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SCHOOL OF GRADUATE STUDIES

JIMMA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

CONSTRUCTION ENGINEERING AND MANAGEMENTCHAIR

INVESTIGATION OF MAJOR SUCCESS FACTORS ON BUILDING CONSTRUCTION: THE CASE OF BOLE SUB CITY, ADDIS ABABA

A thesis submitted to the School of Graduate Studies of Jimma Institute of Technology, Jimma University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Construction Engineering and Management.

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INVESTIGATING MAJOR SUCCESS FACTORS OF BUILDING CONSTRUCTION PROJECTS IN BOLE SUB CITY

BY

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DECLARATION

*I undersigned, declare that this thesis entitled "**Investigating Major Success Factors in Building Construction of Addis Ababa bole sub city**" is my original work, and has not been presented by any other person for an award of a master degree in this or any other University.*

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ABSTRACT

The construction industry is one of the largest job creators in developing countries and is highly competitive. The high number of project failures suggests the existence of underlying major success factors which have not been identified. Major success factors (MSFs) are inputs to project management practice which can lead directly or indirectly to project success.

Ethiopia is one of the developing countries which cannot accomplish its construction industry goals due to lack of identifying different major success factors. This is also true in Bole Sub City. The purpose of this study was to investigate and rank the major success factors in building construction projects of Bole Sub City.

This study was conducted in Addis Ababa Bole Sub City on investigating of MSF based on selected respondents. The literature review was conducted and data collection about success factors on building projects was conducted by using questionnaire, desk review and interview. The collected data was analyzed up to end of December, 2015. The main sources of the information were, clients, contractors, consultants and others in building construction projects of Addis Ababa Bole Sub City. Respondents were purposively selected. 120 questionnaires were distributed to 7 contractors, 4 clients, 5 consultants and 2 others companies in order to identify types of success factors.

From the identified major success factors; Leadership skills of project manager; project clear objective, adequacy of funding, decision making effectiveness and project monitoring are the highest significant success factors according to their rank order which are evaluated based on their relative importance index.

Considering the obtained results of this research, in order to accomplish building construction projects successfully the contractor of the project should have an experienced leader of the project and effective decision maker project manager. Client should ensure adequate preparation for fund is made before projects are started and the objective of project should be clearly stated for constructing parties.

Key words: *Investigation; Major Success Factors; Building Construction; Bole Sub City.*

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ABBREVIATIONS:

AAGCH	Addis Ababa Governmental Construction and Housing
AEC	Architectural, Engineering and Construction
CSR	Corporate Social Responsibility
FPDP	First Plan and Development Program
GDP	Gross Domestic Product
IEG	Independent Evaluation Group
JiT	Jimma Institute of Technology
JU	Jimma University
KPI	Key Performance Indicators
KRA	Key Result Areas
KSF	Key Success Factors
MPSF	Major Project Success Factors
MSF	Major Success Factors
PMBoK	Project Management Body of Knowledge
UNDP	United Nation Development Program

CHAPTER ONE

INTRODUCTION

1.1. Background

The construction industry is one of the most used examples of project based industries. It might be characterized as complex, cost and time consuming and risky. However, construction projects are also dynamic and challenging which attracts capital, new technologies and brilliant brains. Housing building projects particularly represent one of the largest sectors of the construction industry in the most developing economies of the world (Didenko, 2008)

The construction industry has been characterized as dynamic in nature as a result the increasing uncertainties in technology, budgets, and development processes. In recent time, building projects are becoming much more complex and require a careful integrated process management tools and techniques (Omran, 2012).

The construction industry is an important sector of any economy and has multiple backward and forward linkages with other sectors (Mahmood & Shahrukh, 2012). The industry contributes significantly to socio-economic development and employment. Construction companies are the building blocks of construction industry and their success or failure significantly affects the construction industry and other industries including building material industries, investment and growth climate and their success helps to reduce poverty by generating income opportunities for poor household. There are many factors that influence the success and failure of Construction companies.

Projects can be considered as a set of activities that must be completed in accordance to specific objectives which involve the utilization of a company's resources. The project management is coordinating a process of interrelated functions such as planning, organizing and controlling construction activities for getting successful outcomes. Project management concept and techniques can be applied to any project ranging from simple task, office renovations or refurbishment to complex and complicated projects like the design and construction of an airport or shopping center (Babu, et al., 2015).

Construction companies play an important role in national economies worldwide (Meding, et al., 2012), but can only exist and survive based on a regular and continuous stream of successful projects.

Consensus exists among researchers that most reasons for project success can be attributed to the presence or absence of certain project characteristics, referred to as major success factors (MSFs). MSFs require special attention from management owing to their impact on project performance (Inayat1, et al., 2015).

Project is a complex, non-routine, one-time effort limited by time, budget and resource and performance specifications designed to meet customer needs. A construction project is completed through a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment. Since the outcomes of the capital projects have strategic implications on the success and profitability of the business, the ability to deliver based on pre-determined objectives should be critical to the company's success. Project success can be defined as meeting the required expectation of the stakeholders and achieving its intended purpose. Success criteria or a person's definition of success as it relates to construction often changes from project to project depending on participants, scope of services, project size, sophistication of the owner related to the design of facilities, technological implications, and a variety of other factors. The concept of "success factors," was introduced by (Daniel, 1961). Daniel had discussed the problem of inadequate management information for setting objectives, shaping strategies, making decisions, and measuring results against goals. Daniel asserted that organizational planning information should focus on "success factors (Babu, et al., 2015)

A project, irrespective of its size or magnitude, must be completed under three constraints "Cost, Time and Scope" often referred to as the "Triple Constraints of Project Management" (Mahmood & Shahrukh, 2012). The fourth dimension can be "Quality"; it is arguable whether quality can actually be a constraint of a project. In order to remain competitive "Quality" has to be made a constraint. According to Mohandas & Sankara (2008), Quality is the degree to which a specific product/or service satisfies the wants of a specific consumer. Any change in one constraint is likely to trigger change in others also.

Completion of construction projects within the specified triple constraints and quality are signs of successful project management. It has been generally observed that in most of the public sector projects in developing countries, objectives and deliverables are not clearly defined which adversely affect the project planning, designing and execution, as a result, projects over run the triple constraints cost, time and scope. The degree of success of any project is therefore measured with reference to triple constraints of the projects (Sanvido, 1992).

A building project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment. Certain factors are more critical to project success than others. These factors are called major project success factors (MPSFs) (Sanvido, 1992).

It is widely accepted that project managers need focused efforts to gain an expanded comprehension of the potential effects of the major success factors which in turn could assist their work on current and future projects management. This way, their chances for achieving the projected goals could substantially increase in the framework of time, resources, and budget constraints. (Alexandrova, 2012)

Research on the major success factors (MSFs) are considered to be a means to improve the effectiveness of project and to achieve project objectives. According to Morrison (2009) major success factors (MSFs) an element of organizational activity which is central to its future success.

Major success factors (MSFs) may change over time, and may include items such as product quality, employee attitude, manufacturing flexibility, and brand awareness. Major success factors any of the aspects of a business that are identified as vital for successful targets to be reached and maintained. Major success factors are identified in areas as production processes, employee and organization skills, functions, techniques, and technologies (Omran, 2012).

This study has focused to investigate the major success factors of the construction companies working in Addis Ababa Bole Sub City; therefore this city forms my survey population area.

It is obvious that investigating and ranking the major success factors of a company, which works in various fields like construction of dam, irrigation and drainage networks, road construction, bridge construction, tunnel excavation, construction of concrete and metal heavy building, and

mass construction of the residential buildings could result in achieving reliability and more desirable record and lead to any company more success (Pakseresht, et al., 2012).

Thus investigating the major success factors, is the purpose of this study to give a solution for the executive planning of building project construction in Addis Ababa, Bole Sub City.

1.2. Statement of the Problem

The project failure rate at the World Bank was over 50% in Africa until 2000 (Ika, et al., 2012). The World Bank's private arm, the International Finance Corporation has discovered that only half of its African projects succeed. In an independent rating, the Independent Evaluation Group (IEG) claimed that 39% of World Bank projects were unsuccessful in 2010 (Ika, et al., 2012). World Bank projects all too frequently fail to achieve their goals due to a number of problems that could be termed "managerial" and "organizational" imperfect project design, poor stakeholder management, delays between project identification and start-up, delays during project implementation, cost overruns, coordination failure, etc. (Ika, et al., 2012)

A great number of decisions need to be taken during the project management process and as usual, the decisions at the earlier phases of the design have a bigger impact on the project management practice as compared at later stages or during building operation or construction. If project managers are not aware of the criteria that would influence their goals set from the inception phase then the project will not be successful. Hence, this study will identify the MSFs that affect the level of project performance through a project management practice and rank those MSFs that will enable the project management companies to evaluate the project outcome. MSFs will become a gauge by which project managers can evaluate their companies. MSFs allowed the company to implement standard organizational management skills to improve the company and project performance. Rockart (1982) mentioned that to ensure future success, a company and its industry should identify its MSFs (Alias, et al., 2014).

Project management has evolved over the past couple decades as researchers and practitioners have attempted to identify the causes of project failure and the various factors that lead to project success. Traditional project management skills were developed from the requirements of construction and defense industries to plan, control and manage large and complex 'tangible'

projects (Morris, 1994; Bourne & Walker, 2004). From these arose the so-called "hard" concepts of project success criteria in the form of controlling and managing schedule, cost and scope.

According to industry literature outside the construction industry, MSFs should include issues important to the activities of the organization's current operations and future success (Mahmood & Shahrukh, 2012). The construction stage is where all the project goals of the contractual parties like time, cost, performance, quality, safety and so on are established and put to the test. The degree of effectiveness of the project management functions and the degree of success of the project goals will determine the degree to which the individual party will perceive the project as being successful from its own viewpoint (Lim & Mohamed, 1999). Therefore, this study will identify the extent of the MSFs to determine the success of a construction project.

Ethiopia is one of the developing countries which can't accomplish its construction industry goals due to lack of identifying different major success factors. Identifying those Major Success Factors (MSFs) would be helpful for the construction companies as it would be an opportunity for them to enhance their progress and success by addressing their weak and problem areas.

1.3. Research Question and Objectives

1.3.1. Research Questions

The basic problem of any company is to complete the project with the specified time, cost, scope and quality or with the initial agreement to satisfy the customers by completing the building project successfully. Now the basic questions are:

1. What are the types of success factors in building projects in Bole Sub City in Addis**?**
2. What are top significant success factors in building construction projects of Bole Sub City from different stakeholder point of view?
3. What are the major success factors in Bole Sub City building construction projects from perspective of their categories?

1.3.2. General objective

The general objective of this study was to investigate the major success factors in building construction projects of Addis Ababa Bole Sub City.

1.3.3. Specific Objective

The specific objectives of the study are:

1. To investigate the types of success factors on governmental building construction projects of Bole Sub City.
2. To rank the types of success factors based on their relative importance index of governmental building projects in Bole Sub City.
3. To identify major success factors from perspective of their categories

1.3.4 Expected Outcomes

After conducting the research the following findings are expected:-

- Types of success factors in Addis Ababa Bole Sub City building construction projects would be investigated.
- The major success factors would be identified from different types of success factors with different perspectives and recommendation would be recommended for construction parties in order to increase their output.

1.3.5. Scope and Limitation of the Study

The study was target on the investigation of major success factors of building construction projects in Addis Ababa Bole Sub City. Therefore this research did not include the road and water construction projects that were executed in this city and building projects in another Sub Cities due to time, cost and available data resource limitations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Construction Industry

The construction industry is one of the largest job creators in developing countries and is highly competitive. The high number of project failures suggests the existence of underlying major success factors which have not been identified. (Garbharran & Govender, 2012). Construction industry is a sector of the economy which responsible for planning, design, construction, maintenance and eventual demolition of buildings and works (Salleh, 2009).

The construction industry includes all companies primarily engaged in construction as general contractors, operator builders, heavy construction (airports, highways, and utility systems), and construction by specialty trades. Also included companies that engage in the preparation of sites for new construction and in subdividing land for building sites. Construction work may include new work, additions, alterations, or maintenance and repairs. Construction work is often described by either type, residential (home building) versus non-residential (commercial and government buildings and infrastructure projects), or by funding source, public versus private (Mahmood & Shahrukh, 2012).

According to a World Bank report (2007) the construction industry is an important sector of the economy and has multiple backward and forward linkages with other sectors. The industry contributes significantly to socio-economic development and employment.

2.2. Construction Industry in Developing Countries

In developing countries, the construction industry is a key barometer of economic performance. The construction industry contributes a significant percentage of the gross domestic product (GDP) of the countries and provides employment to a substantial proportion of the working population (Salleh, 2009).

Construction industries in all countries face many difficulties and challenges (Gales & Fellows, 1990; Ofori; 1990) as cited on (Salleh, 2009). However, the problems facing the construction

industry in developing countries are significantly more fundamental, more serious and more complex. In developing countries, these difficulties and challenges sit alongside the general situation of socio-economic stress, chronic resource shortages a general inability to deal with the major success factors (Ofori 2000) as cited on (Salleh, 2009) . Whilist in all countries, the construction industry faces conditions of uncertainty and risk, the sources of such risks are sever in developing countries and include:

- ✓ Instability
- ✓ Scarce resource
- ✓ Relatively unskilled labour forces
- ✓ Low level of productivity, over runs and excessive wastages
- ✓ Poor infrastructures
- ✓ Fundamental practices and inability to adopt the best practices.
- ✓ Financing characteristics typical in developing countries
- ✓ Government influence

Ethiopia is the fastest-growing, non-oil driven economy among African countries. The country has showed a remarkable growth over the past ten years. The average annual growth GDP is 10.9% (UNDP, 2014). This figure is double of the Sub Sahara Africa and triple of the world average growths indicating that Ethiopia is one of the fastest economic growths in the world. As a result the contribution of the industry against the GDP is only 3% and this is lower than the sub-Saharan African average which is 6%. The construction industry trend in the past 10 years shows a yearly growth rate of 12.43 and this shows a share of 5.3% of the country's GDP (ECIDP, 2014).

Though the construction sector is given high prominence, several defects are being noted in the sectors that need immediate action. One significant problem is the fact that current infrastructure and construction projects show significant cost variation (ECIDP, 2014). This is occurring in spite of the fact that the Ethiopian Government played significant role in assisting contractors by providing training, supplying machinery, and by developing supportive guidance (ECIDP, 2014). (Zewdu1 & Aregaw, 2015)

2.3. Organizational Structures

Hodge et al. (2003) define an organization as two or more people working together to meet a goal or objective within specific boundaries. The most valuable assets of any Organizations are its

employees, working at various levels of organizational setup in the hierarchy. With effective planning and management of resources and coordinated effort of motivated employees the construction companies have better chances of achieving their goals and objectives as cited on (Mahmood & Shahrukh, 2012).

According to Langford et al. (1995), one useful way of identifying the types of organizations is by looking at their structure which is the formal pattern of authority relationship between the people (managers and operatives) and / or departments that form the subsystems of the firm.

Fryer (1997) contends that generally construction firms have a pyramid type organization structure which has dominated management thinking for many decades. The 'line' managers are responsible for work activities and production. In order to achieve the defined objectives according to given work schedule they coordinate the activities and pass instructions and information down the hierarchy and monitor the activities and processes. 'Staff' is the functional specialists, engineers, accountants, and estimators, among others, who provide a back-up service to the line managers. Some specialists work as in charge of different departments and perform both line and staff responsibilities as cited on (Mahmood & Shahrukh, 2012).

Langford et al. (1995) commented in their research that the matrix structure was initially adopted by both building firms and professional practices in their efforts to find an alternative to the purely functional approach of the classical school. It was felt that in this type of organization it would be possible to tackle project and people problems separately to avoid interference and overlapping of both the critical sections. Furthermore, a matrix organization ensures that staff deputed for various tasks and empowered for decision making gives better performance. However, there are also some problem areas in the matrix organizations, having more than one boss for receiving directions and to give compliance causes problems.

Singh, (1981) contends that three types of organization structures are suitable for adoption in the construction industry. The "line" type of organization is more suitable for small work and organizations. The engineer in charge is empowered to arrange organize and act for completion of the project within triple project constrains ensuring required quality conforming to specifications given in the contract. He/she might work with few assistants and foremen. For medium-sized projects, a more elaborate arrangement is required and the organization is generally on the "line and staff" pattern. The engineer in charge may be assisted by a team of experts, such as architects,

planning engineers, design engineers, accountants and personal officers called "the staff members". The office staff is usually posted at regional office or headquarters. For large projects, the number of working employees involved may run into the thousands and the staff portion of the organization may be departmentalized. Each departmental head looks after a particular aspect of the work, such as plan, design, purchase of materials, human resource etc. and is assisted by a team of subordinates grouped under the charge of different heads. The grouping of work in the field could be on the basis of the type of work, such as civil works, electrical works, mechanical engineering works, piping, ducting or other specialized types of works (Mahmood & Shahrukh, 2012).

2.4. Success, Success Criteria and Major Success Factors

2.4.1. Success

What is project success? How do we define project success and design performance measures that allow us to recognize the degree of success attained?

Completion of a construction project with intended budget is frequently seen as a major criterion of project success by clients, contractors, consultants and related stakeholders. It is here that project management becomes essential tool for the delivery of effective projects than the traditional functional management. The Project Management Institute Project Management Body of Knowledge Guide defines a project as ''a temporary endeavor undertaken to create a unique product or service" (PMI, 1996) (Zewdu1 & Aregaw, 2015).

The literature on major success factors reveals several somewhat conflicting definitions of "project success." The following is a sampling of the various proposals, discussions, and definitions. Results much better than expected or normally observed in terms of cost, schedule, quality, safety, and participant satisfaction having everything turn out as hoped anticipating all project requirements and have sufficient resources to meet needs in a timely manner (Sanvido, 1992).

Success in building construction projects is hazardous matter and might have numerous limitations (factors of failure) and drivers which can lead to successful delivery of a project (factors of success) at the same time. During around half of century researchers in project management field have been working on identification of project success factors. However this area of interest continues to

motivate both academician and practitioners to investigate on factors which lead to project success regardless the amount of studies that already have been done (Didenko, 2008).

The successes of a project as well as the factors that affect this success are considered in a various ways by different project management scholars. There is no unified treatment and definitions of these concepts although there is a consensus about the importance of this aspect for the project management practice. In this respect, Prabhakar (2008) as cited on (Alexandrova, 2012) generalizes that the only agreement is the disagreement on the issue "what is project success".

Success on a project means that certain expectations for a given participant were met, whether owner, planner, engineer, contractor or operator. However, these expectations may be different for each participant as cited on (Alias, et al., 2014) and the study of project success and major success factors (MSFs) is often considered as one of the vital ways to improve the effectiveness of project delivery (Chan et al., 2004) as cited on (Alias, et al., 2014).

Success is a comparative term and broadly speaking execution of a project should achieve success in following areas:

***i. Project objectives*:** Time, cost, scope, and quality, conformance of design and specifications of project as defined in its contract (Deming, 1986).

***ii. Organizational objectives*:** Cost effectiveness, low cost of poor quality improvement in productivity, profitability, customer satisfaction and company image.

***iii. Social and environmental objectives*:** No loss or disturbance to public life and property, execution of work without disturbing environment, wild life, fauna and flora. This aspect is generally covered in contracts of projects in public sector (Pakistan Engineering Council contract documents).

***iv. National objectives*:** The implied objectives include jobs creation, poverty alleviation, skill development, development and use of national resources, support to local construction material industry, paying taxes etc. It is also called "Corporate Social Responsibility" (CSR), which is a moral obligation and not covered in contracts (Chinca, 2010).

