wilson, 2005). Akintoye and Takim (2002) discovered seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service and three company performance indicators. Namely: safety, profitability and productivity.

2.13 Determinants of Project Success

The success of projects depends on many factors. Among them project management knowledge areas are the one that determine projects success. These knowledge areas determine or affect the performance of projects in many ways. To complete construction projects on time, cost, quality, scope and with other performance indicators, the project management knowledge areas have to be used.

2.13.1 The Ten project Management Knowledge Areas

The project management body of knowledge PMBOK Guide-2013 edition is directly applicable to construction projects. The factors determining performance in terms of timely accomplishment, cost efficiency, quality, schedule and scope performance are much related to the ten project management knowledge areas. That will affect positively or negatively the performance of projects.

1 Project Integration Management

The knowledge area which is devoted to identify and define the work in the project is known as project integration management. The knowledge area deals also with efficiently integrating changes in the project. There are three different major processes in the integration management knowledge area (PMBOK Guide, 2013).

Project plan development: - integrating and coordinating all project plans to create a consistent, coherent document.

Project plan execution: - carrying out the project plan by performing the activities included therein.

Integrated change control: - coordinating changes across the entire project.

All of these apply to projects in the construction industry with only slight additions or modifications. The need to have all elements integrated and for them to quickly reflect changes in the project plan as it is executed is particularly important in construction.

2 Project Scope Management

The knowledge area deals with defining the project scope, project requirement scope, project work, making the work breakdown structure, making the scope baseline and managing the scope of the project. This is one point where we plan the ways of keeping the project within the established boundaries. There are five different processes in the scope management knowledge area.

Initiation: -The PMBOK Guide-2013 edition says initiation is the process of formally recognizing that a new project exists or that an existing project should continue in to its next phase.

The PMBOK Guide-2013 edition lists typical reasons for initiating a project

- A market demand
- A business need
- A customer request
- A technological advance
- A legal requirement
- A social need

Scope planning: - The PMBOK Guide-2013 edition says scope planning is the process of progressively elaborating and documenting the project work (project scope) that produces the product of the project. Project scope planning starts with the initial inputs of product description, the project charter, and the initial definition of constraints and assumptions.

For a construction project to be successful scope planning should involve all the key players at all levels, the owner, the consultant, the general contractor, subcontractors and suppliers.

Scope definition: - The PMBOK Guide-2013 edition says scope definition involves sub-dividing the major project deliverables.

- Improve the accuracy of cost, duration and resource estimates
- Define a baseline for performance measurement and control
- Facilitate clear responsibility assignments

Scope verification: - The PMBOK Guide-2013edition says scope verification is the process of obtaining formal acceptance of the project scope by the stakeholders.

Scope change control: - The PMBOK Guide-2013edition says scope change control is concerned with a) influencing the factors that create scope changes to ensure that changes are agreed upon, b) determining that a scope change has occurred, and c) managing the actual changes when and if they occur.

3 Project Time Management

The project managers estimate the duration of the tasks in this knowledge area. This is where he/she sequences the tasks and chooses the number of resources required to achieve the objective of the project. Schedule is monitored and managed here in this area to keep the project on the track. There are eight different processes in the time management knowledge area.

- **Activity definition**
- **Activity sequencing**
- **Activity duration estimating**
- **Schedule development**
- **Schedule control**
- **Activity weights definition**
- **Progress curves development**
- **Progress monitoring**

(PMBOK Guide-2013).

4 Project Cost Management

Budget baseline is established and costs are estimated in this management knowledge area. The plan to manage the costs is categorized in the cost management knowledge area too. There are four different processes in the cost management knowledge area.

- ❖ Resource planning
- ❖ Cost estimating
- ❖ Cost budgeting
- ❖ Cost control

(PMBOK Guide-2013).

5 Project Quality Management

There are three processes in project quality management, the knowledge area where the quality requirements for project deliverables are planned and tracked. In this area, all the quality issues are**: -**

- Quality planning
- Quality assurance
- Quality control

(PMBOK Guide-2013).

6 Project Human Resources Management

This knowledge area, which is the HR management of the project, comprises of the processes very essential to define the ways human resources will be utilized, developed, acquired and managed. Project human resources management has four processes.

- ➢ Organizational planning
- ➢ Staff acquisition
- ➢ Team development
- ➢ Project completion

(PMBOK Guide-2013).

7 Project communications Management

Communication management is the knowledge area that defines how communications within the project will work. In these processes, the project manager makes the communication management plan, ensures the plan is followed, and controls information flow within the project. The communications management knowledge area has four processes.

- Communications planning
- Information distribution
- Performance reporting
- Administrative closure

(PMBOK Guide-2013).

8 Project Risk Management

Project risk management consists of identifying risks, planning risk management, conducting risk assessments, and controlling risks. This knowledge area has six processes in it. The area concentrates on identifying, analyzing, planning responses to both threat risks (negative) and opportunity risks (positive).

- Risk management planning
- Risk identification
- Qualitative risk analysis
- Quantitative risk analysis
- Risk response planning
- Risk monitoring and control

(PMBOK Guide-2013).

9 Project Procurement Management

This knowledge area deals with the processes which project managers usually follow to acquire required material for the successful completion of the project. In this knowledge area, project managers come up with the plan for conducting procurements, controlling the procurements and closing out the procurements. Six processes are there in this knowledge area.

- Procurement planning
- Solicitation planning (documenting product requirements and identifying potential sources)

- Solicitation
- Source selection
- Contract administration
- Contract close out

(PMBOK Guide-2013).

10 Project Stakeholder Management

Project stakeholder management area encompasses all the processes which is used by a project manager for recognizing and satisfying the areas who are affected by the project. The affected party can either be internal or external in nature. There are four processes in stakeholder management.

- Identify stakeholders
- Plan stakeholder engagement
- Manage stakeholder engagement
- Monitor stakeholder engagement

(PMBOK Guide-2013).

2.14 Key Performance Indicators in Construction Projects

Takim and Akintoye (2002) defined the purpose of KPI's as to enable a comparison between different projects and enterprises to identify the existence of particular patterns. Dissanayaka and Kumaraswamy (1999) used different representation values to evaluate time and cost performance such as project characteristics, procurement system, project team performance, client representation's characteristics, contractor characteristics, design team characteristics, external condition. Takim and Akintoye (2002) stated that the development and use of key performance indicators (KPI's) can help to identify dysfunctional in the procurement process. Takim and Akintoye (2002) studied the development of key performance indicators to measure performance such as cost of pricing the tender as a percentage of contract value, cost of pricing the tender as a percentage of contract value, no. of times base tender price changed, time from the first tender to actual award of contract, average delay in payment of base claim, average delay in payment of agreed variations, average time for approval of agreed variations.

Cheung et al (2004) remarked that characteristics of emerging performance measurement indicators need analysis of both the organization and environment such as: nature of work, global competition, quality awards, organizational role, external demands and power of IT. The indicators should be able to identify causes of problems, address all possible performance drivers, and identify potential opportunities for improvement.

Cheung et al (2004) remarked seven main key indicators for performance which are: time, cost, quality, client satisfaction, client changes, business performance, and safety and health. Takim and Akintoye (2002) identified good project performance consists of seven key project performance indicators: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service. They also divide company performance indicators in to three, namely: safety, profitability and productivity.

Ugwu and Haupt (2007) stated that project performance can be determined by two common sets of indicators. The first set is related to the owner, users, stakeholders and the general public which are the groups of people who will look at project performance from the macro viewpoint. The second are the developer, a non-operator, and the contractor which are the groups of people who will look at project performance from the micro viewpoint.

Ugwu and Haupt (2007) studied the relationship-based factors that affect performance of general building projects in China. Thirteen performance metrics was used to measure the success level of construction projects. These factors were categorized into four groups namely cost, schedule, quality and relationship performance. It was recommended that foreign firms that have entered or are going to enter the Chinese construction industry should learn how to build cooperative and harmonious relationships with Chinese partners and finally achieve satisfactory project performance by paying sufficient attention to the aforementioned factors.

Takim and Akintoye (2002) stated successful construction project performance can be grouped along three orientations: procurement, process and result orientations. Predictability of design cost and time, and predictability of construction cost and time can be regarded as procurement orientated, safety as process orientated and defects, client satisfaction with the product, client satisfaction with the service, profitability and productivity listed under result orientation.

Ugwu and Haupt (2007) developed and validated key performance indicators (KPI) for sustainability appraisal using South Africa as a case study. It is used four main levels in a questionnaire to identify the relative importance of KPI. The main indicators were: economy, environment, society, resource utilization, health and safety and project management and administration.

Cordero (1990) list key performance indicators for construction projects under four main groups of aspects. The first is cost aspect; construction cost, cost certainty, client satisfaction on cost, secondly time aspect; construction time, time certainty, client satisfaction on time, thirdly quality aspect; defects, liability period, client satisfaction on cost and the fourth aspect is sustainable development; profitability, partnership, environmental protection and health and safety.

Wateridge (1998) examine the United Kingdom (UK) construction industry launched best practice programme on the key performance indicators for construction before few years ago. This was to create an industry-wide performance measurement system to enable good companies to demonstrate their abilities and allow clients to select contractors and consultants on the basis of reliable data. These KPI's give information on the range of performance being achieved in all construction activities and they include the following: client satisfaction – product, client satisfaction – service, defects, and predictability – cost, predictability – time, profitability, productivity, safety, construction cost and construction time.

Takim and Akintoye (2002) find out the ten key performance indicators of project performance in UK construction industry. These consist of seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service; and three company performance indicators, namely: safety, profitability and productivity. Most of these indicators can be regarded as having results orientation, except for predictability of design cost and time, and predictability of construction cost and time, which can be regarded as procurement orientated, and safety, which can be regarded as process orientated.

Egan (1998) tried to put the most KPIs, such as Construction cost, Construction time, Defects, Client, satisfaction (product), Client satisfaction (service), Profitability, Productivity, Safety, Cost predictability (const.), Time predictability (const.), Cost predictability (design), Time predictability (design). These indicators are targeted at assessing industry-wide performance and individual companies as well. However, the findings fail to show any explicit link between the performance factors measures based on project phases (e.g., selection phase, execution phase) and the factors that may determine the project performance during the implementation phase. There is no key factor linking one phase to another. In addition, the working groups provide no indicators on the performances of the stakeholders involved in the project and prioritize their performance in determining project success.

2.15 Empirical Review

Shaban (2008) in his thesis on factors affecting the performance of construction projects in the Gaza Strip, found out that the most important factors agreed by the owners, consultants and contractors were: average delay because of closure and materials shortage, availability of resources as planned through project duration, leadership skills for project manager, escalation of material prices, availability of personals with high experience and qualification and quality of equipment and raw materials in project. Bui and Ling, (2010) in the study that was carried out in Vietnam on factors affecting construction project outcomes discovered that major enablers that lead to project success are foreign experts' involvement in the project, government officials inspecting the project and very close supervision when new construction techniques are employed. A factor which leads to poor performance is the lack of accurate data on soil, weather, and traffic conditions.

Amusan, (2011) studied factors affecting construction cost performance in Nigerian construction sites. It was discovered from the analysis that factors such as contractor's inexperience, inadequate planning, inflation, incessant variation order, and change in project design were critical to causing cost overrun, while project complexity, shortening of project period and fraudulent practices are also responsible. Fetene (2008) did a study on causes and effects of cost overrun on public building construction projects in Ethiopia. From the results it was found that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects. Iyer and Jha (2006) did a research on factors affecting cost performance evidence from Indian construction projects and found out that the project manager's competence and top management support are found to contribute significantly in enhancing the quality performance of a construction project. Nyangilo (2012) did an assessment of the organization structure and leadership effects on construction projects' performance in Kenya, he found out that lack of appropriate project organization structures, poor management systems and leadership are the major causes of poor project performance.

2.16 Critique of the Existing Literature Relevant to the Study

Lepartobiko (2012) studied the factors that influence success in large construction projects. Kigari and Wainaina, (2014) studied emerging trends in economics and management sciences time and cost overruns in power projects in Kenya by closely relating the factors to the various variables. Based on local studies that have been done in Kenya; Auma (2014) Factors Affecting the Performance of Construction Projects in Kenya; Fetene (2008) did a study on causes and effects of cost overrun on public building construction projects in Ethiopia. The performance of the building construction in Oromia, Ethiopia is poor as time, cost and quality performance of projects are to the extent that over 70% of the projects initiated are likely to escalate with time with a magnitude of over 50% and over 50% of the projects likely to escalate in cost with a magnitude of over 20% (OIUD, 2007).

Besides, many studies which are conducted in this area of study ignore to study the iron triangle and risk project management factors together on performance of a project. Therefore, this research will focus on key performance indicators of commercial building construction projects in lideta sub-city, Addis Ababa which were used as a benchmarking for the owners, consultants and contractors.

