

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES



ADDIS ABABA INSTITUTE OF TECHNOLOGY
SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

**TIME AND COST PERFORMANCE ANALYSIS OF LOCAL AND
INTERNATIONAL CONTRACTORS ON STRUCTURAL WORK OF HIGH
RISE BUILDING PROJECTS IN
ADDIS ABABA**

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A Thesis Submitted To the School Of Graduate Studies of Addis Ababa University in
Partial Fulfillment of the Requirements for the Degree of Master of Science In
Construction Technology and Management.

Addis Ababa
October, 2021

DEDICATION

This thesis is dedicated for my family which dwelled in Addis Ababa, Mexico House No 091 and for all which arises today.

DECLARATION

I the undersigned declare that this thesis is my personal original work which is prepared from my personal knowledge and referenced materials which are indicated in a clearly manner and the collected data and analysis are originally gathered and analyzed only for this work.

Name: - MEKONNEN W/YOHANNES

Signature _____

ACKNOWLEDGEMENTS

First of all I would like to thank the Almighty GOD who gave me the strength and tolerance to pass various obstacles and come up to the accomplishment of this thesis.

I would like to express my deepest gratitude to my instructor Prof. (Dr.-Ing) Abebe Dinku, for his support in letting me to have early experience in preparing thesis. In addition to him I would like to thank my co-Advisor Mr. Fasil Tebeje and AAU staffs in general.

Special thanks are forwarded to project managers, contractors, consultants and clients (project owners) who encourage and support me to have an idea in selection of thesis working area and title build up. In addition, I would like to express my appreciation to ERA who offers me the opportunity to study the post graduate program.

Finally, I would like to extend my deepest gratitude to my dearest family who has supported me until now and I hope they will continue their support in the future.

My study has reached here by the help of all friends, work colleagues and different social, private and governmental organizations here in the country hence I would like to say God bless all.

CONTENTS

DEDICATION	ii
DECLARATION	iii
ACKNOWLEDGEMENTS.....	i
ABSTRACT.....	iv
LIST OF TABLES	v
LIST OF FIGURES.....	vi
LIST OF ABBREVIATIONS.....	vii
1. INTRODUCTION	1
1.1. Project Background and Over view.....	1
1.2. Research Motivation.....	1
1.3. Statement of the Problem.....	2
1.4. Objective of the Study	4
1.5. Research Questions and/or Hypotheses.....	5
1.6. Theoretical Framework.....	6
1.7. Research Approach and Data Analysis	7
1.8. Scope and Limitation of the Study	8
1.9. Significance of the Study	8
1.10. Structure of the Thesis.....	9
2. LITERATURE REVIEW.....	10
2.1. Introduction	10
2.1.1. Performance analysis.....	12
2.1.2. High Rise Building.....	13
2.2. The Industry	13
2.2.1. High Rise Building Construction.....	13
2.2.1.1. Planning.....	14
2.2.1.2. Elements and Execution	15
2.2.1.3. Monitoring & Evaluation	16
2.3. Factors and Challenges in HRB Construction in Urban Areas.....	17
2.4. Expected Reasons of Hiring Foreign Contractors on High Rise Building Construction.....	21
2.5. Construction Project Management	22
2.6. Contract Models in International Contracting	23
2.7. Construction Project Performance and Project Staffs, Risks, ICT and Other Issues.....	26
2.8. Literature Summary.....	33
3. RESEARCH DESIGN AND METHODOLOGY.....	34
3.1. Introduction.....	34

3.2. Approach and Research Type	35
3.3. Data source.....	35
3.4. Sampling & Data collection.....	36
3.4.1. Questionnaire	36
3.4.2. Interview	36
3.4.3. Observation.....	37
3.4.4. Secondary Data Sources	37
3.4.5. Case Studies.....	37
3.4.6. Steps in conducting the research.....	37
3.4.7. Data Analysis	38
4. ANALYSIS OF FINDINGS AND DISCUSSION	39
4.1. Introduction	39
4.2. Responses to Survey.....	39
4.3. High rise building construction Works and Execution Management Practices	42
4.4. Discussion based on each site	54
4.4.1. Project Site Local Contractor one	54
4.4.2. Project site Local Contractor Three	57
4.4.3. Project Site Local Contractor Four	59
4.4.4. Project Site Foreign Contractor one.....	60
4.4.5. Project Site Foreign Contractor Two	62
4.4.6. Project Site Foreign Contractor Three	63
4.4.7. Project Site Foreign Contractor Four	64
4.5. The rest of four parts and open questionnaires	70
4.5.1. Part 1 General	70
4.5.2. Part 2 Managerial.....	73
4.5.3. Part 3 Technological.....	77
4.5.4. Part 4 Technical	79
4.6. Comparing all the four parts	83
5. CONCLUSIONS AND RECOMMENDATIONS.....	94
5.1. Conclusions	94
5.2. Recommendations	95
REFERENCES.....	96
Appendix A: - Questionnaire	98

ABSTRACT

The study assesses the causes of performance difference of local and international contractors on high rise building (HRB) projects at industry level and based on the study it recommends solution to full fill the gap between them and indicate that such projects should be implemented by local contractors (at least 85%) as its implementation is much connected to country's development. The other objective of the research is to explore whether all political, economic, social, technological, environmental and legal factors (PESTEL) have very close relationship with high rise building construction and to aware all stake holders in development of country's PESTEL. However unless such projects are not implemented by citizens of the country the development of the country and the welfare of the citizens will not be achieved because the jobs were occupied by foreigners and need of too many foreign currencies for international contractors.

Different literatures are reviewed to show the relationship between the implementation of high rise building and country's PESTEL development. This research was attempted to assess the current situation and formulate and give recommendations with respect to high rise construction in accordance with the outcome of the paper. The main tools for the collection of data included case study, questionnaires, interviews and site visit were used to identify the various efforts that have been made in the past and to evaluate and examine the reason of hiring foreign contractors on HRB construction project. Simple statistical analysis involving tables and percentages were used in analyzing the results from the questionnaire.

The analysis and discussion part classifies causes of performance difference in to four major parts, that is the General, Managerial, Technological and Technical parts. Hence according to the case study, the respondents and analysis of data the single out standing cause of hiring international contractor is lack of foreign currencies which is found in Managerial part. Again based on top fifteen factors analysis the Managerial part contributes more factors which causes hiring of international contractors such as, poor enterprise management and poor quality management.

As per the result of this study the researcher recommends that there should be a mechanism that local contractors get foreign currency in timely manner with the help of government and all stakeholders. In addition to that managerial capacity of local contractors should be continuously upgraded by on job and off job training with cooperation of government and concerned stakeholders.

Key Words: - High Rise Building, Foreign Currency, Industry, International Contractors, PESTEL, Quality, Performance difference, Stakeholders.

LIST OF TABLES

Table 2.1 Some standard contracts models, project stages and responsibility of employer and contractor.....	24
Table 2.2 Increasing risk allocation for contractor at increasing complexity of contract type	30
Table 4.1 Number and percent by type of organization.....	40
Table 4.2 Top 15 Factors which cause performance difference between local and international contractors..	45
Table 4.3 -Causes of variations by each activity and specific contractor.....	65
Table 4.4 -Top ten factors which cause performance by local.....	66
Table-4.5 Top ten factors which cause performance by foreign.....	66
Table 4.6 General factors which cause performance difference	72
Table 4.7 Managerial factors which cause performance difference	75
Table 4.8 Technological factors which cause performance.....	78
Table 4.9 Technical which cause performance difference.....	82
Table 4.10 Different statistical data of the four parts.....	85
Table 4.11 a: - ANOVA Data input 1-22.....	86
Table 4.11 b: - ANOVA Data input 23-47.....	87
Table 4.11 c: - ANOVA Data input 48-71.....	88
Table 4.11 d: - ANOVA Data input 72-97.....	89
Table 4.12: - ANOVA Output.....	90

LIST OF FIGURES

Figure 2.1 International business and circle of influence.....	12
Figure 2.2 Different perspective on contractual relationships.....	25
Figure 3.1 Flow chart of research methodology.....	36
Figure 4.1 Questionnaires and responses by building story types.....	40
Figure 4.2 Questionnaire and responses by organization type.....	41
Figure 4.3 Questionnaire and responses by story type.....	41
Figure 4.4 Result of questionnaire using RII	43
Figure 4.5 Lack of proper implementation.....	47

LIST OF ABBREVIATIONS

ANOVA = Analysis of Variance

HRB = High Rise Building

PESTEL = Political, Social, Economic, Technological, Environmental and Legal.

ICT = Information Communication Technology

EPC = Engineering Procurement Contract

D & C = Design and Construct

DFBM = Design Finance Build Maintenance

DFBMO = Design Finance Build Maintenance Operation

FIDIC = Fédération International des Ingénieurs Conseils

QA = Quality Assurance

VE = Value Engineering

1. INTRODUCTION

1.1. Project Background and Overview

Urbanization strategy for Ethiopia, which is supported by similar strategies in the education, health, housing and transport sectors, has been underway since 1994. The success of the urbanization strategy and consequent economic recovery and development of a country is highly dependent on the restoration and expansion of Ethiopia's economy that can open more access and reduce costs to the rural community. To achieve these objectives government starts on the rehabilitation and upgrading of urban centers including construction of high-rise buildings.

Project ideas of high-rise construction are always unique and always connected with the development trend of megacities. Analysis of the experience of high-rise construction shows that the more high-rise buildings are built, the longer buildings are used, the more their engineering and organizational-technological specifics are revealed. It is associated with large volumes of long-term investments for new construction, for the preparation of the territory, and for the coordination of relevant legal, regulatory procedures, financial relations and legal and urban issues. (*Shosse, 2018*)

The local construction sector is under development all over the country especially HRB construction becomes familiar in the capital city of Ethiopia, Addis Ababa few years ago. However great numbers of major HRB projects are held by international contractors and this paper tries to seek the advantage and disadvantage of hiring foreign contractors related to country's PESTEL and their performance on such projects.

It is necessary to reflect the major strategic themes of construction project enhancement strategies within the macro business environment of the industry and to reveal how synergies could be formed between these strategies over time. Studies at the industry level focused on productivity measurement and long-term productivity trends. (*Pan, Chen and Zhan, 2019*)

1.2. Research Motivation

There are so many interesting reasons that the researcher chooses this title. As it is known these days in our country the construction of high-rise building is widely engaged in Addis Ababa but most of major high-rise building projects are held by foreign contractors.

Hence the researcher believes that considerable amount of finance is being invested on these foreign contractors and asks why the country spends lots of foreign currency?

What is the reason that the country pays for foreigners is it lack of finance, professional service or unable to deploy contemporary technology?

On the other hand the researcher has been working in the building construction industry for more than 15 years of time and believes that those projects can be implemented by local contractors at least on the scale of 85%. These days many high-rise real estates are implementing by local contractors. A proper motivation and safety systems should be established for improvement of productivity performance of construction projects. (Biyadgign, 2017)

According to the Ethiopian Economic Association (fifth annual report on the Ethiopian Economy published in March 2007), the construction industry has important contributions to the Ethiopian economy, as demonstrated by its share in the GDP. (Mekedes, 2016)

The other reasons that motivate the researcher is that there are a lot of professional jobs which are occupied by foreigners but huge number of professional citizens left jobless hence working with local contractors will increase the participation of local professionals. But if not, some workers will lose their jobs and have to find other occupations, and there will be consistently fewer jobs in certain occupations and more in others. As revealed these days some workers should be able to adapt through retraining or switching careers. But change may also be faster than people's ability to adapt; some may never be able to do so. Therefore, all governments should aim to see frontier technologies disseminated through production structures while devising ways to mitigate adverse effects. (United Nations, 2021) Again, if there is a tendency to develop country's economy there need to start using local products and that is one of the reasons that encourage the researcher to focus and try to do the research on this area.

Finally, the researcher thinks the country will go to the construction of sky scrapers in the future however unless Ethiopia starts build local crew in the present the country will also invest on the foreigners for future as it is doing now.

1.3.Statement of the Problem

It is known that the efficient and effective implementation of large-scale projects have high PESTEL impact on a country. Comprehensive literature review is needed on PESTEL framework to reveal the major strategic themes of construction productivity enhancement. (Pan, Chen and Zhan, 2019) Projects are facing time and cost overrun. (Abebe and Girmay, 2003) indicated that claims, in some projects, in Ethiopian construction sector have been observed reaching up to 200-300% of the project cost.

Improper implementations are the main causes of contract disruption and cause claims. Unless care and full attention is given to the planning and implementation of projects it will affect project time certainty, cost, quality and owner's interest and cause administrative burden and negative economic impact on the country. That is why may be Ethiopian government make an alternative way to hand over the construction implementation process to foreign contractors. On the other hand as it is associated with foreign currency again the country is facing economic burden too. It is known that national plans and strategies can also promote technological applications that could help disadvantaged groups or help stimulate economic development in developing countries, rural areas or declining regions. (*United Nations, 2021*)

If the country is continuing on hand over large-scale projects to foreign contractors including high rise building construction projects it is not only have economic impact on the country, all PESTEL factors are also will play a negative impact. Major strategic themes of construction productivity enhancement are revealed by applying 'PESTEL' framework considering six macro business environmental aspects: political, economic, social, technological, environmental and legal. (Pan, Chen and Zhan, 2019)

National governments are already addressing the potential negative effects of frontier technologies and have good ideas to share. Many national and local governments are working to stimulate the growth of industries that produce jobs and wealth within their boundaries, which in turn reduces inequalities between countries. (*United Nations, 2021*)

1. Politically;-if citizens will not have their input on the development of the HRB project it can't be said that the country will meet social and individual interest of the citizens. On the other hand when our country engaged foreigner contractors most of the time this foreigners want to influence the local political system to the benefit of their political system and that cause conflict of interest between the countries.

2. Economically: - As our country hire foreign contractor it will pay with hard currency and most of professional jobs occupied by those foreigners. Hence the country is losing too much finance on paying to the contractor and as the same time citizens of the country will not get job, in addition to that citizens can't compete locally and internationally.

3. Socially: - Foreigners have their own culture, socially appreciated qualities on their country may be unacceptable behavior for local societies. Hence the local societies will be disappointed by those new cultures and peoples become biased to match these two social characteristics.

4. Technologically: - High Rise Building needs highly educated professionals and latest equipment from inception up to life time of the building. Now a days Ethiopia have enough professionals who can participate on the construction of HRB in different level of human resource needs. But if the country continues hiring foreign contractors the number of highly educated professionals and other skilled workman ship will not have a job chance.

5. Environmentally:- Even if countries have their own local environmental protections codes and rules unless great care and follow up is not done as a business organization to lower costs and to save time contractors are not consider environmental degradation which may cause knowingly or unknowingly.

6. Legally: - As it is said before as social interaction of one country differ from the other the legal frame works also differ too. A legal issue acceptable by one country may be unacceptable to the other hence when come to project contracting either of the party may entertain their country's legal system in negatively manner.

But if the country continue hand over HRB construction projects for foreign contractors it may not develop its own political image, the country will not develop its economy in reasonable period of time, the country may not develop societies living standard and living philosophy in a reasonable period of time, it may not develop citizens technical skills and scientific knowledge, foreign business men may cause environmental degradation and may leave the place without rehabilitation and finally foreigners may influence local legal systems which maybe right on their countries.

1.4.Objective of the Study

The objective of this research is to identify the performance difference between local and international contractors in the high-rise building construction industry of Addis Ababa.

This research also assesses the cause of productivity difference between local and international contractors in the Ethiopian construction industry on HRB projects and it mainly aims to investigate important factors affecting productivity & workmanship in building construction projects. Understanding these factors is helpful for the construction stakeholders in order to efficiently deliver the project as per the plan.

General objective

The main objective of this research is to identify the performance difference between local and international contractors on industry level and to indicate the consequences of hiring international contractors to local business on the country's PESTEL.

Specific objectives

- To present causes of performance difference between local and international contractors on HRB Projects.
- To present the major challenges or factors that influence on local contractors performance on HRB construction industry.
- To indicate where local contractors position in the major complex high rise building construction industry.
- It will also be used by other researchers as an input for further studies related to Ethiopians current status on performance of high rise building construction Sector.

