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Assessment of Critical Success Factors in Construction Projects Performance in South West Ethiopia

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Abstract
Construction industry plays fundamental role in increasing the economy of many countries. It accounts about 13% of global economy and serves as key driver for other industries**.** The basic problem of any company is to complete the projects with specified time, cost, scope and quality. The project failure rate according to World Bank was over 50% in Africa. Ethiopia is one of the developing countries which cannot accomplish its construction industry goals due to lack of identifying critical success factors. Therefore the objective of the study is to assess critical success factors in construction projects of south west Ethiopia. The data was collected from secondary and primary data. This research adopted both qualitative and quantitative research and 103 questionnaires were used in 30 construction projects. There are 81 success factors which were identified from literatures. From 81 success factors, decision making effectiveness (MIS=4.41), project monitoring (MIS=4.41),control mechanism(MIS=4.33), prior project management (MIS=4.32), project manager adaptability to changes project plan (MIS=4.23), site management (MIS=4.23),supervision (MIS=4.23),organizing skills of project manager (MIS=4.23), communication system (MIS=4.23) and project manager authority to take financial decision (MIS=4.21) were the top ten ranked critical success factors. From these 60% of the critical success factors were originated from project management related and 30% were from contractor related factors. Therefore it is recommended that any construction parties should revise their construction management mechanisms and the project owners should evaluate in depth the capability and capacity of their contractors during bidding process before they awarded the project to the contractors.
Keywords: success, construction industry, success factors, critical success factors
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1. Introduction

Construction industry plays a fundamental role in increasing the economy of many countries (Panuwatwanich 2011); (Nokulunga Mashwamaa 2017); (Silva Susil 2015); (Frank D.K. Fugar and Adwoa B. Agyakwah-Baah 2010). The construction industry accounts for about 13% of the global economy and serves as a key driver for other industries as a result of its infrastructural and facilities development (Saheed 2018). The construction industry is an important sector of any economy and has multiple backward and forward linkages with other sectors (Placeholder1); (Nokulunga Mashwamaa 2017). 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.

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 critical success factors (CSFs). CSFs require special attention from management owing to their impact on project performance (A. H. Inayat 2015); (A. M. Inayat 2014). 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.

A construction 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 critical success factors (CSFs) (Muhammad Saqib 2008). A construction project failure primarily defined as disappointment in either one or the combination of cost, time, quality, and management (Ramlee 2016).

This study has focused to assess the project management critical success factors of construction companies working in south west Ethiopia; therefore this south west Ethiopia is my survey population area. It is obvious that identifying and ranking the critical success factors of a company, which works in various fields like construction of road, 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 identifying and ranking the project management critical success factors, is the purpose of this study to give a solution for the executive planning of construction projects in south west Ethiopia.

1.1. Statement of problem

The failure of any construction project is mostly related to the performance problems and there are many reasons and factors which are attributed to such problems (P.O. Akanni a 2015). 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.

The project failure rate according to the World Bank was over 50% in Africa until 2000. 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. 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, Diallo and Thuillie 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 (Alias, et al. 2014). According to industry literature outside the construction industry, CSFs should include issues important to the activities of the organization's current operations and future success (Placeholder1).

Ethiopia is one of the developing countries which cannot accomplish its construction industry goals due to lack of identifying different critical success factors. Identifying those Critical Success Factors (CSFs) 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. These studies which were done in south west Ethiopia will be have a great significant in the construction industry of Ethiopia.

1.2. Research questions

1. What are the types of project management success factors in construction projects of south west Ethiopia?
2. Which type of project management critical success factor will become the first factor in construction projects from their categories?
3. Which success factors will take the top ranking value from all types of success factors construction projects of south west Ethiopia?

1.3. Objectives of the research

1.3.1. General objective

The general objective of the study is to assess the project management critical success factors in construction projects of south west Ethiopia

1.3.2. Specific objective

The specific objectives of the study are:

1. To identify the types of project management success factors on construction projects of south west Ethiopia.
2. To rank the success factors which are identified in specific objective 1 using mean index score value in each group of success factors.
3. To identify the top ranked critical success factors from all types of success factors.

1.4. Expected outcomes

After conducting the research the following findings are expected: - Determination of the major project management success factors in south west construction projects and forwarding of information to different stakeholders in order to be successful in their construction works. Identification of the importance of project management critical success factors construction projects from consultants, clients and contractors perspective. Strategies for increasing the success of building projects will be made.

2.0. Literature review

2.1. Construction industry

The construction industry is dynamic in nature due to the increasing uncertainties in technology, budgets, and development processes (Gebril 2012). Nowadays, building projects are becoming much more complex and difficult due customers demand and availability of technology. The project team is facing unprecedented changes.

The study of project success and the critical success factors (CSFs) are considered to be a means to improve the effectiveness of project. However the concept of project success has remained ambiguously defined in the mind of the construction professionals (Chan, Scott and Chan 2004). The high number of project failures suggests the existence of underlying critical success factors which have not been identified (Hari Garbharran 2010).Construction industry is a sector of the economy which responsible for planning, design, construction, maintenance and eventual demolition of buildings and works (Salleh 2009).

2.2. Construction industry in developing countries

The construction industry is one of the largest job creators in developing countries and is highly competitive. The construction industry everywhere faces problems and challenges. However, in the developing countries, these difficulties and challenges are present alongside a general situation of socio-economic stress, chronic resource shortages, institutional weaknesses and a general inability to deal with the key issues. There is also evidence that the problems have become greater in extent and severity in recent years. (Department of Building 2000)

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). Ethiopia is the third populated countries in Africa and its youth are unemployed but the booming of construction the country contributes a lot in job creation.