Success is defined as the degree to which a company's goals and expectations are met. Since each individual or group of people who are involved in a project have different needs and expectations, therefore it is not very surprising that they interpret project success in their own way of

understanding (Cleland & Ireland, 2004). For those involved with a project, project success is normally thought of as the achievement of some pre-determined project goals (Lim & Mohamed, 1999) while the general public has different views, commonly based on user satisfaction, In the same way that quality requires both conformance to the specifications and fitness for use, project success requires a combination of product success (service, result, or outcome) and project management success (Duncan, 2004).

2.4.2. Success Criteria

Many lists of success criteria have been introduced in the previous decades by various researchers. Primitive success criteria have been an integrated part of project management theory given that early definitions of project management included the so called 'Iron Triangle' success criteria cost, time and quality (Atkinson, 1999). The criteria are a set of principles or standards by which judgments are made (Chan et al., 2004). It is also said that success is a journey, not a destination.

Kerzner (2001) suggested three criteria from the organization perspective for a project to be successful. The first is that it must be completed with minimum or mutually agreed upon scope changes, even though stakeholders constantly have different views about projects' results (Maylor, 2005) as cited on (Mahmood & Shahrukh, 2012) . Second without disturbing the main work flow of the organization because a project has to assist organization's everyday operations and try to make them more efficient and effective. Finally, it should be completed without changing the corporate culture even though projects are "almost exclusively concerned with change with knocking down the old and building up the new (Baguley, 1995).

A more structured approach to project success is grouping the criteria into categories. Wide man, (1996) describes four groups, all of them time dependent: internal project objectives efficiency during the project, benefit to customer effectiveness in the short term, direct contribution in the medium term and future opportunity in the long term. The characterization of 'time dependent' is based on the fact that success varies with time. Looking at the future benefits of the organization can be really difficult, because in some cases they don't even know what they want, yet it is vital to know what the project is trying to achieve after completion time so that success criteria are clearly defined in the early stages. This is quite a different approach, because the focus moves from the present success criteria to the future, in a way that a project can be unsuccessful during

execution if it is judged by criteria like cost and quality, but in the long term it can turn to be a success story (Athens, 2004.)

Major success factors are the set of circumstances, facts, or influences which contribute to the project success. Project success criteria are the set of principles or standards by which project success can be judged (Hoang, 2008)

Major success factors can be perceived as facilitated or impeded conditions which influence the project outcome, while project success criteria can be viewed as a set of measurement agreed among stakeholders to assess the project outcomes. Furthermore, some researchers observe major success factors (MSFs) as independent variables and project success criteria as dependent variables (Belout, 1998, Zwikael and Globerson, 2006). It means that major success factors can improve the project outcomes, which in turn can be assessed by a set of measurements as indicated in the project success criteria.

Major success factors should not be confused with success criteria; the latter are outcomes of a project or achievements of an organization that are needed to consider the project a success or to esteem the organization successful. Success criteria are defined with the objectives and may be quantified by KPIs. Success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business (Cooke & Davies, 2002).

It is noteworthy that the differentiation between success criteria and success factors is also important. The success criteria are the measures based on which the project success or failure is judged; while the success factors are those entered into the management systems and result in project success directly or indirectly.

Success criteria or a person's definition of success as it relates to a building often changes from project to project depending on participants, scope of services, project size, sophistication of the owner related to the design of facilities, technological implications, and a variety of other factors.

On the other hand, common threads relating to success criteria often develop not only with an individual project but across the industry as we relate success to the perceptions and expectations of the owner, designer, or contractor. Differences in a person's definition of success are often very evident. To orient the researchers, lists of typical success criteria for the owner, designer, and

contractor were developed. Each list was developed by the writers' reviewing the literature and then brainstorming and discussing success criteria for the owners, designers, and contractors represented on the project team. An un-prioritized summary of these success criteria follows (Babu & Sudhakar, 2015).

Success criteria are "measures by which success or failure of a project or business will be judged". Early main criteria for success were assumed to be cost, schedule and quality (Babu & Sudhakar, 2015).

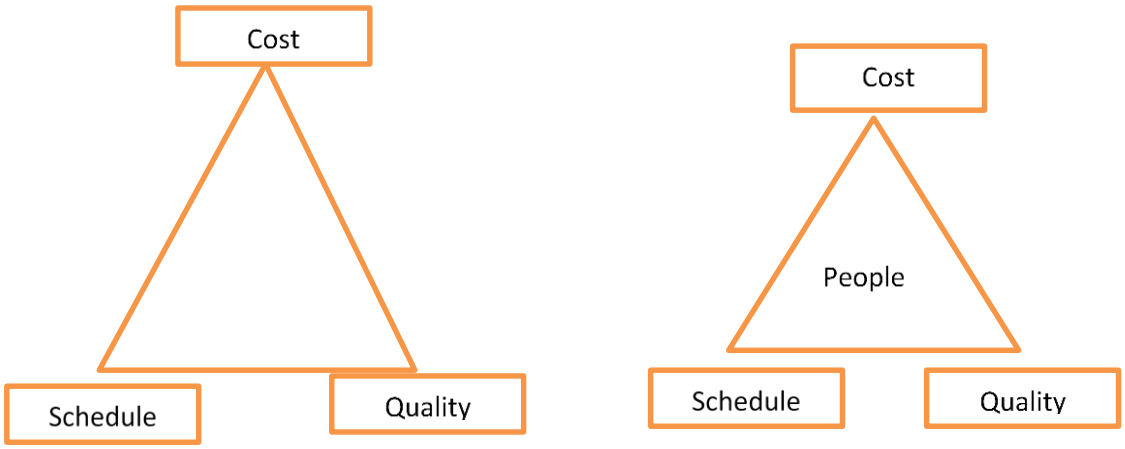


Figure 2

Iron Triangle of Project Management *Golden Triangle of Project Management*

Figure 2.1: Golden Vs Iron triangle of project management

The iron triangle of project management emphasizes the relationships among cost, schedule and quality. The golden triangle of project management emphasizes the relationships among cost, schedule, quality and people by placing people at the center of the iron triangle (Figure 1). People are the one element that ties the other elements together. Mostly emphasis will be given to iron triangle. The emphasis on people in the golden triangle helps maintain a balance among cost, schedule and quality.

Later more potentially competing criteria like ''the satisfaction of all stakeholders'' were defined. Researches on project success show that it is impossible to generate a universal checklist of project success criteria suitable for all projects. Success criteria will differ from project to project depending on participants, scope of services, project size, and sophistication of the owner related

to the design of facilities, technological implications, and a variety of other factors. On the other hand, common threads relating to success criteria often develop not only with an individual project but across the industry as we relate success to the perceptions and expectations of the owner, designer, or contractor (Babu, et al., 2015).

2.4.3. General Project Success Criteria (GPSC) and Project Success Factors (PSF)

Some PSFs seem to be more significant than others. These criteria and factors are generic and can influence most types of construction projects which are given below (Jari, et al., April 2013):

- **Time**

"Time" or "Schedule" as one of the most important project success criteria for any project. Time has been addressed as a criterion by which to evaluate a project's degree of success. It has also been mentioned as a factor, which can help the other factors/criteria be met. It is found that the definition of "Time" is of great importance. "Time" as the date when a project is most likely to end can be a criteria, but "Time" as a manageable component might be considered as a factor (Jari, et al., April 2013).

- **Cost**

Without a doubt, every project is dependent on its cost or budget. Cost has been addressed as a very important success criterion, where as having an intellectual budget plan and proper cost estimation have been mentioned as prominent success factors in some studies.

- **Quality**

Quality, whether it concerns the product or process, has been considered as both a project success criterion and factors. Some researchers named it quality performance and considered it as a major project success criterion. In addition, some other researchers addressed quality as a criterion under the name of product's quality. On the other hand, some researchers considered quality management process as a project success factor, which facilitates the success of other criteria and factors (Jari, et al., April 2013).

- **Project Control**

Time, cost and quality are usually grouped together and known as the "Project Control Mechanism." This is because they allow a project manager or project team to monitor and control the project, leading it to success. In fact, "Project control", which is introduced by some researchers

as a project Success factor, directly controls and monitors some key project success criteria such as the project's time, cost, quality, change and especially scope (Jari, et al., April 2013).

3.4.4. Success Criteria According to Owners, Designers and Contractors

- **Owner's criteria**

Owner's criteria for measuring success: on schedule; on budget; function for intended use (satisfy users and customers); end result as envisioned; quality (workmanship, products); aesthetically pleasing; return on investment (responsiveness to audiences); building must be marketable (image and financial); and minimize aggravation in producing a building (Jari, et al., April 2013).

- **Designer's criteria**

Designer's criteria for measuring success: satisfied client; quality architectural product; met design fee and profit goal; professional staff fulfilment; met project budget and schedule; minimal construction problems (easy to operate, constructible design); socially accepted (community response); client pays (reliability); and well defined scope of work (Babu, et al., 2015).

Designer's criteria for measuring success: satisfied client (obtain or develop the potential to obtain repeat work); quality architectural product; met design fee and profit goal; professional staff fulfillment (gain experience, learn new skills); met project budget and schedule; marketable product/ process (selling tool, reputation with peers and clients); minimal construction problems (easy to operate, constructible design); no "ghosts," liability, claims (building functions as intended); socially accepted (community response); client pays (reliability); and well defined scope of work (contract and scope and compensation match) (Sanvido, 1992).

- **Contractor's criteria**

Contractor's criteria for measuring success: meet schedule (preconstruction, construction, design); profit; under budget (savings obtained for owner and/or contractor); quality specification met or exceeded; no claims (owners, subcontractors); safety; client satisfaction (personal relationships); good subcontractor buy out; good direct communication (expectations of all parties clearly defined); and minimal or no surprises during the project (Sanvido, 1992).

Contractor's criteria for measuring success: meet schedule (preconstruction, construction, design); profit; under budget; quality specification met or exceeded; no claims (owners, subcontractors); safety; client satisfaction (Babu, et al., 2015) .

- **Common Criteria**

Priority item and one that appears in all three lists (designer, owner, and contractor) in some form is the financial reality of doing business. The owner wants the project completed on time and on budget, and the designer and contractor both expect to meet certain profit or fee goals. All three viewpoints also recognize the absence of any legal claims or proceedings on a project as a desirable outcome. In other words, this is a major criterion for measuring success. Another common thread among the three groups involves meeting an appropriate schedule as a way of measuring or determining if a project was successful (Babu, et al., 2015).

- **Unique criteria**

It is also evident that there are some unique factors associated with each of the three groups. The designer for instance is looking for a project that will increase the level of professional development and professional satisfaction among his employees. Safety is a high-priority issue for the contractor that would not normally be an issue with the other two groups, because their employees are at much less risk during the design or operation of a building than the contractor's workers is during the construction of a building (Babu, et al., 2015).

2.4.5. Major Success Factors

Cooke-Davies, (2002) eliminates a conceptual difference between 'success criteria' and 'success factors'. He stresses that success criteria belong to specific measurement which needs to be formulated in order to conclude whether project succeeds or fails. However, success factors are more about particular levers that can be used by project manager to increase a probability of successful outcome of a project. Project success factors are the elements of a project that can be influenced to increase the likelihood of success; these are independent variable that makes success more likely. Project success criteria are the measures by which judge the successful outcome of a project; these are dependent variable which measure project success. Success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business. Project success factors are not universal for all projects since different projects and different people prioritize different sets of success factors. Project success criteria also vary from

project to project and what is acceptable in one project without impact on perceived success is deemed an abject failure in another project. For instance, taking a week delay in an IT project to ensure the objectives are achieved may have a minor impact for this project in terms of success. However, this delay might be a disaster in building a function center, which is supposed to be undertaken before its opening day. The project implementation process is complex. It usually involves attention to a broad variety of human, budgetary, and technical variables. From project management perspective, major success factors (MSFs) are characteristics, conditions, or variables that can have a significant impact on the success of the project when properly sustained, maintained, or managed. There is a very close link between the type and scope of projects and respective Major Success Factors (MSF) (Babu, et al., 2015).

According to Babu & Sudhakar, (2015) the most important MSFs within the Project life cycle are described as follows:

1. **Project Mission**-Initial clearly defined goals and general directions. The preparation of a detailed project scope statement is critical to project success.
2. **Top Management Support**- Willingness of top management to provide the necessary resources and authority/ power for project success. The flexible and adequate access to organizational resources is considered as a core precondition for effectively executing the project activities. This can hardly be available without definite and timely reaction and support from the top management of the project-executing organization.
3. . **Competence of Project Manager**- The competence of project manager has been identified as the most important factor for the successful realization of their project. The technical and administrative skills of the project manager, as well as his/her commitment and competence, become the most critical component during the project life cycle.
4. **Project Schedule/Plan**- A detailed specification of the individual action steps required for project implementation.
5. **Client consultation** - Communication, consultation, and active listening to all impacted parties.
6. **Competence of Project Team Members**- Recruitment, selection and training of the necessary personnel for the project team. The knowledge, skills, personal aims, and personal traits should be considered not only as a vital component of the overall organizational culture but also as an essential factor of the integrity and multi-functionality of the project team.

7. **Quality of Suppliers and Subcontractors** -In the contemporary world, it is rarely possible for one and the same organization to have capabilities and competencies in every aspect of the work required. Competence of project partnership is vital for success of project.
8. **Technical tasks**- Availability of the required technology and expertise to accomplish the specific technical action steps.
9. **Client Acceptance**- The act of "selling" the final project to its ultimate intended users.
10. **Monitoring and Feedback**- Timely provision of comprehensive control information at each stage in the implementation process.
11. **Communication**- The provision of an appropriate network and necessary data to all key actors in the project implementation.
12. **Troubleshooting**- Ability to handle unexpected crises and deviations from plan.

Certain factors are more critical to a project's success than others. These factors are called major project success factors. The term major success factors in the context of the management of projects was first used by John F. Rockart, of MIT's Sloan School of Management, in 1979 as a way to help senior executives define their information needs for the purpose of managing their organizations. Rockart in 1982; defined as those factors predicting success on projects of key areas of activity that directly gives favorable results for a project goal. Project success requires creating a well-planned project schedule as well as understanding of the key success factors also. It helps the project manager and the stakeholders to take the right decisions and act towards the project success (Babu, et al., 2015).

By its nature, construction is a risky business. Current project management practices of organizations in the construction industry sector do not always ensure project success. Successful construction project greatly depends on how the project has been managed and controlled. The main problem with projects management practices have always been mentioned as planning, project implementation, cost and time overruns and quality non-achievement. The major success factors (MSFs) are more useful in decision-making support; more player-based research studies should be conducted. Architectural, Engineering and Construction (AEC) firms are main players in the design and construction stages of building projects, and their decisions can significantly affect performance of building projects Forcada, et al. (2008). To date, there is no comprehensive

study that explores the important major success factors from the perspective of project management practitioners. Thus, comprehensive studies on this problem are necessary.

From a Project Management perspective, major success factors (MSFs) are characteristics, conditions, or variables that can have a significant impact on the success of the project when properly sustained, maintained, or managed (Milosevic and Patanakul, 2005) as cited on (Alias, et al., 2014). Different studies have identified different MSFs and a lack of consensus of opinion among researchers on the criteria for judging project success and the factors that influence that success (Fortune and White, 2006). In addition, several studies addressing MSFs have observed the impact of context on which factors are considered most major as well as whether certain MSFs are indeed related to success. In most construction companies, management activities in construction project can be a better understanding by exploring the major success factors (MSFs) for improving the performance of their building projects.

Major success factors are those few things that must go well to ensure success for a manager or an organization, and, therefore, they represent those managerial or enterprise area, that must be given special and continual attention to bring about high performance. MSFs include issues vital to an organization's current operating activities and to its future success.

According to Hutching and Christ offers on (2001), a success factor is a situation where it needs special attention of management because of the importance that it brings to the organization. It gives a positive and negative effect and influences the internal and external project environment. It conveys the important characteristics such as the need for special attention or observation to prevent a great shock which is not desirable or the missing opportunity or objectives. Success factors are identified by assessing the strategy, environment, source and corporate operations.

Another definition of Major Success Factors is that, they are limited in number (usually between3 to 8) of characteristics, conditions, or variables that have a direct and serious impact on the effectiveness, efficiency, and viability of an organization, program, or project. Activities associated with MSF must be performed at the highest possible level of excellence to achieve the intended overall objectives. Also called key success factors (KSF) or key result areas (KRA).

In 1996 Walid Belassi and Tukel Oya Icmeli divided the major success factors into four main groups in a new format:

1. Project dependent factors
2. Team members and project manager dependent factors
3. Organizational structure dependent factors
4. External environment dependent factors

Studying the results proves that the project manager, management skills, team members, teamwork, their technical filed, project properties, viable environmental factors could be considered as the organization's major success factors; although the degree of these factors' significance varies from one industry to another one.

Adnane Belout and Clothilde Gauvereau considered the following four dimensions as the success factors in 2003 (Pakseresht & Asgari, 2012):

1. Project Result
2. Customers effects
3. Commercial success and conduction and preparation for the future
4. Identifying the beneficiary groups (stockholders, managers, customers and personnel) which are significant as well as major success factors until different people wants to see success in different ways.

In 2004 Nguyen et al. identified five major success factors among the twenty factors of projects success: (Pakseresht, et al., 2012)

1. Competent project manager
2. Providing adequate financial resources to the end of the project
3. Competent and multidisciplinary project team
4. Commitment to the project
5. Access to resources

Research Conceptual Model

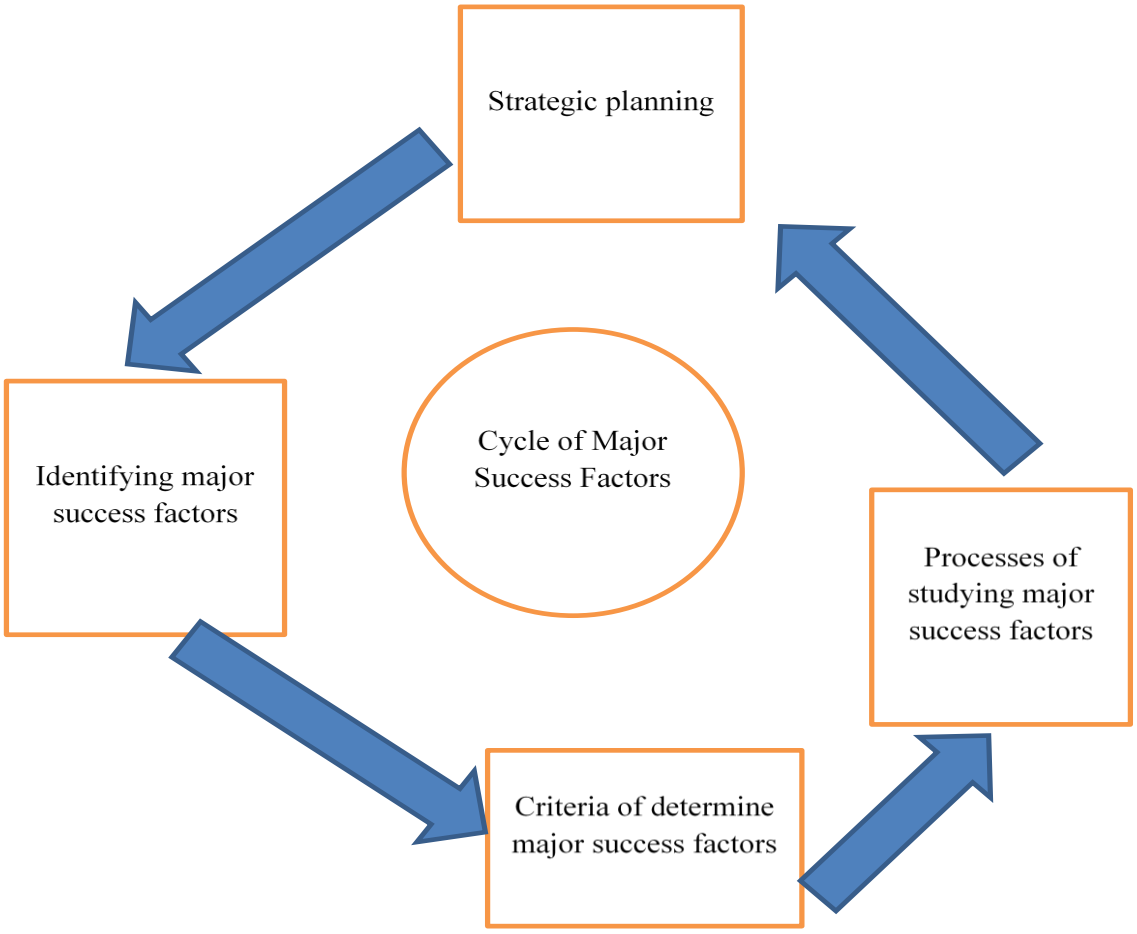


Figure 2. 1: Cycle of major success factors. *(Pakseresht, et al., 2012)*

Figure 2 shows that identifying the major success factors is needed for strategic planning by starting from identifying major success factors; identify the factors an appropriate strategy could be planned by determining the criteria and consequently by process of studying the major factors. Of course based on this approach and using the previous researches and experts opinion, to identify the major factors the hierarchical structure consists of levels of objectives, criteria and choices as below:

First Level: Objective investigating the major success factors and ranking them is the objective of this study.