1.5. Research Questions and/or Hypotheses

The following question-answer approach was considered helpful to assist these operations in order to formulate the research problem. This thesis will be guided by these questions as benchmarks.

- What is the practice of Addis Ababa construction projects in the execution management of high rise buildings?
- What are the problems and challenges incurred with regard to high rise building projects?
- How improved methodologies (updated technologies and management) can be achieved in order to have better implementation?
- When and how the country lets international to participate on the process of its development?
- What seems current status of local service givers in the high-rise building construction?
- What is the difference between hiring local contractors versus international contractors in the country's economy?
- What benefit or loss the local societies face by interacting with foreigners in different situations?
- What seems the technology and management science transfer from foreigners to local ones? Is there a big difference?
- How is foreign contractor's implementation regarding to environmental preservation?
- What legal and contract administration issues will be arisen on the implementation process?

By considering all the above points one can infer some hypothetical ideas that why the country relies on foreign contractors' engagement for its major high rise building construction projects.

Regarding country's economy the clients may not give enough attention that they are spending huge amount of money that will go to foreigners and it has also negative impact on the development of the country.

Without the participation of the local society in different level on execution of high rise building there may slow the technology transfer and block citizen's job opportunity.

There may be legal framework considerations those should be entertained by local officials who have the capacity to check the execution process with the country's legal system but the implementation may lacks follow up.

1.6. Theoretical Framework

Any civil engineering construction project is a capital project from its inception up to its life time for the country. HRB construction is one and major part of civil engineering construction. The construction of HRB in any country contributes so many positive images about the country and its people.

Therefore, once the HRB construction culture is entertained by some society it shows the civilization of that country and its people. Indeed, the emergence of HRB construction falls in to two main reasons, i.e., the first reason is solving the gap between demands and supply of the land in a concerned country and the other main reason of construction of HRB in a country many times it becomes the pride and asset of the host country.

In all stages i.e., in inception, planning, design, construction and operating of major civil engineering construction needs human capital that is different professionals become engaged. Once these professionals develop their knowledge and start applying their skill to any major civil engineering work, they become the capital of that country also.

There are many stages in development of HRB like any big civil engineering construction. The main once is inception, feasibility study, design planning & design, procurement planning and tendering, construction planning and construction and finally operating the HRB. Hence once one has to pass through all those steps, he has to use his technological and scientific skills to make it happen. But passing with all those steps is not an easy task it needs the complex and updated resource and their administration. Therefore, if such a kind of project is done by any country's citizens one can say that the societies are well civilized and the country is developed or under rapid development. Generally, the construction of HRB of a country by its own force shows the advancement of that country on science and technology.

The HRB construction is always concerned with the society as it is constructed mainly in cities, the life style of the dwellers of that city will also develop with the existence and expansion of those buildings. Natural dwelling environment (Rural Area) and cities have different living societies in knowledge, philosophy and principles of life. In most cases dwellers in urban area are more experienced with technologies and know their environment and the world more than the dwellers of rural areas. Generally, in most cases urban dwellers considered as civilized ones than rural people and this implies that the HRB of a country implies the civilization of the society around.

Nowadays in designing and construction of HRB is very concerned with environment. Without proper town planning and HRB construction the living environment may be degraded by different actions. It is not good that planning and constructing of HRB in congested way because it causes temperature rises around the congested area and causes traffic and over flow in winter. Hence once HRB is well planned and constructed it contributes a well-developed environment which provide best for the living society but in the contrary if it is not well developed it causes disturbed and unhealthy environment and it looks like the 'hell' for the dwellers.

The HRB construction has its own influence on the country's (city's) legal system from its inception to operational stages. HRB design and Construction Phases requires highly experienced professionals those are recognized by local and international legal frames. Hence cities and their dwellers are abided by some legal systems which are caused due to the emergence of high-rise buildings. The use and administration of high-rise building cause to imbed some legal systems to the users and the dwellers. As it causes shared facilities to the users and the dwellers there must be a legal or administration systems for all in order to be served proportionally.

1.7. Research Approach and Data Analysis

The research method goal is to present practical difference on the performance between local and international contractors on implementation of high rise building construction projects in Addis Ababa. Hence as per the case is existing and the research output helps to develop the current practice to the better accomplishment the research goal becomes applied type of research. This research is formal and focused on gaining background information about performance of local and international contractors, the cause of the difference and the impact of hiring foreign contractors to the home country, the research uses explanatory research format.

In conducting this research it uses both qualitative and quantitative (Unstructured and Structured) research approach to cover all comparable performance in the sector based on the facts that are measurable and those which needs human degree of perception in order to classify the degree of influence on the HRB construction industry stakeholders. The other main character of this research is its design of conduction. The research information will be gathered from the site and different literature and if it is needed some onsite experiments will be done there for the design of this research will be quasi-experimental with primary and secondary data sources.

1.8.Scope and Limitation of the Study

Due to current situation of Addis Ababa there are enough high rise building Projects which are on the implementation process and the researcher try to consider balanced number of projects those are constructing by local contractors four and by foreign contractors four.

Because of time and cost limitation, the scope of this research project is limited to only on time and cost performance of the execution of structural parts of high rise buildings which have more than 15 story and similar substructure works (most international contractors engaged in, large scale projects and somehow represent the higher ones). However the established principles of methodology used on this research could be applied for similar projects and may be it becomes a bench mark for future Skyscraper building projects which may be built by local contractors in Ethiopia.

1.9.Significance of the Study

The study tries to illustrate and identify the major performance difference between local and international contractors and helps the local contractors to know where they are and to improve their capacity. In addition to this to create more awareness to all stakeholders in the construction industry and to make capacity building in the sector. In general, the researcher believes that the research will be significant for Ethiopian construction industry by comparing the performance of the local contractors with international contractors and inspire the local contractor to improve their capacity. On the other hand once the local contractor capacity increased the country will reduce the foreign currency expense and creates professional jobs to the citizens. It also becomes additional input for designing a practical intervention mechanism which may indicate the performance of the local contractors in the sector and the PESTEL of the country.

1.10. Structure of the Thesis

This research generally organized in five chapters and appendices

Chapter-1 Introduction: Provides back ground information and overview of the construction industry of the high rise building construction in Addis Ababa followed by research motivation, statement of the problem and objective of the study. Research question and hypothesis, practical judgment of current situation, research idea and theoretical frame work are also included for better understanding of the aim of the study. Finally to be practical research approach, scope and limitation of the study and significance of the study were discussed.

Chapter-2 Literature review: This chapter provides detail information about high rise construction industry and so many related issues with it. Causes and impacts of hiring foreign contractors is discussed by compare and contrast with technical terms such as contract models, international construction, performance analysis, factors and challenges in high rise building construction, expected reasons of hiring foreign contractor, technical issues related to high rise building construction and finally high rise building construction and PESTEL issues of the country was discussed.

Chapter-3 Research design and methodology: Contains the techniques and procedures followed in order to address the objectives of the research. This chapter provides the plan of the research. In other words it discusses about approach and research type, data sources; method of sampling and data collection, questionnaires, interviews, observation, desk study survey, steps in conducting of the research and data analysis technic is also described.

Chapter-4 Analysis of findings and discussion: This section provides the results from the case studies and analysis to make a comparison with literature. In addition these results are used to confirm or reject the hypotheses. On the other hand this chapter also provides a critical evaluation of this work including the limitations of the result. It discusses about all findings which fall on the four major parts that is in General, Managerial, Technological and Technical. Finally based on the findings it compares and contrast the outstanding factors which have higher relative importance index.

Chapter-5 Conclusion and Recommendation: Based on the output of chapter four and limitation of the study this chapter summarizes the whole work and point out logical conclusion followed by possible recommendation that may helpful for the industry.

In addition to the above five chapters References and Appendixes are also included at the end.

2. LITERATURE REVIEW

The literature review is mainly organized by three major parts, the first one is the introduction part which is organized by definition of the topic, reason of selecting the topic and some trends related with the topic were included.

The body of the literature review describes the high-rise building construction industry trends based on relevant data sources and current situations including latest managerial and technological aspects in thematically approach.

Finally as conclusion major contributions are summarized, current situations are evaluated, some limitations in the methodology were pointed out, gaps and contradictions were discussed and areas of further study were suggested.

2.1. Introduction

The demand of land, service and infrastructures is increasing following the increased inhabitants and urbanization. To use resources such as land, water supply, electric supply, and existing roads effectively and efficiently in the city it is mandatory to upgrade the city proportional to the current populations. The construction of High Rise Buildings is one of the methods in using the cities' resources efficiently.

On the other hand the most important reason for constructing high-rise buildings in the city is the desire of developers to attract «hot money» of investors to the city. Another significant factor is the rapid growth of the economy, which requires huge volumes of office and residential construction, preferably of high quality and with a high level of individuality. (*Artur Petrov and Daria Petrova, 2018*)

Before reviewing literatures it is helpful to have a clear image of what does it mean by Performance Analysis of Local and International Contractors on High Rise Building Projects?, in the perspective of this research.

Performance: - is accomplishment of something: the act of carrying out or accomplishing something such as a task or action. According to this research, Performance is the efficient uses of inputs to get effective output. Hence the research tries to describe that using inputs excessively to get the target output is not appropriate performance. So only the required amount of inputs should be deployed to get the intended output. On the other hand when someone thinks of performance effectiveness is mandatory. As one tries to control the efficiency of inputs he should not compromise the output otherwise the output become defective

and undesirable result. On the contrary if we get over qualified output by using inappropriate uses of inputs the result may not usable for the intended use and it becomes uneconomical.

Local Contractor: - Local contractor is any contractor, supplier or service provider who is governed by its home country and mainly its tasks are connected only in its home country but as an international contractor the local contractor should also have the capacity in terms of legality, financial capacity, technically, managerially and can perform specialized and complex tasks within its home country. A local contractor for one country may be international or foreign contractor for the other country but foreign contractor can be active only between countries which have preexisted agreement based on mutual interest of the countries.

International Contractor: - The term international shows that a thing which can involves in two or more countries. This shows that when one say something international it has the capacity to involve and can serve beyond its home country, in many terms it can participate on complex and large issues mostly the host country can't exercise by itself. When one say international contractor it is any contractor, supplier or service provider who have the capacity in terms of legality, financial capacity, technically, managerially and can perform specialized and complex tasks within its home country and/or abroad.

International Construction: - Technological innovation, economic internationalization, and the authority of neoliberal ideology are the three primary movers of globalization (*Lubbers, 1999*). As a result, some authors have said that globalization has eroded exclusive rights to the domestic market. The construction industry is one of the top four economic sectors in terms of inter sectorial linkages. An international construction project is one in which the contractor, the lead consultant, or the employer are not of the same country, and at least one of them is working outside its own country of origin. Based on our worlds current and future fact the construction of HRB will be expanded extremely because of the following situations. (*Lubbers, 1999*).

- Increasing world population
- Newly constructed infrastructure
- Increasing energy consumption.
- Growing needs for terminal and transport capacity.
- Complex value chains.
- Risk management.
- Contract management
- Claim
- Culture

The following figure shows the influencers of international businesses as well as the national one in such a way that the degree of influence vary in specific case.

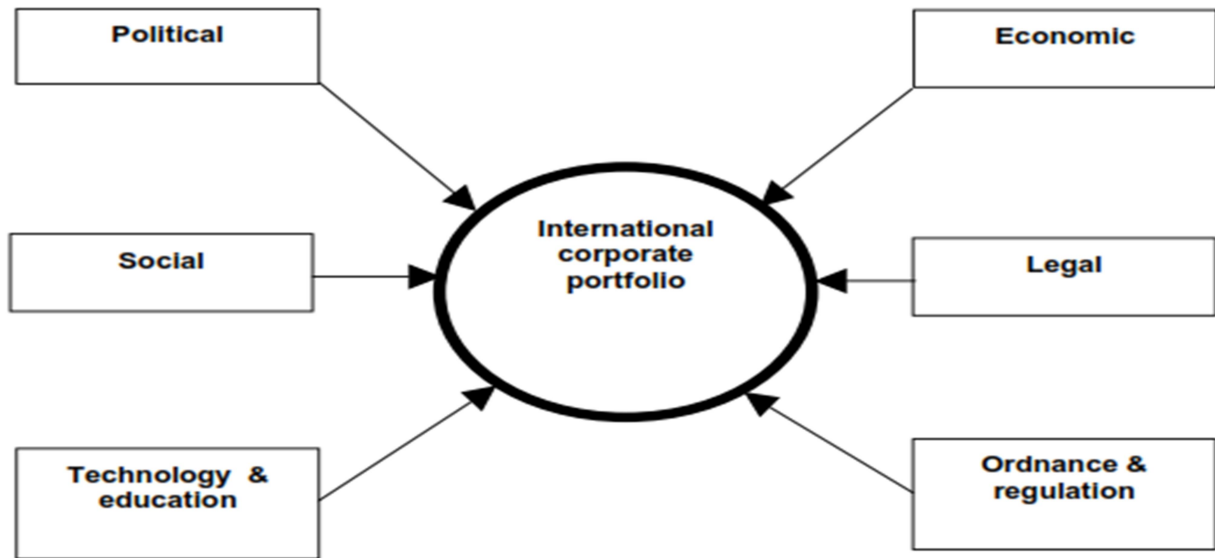


Figure 2. 1 International Business and Circle of Influence

Source: - (*Strategic Management applied to international Construction, Howes and Tah, 2003*)

2.1.1.1. Performance analysis

When someone analyze something he may say that something that he will going to analyze is takes an event and that event can be compare and contrast with another reference as it is said above it can be natural matter, preexisting standard or other event.

The performance in other hand is a parameter which systematically combine the effectiveness of the intended product and the efficient uses of resources to get the desirable product. In other words there is an ideal point in producing the desired product. It has been suggested that the processes necessary for a notational analyst working either as a consultant or an academic researcher are as follows (*Hughes, 2004*):-

1. Defining performance indicators,
2. Determining which are important,
3. Establishing the reliability of the data collected,
4. Ensuring that enough data have been collected,
5. Comparing sets of data,
6. Modelling performances.

2.1.2. High Rise Building

There are different countries and organizations which have different definition on the term high rise building based on different technical and managerial perspectives. Some of them are enumerated in different books however the researcher tries to define considering Ethiopia's current technological advancement situation and construction engineering perspective.

The Ethiopian Building Proclamation No 624/2009 part 3 clause 33/4 says "Any building, which is more than 20 meters above the ground floor shall be provided with a lift or other similar services." On other hand Federal Urban Development and Construction Minister Directives No 648/2021 states that "And High-rise building has at least fifteen story above the ground and no more than forty-five story". The researcher considers this definition as Ethiopian standard of high rise building by relating with other definitions.

2.2. The Industry

2.2.1. High Rise Building Construction

According to the Global Tall Buildings Database of the CTBUH (Council on Tall Buildings and Urban Habitat) until now were erected 1647 buildings taller than 200 m. The high-rise building construction is characterized by high demand of construction technology and complex engineering works. (*Jerzy Szolomicki and Hanna Golasz-Szolomicka, 2019*)

What is a High-Rise Building?, As *High Rise Security and Fire Safety, by Elsevier Inc, 2009*. describes "A building is an enclosed structure that has walls, floors, a roof, and usually windows." and "A 'tall building' is a multi-story structure in which most occupants depend on elevators [lifts] to reach their destinations. The most prominent tall buildings are called 'high-rise buildings' in most countries and 'tower blocks' in Britain and some European countries. The terms do not have internationally agreed definitions." However, a high-rise building can be defined as follows: "Any structure where the height can have a serious impact on evacuation" (*The International Conference on Fire Safety in High-Rise Buildings, 2009*).

Generally, a high-rise structure is considered to be one that extends higher than the maximum reach of available fire-fighting equipment. In absolute numbers, this has been set variously between 75 feet (23 meters) and 100 feet (30 meters)," or about seven to ten stories (depending on the slab-to-slab distance between floors). The exact height above which a particular building is deemed a high-rise is specified by fire and building codes for the country, region, state, or city where the building is located.