2.3. Success and critical success factors

2.3.1. Success

Project success is one of the few topics in the field of project management that are so frequently discussed, and yet rarely agreed upon (J. K. Pinto 1988). Project will be considered as success when the project is completed on time, within budget and the quality is satisfied by all. Success also can defined as much better results than the expected or normally obtained in term of cost, schedule, quality, and safety. The meaning of 'success' itself has undergone many changes due to involvement of so many stakeholders in nowadays complex project environment (Chan A P C. 2002).

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 (Sanvido, V. et al. 1990) and the study of project success and critical success factors (CSFs) 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 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 (Placeholder1).

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 (Arti Jari 2013).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 (Ivanova 2015).

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, p338). 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. Project success criteria are the set of principles or standards by which project success can be judged (Hoang 2008).

2.3.2. Critical success factors

Certain factors are more critical to a project's success than others. These factors are called critical project success factors (Sumesh Sudheer Babu 2015). Critical success factors are the set of circumstances, facts, or influences which contribute to the project success. Critical 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. CSFs include issues vital to an organization's current operating activities and to its future success.

Critical 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). From a Project Management perspective, critical success factors (CSFs) are

characteristics, conditions, or variables that can have a significant impact on the success of the project when properly sustained, maintained, or managed (Alias, et al. 2014).

2.3.3. Factors affecting project success

A number of variables influencing the success of project implementation were identified following a thorough literature review. The success factors were grouped into different categories according to different scholars. For instance according to (Walid Belassi 1996) divided the critical success factors into four main groups: Project dependent factors, Team members and project manager dependent factors , Organizational structure dependent factors and External environment dependent factors ; (Shahid 2012) the factors were categorizes into five groups like (Financial Factors, Technical Factors, Organizational Factors, Environmental Factors and Human Factors); (Muhammad Saqib 2008). In 2004 Nguyen et al. identified five major success factors among the twenty factors of projects success: competent project manager Providing adequate financial resources to the end of the project, competent and multidisciplinary project team and Commitment to the project (Pakseresht, et al. 2012). Success factors were grouped in to seven categories. The categories includes: project management factors, procurement related factors, client related factors, design team-related factors, design team-related factors, contractor-related factors, project manager related factors and business and work environment-related factors. After a careful study of previous literatures was conducted the researcher suggests that CSFs can be grouped under eight main categories

Project Management Factors: The appropriate selection of team members also influences the success of construction projects. A good coordination between all parties in management factors plays the main role (Ismail 2012)

Procurement Related Factors: Two attributes are used to measure this factor; they are procurement method (selection of the organization for the design and construction of the project) and tendering method (procedures adopted for the selection of the project team and in particular the main contractor) (Sumesh Sudheer Babu 2015); (Sugumaran B 2014).

Client Related Factors: The success of construction projects depends on client's experience, type (private or public), size, influence, ability to make timely decision, clear and precise goals, risk attitude, ability to participate in different phases of project (Neringa Gudienėa 2013).

Design Team-Related 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, and mistakes/delays in producing design documents.

Contractor-Related Factors: Contractor's expertise and performance play a significant role in successful delivery of a project (Doloi 2011). They start their main duties when a project reaches the construction or execution stage where the actual work of the project is accomplished. The group includes these factors: company characteristics, technical and professional capability, experience, economic and financial situation, quality issues, health and safety conditions, work conditions.

Project Manager Related Factors: It is widely accepted that project managers need focused efforts to gain an expanded comprehension of the potential effects of the critical success factors which in turn could assist their work on current and future projects management (Iva15). The Project Manager is the key person in the project. They must demonstrate multi-dimensional abilities including (Arti Jari 2013). The project manager is another key stakeholder in a construction project and his competence is a critical factor affecting project planning, scheduling, and communication (Sumesh Sudheer Babu 2015).

Environment Related Factors

Factors related to project characteristics

2.4. Importance of critical success factors identification

Identify the CSFs that affect the level of project performance through a project management practice and rank those CSFs that will enable the project management companies to evaluate the project outcome. CSFs will become a gauge by which project managers can evaluate their companies. CSFs allowed the company to implement standard organizational management skills to improve the company and project performance. According to Rockart (1982) to ensure future success, a company and its industry should identify its CSFs.

3.0. Methods and materials

3.1. The study area

The study was conducted at in south western region of Ethiopia for selected projects.

3.2. Population

The main sources of the information was staff managers in the central office, project managers, consultant, clients and technical experts in executing the company of construction projects of south west Ethiopia.

3.3. Sample size and sampling techniques

In this study 30 Projects were selected purposively from those who are included in the sample for the desk review. Questionnaire was distributed to sample of contractors and consultants that participate in the projects.

3.4. List of variables

Independent Variables; project management factors, procurement related factors, client related factors ,design team-related factors , contractor-related factors ,project manager related factors, environment related factors, factors related to project characteristics

Dependent Variables; Success in the construction projects

3.5. Data quality control and analysis

Data collection tools were adapted after review of relevant literatures. Data collection was free from any bias and all collected data were included in the output. Clarification was performed for respondents as an introduction on the questionnaire.

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 5 (strongly agree) up to 1 (strongly dis 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.

The data was collected from secondary data which is (journal, articles, books & electronic databases) and primary data which is the questionnaire. This research adopted both qualitative and quantitative research and 103 useable questionnaires were used as an instrument tool for the study. Random sampling method was used to select the respondents in various construction companies.