Second Level: Criteria to achieve this level's criteria, interview with project managers were done in addition to studying the principals of construction projects contracting and library resources. Finally seven criteria were selected:

1. Effective factors in project management
2. Employer related factors
3. Project logistics related factors
4. Consultant design team related factors
5. Contractor related factors
6. Project manager related factors
7. Environmental factors related to the project's business environment

Third Level: Options after examining the validity and reliability the Options (of the questions) related to every criterion, were also included in the questionnaire (Pakseresht & Asgari, December 2012).

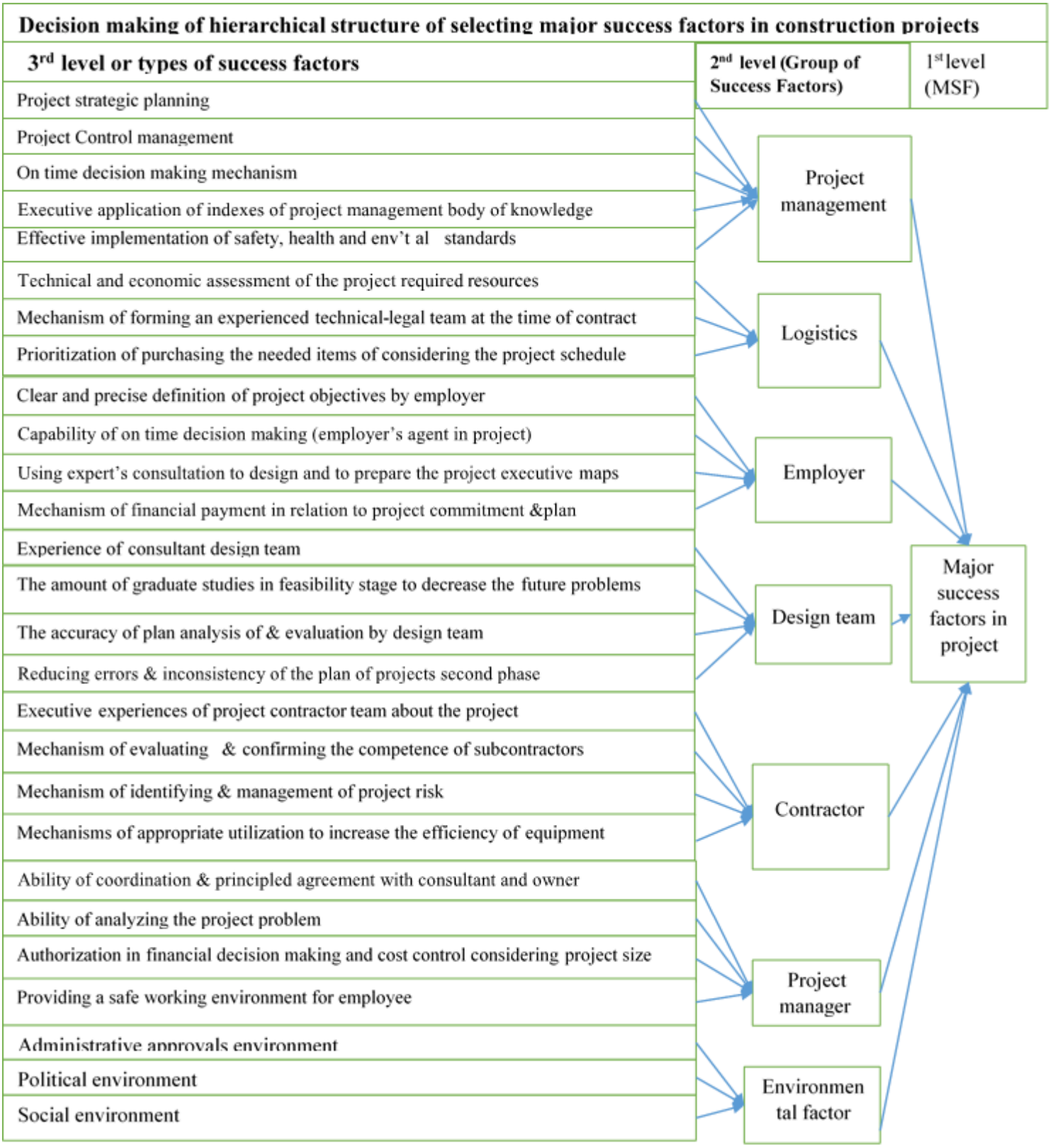


Figure 2.2: Hierarchical structures of selecting major success factors. *(Pakseresht & Asgari, December)*

2.5. Major Success Factors Investigation and Analysis

In order to investigate major success factors, this study were performed with two stages. At the first stage to investigate the major success factors questionnaires and interviews were prepared and the questioners distributed among the selected projects. The interview were interviewed to some of the client. Then data obtain from the distributed questionnaires and interviewed were analyzed by using the SPSS version 20.According to SPSS analysis the largest relative importance index would be had the first rank and this indicate us that factor the first major success factor.

Conceptual model of success factors and success

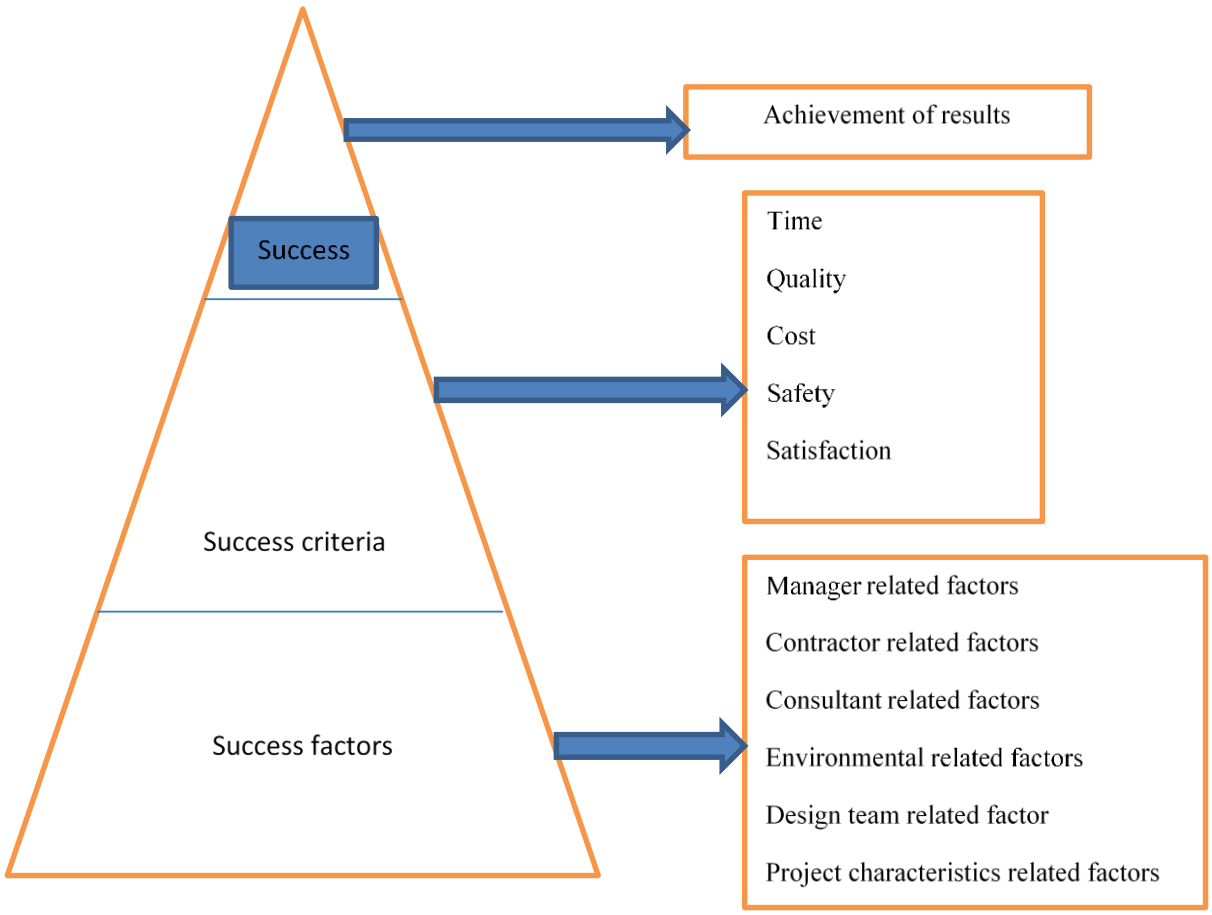


Figure 2.3: Conceptual model of major success factors. *(Alexandrova, 2000)*

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. The study Area

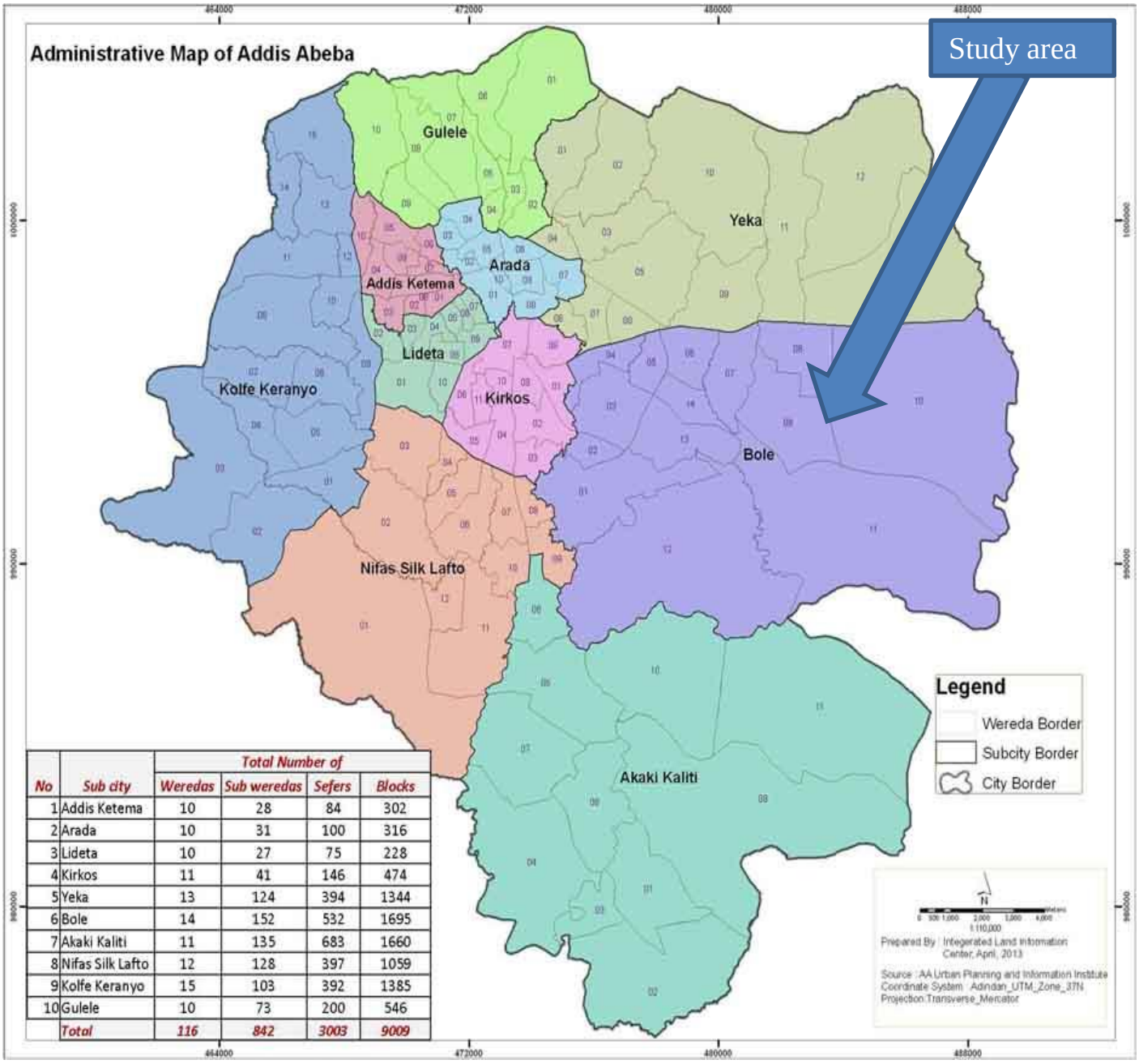
The study was carried out on building projects found in Addis Ababa Bole Sub City. Bole Sub City is one of the largest sub city in the capital city of Addis Ababa Ethiopia. Addis Ababa is the largest city in Ethiopia, with a population of 3,384,569 with annual growth rate of 3.8% (UN, 2007). Addis Ababa lies at an average altitude of 2,300 meters and located at average coordinates of 9°1′48″ N 38°44′24″ E. Bole Sub City is located in the south- east direction of Addis Ababa.

The city is divided into 10 areas named sub cities and 116 Woredas. The black color indicates the location of Bole Sub City. The area coverage, total population and location of direction of the Sub City is as shown in the following table (Addis Ababa Administration office, 2003).

Table 3. 1: The Bole Sub City in Addis Ababa with its population, area coverage and location.

Sub City	Area (km^2)	Population	Density	Map
Bole	**122.08**	**328,900**	**2,694.1**	

The map of Addis Ababa with its Subdivisions and Woredas is as shown below in figure 3.1 (Addis Ababa city administration integrated land information, 2003).



No	Sub city	Total Number of			
		Weredas	Sub weredas	Sefers	Blocks
1	Addis Ketema	10	28	84	302
2	Arada	10	31	100	316
3	Lideta	10	27	75	228
4	Kirkos	11	41	146	474
5	Yeka	13	124	394	1344
6	Bole	14	152	532	1695
7	Akaki Kaliti	11	135	683	1660
8	Nifas Silk Lafto	12	128	397	1059
9	Kolfe Keranyo	15	103	392	1385
10	Gulele	10	73	200	546
	Total	*116*	*842*	*3003*	*9009*

Figure 3.1: Addis Ababa administrative division (Addis Ababa city administration integrated land information, 2003).

3.2. Study Period

The study was conducted from the middle of June to end of December, 2015.

3.3. Study Design

The literature review and data collection by questionnaires distributing and interview about the projects was conducted. After selecting respondents based on the specified sampling method, the collected questionnaires were analyzed up to end of December, 2015 by using SPSS v20.

3.4. Population

The main sources of the information would be, project contractors, consultants, clients and other experts who were executing the building projects within Bole Sub City in Addis Ababa.

3.5. Sample size and Sampling Techniques

The important characteristic of the sample which is argued by many researchers as the most important one in terms of precision is suitable sample size (Cooper and Schindler, 2003; Bryman and Bell, 2003; Saunders, *et al.*, 2007; Ticehurst and Veal, 1999; Sekaran, 2003). However the majority of the research in this area focuses on using samples in order to identify major success factors in building construction in Bole Sub City. In this case the standard error which mainly depends on standard deviation of the sample and sample size might have a significant impact on the precision of the study.

Statisticians did numerous research in this area and developed precise formulas and tables researches might use if they know the population size and the level of error (Cooper and Schindler, 2003; Saunders, *et al.*, 2007; Ticehurst and Veal, 1999; Sekaran, 2003). However since the focus of this research is on Bole Sub City construction industry the population size is very unlikely to be known as no records of successful building construction project exist in the sub city.

Another peculiarity of this study is focus on relative data rather than absolute. The main question in the questionnaire is a Likert scale which represents the importance of each success factors. Therefore the final sample distribution gains particular importance.

A lot of research was conducted by statisticians to identify which sample size should be considered large enough regardless of the size and distribution of the population.

According to Berenson *et al.* (2002) we can refer to the central limit theorem which states that for 'many population distribution, when the sample size is at least 30, the sample distribution will be approximately normal'. Therefore taking into account that the assumptions for the theorem (Berenson *et al.*, 2002) were considered and the response rate, as identified below, is likely to exceed 30 per cent the questionnaire will be sent to minimum 20 offices in Bole Sub City.

Respondents were selected purposively from those who are included in the population. As I have reviewed in Bole Sub City house development construction 59 structures were completed in the first plan and development program (FPDP) but the successfulness of these projects were questionable and there is no full information who were the contractors and the consultants for the above completed projects due to this and other conditions, I had selected the samples purposively and the questionnaires were distributed to the sample of 7 contractors, 4 owners, 5 consultants and 2 others who participated in the Bole Sub City building construction projects.

3.6. Materials

Since the research did not need any experiment, no experimental equipments were required. But, the main tool of this research is excel and SPSS 20 which the questionnaires were prepared and analyzed. The relative importance index (RII) of Likert 5 scale rating is a means of major success factors selection. For interview voice recorder was used. Excel and SPSS 20 were the best tools which were used to perform different analysis.

3.7. Method of Data Analysis

Data collection tools were adapted after review of relevant literatures and used. Data collection was free from any bias and all collected datas were included in the output. Assistances were trained to collect the data carefully.

The score assigned to each factor by the respondents represents the degree to which the factor contributes to overall project success. This degree of agreement value vary from 1 (strongly dis agree up to 5 (strongly agree). All the collected information from the survey were checked and verified for the correctness by principal investigator. The data were subjected to statistical analysis for further insights using the Statically Package for Social Science (SPSS) v20.

3.7.1. Relative importance index

The Relative Importance Index (RII) is a statistical method which is used to determine the ranking of different project success factors. As this survey was designed to investigate the relative importance of various major success factors, the method was adopted in this study within various groups. The RII five-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree) was adopted and transformed the relative importance indices' for each success factors as follows;

$$RII = \frac{\sum W}{A*N} = \frac{1*n_1+2*n_2+3*n_3+4*n_4+5*n_5}{5*N} \quad \text{.....3.1}$$

Where **w** is weighting given to each factor by respondents ranging from 1 to 5. (n_1 = number of respondents for strongly dis agree, n_2 = number of respondents for disagree, n_3 = number of respondents for neutral, n_4 = number of respondents for agree, n_5 = number of respondents for strongly agree). "A"' is the highest weight (i.e. 5 in this case), and N is the total number of respondents. The RII value had a range between $0<RII \leq 1$. The highest value of RII, the more important success factor and it is the major success factors.