2.17 Research Gaps

Fetene (2008) studied the causes and effects of cost overrun on public building construction project in Ethiopia; Siraw (2014) did studied the analysis of factors contributing to time overruns on building construction projects under Addis Ababa city Administration; Tekalign (2014) studied the role of project planning on project performance in Ethiopia. But, many studies which are conducted in this area of study ignore to study the iron triangle factors together on performance of a project. In addition, it is recommended to study and identify the most important factors affecting the performance of building construction projects.

2.18 Summary

According to previous studies, it could be said that the performance measurement is a process that include factors as Key Performance Indicators (KPIs) such as time, cost, quality and scope in order to enable measurement of current construction projects performance and to achieve significant performance improvements of future projects. It was obtained that there were many fields and topics which are related to performance such as, construction management, information technology, factors affecting performance of managers, measurement of project performance, key performance indicator and benchmarking. The key performance indicators are used to evaluate performance of construction projects. These indicators can then be used for benchmarking purposes, and will be as a key component of any organization to move towards achieving best practice and to overcome building construction performance problem in Lideta sub-city, Addis Ababa.

2.19 Conceptual Framework

A conceptual framework is defined as a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Ramey & Reichel, 1987). The conceptual framework in this study was used to show various variables that affect the performance of construction projects.

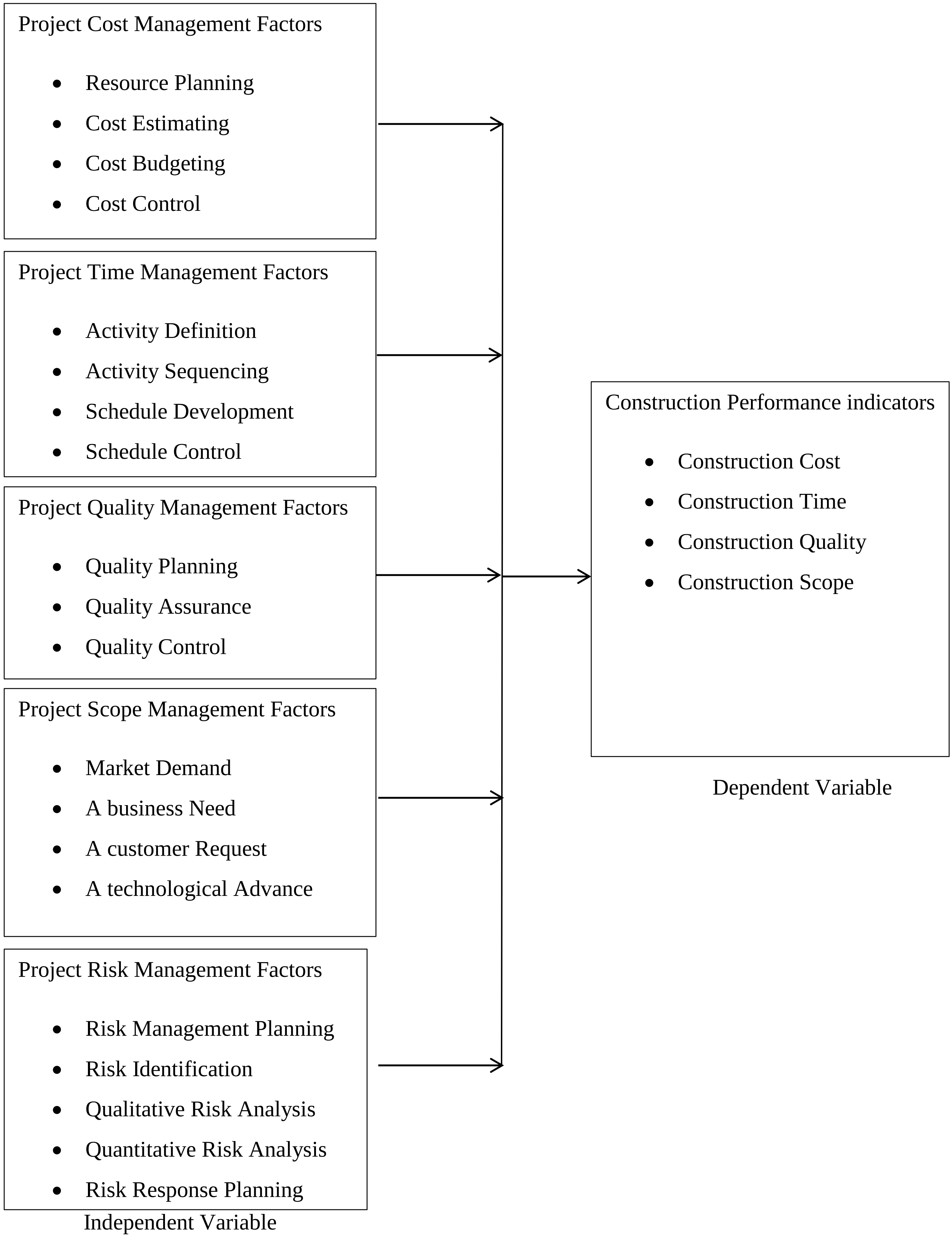

Figure 2.1: Conceptual Framework

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

In this chapter the details of all information regarding the methods that was used to carry out the research, the type of research design that was used, the target population, the sample size, sampling techniques, the procedure that was used to obtain samples and the research instrument and method of data collection will discuss. It also indicated how data have been analyzed and presented.

3.2 Research Design and Approach

This research was investigated the performance of commercial building construction projects in Lideta sub-city that have taken building permit license in the past five years (2006-2010 E.C) that are under construction. The research objective is to investigate the factors affecting the performance of commercial building construction projects in Lideta sub-city. The researcher used causal type of research design, because it was tried to describe the actual rate of performance indicators and the variables or factors affecting performance of commercial building construction projects in Lideta sub-city. The research obtained quantitative data, thus a quantitative research approach was adopted.

3.3 Population of the Study

The research consisted of a total of 58 commercial building construction projects in Lideta sub-city which are under construction in the past five years from 2006-2010 E.C. Therefore, the target populations were all of the owners, contractors and consultants of each commercial building construction projects are the population of the study. The total population size of the study was 174 (58 owners, 58 contractors and 58 consultants). The researcher distributed questionnaire for owners, contractors and consultants of commercial building construction projects.

In the case of this research, population it does not mean that all members (employees) of commercial building construction projects are possible respondents for the questionnaire. Rather the researcher distributed the questionnaire for the total representative of owners, contractors and consultants in the selected commercial building construction projects in Lideta Sub-city. As the data from Lideta sub-city building permit and control office, there are 58 commercial building construction projects that are under construction in the past five years. The researcher selected the owner, contractor and consultants of the total 58 commercial building construction projects as a respondent of the research.

3.4 Data Collection Method

The data collection method was quantitative. Quantitative because the researcher prepared and distribute questionnaire for all respondent (Questionnaires have been distributed to contractors, owners and consultants of the commercial building construction projects). The researcher hope that, these sources was enough and relevant to investigate the most common and frequent factors affecting commercial building construction projects performance in Lideta sub-city.

Questionnaires used to gather data because the information could be collected from a large sample and diverse regions, confidentiality were upheld and saved on time.

3.5 Data Analysis Technique

The analysis part was combined based on all groups of respondents (contractors, consultants and owners) in order to obtain significant results. For the purpose of this study, regression analysis was used to analyze quantitative data generated through questionnaire based survey questionnaire. The analysis of quantitative data was assisted by SPSS. Data was manipulated in order to change the data to the form that can be used to conduct analyses (Pallant, 2011). Therefore, the researcher conducted various data manipulation activities in order to prepare the data for analysis depending on the data file, variables of interest and the type of research questions that was desired to be addressed. Descriptive statistics was used to clean and scan data, preliminary analysis and final analysis.

The proposed model according to the identified dependent and independent variables from the conceptual model are described below

$$\boldsymbol{Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5}$$

Y= Performance indicators of building construction projects

$\boldsymbol{x_1}$ = project cost management factors

$\boldsymbol{x_2}$ = project time management factors

$\boldsymbol{x_3}$ = project quality management factors

$\boldsymbol{x_4}$ = project scope management factors

$\boldsymbol{x_5}$ = project risk management factors

3.6 Ordinary definition of terms

Project: Commercial building construction projects constructed in the last five years from 2006-2010 E.C in Lideta Sub-city.

Building: A permanent or temporary construction used for the purpose of business.

Construction: means the construction of new building projects in Lideta sub-city.

Owner: individual and organizations entity for whom the construction project is being undertaken.

Contractor: A natural or juridical person under contract with an owner to construct the building construction projects.

Consultant: The person or entity appointed by the owner to establish and agree all budgets, and implement and manage the necessary cost control on the project. Performance: The accomplishment of a given building construction projects against the contractual cost, time and quality standards.

3.7 Pilot Study

3.7.1 Pilot Study Results

Pilot study of the questionnaire is achieved by a scouting sample, which consisted of 35 questionnaires. These questionnaires were distributed to expert engineers such as projects managers, site engineers (office engineers) and organizations managers. They have a strong practical experience in construction industries field. Their sufficient experiences are a suitable indicator for pilot study. The following items are summary of the main results obtained from pilot study:

1. Questionnaire should be started with a cover page.
2. The first part of questionnaire should be general information about the organization.
3. Owner category should be added as a respondent of questionnaire
4. Typical of project organization should be modified according to actual and practical building projects constructed in lideta sub-city.
5. Some factors and sentences should be modified or represented with more details.
6. Some factors and sentences should be modified in order to give more clear meaning and understanding.
7. There are some parts of questionnaire required to be regulated well.
8. Some factors should be rearranged in order to give more suitable and consistent meaning.

3.7.2 Validity Test

This section presents test of validity of questionnaire according to the pilot study. Validity refers to the degree to which an instrument measures what is supposed to measure (Pilot and Hunger, 1985). Validity has a number of different aspects and assessment approaches. Statistical validity is used to evaluate instrument validity, which include criterion-related validity and construct validity. To insure the validity of the questionnaire two statistical tests should be applied. The first test is criterion- related validity test (spearman test) which measures the correlation coefficient between each paragraph in one field and the whole field. The second test is structure validity test (spearman test) that used to test the validity of the questionnaire structure by testing the validity of each filed and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all of the fields of the questionnaire that have the same level of similar scale.

3.7.2.1 Criterion-Related Validity Test

To test criterion- related validity test, the correlation coefficient for each item of the group factors and the total of the field is achieved. The p-values (sig.) are less than 0.01 for all results, so the correlation coefficients of each field are significant at α=0.01, so it can be said that the paragraphs of each field are consistent and valid to measure what it was set for.

3.7.2.2 Structure Validity Test

It is assessed the fields structure validity by calculating the correlation coefficients of each field of the questionnaire and the whole of the questionnaire.

Table 3.1 Correlation coefficient of each field and the whole of questionnaire

No.	Field	Spearman Correlation Coefficient	P-Value
1	Project Cost Management Factors	0.444	0.000**
2	Project Time Management Factors	0.500	0.000**
3	Project Quality Management Factors	0.384	0.000**
4	Project Scope Management Factors	0.557	0.000**
5	Project Risk Management Factors	0.662	0.000**

** Correlation is significant at the 0.01 level

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Table 3.1 clarifies the correlation coefficient for each field and the whole questionnaire. The p-values (sig.) are less than 0.01, so the correlation coefficients of all the fields are significant at α=0.01, so it can be said that the fields are valid to measured what it was set for to achieve the main aim of the study.

3.7.3 Reliability Analysis

Reliability is actually a tool to measure a questionnaire which is an indicator of the variables or constructs. Questionnaire said to be reliable if answer a person to questions are internally consistent or stabilized over time. In conducting the reliability test using SPSS version 20 for windows.

Coefficients were evaluated using the guidelines suggested by George and Mallery (2010), where values 0.9 or higher indicate excellent reliability, values ranging from 0.8 to 0.89 indicate good reliability, values ranging from 0.7 to 0.79 indicate acceptable reliability, values ranging from 0.6 to 0.69 indicate questionable reliability, values ranging from 0.5 to 0.59 indicate poor reliability and values less than 0.5 indicate unacceptable reliability.

3.7.3.1 Reliability Analysis of Dependent and Independent Variables

Table 3.2 Reliability Statistics of Dependent and Independent variables

Reliability Statistics

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Performance Indicators	0.82	0.83	4
Project Cost Management Factors	.824	.824	4
Project Time Management Factors	.851	.853	4
Project Quality Management Factors	.834	.835	3
Project Scope Management Factors	.871	.873	4
Project Risk Management Factors	.857	.858	5
Reliability Statistics of All Variables	.914	.920	24

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

As indicated in table 3.2, for performance indicators, project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors the cronbach's alpha results in 0.82, 0.824, 0.851, 0.834, 0.871 and 0.857 respectively. For all items which exceed 0.8, indicate good reliability. In short nuts, the responses generated for the dependent variable (performance indicators) and independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors) used in this research indicate good reliability enough for data analysis.