The reasons and the causes of this fast growing economy in our country is the result of fast growing economy on our planet which is in turn the result of ICT and other technologies advancement. The future of world's construction industry is ahead towards the smart construction technology which is the result of smart technology. Even these days some countries such as Saudi Arabia are on the way to start to construct smart cities. In this research, it is planned to look for information on issues related to high rise buildings, its construction methods and the experience in our city from different sources considering local and international contractors.

The high rise building construction is one of the complex civil engineering construction projects. Unless properly managed and implemented as it gives a pride and being a capital for the country when it is finished, it can be debt and cause burden on economy, politics, society, technology advancement, environment preservation and administration on the country.

To answer on integrated scale for the development of factors enumerated above, the government should focus on implementing such a kind of project by local contractors. But the contextual situation reveals that most major high rise building constructions are engaged by foreign contractors.

Previous construction productivity research focused on developing productivity measurement methods and quantifying the impact of influencing factors. However, the development of holistic strategies for productivity enhancement of a construction industry has received limited attention. *(Wei Pan, Le Chen and Wenting Zhan, 2019)*

One of the main challenges in high rise building construction industry is the need for integration of construction parties for the project execution as per the project definition and requirement. These integration problems mainly take place at any construction project phase (i.e., initiation, planning, design, construction, or close out), and to eliminate these problems, they must be properly identified. There are three major stages in construction of High Rise Building and other complex civil engineering projects, these are

2.2.1.1. Planning

Planning involves identifying the hazards, assessing the risks and determining appropriate control measures in consultation with all relevant persons involved in the work, including the principal contractor, excavation contractor, designers and mobile plant operators. Structural or geotechnical engineers may also need to be consulted at this stage.

Planning Considerations:-The following are some of the basic considerations required during the construction planning process:-

- Statutory Obligation
- Contractual Obligation
- Social Obligation
- Site Characteristics
- Environmental Considerations and
- So many other Considerations.

Deltares developed the Geo Q method (Staveren, 2006) which is used to structure construction related risk management. GeoQ is based on six generally accepted risk management steps:

1. Determination of objectives and data collection.
2. Risk identification
3. Risk classification and quantification.
4. Risk remediation:
5. Risk evaluation:
6. Transfer of risk information to next project phase

New buildings are experiencing a continuous increase in the sophistication of their building systems and methods of construction. This situation creates a need for a planning tool that is capable of serving one or more of the complex set of activities during the project life phases.

2.2.1.2. Elements and Execution

In particular in most modern development projects, the scale of construction tends to be growing bigger and bigger, that makes construction of High Rise Building become much more difficult and complex. The High Rise Building construction are identified by means of a work-break-down-structure (WBS). For every element a list of unwanted events has been made even if they don't exist for risk management. Below major elements and activities in execution process are enumerated.

Sub Structure Elements and Activities

- Deep Excavation
- Pile Foundation (Pile Cape) Lean Concrete
- Mat Foundation
- Foundation Columns
- Basement Walls (Concrete or masonry)
- Ground Slab Finishing's
- Sanitary Installation
- Electrical and Data Installation
- Electro Mechanical Installation Others

Super Structure Elements and Activities

- Elevation columns
- Floor Slabs
- Roof Slabs
- Wall Works (Curtain wall) Carpentry & Joinery
- Metal Works
- Glazing (Curtain Wall) Finishing
- Sanitary Installation
- Electrical & Data Installatio

Generally the construction implementation stage of high rise building is the same as other construction projects but as many high rise building are built in side of urban centers many factors should be considered in detail. such as geological data, underground water table, around & underground utility line, site boundary, adjacent structures, seasonal traffic load, quarry locations, disposal sites, skilled and semi-skilled laborers availability, the market, metrology data, capability of the contractor towards such a kind of project in terms of technological and managerial advancement, PESTEL factors of the country some of the things that should be considered.

In the execution stage one have to focus on how to manage project construction by contractors, third parties, and the agency's own forces. Emphasis will be given to schedule, cost, change controls, configuration management, document control, partnering and value engineering (VE) incentives. Other important issues are construction Quality Assurance (QA) and Safety Management.

In the construction phase contractors, procured by the agency, combined with the agency's own forces, construct the project's facilities, and fabricate and install equipment. The work is done in accordance with the plans and specifications developed during the design phase. Following construction of the facilities and equipment then integration and testing will take place in the commissioning phase.

The project's highest levels of activity, in terms of numbers of personnel and costs incurred per day, occur during construction. The construction phase also has the most opportunities for cost overruns due to changes and delays, disputes with contractors, and the resulting contract changes and claims.

2.2.1.3. Monitoring & Evaluation

Project Integration Management leads us to Project Integration Control which includes Develop Project Charter, Develop Project Management Plan, Direct and Manage Project Work, Manage Project Knowledge, Monitor and Control Project Work, Perform Integrated Change Control and Close Project or Phase is the basic monitoring and evaluating instrument for complex projects. In general there are four types of objectives for measuring and monitoring activities which are proposed as:

1. Operational/Qualitative goals
2. Communicative goals:
3. Legal goals:
4. Scientific goal:

As PMBOK 2017 states major areas of project to be monitored and evaluated are project scope, project schedule, project cost, project quality, project resource, project communications, project risk and project procurement are the one which have positive impact if administered carefully if not their negative impact leads to project failure and bankruptcy. Below discussed basic Monitoring and Evaluating areas

Schedule Control: - Construction contractors control their contracts by detailed schedule progress. As project manager his focus is the big picture, the master schedule, to manage interfaces between contractor, third party, and agency construction activities. Your approach to master schedule control depends on the project's size and complexity:

Cost and Change Control: - Cost control's objective in construction is to complete the contracts within budget. Most construction contracts awarded for projects like the high rise building has estimated or a lump sum fixed price. After award the contractor is responsible for completing the work at the fixed bid price, unless a change to the contract is agreed that alters the contract price. Consequently once the fixed price construction contracts are awarded, cost control comes down to managing changes to the contracts so that the original award amounts plus agreed changes are within the construction budget.

Quality Control: - The complexity nature of such project produces so many check lists which should be revised by all the stake holders. Quality management during the construction phase covers review of contract documents to verify that quality aspects have been considered, it is surveillance of construction for adherence to quality requirements.

Health and Safety Control: - It includes planning of work to avoid personal injury and property damage, monitoring of work to provide early detection and correction of unsafe practices and conditions, protecting adjacent public and private properties to provide for the safety of the public therefore there needs providing safety education and incentive programs.

2.3. Factors and Challenges in HRB Construction in Urban Areas

Problems and failures costs related to construction are increasingly acknowledged, since it has become clear that they have a large influence on the image of the sector and results can be computed as in terms of money, loss of effectiveness due to failure causes costs equal to 2-3% net profit. (*Semegn W/Yohannes, 2016*). Most of success factors for megaprojects mentioned are of the operative level. They can divide these into three categories: people, methods, and organization. The most important method is complexity management through standardization and communication.

Resource leveling and scheduling are also forms of standardization; neither design firms nor contractors can easily adjust their manpower to the ever-changing requirements of a megaproject. Projects, quality, changes, and risks require management. The only observation here is that the application of risk management is not widely used in megaprojects; in fact, it is very seldom applied by contractors (Brockmann 2021).

Here some factors & Challenges observed in high rise building construction are presented below:

Source (Semegn, 2016), (Christian Brockmann, 2021)

- | | |
|---|------------------------------------|
| a) Inadequate geotechnical analysis | g) Resource management |
| b) Incomplete & defective contract documents | h) Communication gap |
| c) Incomplete & defective construction Planning | i) Absence of metrology data |
| d) Insufficient toe penetration of piles, | j) Environmental issues |
| e) Access to the site and inside the site | k) Negligence of health and safety |
| f) Traffic conjunctions | l) Geography of the site |
| | m) Other PESTEL Factors |

There are also technical issues that can be factors and challenges which can be ignored or forgotten or wrongly calculated in the design stage and in the execution phase. Such as

- Improper terms of reference preparation
- Wrong calibration of equipment
- Improper responsive bidder selection
- Defective working drawing
- Wrongly gathered site data
- Being unfamiliar for the specification
- wrong testing methods
- Wrongly calculated project duration
- Improper scheduling
- Defective construction materials
- Using unqualified workers
- Bad work culture
- Out dated construction equipment

As innovative construction is one of the factors in HRB construction, *Roozbeh, 1997*) investigated smart building automation technology (SMART) in the context of the four factors that contribute to innovation: these are technology fusion, strategic alliances, effective information gathering capability and reputation through innovation.

1. **Strategic Alliances**-an agreement between two or more professional organizations to pursue a set of agreed upon objectives needed while remaining independent organizations.
2. **Information Gathering**- Precise computerized information gathering and analysis in bulk.
3. **Reputation through innovation**-competitive experience advantage via firms for tangible and intangible resources.
4. **Construction Technology Fusion**-To distinguish highly multidisciplinary approach from relatively low level multidisciplinary approach.

The other factors to be considered in order to tackle out different problems on HRB construction and to have better performance the contractor and project managers should have not only have technical skill rather they should have best management and leadership skill.

The construction of HRB is technically challenging task which requires serious attention and follow up to avoid any associated accidents which can easily result in serious damage to adjacent structures or cause human casualties. Mostly these difficulties are ignored and left carelessly but lately could develop to poor performance. Here some cases of the poor performance observed in HRB construction are presented; primarily the possible poor technical cases are described below: (*Semegn W/Yohannes,2016*)

- a) Inadequate instability analysis of an open cut excavation can lead to a slope failure
- b) Insufficient toe penetration of steel sheet piles.
- c) The earth pressure induced by soft clay was often wrongly calculated
- d) Improper dewatering and drying of underneath ground
- e) Improper selection and use of construction material
- f) Improper and buckling support
- g) Wrongly calculated tested materials
- h) Use off outdated and un calibrated small and big equipment's and machineries
- i) Use of unskilled or not well skilled site staffs
- j) Poor workmanship and material usage
- k) Poor procurement methodology
- l) Lack of cleanliness and other technical issues.

Technological Cases: - Construction automation and robotics have been researched and developed over the last three decades. Although the practical needs keep rising, the on-site application rate remains limited, (*American Society of Civil Engineers 2020*). Possible Poor technological cases for poor performance which depends on assumed solutions which influence the changes of construction state such as: (*Semegn 2016 and PMBOK 2017*)

- a) Quality of design and contract documents
- b) Type and technology of construction system
- c) Execution method of High Rise Building Construction ,
- d) Changes of construction state during the elevation changing process
- e) Type of support in each stage;
- f) Not fixing of formworks accurately and stable.
- g) Vibrations during driving/vibrating of concrete structures
- h) Vertical and horizontal transportation system
- i) Concrete curing system/methodology
- j) Poor surveying and other measurement accuracy
- k) Poor communication system
- l) Poor use of equipment's and machineries which lead to poor performance
- m) And others related to skills and knowledge

Finally managerial cases of possible poor performance:-Related with the human staffs which happens in the site and out of the site. Managers and Engineers of Large Civil Engineering Projects Megaprojects act as magnifying glasses for general construction project management. Because of their complexity, few problems remain hidden. Each problem might (and often does) bear heavy consequences, which would not manifest in smaller projects. Lessons learned from megaprojects will provide managers and engineers of smaller projects with the foresight to avoid unaccustomed pitfalls (*Christian Brockmann Hochschule Bremen, Germany, 2021 and PMBOK, 2017*)

- a) Head office organization management
- b) Site access management
- c) Site organization management
- d) Transportation management
- e) Financial \cost management
- f) Equipment delivery and its management
- g) Material use and delivery management
- h) Time/ schedule management

- i) Human resource management
- j) Stakeholders management
- k) Managerial and leadership skill of the leaders
- l) Project scope management
- m) Communication management
- n) Quality management
- o) project integration management
- p) project risk management
- q) Project Risk Management
- r) Project Procurement Management
- s) Project Stakeholder Management
- t) Project Change order Management
- u) Project Environment Management
- v) And other poor management systems related to construction execution

In addition to the above most urban high rise building construction quite often cause ground surface settlement which can occur during three construction stages: Retaining wall construction, Ground water pumping and Main excavation.

2.4. Expected Reasons of Hiring Foreign Contractors on High Rise Building Construction

Advanced Technology: -Today world's technology is growing with exponential rate. To cop up with this race one should be equipped with huge amount of advanced professionals in academic back ground and experience following them the skilled and semiskilled labor force also should be available in a qualitative and quantitative manner. Generally when it is said advanced technology that means sufficient amount of labor in terms of quality and quantity. The other thing considering advanced technology is the plants and equipment should be in line with current project needs. Finally the materials and other inputs in the construction industry should be as per the specification and which also needs advanced material management. Hence our contractors should check their resources whether it is in line with the current market.

Advanced Business Management: - Anyone should not only have to have qualified professionals in technical field he have to have experienced decision maker manager in the field. A good manager may save cost of project up to 5% of project cost as once seen from past experience. When it is said advance business management it tries to sound that integrated resource management related to outstanding decision making. One have to have a manager who can assess all

risks in advance, analyze them using his personal intuition, managerial skill and technological support such as software's which can be decision making tools those are what current advanced business management uses.

Financial Background: - The need of financially well-established organization for the project like high rise building construction is mandatory. As it is known our Local contractors have series financial problems including its management. Some amount of financial contingency for such a kind of project is mandatory or there should be any means of access for liquid asset otherwise a small shortage of finance can occur a series impact on construction project implementation mainly on cost & time overrun and poor workmanship.

2.5. Construction Project Management

In general project management is a wide, unique and complex task which needs thorough follow up and monitoring from its inception to final stage or hand over. Hence it is helpful to see some issues related to project and contract management.

Contract management is "The process that ensures that all parties to a contract fully meet their obligations, in order to satisfy the operational objectives of the contract and the strategic business goals of the customer. A major problem that underlies in contract management is how to transform a conflict system into a cooperative one.

Projects:-As *PMBOK Sixth Edition 2017* describes Projects are unique product, service or result. Means each project have its own specific properties that is understandable, unforeseen or unpredictable matters which need appropriate action to take for their successful implementation.

Performance management process: -The performance management process outlines the activities to set direction, which uses performance information to manage better, demonstrates what has been accomplished and sets of actions to improve. Performance metrics may be defined using the SMART test (Specific, Measurable, Attainable, Relevant and Timely) measurement criteria may be defined using the FABRIC test (Focused, Appropriate, Balanced, Robust, Integrated and Cost-effective).

Project Quality Management;-Is a goal for quality and its relationship with diverse areas of the project such as Quality Assurance, Quality in Manufacturing (which includes: - Cost of Quality (COQ), Total Quality Management (TQM)). As defined TQM is "A cooperative form of doing business that relies on the talent and capabilities of labor and management using team work to continually improve quality, economy and productivity to complete satisfaction and delight of the customer (*Sharad and Sulimani, 1994*)

Performance management plan: -Performance management should be an integrated part of a development project from its definition through to monitoring and review. Where it is not possible to establish direct ‘cause and affect’ linkages or precise measures of performance, interim measures such as key performance indicators (KPIs) are often used. These could be trends over time, value to the customer, awareness of product or service are also can be performance indicators but this paper uses time and cost key performance indicators (KPIs) because of time and budget constraints considered in doing this research.

Performance monitoring: - Throughout the last few decades, a number of industries, primarily manufacturing, have introduced innovative methods and techniques to shift traditional paradigms in order to improve their performance. This has led to the creation of philosophies such as concurrent engineering /construction, lean/agile production/construction and many others such as JIT (just in time), TQM (total quality management), etc. The main driver behind those philosophies is to optimize an organization’s performance both internally and externally within its respective marketplace. This has led to the ‘rethinking’ of performance management systems through effective performance measurement.

Supply Chain Management: -This is the other basic factor that used to compare the local contractors trend with the international ones, it is critical in the implementation of complex civil engineering projects such as HRB, it needs inputs from different part of the world because of many different reasons, like such inputs are not readily available rather they are mostly manufactured by the order of end user. Hence this creates packing of materials in bulk and transporting them to the site causes the use of more advanced technology and material management system and the use of supply chain management science is developed and it is crucial these days. The development of port facilities, together with more efficient ships and the introduction of integrated transport systems have increased the feasibility and mobility of materials and products, thus increasing choice available to customers.