The RII was used to rank the relative importance index of the different major success factors. These ranking made it possible to cross compare the relative importance of the factors as perceived by the group of respondents (i.e. owners, contractors and consultants). Each individual success's RII, as perceived by all respondent was used to assess the general and an overall ranking in order to give an overall picture of major success factors of building construction in Addis Ababa Bole Sub City.

The numbers assigned to the respondents' agreement scale (1, 2, 3, 4, 5) do not indicate that the interval between the scales are equal, nor do they indicate absolute quantities except they are representative for future analysis.

Table 3.2: Values assigned for the Likert scale in the questionnaire

Scale	1	2	3	4	5
Item	Strongly Dis -Agree	Dis-Agree	Neutral	agree	Strongly Agree

3.8. Ethical Consideration

Any research in social science area to ascertain extent deals with the question of ethics.

Saunders et al., (2007) as cited on (Konovets, 2008) states that any researcher who collect data, analyses and report findings might face ethical issues. Therefore in order to avoid problems that will be occurred the data was only be collected after ethical clearance is obtained from JiT - Research, Publication, and Graduate Studies & Consultancy Office of JiT. Informed consent was obtained from the organization before proceeding to the data collection. The purpose of the survey is entirely academic and it was clearly described to the organization. Participation in survey is voluntary; By any chance any information cannot be traced back to the respondents or to the company; any information concerning the projects was kept confidential and the questionnaires collected from the organization was only analyzed for the intended purposes.

3.9. List of Variables

Independent Variables:

- Administrative and purchasing Factors
- Client and contractor -related Factors
- Design or consultant team-related Factors
- Project Manager related factors
- Environment-related Factors
- Factors related to project characteristics

Dependent Variables: Major Success factors in buildings construction

3.10. Data Collection Process

In order to have a good output of the research both primary and secondary sources of projects were included. Primary sources include questionnaire, interview and open discussion while secondary sources includes journals, internet sources were included. Combining the above different sources and compiling them helps as evidence of one for another and as means of minimizing the errors in the data collection process in order to get good output of the research.

3.10.1. Primary Data Sources

Questionnaires

A questionnaire survey was used to examine the relevant factors and identify their importance in evaluating construction project performance based on RII (Park, 2009). The choice of data collection technique is a final step in the methodology design process (Saunders *et al.,* 2007). In order to collect data about building construction industry in Bole Sub City a questionnaire sent to the construction companies might be a good approach. Questionnaires have been widely used for descriptive and analytical surveys in order to find out facts, opinions and views on what is happening, who, where, how many or how much. (Naoum, 1998). Questionnaires were used for collecting information from different construction companies to reach the final conclusions. Due to this 120 questionnaires were distributed to different professionals and 81 questionnaires were returned back as shown below.

Table 3.3: Summary of distributed and collected questionnaires

Name of Organization	Number of questionnaires sent	Number of questionnaires returned back	% of returned questionnaires	Valid returned questionnaires	% of valid returned questionnaires
Contractors	45	29	64.44	28	62.22
Client	30	20	66.66	18	60.00
Consultant	35	27	77.14	27	77.14
others	10	8	80	8	80.00
total	120	84	67.5	81	67.50

Interview

The primary advantage of in-depth interviews is that they provide much more detailed information than what is available through other data collection methods, such as surveys. (Boyce and Neale, 2006) as cited in (Ambo, 2015). Due to this an interview was conducted on owner and others side since they are much more available in the constructed buildings relative to the other parties.

3.10.2. Secondary Sources

The data collected using the desk study approach are called 'secondary' data because the data are obtained from other sources (Naoum, 1998). The most significant of the secondary data are related to time and cost. In general, it is much less expensive to use secondary data than it is to conduct a primary research investigation Stewart and (Kamins, 1993) as cited on (Naoum, 1998).But it may not be good as primary data due to different factors like time, mistaking of the collector. Secondary data can minimize the loss of energy, money and other resources of the researchers.

In the office of governmental housing and construction, housing construction license and control, Bole Sub City governmental housing construction and supervision; there were different documents which express about the conversation of the project workers with owners or consultants and these documents helped me to use them as secondary sources. Those documents gave me a hint of identifying the respondents.

3.11. Demographic Characteristics of Respondents

This subsection summarizes background characteristics of respondents. Demographic characteristics includes types of organization, occupational position of the respondents, respondent working experience in building projects, construction business classification, the highest contract value of project, types of budget source, number of stories and number of building project completed in the last five years, in Bole Sub City with their respective companies. The detail explanation can be shown in the table 4.1.

3.12. Data Processing and Analysis

First of all the questionnaires was examined on accuracy and relevancy in order to filter the forms which cannot be used for further analysis. The forms left after the filtering was form the database for further analysis. ((Didenko, 2008)

Data collection tools were adapted after review of relevant literatures and used. Data collection was free from bias and all collected data's were included in the output.

The collected data from respondents was checked for accuracy, completeness, consistency and reliability across all data sources. Data was entered and double checked by the principal investigator. Data which were incomplete and difficult to be verified were not included.

3.12.1 Reliability of data

The reliability of an instrument is the degree of consistency (Polit & Hunger, 1985) as cited on (Hammad, 2013).In order to have accurate finding (Creswell, 2003) recommends to use different data sources. Due to this, the methods used in this study were used data from different sources and one data supports the other data. For questionnaire it is essential to check internal reliability of data (Creswell, 2003). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability (Hammad, 2013). Cronbach's Coefficient Alpha can be used to check reliability of questionnaire. The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency (Hammad, 2013). The equation used to analyze Cronbach's Coefficient Alpha is:

$$a = \frac{Kr}{1+(K-1)r} \quad \text{.....3.2}$$

Where: a = is Cronbach's Coefficient Alpha

K = is items (variables) in the scale and

r = is the average of the inter-item correlations.

The data collected on procurement related success factors, client related success factors, design team-related success factors, contractor-related success factors, project manager related success factors, environment related success factors and success factors related to project characteristics the value of Cronbach's coefficient alpha analyzed using SPSS v20 and the result is shown in table 4.4 below.

3.12.2 Spearman Rank Correlation Coefficient

According to (Naoum, 2007) the Spearman (rho) correlation is a non-parametric test for measuring the difference in ranking between two groups of respondent's scoring a number of issues, attributes or factors as cited in (Cing, 2012).

Spearman's rank correlation factor is going to be used to check the accuracy of collected data. Spearman's rank correlation coefficient is a non-parametric test. Nonparametric tests are also referred to as distribution free tests. These tests have the obvious advantage of not requiring the assumption of normality or the assumption of homogeneity of variance. They compare medians rather than means and, as a result, if the data have one or two outliers, their influence is invalid.

Correlation is a relationship measure among different parties or factors and the strength and direction of the relationship. (Megha & Rajiv, 2013)

In this research it is used to show the degree of ranking the different factors. The correlation coefficient varies between +1 and −1, where +1 implies a perfect positive relationship (agreement), while −1 results from a perfect negative relationship (disagreement). It might be said then that sample estimates of correlation close to unity in magnitude imply good correlation, while values near zero indicate little or no correlation.

The Spearman's Rank Correlation Coefficient r_s is used to measure and compare the association between the rankings of two factors for a single cause of success, while ignoring the ranking of the third party. And it is calculated by the following formula:

$$r_S = 1 - \frac{6\sum d^2}{n^3 - n} \quad \text{.....3.3}$$

Where:

r_s = is the Spearman rank correlation coefficient between two parties,

d =is the difference between ranks assigned to variables for each success, and

n =is the number of pairs of rank.

CHAPTER FOUR

RESULT AND DISCUSSION

4.0. Introduction

This section covers the, demographic characteristics of respondent, types of success factors identified by different mechanisms and the rating output of field survey of 120 questionnaires: 56 Consultants and contractor experts; 20 clients and 8 others experts. It is supported with interview with owners and others experts of the project. The chapter starts from demographic characteristics; management related success factors and go through procurement, client, design team, contractor, project manager, environment related factors and factors related to project characteristics in Bole Sub City building projects and then identifying types and major success factors in this Sub City.

Under analysis the study variables: administrative or management and purchasing factors; client and contractor related factors; design or consultant team related factors; project manager related factors; environment-related factors; factors related to project characteristics has been discussed and success factors were ranked based on the relative importance indices. Lastly mechanisms to accomplish projects successfully was recommended.

4.1. Demographic Characteristics of Respondents

The demographic information was an introduction to the respondents which could give the summarized information about types of organizations, respondents experience, occupational position, the highest contract value (in birr),construction business classification, number of building projects completed in past five years, types of budget source, number of stories in the performed project. The table 4.1 shows frequencies and percentages characteristics of respondents.

Table 4.1: Demographic characteristics of respondents

S.No	Demographic characteristics	Frequency	Percentage
1	**Types of Organization**		
	Consultant	27	33.3
	Contractor	28	34.6
	Client	18	22.2

S.No	Demographic characteristics	Frequency	Percentage
	Others	8	9.9
2	**Occupational position**		
	Resident Engineers	10	12.3
	project manager	19	23.5
	supervisor engineer	22	27.2
	others	30	37
3	**Number of years working experience in road projects**		
	<5year	40	49.4
	5-10 year	26	32.1
	>10 year	15	18.5
4	**The highest contract value (in birr)**		
	<10million	7	8.6
	10-50 million	20	24.7
	50-100 million	23	28.4
	>100million	31	38.3
5	**Construction business classification**		
	governmental	49	60.5
	private	32	39.5
6	**Number of building projects completed in past five years**		
	<2	5	6.2
	3---5	22	27.2
	6---8	23	28.4
	>9	31	38.3
7	**Types of budget source**		
	governmental	33	40.7
	private	29	35.8

S.No	Demographic characteristics	Frequency	Percentage
	public	10	12.34
	Others	9	11.11
8	**Number of stories of the performed project**		
	<3	7	8.64
	3---6	16	19.75
	7---9	30	37.04
	≥10	28	34.57

4.2. General Overview on Extent of Successfully Completion Building Projects

As indicated in figure 4.1 below, 37% of the respondents for this research had agreed that there were successfully completed building projects in Addis Ababa Bole Sub City building construction industry. Out of 100%, 10% of the respondents strongly agreed, 18% neutral, 31% dis agree, while the remaining 4% of the respondents strongly dis agreed on the presence of successfully completed projects.

But even if 35% of the respondents did not agree with the presence of building construction successfulness, they could know which factors would lead to the success.

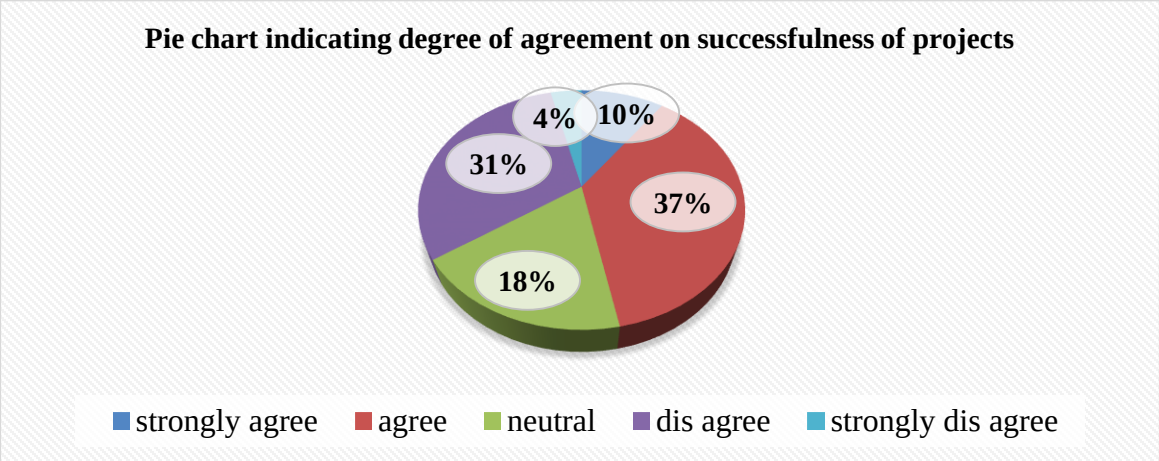


Figure 4.1: Respondents' perception on successful completion building projects in Bole Sub City

4.3. Interview

Interview is direct data collection method which can use to strengthen datas which were collected by using literature and questionnaires. Due to this interview was conducted on Addis Ababa

governmental housing construction head office with engineer Zena; Addis Ababa construction management enterprise and other experts.

As they responded to me there were different reasons for a building project not to be successful. As most of them mentioned in order to a project to be successful, all parties who were participating in any building construction have their own part and if those parties perform their responsibility according to the agreement in the contract; the project would be completed successfully.

4.4. Types of Success factors

4.4.1. Types of Success factors which are identified from literature review

Research objective one: To investigate the types of success factors on building construction projects in Bole Sub City.

Research question one: What are the types of success factors in building construction projects in Bole Sub City, Addis Ababa.

The first specific objective of this study was to identify the types of success factors that leads to successful completion of building projects. A total of 79 factors has been identified from literature review and around 19 factors from questionnaires and presented in table 4.2 and 4.3 respectively as shown below:

Table 4.2: Success factors identified through literature review

Group No	**Group of Success Factors**	**Types of Success Factors**
1	**Project Management Related Success Factors**	Communication system
		Control mechanism
		Feedback capabilities
		Troubleshooting (sudden problem solving ability)
		Planning effort
		Coordination effectiveness
		Decision making effectiveness

Group No	Group of Success Factors	Types of Success Factors
		Project monitoring
		Developing an appropriate organization structure
		Implementing an effective safety program
		Implementing an effective quality assurance program
		Control of sub-contractors' work
		Prior project management experience
		Risk identification and allocation
		Formal dispute resolution process
		Motivation/ Incentives
		Constructability program
		Training the HR in the skill demanded by project
2	**Procurement Related Success Factors**	Project delivery system (e.g. design-bid-build, design build)
		Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)
		Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)
3	**Client Related Success Factors**	Influence of client/ client's representative
		Client's experience
		Nature of client (privately funded vs. publicly funded)
		Size of client's organization
		Client's knowledge of construction project organization
		Client's confidence in construction team
		Owner's construction sophistication
		Owner's clear and precise definition of project scope & objectives
		Timely decision by owner/ owner's representative
		Owner's risk attitude (willingness to take risk)

Group No	Group of Success Factors	Types of Success Factors
		Client's emphasis on low construction cost
		Client's emphasis on high quality of construction
		Client's emphasis of quick construction
		Client's project management
		Client's ability to brief
		Client's ability to make decision
		Client's ability to define roles
4	**Design or Consultant Team-Related Success Factors**	Design team experience
		Project design complexity
		Mistakes/ delays in producing design documents
		Design team's contribution to construction (constructability review, value engineering, etc.)
		Adequacy of plans and specifications
5	**Contractor-Related Success Factors**	Contractor experience
		Site management
		Supervision of the project
		Extent (Involvement) of Subcontracting
		Contractor's cash flow
		Effectiveness of cost control system
		Speed of information flow
6	**Project Manager Related Success Factors**	Project Manager's competence
		Project Manager's experience
		Project Manager's authority to take day-to-day decisions
		Project Manager's authority to take financial decision, selecting key team members, etc.
		Technical capability of project manager
		Leadership skills of project manager
		Organizing skills of project manager

Group No	Group of Success Factors	Types of Success Factors
		Coordinating ability and rapport of project manager with contractors/ subcontractors
		Coordinating ability and rapport of project manager with owner/ owner representatives
		Motivating skills of project manager
		Project manager's commitment to meet quality, cost &time
		Project manager's early & continued involvement in project
		Project manager's adaptability to changes in project plan
		Project manager's ability to delegate authority
		Construction control meetings
7	**Environment Related Success Factors**	Economic environment
		Social environment
		Weather condition (rainy, hot, cold…)
		Political environment
		Physical work environment
		Industrial relations environment
		Administrative approvals environment
		Commitment of all parties to the project
		Adequacy of funding
		Technology availability
		Human Skill availability
		fraudulent practices, corruption, favoritism, lack of ethics,
8	**Success Factors Related to Project Characteristics**	project scope/size
		project clear objective

4.4.2. Types of Success Factors Which Are Identified From Questionnaires

As we had reviewed from literature there were different types of success factors in building construction projects in the world, Africa as well as in Ethiopia and lastly in Bole Sub City. In order to identify additional success factors in Bole Sub City, questionnaires were distributed to the respondents and interview was conducted in this Sub City. In addition to success factors which were mentioned in different literatures the following success factors were identified through the questionnaires in Bole Sub City building construction projects. The respondents were gave Likert's scale five (strongly agree) for the whole types of success after they had written down the factors which were listed below but since only one or too much two to three respondents gave the rate, these success factors were not considered in the further analysis.

Table 4.3: Success factors identified through questionnaire

S.No	Types of success factors		S.No	Types of success factors
1	Fairly allocation and controlling of resources		11	Applicable standard bidding document
2	Age, skill and experience of worker		12	Design clarity; readiness & response time
3	Judgment		13	Completed design
4	Interpersonal skill		14	Allocation of the right persons at the right place
5	Coordination between workers		15	Project planning
6	Good safety measures		16	Project scheduling
7	Handling of time and finance		17	Fairness and communication capacity
8	Availability of materials		18	Human skill
9	Fairness in any activity		19	Timely advanced and in term payment
10	Good head office support			

4.5. Reliability Checking - Cronbach's Alpha

The reliability of the data was analyzed by using Statically Package for Social Sciences version 20 (SPSS v20). SPSS v20 was used to run the value of Cronbach's alpha and the results for management, procurement, client, design team, contractor, project manager environment related success factors and factors related to project characteristics are as shown below.

Success factors which have Cronbach's coefficient alpha value of greater than 0.7 are considered as highly reliable and Cronbach's coefficient alpha value of between 0.3- 0.7 is considered as moderately reliable.

Table 4.4: Cronbach's Alpha for questionnaires reliability checking

S.No	Independent Variables (Group of Success Factors)	Cronbach's Alpha value	Number of Items
1	Project Management Factors	0.96	18
2	Procurement Related Factors	0.55	3
3	Client Related Factors	0.954	17
4	Design Team-Related Factors	0.819	5
5	Contractor-Related Factors	0.895	7
6	Project manager related factors	0.963	15
7	Environment Related Factors	0.862	12
8	Factors related to project characteristics	0.722	2

All questionnaires related to project management; procurement; client ; design team ; contractor ; project manager ; environment and factors related to project characteristics are highly reliable except procurement related factors because they had Cronbach's alpha value of greater than 0.7 as shown in the table 4.4. But procurement related factors moderately reliable which has Cronbach's alpha value of 0.550 which is greater than 0.3.

4.6. Investigating Major Success Factors of Building Projects in Bole Sub City

Research objective two*:* To rank the type of success factors from different stakeholders point of view based on their relative importance index of governmental building projects in Bole Sub City.

Research question two: What are top significant success factors in building construction projects of Bole Sub City from different stakeholder point of view?

4.6.1. Relative Importance Index Analysis and Ranking Success Factors

The Relative Importance Index (RII) is a statistical method which is used to determine the ranking of different project success factors. Table 4.5 shows the relative importance index and ranking of

success factors from client, consultants, contractors, others and overall perspectives. The values of these relative importance index were calculated using equation 3.1 from client view, contractors view, consultants view; others view and from the overall view. The prime benefit of this index was to take a consideration to the success factors that were important for building construction successful accomplishment.