Questionnaires were used to collect data for the study and closed questions were asked in order to manage the data. The likert scale of 1 to 5, where 1 -“Strongly disagree”, 2-“Disagree”, 3-“neutral or unsure”, 4-“Agree” and 5- “Strongly agree” was used. The likert scale is a popular format of questionnaire that is used in education research. The likert scale is chosen in this study because it allows the respondents to express how much they are agree or disagree with certain statements. The Mean index Score (MIS) is ranked in descending order (from the highest to the lowest).The statement with the highest ranking is the one that was considered to be dominant. The Mean Index Score (MIS) was derived from the following formula (Mashwama and Aigbavboa 2016).

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

Where;

n_1 = number of respondents for strongly disagree
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
N = Total number of respondents

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’ consultants and others). Each individual success as perceived by all respondents was used to assess the general and an overall ranking in order to give an overall picture of major success factors of construction projects in south west Ethiopia. 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.

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

4.0. Result and discussion

This section covers the, demographic characteristics of respondent, types of success factors identified by different mechanisms and the rating output of field survey of 103 questionnaires: 35 consultants, 37 contractor, 20 clients and 11 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 south west construction projects and then identifying types and major success factors in this study area. 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 the benefits of identifying and ranking of success factors for successful accomplishment of construction projects were forwarded.

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, the highest contract value (in birr), types of projects on which the respondents participating on, in past five years. The following figures from figure1 up to figure 4 indicate to us that the percentages characteristics of respondents.

4.1.1. Types of organizations

In this study the types of organizations under which the respondents categorized were consultants, contractors, clients and others. From these the larger respondents were from contractors and consultants which were 35.92% and 33.98% respectively.

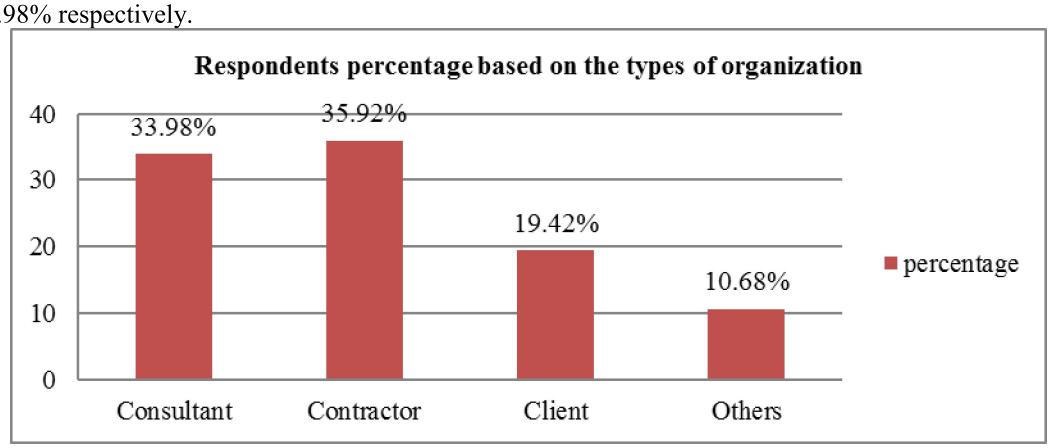

Figure 1. Respondents category based on organization types

4.1.2. Respondents' experience

It is obvious that as the working experience of the respondents increases their capability of give concrete information increase. When we see the respondents based on their working experience most of the respondents were 5 to 10 years which account about 53%. Respondents which had more than 10years were 33%.

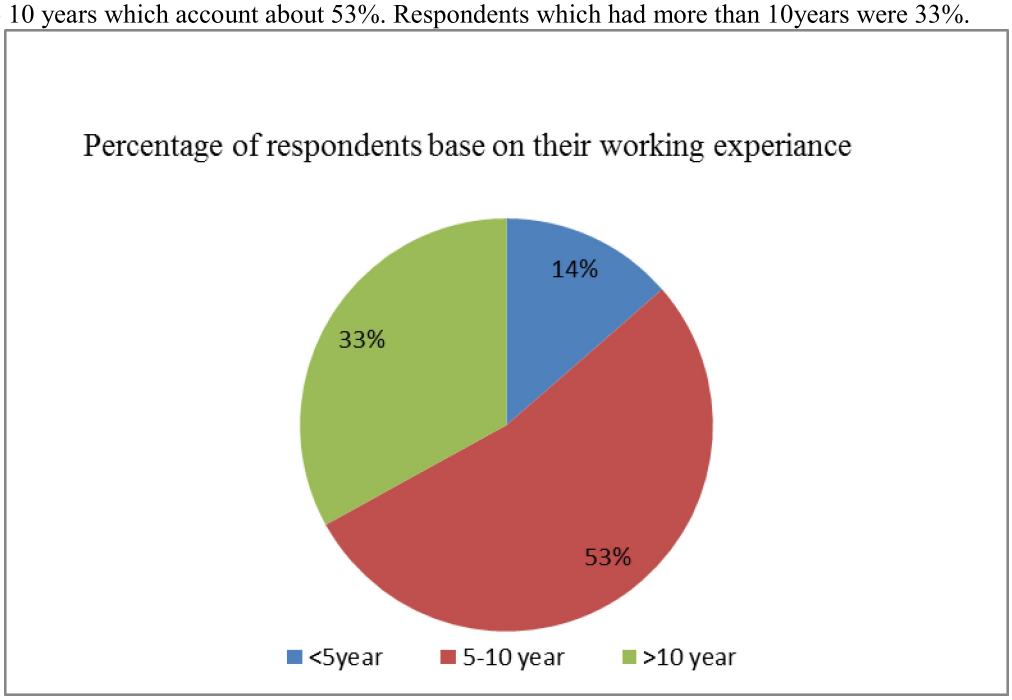

Figure 2. Pie chart respondents category based on their working experience

4.1.3. Maximum contract value of the respondents

As it is seen from figure 3 below around 35.5% of the respondents were performing projects which has contract value of greater than 100million Ethiopian birr.