2.6.Contract Models in International Contracting

The reason why the researcher arise contracting model here is that to present which type of model may be appropriate for our clients and contractor’s in terms of different perspectives. There are different kinds of contracting models in international construction which designed to contribute the best performance in executing the complex projects such as HRB construction. These are Design and Construct (D&C), EPC/Turnkey, DFBM, and DBFMO contracts. Each model will contribute the risk allocation and payment method which may suitable for specific project property. In general these

models have three big mechanisms which have major influence on the model behavior these are: - (1) Pricing mechanisms, (2) payment mechanisms and (3) risk allocation mechanisms.

There are different Standard contracts in the world some of international standards are FIDIC, LOG-IC and BIMCO, and others. Each contract model can be best fit for specific construction project based on the construction process and final product property. Example of contract models are Fixed Price Contract, Reimbursable/ time and materials, unit rate/ charter, Time charter Design and Construct, DBFM (Design, Build, Finance and Maintenance), DBFMO (Design, Build, Finance, Maintenance and Operate). The table below shows the major contract types and project activity stages with the responsibility allocation situation for the client and the contractor.

Table 2.1 some standard contracts models, project stages and Responsibility of Employer and Contractor (Source international contracting, john van der puil)-

Contract Model	Construct	Design & Construct	EPC/Turnkey	DBFM	DBFMO
Project stages	1	1	1	1	1
Initiate	1	1	1	1	1
Research	1	1	1	1	1
Definition	1	1	1	1	1
Basic Design	1	2	3	3	3
Detailed Design	1	3	3	3	3
Final Design	1	3	3	3	3
Technical Design	1	3	3	3	3
Project startup	1	3	3	3	3
Project Execution	3	3	3	3	3
Maintenance	1	1	2	3	3
Operation	1	1	2	1	3
Financing	1	1	1	1	3

1	Responsibility of Employer
2	Joint Responsibility
3	Responsibility of Contractor

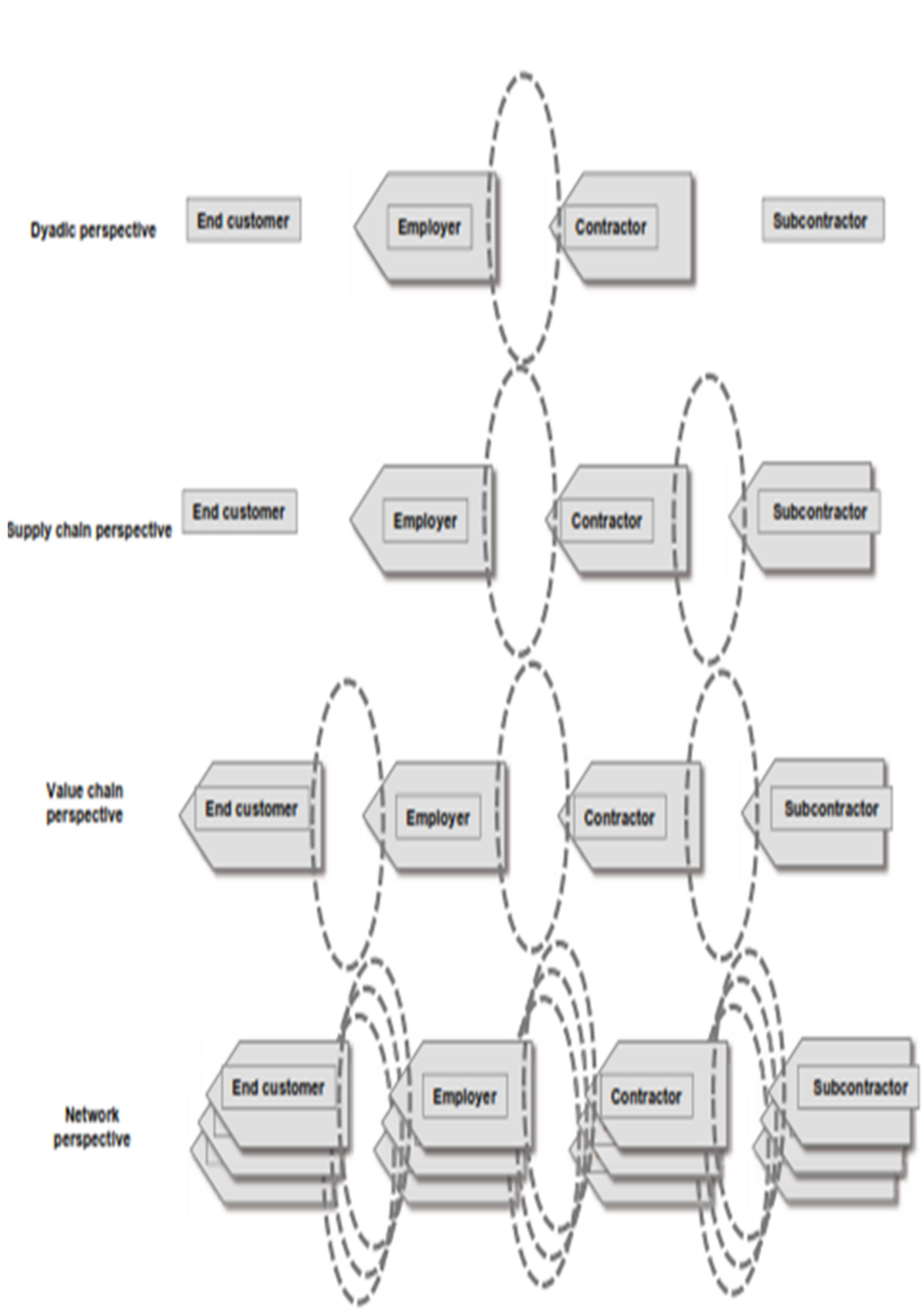


Figure 2.2: Different perspective on contractual relationships

Source: international contracting, John van der Puil, 2014

2.7. Construction Project Performance and Project Staffs, Risks, ICT and Other Issues

A.) Staffs: - The capability of project staff is crucial point on the execution of HRB construction. Here the research going to explain some of them in order to compare and contrast staffs of local contractor and International contractor.

Division of management responsibilities between the agency and construction manager as project manager should be defined. The project manager's responsibility is to find Value Engineering opportunities to deliver a lower cost project without compromising quality. VE does not end with design. Even though VE's main use is in the design phase, the project manager can organize a design scrub workshop with the designer and contractor before and during the construction, where the contractor can bring questions, comments, and ideas. At a minimum this meeting will save time during construction in processing best result in VE ideas to save time and/or money.

As discussed in United Nations report governments in low- and lower-middle-income developing countries should prepare their workforces with specialized skills in technologies. This will require basic literacy and competencies in science, technology, engineering and mathematics – as well as in design, management and entrepreneurship. These countries will also need capacities for complex problem-solving, critical thinking, and creativity. (United Nations, 2021)

Construction Project team duties and responsibilities

Project manager:-The project manager has a role which is principally that of monitoring the performance of the main contractor and the progress of the works of Design team, Quantity Surveyor, Contractor.

Construction manager:-A client may decide on a construction management route, directly employing a construction manager as a consultant acting as an agent with expertise in the procurement and supervision of construction and not a principal.

Management contractor:-In the managing contracting arrangement, a management contractor acting as a principal would have the additional direct contractual responsibility for the performance of the works package contractors.

Subcontractors and suppliers:-Subcontractors have specialist expertise, usually trade related (i.e. mechanical or electrical installations, lift installation, joinery and demolition) to the supply and installation of an element of the total works.

The role of project managers and contract managers: -Working at places that are often very remote from their headquarters, project managers need to manage their projects within the corporate guidelines, the contract, the project budget and timeline. Today, project management means stake-

holder management rather than only managing a project in a technical way. The world of international contracting is a dynamic world.

The successful Project Manager will invest the time necessary to assemble the best project team that the constraints of the project and the organization will allow to

- The Right Type of Expertise
- The Right Type of People

Below are some things the PM can do to identify the best people for a project team.

- Your own experience.
- Recommendation of colleague or friend
- Ask your boss
- Recruit from outside your organization

There are no “born leaders” who can manage everything by their great personality. Instead, we must understand leadership as a relationship or match. Matches concern tasks, people, and information. The problems with implementing a megaproject often exceed the limits of human understanding. How can anyone without pertinent experience hope to solve them? People working in megaprojects are not only civil engineers; there are also mechanical, electrical, and computer science engineers involved, along with politicians, bureaucrats, businesspersons, bankers, insurers, lawyers, police, and the concerned and interested public. However, at its core, construction megaprojects pose civil engineering problems. (*Brockmann Hochschule Bremen, Germany, 2021*)

The role of the project manager has three main parts

1. Membership/managerial roles.
2. Responsibility/conceptual for team
3. Knowledge and skills

The project manager also works to:

1. Demonstrate the value of project management,
2. Increase acceptance of project management in the organization, and

Advance the efficacy of the PMO (Project management organization) when one exists in the organization the project manager stays informed about current industry trends. The project manager takes this information and sees how it may impact or apply to the current project & must have three key skill sets

1. Technical project management
2. Leadership.
3. Strategic and business management

Strategic and business management skills: -Strategic and business management skills involve the ability to see the high-level overview of the organization and effectively negotiate and implement decisions and actions that support strategic alignment and innovation. In order to make the best decisions regarding the successful delivery of their projects, project managers should seek out and consider the expertise of the operational managers who run the business in their organization.

The business and strategic factors include but are not limited to:

- Risks and issues,
- Financial implications,
- Cost versus benefits analysis (e.g., net present value, return on investment), including the various options considered,
- Business value,
- Benefits realization expectations and strategies, and
- Scope, budget, schedule, and quality

Through the application of this business knowledge, a project manager has the ability to make the appropriate decisions and recommendations for a project. As conditions change, the project manager should be continuously working with the project sponsor to keep the business and the project strategies aligned. (PMBOK, 2017)

Politics, power, and getting things done: -Leadership and management are ultimately about being able to get things done. The skills and qualities noted help the project manager to achieve the project goals and objectives. At the root of many of these skills and qualities is the ability to deal with politics. Politics involves influence, negotiation, autonomy, and power. Relationships enable project managers to get things done on the project. For the huge complex civil engineering projects like High Rise Building political support should be exist for smooth and efficient working environment: A good project manager should possess the following qualities.

1. Positional (sometimes called formal, authoritative, legitimate)
(e.g., formal position granted in the organization or team);
2. Informational (e.g., control of gathering or distribution);
3. Referent (e.g., respect or admiration others hold for the individual, credibility gained);
4. Situational (e.g., gained due to unique situation such as a specific crisis);

5. Personal or charismatic (e.g., charm, attraction);
6. Relational (e.g., participates in networking, connections, and alliances);
7. Expert (e.g., skill, information possessed; experience, training, education, certification);
8. Reward-oriented (e.g., ability to give praise, monetary or other desired items);
9. Punitive or coercive (e.g., ability to invoke discipline or negative consequences);
10. Ingratiating (e.g., application of flattery or other common ground to win favor or cooperation);
11. Pressure-based (e.g., limit freedom of choice or movement for the purpose of gaining compliance to desired action);
12. Guilt-based (e.g., imposition of obligation or sense of duty);
13. Persuasive (e.g., ability to provide arguments that move people to a desired course of action); a
14. Avoiding (e.g., refusing to participate).

B. Risk: - Some scholars emphasized the negative or harmful consequences of risk and considered the risk as synonymous with threat while some recognized risk as a double-edged sword, encompassing both down side risk (threat) and upside risk (opportunity) in both ways risk affects performance. In addition, as risk arises from uncertainty (*Hillson and Simon 2007*), some definitions have linked risk with uncertainty and other argued that risk was calculable within reasonable precision, while uncertainty was not calculable.

Risk management: -Implement a regular monitoring system to check the progress of key suppliers or subcontractors (against the contractor's delivery schedule) so that there are timely warning signals of any potential delays or failures that could have an adverse effect on the progress and financial stability of the project.

As risk management has greater influence on the execution of construction project the researcher will also compare and contrast the local and international trends by gathering information on the current situation.

Risk identification and management: - Procedurally, the project manager must inform both the design consultants and the main contractor that all variation instructions must be in the correct written form and must only be issued via the contract administrator. Risk management process includes

- | | |
|-----------------------------------|--------------------------|
| 1. Communication and consultation | 5. Risk evaluation |
| 2. Establishing the context | 6. Risk treatment |
| 3. Risk identification | 7. Monitoring and review |
| 4. Risk analysis | |

Enterprise Resource Management: - Although there have been various definitions of ERM The *COSO (2004)* defined ERM as “a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives”.

Some Categorizations of Risks

Risks can be categorized as follows:

- Market risk.
- Credit risk.
- Financial risk.
- Operational risk.
- Legal and regulatory risk.
- Business risk.
- Executional risks.
- Defaults of contractor’s subcontractors, service providers, and suppliers.
- Political risks.
- Design errors in employer’s design.
- Own design failures.
- Risks in local labor.
- Strategic risk.
- Reputation risk.
- Contractual risks

There are different contract types in the construction industry which have different degree of responsibilities based on activity type. The following table shows different type of contract types with respect to client, consultant and contractor.

Table 2: 2: - Increasing risk allocation for contractor at increasing complexity of contract type

Source: Heerma Fabrication Group

Construct	Design and build	Design and build	EPC-Turnkey	DBM	DBFM	DBFMO
Employer’s Design	Contractor’s Design	Contractor’s Design	Contractor’s Design	Contractor’s Design & Maintenance	Contractor’s Design+finance+ Maintenance+	Contractor’s Design+finance+M ainte-nance+Operation s
Re-Measurable	Re-Measurable	Lump Sum	Lump Sum	Lump Sum	Lump Sum	Lump Sum /Re-Measurable
Descriptive Specification	Descriptive Specification	Descriptive Specification	Functional Specification	Functional Specification	Functional Specification	Functional Specification

C.ICT: -Now a day's complex civil engineering construction without the use of Information Communication Technology (ICT) cannot be achieved with the necessary performance. From inception up to the life cycle of the construction project. ICT plays crucial role in every stage. The question here is how much local and international contractors deploys this technology on their project implementation.

Electronic communication The Internet, Remote access, Telnet enables, File transfer a facility known as FTP (File Transfer Protocol) enables the transfer of files from one computer to another across the Internet and TCP/IP-based networks, Electronic mail, Voice mail, Newsgroup formation and access, Electronic conferencing, the world wide web (www), the intranet, extranets (this is a web site dedicated to an organization and its extended supply chain partners and customers rather than the general public) all the above can provide access to virtually any information that is private and not published for everyone. An extranet uses the public internet as its transmission system, but requires passwords to gain entrance. Access to the site may be free or require payment for some or all of the services offered. (*Strategic management applied to International Construction, R. Howes and J. H. M. Tah, 2003*)

The industry is typically extremely information intensive and knowledge based and, therefore, construction organizations in order to be successful and efficient need to fully embrace information and communication technologies (ICT), it has continued to receive significant levels of growth and integration on,

- Business process
- Interoperability
- E-Business
- Electronic Document and Records Management Systems (EDRMS)
- Electronic Trading – Construction Industry Trading Electronically (CITE)
- Enterprises Resources Planning (ERP)
- Concurrent Engineering
- Information visualization

Mobile technology – Mobile data management systems are being used to manage several technical functions which include the following:

- Health and safety
- Drawing distribution and usage
- Goods received notes
- Maintenance and snagging inspections

- Monitoring hazardous activities
- Monitoring progress
- Monitoring resources
- Quality inspection
- On-site design issues resolution
- Site diaries
- Task allocation and monitoring

In view of the continual growth and popularity of 3D and 4D soft wares particularly through BIM, ICT constitutes an important and critical tool in successful development and delivery of construction projects.

D.Other Issues: - As discussed in *construction innovation 4lobal* © 2003 by CRC Press LLC to remain competitive and to satisfy the demands of the owners, constructors have to become more innovative. Firms who before would not try anything different are now exploring and implementing new technologies in every aspect of their business so as to remain competitive. Further, with trade barriers between countries effectively reduced and, in some instances nonexistent, it is found that firms are now forming alliances with owners, suppliers, constructors and designers in different countries so as to have a competitive edge in the market place.