4.6.2. Major Success Factors from Overall Ranking

In Ukraine the major success factors which were identified by Inna Didenko on building construction were: economic, project manager's experience, qualification of project team, planning, project manager's competence and leadership, political, and monitoring and control according to their significance order. According to Ika, Dillo and Thuillier major success factors investigation on World Bank projects, the major ones were: monitoring, coordination, design clarity, training and institutional environment with their significant order.

According to Rohaniyati Salleh the significant success factors in building constructions projects in Queensland University were; project managers' capability, clarity of project scope, organizational planning, use of control system, project managers goal commitment, project team motivation and safety precaution.

As we have seen from table 4.5 below the rank of success factors based on RII using Excel and SPSSv 20 from constructions parties perspectives. According to group of contractors response on building construction projects of Bole Sub City was: site management; adequacy of funding; leadership skills of project manager takes the first three ranks. The consultants gave a priority to decision making effectiveness; adequacy of funding; control mechanism. According to clients: leadership skills of project manager; project clear objective; adequacy of funding. Other respondents ranked the success factors one up to three as follow: contractor's cash flow; planning effort; technology availability; training the HR in the skill demanded by project.

The top ten major success factors from overall ranking success factors as we have seen from table 4.5 were: leadership skills of project manager; project clear objective; adequacy of funding ; decision making effectiveness; project monitoring; project manager's commitment to meet quality, cost &time; project manager's early & continued involvement in project; contractor's cash flow;

Site management; coordinating ability and rapport of project manager with contractors/ sub-contractors; project manager's authority to take financial decision, selecting key team members; organizing skills of project manager are the top ten major success factors according to their significant on building project in Bole Sub City in order to accomplished projects successfully.

As we have seen from the above discussion, success factor have different priority in different countries. This variation may be due to different reasons like developmental stage, natural and manmade environmental conditions, and way of construction parties' understanding.

Table 4.5: Relative importance index and ranking of success factors from different perspectives

Types of success factors	contractor		consultant		client		other		over all	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Leadership skills of project manager	0.929	3	0.911	8	0.889	2	0.875	14	0.901	1
project clear objective	0.900	11	0.896	17	0.889	2	0.900	8	0.896	2
Adequacy of funding	0.943	2	0.926	4	0.889	2	0.825	35	0.896	2
Decision making effectiveness	0.886	20	0.948	1	0.874	10	0.875	14	0.896	2
Project monitoring	0.886	20	0.904	12	0.856	15	0.911	5	0.889	3
Project manager's commitment to meet quality, cost &time	0.921	5	0.904	12	0.878	7	0.825	35	0.882	4
Project manager's early & continued involvement in project	0.893	16	0.904	12	0.878	7	0.850	23	0.881	5
Contractor's cash flow	0.879	23	0.881	22	0.833	30	0.925	3	0.880	6
Site management	0.950	1	0.859	34	0.856	15	0.850	23	0.879	7
Coordinating ability and rapport of project manager with contractors/ subcontractors	0.921	5	0.859	34	0.844	21	0.875	14	0.875	8
Project Manager's authority to take financial decision, selecting key team members, etc.	0.857	35	0.911	8	0.878	7	0.850	23	0.874	9
Organizing skills of project manager	0.907	8	0.896	17	0.833	30	0.850	23	0.872	10
Contractor experience	0.900	11	0.919	6	0.800	46	0.850	23	0.867	11

Types of success factors	contractor		consultant		client		other		over all	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Supervision	0.800	46	0.904	12	0.856	15	0.900	8	0.865	12
Design team experience	0.893	16	0.926	4	0.811	42	0.825	35	0.864	13
Design team's contribution to construction (constructability review, value engineering, etc.)	0.893	16	0.874	26	0.811	42	0.875	14	0.863	14
Project Manager's authority to take day-to-day decisions	0.879	23	0.821	55	0.878	7	0.875	14	0.863	15
Control of sub-contractors' work	0.879	23	0.859	34	0.867	11	0.844	27	0.862	16
Planning effort	0.807	43	0.881	22	0.833	30	0.925	3	0.862	16
Technology availability	0.864	29	0.793	64	0.856	15	0.925	3	0.859	17
Training the HR in the skill demanded by project	0.800	46	0.830	51	0.878	7	0.925	3	0.858	18
Project Manager's experience	0.864	29	0.919	6	0.844	21	0.800	46	0.857	19
Project Manager's competence	0.910	6	0.837	46	0.844	21	0.825	35	0.854	20
Project delivery system (e.g. design-bid-build, design build)	0.900	11	0.838	44	0.833	30	0.825	35	0.849	21
Coordination effectiveness	0.864	29	0.852	39	0.856	15	0.825	35	0.849	21
Economic environment	0.864	29	0.844	43	0.856	15	0.825	35	0.847	22
Coordinating ability and rapport of project manager with owner/ owner representatives	0.864	29	0.852	39	0.878	7	0.775	53	0.842	23
Construction control meetings	0.893	16	0.867	29	0.833	30	0.775	53	0.842	24
Effectiveness of cost control system	0.893	16	0.852	39	0.822	37	0.800	46	0.842	24
Control mechanism	0.834	39	0.941	2	0.811	42	0.778	49	0.841	25
Risk identification and allocation	0.807	43	0.821	55	0.833	30	0.900	8	0.840	26
Technical capability of project manager	0.871	25	0.830	51	0.833	30	0.825	35	0.840	26
Commitment of all parties	0.893	16	0.874	26	0.767	57	0.825	35	0.840	26

Types of success factors	contractor		consultant		client		other		over all	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Project manager's ability to delegate authority	0.857	35	0.896	17	0.844	21	0.750	59	0.837	27
Adequacy of plans and specifications	0.800	46	0.867	29	0.856	15	0.825	35	0.837	27
Prior project management experience	0.864	29	0.807	60	0.833	30	0.825	35	0.832	28
Extent of Subcontracting	0.857	35	0.844	43	0.778	51	0.850	23	0.832	28
Mistakes/ delays in producing design documents	0.731	66	0.904	12	0.811	42	0.875	14	0.830	29
Project manager's adaptability to changes in project plan	0.886	20	0.874	26	0.833	30	0.725	62	0.830	29
Constructability program	0.779	55	0.867	29	0.756	60	0.900	8	0.825	30
Project design complexity	0.783	54	0.852	39	0.778	51	0.875	14	0.822	31
Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)	0.814	41	0.815	56	0.778	51	0.875	14	0.820	32
Developing an appropriate organization structure	0.859	32	0.814	57	0.756	60	0.850	23	0.820	32
Motivating skills of project manager	0.907	8	0.911	8	0.833	30	0.625	74	0.819	33
Formal dispute resolution process	0.729	68	0.859	34	0.833	30	0.800	46	0.805	34
project scope/size	0.786	53	0.874	26	0.733	65	0.825	35	0.805	35
Physical work environment	0.843	37	0.770	67	0.844	21	0.750	59	0.802	36
Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)	0.721	69	0.889	19	0.822	37	0.775	53	0.802	36
Communication system	0.800	46	0.837	46	0.744	62	0.825	35	0.802	36
Social environment	0.821	40	0.757	70	0.778	51	0.825	35	0.795	37
Human Skill availability	0.907	8	0.881	22	0.765	58	0.625	74	0.795	38
Timely decision by owner/ owner's representative	0.800	46	0.793	64	0.718	67	0.850	23	0.790	39
Speed of information flow	0.857	35	0.885	20	0.733	65	0.675	68	0.788	40

Types of success factors	contractor		consultant		client		other		over all	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Owner's clear and precise definition of project scope &objectives	0.771	58	0.793	64	0.778	51	0.800	46	0.785	41
Client's confidence in construction team	0.793	50	0.800	61	0.778	51	0.750	59	0.780	42
Client's emphasis of quick construction	0.757	61	0.822	53	0.741	63	0.800	46	0.780	42
Client's emphasis on low construction cost	0.650	75	0.859	34	0.811	42	0.800	46	0.780	42
Weather condition (rainy, hot, cold…)	0.793	50	0.896	17	0.811	42	0.600	78	0.775	43
Implementing an effective safety program	0.671	73	0.832	48	0.711	69	0.867	18	0.770	44
Nature of client (privately funded vs. publicly funded)	0.786	53	0.807	59	0.811	42	0.675	68	0.770	44
Feedback capabilities	0.743	63	0.681	76	0.822	37	0.825	35	0.768	45
Size of client's organization	0.771	58	0.852	39	0.778	51	0.650	71	0.763	46
Client's ability to make decision	0.771	58	0.785	66	0.775	55	0.700	64	0.758	47
Implementing an effective quality assurance program	0.693	71	0.756	72	0.789	47	0.756	56	0.748	48
Client's knowledge of construction project organization	0.693	71	0.859	34	0.689	72	0.750	59	0.748	49
Owner's construction sophistication	0.771	58	0.830	51	0.678	75	0.675	68	0.738	50
Owner's risk attitude (willingness to take risk)	0.729	68	0.837	46	0.711	69	0.675	68	0.738	50
Troubleshooting	0.643	76	0.690	75	0.838	24	0.775	53	0.736	51
Industrial relations environment	0.736	65	0.763	69	0.744	62	0.700	64	0.736	51
Administrative approvals environment	0.836	38	0.793	64	0.689	72	0.625	74	0.736	51
Client's emphasis on high quality of construction	0.743	63	0.830	51	0.678	75	0.675	68	0.731	52
Client's project management	0.757	61	0.756	72	0.638	78	0.775	53	0.731	52

Types of success factors	contractor		consultant		client		other		over all	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Motivation/ Incentives	0.736	65	0.807	59	0.663	76	0.700	64	0.726	53
Influence of client/ client's representative	0.679	72	0.715	73	0.705	70	0.775	53	0.719	54
Client's ability to define roles	0.793	50	0.674	77	0.733	65	0.625	74	0.706	55
Client's experience	0.629	78	0.763	69	0.767	57	0.625	74	0.696	56
Client's ability to brief	0.664	74	0.659	78	0.647	77	0.725	62	0.674	57
Political environment	0.629	78	0.711	74	0.689	72	0.600	78	0.657	58
fraudulent practices, corruption, favoritism, lack of ethics,	0.341	79	0.333	79	0.511	79	0.275	79	0.365	59

4.8. Ranking of Success Factors in Building Construction Projects Based on Their Categories

Research objective three: To identify major success factors from perspective of their categories

Research question three: What are the major success factors in Bole Sub City building construction projects from perspective of their categories?

The success factors of building construction projects in Addis Ababa Bole Sub City were grouped into eight categories. These group were project management factors, procurement related factors, client related factors, design team-related factors, contractor-related factors, project manager related factors, and environment related factors, factors related to project characteristics. Analyzing of success factors based on their category is essential to take an action on it. Ranking of success factors under the above categories were shown below turn by turn and lastly put in an overall view of respondents. The success factors under each category as well as overall view of respondents were ranked by their relative importance index and discussions on each group of factors were made hereafter.

4.8.1. Management Related Success Factors

Project management action is a key for project success. Competent project managers can use management tools to plan and execute their construction projects to maximize the project's

chances of success. The variables in project management include adequate communication; control mechanisms; feedback capabilities; trouble shooting; coordination effectiveness; decision making effectiveness; monitoring; project organization structure; plan and schedule followed, and related previous management experience; risk identification; formal dispute resolution process; motivation/ incentives; constructability program; training the HR in the skill demanded by project.

Project managers would have a clear understanding of which aspects of variables might be major for project successful completions. For a project to be successful, it is essential to understand the project requirements right from the start and go for project planning which provides the right direction to project managers and their teams and execute the project accordingly. A successful project is one that is delivered on time and managed within the budget, Time, cost and quality have been recognized as "triple constraint" or important elements of project success. The study of project success and major success factors (MSFs) is often considered as one of the vital ways to improve the effectiveness of project delivery. The major success factors (MSFs) are more useful in decision-making support. The study of major success factors (MSFs) is a means of understanding and thereby improving the effectiveness of construction projects.

In order to investigate the major success factors related to project management the responded questionnaires and interviewee was analyzed by using SPSS v20. The following table 4.6 and figure 4.2 indicate the output of the analysis. As we have seen from the table and figure decision making effectiveness which has (RII =0.896) in the project management take the first rank over the whole success factors; factor of project monitoring with its value of (RII =0.889) in project management take the second rank and planning effort and control of sub-contractors' work took the third rank based on their relative importance index. The rank of other factors were as shown from table 4.6.

As we have seen from table 9 below; decision making effectiveness of a management (RII=0.896), project monitoring (RII=0.889) ; Planning effort (RII=0.862) and Control of sub-contractors' work (RII=0.862) take the first, second and third ranks respectively over the other success factors which are related to project management in Bole Sub City building construction projects.

Therefore in the management activity the one who is assigned as a project manager should have the ability of effective decision making, good project monitoring skill, and well project planning ability in order to the project completed successfully.

Figure 4.2: Significance of success factors related to project management

Table 4.6: Ranking of success factors related to project management in Bole Sub City building construction.

Types of success factors	1	2	3	4	5	Mean	RII	Rank
Decision making effectiveness	2	2	1	26	50	4.481	0.896	1
Project monitoring	2	2	4	23	50	4.444	0.889	2
Planning effort	3	1	2	37	38	4.309	0.862	4
Control of sub-contractors' work	1	3	8	27	42	4.309	0.862	4
Training the HR in the skill demanded by project	1	4	10	21	44	4.288	0.858	5
Coordination effectiveness	2	3	3	38	35	4.247	0.849	6
Control mechanism	3	1	3	44	31	4.207	0.841	7
Risk identification and allocation	2	2	8	35	34	4.198	0.84	8
Prior project management experience	1	7	10	23	40	4.16	0.832	9
Constructability program	2	1	14	32	32	4.123	0.825	10
Developing appropriate organization structure	1	3	6	48	23	4.099	0.82	11
Formal dispute resolution process	2	1	10	46	20	4.025	0.805	12
Communication system	2	6	10	34	29	4.012	0.802	13
Implementing an effective safety program	2	6	16	35	22	3.852	0.77	14
Feedback capabilities	5	5	10	39	22	3.84	0.768	15
Implementing effective quality assurance program	9	2	15	29	25	3.738	0.748	16
Troubleshooting	4	6	16	41	14	3.679	0.736	17
Motivation/ Incentives	4	12	16	27	22	3.63	0.726	18

4.8.2. Purchasing Related Success Factors

A number of researchers identified the importance of procurement factors defined the scope of procurement as the framework within which construction is brought about, acquired or obtained. Therefore, three attributes are used to measure this factor; they are procurement method (selection of the organization for the design and construction of the project); tendering method (procedures adopted for the selection of the project team and in particular the main contractor) and project

contracting mechanism through which an agreement is performed. The three purchasing related success factors were:

- Project delivery system
- Project Bidding Method
- Project contract mechanism

For a project to be successful a procurement method must be free from bias and should be followed a legal procedure as it was discussed with some of the professional; they said that the winner of the bidding for some projects did not select by following the legal way; due to this after the project is awarded to the contractor, the contractor did not do the project according to the agreement and it would lead to unsuccessfulness of the projects. Therefore in order to the project to be successful the procurement method should be in the right way.

As we have seen from the table 4.7 and figure 4.3 below the SPSS v20 analysis show the ranks of success factors, based on their relative importance index. The ranking result indicates that project delivery system (RII=0.849); project bidding method (RII=0.820) and project contract mechanism (RII=0.802) were first rank, second rank and third rank respectively.

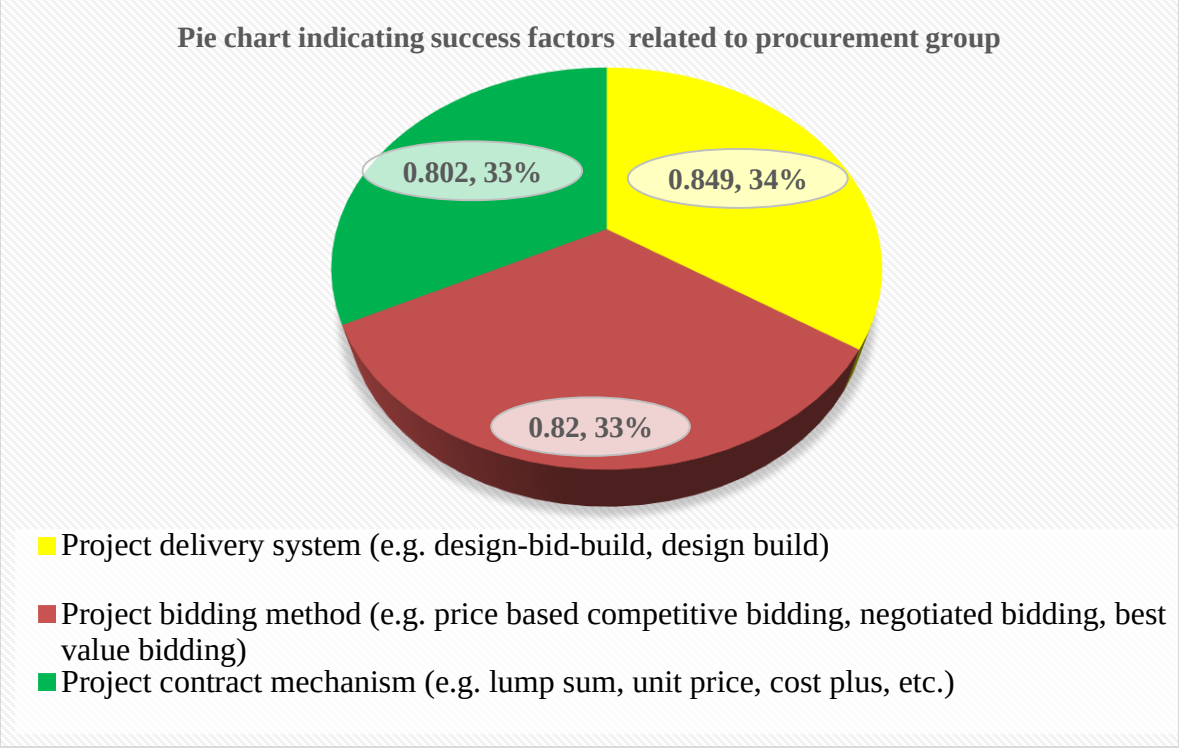


Figure 4.3: Significant success factors related to procurement

As we have seen from table 4.7 below, project delivery system which has relative importance index of 0.849 has a first significant impact on successful accomplishing of governmental building projects which is followed by project bidding method of relative importance index of 0.820 in Bole Sub City.

Table 4.7: Procurement related success factors ranking of building projects in Bole Sub City based on their RII

Types of success factors	1	2	3	4	5	Mean	RII	Rank
Project delivery system (e.g. design-bid-build, design build)	0	0	13	35	33	4.247	0.849	1
Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)	2	1	15	32	31	4.099	0.82	2
Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)	6	1	12	29	33	4.012	0.802	3

4.8.3. Client Related Success Factors

The client or the owner of the project is one party from different parties which are involved in building construction projects. This party is mostly the source of the budget for a project. There are different variables which are under the category of clients. These are the client related variable or success factors concerned with client characteristics, client type and experience, knowledge of construction project organization, project financing, client confidence in the construction team, well-defined scope, owner's risk hate, client project management. By using SPSS v20 there was an analysis and the result of the analysis was as shown in the table 4.8 and figure 4.4.

As we have seen from table 4.8 below timely decision by owner/ owner's representative (RII=0.790); Owner's clear and precise definition of project scope and objectives (RII=0.785); client's emphasis on low construction cost (RII=0.780), client's confidence in construction team (RII=0.780); client's emphasis of quick construction (RII=0.780) take the first three ranks over the other success factors which are related to client in Bole Sub City building construction projects.

Generally the client of the project should be had a clear objective for what purpose did the building be used after the completion and the client or the owner should be also gave a decision within a short period of time on any type of issue concerning to the project in his or her authority.