The reliability statistics of all variables cronbach's alpha results in 0.914 which exceed 0.9. In short nuts, the responses generated for all of the variables used in this research indicates excellent reliability enough for data analysis.

This value was acceptable based on the rule of George and Mallery (2010).

3.8 Ethical Considerations

This research was guided by strict adherence to research ethics which do not allow the researcher to engage in deception or invasion of privacy. The respondents' rights will not to respond to the questions not clear from the onset and consent sought from the word go. The secrecy of the respondents will be assured and confidentiality will guaranteed as an integral part of the research. The researcher will maintain humility and conduct the research with utmost honesty avoiding distortions and misleading data manipulation. The researcher will strive to uphold intellectual honesty and seek collaborative support which is duly acknowledged. The researcher also endeavored to arrive at conclusions based on objective inferences that are merely guided by the data which will be collected.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATIONS

4.1 Introduction

This chapter presents the data analysis including the response rate, descriptive statistics, assumption testing for regression analysis, the regression analysis, hypothesis testing and the discussion. The purpose of the study is to identify the factors affecting the performance of building construction projects at lideta sub-city: The case of commercial building construction projects. 174 questionnaires were distributed to contractors, consultants and owners and 163 of them were returned. The results and discussions of this study are based on the response rate presented in table 4.1.

Table 4.1 Distribution of Questionnaires to Contractors, Consultants and Owners and Response Rates

Category of the Respondents	Method	Distributed Numbers	Returned Numbers	Response Rates (%)
Contractors	Hand Delivered	58	56	97%
Consultants	Hand Delivered	58	53	92%
Owners	Hand Delivered	58	54	94%
Total	Hand Delivered	174	163	94%

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Of the 174 questionnaires distributed to contractors, consultants and owners 163 were returned (94% response rate)

4.2 Results of Descriptive Statistics

4.2.1 Respondents Profile

Demographic analysis included gender, age, type of organization, years of experience, numbers of projects executed in the last five years and professional background. The variables help to identify the background of the respondents.

Table 4.2 Summary of Demographic Variables

	Variable Classification	Owner		Consultant		Contractor	
		Frequency	%	Frequency	%	Frequency	%
Gender	Male	43	80%	48	91%	48	86%
	Female	11	20%	5	9%	8	14%
	Total	54	100%	53	100%	56	100%
Age	20-29	0	0%	11	21%	9	16%
	30-39	20	37%	20	38%	22	39%
	40-49	16	30%	13	25%	20	36%
	50-59	14	26%	8	15%	5	9%
	60-69	4	7%	1	2%	0	0%
	Total	54	100%	53	100%	56	100%
Years of Experience	1-6 Years	25	46%	15	28%	21	38%
	7-12 Years	15	28%	18	34%	15	27%
	13-18	10	19%	14	26%	13	23%
	19-24	2	4%	2	4%	4	7%
	25-30	1	2%	3	6%	3	5%
	>30	1	2%	1	2%	0	0%
	Total	54	100%	53	100%	56	100%
Number of Projects	1-3	36	67%	20	38%	16	29%
	4-7	15	28%	18	34%	26	46%
	8-10	3	6%	6	11%	5	9%
	>10	0	0%	9	17%	9	16%
	Total	54	100%	53	100%	56	100%
Professional Background	Surveyor	0	0%	3	6%	9	16%
	Mechanical engineer	0	0%	3	6%	3	5%
	Architect	0	0%	7	13%	7	13%
	Civil engineer	0	0%	22	42%	21	38%
	Electrical engineer	0	0%	5	9%	7	13%
	Sanitary engineer	0	0%	5	9%	4	7%
	other	0	0%	8	15%	5	9%
	Total	0	0%	53	100%	56	100%

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

As listed in table 4.2, 80% of owner respondents were male and 20% of owner respondents were female, 91% of consultant respondents were male and 9% of consultant respondents were female and also 86% of contractor respondents were male and 14% of contractor respondents were female. The respondents age category is divided in to five intervals 37% of owner respondents were 30-39 years old, 30% of owner respondents were 40-49 years old, 26% of owner respondents were 50-59 years old and 7% of owner respondents were 60-69 years old, 21% of consultant respondents were 20-29 years old, 38% of consultant respondents were 30-39 years old, 25% of consultant respondents were 40-49 years old, 15% of consultant respondents were 50-59 years old and 2% of consultant respondents were 60-69 years old, 16% of contractor respondents were 20-29 years old, 39% of contractor respondents were 30-39 years old, 36% of contractor respondents were 40-49 years old and 9% of contractor respondents were 50-59 years old. The researcher believes they are mature enough to provide reliable answers to the questions asked.

The work experience of the respondents were categorize in to six intervals, 46% of owner respondents had 1-6 years work experience, 28% of owner respondents had 7-12 years work experience, 19% of owner respondents had 13-18 years work experience, 4% of owner respondents had 19-24 years work experience, 6% of owner respondents had 25-30 years work experience and 2% of owner respondents had more than 30 years work experience, 28% of consultant respondents had 1-6 years work experience, 34% of consultant respondents had 7-12 years work experience, 26% of consultant respondents had 13-18 years work experience, 4% of consultant respondents had 19-24 years work experience, 6% of consultant respondents had 25-30 years work experience, 2% of consultant respondents had more than 30 years work experience, 38% of contractor respondents had 1-6 years work experience, 27% of contractor respondents had 7-12 years work experience. 23% of contractor respondents had 13-18 years work experience, 7% of contractor respondents had 19-24 years work experience, 5% of contractor respondents had 25-30 years work experience. Most of the owners, contractors and consultants had better experience as a result it is helpful for the performance of the construction project.

The respondents number of projects executed in the last five years were categorized in to four intervals, 67% of owner respondents had 1-3 number of projects, 28% of owner respondents had 4-7 number of projects, 6% of owner respondents had 8-10 number of projects, 38% of consultant respondents had 1-3 number of projects, 34% of consultant respondents had 4-7 number of projects, 11% of consultant respondents had 8-10 number of projects, 17% of consultant respondents had more than ten number of projects executed in the last five years, 29% of contractor respondents had 1-3 number of projects, 46% of contractor respondents had 4-7 number of projects, 9% of contractor respondents had 8-10 number of projects, 16% of contractor respondent had more than ten number of projects executed in the last five years. Most of the owners, contractor and consultants had done many projects as a result it is helpful for the performance of the construction project.

The professional background of the respondents were 6% of consultant respondents were surveyor, 6% of consultant respondents were mechanical engineer, 13% of consultant respondents were architect, 42% of consultant respondents were civil engineer, 9% of consultant respondents were electrical engineer, 9% of consultant respondents were sanitary engineer, 15% of consultant respondents were other professional background, 16% of contractor respondents were surveyor, 5% of contractor respondents were mechanical engineer, 13% of contractor respondents were architect, 38% of contractor respondents were civil engineers, 13% of contractor respondents were electrical engineer, 7% of contractor respondents were sanitary engineer, 9% of contractor respondents were other professional background.

Most of the contractors and consultants are engineers as a result they are helpful for improving the performance of construction projects.

4.2.2 Descriptive Analysis Results of Performance Indicators

Construction cost is a performance indicator for building construction projects at lideta sub-city. The mean score and SD for construction cost performance indicator is 3.21 and 0.91 respectively, which means construction cost performance indicator is meeting average for building construction projects at lideta sub-city. Construction time is a performance indicator for building construction projects at lideta sub-city. The mean score and SD for construction time performance indicator is 2.41 and 1.04 respectively, which means construction time performance indicator is meeting poor for building construction projects at lideta sub-city.

Construction quality is a performance indicator for building construction projects at lideta sub-city. The mean score and SD for construction quality performance indicator is 3.61 and 0.98 respectively, which means construction quality performance indicator is meeting good for building construction projects at lideta sub-city. Construction scope is a performance indicator for building construction projects at lideta sub-city. The mean score and SD for construction scope performance indicator is 3.43 and 1.29 respectively, which means construction scope performance indicator is meeting on neutral for building construction projects at lideta sub-city.

Table 4.3 Descriptive Statistics of Building Construction Performance Indicators

Construction Performance Indicators	N Valid	Mean	Standard Deviation
Construction Cost	163	3.21	0.91
Construction Time	163	2.41	1.04
Construction Quality	163	3.61	0.98
Construction Scope	163	3.43	1.29

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.2.3 Descriptive Analysis Results of Project Cost Management factors

The project cost management factors analysis results show in table 4.4. The mean score for the items range from 2.99 (cost budgeting project cost management factors) to 2.81 (cost control project cost management factors). The overall mean and SD for project cost management factors is 2.90 and 1.08 respectively, which means the overall project cost management factor items moderately important affect the performance of building construction projects at lideta sub-city.

Table 4.4 Descriptive Statistics of Project Cost Management Factors

Project Cost Management Factors	N Valid	Mean	Standard Deviation
Resource Planning	163	2.89	1.12
Cost Estimating	163	2.93	1.09
Cost Budgeting	163	2.99	0.98
Cost Control	163	2.81	1.29

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.2.4 Descriptive Analysis Results of Project Time Management factors

The project time management factors analysis results show in table 4.5. The mean score for the items range from 3.99 (activity definition project time management factors) to 3.04 (activity sequencing project time management factors). The overall mean and SD for project time management factors is 3.52 and 1.19 respectively, which means the overall project time management factor items importantly affect the performance of building construction projects at lideta sub-city.

Table 4.5 Descriptive Statistics of Project Time Management Factors

Project Time Management Factors	N	Mean	Standard Deviation
	Valid		
Activity Definition	163	3.99	1.22
Activity Sequencing	163	3.04	1.15
Schedule Development	163	3.06	1.23
Schedule Control	163	3.89	1.14

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.2.5 Descriptive Analysis Results of Project Quality Management Factors

The project quality management factors analysis results show in table 4.6. The mean score for the items range from 2.98 (quality planning project quality management factors) to 2.93 (quality control project quality management factors). The overall mean and SD for project quality management factors is 3.00 and 1.07 respectively, which means the overall project quality management factor items moderately important affect the performance of building construction projects at lideta sub-city.

Table 4.6 Descriptive Statistics of Project Quality Management Factors

Project Quality Management Factors	N	Mean	Standard Deviation
	Valid		
Quality Planning	163	2.98	1.067
Quality Assurance	163	2.95	1.071
Quality Control	163	2.93	1.074

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.2.6 Descriptive Analysis Results of Project Scope Management Factors

The project scope management factors analysis results show in table 4.7. The mean score for the items range from 2.47 (a technological advance project scope management factors) to 2.36 (a business need project scope management factors). The overall mean and SD for project scope management factors is 2.41 and 1.27 respectively, which means the overall project scope management factor items less importantly affect the performance of building construction projects at lideta sub-city.

Table 4.7 Descriptive Statistics of Project Scope Management Factors

Project Scope Management Factors	N Valid	Mean	Standard Deviation
Market Demand	163	2.46	1.28
A Business Need	163	2.36	1.24
A Customer Request	163	2.43	1.23
A Technological Advance	163	2.47	1.31

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.2.7 Descriptive Analysis Results of Project Risk Management Factors

The project risk management factors analysis results show in table 4.8. The mean score for the items range from 2.98 (quantitative risk analysis project risk management factors) to 2.12 (risk response planning project risk management factors). The overall mean and SD for project risk management factors is 2.55 and 1.13 respectively, which means the overall project risk management factor items moderately important affect the performance of building construction projects at lideta sub-city.

Table 4.8 Descriptive Statistics of Project Risk Management Factors

Project Risk Management Factors	N Valid	Mean	Standard Deviation
Risk Management Planning	163	2.23	1.14
Risk Identification	163	2.28	1.11
Qualitative Risk Analysis	163	2.47	1.08
Quantitative Risk Analysis	163	2.98	1.12
Risk Response Planning	163	2.12	1.17

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.2.8 Summary of Descriptive Statistics of the Dependent and Independent Variables

This section presents the descriptive statistics of dependent and explanatory variables used in this study on the conceptual framework. The dependent variable used in this study was performance indicators for construction projects (construction cost performance indicator, construction time performance indicator, construction quality performance indicator and construction scope performance indicator) while explanatory variables were project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors.

Table 4.9 shows the summary of descriptive results for all the variables used in the study such as mean, standard deviation and number of observation.