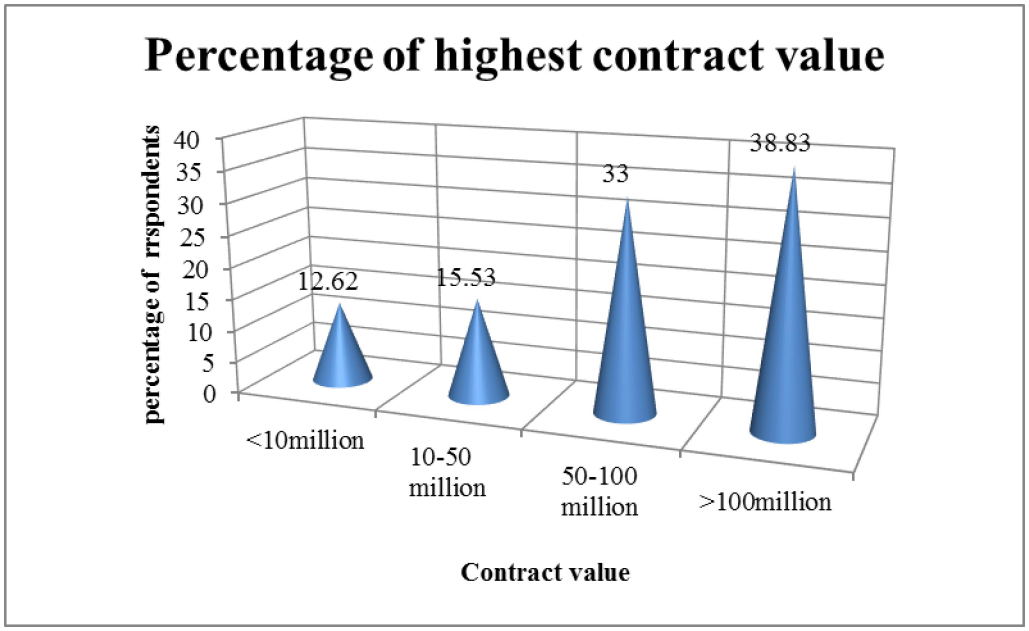

Figure 3 respondents classification based on their contract value

4.1.4. Types of projects on which the respondents participating on

Even though there are different types of construction projects in the study area, the researcher focus only road and building construction projects. From these two types of construction projects which were included in the study area most of the respondents were under building construction projects.

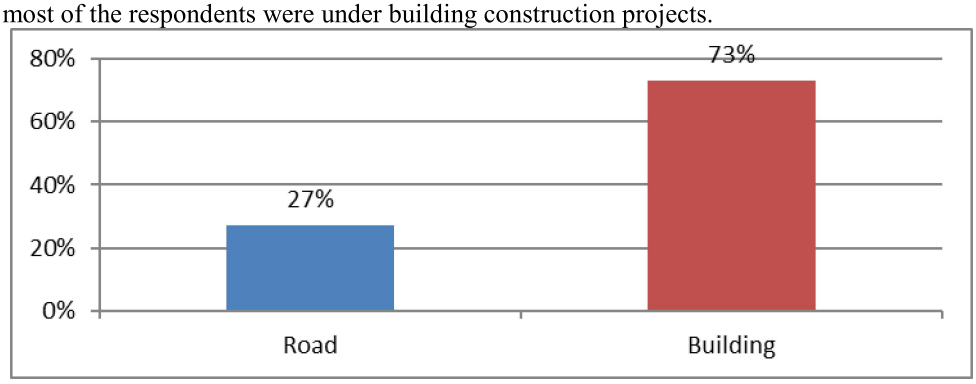

Figure 4. Types of projects on which the respondents participating on

4.2. Types of success factors which are identified from literature review

There are eighty-one success factors which were identified from reviewing literatures which are related to the study objective. These eighty-one success factors were listed in the table 5 below.

4.3. Investigating critical success factors of construction projects in south west ethiopia

4.3.1. Mean index score value and ranking of success factors

The mean value is a statistical method which is used to determine the ranking of different project success factors. Table 1-5 and figure 5-8 indicate mean index score (MIS) value and ranking of success factors for Project Management Factors, Procurement Related Factors, Client Related Factors, Design Team-Related Factors, Contractor-Related Factors, Project Manager Related Factors, Environment Related Factors and Factors related to project characteristics**.**

The values of mean index score were calculated using equation 3.1 from respondents' point of view in eight groups 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.

4.3.2. Project management related success factors and ranking value

As it is seen from table 1, 18 project management related success factors were identified from literature review. According to respondents rating decision making effectiveness (MIS=4.41, R-1), project monitoring (MIS=4.41, R-1) and control mechanism (MIS=4.33, R-2) and prior project management experience (MIS=4.32, R-3) took the first, second and third ranks.