Table 4.8: Ranking of clients related success factors of building construction projects in Bole Sub City based on their RII.

Types of success factors	Scale							
	1	2	3	4	5	Mean	RII	Rank
Timely decision by owner/ owner's representative	2	2	18	35	24	3.951	0.79	1
Owner's clear and precise definition of project scope &objectives	4	2	15	35	25	3.926	0.785	2
Client's confidence in construction team	2	2	19	37	21	3.901	0.78	3
Client's emphasis on low construction cost	1	9	12	34	25	3.901	0.78	3
Client's emphasis of quick construction	1	4	16	41	19	3.901	0.78	3
Nature of client (privately funded vs. publicly funded)	3	3	23	26	26	3.852	0.77	4
Size of client's organization	2	2	27	28	22	3.815	0.76	5
Client's ability to make decision	8	0	18	30	25	3.79	0.758	6
Client's knowledge of construction project organization	3	11	22	13	32	3.741	0.748	7
Owner's construction sophistication	8	4	18	26	25	3.691	0.738	8
Owner's risk attitude (willingness to take risk)	6	8	12	34	21	3.691	0.738	8
Client's emphasis on high quality of construction	8	8	15	23	27	3.654	0.731	9
Client's project management	9	3	17	30	22	3.654	0.731	9
Influence of client/ client's representative	11	5	12	31	22	3.593	0.719	10
Client's ability to define roles	8	2	26	29	16	3.531	0.706	11
Client's experience	10	7	18	26	20	3.482	0.696	12
Client's ability to brief	10	3	24	35	9	3.37	0.674	13

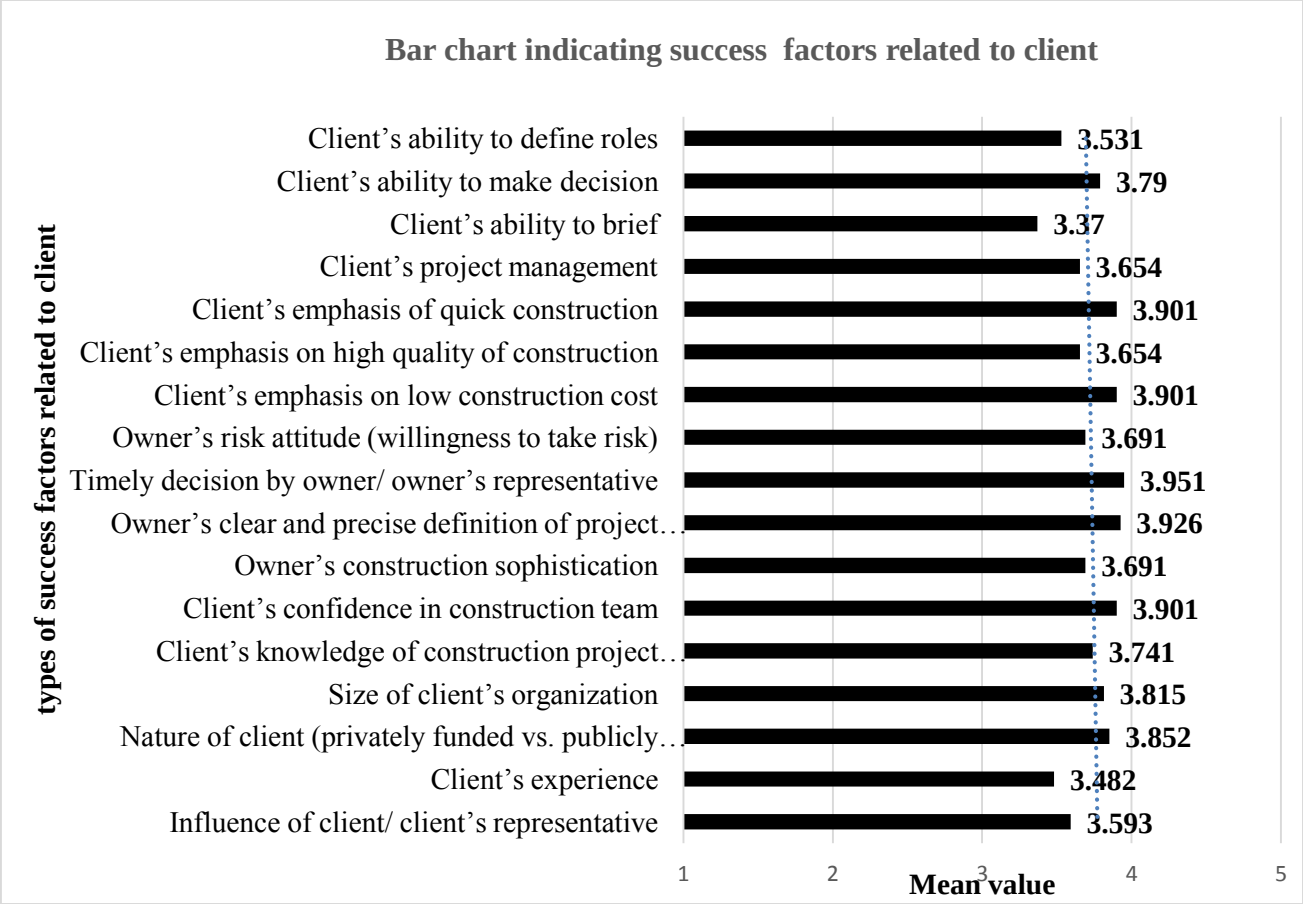


Figure 4.4: Presents an arithmetical average of ranks ascribed to success factors from building construction client group.

4.8.4. Contractor Related Success Factors

The main contractor and subcontractors start their main duties when the project reaches the construction stage. The variables included under the contractors were: contractor experience, site management, supervision and involvement of subcontracting, contractor's cash flow, effectiveness of cost control system, and speed of information flow.

As it was identified the contractor related success factors include; proper financing project by contractor, good site management and supervision by contractor, good communication and coordination by contractor with other parties, proper construction methods implemented by contractor, success in sub-contractors work, adequate contractor's work, absence of frequent

change of sub-contractors because of their inefficient work, good qualification of the contractor's technical staff.

The contractor is one of the main parties in any construction industry. The amount of money that is released to the project by the concerned body should be managed properly by the contractor in order to build the construction successfully. The contractor should be assigned the knowledgeable guys as an accountant and also it is better if he or she would be a relative to the contractor or a responsible citizens to his or her works. The contractor should have also a good site management because if the contractor had a capability of managing the site, it all about resource management and it leads the contractor to accomplish the contract according to an agreement that they made with the owner of the projects and this leads them to successfulness.

As we have seen from table 4.9 below, contractor's cash flow (RII=0.88), site management (RII=0.879) and contractor experience (RII=0.867) took the first, second and third ranks respectively based on their relative importance indexes over the other success factors which were related to contractor in Bole Sub City building construction projects.

Table 4.9: Ranking of contractor related success factors of building projects in Bole Sub City based on their RII.

Types of success factors	**Scale**							
	1	**2**	**3**	**4**	**5**	**Mean**	**RII**	**Rank**
Contractor's cash flow	2	0	7	20	41	4.4	0.88	1
Site management	2	1	5	28	45	4.395	0.879	2
Contractor experience	3	1	9	21	47	4.333	0.867	3
Supervision	2	1	2	33	33	4.324	0.865	4
Effectiveness of cost control system	2	4	7	30	38	4.21	0.842	5
Extent (Involvement) of Subcontracting	2	2	13	28	36	4.161	0.832	6
Speed of information flow	2	6	14	32	27	3.938	0.788	7

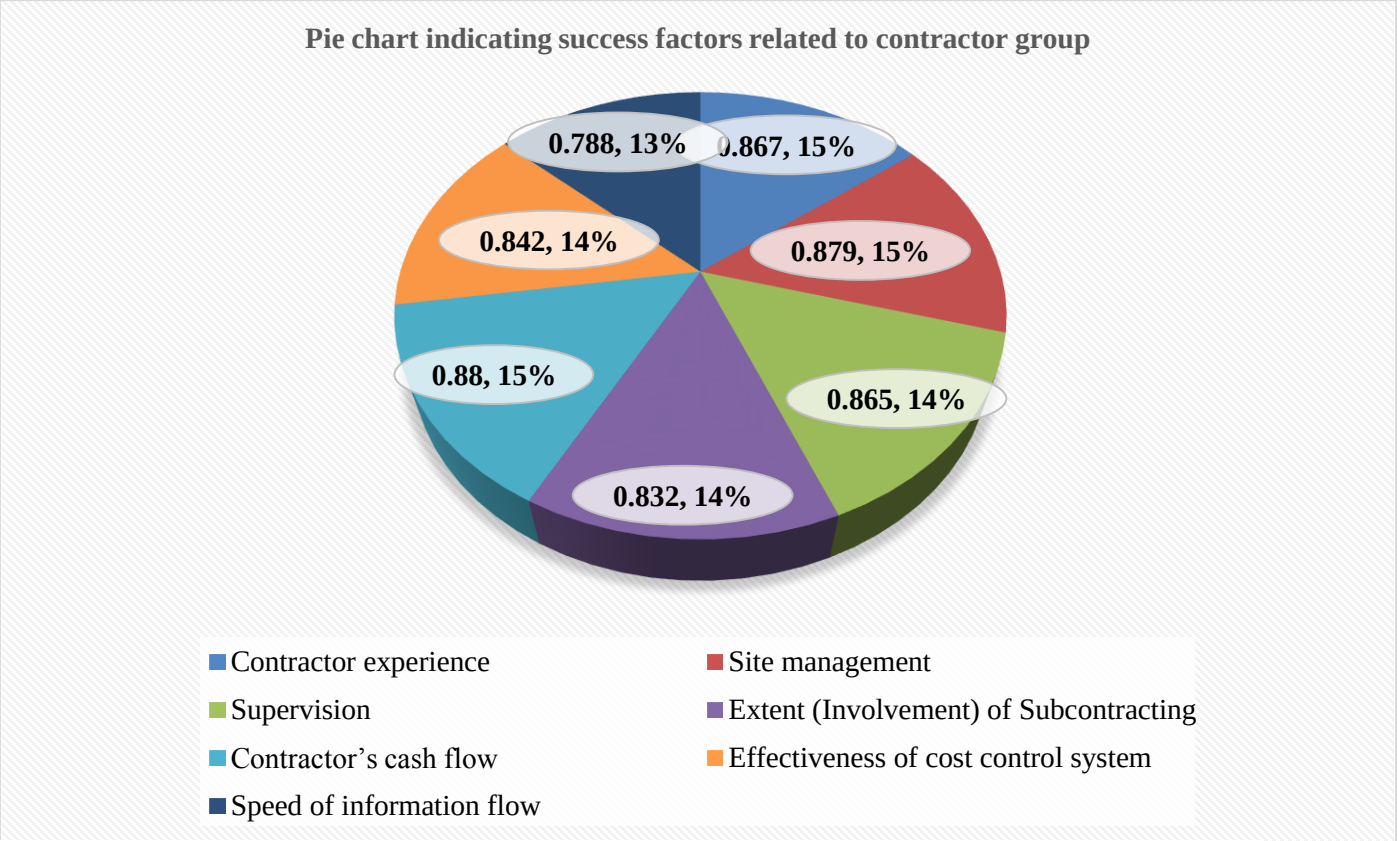


Figure 4.5: Pie chart on success factors of contractor related group

4.8.5. Design (Consultant) Team Related Success Factors

Designers play a vital role as their work involves from inception to completion on a project. Design team-related factors consist of design team experience, project design complexity, Adequacy of plans and specifications and mistakes/delays in producing design documents.

The literature review was done through books, engineering journals, conference papers, masters and academic thesis, the internet, and interview with experts from the construction industry to identify factors that are responsible for successful construction projects globally. Several studies have identified consultant related factors to cause successful. Full or complete design, clear specification, periodic inspection of the construction, good communication between contractor and designer, availability of complete design documents and drawings are some of the factors which are useful for project successfulness.

The following were success factors which are evaluated by the respondents with the distributed questionnaires and the result of an analysis by SPSS v20 based on their relative importance index was as shown in the table 4.10 and figure 4.6 below.

Design team experience, project design complexity, mistakes/ delays in producing design documents, design team's contribution to construction (constructability review, value engineering), adequacy of plans and specifications.

As we have seen from table 4.10 below design team experience (RII=0.864); design team's contribution to construction (constructability review, value engineering,) (RII=0.863) and adequacy of plans and specifications (RII=0.837) took the first, second and third ranks respectively over the other success factors which are related to design team in Bole Sub City building construction projects based on their relative importance indexes.

Table 4.105: Ranking of design team related success factors of building projects in Bole Sub City based on their RII.

Types of success factors	**Scale**							
	1	**2**	**3**	**4**	**5**	**Mean**	**RII**	**Rank**
Design team experience	1	1	9	30	40	4.321	0.864	1
Project design complexity	2	2	17	24	36	4.111	0.822	5
Mistakes/ delays in producing design documents	6	4	3	27	41	4.148	0.83	4
Design team's contribution to construction (constructability review, value engineering, etc.)	1	0	6	39	34	4.313	0.863	2
Adequacy of plans and specifications	7	0	4	30	40	4.185	0.837	3

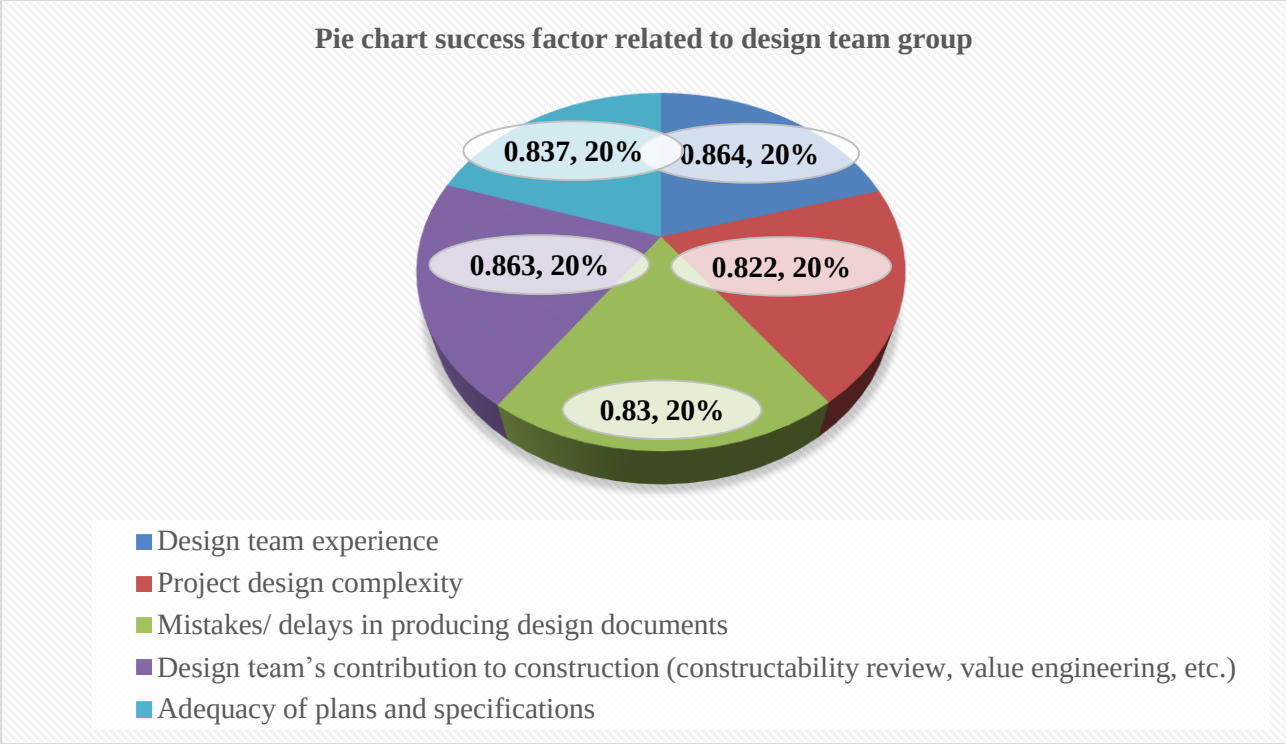


Figure 4.6: Presents RII of ranks ascribed to success factors from building construction design team related group.

4.8.6. Project Manager Related Success Factors

The project manager is another main stakeholder in a construction project and his or her competence is a major factor affecting project planning, scheduling, and communication. Variables under this factor consist of the skills and characteristics of project managers, their commitment, competence, experience, and authority (Chua et al. 1999). A construction project requires team spirit; therefore team building is important among different parties. Team effort by all parties to a contract, owner, architect, construction manager, contractor, and subcontractors are a crucial ingredient for the successful completion of a project.

The project manager is the key person in the project. They must demonstrate multi-dimensional abilities including interpersonal, technical and administrative skills. The most important element is that the project manager must clearly understand their role as project leader, clearly defining their extent of involvement, and the authority and control they exercise over personnel.

Personality – the project manager must have a personality which encourages respect from team players, associates and peers.

Leadership – the project manager should have leadership skills and be able to apply competent managerial skills. The project manager should have the ability to encourage other members of the group to their view, and be able to resolve conflict between parties.

Organizing – the project manager should be responsible for organizing, selecting and defining the responsibilities of the project team.

Coordinating – the project manager should identify interfaces between the activities of the functional departments, subcontractors, and other project contributors.

Controlling – the project manager should be responsible for monitoring progress, identifying problems, communicating the status of interfaces to contributors, and initiating and coordinating corrective action.

Motivating – the project manager should motivate the project team to perform their duties, and also convince the project team to co-operate with each other.

Technical knowledge and experience – the project manager must possess good technical knowledge and experience, since most of the project is highly technical.

Table 4.11: Ranking of project manager related success factors of building projects in Bole Sub City based on their RII.

Types of Success Factors	Scale							
	1	2	3	4	5	Mean	RII	Rank
Leadership skills of project manager	1	0	3	30	47	4.506	0.901	1
Project manager's commitment to meet quality, cost &time	2	0	4	26	39	4.408	0.882	2
Project manager's early & continued involvement in project	2	0	4	32	43	4.407	0.881	3
Coordinating ability and rapport of project manager with contractors/ subcontractors	1	5	2	27	45	4.375	0.875	4
Project Manager's authority to take financial decision, selecting key team members, etc.	1	1	6	32	41	4.37	0.874	5
Organizing skills of project manager	1	1	4	37	38	4.358	0.872	6

Types of Success Factors	Scale							
	1	2	3	4	5	Mean	RII	Rank
Project Manager's authority to take day-to-day decisions	3	0	5	30	38	4.316	0.863	7
Project Manager's experience	3	1	2	39	36	4.284	0.857	8
Project Manager's competence	2	2	6	33	38	4.272	0.854	9
Coordinating ability and rapport of project manager with owner/ owner representatives	1	0	10	32	28	4.211	0.842	10
Construction control meetings	1	1	15	27	37	4.21	0.842	11
Technical capability of project manager	1	4	10	29	37	4.198	0.84	12
Project manager's ability to delegate authority	1	0	9	44	27	4.185	0.837	13
Project manager's adaptability to changes in project plan	1	6	7	33	34	4.148	0.83	14
Motivating skills of project manager	1	0	18	25	28	4.097	0.819	15

As we have seen from table 4.11 above after the success factors analyzed by using Excel and SPSS v20 success factors were ranked as shown in table 4.11. From those ranked success factors leadership skills of project manager (RII=0.901); project manager's commitment to meet quality, cost &time (0.882); Project manager's early & continued involvement in project (RII=0.881) took the first, second and third ranks respectively over the other success factors which were related to project manager in Bole Sub City building construction projects based on their relative importance indexes.