Table 4.9 Descriptive Statistics of Variables

Descriptive Statistics

	N	Mean	Std. Deviation
Construction Cost Performance Indicator	163	3.2178	.91293
Construction Time Performance Indicator	163	2.4128	1.04369
Construction Quality Performance Indicator	163	3.6135	.98335
Construction Scope Performance Indicator	163	3.4294	1.29562
Cost Management Factors	163	3.6534	.79511
Time Management Factors	163	1.9049	.93920
Quality Management Factors	163	2.0215	1.06371
Scope Management Factors	163	1.9652	.97543
Risk Management Factors	163	2.4310	1.14000
Valid N (listwise)	163		

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

The data consisted of 163 observations measured on six variables. The researcher conducted descriptive statistics and frequencies and percentages for categorical variables. The study conducted on explanatory variables revealed that the mean score value for project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors in average was 3.65 (SD=0.79), 1.90 (SD=0.94), 2.02 (SD=1.06), 1.97 (SD=0.98), 2.43 (SD=1.14) respectively, which falls on importantly and less importantly affect the performance of building construction projects at lideta sub-city. In regard to performance indicators, construction cost performance indicator mean score value was 3.21 (SD=1.00) which means the construction cost performance indicator falls on average, the construction time performance indicator man score value was 2.41 (SD=1.04) falls on poor, the construction quality performance indicator mean score value was 3.61 falls on good and the construction scope performance indicator mean score value was 3.43 falls on neutral. Therefore, for all most all the variables, the mean value lies within their minimum and maximum values showing a good level of consistency.

4.3 Results of Regression Analysis

4.3.1 Test of Assumption of the Regression Analysis

Meeting the assumptions of regression analysis is necessary to confirm that the obtained data truly represented the sample and that researcher has obtained the best results (Hair et al., 1998). Three assumptions for regression analysis used in this study were discussed for the individual variables: multicollinearity, linearity and Normality. In the following paragraphs, each assumption is explained.

4.3.1.1 Test for Multicollinearity

Hill et al. (2003) explain that economic variables may move together in systematic ways when the data are the result of an uncontrolled experiment. Such variables are believed to have problems with collinearity or multicollinearity rises, it will complicate the interpretation of the variables because it is more difficult to confirm the effect of any single variable, owing to their interrelationship (Hair et al., 1996). According to Hill et al. (2003), multicollinearity is not a violation of the assumptions of regression but it may cause serious difficulties. Hill et al. (2003) propose that these serious difficulties include: (1) variances of parameter estimates may be unreasonably large; (2) parameter estimates may not be significant; and (3) a parameter estimate may have a sign different from what is expected.

The initial inspection of the Pearson Correlation Matrix for the regression models revealed that the correlations between the independent variables did not exceed 0.70. While checking, the independent variables showed significant relationship with the dependent variable. Also the researcher checked that the correlation between each of independent variables is not too high. Hill et al. (2003) suggest that you think carefully before including two variables with a bivariate correlation of, say, 7 or more in the same analysis.

Tolerance is the amount of variance in the individual variable not explained by the other predictor variables. It varies from 0 to 1; a value close to 1 indicates that the other predictors do not explain the variance in that variable.

A value close to 0 implies almost all the variance in the variable is explained by the other variables. This permits us to more formally check that our independent variables are not too highly correlated. To meet multiple regression assumptions we need tolerance score not less than 0.1 and VIF scores not greater than 10 or tolerance score not less than 0.2 and VIF scores not greater than 5. So, with regards to multicollinearity statistics shown below, the tolerance and variance inflation factors (VIF) showed that there was no multicollinearity because VIF of all variables were not greater than 10 and tolerance scores not less than 0.1. Also VIF of all variables were not greater than 5 and not less than 0.2.

Table 4.10 Multicollinearity Problem Test using VIF

Variable	Tolerance	VIF
Cost Management Factors	0.871	1.148
Time Management Factors	0.545	1.833
Quality Management Factors	0.616	1.623
Scope Management Factors	0.632	1.584
Risk Management Factors	0.624	1.602

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

4.3.1.2 Test for Linearity

The linearity of the relationship between the dependent and independent variable represented the degree to which the change in the dependent variable is associated with the independent variable (Hair et al., 1998). In a simple sense, linear models predict values falling in a straight line by having a constant unit change (*slope) of the dependent variable for a constant unit change of the independent variable (Hair et al., 1998). Malhotra et al. (2007 as cited in Devika, 2012) discussed that conventional regression analysis will underestimate the relationship when nonlinear relationships are present, i.e., R2 underestimates the variance explained overall and the betas underestimate the importance of the variables involved in the non- linear relationship

In order to test this assumption we need to examine the bivariate correlation for each pair of variables to make sure that we do not detect any non-linear correlation. To determine whether the relationship between the dependent variable: performance indicators (construction cost, construction time, construction quality, construction scope) and independent variables: project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors is linear; plots of the regression residuals through SPSS software had been used.

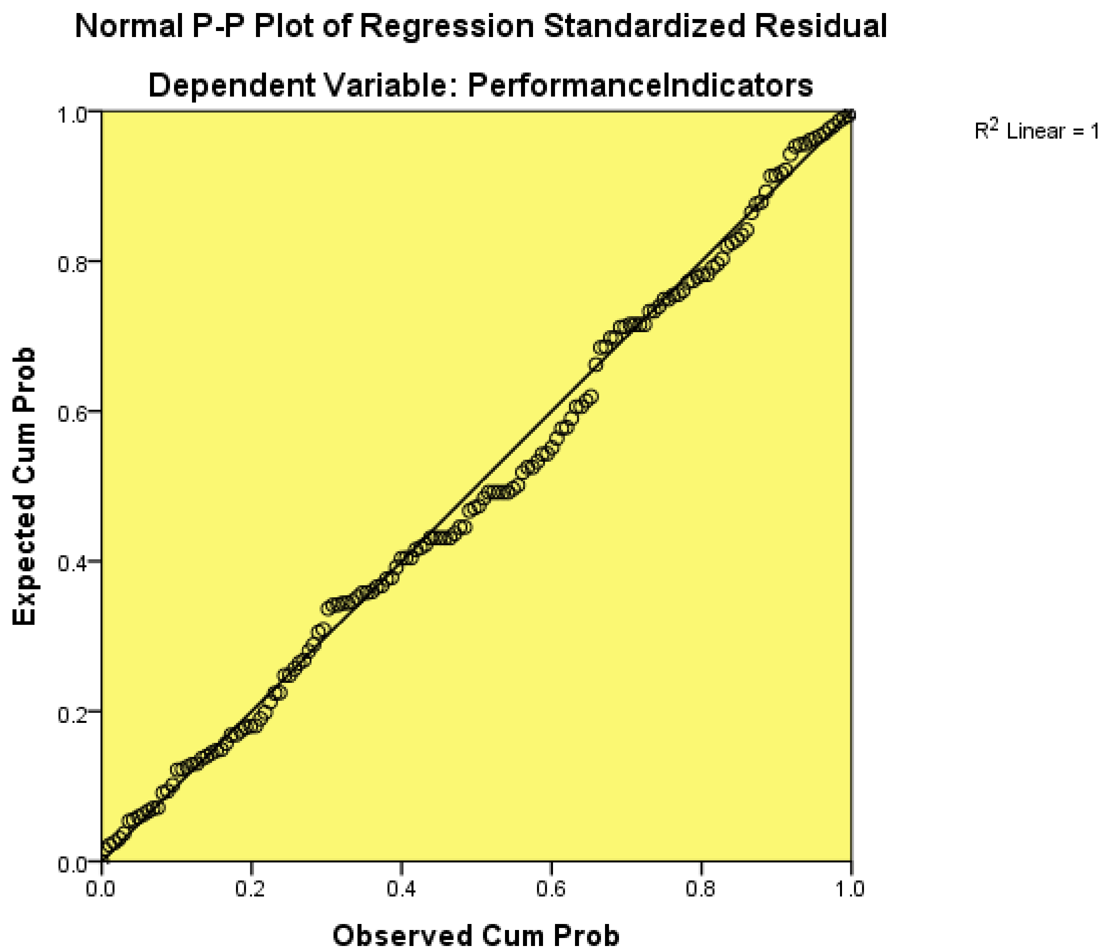

Figure 4. 1: Normal Point Plot of Standardized Residual

Source: researchers own compilation of survey data and SPSS V20 output (2019)

As we can see from figure 4.2 above, the model follows the assumption of linearity or there is linearity between dependent variable and independent variables.

To see the linearity between each dependent variable (construction cost performance indicator, construction time performance indicator, construction quality performance indicator, construction scope performance indicator) and independent variables: project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors is linear refer the appendix attached at the back.

4.3.1.3 Normality Test

In terms of this assumption, a check for normality of the error term is conducted by a visual examination of the normal probability plots of the residuals.

Malhotra et al. (2007) propose that normal probability plots are often conducted as an informal means of assessing the non-normality of a set of data. According to Hair et al. (1998), the plots are different from residuals plots in that the standardized residuals are compared with the normal distribution. In general, the normal distribution makes a straight diagonal line, and the plotted residuals are compared with the diagonal (Hair et al., 1998). If a distribution is normal, the residual line will closely follow the diagonal (Hair et al., 1998). Malhotra et al. (2007) explain that the "correlation coefficient" will be near unity if the data fall nearly on a straight line. The "correlation coefficient" will become smaller if the plot is curved.

The normality probability plots were plotted to assess normality. The P-P plots were approximately a straight line instead of a curve. Accordingly, the residuals were deemed to have a reasonably normal distribution, as suggested by Hair et al. (1998). The Skewness value provides an indication of the symmetry of the distribution while kurtosis provides information about the peakedness of the distribution. A positive Skewness value indicates right (positive) skew while a negative value indicates left (negative) skew. The higher the absolute value is the greater the skew (Tabachnick & Fidell, 2001).

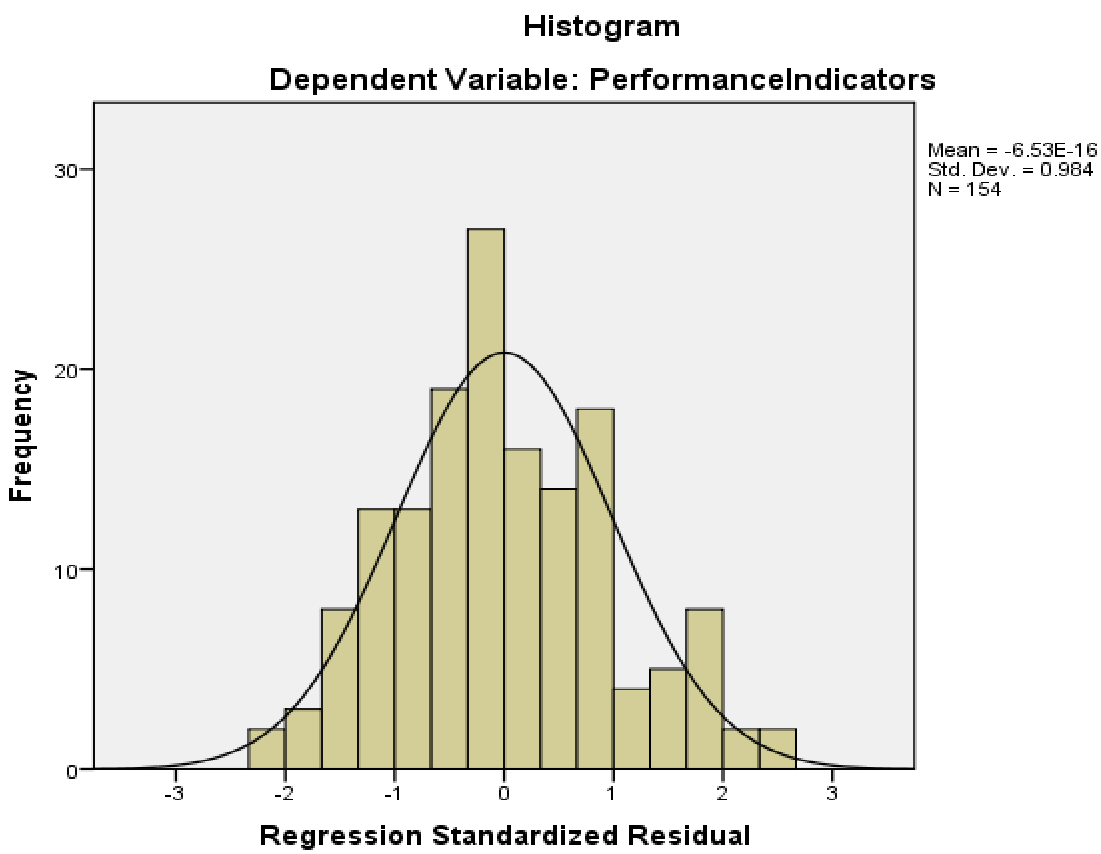

Figure 4. 2: Frequency Distribution of Standardized Residual

As we can see from figure 4.3 above, it shows the frequency distribution of the standardized residuals compared to a normal distribution. As you can see, although there are some residuals (e.g., those occurring around 0) that are relatively far away from the curve, many of the residuals are fairly close. Moreover, the histogram is bell shaped which lead to infer that the residual (disturbance or errors) are normally distributed. Thus, no variations of the assumption normally distributed error term.

To see the normality test between each dependent variable (construction cost performance indicator, construction time performance indicator, construction quality performance indicator, construction scope performance indicator) and independent variables: project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors refer the appendix attached at the back.
Thus, from an examination of the information presented in all the three tests the researcher concludes that there are no significant data problems that would lead to say the assumptions of classical linear regression have been seriously violated.