Distance is not the issue that it once was. With improvements in information technology, both in hardware and software, collaborations between firms in different countries are now common. This technology is vital for the management of the many pieces of information needed to complete a project. Globalization and Competitiveness starts with the core issues that influence construction and ends with its impact in some countries.

Generally, in the construction industry in each stage there should be great performance to be competitive globally as in *code of practice for project management for construction and development construction 251, 2014, willey blackwell* describes the stage are enumerates as follows

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Inception 2. Feasibility study 3. Strategy 4. Pre-Construction | <ol style="list-style-type: none"> 5. Construction <ol style="list-style-type: none"> a. Stage Check list b. Stage Process and Out Come c. Project Team Duties and Responsibilities d. Performance monitoring |
|--|---|

There for from the stages above the construction implementation performance of High Rise Building and any other complex civil engineering construction is not only the result of construction stage but the cumulated performance in every stage hence any constructor should be aware of each stage and if possible should participate from inception to commissioning stage.

2.8.Literature Summary

Generally the literature review is organized to describe that what it meant when one say high-rise building and why one need to construct them. Some of the reasons identified that the need of high-rise building are using cities resources efficiently, attract hot money and rapid growth of economy. The complexity related to HRB constructions and its methodologies of construction including international contracting were discussed. The definition, generations, types and functions of such buildings were also discussed in order to the potential stakeholders can have a detailed information about the sector.

As this research aims to point out the reasons of hiring foreign contractors in such projects and forward some points that help local contractors to engaged widely in the sector, the researcher believes that it is necessary to discuss some issues in the literature review including economic growth, construction management integration problem and ICT.

The technical issues discussed briefly are divided in to three parts planning, execution and monitoring and evaluation. The planning is the basic preparation before entering construction, the elements and execution generally tries to address major parts of the construction process. The other vital parts monitoring and evaluations are also discussed.

The major factor and challenges on construction of HRB at operation level which is composed of people, methods and organizations are discussed including risk and complexity management through standardization and communication. The probable reasons of hiring foreign contractors such as advanced technology, advanced business management and financial background are also presented and finally problems and impacts of foreign contractors in country's PESTEL are discussed as the main aim of this research is to find out the performance difference between foreign contractors and local contractors in Ethiopian HRB construction industry.

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

As it was revealed in the previous chapters the aim of this research is to compare and contrast the performance of local and international contractors on high rise building construction hence as it considers the practical situation in Addis Ababa, Ethiopia and based on the fact that it is the existing situation the researcher decided to use applied (practical) research from the point of its goal & perspective.

As this research is formal and focused on gaining background information about performance of local and international contractors, the cause of the difference and the impact of hiring foreign contractors to the home country the researcher of this paper used explanatory research method.

In conducting this research the researcher use both qualitative and quantitative (Unstructured and Structured) research approach to cover all comparable performance in the sector that were measurable and those which needs human degree of perception in order to classify the degree of influence on the HRB construction industry stakeholders.

The study was carried out by questionnaire, interview the site officials, site documents revision and observation. In addition to that detail discussion with officials was carried out with recursive manner. The data's was gathered from contract agreement, site correspondence letters, site book, change orders and generally most contract documents were referred., from different literature and if it is needed some onsite experiments will be done there for the design property of this research will be quasi-experimental with data sources of type primary and secondary. The research focuses on the factors those influence the country's PESTEL related to foreign contractors with local contractors performance one can say that the research is natural science research with some degree of social science properties.

The purpose of this chapter is to show the research methodology which will be followed to achieve the ultimate goal of the research. Proper research can either be a theory based (deductive), or a problem initiated for theory contribution (inductive). Hence this research stands from performance difference problem it will be inductive type of research.

This research were started through identification of factors from literature, which includes thesis's magazines, books; journals etc. in parallel with literature review an in-depth desk study were conducted. During the desk study, various documents such as contract documents, claim documents, correspondences, progress reports, completion reports, payment certificates etc...were critically evaluated. More of the information was collected from interview and questioner of different con-

struction stakeholders in order to maximize the clarity and to gain adequate understanding of the data for its use in analysis. Then analysis and discussion were followed based on the primary & secondary data obtained. At the end of the research, conclusion and recommendation were drawn based on the finding of the study.

3.2. Approach and Research Type

The basic research design here is an exploratory research methodology using both primary and secondary data. This design was chosen since it enables to assess the magnitude and scope of problems and facilitate for the suggestion of solutions. Generally, the research process was designed through defining the research problems, its objectives and questions.

To accomplish these objectives the research was made using the following methodologies

1. Review the pertinent domestic and foreign literatures, ongoing researches, books, conference proceedings, the Internet, leading construction management and engineering journals and relevant practices related to construction of high-rise buildings.
2. Review data from construction stakeholders, to determine the causes of poor performance of local contractors and methods used to avoid and mitigate the problem.
3. Analyze the causes of poor performance of local contractors and their impacts through an in-depth case study and desk study on high-rise building construction projects. Whenever there is unclear primary data or ambiguous during the desk study, further explanation or information will be obtained through interviews with relevant bodies in order to maximize the clarity and to gain adequate understanding of the data for its use in analysis.

Then analysis and discussion will follow based on the primary & secondary data obtained. Finally, conclusions will be drawn and recommendation will be forwarded based on the finding of the study and reviewed literature.

3.3. Data source

Existing high-rise building construction sample projects system will be reviewed and data will be collected from different construction sites how contractors construct high-rise buildings and identification of problems encountered in the current practice will take place and finally to alleviate these problems data's will be forwarded for analysis.

The estimated number of the total population size for the research was gathered during the research and data was found from the concerned governmental organization therefore according to the data gathered from Addis Ababa city administration infrastructure and construction permit and

control authority there are more than 5,940 registered high-rise building (greater than 28m height) are present in Addis Ababa. .

Figure 3.1 shows the overall steps of research methodology in conducting the whole work in general, but the actual situation has so many parts and repetitive works.

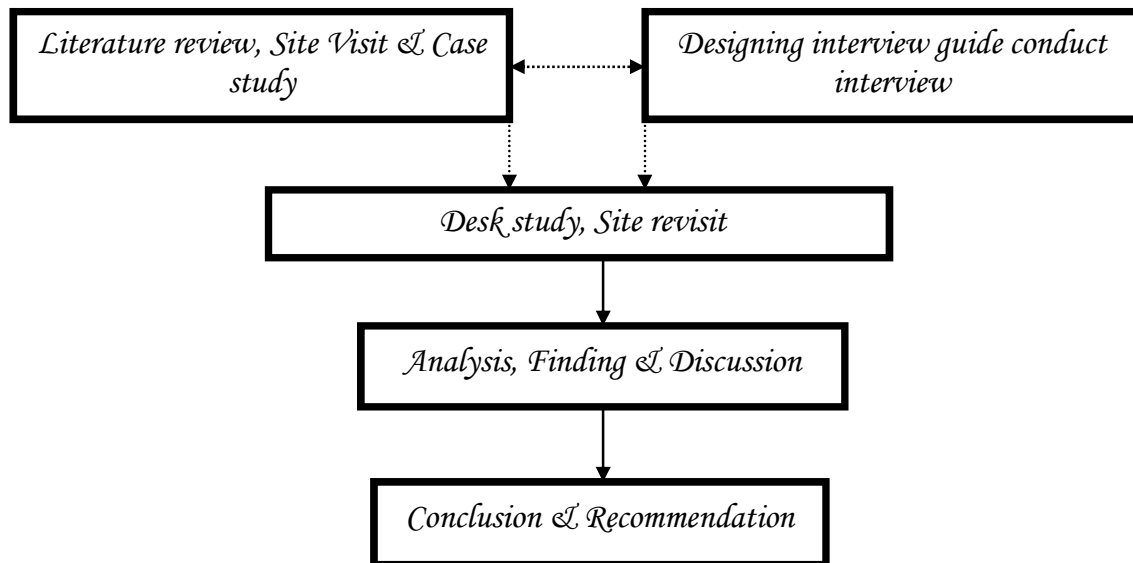


Figure: 3.1 - Flow chart of research methodology

3.4. Sampling & Data collection

The judgmental sampling and data collections method took place on procedural manner and majorly based on sampling cost, sampling time and vulnerability to error of the sample.

The following methods were used in data collection, these are Questionnaire, Interview, Observation, Secondary data and Desk study are major ones.

3.4.1. Questionnaire

From general perspective to detailed technical and managerial aspect a total of 36 short and clear questionnaires were dispersed to the focused group who were selected based on their attachment to the selected sample projects and their experience and educational back ground were considered.

3.4.2. Interview

Interview was one of the primary data collection methods which is flexible and adaptive way of investigating underlying motives of a subject in a way that self-administered questionnaires cannot answered. The interview undertaken for this thesis will be based on semi- structured style. This type of interview has a predetermined set of questions (generalized form of questionnaire) with a

flexible order depending on what the interviewer perceives the subject matter by looking at the respondent capability and exposure or experience.

3.4.3. Observation

Observations on selected projects were used in this research to support or supplement responses and arguments found through questionnaire and interview. Undergoing high rise building construction projects were observed to find out how it is implemented and managed in local construction projects.

3.4.4. Secondary Data Sources

The secondary data were obtained from relevant books, journals, magazines and research papers which have been used to perceive the practice of high rise building construction. These secondary sources provided a general understanding of the subject area by presenting a wide range of ideas in the field which help to supplement other specific information obtained from the primary data sources. A Desk study survey research methodology has been applied to a positive research paradigm adopted for the study. Primary and secondary data was collected from site and desk study were conducted.

3.4.5. Case Studies

A case study is an in-depth study of one person, group or an event. In case study nearly every aspect of the subject's life and history is analyzed to seek patterns and causes of behavior. One of the greatest advantage of case study is that it allows researchers to investigate things that are often difficult to impossible to do in a laboratory. It allows researcher to collect a great deal of information, give chance to collect information on rare or unusual cases and helps to develop hypothesis that can be explored in experimental research. Case studies help to get the detail information about sample projects and helps to understand the current situation. Totally eight projects were studied to reveal the current situation of major high rise building construction industry in Addis Ababa by considering the equal number of projects which are implemented by international contractors and local contractors. The type of buildings studied were bank, insurance and apartment buildings.

3.4.6. Steps in conducting the research

Step 1: - Literature review, Site Visit & Case study

Step 2: - Designing interview guide conduct interview

Questions are designed in such a way that to achieve the research objective, which and what are the causes and impact of hiring foreign contractors, what measure do the stakeholders take to minimize the effect and what should be done to control the effect of international contractors.

Question for interviews and desk study design process are described shortly as follows:

- ✚ Identify the first thought questions:-All Possible questions related to our research, formulating the final question, Order the question in the following sequence
- ✚ Wording of Questions:-Short and compressive, avoiding double questions etc.
- ✚ Questions concerning the cause and impact of hiring foreign contractors especially on HRB

Step 3: - Desk study, Site revisit

Step 4: - Analysis the response from interview, observation, site revisit and discussion

Step 5: - Conclusion and recommendation of the research

After the analysis is made conclusion is produced from the bases of the analysis and recommendation was made on how to minimize the cause and impact of hiring foreign contractors.

3.4.7. Data Analysis

Since Likert type of questionnaire used, the analysis have been performed by identifying the Relative Importance Index (RII) method. The relative importance index method is used to determine the relative effect of the factors affecting the performance of the construction of high rise building. In addition to that ANOVA (Analysis of variance) test also included to show the variance between all responses. The relative importance index is computed as follows.

Weighted average

$$RII = \frac{\sum W}{A \times N}$$

N	n1	n2	n3	n4	n5
5(0-4)	ES	VS	MS	SS	NS

Where: W is the weight given to each factor by the respondents and ranges from 0 to 4

A = the highest weight = 4

N = the total number of respondents $RII = \frac{4n1+3n2+2n1+1n4+0n5}{4N}$

4N

Equation 3.1. Relative Importance Index (RII)

4. ANALYSIS OF FINDINGS AND DISCUSSION

4.1. Introduction

This chapter deals with the analysis of gathered data and presents discussion from the result of analysis on the major issues by combining with literature review.

The procedure applied to analyze the result of the questionnaire is by forming the Relative Important Index (RII) for the factors of challenges and unwanted effects and ANOVA test is applied to analyze the variance between groups and each factors. The questionnaire presents opportunities of responses as Extreme Significant (ES), Very Significant (VS), Moderately Significant (MS), Slightly Significant (SS) and Not Significant (NS). To identify the factors as the frequency of occurrence of the variable, the percentage of respondent's answer were ranked for the analysis purpose.

Through case study and RII ranking and ANOVA test it was possible to identify the major causes for the challenges and performance differences that have impact on the high rise construction in Addis Ababa as well as in Ethiopia.

4.2. Responses to Survey

This study has focused on directly participating key professionals of the construction stakeholders who were engaged in the construction of high rise building. For key professionals of systematically selected projects detailed structured questionnaire was distributed. To make the analysis more comprehensive the questionnaire were dispersed to contractors, consultants and clients of different projects, a total of 39 questionnaires were distributed out of which 29 (74%) were filled and returned. Table 4.1 and Figure 4.1 present the illustration of response rate in terms of organization and project type. In addition, ten reputed professionals of the sector (two from client, four from consultants and four from contractors), who have strong expertise with regard to the high rise building construction work in focus, have been interviewed and their responses have been supplemented with the questionnaire survey.

The following table summarizes the number of respondents which are selected from client, contractors and consultants.

Table 4.1:- Number and percentage by type of organization

Stakeholders	Dispersed No of Questionnaires	No Questionnaires Answered	percentage
Client	7	5	71%
Consultant	11	8	73%
Contractor	18	13	72%
Total	36	26	72%

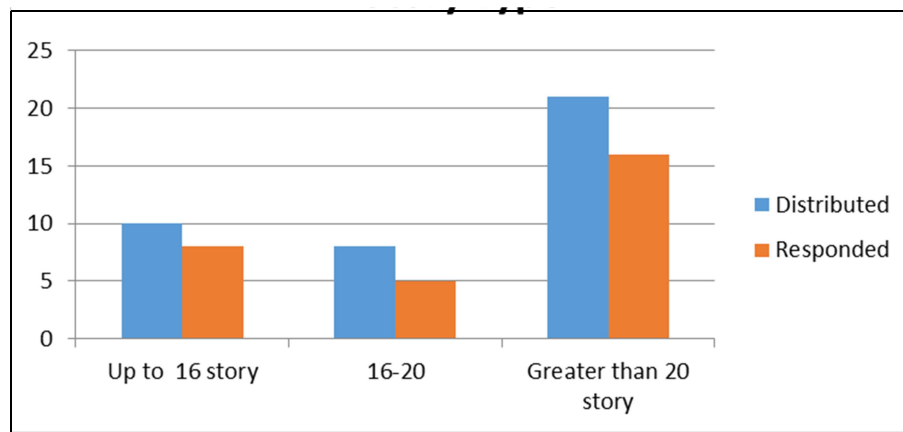


Figure 4.1 Questionnaires and responses by building story types

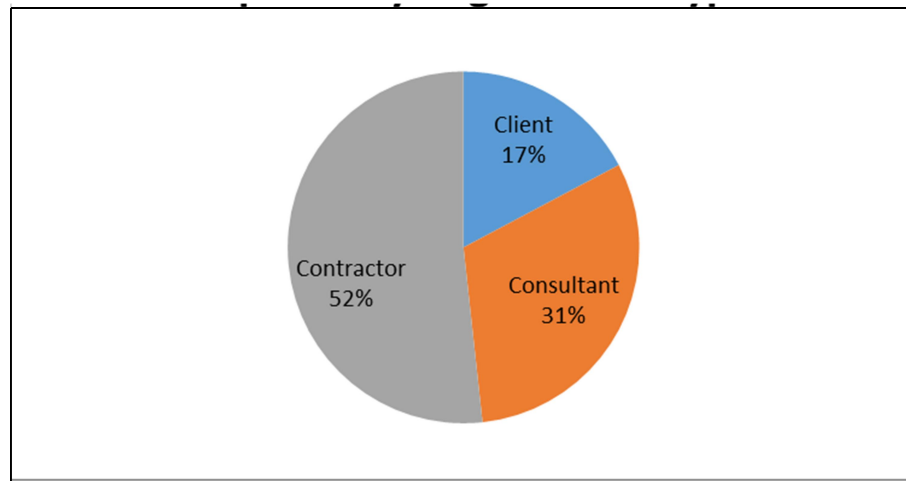


Figure 4.2 Responses by organization types

As it can be seen from the table 4.1 and figure 4.1 the response rate of contractors with respect to the distributed amount of questionnaire is greater than clients and consultants.