Table 1.Ranking of project management success factors based on MIS value

Group of factors	S.No	Types of Factors	MIS Value	Rank
Project Management Factors	1	Decision making effectiveness	4.41	1
	2	Project monitoring	4.41	1
	3	Control mechanism	4.33	2
	4	Prior project management experience	4.32	3
	5	Communication system	4.23	4
	6	Coordination effectiveness	4.19	5
	7	Control of sub-contractors' work	4.19	5
	8	Planning effort	4.19	5
	9	Training the HR in the skill demanded by project	4.18	6
	10	Developing an appropriate organization structure	4.14	7
	11	Risk identification and allocation	4.09	8
	12	Implementing an effective quality assurance program	4.07	9
	13	Constructability program	4.05	10
	14	Feedback capabilities	4.02	11
	15	Implementing an effective safety program	4.01	12
	16	Formal dispute resolution process	3.97	13
	17	Troubleshooting	3.69	14
	18	Motivation/ Incentives	3.57	15

4.3.3. Procurement related success factors and ranking value

As we have seen from table xxx there are 3 performance factors which were identified under procurement related factors and the respondents rating Project delivery system (e.g. design-bid-build, design build) (MIS=4.10,R-1), Project contract mechanism (e.g. lump sum, unit price, cost plus, etc.) (MIS=4.09, R-2) and Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding) (MIS=3.95, R-3) were the firstly, secondly and thirdly ranked critical success factors ofconstruction projects in the study area.

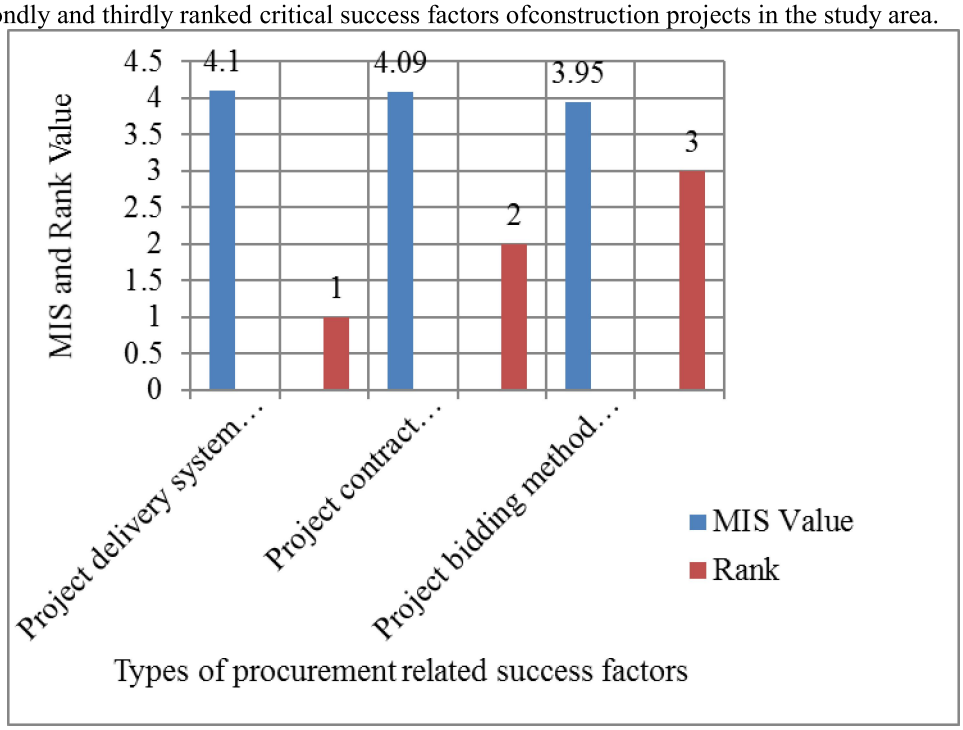

Figure 5. Ranking of procurement success factors based on MIS value

4.3.4. Client related success factors and ranking value

The nine Client Related Factors were listed in the following table xxxx. From these factors Timely decision by owner/ owner's representatives (MIS=4.07, R-1) Client's knowledge of construction project organization

(MIS=4.02,R-2) and Client's experience (MIS=3.99,R-3) and Owner's clear and precise definition of project scope & objectives (MIS=3.99,R-3) were the highly ranked success factors in from Client Related Factors category.

Table 2. Ranking of client related success factors

Group of factors	S.No	Types of Factors	MIS Value	Rank
Client Related Factors	1	Timely decision by owner/ owner's representative	4.07	1
	2	Client's knowledge of construction project organization	4.02	2
	3	Client's experience	3.99	3
	4	Owner's clear and precise definition of project scope &objectives	3.99	3
	5	Nature of client (privately funded vs. publicly funded)	3.95	4
	6	Owner's risk attitude (willingness to take risk)	3.92	5
	7	Client's confidence in construction team	3.92	5
	8	Client's project management	3.92	5
	9	Influence of client/ client's representative	3.89	6
	10	Client's emphasis on low construction cost	3.88	7
	11	Client's ability to make decision	3.86	8
	12	Client's emphasis on high quality of construction	3.83	9
	13	Client's emphasis of quick construction	3.80	10
	14	Size of client's organization	3.79	11
	15	Owner's construction sophistication	3.74	12
	16	Client's ability to define roles	3.65	13
	17	Client's ability to brief	3.45	14

4.3.5. Design team-related success factors and ranking value

The fourth group performance factor was design team related factors which included five factors. From these factors Mistakes/ delays in producing design documents (MIS=4.05, R-1), Design team's contribution to construction (constructability review, value engineering, etc.) (MIS=4.02, R-2) and Design team experience (MIS=3.97, R-3) were the 1st, 2nd and 3rd rank respectively.