The Skewness and kurtosis measures should be as close to zero as possible. In reality, however, data are often skewed and kurtotic. A small departure from zero is therefore no problem as long as the measures are not too large compare to their standard errors. Divide the measure (statistic) by its standard error using a calculator the z value should be somewhere between -1.96 and +1.96. The researcher conclude that, regarding Skewness and kurtosis the performance indicators are a little skewed and kurtotic for project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors. But, it does not differ significantly from normality.

Finally, the researcher assumed that the data are approximately normally distributed in terms of Skewness and kurtosis.

4.3.1.4 Auto-correlation /Durbin-Watson Test/

It is the assumption of independent error acceptable or reasonable test. Durbin-Watson used to test for serial correlation between errors. The Durbin-Watson statistic test can vary between 0 and 4. A value of 2 meaning residual statistics are uncorrelated field (2006). A value greater than 2 indicates negative correlation adjacent residuals, whereas a value below 2 indicates a positive correlation. Similarly, Ott and Longnecker (2001) defines when there is no serial correlation, the expected value of Durbin-Watson test statistics d is approximately 2.00; a positive serial correlation makes d> 2.00. Although, values of d less than approximately 1.5 (or greater than approximately 2.5) lead one to suspect positive (or negative) serial correlation. If serial correlation is suspected, then the proposed multiple linear regression models are inappropriate.

Referring this and the model summary table attached at the appendix; the Durbin-Watson value of this study is 1.813. Therefore, the auto-correlation test has almost certainty met, since it falls between 1.5 and 2.5, and we can conclude that our model is free of serial correlation.

To see the Durbin-Watson test between each dependent variable (construction cost performance indicator, construction time performance indicator, construction quality performance indicator, construction scope performance indicator) and independent variables project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors refer the appendix attached at the back.

4.3.2 Regression Analysis Results for Independent Variables and Construction Cost Performance Indicator

The study assumed that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive and significant effect on construction cost performance indicator.

As shown in appendix attached at the back, the overall model 1 statistics of dependent variable construction cost performance indicator, R=.818 indicates that there is a positive correlation between the dependent variable construction cost performance indicator and the independent variables project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors and the adjusted R square value of .658 indicates that the independent variables included in the model explained 65.8% of variance (.658×100%) in dependent variable construction cost performance indicator, the remaining 34.2% variance of the dependent variable construction cost performance indicator is due to other factors that are not included in this model.

Hence, the overall model statistic (adjusted R square=0.658), supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive influence on construction cost performance indicator.

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To test significance of the model 1, ANOVA (F- test) was performed. As shown in appendix attached at the back, it can be observed from the ANOVA table that the model as a whole is significant P value <0.05 (P=.000, F *(5, 148)* 59.754). Thus, it is concluded that the proposed hypothesis which states that construction cost performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

Hence, hypothesis 1 is rejected.

Table 4.11 The Coefficient Statistics of Independent Variables and Construction Cost Performance Indicator

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.377	.226		1.669	.097
	Cost Management Factors	.884	.057	.790	15.587	.000
	Time ManagementFactors	-.103	.092	-.072	-1.118	.265
	Quality Management Factors	.198	.081	.147	2.443	.016
	Scope Management Factors	-.126	.082	-.092	-1.545	.125
	Risk Management Factors	.073	.074	.059	.987	.325

a. Dependent Variable: Construction Cost Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

From the above table 4.15 regression model 1, the following regression equation was obtained:

$$\boldsymbol{Construction\ Cost\ Performance\ indicator = 0.38 + 0.88x_1 - 0.10x_2 + 0.19x_3 - 0.13x_4 + 0.07x_5}$$

Where x represent the independent variables

4.3.3 Regression Analysis Results for Independent Variables and Construction Time Performance Indicator

The study assumed that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive and significant effect on construction time performance indicator.

As shown in appendix attached at the back, the overall model 2 statistics of dependent variable construction time performance indicator, R=.825 indicates that there is a positive correlation between the dependent variable construction time performance indicator and the independent variables project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors and the adjusted R square value of .669 indicates that the independent variables included in the model explained 66.9% of variance (.669×100%) in dependent variable construction time performance indicator, the remaining 33.1% variance of the dependent variable construction time performance indicator is due to other factors that are not included in this model.

Hence, the overall model statistic (adjusted R square=0.669), supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive influence on construction time performance indicator. .

To test significance of the model 2, ANOVA (F- test) was performed. As shown in appendix attached at the back, it can be observed from the ANOVA table that the model as a whole is significant P value<0.05 (P=.000, F *(5, 148)* 62.875). Thus, it is concluded that the proposed hypothesis which states that construction time performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

Hence, hypothesis 2 is rejected.

Table 4.12 The Coefficient Statistics of Independent Variables and Construction Time Performance Indicator

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.156	.246		.633	.528
	Cost Management Factors	.992	.062	.799	16.029	.000
	Time Management Factors	-.180	.100	-.113	-1.790	.076
	Quality Management Factors	.158	.089	.106	1.788	.076
	Scope Management Factors	-.020	.089	-.013	-.219	.827
	Risk Management Factors	.065	.081	.047	.807	.421

a. Dependent Variable: Construction Time Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

From the above table 4.16 regression model 2, the following regression equation was obtained:

$$\boldsymbol{Construction\,Time\,Performance\,Indicator = 0.16 + 0.99x_1 - 0.18x_2 + 0.16x_3 - 0.20x_4 + 0.07x_5}$$

Where x represent the independent variables

4.3.4 Regression Analysis Results for Independent Variables and Construction Quality Performance Indicator

The study assumed that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive and significant effect on construction quality performance indicator.

As shown in appendix attached at the back, the overall model 3 statistics of dependent variable construction quality performance indicator, R=.848 indicates that there is a positive correlation between the dependent variable construction quality performance indicator and the independent variables project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors and the adjusted R square value of .710 indicates that the independent variables included in the model explained 71.0% of variance (.710×100%) in dependent variable construction quality performance indicator, the remaining 29.0% variance of the dependent variable construction quality performance indicator is due to other factors that are not included in this model.

Hence, the overall model statistic (adjusted R square=0.710), supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive influence on construction quality performance indicator.

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To test significance of the model 3, ANOVA (F- test) was performed. As shown in appendix attached at the back, it can be observed from the ANOVA table that the model as a whole is significant P value <0.05 (P=.000, F *(5, 148)* 76.035). Thus, it is concluded that the proposed hypothesis which states that construction quality performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

Hence, hypothesis 3 is rejected.

Table 4.13 The Coefficient Statistics of Independent Variables and Construction Quality Performance Indicator

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.099	.214		-.461	.646
	Cost Management Factors	.988	.054	.856	18.369	.000
	Time Management Factors	.192	.087	.130	2.202	.029
	Quality Management Factors	.015	.077	.011	.200	.842
	Scope Management Factors	-.060	.077	-.042	-.772	.442
	Risk Management Factors	-.072	.070	-.056	-1.022	.308

a. Dependent Variable: Construction Quality Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

From the above table 4.17 regression model 3, the following regression equation was obtained:

$$Construction\ Quality\ Performance\ Indicator = -0.09 + 0.99x_1 + 0.19x_2 + 0.02x_3 - 0.06x_4 - 0.07x_5$$

Where x represent the independent variables

4.3.5 Regression Analysis Results for Independent Variables and Construction Scope Performance Indicator

The study assumed that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive and significant effect on construction scope performance indicator.

As shown in appendix attached at the back, the overall model 4 statistics of dependent variable construction scope performance indicator, R=.799 indicates that there is a positive correlation between the dependent variable construction scope performance indicator and the independent variables project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors and the adjusted R square value of .626 indicates that the independent variables included in the model explained 62.6% of variance (.626×100%) in dependent variable construction scope performance indicator, the remaining 37.4% variance of the dependent variable construction scope performance indicator is due to other factors that are not included in this model.

Hence, the overall model statistic (adjusted R square=0.626), supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive influence on construction scope performance indicator.

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To test significance of the model 4, ANOVA (F- test) was performed. As shown in appendix attached at the back, it can be observed from the ANOVA table that the model as a whole is significant P value<0.05 (P=.000, F *(5, 148)* 52.135). Thus, it is concluded that the proposed hypothesis which states that construction scope performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

Hence, hypothesis 4 is rejected.

Table 4.14 The Coefficient Statistics of Independent Variables and Construction Scope Performance Indicator

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.434	.302		-1.435	.153
	Cost Management Factors	1.137	.076	.793	14.969	.000
	Time Management Factors	.091	.123	.049	.735	.464
	Quality Management Factors	-.372	.109	-.216	-3.423	.001
	Scope Management Factors	.205	.109	.117	1.879	.062
	Risk Management Factors	-.066	.099	-.042	-.671	.503

a. Dependent Variable: Construction Scope Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

From the above table 4.18 regression model 4, the following regression equation was obtained:

$$\boldsymbol{Construction\ Scope\ Performance\ Indicator = -0.43 + 1.14x_1 + 0.09x_2 - 0.37x_3 + 0.20x_4 - 0.07x_5}$$

Where x represent the independent variables

4.3.6 Regression Analysis Results for Independent Variables and Performance Indicators

According to Sinn (2011) on his SPSS Guide–Correlation & Regression, explained the model summary of the regression analysis gives you the R-value & the R square value. Coefficients give beta values, and the p-value to check for significance. We reject Ho if p<=0.05. This means the relationship is reliable and can be used to make predictions.

Based on model summary and ANOVA table result attached at the appendix for model 5, when performance indicators was regressed on the five independent variables (project cost management factors, project time management factors , project quality management factors, project scope management factors and project risk management factors), the independent variables contribute to statistically significant level p-value 0.000. And the coefficient of determination adjusted R square was found to be 0.567 which indicate that

56.7% of the variability of performance indicators was explained by the five independent variables. The other variables that were not considered in this study contribute about 43.3% of the variability of performance indicators.

Hence, the overall model statistic (adjusted R square=0.567), supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a positive influence on construction performance indicators.

To test significance of the model 5, ANOVA (F- test) was performed. As shown in appendix attached at the back, it can be observed from the ANOVA table that the model as a whole is significant P value<0.05 (P=.000, F *(5, 148)* 41.045). Thus, it is concluded that the proposed hypothesis which states that construction performance indicators has no significant relationship with project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

Hence, hypothesis 5 is rejected.

Table 4.15 The Coefficient Statistics of Independent Variables and Performance Indicators

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.131	.168		.782	.436
	Cost Management Factors	.190	.042	.257	4.513	.000
	Time Management Factors	.201	.069	.212	2.938	.004
	Quality Management Factors	-.013	.060	-.015	-.222	.825
	Scope Management Factors	.192	.061	.211	3.156	.002
	Risk Management Factors	.308	.055	.377	5.593	.000

a. Dependent Variable: Performance Indicators

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

From the above table 4.19 regression model 5, the following regression equation was obtained:

$$\boldsymbol{Performance\ Indicators} = \mathbf{0.13 + 0.19x\_1 + 0.20x\_2 - 0.01x\_3 + 0.19x\_4 - 0.31x\_5}$$

Where x represent the independent variables

Based on the above multiple regression analysis the following are the most significant factors affecting the performance of commercial building construction projects at Lideta Sub-city based on the value of adjusted R square for each independent variable (explaining the variance in dependent variable).

Table 4.16 Rank of Factors Affecting the Performance of Building Construction Projects

Independent Variable	Adjusted R square Value	Rank
Project Risk Management Factors	43.40%	1
Project Scope Management Factors	30.60%	2
Project Time Management Factors	24.50%	3
Project Cost Management Factors	19.10%	4
Project Quality Management Factors	14.20%	5

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

From the above table 4.30 the most significant factors affecting the performance of commercial building construction projects at Lideta Sub-city are ranked based on their adjusted R square value. Project risk management factors explained for 43.4% of variance in performance indicators, project scope management factors explained for 30.6% of variance in performance indicators, project time management factors explained 24.5% of variance in performance indicators, project cost management factors explained 19.1% of variance in performance indicators and project quality management factors explained 14.20% of variance in performance indicators for building construction projects at Lideta Sub-city.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

In this section the main findings of the research is summarized and conclusions on major findings is presented. Recommendations are given based on the research findings and the limitation of the study is mentioned. Finally, the study forwarded some suggestions for further investigations.

5.1 Summary of Findings

In this study the factors affecting the performance of building construction projects were examined quantitatively. Based on the results of the regression analysis the following summaries of findings were drawn.

From regression analysis results for independent variables and construction cost performance indicator the overall model statistics box of dependent variable, construction cost performance indicator revealed R value of .818 which indicates the correlation between project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors (independent variables) and construction cost performance indicator (dependent variable). The adjusted R square value of .658 that the independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors) included in the model explained 65.8% of variance in dependent variable (construction cost performance indicator).