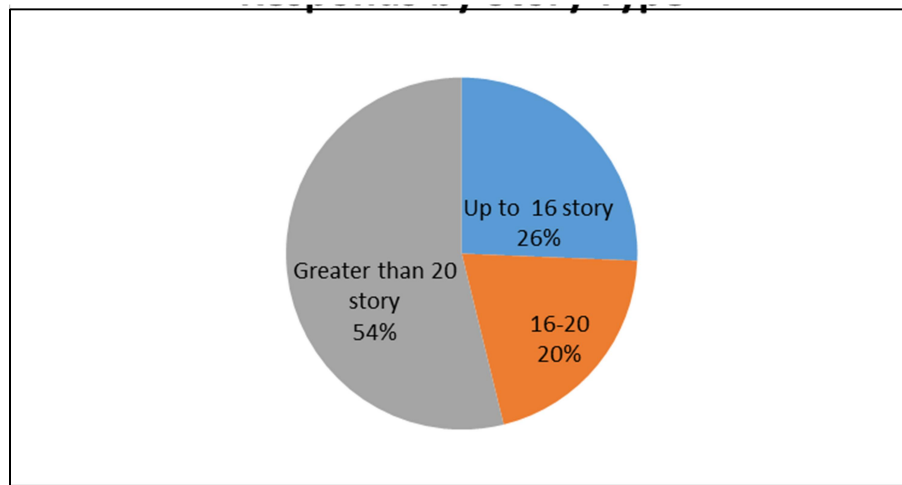


Figure 4.3 Responses by story types

All sites observed in detail are undergoing construction projects which were engaged in high rise building construction work though the findings from the observation is accompanied in the analysis of data found from questionnaire.

4.3. High rise building construction Works and Execution Management Practices

In conducting this research, the primary objective was to identify how is the high rise building construction work implementation going in Addis Ababa. Engaging high rise building construction Work widely, performing geotechnical investigation and testing of construction materials are appreciative practices. On the side of local contractors poor experiences in safety & health management, less protection of the surrounding environment, accident, and failures found as a result of instability of excavation and less implementation of quality assurance and construction work methodologies are deemed as bad experiences in Addis Ababa.

As high rise building construction work requires careful planning to attain the intended quality that is effective product and efficient utilization of resources with safe working conditions, different mechanisms are applied or adopted but faces many challenges as it is performed in urban and congested area. In the local construction practice especially in Addis Ababa high rise building construction work has its own limitation and challenges. To determine the factors that influence the high rise building construction Work and the causes that cultivate problems and unwanted effects, the hypothesis factors were developed in closed question where the rest practice with the remedial measures was incorporated with open questioners. Thus the outcomes of the questionnaire discussed further below.

Hereunder the most common causes and events that occur frequently in the local practice of construction of high rise building construction works are presented by pointing out the highly ranked items that have greater values of Relative Important Index (RII). Whereas the whole analysis result of the questioners is presented in the appendix.

From the result of the first part of the questionnaire, which is the closed questioner, the most critical factors that influence execution of high rise building construction work are screened out by rank of their result of relative important index. As one can see in figure 4.4 the result shows that the factors mentioned in questioner have high intensity of occurrence as per the RII analysis which describes how much the high rise building construction work in Addis Ababa lack good execution management practice. More than 95% of the factors get results above 50% or greater than 0.5 RII which are labeled above the green line.

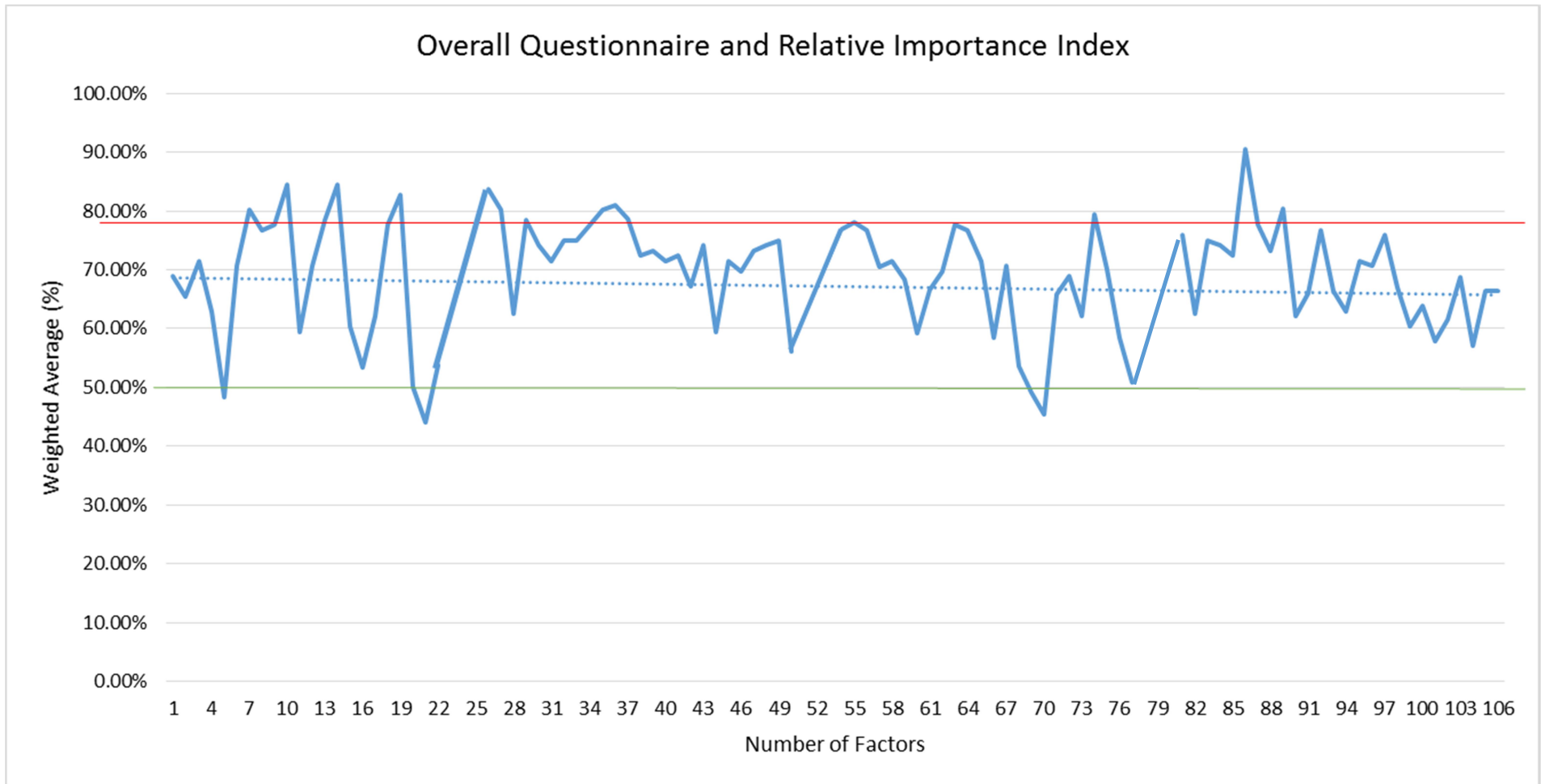


Figure 4.4: Result of questionnaire using RII

This shows that the local practice in terms of implementing of high rise building construction work in all three phases, i.e. during planning, execution and monitoring and evaluation stage is facing challenges.

For this research purpose, the factors found above the red line in figure 4.4 are selected for discussion and they are presented in the table below and designated as top fifteen factors which cause performance difference between local and international contractors.

Although there are many reasons, the deficiency of cash is one of the main factors threatening the success of the construction projects and causing business failures. (kassahun, 2016)

Table 4.2 Top fifteen factors which cause performance difference between local and international Contractors on high rise building construction

Question no	Factors causes performance difference between local and international contractors	E.S	V.S	M.S	S.S	N.S	sum	RII	RII %	Ran k
6	Lack of foreign currency	22	5	1		1	29	0.9052	90.52%	1
10	Lack of technological Experience	18	7	2	1	1	29	0.8448	84.48%	2
14	Lack of working culture	18	7	2	1	1	29	0.8448	84.48%	2
1	Poor Enterprise management system	16	10	1	1	1	29	0.8362	83.62%	3
18	b) Economical	16	6	7			29	0.8276	82.76%	4
11	Poor quality Management	16	7	4	1	1	29	0.8103	81.03%	5
9	Lack of performance on electromechanical works	12	12	3		1	28	0.8036	80.36%	6
7	Lack of experience on high rise building construction	17	3	8		1	29	0.8017	80.17%	7
2	Poor site organizational management	14	11	2		2	29	0.8017	80.17%	7
10	Poor cost Management	13	11	4		1	29	0.8017	80.17%	7
21	Lack of international financing	14	9	3		2	28	0.7946	79.46%	8
12	Poor Enterprise resource Management and delivery	13	8	6		1	28	0.7857	78.57%	9
13	Lack of finance	13	11	3	0	2	29	0.7845	78.45%	10
4	Lack of asset management	15	7	5		2	29	0.7845	78.45%	10
2	Lack of equipment in variety	10	11	2	1	1	25	0.7800	78.00%	11

1. The primary factor found to be the lack of foreign currency which has the relative important index 0.9052 or 90.52% as per the responders which shows that the construction of high rise building is extremely attached with country's economy in other hand unless county's economy is well developed and the country have enough foreign currency the local contractors cannot perform with all its capacity even if factors such as general, managerial, technological and technical factors are on acceptable status. Therefore in order to make the local contractors capable of executing high rise building construction the government should reduce foreign currency shortage in the industry which needs political decision in addition to the economic analysis and decisions. Not only the government tries to avoid the foreign currency shortage but all stakeholders in the industry should contribute in getting such currencies for the better implementation. Unless hard currency problem reduced for our contractors our country cannot execute huge and complex civil engineering construction projects with our local contractors.
2. The second factor mentioned by the responders is that lack of technological experience which comprises the relative importance index 0.8448 or 84.48%. Technological experience is vital in complex civil engineering construction like high rise building construction. Technological experience includes using electronic communication, contemporary machineries, different mechanical tools and gauges. But only the equipment and machineries couldn't give the intended result but skilled professional who operate these equipment should be available.

To avoid the lack of such technological implementation machineries and equipment should be always calibrated and professionals should have sustainable training and monitoring them tentatively even scheduled training and skill testing will have great impact in the construction process. In addition to that equipment and machineries should have serviced as per companies manual. Now a days in this information technology era there are plenty type of communication technologies which are upgraded from time to time hence local contractors should have a department that follow and upgrade such communications.

The other technological factor which should not be undermined is that the use and management of machineries and equipment this resources also can be digitalized and they can perform lot if appropriately used and managed. In general if our contractors should be participate on large scale civil engineering works including high rise building construction in our country there must upgrade system to the contemporary art of technology every time.

3. The other second factor by responders is lack of working culture. This also comprises the relative importance index 0.8448 or 84.48%. Working culture is mainly associated with civilization. A civilized society clearly understands their right, responsibility and obligation. Working culture is the basic productive factor which helps implementation smoothly and timely manner. In civilized society everybody knows what is needed from them and always ready to do what is expected from him and of course he will know his right too. Therefore it is essential to train employees about self-development tactics including motivational teaching.

On the other hand the employer also should exercise their right and obligation related to the work, the employees and with all stakeholders around the industry. Once the work force doesn't have a working culture one can't speak about the development of local contractors even our country's development. Changing working culture is not any easy task even on the scale of country it is sophisticated. But it can be achieved by continuous training and support in general. Employees need much from employers not only salary but they need a visionary leader who motivates and inspires them.

It obvious that the government and the employers have a better understanding of working culture hence unless they share this culture to their employees one can't talk the development of local contractors and as well as the development of the country. Working culture comes with civilization. Even if Ethiopian people have a civilization history but these days the working force doesn't have a working culture this may be because of poor government administration, addicted working force, unstable political system and poor economy.



Figure 4.5:- Lack of proper implementation

4. Poor enterprise management system is the third factor that causes performance difference between local and international contractors. And it comprises the relative important index of 0.8362 or 83.62%. Mostly our local contractors either not have delegated organizational structure nor they didn't implement their enterprise management system. The enterprise management system for organization is like a nervous system of our body. It has internal and external stakeholder's communication system which is designed precisely for effective and efficient performance of the organization.

To make an organization effective and efficient enterprise management system implementation should be done in a wisely manner because without delegation one can't even run a small enterprise. Therefore for a company which runs such a kind of complex civil engineering work like high rise building should implement enterprise management system thoroughly. Poor enterprise management is caused by lack of knowledge. As local contractors are our country's wealth, the government and other public organization should work on the capacity building of local contractors. Theoretically our companies have organizational structure that is proposed professionals but on the actual ground they run their business traditionally. Because they believe that family members are more trustable than new comer professionals.

But as a consequence many of them are not successful by this traditional system they either become stagnant that means no further growth or leads to bankruptcy as it can be seen in the past. Indeed all professionals are not the same some are disloyal and incapable and the others are well trained and have capacity then it is the employer task to verify their behavior during recruitment process and then by creating a control system on job process.

5. The fourth factor which is the main reason of hiring foreign contractor is economic status of the country. As per the respondent of the questionnaire economic status of the country comprises the relative important index of 0.8276 or 82.76%. It is obvious that economic development of a country has direct influence on local investor's capacity that means if our country economy develops well the local contractors capacity in other hand will have strong economic status which leads to be engaged in high rise building construction in widely manner.

If countries economy is well developed the government can help the contractors or may work with the Public Private Partnership (Already established by proclamation number ---2017) which will have a win-win output for the government and the local private companies. Hence to make high rise building construction by local contractors in widely manner it is necessary to focus on countries economy and of course the local contractors should contribute on the development of countries economy in detail and sustainable manner generally it has mutual benefit between the

government and local contractors. Indeed one of the reasons of hiring foreign contractor is economy. Once economy is poor it is difficult to get the capacity of implementation in any ways. So it is about the government and riches to build firm economy to the country.

High rise building construction is one which reflexes country's wealth that's why the researcher have a stand that most major and complex high rise building construction should be constructed by local contractors because they are not only reflex country's wealth rather if they are done by local contractors they shows citizens civilization. Most huge and complex civil engineering works talks a lot about the country of where they exist. So as previously discussed local contractors should not only participate on construction industry of the country they have to work with other economic motors such as with local and international investors and of course with the government.

6. Poor quality management is the fifth factor which influences local contractor's productivity and have the relative important index of 0.8103 or 81.03% as per the respondent of the questionnaire. Quality workmanship difference between the local contractors and the foreign contractors is the reality that one saw during the past decades. This part of management should have to develop very much by local contractors. Quality management is the core part of the implementation of high rise building. Unless great care is not taken on the quality management of high rise building construction as the final product gives great economic development to the country it can be debt to that country.

Because it may not serve as per the design and as per intended quality standard. Further if there is not quality management system in a company the final product of that company will be defective and that leads it to bankruptcy. The other factor which cause poor quality is that in order to get the job a bidder compromises so many factors which degraded the quality standards of the final product. Other than this poor quality management comes from corruption in our construction industry. Even if it has a supervisory structure on each level on the construction industry the field is so corrupted that many an acceptable quality standards are approved by the concerned body. Some local contractors are seeing such a kind of thing as part of the work not as a corruption. The big problem is here. Even it was seen that some foreign contractors also entertain such a kind of mischief on the construction industry.