Project managers should be had the capability of leading the workers in the project. Leading of the workers includes many activities like assigning the right persons to the right place, giving the direction of the work to the workers, encouraging the workers, controlling the quality of construction materials, monitoring the cost of the project, generally controlling the all over activities of the project is the duty of the project managers. Therefore the project manager should be have leading skills to accomplish the project successfully.

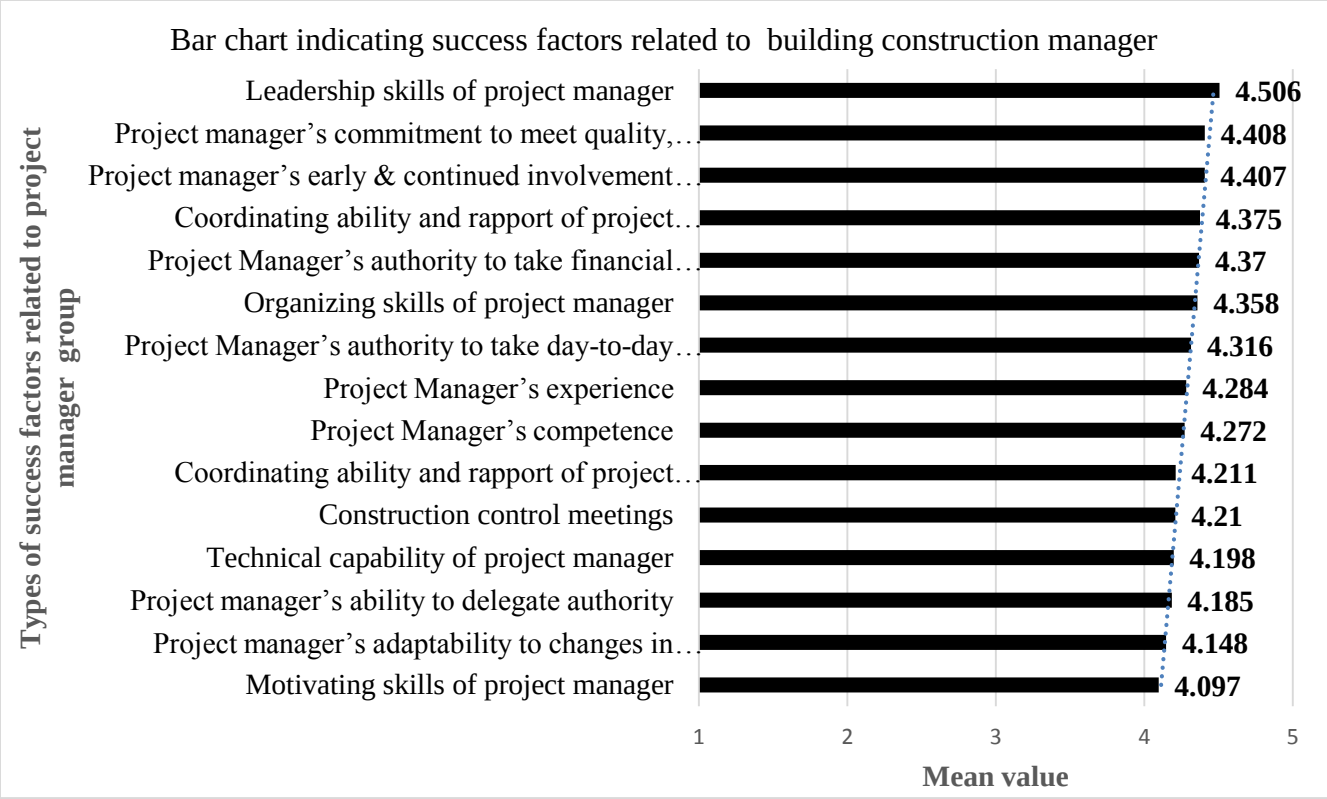


Figure 4.7: Presents arithmetic average of ranks ascribed to success factors from building construction project manager related group.

4.8.7. Environment Related Success Factors

Akinsola et al. (1997), described ‘‘environment’’ as all external influences on the construction process, including social, political, and technical systems. The attributes used to measure this factor are economic environment, social environment, political environment, physical environment, industrial relation environment, and level of technology advanced.

The economic and financial aspect zeroed on the level of general economic activity, as well as the resources available to carry out the work and it includes the economic competition of various degrees around the appointment of all the parties of the building project. Financial limits always seem to exist on building projects according to Obalola whose study clarified that financial environment forces are distinguished from economic ones on the basis that economics is to do with the deployment of resources, whereas financial limitations are strictly to do with money.

Technology is an aspect of the environment that should be considered in developing strategic plans. Political environment is concerned with government policy and the effect of political decisions upon construction projects. The significant roles played by the government in the

construction industry are mostly clients, regulators of the national economy, and regulators of the construction environment such as laws that guide ethics and construction practices and many others. This inferred that governments can significantly increase or decrease the demand for construction services through budgetary measures and monetary policies. (Akanni & Akpomiemie, 2014)

As we have seen from table 4.12 below adequacy of funding (RII=0.896) was the first significant success factors over the others. Technology availability (RII=0.859) was the second significant success factors and economic environment (RII=0.847) was the third significant success factors over the other success factors which were related to environment in Bole Sub City building construction.

Table 4.12: Ranking of environmental related success factors of building projects in Bole Sub City based on their RII.

Types of success factors	**Scale**							
	1	**2**	**3**	**4**	**5**	**Mean**	**RII**	**Rank**
Adequacy of funding	2	0	5	24	50	4.481	0.896	1
Technology availability	2	0	5	39	35	4.296	0.859	2
Economic environment	3	1	6	35	36	4.235	0.847	3
Commitment of all parties to the project	4	1	4	38	34	4.198	0.84	4
Physical work environment	1	3	5	57	15	4.012	0.802	5
Social environment	3	0	21	29	28	3.975	0.795	6
Human Skill availability	4	7	6	33	30	3.975	0.795	7
Weather condition (rainy, hot, cold…)	1	5	16	40	19	3.877	0.775	8
Industrial relations environment	5	7	11	44	14	3.679	0.736	10
Administrative approvals environment	8	3	15	36	19	3.679	0.736	10
Political environment	16	1	24	24	16	3.284	0.657	11
fraudulent practices, corruption, favoritism, lack of ethics,	45	17	10	6	3	1.827	0.365	12

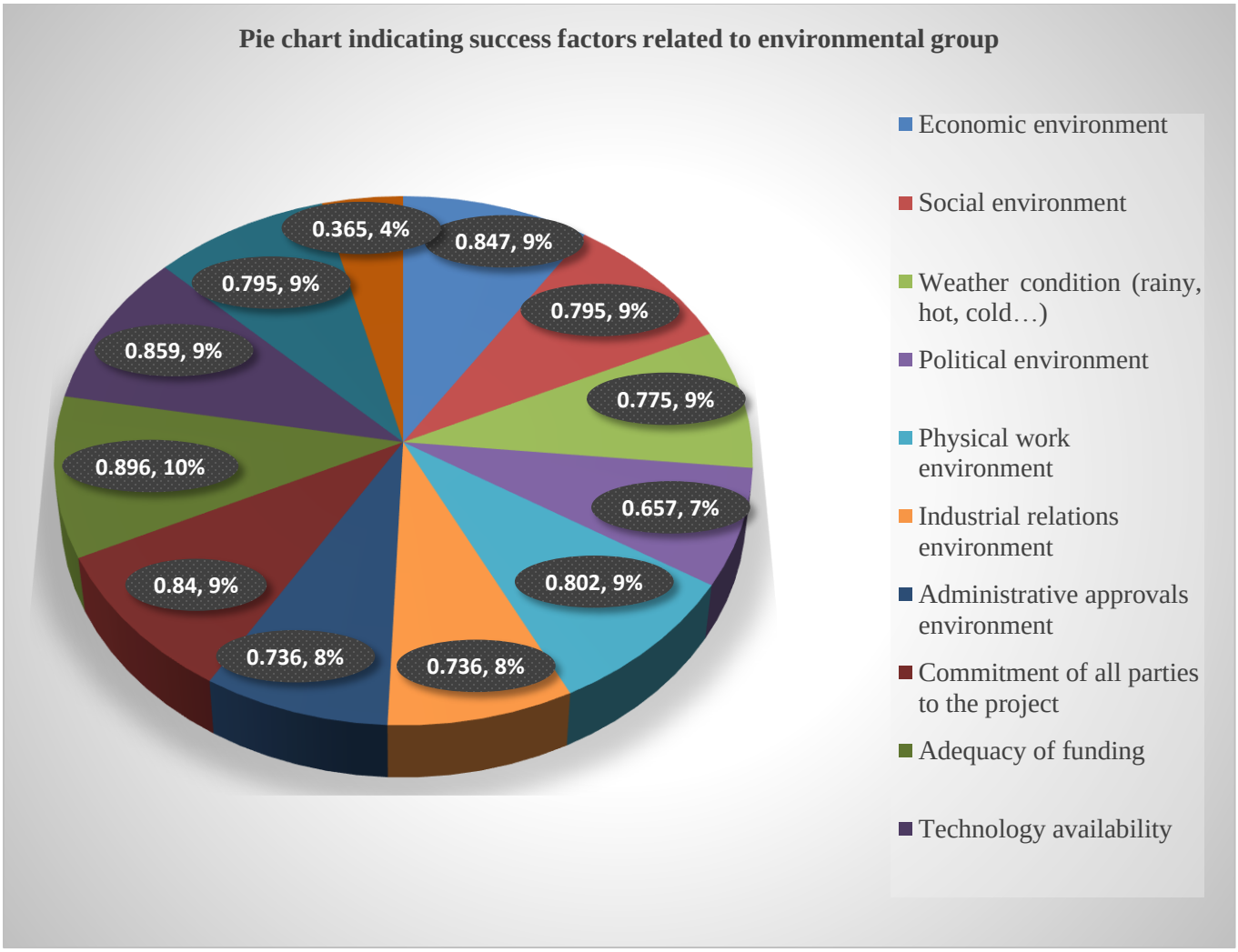


Figure 4.8: Presents RII ranks ascribed to success factors from building construction project environmental related group.

4.8.8. Success Factors Related to Project Characteristics

Project characteristics includes the project scope or size and project clear objective. As the scope of the project is large it is obvious that it require much more resources and well skilled worker. If the project has a clear objective the building construction accomplished successfully. As we have seen from the table 4.13 project clear objective took the first rank according to surveying data analysis.

Table 4.13: Ranking of project charactstics related success factors of building projects in Bole Sub City based on their RII.

Types of success factors	Scale							
	1	2	3	4	5	Mean	RII	Rank
Project clear objective	2	1	3	25	50	4.481	0.896	1
project scope/size	2	2	9	47	21	4.025	0.805	2

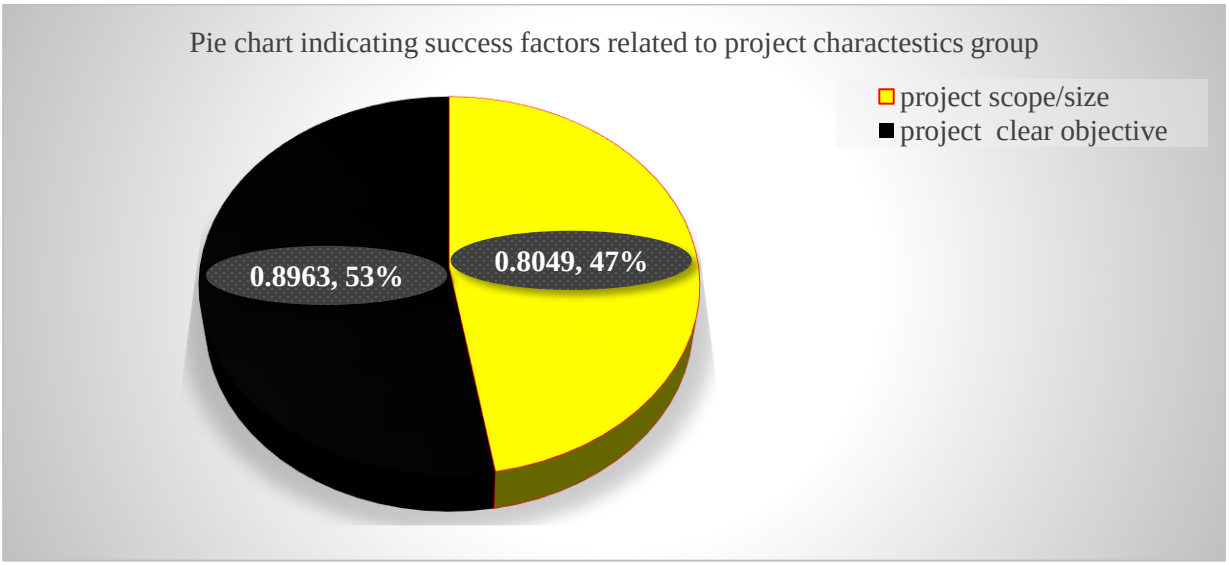


Figure 4.9: Presents RII of ranks ascribed to success factors from building construction project charactstics related group.

From the above chart more or 53% of the respondents said project's clear objective is the successful factor of building construction in Bole Sub City.

4.9. Ranking of Success Factors Based on General Responses of the Respondents.

Ordering of each success factors by respondents based on success factors' relative importance is so much essential in order to give a priority for those success factors which have the highest significant impact on building construction projects. For this reason all 79 success factors were ranked as it shown from table 4.14 below based on their RII. From these ranked success factors leadership skills of project manager (RII=0.901); project clear objective (RII=0.896); adequacy of funding (RII=0.896);decision making effectiveness (RII=0.896); project monitoring (RII=0.889) ;

project manager's commitment to meet quality, cost &time (RII=0.882); project manager's early & continued involvement in project (RII=0.881); contractor's cash flow (RII=0.880); site management (RII=0.879); coordinating ability and rapport of project manager with contractors/ subcontractors (RII=0.875) Project Manager's authority to take financial decision, selecting key team members, (RII=0.874);Organizing skills of project manager (RII=0.872) were the top ten major success factors which were identified from success factors analysis.

Table 4.14: Ranking of all types of success factors of building construction projects in Bole Sub City based on all respondents' RII.

Types of Success Factors	**1**	**2**	**3**	**4**	**5**	**Mean**	**RII**	**Rank**
Leadership skills of project manager	1	0	3	30	47	4.506	0.901	1
Decision making effectiveness	2	2	1	26	50	4.482	0.896	2
Adequacy of funding	2	0	5	24	50	4.482	0.896	2
project clear objective	2	1	3	25	50	4.482	0.896	2
Project monitoring	2	2	4	23	50	4.444	0.889	3
Project manager's commitment to meet quality, cost &time	2	0	4	26	39	4.409	0.882	4
Project manager's early & continued involvement in project	2	0	4	32	43	4.407	0.881	5
Contractor's cash flow	2	0	7	20	41	4.400	0.880	6
Site management	2	1	5	28	45	4.395	0.879	7
Coordinating ability and rapport of project manager with contractors/ subcontractors	1	5	2	27	45	4.375	0.875	8
Project Manager's authority to take financial decision, selecting key team members, etc.	1	1	6	32	41	4.370	0.874	9
Organizing skills of project manager	1	1	4	37	38	4.358	0.872	10
Contractor experience	3	1	9	21	47	4.333	0.867	11
Supervision	2	1	2	33	33	4.324	0.865	12
Design team experience	1	1	9	30	40	4.321	0.864	13

Types of Success Factors	1	2	3	4	5	Mean	RII	Rank
Project Manager's authority to take day-to-day decisions	3	0	5	30	38	4.316	0.863	14
Design team's contribution to construction (constructability review, value engineering, etc.)	1	1	6	39	34	4.313	0.863	15
Planning effort	3	1	2	37	38	4.309	0.862	16
Control of sub-contractors' work	1	3	8	27	42	4.309	0.862	16
Technology availability	2	0	5	39	35	4.296	0.859	17
Training the HR in the skill demanded by project	1	4	10	21	44	4.288	0.858	18
Project Manager's experience	3	1	2	39	36	4.284	0.857	19
Project Manager's competence	2	2	6	33	38	4.272	0.854	20
Coordination effectiveness	2	3	3	38	35	4.247	0.849	21
Project delivery system (e.g. design-bid-build, design build)	0	0	13	35	33	4.247	0.849	21
Economic environment	3	1	6	35	36	4.235	0.847	22
Coordinating ability and rapport of project manager with owner/ owner representatives	1	0	10	32	28	4.211	0.842	23
Effectiveness of cost control system	2	4	7	30	38	4.210	0.842	24
Construction control meetings	1	1	15	27	37	4.210	0.842	24
Control mechanism	3	1	3	44	31	4.207	0.841	25
Risk identification and allocation	2	2	8	35	34	4.198	0.840	26
Technical capability of project manager	1	4	10	29	37	4.198	0.840	26
Commitment of all parties to the project	4	1	4	38	34	4.198	0.840	26
Adequacy of plans and specifications	7	0	4	30	40	4.185	0.837	27
Project manager's ability to delegate authority	1	0	9	44	27	4.185	0.837	27
Prior project management experience	1	7	10	23	40	4.161	0.832	28
Extent (Involvement) of Subcontracting	2	2	13	28	36	4.161	0.832	28
Mistakes/ delays in producing design documents	6	4	3	27	41	4.148	0.830	29
Project manager's adaptability to changes in project plan	1	6	7	33	34	4.148	0.830	29

Types of Success Factors	1	2	3	4	5	Mean	RII	Rank
Constructability program	2	1	14	32	32	4.124	0.825	30
Project design complexity	2	2	17	24	36	4.111	0.822	31
Developing an appropriate organization structure	1	3	6	48	23	4.099	0.820	32
Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)	2	1	15	32	31	4.099	0.820	32
Motivating skills of project manager	1	0	18	25	28	4.097	0.819	33
Formal dispute resolution process	2	1	10	46	20	4.025	0.805	34
project scope/size	2	2	9	47	21	4.025	0.805	35
Communication system	2	6	10	34	29	4.012	0.802	36
Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)	6	1	12	29	33	4.012	0.802	36
Physical work environment	1	3	5	57	15	4.012	0.802	36
Social environment	3	0	21	29	28	3.975	0.795	37
Human Skill availability	4	7	6	33	30	3.975	0.795	38
Timely decision by owner/ owner's representative	2	2	18	35	24	3.951	0.790	39
Speed of information flow	2	6	14	32	27	3.938	0.788	40
Owner's clear and precise definition of project scope &objectives	4	2	15	35	25	3.926	0.785	41
Client's confidence in construction team	2	2	19	37	21	3.901	0.780	42
Client's emphasis on low construction cost	1	9	12	34	25	3.901	0.780	42
Client's emphasis of quick construction	1	4	16	41	19	3.901	0.780	42
Weather condition (rainy, hot, cold…)	1	5	16	40	19	3.877	0.775	43
Implementing an effective safety program	2	6	16	35	22	3.852	0.770	44
Nature of client (privately funded vs. publicly funded)	3	3	23	26	26	3.852	0.770	44
Feedback capabilities	5	5	10	39	22	3.840	0.768	45
Size of client's organization	2	2	27	28	22	3.815	0.763	46

Types of Success Factors	1	2	3	4	5	Mean	RII	Rank
Client's ability to make decision	8	0	18	30	25	3.790	0.758	47
Client's knowledge of construction project organization	3	11	22	13	32	3.741	0.748	48
Implementing an effective quality assurance program	9	2	15	29	25	3.738	0.748	49
Owner's construction sophistication	8	4	18	26	25	3.691	0.738	50
Owner's risk attitude (willingness to take risk)	6	8	12	34	21	3.691	0.738	50
Troubleshooting	4	6	16	41	14	3.679	0.736	51
Industrial relations environment	5	7	11	44	14	3.679	0.736	51
Administrative approvals environment	8	3	15	36	19	3.679	0.736	51
Client's emphasis on high quality of construction	8	8	15	23	27	3.654	0.731	52
Client's project management	9	3	17	30	22	3.654	0.731	52
Motivation/ Incentives	4	12	16	27	22	3.630	0.726	53
Influence of client/ client's representative	11	5	12	31	22	3.593	0.719	54
Client's ability to define roles	8	2	26	29	16	3.531	0.706	55
Client's experience	10	7	18	26	20	3.482	0.696	56
Client's ability to brief	10	3	24	35	9	3.370	0.674	57
Political environment	16	1	24	24	16	3.284	0.657	58
fraudulent practices, corruption, favoritism, lack of ethics,	45	17	10	6	3	1.827	0.365	59

4.11. Test for Agreement on the Major Success Factors of Building Construction Projects among Respondents

4.11.1. Test for Agreement on the success factors of Projects for individual factors

In order to evaluate the major success factors by each party independently contractors, consultants and the client data were analyzed separately. This process also facilitated to determine the degree of agreement between each party's responses. The agreement between parties had been addressed in Spearman Rank Correlation Coefficient among ranks of the respondents.