Hence, the overall model statistic of construction cost performance indicator (adjusted R square=.658) is supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a significant relationship with the construction cost performance indicator of building construction projects at Lideta Sub-city.

To test significance of these regression analysis results for independent variables and construction cost performance indicator ANOVA (F test) was performed, it can be observed from the ANOVA table that the model as a whole is significant $P<0.05$ ($P=.000$, F (5, 148) 59.754). Hence, it is concluded that the proposed hypothesis which states that construction cost performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

From regression analysis results for independent variables and construction time performance indicator the overall model statistics box of dependent variable, construction time performance indicator revealed R value of .825 which indicates the correlation between project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors (independent variables) and construction time performance indicator (dependent variable). The adjusted R square value of .669 that the independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors) included in the model explained 66.9% of variance in dependent variable (construction time performance indicator).

Hence, the overall model statistic of construction time performance indicator (adjusted R square=.669) is supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a significant relationship with the construction time performance indicator of building construction projects at Lideta Sub-city.

To test significance of these regression analysis results for independent variables and construction time performance indicator ANOVA (F test) was performed, it can be observed from the ANOVA table that the model as a whole is significant $P<0.05$ ($P=.000$, F (5, 148) 62.875). Hence, it is concluded that the proposed hypothesis which states that construction time performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

From regression analysis results for independent variables and construction quality performance indicator the overall model statistics box of dependent variable, construction quality performance indicator revealed R value of .848 which indicates the correlation between project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors (independent variables) and construction quality performance indicator (dependent variable). The adjusted R square value of .710 that the independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors) included in the model explained 71.0% of variance in dependent variable (construction quality performance indicator).

Hence, the overall model statistic of construction quality performance indicator (adjusted R square=.710) is supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a significant relationship with the construction quality performance indicator of building construction projects at Lideta Sub-city.

To test significance of these regression analysis results for independent variables and construction quality performance indicator ANOVA (F test) was performed, it can be observed from the ANOVA table that the model as a whole is significant $P<0.05$ ($P=.000$, F (5, 148) 76.035). Hence, it is concluded that the proposed hypothesis which states that construction quality performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

From regression analysis results for independent variables and construction scope performance indicator the overall model statistics box of dependent variable, construction scope performance indicator revealed R value of .799 which indicates the correlation between project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors (independent variables) and construction scope performance indicator (dependent variable). The adjusted R square value of .626 that the independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors) included in the model explained 62.6% of variance in dependent variable (construction scope performance indicator).

Hence, the overall model statistic of construction scope performance indicator (adjusted R square=.626) is supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a significant relationship with the construction scope performance indicator of building construction projects at Lideta Sub-city.

To test significance of these regression analysis results for independent variables and construction scope performance indicator ANOVA (F test) was performed, it can be observed from the ANOVA table that the mode as a whole is significant $P<0.05$ ($P=.000$, $F(5, 148)$ 52.135). Hence, it is concluded that the proposed hypothesis which states that construction scope performance indicator has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

From regression analysis results for independent variables and construction performance indicators the overall model statistics box of dependent variable, construction performance indicators revealed R value of .762 which indicates the correlation between project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors (independent variables) and construction performance indicators (dependent variable). The adjusted R square value of .567 that the independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors) included in the model explained 56.7% of variance in dependent variable (construction performance indicators).

Hence, the overall model statistic of construction performance indicators (adjusted R square=.567) is supported the view that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors has a significant relationship with the construction performance indicators of building construction projects at Lideta Sub-city.

To test significance of these regression analysis results for independent variables and construction performance indicators ANOVA (F test) was performed, it can be observed from the

ANOVA table that the model as a whole is significant $P<0.05$ (P=.000, F (5, 148) 41.045). Hence, it is concluded that the proposed hypothesis which states that construction performance indicators has no significant relationship with the project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors of commercial building construction projects at lideta sub-city is rejected.

5.2 Conclusion

This study examined the effect of project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors on performance of building construction projects at Lideta Sub-city, Addis Ababa. The descriptive analysis showed that construction cost performance indicator is meeting average, construction time performance indicator is meeting poor, construction quality performance indicator is meeting good and construction scope performance indicator is meeting on neutral for building construction projects at Lideta Sub-city. And also the descriptive analysis of explanatory variables show that project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors falls on importantly and less importantly affect the performance of building construction projects at Lideta Sub-city.

From this study finding, there is a positive and significant relationship between the five independent variables mentioned above and performance indicators.

The results of linear multiple regression analysis regarding the effects of project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors on performance indicators (construction cost performance indicator, construction time performance indicator, construction quality performance indicator and construction scope performance indicator), it is concluded that there is a positive and significant relationship. This result suggests the successful management of cost, time, quality, scope and risk results in increased performance of building construction projects at Lideta Sub-city.

The independent variables project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors which is responsible for 56.7% of variance in performance indicators. This implies best management of cost, time, quality, scope and risk increased the performance of building construction projects at Lideta Sub-city.

5.3 Recommendations

5.3.1 Introduction

Performance problem is costly and often result in disputes, claims and affect the development of the construction industry. The construction organizations must have a clear mission and vision to formulate, implement and evaluate performance. The environment of construction organizations should be proper to implement projects with success performance. It is important for construction organizations to identify the weakness of performance in order to solve and overcome. The following issues are recommendations related to obtained results.

5.3.2 Training Programs

It is recommended to develop human resources in the construction industry through proper and continues training programs about construction projects performance. These programs can update their knowledge and can assist them to be more familiar with project management techniques and processes. In addition, it is preferred to develop and improve the managerial skills of engineers in order to improve performance of construction projects. All of that can be implemented by offering effective and efficient training courses in managing schedule, time, cost, quality, scope, risk, etc.

5.3.3 Recommendations for Owners

Owners are recommended to facilitate payment to contractors in order to overcome delay, disputes and claims. All managerial levels should be participated with sensitive and important decision-making. Continues coordination and relationship between project participants are required through project life cycle in order to solve problems and develop project performance. It is recommended to minimize disputes between owner and project parties.

5.3.4 Recommendations for Consultants

Consultants should be more interested with design cost by using multi criteria analysis and choosing the most economic criteria in order to improve their performance and to increase owners satisfaction. Consultants are recommended to facilitate and quicken orders delivered to contractors to obtain better time performance and to minimize disputes and claims. In addition, it is advisable that consultants should really give emphasis on addressing project cost management factors, project time management factors, project quality management factors, project scope management factors, project risk management factors and other project management knowledge areas so as to increase performance of construction projects.

5.3.5 Recommendations for Contractors

Contractors should not increase the number of projects that cannot be performed successfully. In addition, contractors should consider political and business environment risk in their cost estimation in order to overcome delay because of closures and materials shortage. There should be adequate contingency allowance in order to cover increase in material cost. In addition, it is advisable that contractors should really give emphasis on addressing project cost management factors, project time management factors, project quality management factors, project scope management factors, project risk management factors and other project management knowledge areas so as to increase performance of construction projects.

5.4 Limitation and Future Research Area

Students working in this area for the future can follow the following untapped area. Firstly, in this study, only contractors, consultants and owners are the study population so any other researcher can make their population of study other than contractors, consultants and owners i.e. labors, suppliers, government regulators etc…

Secondly, any party interested in this area can also study the factors affecting the performance of building construction projects on other area other than used in this study, which is Lideta sub-city. In other words, replication can also be tested in different building construction projects.

Thirdly, due to time and money constraint this research paper focus only on project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors. The researcher found only 56.7% of the variability of performance indicators to be explained by the five independent variables (project cost management factors, project time management factors, project quality management factors, project scope management factors and project risk management factors). This indicates there are other factors which are not included in this study that are responsible to the 43.3% of the variability of performance indicators. So any voluntary researcher can dig out the rest factors.

Lastly, the other limitation faced by the researcher was because of lack of and unwilling support from the contractors and consultants, document analysis was impossible to perform.

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APPENDICES

APPENDIX A: Questionnaire

ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

MASTER PROGRAM IN PROJECT MANAGEMENT

(QUESTIONNAIRE)

DEAR SIR/MADAM,

The purpose of this questionnaire is to collect data for the study entitled **"Factors Affecting Performance of Building Construction Projects at Lideta Sub-city: The Case of Commercial Building Projects"** for partial fulfillment of M.A in Project Management. The genuine responses you forward will be used as input for the study and have great contribution to the success of the study. Your privacy will be kept anonymously and, therefore, no one knows who provided the information. Furthermore, any information you provide in the questionnaire will be kept confidential and only used for the purpose of the study. Therefore, you are kindly requested to provide your genuine responses to different questions below.

Thank You in advance for your cooperation!

If you have any question concerning this questionnaire, please feel free to contact me: Maerege Gebrehewot; Tel.0910689231; E-mail: maeregemelody35@gmail.com.

The questioner has six sections. Here, I kindly request you to give honest and genuine answers to all the questions without which the research will not succeed. It will take maximum of 30 minutes to answer all the questions.

General Instruction: Please, tick **"✓"** in the appropriate columns for your response for closed - ended questions among the provided alternatives but write your response in the space provided for open-ended questions.

SECTION A: Demographic Data

Instruction: Please tick [✓] appropriately

1. Gender: Female [ ] Male [ ]

2. Age……………year

3. Type of Organization

Owner [ ] Consultant [ ] Contractor [ ]

4. Years of Experience………......years

5. Number of Projects Executed in the last Five Years…………

6. Professional Background (Consultant and contractor only)

Quantity Surveyor [ ] Architect [ ] Electrical Engineer [ ]

Mechanical Engineer [ ] Civil Engineer [ ] Sanitary Engineer [ ]

Other [ ]

SECTION B

Objectives of the study:

- To **assess the performance** of commercial building construction projects at Lideta Sub-City.
- To identify **cost management practice** in commercial building construction projects at Lideta Sub-City.
- To identify **time management practice** in commercial building construction projects at Lideta Sub-City.
- To identify **quality management practice** in commercial building construction projects at Lideta Sub-City.

- To identify **scope management practice** in commercial building construction projects at Lideta Sub-City.
- To identify **risk management practice** in commercial building construction projects at Lideta Sub-City.

Instruction: Please, tick "✓" in the appropriate boxes and columns.

Please, tick "✓" in the appropriate columns to indicate the extent that the following listed indicators of performance is meeting for commercial building construction projects at Lideta sub-city.

Groups/Factors	**Very High**	**Above Average**	**Average**	**Below Average**	**Very Low**
2.1Indicators of Performance of Building Construction Project					
Construction Cost					

Groups/Factors	**Very Good**	**Good**	**Fair**	**Poor**	**Very Poor**
2.2 Indicators of Performance of Building Construction Project					
Construction Time					

Groups/Factors	**Very Good**	**Good**	**Acceptable**	**Poor**	**Very Poor**
2.3 Indicators of Performance of Building Construction Project					
Construction Quality					

Groups/Factors	**On the Scope**	**Moderately On the Scope**	**Neutral**	**Below scope**	**Beyond Scope**
2.4 Indicators of Performance of Building Construction Project					
Construction scope					

3.1 Do you agree that there are **project cost management factors** affecting performance of commercial building construction projects at Lideta sub-city? **Yes** ☐ **No** ☐

3.2 If your answer is yes for question 3.1, rate **project cost management factors** in terms of their effect on the performance of commercial building construction projects at Lideta sub-city.

Please, tick **"✓"** in the appropriate columns to indicate how much you agree that the following listed **project cost management factors** affecting performance of commercial building construction projects at Lideta sub-city.

Groups/Factors	Highly Important	Important	Moderately Important	Less Important	Least Important
3.2 Project Cost Management Factors					
Resource Planning					
Cost Estimating					
Cost Budgeting					
Cost control					

SECTION C

4.1 Do you agree that there are **project time management factors** affecting performance of commercial building construction projects at Lideta sub-city? **Yes** ☐ **No** ☐

4.2 If your answer is yes for question 4.1, rate the **project time management factors** in terms of their effect on the performance of commercial building construction projects at Lideta sub-city.

Please, tick **"✓"** in the appropriate columns to indicate how much you agree that the following listed **project time management factors** affecting performance of commercial building construction projects at Lideta sub-city.

Groups/Factors	Highly Important	Important	Moderately Important	Less Important	Least Important
4.2 Project Time Management Factors					
Activity Definition					
Activity Sequencing					
Schedule Development					
Schedule Control					

SECTION D

5.1 Do you agree that there are **project quality management factors** affecting performance of commercial building construction projects at Lideta sub-city? **Yes** ☐ **No** ☐

5.2 If your answer is yes for question 5.1, rate the **project quality management factors** in terms of their effect on the performance of commercial building construction projects at Lideta sub-city.

Please, tick **"✓"** in the appropriate columns to indicate how much you agree that the following listed **project quality management factors** affecting performance of commercial building construction projects at Lideta sub-city.