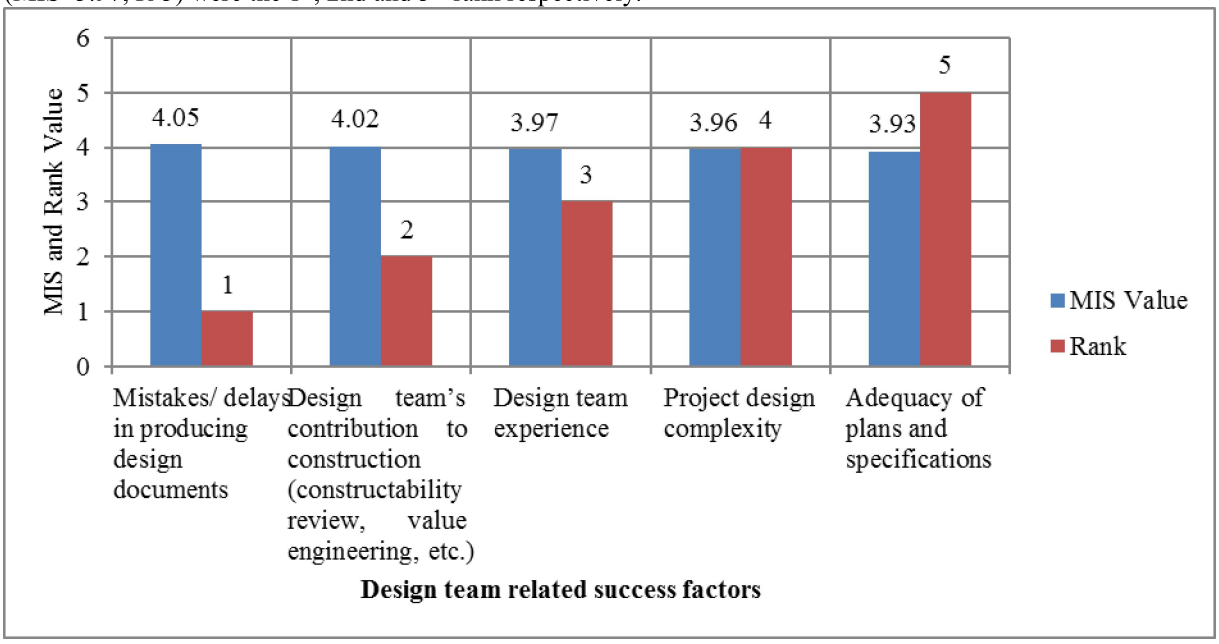

Figure 6. Ranking of design team related success factors

4.3.6. Contractor related success factors and ranking value

The fifth group of performance factors was Contractor-Related success Factors which included seven factors. From these factors Site management and Supervision (MIS=4.23, R-1), Contractor experience (MIS=4.20,R-2) and Contractor's cash flow (MIS=4.16, R-3)were the 1st, 2nd and 3rd rank respectively.

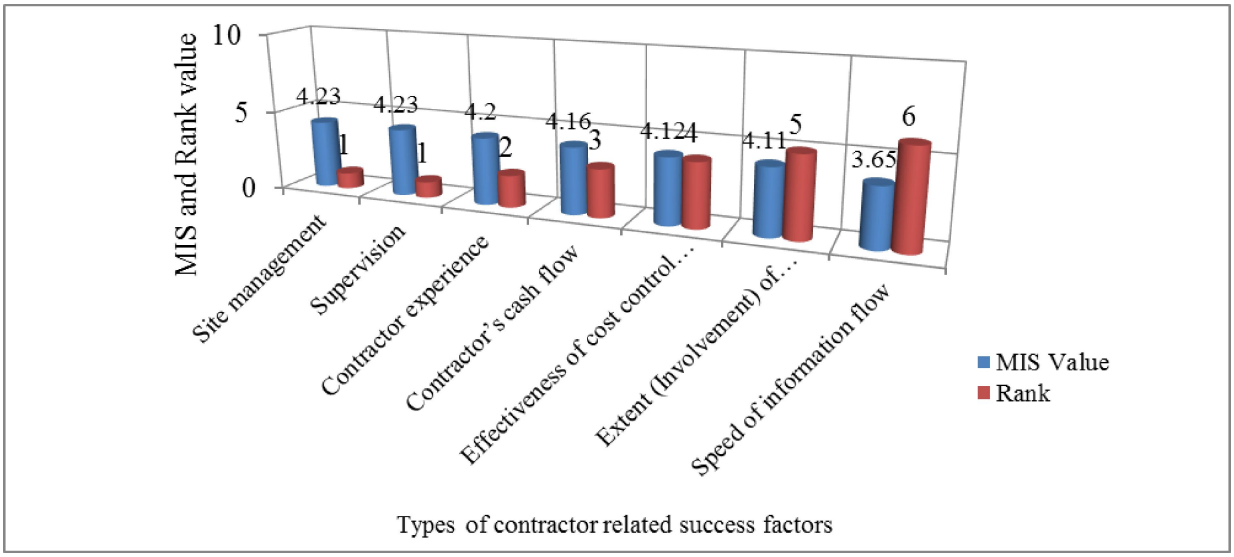

Figure 7.Ranking of contractor related success factors based on MIS value

4.3.7. Project manager related success factors and ranking value

According to the respondents rating of project managers relating factors, Project manager's adaptability to changes in project plan and organizing skills of project manager (MIS=4.23,R-1), Project Manager's authority to take financial decision, selecting key team members, etc.(MIS=4.21, R-2) and Project manager's early & continued involvement in project (MIS=4.17, R-3).