7. The sixth factor that causes the local contractors performance difference with international contractor is Lack of performance on electromechanical works it is weighted by responders as relative importance index 0.8036 or 80.36%. Even if electro mechanical work is differ than civil work most of the time a contractor which is engaged on the construction of high rise building as a

primary contractor will be responsible for the electro mechanical installation also. Hence a local contractor who is engaged on high rise building should be organized with electro mechanical professional staffs. Such works need precise installation and delivery time. The electro mechanical installation methodology shall be planned in suitable manner for workers.

Allocation of machineries and materials, procedures of activities, how to install without disturbing the surrounding structures and so on must be studied and planned before handing over to execution. However, the consultant and design engineers do only the design of the electro mechanical to be installed but the methodology starts to be observed when construction is ahead and problems being observed. . Indeed it is other field than civil engineering but it is obvious that the civil contractor is responsible for the installation of electromechanical works. To alleviate the poor performance of local contractors in this field the country should focus on training such professionals in cooperating with high rise building construction stakeholders.

8. Lack of experience on high rise building construction is the seventh factor which have relative importance index 0.8017 or 80.17%. As it is known before few years ago 16 and above story building construction is not familiar. As the height of the building increases the constructing methodology becomes sophisticated hence as local contractors are new for such a kind of execution it has great factor on the performance of construction between local and international contractors. On high rise building construction the substructure work and vertical transportation plays an important role on performance.

In addition to that as the project sites are mainly in the center of the city and have small area it needs site organization management in detail. Experience of any work plays an important role on the speed and quality workman ship. The basic difference is here, lack of experience on high rise building construction which has big influence on the performance of constructing it. As our country enters on high rise building construction widely in recent decades our local contractor, most of them have little or no experience on high rise building construction.

Experience makes perfect as they said. On the other hand foreign contractors have a well entertained experience on high-rise building. Hence they took an advantage of this on technical competitiveness on the procurement method. The basic idea is to work with efficient and effective working environment such a kind of environment is created either from previous working experience or from repeated training and sharing work experience from another contractor who have experience of high rise building construction.

9. As it is discussed in high rise building construction experience, site organizational management is crucial on the construction performance of a high rise building. According to the responders Poor site organizational management is also the seventh factor which cause performance difference between local and international contractors and have a relative importance index 0.8017 or 80.17%. Poor site organizational management causes the overall negative impact on the construction performance especially on effective and efficient workman ship. Unless a site is managed effectively one will lost lots of working hours, loss of construction materials and equipment, poor quality workmanship and even site accident can occur.

In addition to that unless site organizational management done properly the safety and health issues becomes very difficult to manage. Site organization management is a key management system on the site. Again here our local contractors have a theoretical organizational structure on the site most of them are not implemented in actual ground. As it is discussed in poor enterprise management system here also the scientific methodology is not applied by most of our contractors. This is because of loyalty question choosing between family, friends or professionals.

Here the researcher recommends that if a contractor wants to be develop his firm and to be competitive internationally he have to be follow scientific organization system and upgrading it with all current system. Without scientific site organization management there cannot be achieved an efficiently used resources as well as an effective product

10. According to the respondants for the third time the seventh factor which causes construction performance difference between local and international contractors is Poor cost Management and that have relative importance index 0.8017 or 80.17% also. Unless great care is not taken on liquid asset at hand and working as per the tender cost the overall construction will be hindered at some point during construction phase. Cost management is the very critical issue on project management.

If a project cost managed properly the company will get additional profit than expected on tender stage but if it isn't managed it may cause the project stack at some point and even further which may lead the company to bankruptcy. Most of the time contractors consider advance payment is their asset but the reality is it is the amount of money which helps to site mobilization and early works cost. There for the contractors should consider the cash flow during the whole construction stage and manage the cost with the net profit on each stage.

Poor cost management is seen by our local contractors. The clients in Ethiopia generally tries to support contractors as a whole by providing advance payment this payment is not contractors

profit it is rather a credit for the contractor to execute the work initially it uses as a tool to eliminate financial shortage at the beginning of the construction phase. But some of our contractors either knowingly or unknowingly saw on investing on other consumptions that will not have return. On other hand it was better if they invest on a capital return investment which can have a return value or used as collateral for the company. The first option of using an advance payment should be to invest on the intended project only. Other investments will be take place as per the company's cash flow situation.

The second option should be investing on a capital which have quick return for example investing on real states is one option because every time real states value is appreciate and also can be collateral. The other option as per the researcher if the contractor wants to have an investment it is better to invest on construction equipment this option has two useful purposes one the contractor use these equipment as resource on the project and the other they can be used as a collateral also.

11. Lack of international financing is the eighth factor which causes performance difference between local and international contractors and it comprises the relative important index of 0.7946 or 79.46%. International financing is that any means of liquid asset fund which is found from foreign entity to the local contractor. However as per the researcher experience there is no such a kind of fund between entities of different countries rather such a kind of support may be done by the correspondence between the local contractor's government and the international financier government.

Hence our government should work with such entities to help local contractors to resolve financial problem especially foreign currency. For example organizing a bazar for local and international contractors together in order to create a stage of discussion and may create a joint venture company which can resolve the finance and a job for both companies.

12. Poor Enterprise resource Management and delivery becomes the ninth factor according to the responders and which have a relative importance index of 0.7857 or 78.57%. Enterprise resource management comprises a wide range of management of resource. Basically it is done at the head office of the company. A company may have more than one project in different stage therefore it is up to the company's management to use different resources for different projects at the same time. Every resource should be delivered on time for different projects. In construction company when it is said enterprise resource management it includes but not limited to Manpower, Material, Machineries, Money and Methodology.

When it is said poor enterprise resource management it includes presenting resource on the wrong time that is early or deferred supply of resources, defective resources, incapable resources, in-

compatible resources, low quality resources and so on. Generally it is observed that poor enterprise resource management causes inefficient utilization of resource and produce ineffective product. Poor Enterprise resource Management and delivery is other factor that our local contractors should make a progress. A contractor should be care on the selection and deploy of resources to his project. Unless resources are not evaluated and tested before deployed they cause bankruptcy. Even once resources are selected and deployed it needs close follow up and evaluations in every implementation process.

13. Lack of finance comprises the relative importance index of 0.7845 or 78.45% and become the tenth factor which causes the performance difference between local and international contractors. According to the researcher lack of finance may not be exist if the contractor wins a project with reasonable amount of money. Because the contractor is entitled advance payment for the new project which alleviate shortage of finance but if the contractor wins a project with poor price even if there is advance payment the contractor may not cover his cost.

Hence the researcher tries address that lack of finance is caused by the tender price of the company. On the other hand as it is mentioned before poor cash flow management causes lack of finance. Poor cash flow management can be caused by deliberate expenditure of money or unwise decision by managers. In both cases it causes lack of finance on project and creates bankruptcy on the particular project as well as the company.

14. Lack of asset management is the other tenth factor which differ the local contractor with foreign contractor in performance and it comprises the relative importance index of 0.7845 or 78.45%. When it is said lack of asset management it mainly includes unwise investment that is not have a return or which have poor return rate. Our contractors don't follow scientific economical investment by the asset already they have on the hand.

Unless local contractors invest wisely on something that let them to grow on healthy manner they can't participate in high civil engineering structures such as high rise building construction. Because such project have huge amount price, the contractor should present collateral which have equal amount of the advance payment and performance bond. There for the contractors should focus on the investment which is mostly related to the real estate and construction equipment and any other investment which have fast return rate.

15. Construction equipment has two major roles as it is discussed in previous section. First they are a resource on the project and second they can be collateral for the firm. As a resource a company should have variety type of equipment because each type of equipment has its own specific task that can be performed by it. Lack of equipment in variety stands on the last stage of top fifteen

which cause performance difference between local and international contractors. According to responders it gets relative important index 0.7800 or 78.00%. Unless beyond capacity of the firm substituting equipment with another type which main task is for other purpose causes loss of efficiency and not effective product. Generally lack of variety of equipment cause delay on the performance, poor quality workmanship and incurred additional cost.

Generally improper execution and resources brings accident to workers and wastage of resources. As described in the literature construction works methodology defined in the design stage as one major task so that planning of construction procedure, arrangement of site, locating of mobile equipment, stability of adjacent structures and related points have to be done by design engineers & other professionals with consultation of all responsible personnel.

4.4. Discussion based on each site

4.4.1. Project Site Local Contractor one

During site visit and discussion, it was learnt that this project is a real estate project implemented by local grade one contractor having total built up area about 1850 square meter and it is designed for the purpose of residential and commercial floors. As per site document revision it is learnt that the building is a 3B+G+22 story building and planned to be built within four year of construction duration. The initial construction cost estimated was about 480 million Birr. The current construction stage is only at fourth floor column.

The purpose of study of this site is to reveal the overall situations those happens from inception up to current physical status and the strength and weakness of the stake holders in the implementation process in order to compare and contrast the performance of the contractor with other sites those are implemented by local and foreign contractors. Generally, this project is too delayed that the case study tries to answer the main reason for such a kind of delay.

The project is aimed to be built within four years but from the beginning it faces administration and financial problems. The administration problems comes starting from receiving title deed document from the concerned governmental organization followed by building permit process it almost takes one year to commence the site work and it causes variation on cost and time beyond the plan.

After commencement of onsite activities the demolishing and clear of the site work takes more than the planned schedule because the contractor uses few resources and uses traditional demolishing workmanship- it is lack of technological experience. Unskilled and semi-skilled laborers with some construction tools were deployed on the demolishing work. One can guess that the contractor's methodology of de-

molishing is to make economical but in the contrary because of extended time the site overhead cost was rise excessively it is the implication of working culture.

The site establishment takes place longer time than scheduled the reason behind this as explained by site officials they simply describe that financial shortage but the researcher believes that it is the financial management problem after reviewing site financial correspondence letters from office engineering documents. On the other hand the built up area is so wide that the contractor urged to use the local road and that creates burden on the dwellers around, poor site organizational management.

The shoring pile work also takes three months longer period than the schedule as per site officials and site documents one of the reason for delay of this activity is the oldness of machineries and other reasons is lack of foreign currencies as described by the officials to buy new machinery but one can learn that considerable variation in cost and time takes place because of lack of support from the head office. The shoring pile drilling progress not only so slow but it was interrupted for some days because of breakdown of drilling machine and lack of finance for the resources.

The stage excavation and earth work takes additional time in addition to oldness of machineries here the problem is access to the site in terms of open space, access road width and road quality to accommodate enough machineries. Iterated access road maintenance takes place as the existing road is bad and eroded by rainy season and heavy construction machineries. The remaining shoring work that is shotcreting is takes place in line with the stage excavation hence its delay comes because of excavation and earth work is done in difficult access to the site manner but in addition to that it had poor workmanship caused by old machines and poor site management hence that is the cause of variation too.

Once the stage excavation and shotcreting finished the mat, isolating footing & combined footing foundation work takes place but it is not only takes longer period than expected but failure of shoring happen due to rainfall surface and underground water. No investigation is done whether the shoring design and construction problem cause that failure or another unpredictable factor. To evacuate the fallen ground it needs considerable cost and time on the other hand the treatment for the fallen wall is traditional just by making eucalyptus grid to support but fortunately the soil wall becomes stable.

The sub structures is the mat, isolated footing and combined footing, basement slabs, basement columns and ground floors are done in a very slow progress and interrupted so many times because of lack of finance. Even if there is tower crane and all concrete equipment small amount of concrete casted per day. Too small resources were deployed for the construction of formwork and reinforcement bar. All implementation manners are repeated for the supper structure also.

Generally, the project is too delayed that even after four years of activity at present it is on fourth floor columns construction. The major problem of this site as per the officials is that “Financial Shortage”. But one can realize that the project faces poor government support, follow up and monitoring activity or generally no corrective measure was taken by government.

Even if the project is private business it is financed by buyers who already paying by agreed instalment period. so if that is the case the real estate developer should be urged to respect the construction time line and decrease site overhead which caused by extended construction period and inflation.

Project Site Local Contractor Two

This project is a real estate project also implemented by local grade one contractor having total built up area about 2800 square meter and it is designed for the purpose of residential and commercial floors. As per site document revision it is learnt that the building is a 3B+G+21 story building and planned to be built within four year of construction duration. The initial construction cost estimated was about 680million ETB. The current construction stage is on finishing stage.

This study is also done for compare and contrast the effort of the contractor with the rest focus grouped sites and specifically how the contractor handle different obstacles and the weakness and strength to reach on the current status. On the other hand the study tries to address the factors those have major influence on the implementation process.

During site visit and discussion it is observe that the project is going without any accident and the site access road is sufficient to move to the site and out from the site but for the internal circulation the built up area is so wide that it makes movement difficult this shows poor site organizational management.

The demolishing and clear of the site is done almost as planned with little deviation caused by unpredictable different reasons. Even if the demolishing done as planned the methodology is not efficient to much resources deployed that is many site workers engaged on the process and was caused dust air pollution around it.

The site facility establishment is done two times in different location the first one is just near the building to be constructed but after some progress of the work they changed a location out of the project compound but near to the site because of difficulty of locomotion this shows poor site organizational management.

The shoring work here also takes longer time than the planned because of old machineries and poor workmanship. The drilling machine most of the time failed and needs iterated maintenance. Because of this and other unpredicted situations the shoring work was very difficult. One can say that the major fac-

tor for this delay are lack of equipment in variety and poor enterprise resource management and delivery.

The delay of stage excavation and earth work is caused by its working time that is the activity is takes place mostly by night shift because of traffic jam in the city this working culture is applied for all eight construction sites. The stage excavation and shotcreting causes considerable cost and time variation. In addition to that limited machineries are allowed to the site to move for an activity.

The mat foundation activity takes place in delayed manner too iterative dewatering activity causes additional time and cost even after dewatering the ground in which the foundation lays needs treatment to gain its natural strength and that causes variation on cost, time and quality on the project. The back filling work is done almost in time but small delays. Other major reasons for the delay are rainy season, management gap and shortage of finance. One other thing that interrupt the substructure work is absence of enough reinforcement bar which intended to buy from abroad and because of lack of foreign currency the supply of rebar interrupted for considerable time.

The rest of structure construction is done in varying manner that is sometimes it is done in progressive manner and sometimes it becomes stagnant for a period of weeks and even for a month. The reason behind for this delay is shortage of supplying resource including finance. Generally the structure part is already finished this project causes delay and additional cost beyond its initial budget. Even though the sub and super structural construction activity is finished these days the project is delayed for one and half year beyond its four years schedule.

Considering this contractor he have to upgrade his site organization and its management capacity in order to avoid unnecessary delay and rework in addition to that before commencement of any work using machinery the machine must be well inspected and if it is needed full maintenance work must be done on the other hand for foreign purchase there should be early preparation for foreign currency.

4.4.2. Project site Local Contractor Three

This project is an insurance head office building project also implemented by local grade one contractor having total built up area about 2200 square meter and it is designed for the purpose of offices and commercial floors. As per site document revision it is learnt that the building is a 3B+G+22 story building and planned to be built within four year of construction duration. The initial construction cost estimated was about 750 million Birr. The current construction stage is sub structure stage.

This study is also done for compare and contrast the effort of the contractor with the rest sites and specifically how the contractor handles the excavation and earth work related to access to the machineries

and strength to reach on the current status. In addition to that the study tries to address the factors those have major influence on the implementation process.

Even if the site demolishing work is carried out in traditional way the open ground help the workers to implement it in good way without air pollution and excessive resource usage.

The built up area and the site are almost equal that the contractor is urged to construct the site facility by borrowing a piece of land from public road. Hence the other crucial point about this site is that the built up area is almost the same as the whole site area and the contractor is urged to have congested site facility having great opportunity for accident and poor workmanship. The site facilities are out of the project territory.

The commencement period of construction activity is about a year from now. The site has access by its three sides by main roads of the city but all the three roads are busy traffic roads and now it is on the stage excavation and earth work stage after the finishing of shoring work.

Again here the shoring work was takes longer period of time than its budget of time because of rainy season and old machineries. This work is done on interrupted manner that considerable cost and time are consumed and from the site correspondence it has learnt that the contractor was a plan to buy drilling machine but it can't be achieved because of foreign currency and lack of finance hence the contractor is urged to work using old drilling machines.