Groups/Factors	**Highly Important**	**Important**	**Moderately Important**	**Less Important**	**Least Important**
5.2 Project Quality Management Factors					
Quality Planning					
Quality Assurance					
Quality Control					

SECTION E

6.1 Do you agree that there are **project scope management factors** affecting performance of commercial building construction projects at Lideta sub-city? **Yes** ☐ **No** ☐

6.2 If your answer is yes for question 6.1, rate the **project scope management factors** in terms of their effect on the performance of commercial building construction projects at Lideta sub-city

Please, tick **"✓"** in the appropriate columns to indicate how much you agree that the following listed **project scope management factors** affecting performance of commercial building construction projects at Lideta sub-city.

Groups/Factors	**Highly Important**	**Important**	**Moderately Important**	**Less Important**	**Least Important**
6.2 Project Scope Management Factors					
Market Demand					
A business Need					
A customer Request					
A technological Advance					

SECTION F

7.1 Do you agree that there are **project risk management factors** affecting performance of commercial building construction projects at Lideta sub-city? **Yes** ☐ **No** ☐

7.2 If your answer is yes for question 3.1, rate the **project risk management factors** in terms of their effect on the performance of commercial building construction projects at Lideta sub-city.

Please, tick **"✓"** in the appropriate columns to indicate how much you agree that the following listed **project risk management factors** affecting performance of commercial building construction projects at Lideta sub-city

Groups/Factors	**Highly Important**	**Important**	**Moderately Important**	**Less Important**	**Least Important**
7.2 Project Risk Management Factors					
Risk Management Planning					
Risk Identification					
Qualitative Risk Analysis					
Quantitative Risk Analysis					
Risk Response Planning					

Thank You Again In Advance for Your Cooperation!!

APPENDIX B: Descriptive Analysis of Variables, Reliability Analysis, Multicollinearity, Linearity Test, Normality Test, Auto-Correlation Test/Durbin-Watson Test/ and Regression Analysis Results

Descriptive Analysis of Variables

Limits of Scales	Likert Scales of Dependent Variables			
	Construction Cost Performance Indicator	Construction Time Performance Indicator	Construction Quality Performance Indicator	Construction Scope Performance Indicator
1.00-1.49	very low	Very Poor	Very Poor	Beyond Scope
1.50-2.49	below average	Poor	Poor	Below Scope
2.50-3.49	Average	Fair	Acceptable	Neutral
3.50-4.49	Above average	Good	Good	Moderately on the scope
4.50-5.00	Very High	Very Good	Very Good	On the scope

Limits of Scales	Likert Scales of Independent Variables				
	Project Cost Management Factors	Project Time Management Factors	Project Quality Management Factors	Project Scope Management Factors	Project Risk Management Factors
1.00-1.49	Least important	Least important	Least important	Least important	Least important
1.50-2.49	Less important	Less important	Less important	Less important	Less important
2.50-3.49	Moderately important	Moderately important	Moderately important	Moderately important	Moderately important
3.50-4.49	Important	Important	Important	Important	Important
4.50-5.00	Highly important	Highly important	Highly important	Highly important	Highly important

Reliability Analysis

Case Processing Summary

		N	%
Cases	Valid	154	100.0
	Excluded[a]	0	.0
	Total	154	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.914	.920	24

Item Statistics

	Mean	Std. Deviation	N
Construction Cost Performance Indicator	3.5714	1.04698	154
Construction Time Performance Indicator	3.6948	1.16219	154
Construction Quality Performance Indicator	3.4545	1.07916	154
Construction Scope Performance Indicator	3.2273	1.34078	154
Resource Planning Project Cost Management Factors	1.7987	.94544	154
Cost Estimating Project Cost Management Factors	1.8506	.90592	154
Cost Budgeting Project Cost Management Factors	1.9091	.91725	154
Cost Control Project Cost Management Factors	1.7403	.83082	154
Activity Definition Project Time Management Factors	2.0000	.96338	154

Activity Sequencing Project Time Management Factors	1.9026	.87649	154
Schedule Development Project Time Management Factors	1.9675	.99947	154
Schedule Control Project Time Management Factors	1.8052	.85618	154
Quality Planning Project Quality Management Factors	1.8506	.86154	154
Quality Assurance Project Quality Management Factors	1.9481	.88408	154
Quality Control Project Quality Management Factors	1.8766	.89536	154
Market Demand Project Scope Management Factors	2.2143	1.01598	154
A Business Need Project Scope Management Factors	2.1169	.92848	154
A Customer Request Project Scope Management Factors	2.1818	.95967	154
A Technological Advance Project Scope Management Factors	2.2597	1.07135	154
Risk Management Planning Project Risk Management Factors	2.1039	.89420	154
Risk Identification Project Risk Management Factors	2.1104	.85223	154
Qualitative Risk Analysis Project Risk Management Factors	2.3312	.83279	154
Quantitative Risk Analysis Project Risk Management Factors	2.3701	.87036	154
Risk Response Planning Project Risk Management Factors	1.9610	.89211	154

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.260	1.740	3.695	1.955	2.123	.348	24
Item Variances	.923	.690	1.798	1.107	2.604	.063	24
Inter-Item Correlations	.323	-.192	.798	.990	-4.149	.026	24

Multicollinearity

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors[b]	.	Enter

a. Dependent Variable: Performance Indicators

b. All requested variables entered.

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Cost Management Factors	.871	1.148
	Time Management Factors	.545	1.833
	Quality Management Factors	.616	1.623
	Scope Management Factors	.632	1.584
	Risk Management Factors	.624	1.602

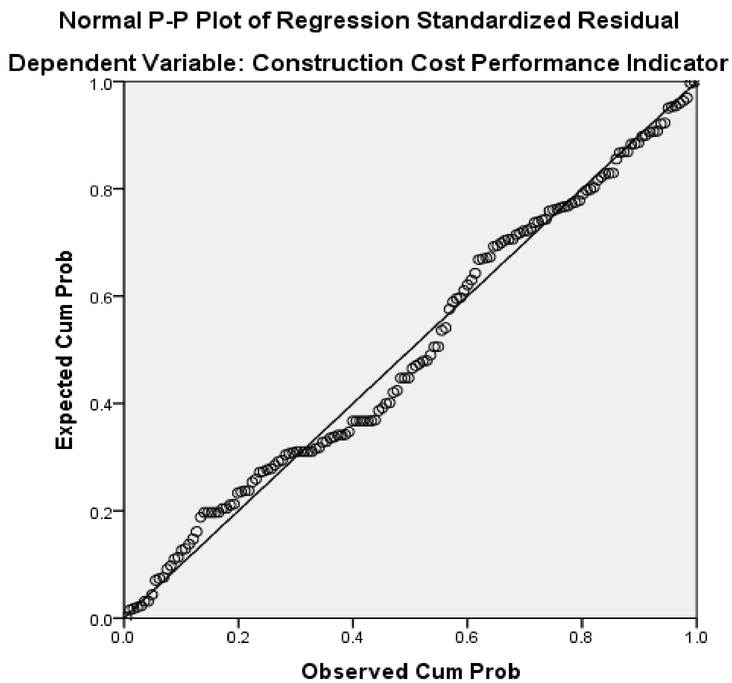
a. Dependent Variable: Performance Indicators

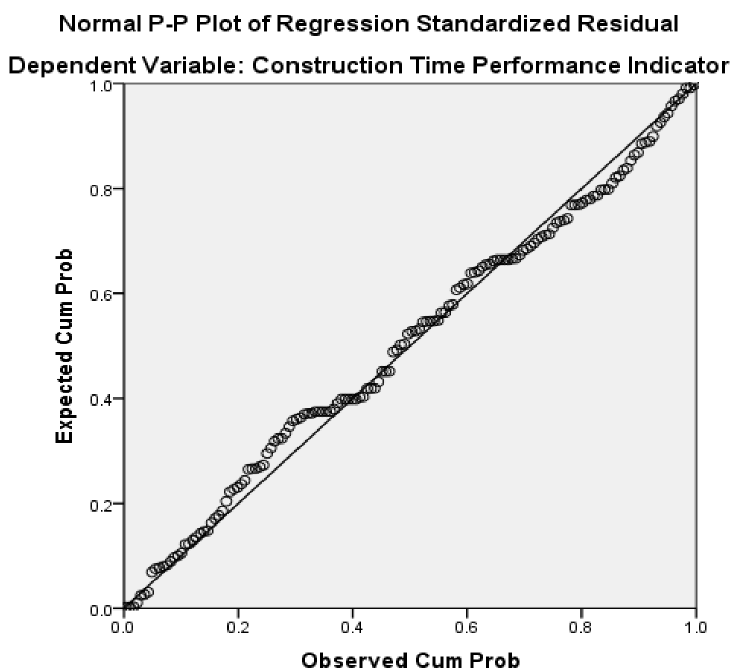
Collinearity Diagnostics[a]

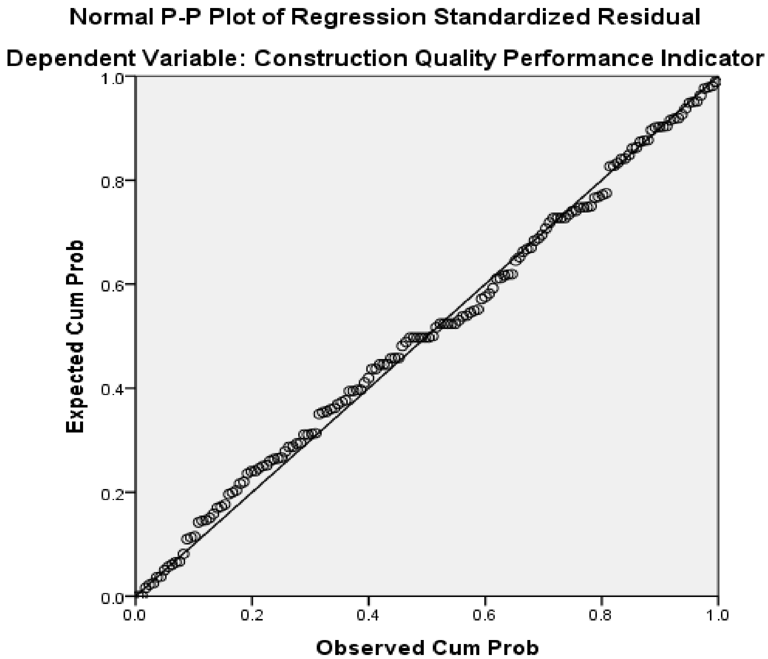
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions					
				(Constant)	Cost Management Factors	Time Management Factors	Quality Management Factors	Scope Management Factors	Risk Management Factors
1	1	5.640	1.000	.00	.00	.00	.00	.00	.00
	2	.124	6.742	.06	.18	.14	.14	.02	.01
	3	.088	8.025	.04	.03	.01	.25	.38	.22
	4	.064	9.403	.03	.00	.01	.00	.55	.69
	5	.055	10.166	.04	.00	.73	.60	.04	.03
	6	.030	13.662	.83	.79	.10	.00	.00	.05

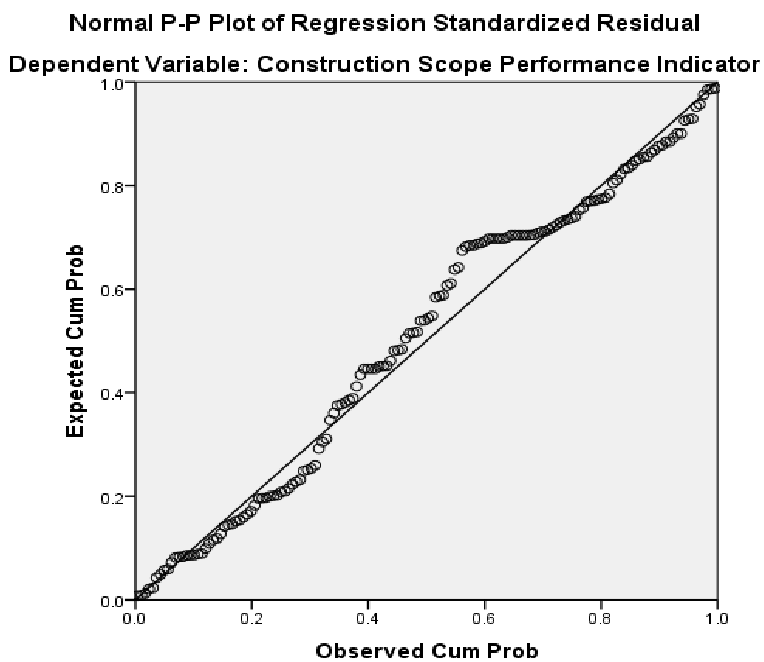
a. Dependent Variable: Performance Indicators