Table 3. Ranking of project manager related success factors

Group of factors	S.No	Types of Factors	MIS Value	Rank value
Project Manager Related Factors	1	Project manager's adaptability to changes in project plan	4.23	1
	2	Organizing skills of project manager	4.23	1
	3	Project Manager's authority to take financial decision, selecting key team members, etc.	4.21	2
	4	Project manager's early & continued involvement in project	4.17	3
	5	Project Manager's authority to take day-to-day decisions	4.15	4
	6	Coordinating ability and rapport of project manager with contractors/ subcontractors	4.13	5
	7	Project Manager's experience	4.09	6
	8	Leadership skills of project manager	4.07	7
	9	Technical capability of project manager	4.07	7
	10	Motivating skills of project manager	4.04	8
	11	Project manager's ability to delegate authority	4.03	9
	12	Construction control meetings	4.02	10
	13	Project Manager's competence	3.99	11
	14	Project manager's commitment to meet quality, cost &time	3.99	11
	15	Coordinating ability and rapport of project manager with owner/ owner representatives	3.93	12

4.3.8. Environment related success factors and ranking value

From twelve identified success factors of environmental related factors the respondents rating as Technology availability (MIS=4.10, R-1), Adequacy of funding (MIS=3.99, R-2 and Economic environment (MIS=3.97, R-3). Therefore any constructing parties should be taking care for the above R-1 to R-3 and others environmental factors in order to achieve their goals.

Table 4 Ranking of environmental related success factors

Group of factors	S.No	Types of Success Factors	MIS Value	Rank value
Environment Related Factors	1	Technology availability	4.10	1
	2	Adequacy of funding	3.99	2
	3	Economic environment	3.97	3
	4	Weather condition (rainy, hot, cold…)	3.90	4
	5	Social environment	3.89	5
	6	Administrative approvals environment	3.87	6
	7	Political environment	3.87	6
	8	Human Skill availability	3.87	6
	9	Industrial relations environment	3.85	7
	10	Commitment of all parties to the project	3.65	8
	11	Physical work environment	3.57	9
	12	fraudulent practices, corruption, favoritism, lack of ethics,	2.26	10

4.3.9. Project characteristics related success factors and ranking value

Project characteristics include the project risk, scope or size, profitability and project clear objective. As the scope of the project is large it is obvious that it requires much more resources and well skilled worker. If the project's risk is identified, profitable and has a clear objective the building construction accomplished successfully

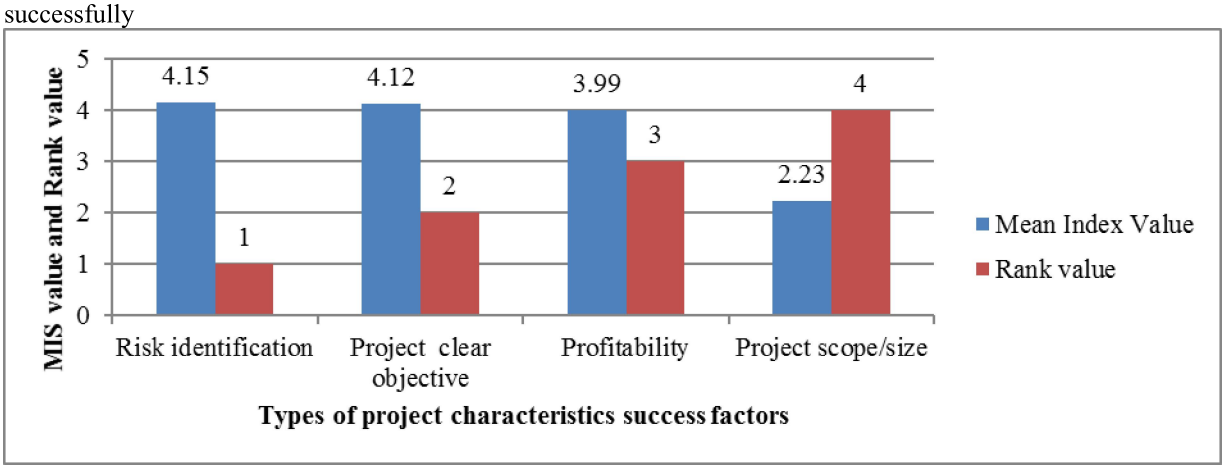

Figure 8. Ranking of project characteristics related success factors

4.3.10. Overall ranking of construction project success factors

As it is seen from table 5 from eight-one construction project success factors which were identified from literature review decision making effectiveness, project monitoring, control mechanism, prior project management experience, communication system, project manager's adaptability to changes in project plan, site management, supervision, organizing skills of project manager and project manager's authority to take financial decision, selecting key team members, etc. were the top ten construction project success factors.

Table 5.Ranking of success factors from all over respondents

S.No	Types of Success Factors	MIS Value	Rank
1	Decision making effectiveness	4.41	1
2	Project monitoring	4.41	1
3	Control mechanism	4.33	2
4	Prior project management experience	4.32	3
5	Communication system	4.23	4
6	Project manager's adaptability to changes in project plan	4.23	4
7	Site management	4.23	4
8	Supervision	4.23	4
9	Organizing skills of project manager	4.23	4
10	Project Manager's authority to take financial decision, selecting key team members, etc.	4.21	5
11	Contractor experience	4.20	6
12	Coordination effectiveness	4.19	7
13	Control of sub-contractors' work	4.19	7
14	Planning effort	4.19	7