Spearman's coefficient of rank correlation is used to determine whether there was the agreement or disagreement among each pair of parties. The value of Spearman's coefficient of rank correlation ranges from +1 (perfect positive correlation) to 0 (no correlation) to −1 (perfect negative correlation) and was calculated using equation 3.3 Cohen (1988) as cited in Memon, *et al*., (2010) suggested that if the correlation coefficient value lies between ± 0.5 and ± 1, it is said to have a high degree of correlation. For correlation coefficient value between ± 0.3 and ± 0.5, the degree of correlation is moderate. Low degree of correlation occurs when the correlation coefficient lies between ± 0.1 and ± 0.3. The spearman coefficient and significance level is shown in table 18.

Therefore, the results of the agreement with a level of significance of 99% (r=0.01) showed that the relative importance index of successfully accomplishing building projects between Contractors-consultants, Consultants-owners, owners-others, others-contractors, contractors-owners, Consultants-others were 0.569,0.498,0.518,0.406,0.626 and 0.341 respectively.

This result showed that relatively highest agreement value had been found between Contractors-consultants, owners-others and contractors-owners which have spearman coefficient value of 0.569, 0.518 and 0.626 respectively. While, Consultants-owners (0.498**) others-contractors (0.406**) and Consultants-others (0.341**) had a moderate agreement as a result of spearman correlation coefficient shown in the table 4.15 below.

Table 4.15: Summary of spearman rank correlation coefficient based on RII for individual respondents success factors

Construction parties	Spearman's rho value	Significance level
Contractors-consultants	0.569**	0.000
Consultants-owners	0.498**	0.000
owners-others	0.518**	0.000
others-contractors	0.406**	0.000
contractors-owners	0.626**	0.000
Consultants-others	0.341**	0.001

**. Correlation is significant at the 0.01 level (1-tailed).

Spearman rank correlations were also been calculated among the parties to evaluate the agreement on success ranking under the categories based on the ranking.

Table 4.16: Summary of spearman rank correlation based on group of respondents success factors ranking

Construction parties	Spearman's rho value	Significance level
Contractors-consultants	0.570**	0.000
Consultants-owners	0.499**	0.000
owners-others	0.518**	0.000
others-contractors	0.406**	0.000
contractors-owners	0.626**	0.000
Consultants-others	0.342**	0.001

**. Correlation is significant at the 0.01 level (1-tailed).

As we have seen from table 4.16 spearman's coefficient of rank correlations of agreement on the success factors for successfully completion of building construction projects were also resulted 0.570, 0.499, 0.518, 0.406, 0.626 and 0.342 among contractors-consultants, consultants-owners, owners-others, others-contractors, contractors-owners, consultants-others respectively. Thus, contractors-owners (0.626**); contractors-consultants (0.570) and owners-others (0.518**) high agreement on the ranking of success factors while consultants-owners (0.499); others-contractors (0.499) and consultants-others (0.342) have a moderate agreement on the ranking of success factors.

4.10. Finding of Success Factors Analysis

To summarize all findings described and discussed in this part of study it would be easier to evaluate significance of success factors obviously. Table 4.14 reflects the list of success factors which were relevant for Bole Sub City building construction projects according to their significance for project success presented in their average and relative importance index. From this list the top ten major success factors according to their rank order based on relative importance index were the following:

1. Leadership skills of project manager
2. project clear objective, Adequacy of funding, Decision making effectiveness
3. Project monitoring;
4. Project manager's commitment to meet quality, cost &time
5. Project manager's early & continued involvement in project
6. Contractor's cash flow
7. Site management
8. Coordinating ability and rapport of project manager with contractors/ subcontractors
9. Project Manager's authority to take financial decision, selecting key team members
10. Organizing skills of project manager were the tewelve; top ten major success factor which were identified from success factors analysis.

The above 1-10 lists were the types of major success factors in Bole Sub City building construction projects which were identified from this study according to their significant order.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

A number of literatures had been reviewed; a desk review and an interview were conducted to identify success factors of building construction projects in Bole Sub City.

The first objective of this study was to investigate the types of success factors on governmental building construction projects. Due to this by conducting literatures review, desk review and interview; around 98 types of success factors were identified in Bole Sub City building construction projects. These factors could originated from different eight categories of success factors, namely management, procurement, client, consultants (designer), contractors, managerial, project characteristics and environmental group.

Secondly the aim of this study was to rank the types of success factors which were identified under objective one based on their relative importance index. Therefore; from identified 98 types of success factors, 79 were collected from literature review and a further analysis were performed on this 79 success factors by using excel and SPSS to rank them according to their high significant effect on building projects. The ranking result indicates that (1). Leadership skills of project manager; (2) project clear objective, adequacy of funding, decision making effectiveness , (3) project monitoring ; (4) project manager's commitment to meet quality, cost &time; (5) project manager's early & continued involvement in project; (6) contractor's cash flow; (7) site management; (8) coordinating ability and rapport of project manager with contractors/ subcontractors; (9) project manager's authority to take financial decision, selecting key team members; (10) organizing skills of project manager were the tewelve; top ten major success factor according to their high significance order.

The third aim of the study was to identify major success factors from perspective of their categories. Generally based on their occurrences, the type of success factors were grouped in to eight categories as: project management related, procurement related, client related, design team or consultant related, contractor-related, project manager related, environmental related and project characteristics related success factors. From these different group of success factors 50% of top ten highly significance success factors were generated from project manager related success

factors while 33.33% of success factors were from project management and contractor related factors contributed equally. The sources of the remaining 16.67% of major success factors were environment and client related.

5.2. RECOMMENDATIONS

Considering the obtained results of this research, the following points can be recommended:

Recommendations for contractors:

- In order to accomplish building project successfully the contractor of the project should have enough experience to lead the project.
- The contractor of the project should have an effective decision maker project manager in order to execute the project successfully.
- The contractor of the project should have good site management mechanism in order to increase an efficient use of resource.
- The Contractors should have a clear controlling cash flow mechanisms that are released by the owners or owners' representatives.

Recommendations for project managers:

- Project Managers should have an authority to take financial decision, selecting key team members of the project.
- Project managers should be able to coordinate and should create a relationship with contractors/ subcontractors.
- Since the final output or success of a project is a combination of the whole workers in the project, the project manager should have enough Leadership skills.
- Project managers should be highly committed to meet the qualitative, cost effective & timely completed project.
- Project managers should be involved early or in the beginning of the project and continued until the project is completed.
- Project manager should have also an Organizing and leading ability of the workers in the project.
- Generally half of the top significant success factors were related to project managers therefore in any building construction projects the concerned body should know the capability of the manager before he or she is assigned to the projects.

Recommendations for project owners:

- Client must ensure that funds are available or adequate preparation for funds are made before projects are started with demonstrable cash flow plan.
- The objective of the project should be clearly stated for a consultants or to the designers and the contractors.

Recommendations for researchers:

The researchers who want to conduct a research on similar area, should collect a data with two or more than two rounds in order to consider the whole types of success factors in the analysis to get a better outputs.

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Annex 1: Questionnaire

Jimma University

School of Graduate Studies

Jimma Institute of Technology

School of Civil and environmental Engineering

Construction Engineering and Management chair

Dear all participants,

I request your participation and support in my research on " Investigating Major Success Factors in Building Construction Projects in Addis Ababa bole sub city" undertaken as a part of my Master Thesis at Jimma university of construction engineering and management, Jimma.

This survey is part of academic research that aims to investigate the major success factors in building construction in Addis Ababa. With this survey, I would like to investigate the major success factors in order to improve the building construction delivery process. In the long term this research help the contract parties to complete project on time, within budget and with highest quality. All information you provide will kept in strict confidentially and only used for academic research. Please feel free to answer the questions with what you know and what you think in your mind. I value your participation and thank you for the commitment of time, energy and effort.

Sincerely

Questionnaire to be used to gather the major success factors of building projects in Addis Ababa bole sub city This questionnaire contains two parts:-

- ***Part 1*** – General Information
- ***Part 2*** – major success factors on building construction projects in Addis Ababa city.

Part I – General/Organization Information

1. Please write your name (optional)_____
2. Please write your Company's name__ _____
3. Project Name:_____
4. Date and time: _____
5. Please specify what most represents your organization:

◯ Contractor ◯ Consultant ◯ Client ◯ Other

6. Your position:

◯ Resident Engineer ◯ Project Manager ◯ Supervisor Engineer ◯ Other

7. Your experience relating to building construction projects:

◯ <5 years ◯ 5 – 10 years ◯ >10 years

8. The highest contract value you ever worked (in birr, million):

◯ < 10 ◯ 10-50 ◯ 50 -100 ◯ > 100

9. Classification of your firm in construction business:

◯ Governmental ◯ Private ◯ Other specify _____

10. Number of projects implemented during the last five years:

◯ < 2 ◯ 3 – 5 ◯ 6 – 8 ◯ > 9

11. From which the source of your project budget?

◯ Government ◯ private ◯ public ◯ other; specify

12. Number of stories in your building project

◯ <3 ◯ 3--6 ◯ 7—9 ◯ ≥10

11. Please list some factors that makes a building project successful?

_____

_____

_____

12. Please list some projects which was successful in your organization

_____

_____

Part 2 – Major success factors on building construction projects in Addis Ababa

1. Do you think building construction in Addis Ababa projects are successful?

◯ Strongly Agree ◯ Agree ◯ Neutral ◯ Disagree ◯ Strongly disagree

2. Based on your experiences, what is your opinion for the following types of success factors that can affect the success on building construction projects?

(Please indicate your opinion by checking (✓) (in the 1 to 5 scale)

Key:

1= Strongly Disagree (SD)
2= Disagree (D)
3= Neutral (N)
4= Agree (A)
5= Strongly Agree (SA)

Group of success factors	**S.No**	**Types of success factors**	**1**	**2**	**3**	**4**	**5**
Project Management Factors	1	Communication system					
	2	Control mechanism					
	3	Feedback capabilities					
	4	Troubleshooting					
	5	Planning effort					
	6	Coordination effectiveness					
	7	Decision making effectiveness					
	8	Project monitoring					
	9	Developing an appropriate organization structure					
	10	Implementing an effective safety program					
	11	Implementing an effective quality assurance program					
	12	Control of sub-contractors' work					
	13	Prior project management experience					
	14	Risk identification and allocation					
	15	Formal dispute resolution process					
	16	Motivation/ Incentives					
	17	Constructability program					
	18	Training the HR in the skill demanded by project					
If there are others, please specify							
Procurement Related Factors	1	Project delivery system (e.g. design-bid-build, design build)					
	2	Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)					
	3	Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.)					
If there are others, please specify							
Client Related Factors	1	Influence of client/ client's representative					
	2	Client's experience					
	3	Nature of client (privately funded vs. publicly funded)					
	4	Size of client's organization					
	5	Client's knowledge of construction project organization					

Group of success factors	**S.No**	**Types of success factors**	**1**	**2**	**3**	**4**	**5**
	6	Client's confidence in construction team					
	7	Owner's construction sophistication					
	8	Owner's clear and precise definition of project scope &objectives					
	9	Timely decision by owner/ owner's representative					
	10	Owner's risk attitude (willingness to take risk)					
	11	Client's emphasis on low construction cost					
	12	Client's emphasis on high quality of construction					
	13	Client's emphasis of quick construction					
	14	Client's project management					
	15	Client's ability to brief					
	16	Client's ability to make decision					
	17	Client's ability to define roles					
If there are others, please specify							
Design Team-Related Factors	1	Design team experience					
	2	Project design complexity					
	3	Mistakes/ delays in producing design documents					
	4	Design team's contribution to construction (constructability review, value engineering, etc.)					
	5	Adequacy of plans and specifications					
If there are others, please specify							
Contractor-Related Factors	1	Contractor experience					
	2	Site management					
	3	Supervision					
	4	Extent (Involvement) of Subcontracting					
	5	Contractor's cash flow					
	6	Effectiveness of cost control system					
	7	Speed of information flow					
If there are others, please specify							
	1	Project Manager's competence					
	2	Project Manager's experience					

Group of success factors	**S.No**	**Types of success factors**	**1**	**2**	**3**	**4**	**5**
Project Manager Related Factors	3	Project Manager's authority to take day-to-day decisions					
	4	Project Manager's authority to take financial decision, selecting key team members, etc.					
	5	Project Manager's authority to take financial decision, selecting key team members, etc.					
	6	Technical capability of project manager					
	7	Leadership skills of project manager					
	8	Organizing skills of project manager					
	9	Coordinating ability and rapport of project manager with contractors/ subcontractors					
	10	Coordinating ability and rapport of project manager with owner/ owner representatives					
	11	Motivating skills of project manager					
	12	Project manager's commitment to meet quality, cost &time					
	13	Project manager's early & continued involvement in project					
	14	Project manager's adaptability to changes in project plan					
	15	Project manager's ability to delegate authority					
	16	Construction control meetings					
If there are others, please specify							
Environment Related Factors	1	Economic environment					
	2	Social environment					
	3	Weather condition (rainy, hot, cold…)					
	4	Political environment					
	5	Physical work environment					
	6	Industrial relations environment					
	7	Administrative approvals environment					
	8	Commitment of all parties to the project					
	9	Adequacy of funding					
	10	Technology availability					

Group of success factors	**S.No**	**Types of success factors**	**1**	**2**	**3**	**4**	**5**
	11	Human Skill availability					
	12	fraudulent practices, corruption, favoritism, lack of ethics,					
If there are others, please specify							
Factors related to project characteristics if there are others, please specify	1	project scope/size					
	2	project clear objective					

If you have any idea which I have missed in the above and that you think it will be an input for my work **please** write it down:

_____
_____
_____
_____.

Thank you very much for your time.

Appendix II: Interview Protocol

Investigating major success factors in building construction project in Addis Ababa

Project Name: _____

Name of the organization: _____

Respondent's Name (optional): _____

Position/role: _____

Date and time: _____

The interviewee is the member of the organizations and previously involved or still involved in the project.

Introduction

Good morning/Good afternoon Mr/Ms (name of respondent) my name is Mamaru Dessalegn. Before starting my question, I would like to thank you for your volunteer participation in this research. The interview will be divided into three sections and will last approximately 35 to 45 minutes.

This semi closed interview which is forwarded to the client is part of academic research that aims to investigate the major success factors in building construction in Addis Ababa. With this survey, I would like to investigate the major success factors in order to improve the building construction delivery process. In the long term this research help the contract parties to complete project on time, within budget and with highest quality. All information you provide will kept in strict confidentially and only used for academic research. Please feel free to answer the questions with what you know and what you think in your mind. I value your participation and thank you for the commitment of time, energy and effort.

Recording Confidentiality

I would like to ask your permission to make recording on our conversation. The reason why I want to make a record is in order to get full details about this interview which will help me for analysis phase. Other than that it will also be more comfortable for us to discuss because I can focus much more on the conversation not on writing too much about the details of our conversation.

The content of this interview is confidential. It will not be disclosed to anyone without your Permission. After the research; everything (recordings, notes, etc.) will be erased.

Additionally, my supervisor will only have access to the analyzed information.

Clients' Questioner

1. Questions about interviewee:

a) What is your role in the projects?

b) In which type of projects you were working before?

c) Who is the main contractor in your company?

2. Questions about success in projects:

a) What is in your opinion make the project successful?

b) Was your last project successful (considering time, budget, quality requirements, stakeholder satisfaction and project purpose)?

c) Do you have a real example of successful project in your experience?

Please describe it.

3. Questions about groups of success factors and their influence on project success:

a) Do you think client related factors are important for building construction project success? Please specify which and why.

b) Do you think factors related to project management are important for building construction project success? Please specify which and why.

c) Do you think factors related to contractor are important for building construction project success? Please specify which and why.

c) Do you think design team related factor is important for building construction project success? Please specify which and why.

e) Do you think procurement is important for building construction project success? Please specify which and why.

f) Do you think environment characteristics are important for building construction project success? Please specify which and why.

Closing Questions and Remarks

First of all, allow me to say thank you very much for your participation and cooperation in this research. And lastly if there particular documents that might be useful for my research, please allow to me to take a copy of it?

ANEX.2: *Data collected by questionnaire (responses spreadsheet).*

Participants	Communication system	Control mechanism	Feedback capabilities	Troubleshooting	Planning effort	Coordination effectiveness	Decision making effectiveness	Project monitoring	Developing an appropriate organization	Implementing an effective safety program	Implementing an effective quality	Control of sub-contractors' work	Prior project management experience	Risk identification and allocation	Formal dispute resolution process	Motivation/ Incentives	Constructability program	Training the HR in the skill demanded by	Project delivery system (e.g. design-bid-	Project bidding method (e.g. price based	Project contract mechanism (e.g. lump	Influence of client/ client's representative	Client's experience	Nature of client (privately funded vs.	Size of client's organization	------
1	1	1	1	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	3	1	1	1	1	1	1	---
2	1	1	1	1	1	2	2	1	2	1	1	2	2	1	1	1	1	2	3	1	2	1	1	1	3	---
3	3	1	2	1	1	1	1	2	3	2	2	2	3	2	2	1	2	2	3	2	3	1	1	2	3	---
4	3	3	2	2	3	2	3	3	3	2	5	3	3	3	2	2	3	3	3	3	3	1	3	3	3	---
5	3	3	3	2	3	3	4	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	---
6	3	3	3	2	3	3	4	3	3	3	3	3	3	3	3	2	3	3	4	3	3	3	3	3	3	---
7	3	4	3	3	5	4	4	4	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	---
8	4	4	3	3	5	4	4	4	4	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	---
9	4	4	3	3	5	4	4	4	4	3	3	3	3	3	3	3	3	5	4	4	4	3	4	4	3	---
10	4	4	3	3	5	4	4	4	4	4	4	4	4	4	3	3	4	4	4	4	4	3	4	4	4	---
11	4	5	4	3	5	4	5	5	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	5	---
12	5	5	4	3	5	4	5	5	4	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	---
13	5	5	4	3	5	5	5	5	4	4	4	5	4	4	4	4	4	5	5	4	4	4	4	4	4	---
14	5	5	4	4	5	5	5	5	4	4	4	5	4	4	4	4	4	4	5	4	4	4	4	5	4	---
15	5	5	5	4	5	5	5	5	5	4	4	5	4	4	4	4	4	4	5	4	5	4	4	5	4	---
16	5	5	5	4	5	5	5	5	5	4	4	5	5	5	4	4	5	5	5	4	5	4	4	5	4	---
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