Linearity Test

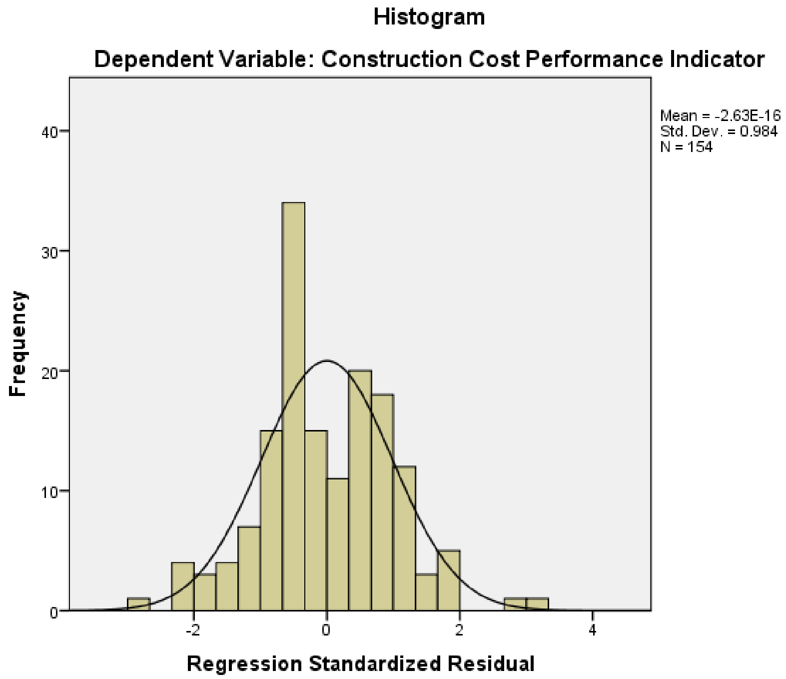


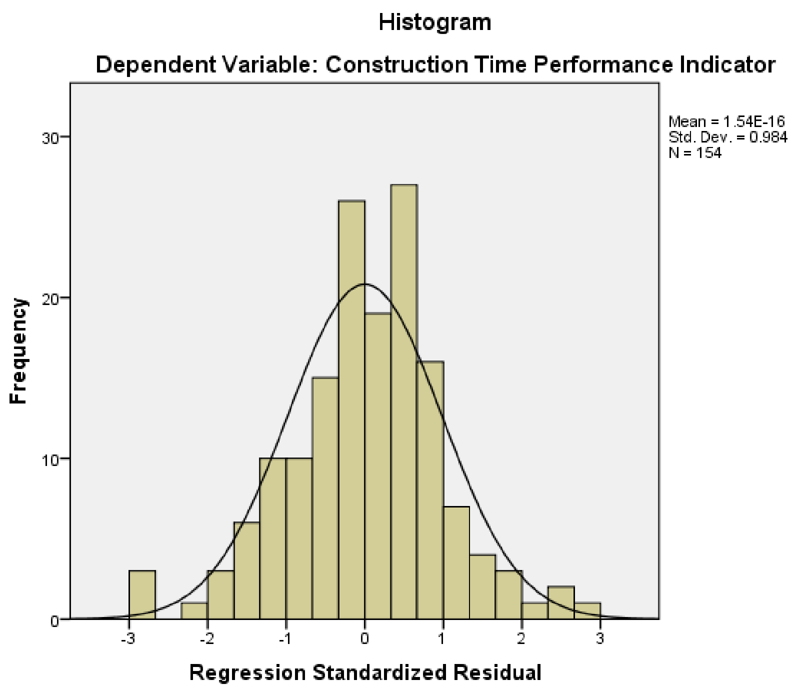


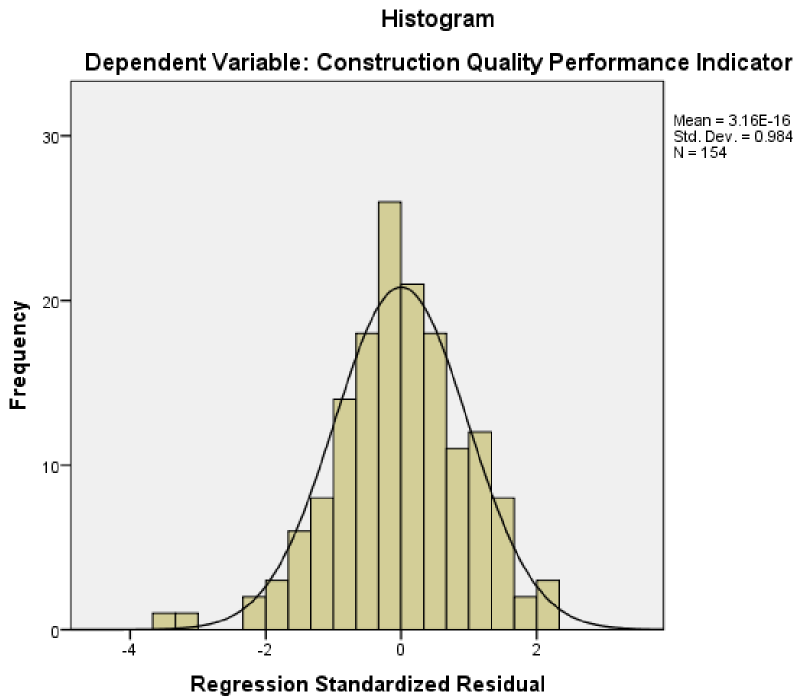

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Construction Quality Performance Indicator
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

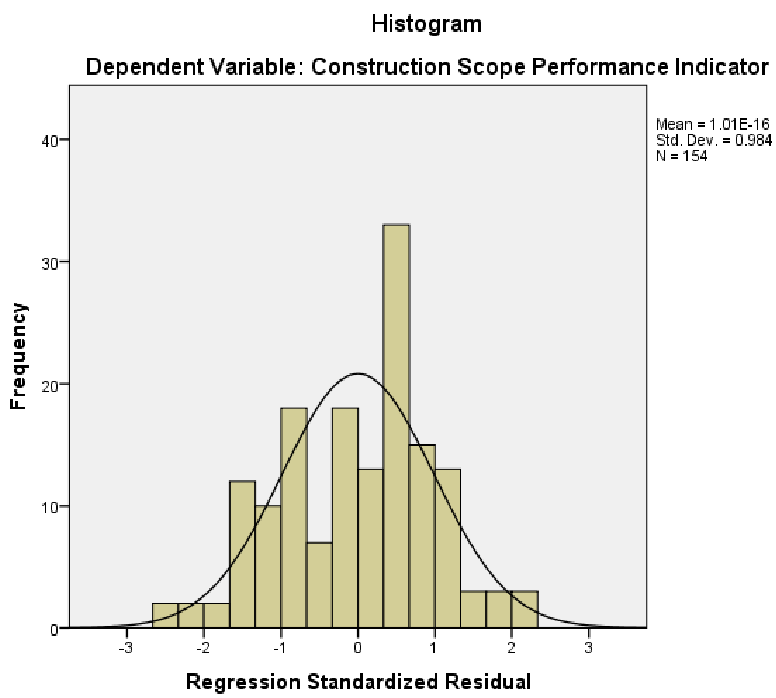

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Construction Scope Performance Indicator
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

Normality Test






Histogram
Dependent Variable: Construction Quality Performance Indicator
Mean = 3.16E-16
Std. Dev. = 0.984
N = 154
Frequency
Regression Standardized Residual
30
20
10
0
-4
-2
0
2


Histogram
Dependent Variable: Construction Scope Performance Indicator
Mean = 1.01E-16
Std. Dev. = 0.984
N = 154
Frequency
Regression Standardized Residual
40
30
20
10
0
-3
-2
-1
0
1
2
3

Descriptive Statistics

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Construction Cost Performance Indicator	154	1.04698	-.832	.195	.259	.389
Construction Time Performance Indicator	154	1.16219	-.672	.195	-.312	.389
Construction Quality Performance Indicator	154	1.07916	-.577	.195	-.286	.389
Construction Scope Performance Indicator	154	1.34078	-.243	.195	-1.138	.389
Cost Management Factors	154	.93576	-.947	.195	.365	.389
Time Management Factors	154	.72880	1.093	.195	1.296	.389
Quality Management Factors	154	.77790	.797	.195	.317	.389
Scope Management Factors	154	.76306	.883	.195	.674	.389
Risk Management Factors	154	.84733	.306	.195	-.556	.389
Valid N (listwise)	154					

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Auto-Correlation Test/Durbin-Watson Test/

Durbin- Watson Test for Independent Variables and Performance Indicators (Dependent Variable)

Regression Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**Durbin-Watson**
1	.762[a]	.581	.567	.45606	**1.813**

a. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

b. Dependent Variable: Performance Indicators

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Durbin- Watson Test for Independent Variables and Each Dependent Variable)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**Durbin-Watson**
1	.820[a]	.673	.660	.61076	**1.947**

a. Predictors: (Constant), Performance Indicators, Quality Management Factors, Cost ManagementFactors, Scope Management Factors, Time Management Factors, Risk Management Factors

b. Dependent Variable: Construction Cost Performance Indicator

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**Durbin-Watson**
1	.826[a]	.683	.670	.66770	**1.905**

a. Predictors: (Constant), Performance Indicators, Quality Management Factors, Cost Management Factors, Scope Management Factors, Time Management Factors, Risk Management Factors

b. Dependent Variable: Construction Time Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**Durbin-Watson**
1	.851[a]	.725	.714	.57740	**2.012**

a. Predictors: (Constant), Performance Indicators, Quality Management Factors, Cost Management Factors, Scope Management Factors, Time Management Factors, Risk Management Factors

b. Dependent Variable: Construction Quality Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**Durbin-Watson**
1	.814[a]	.662	.648	.79492	**1.732**

a. Predictors: (Constant), Performance Indicators, Quality Management Factors, Cost Management Factors, Scope Management Factors, Time Management Factors, Risk Management Factors

b. Dependent Variable: Construction Scope Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Regression Analysis Results

Model 1 (Regression Analysis Results for Independent Variables and Construction Cost Performance Indicator)

The Regression Model Statistics of Independent Variables and Construction Cost Performance Indicator

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.818[a]	.669	.658	.61269	1.902

a. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

b. Dependent Variable: Construction Cost Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	112.156	5	22.431	59.754	.000[b]
	Residual	55.558	148	.375		
	Total	167.714	153			

a. Dependent Variable: Construction Cost Performance Indicator

b. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Model 2 (Regression Analysis Results for Independent Variables and Construction Time Performance Indicator)

The Regression Model Statistics of Independent Variables and Construction Time Performance Indicator

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.825[a]	.680	.669	.66854	1.898

a. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

b. Dependent Variable: Construction Time Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	140.508	5	28.102	62.875	.000[b]
	Residual	66.148	148	.447		
	Total	206.656	153			

a. Dependent Variable: Construction Time Performance Indicator

b. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality ManagementFactors, Scope Management Factors, Time Management Factors

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Model 3 (Regression Analysis Results for Independent Variables and Construction Quality Performance Indicator)

The Regression Model Statistics of Independent Variables and Construction Quality Performance Indicator

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.848[a]	.720	.710	.58082	2.004

a. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

b. Dependent Variable: Construction Quality Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	128.254	5	25.651	76.035	.000[b]
1	Residual	49.928	148	.337		
	Total	178.182	153			

a. Dependent Variable: Construction Quality Performance Indicator

b. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Model 4 **(Regression Analysis Results for Independent Variables and Construction Scope Performance Indicator)**

The Regression Model Statistics of Independent Variables and Construction Scope Performance Indicator

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.799[a]	.638	.626	.82038	1.645

a. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

b. Dependent Variable: Construction Scope Performance Indicator

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	175.438	5	35.088	52.135	.000[b]
	Residual	99.607	148	.673		
	Total	275.045	153			

a. Dependent Variable: Construction Scope Performance Indicator

b. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

Model 5 (Regression Analysis Results for Independent Variables and Performance Indicators)

Summary of the Overall Regression Model

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.762[a]	.581	.567	.45606	1.813

a. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

b. Dependent Variable: Performance Indicators

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.684	5	8.537	41.045	.000[b]
	Residual	30.782	148	.208		
	Total	73.466	153			

a. Dependent Variable: Performance Indicators

b. Predictors: (Constant), Risk Management Factors, Cost Management Factors, Quality Management Factors, Scope Management Factors, Time Management Factors

Source: Researcher's own compilation of survey data and SPSS V20 output (2019)

DECLARATION

I, the undersigned declare that this thesis is my original work, prepared under the guidance of Dr. Maru Shete (Assoc. Professor). All sources of materials used for this thesis have been duly acknowledged. I further confirm that this thesis has not been submitted either in part or in full to any higher learning institution for the purpose of earning any degree.

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Signature

St. Mary's University, Addis Ababa **May, 2019**

ENDORSMENT

This thesis has been submitted to St. Mary University, school of graduate studies for examination with my approval as a University advisor.

Dr. Maru Shete, Assoc. Professor

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Signature

St. Mary's University, Addis Ababa **May, 2019**