S.No	Types of Success Factors	MIS Value	Rank
15	Training the HR in the skill demanded by project	4.18	8
16	Project manager's early & continued involvement in project	4.17	9
17	Contractor's cash flow	4.16	10
18	Project Manager's authority to take day-to-day decisions	4.15	11
19	Risk	4.15	11
20	Developing an appropriate organization structure	4.14	12
21	Coordinating ability and rapport of project manager with contractors/ subcontractors	4.13	13
22	project clear objective	4.12	14
23	Effectiveness of cost control system	4.12	14
24	Extent (Involvement) of Subcontracting	4.11	15
25	Technology availability	4.10	16
26	Project delivery system (e.g. design-bid-build, design build)	4.10	16
27	Risk identification and allocation	4.09	17
28	Project Manager's experience	4.09	17
29	Project contract mechanism (e.g. lump sum, unit price, cost plus)	4.09	17
30	Leadership skills of project manager	4.07	18
31	Timely decision by owner/ owner's representative	4.07	18
32	Technical capability of project manager	4.07	18
33	Implementing an effective quality assurance program	4.07	18
34	Constructability program	4.05	19
35	Mistakes/ delays in producing design documents	4.05	19
36	Motivating skills of project manager	4.04	20
37	Project manager's ability to delegate authority	4.03	21
38	Client's knowledge of construction project organization	4.02	22
39	Construction control meetings	4.02	22
40	Feedback capabilities	4.02	22
41	Design team's contribution to construction (constructability review, value engineering, etc.)	4.02	22
42	Implementing an effective safety program	4.01	23
43	Project Manager's competence	3.99	24
44	Project manager's commitment to meet quality, cost &time	3.99	24
45	Client's experience	3.99	24
46	Owner's clear and precise definition of project scope &objectives	3.99	24
47	profitability	3.99	24
48	Adequacy of funding	3.99	24
49	Economic environment	3.97	25
50	Formal dispute resolution process	3.97	25
51	Design team experience	3.97	25
52	Project design complexity	3.96	26
53	Project bidding method (e.g. price based competitive bidding, negotiated bidding, best value bidding)	3.95	27
54	Nature of client (privately funded vs. publicly funded)	3.95	27
55	Adequacy of plans and specifications	3.93	28
56	Coordinating ability and rapport of project manager with owner/ owner representatives	3.93	28
57	Owner's risk attitude (willingness to take risk)	3.92	29
58	Client's confidence in construction team	3.92	29
59	Client's project management	3.92	29
60	Weather condition (rainy, hot, cold…)	3.90	30
61	Influence of client/ client's representative	3.89	31
62	Social environment	3.89	31
63	Client's emphasis on low construction cost	3.88	32
64	Administrative approvals environment	3.87	33
65	Political environment	3.87	33
66	Human Skill availability	3.87	33

S.No	Types of Success Factors	MIS Value	Rank
67	Client's ability to make decision	3.86	34
68	Industrial relations environment	3.85	35
69	Client's emphasis on high quality of construction	3.83	35
70	Client's emphasis of quick construction	3.80	36
71	Size of client's organization	3.79	37
72	Owner's construction sophistication	3.74	38
73	Troubleshooting	3.69	39
74	Client's ability to define roles	3.65	40
75	Speed of information flow	3.65	40
76	Commitment of all parties to the project	3.65	40
77	Motivation/ Incentives	3.57	41
78	Physical work environment	3.57	41
79	Client's ability to brief	3.45	42
80	fraudulent practices, corruption, favoritism, lack of ethics,	2.26	43
81	project scope/size	2.23	44

5.0. Conclusion and recommendation

5.1. Conclusion

Eighty-one construction project success factors which were categorized in to eight groups as project management factors, procurement related factors, client related factors, design team-related factors, contractor-related factors, project manager related factors, environment related factors, factors related to project characteristics**,** were identified from literature in this study.

Decision making effectiveness (MIS=4.41, R-1) and project monitoring (MIS=4.41, R-1) design build) (MIS=4.10,R-1), timely decision by owner/ owner's representatives (MIS=4.07, R-1) mistakes/ delays in producing design documents (MIS=4.05, R-1), site management and supervision (MIS=4.23, R-1),project manager's adaptability to changes in project plan and organizing skills of project manager (MIS=4.23,R-1), technology availability (MIS=4.10, R-1), project's risk is identification (MIS=4.15,R-1) were the first ranked project success factors from each success factors of project management factors, procurement related factors, client related factors, design team-related factors, contractor-related factors, project manager related factors, environment related factors, factors related to project characteristics respectively.

From all over eighty-one success factors the following were the top ten ranked success factors. These are: Decision making effectiveness (MIS=4.41), Project monitoring(MIS=4.41),Control mechanism(MIS=4.33), Prior project management experience(MIS=4.32), Project manager's adaptability to changes in project plan (MIS=4.23), Site management (MIS=4.23 Supervision (MIS=4.23), Organizing skills of project manager(MIS=4.23), Communication system(MIS=4.23) and Project Manager's authority to take financial decision, selecting key team members, etc. (MIS=4.21).

As we have seen from overall ranking of construction projects success factors 60% of the critical success factors were originated from project management related success factors and 30% were from contractor related success factors. Therefore in south west construction projects construction parties should review their project management and contactors capability in depth in order to accomplish their projects successfully. But it is not to mean that the other types of success factors did not have contribution for construction project to be successful or not.

5.2. Recommendation

As we can see from this research finding 60% and 30% of top ten critical success factors were generated from project management related success factors and from contractor related success factors, therefore it is recommended that any construction parties should revise their construction management mechanisms and the project owners should evaluate in depth the capability and the capacity of their contractors during bidding process.

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