After execution of shoring pile work the stage excavation and earth work is done on interrupted manner too. Due to the smallness of the site it can't be construct access slope road to and from the site hence during excavation of the final stage it causes difficulty to cart away the excavated material from the reduced level to dump truck even the last excavator is carried out with the help of other machineries on unusual way. Even if there is no access to the site problem the traffic jam around the site during the day urges to work the stage excavation and earth work at night shift as it is seen on the other sites. Again here the rainy season, financial shortage and management gap creates delay on the execution of shoring and stage excavation and earth work. As per the discussion and observation the site is on the verge of starting foundation construction. Seasonal dewatering is also takes place because of considerable amount of surface water existing in the reduced level during rainy season.

The study of this site shows that when the built up area and the total site are equal and if there is no other additional place the stake holders specially the contractor should come up with a specific planning and design for proper implementation and avoid additional cost, time and other resource usages.

4.4.3. Project Site Local Contractor Four

This project is also an insurance head office building project and implemented by local grade one contractor having total built up area about 2200 square meter and it is designed for the purpose of offices and commercial floors. As per site document revision it is learnt that the building is a 3B+G+22 story building and planned to be built within four year of construction duration. The initial construction cost estimated was about 760 million Birr. The current construction stage is on finishing stage.

This study also describes the early challenges on the construction process that the contractor faces and why the total work is interrupted for the long period of time. In addition to that it examines the strength and weakness of the contractor in handling those arose problems and compare and contrast with the causes of delays faced by the contractor.

This project was stopped for more than one years because of contract administration and hard currency shortage for the supply of finishing material which are imported from abroad. The 22-story insurance building construction was started before four and half years from now. The demolishing and clear of the site was done beyond the planned schedule but it doesn't cause considerable delay as compared to the total project life. The site facilities management also delayed because of poor site management and loss of focus just rush to start the shoring work. As other similar projects it has administration issues with governmental organizations at the beginning including having title deed document, lease contract renewal issue and building permit even after commencement of site activity.

During shoring construction, the major problems were the drilling machines. These machines are so old that their productivity is so small and they need iterative repair on the site. Once the shoring work is finished the stage excavation and shotcreting is done in similar manner as other major building construction is done here considerable delay registered that the contractor should be penalized but there was delay caused by clients default hence the contractor asks to compensate with clients default and the contractor has relief from penalty. One of the cause of stage excavation and shotcreting work delay is that the cart away work is done during the night because of city's traffic jam. The pile foundation work is done in similar way with the shoring work but more time is spent here as the work is done with the same old machines, rainy season and ground water makes the work very tough. Dewatering ground water from this site exists up to in the near past time. As it is described on the site the water level is near to the ground when rainy season comes it rise above the damp proof course and it floods the basement of the building but now a days dewatering from the basement is resolved. The mat foundation work done with small variation of cost and time with the planed schedule one of the main reason for this variation is the traffic jam again even if it is done day and night the productivity on day time is so small that it is must

to work at night shift. The substructure work delayed because of treating this underground and surface water in rainy season is one factor and “the shortage of finance” is the other but it is informed that the lack of support of head office and the poor site management causes burden on the progress of the structure work. The other super structure work also delayed because of shortage and deferred supply of resources including finance. The former poor site construction management skill also causes delay on the execution of superstructure construction activity.

This study help us to acknowledge the need of proper working plan and good organizational management system before starting any given work. And it also teaches us consultants studies should be checked in some mechanism before entering to work in full manner if it is possible, in addition to it tells that risk management is the key to overcome the unpredictable and unforeseen events.

Even though the contractor main task is to implement the construction process preliminary engineering studies and design should be checked by the contractor because default caused by preconstruction stages will not give relief for the contractor during construction stage in this case the underground water level should be solved by the contractor before continuing the successive works.

4.4.4. Project Site Foreign Contractor one

This project is built for bank head office building project and implemented by foreign grade one contractor having total built up area about 2800 square meter and it is designed for the purpose of offices and banks floors. As per site document revision it is learnt that the building is a 3B+G+33 story building and planned to be built within four year of construction duration. The initial construction cost estimated was more than 1 billion Birr. The current construction stage is on finishing stage.

This study aims to describe the contractor’s capacity in order to resolve major on site problems and the technical and managerial implementation as compared to other focused grouped members. In addition to that it describes early administration problems that the site faced.

During procurement stage the winner for substructure is subcontracting to other contractor and the subcontracting process consumes considerable time and that caused dispute between the client and the main contractor and from the site correspondence it is informed that they resolved it with negotiation.

During shoring construction the equipment used had moderate age and it causes finishing of the work in delay. Even if here the built up area and the site area are almost the same the contractor manage the access to the reduced level by borrowing a piece of land from adjacent to the site for temporary time. As the shoring work is very wide and numbers of shoring piles to be embedded are many the work takes a lot of time, cost and other resources more than expected. Even if old machineries are the very reason for

delay other factors such as technological experience, shortage of finance and other unpredictable factors during design and planning stages (which are specific to the site) contribute considerable expense on the execution stage. The stage excavation, earth work and shotcreting construction is done in accustomed situation in day and night shift because of the known city traffic jam and waiting the night causes delay on performance as other similar projects in the city.

Foundation pile and pile cape construction work is done with similar manner to the shoring pile but here the hardness of the reduced ground contributes a burden on the productivity of the site resources and that cause profit decrease for the sub-contractor.

Starting from the mat foundation the work is done by the main by contractor. As the contractor has previous experience on similar project the construction of mat foundation is done almost on time but the sub structure construction work also takes longer time than expected because of shortage of finance and hard currency for importing rebar in bulk. But here the quality of work and cost are the same except the variations caused by client default and that the contractor justifies the consequences. For the supper structure works the client and the contractor dedicated to produce the intended product within reasonable budget hence like the sub structure a good quality work with reasonable cost is achieved in a condition that the justification for variation and penalties for unjustifiable variations are exercised reasonably. The other thing to be mentioned in the superstructure work is that relatively modern equipment and quality control mechanisms are applied. At present the structural construction is finished and other activities such as wall work and finishing works are on the way. The site communication system and equipment's were good.

Even if the sub-contractor execution and shortage of hard currency causes some delay the main contractor execution can be said that good hence the author recommends that the sub-contractor selection and administration should be carefully studied and other local contractors can learn a lot from this.

From the case of this site we can learnt that unless there was old machineries and subcontracting issue which causes considerable delay and conflict the implementation process is better than the local ones mostly other than earth work and shoring work the sub structure and the supper structure works were implemented in progressive manner.

As a recommendation the clients when they make procurement of contractor they have to consider the contractor's equipment statutes in detail not only year of production of machines should be considered but also the agreeable productivity of machineries should be put in consideration.

4.4.5. Project Site Foreign Contractor Two

This project is built for bank head office building project and implemented by foreign grade one contractor having total built up area about 3300 square meter and it is designed for the purpose of offices and banks floors. As per site document revision it is learnt that the building is a 3B+G+30 story building and planned to be built within four year of construction duration. The initial construction cost estimated was more than 950 million Birr. The current construction stage is on finishing stage.

This study aims to describe the contractor's capacity in order to resolve major on-site problems and the technical and managerial implementations as compared to other focused grouped members. This site was chosen as it is very convenient to compare with other contractors with its similarity with the foreign contractors and implementation difference with the local ones.

As the previous project this site also had administrative and planning problems. Here also the built up area and the site are almost the same. Front side of the site is adjacent to the main roads of the city but busy roads as usual can't help in doing cart away works during day time so the stage excavation and earth work construction is done in accustomed situation in night shift too. The shoring works also done similar to the previous project but more delays were registered in this site. During shoring construction the equipment used was similar to previous and it causes finishing of the work in delay. The shoring work is very similar to the previous site the work takes a lot of time, cost and other resources more than expected and more time than the previous site although the size is lesser. Similar to the above old machineries are the very reason for delay other factors such as shortage of finance and unpredictable factors during design and planning stages (which are specific to the site) contribute considerable expense on the execution stage. The sub structure construction work also takes longer time than expected even more time than the previous one because of shortage of finance and foreign currency but the size of this building is smaller than the previous one. On the other hand here the quality work and cost are the same except the variations caused by client default and that the contractor justifies to the consequences. For the super structure works the client and the contractor dedicated to produce the intended product within reasonable budget hence like the sub structure a good quality work with reasonable cost is achieved in a condition that the justification for variation and penalties for unjustifiable variations are exercised reasonably. Superstructure work is that relatively modern equipment and quality control mechanisms are applied. At present the structural construction is finished and other activities such as wall work and finishing works are on the way. The site communication system and equipment's were good. The other thing to be mentioned in the superstructure work is that relatively modern equipment and quality control

mechanisms are applied. Activities such as wall work and finishing works are on the way. The site communication system and equipment's were good.

From the case of this site we can learnt that except old machineries the implementation process is better than the local ones mostly other than earth work and shoring work the sub structure and the supper structure works were implemented in progressive manner.

As a recommendation the clients when they make procurement of contractor they have to consider the contractor's equipment statutes in detail not only year of production of machines should be considered but also the agreeable productivity of machineries should be put in consideration.

4.4.6. Project Site Foreign Contractor Three

This project is also built for bank head office building project and implemented by foreign grade one contractor having total built up area about 3350 square meter and it is designed for the purpose of offices and banks floors. As per site document revision it is learnt that the building is a 3B+G+33 story building and planned to be built within four year of construction duration. The initial construction cost estimated was more than 850, million Birr. The current construction stage is on finishing stage.

This study aims to describe the contractor's capacity in order to resolve major on site problems and the technical and managerial implementations as compared to other focused grouped members. This site was chosen as it is very convenient to compare with other contractors with its similarity with the foreign contractors and implementation difference with the local ones.

The site has access on two sides on the front and on the left side. As the previous two sites here the built up area is almost the same as the site area but fortunately the site has open space at the back and the contractor uses that open space by agreement with the owner of the land. Hence the site facility organization is better than the two previous sites that mean it has better circulation space.

The shoring work is done in similar manner of the two previous sites and delay occur because of old machineries, administrative issues and shortage of finance in addition to these major reasons shortage of hard currency and unpredictable factors contribute significant delays on the shoring work. The stage excavation and earth work construction is done in accustomed situation in night shift because of the traffic jam and waiting the night causes delay on performance as other similar projects in the city. The sub structure construction work also takes longer time than expected because of surface and underground water, shortage of finance and hard currency. The supper structure work is done with quality but some delays occur because of finance, hard currency and considerable different unpredictable factors. The machineries for supper structure construction were on good conditions. The site communication system

and equipment's were good. These days the structural construction is finished and other activities such as wall work and finishing works are on the way. The site communication system and equipment's were good. Quality control mechanisms and quality assurance mechanisms were entertained in reasonable manner. From the case of this site we can learnt that except old machineries the implementation process is better than the local ones mostly other than earth work and shoring work the sub structure and the supper structure works were implemented in progressive manner.

As a recommendation the contractor should implement risk management methodology and the client when they make procurement of contractor they have to consider the contractor's equipment statutes in detail not only year of production of machines should be considered but also the agreeable productivity of machineries should be put in consideration.

4.4.7. Project Site Foreign Contractor Four

This project is also built for bank head office building project and implemented by foreign grade one contractor having total built up area about 1500 square meter and it is designed for the purpose of offices and banks floors. As per site document revision it is learnt that the building is a 2B+G+16 story building and planned to be built within three year of construction duration. The initial construction cost estimated was more than 650 million Birr. The current construction stage is on finishing work stage.

This study aims to describe the contractor's capacity in order to resolve major on-site problems and the technical and managerial implementations as compared to other focused grouped members. This site was chosen as it is very convenient to compare with other contractors with its similarity with the foreign contractors and implementation difference with the local ones.

It is smallest building from all three previous sites those are occupied by foreign contractor. The current status of the project is on the verge of starting finishing work that means the structure and wall works are already finished. Here unlike the past three project sites the shoring work is completed almost as per the schedule that is small amount of difference with the schedule and most delays were justifiable by client. Even if it is located between existing buildings on the left and on the right site the shoring work is implemented on properly way and without any damage to the adjacent structures. The site has access only on the front in addition to that the built up area and the site area are almost equal but even if it is congested for site facilities the contractor manages it to come out from structure work within reasonable delay. The stage excavation and earth work of this project is also done in night and that helps the contractor to finish this activity ahead of the schedule. But when we come to structural work delays occur on both sub and supper structure. Most of these delays happened by the client side. The factor of delay dif-

fers from time to time and it includes administration, financial and shortage and hard currency. This project site doesn't use Tower crane and many equipment but the implementation progress is very well and there were no surface and underground water problem that cause dewatering which in turn cause time and cost variation.

From the case of this site we can learnt that the size or having multiple equipment not give the better productivity but choosing the suitable and well inspected equipment can give the efficient uses of inputs and the effective product in addition to that we can learn from this site is the technological experience, enterprise management, site organizational management, enterprise resource management and delivery and other scientific methodologies were well entertained. Similarly the sub structure and the supper structure works were implemented in timely manner.

As we can see from each project sites most of the time the enumerated project sites faces cost and time variation those are caused by different stake holders mainly by the clients, the contractors and the government. But the degree of variation varies from project to project, below summary of project sites with degree of variations which occur in terms of time and cost is presented in tabulated form.

Table 4.3 -causes of variations by each activity and specific contractor

No	Project Implementation Activities	Projects by Local Contractors					Average	Projects by Foreign Contractors				Average
		Project 1	Project 2	Project 3	Project 4	Project 1		Project 2	Project 3	Project 4		
1	Demolishing and site clearing	VS	MS	SS	MS	MS	SS	SS	SS	MS	SS	
2	Site facilities Establishment	MS	MS	VS	MS	MS	VS	VS	MS	VS	MS	
3	Shoring pile work	ES	ES	ES	VS	ES	VS	VS	VS	VS	VS	
4	Stage Excavation and shotcreting work	ES	ES	ES	VS	ES	MS	MS	MS	MS	MS	
5	Foundation pile and pile cape work	VS	VS	MS	VS	VS	VS	VS	VS	MS	VS	
6	Mat foundation work	MS	MS	NS	VS	MS	SS	SS	SS	SS	SS	
7	Remaining Sub-structure work	VS	VS	NA	MS	VS	SS	SS	SS	SS	SS	
8	Super structure work	ES	VS	NA	MS	VS	SS	SS	SS	SS	SS	

-ES=Extremely Significant, -VS=Very significant, MS=Medium Significant, SS=Small Significant, NS=No Significance
 -NA=Not Applicable

As we can see from the above table even if factors which causes performance difference on implementation of activities, generally the performance of foreign contractors is better than the local ones the detail causes are as described above in each project site narration.

Even if factors which causes performance difference between project sites differs specifically to the site many times projects can share same factors that cause delay in performance. Based on this fact many factors were gathered during desk study, site visit and discussion to analyze the degree of influence caused by these factors. Hence to identify the influence of these factors on each projects the author enumerate them in the questionnaire and tries to evaluate each projects causes of variation. Below we will find top ten factors which causes variation on each projects which are implemented by local contractors (Four) and foreign contractors (Four).

Table 4.4 -Top ten factors which cause performance difference between local and foreign contractors described by local contractors.

Question no	Factors causes performance difference b/n local and	E.S	V.S	M.S	S.S	N.S	Remarks	sum	RII	RII %	RANK
6	Lack of foreign currency	9	1	1	0	1		12	0.8542	85.42%	1
14	Lack of working culture	10	0	0	1	1		12	0.8542	85.42%	1
10	Lack of technological Experience	8	2	1	0	1		12	0.8333	83.33%	2
21	Lack of international financing	8	2	1	0	1		12	0.8333	83.33%	2
	b) Economical	6	2	4	0	0		12	0.7917	79.17%	3
9	Lack of Managerial Experience	7	2	2	0	1		12	0.7917	79.17%	3
	a) Political	7	0	2	2	0		11	0.7727	77.27%	4
1	Poor Enterprise management system	6	4	0	1	1		12	0.7708	77.08%	5
11	Poor quality Management	7	2	1	1	1		12	0.7708	77.08%	5
9	Lack of performance on electromechanical works	6	3	2	0	1		12	0.7708	77.08%	6

Table-4.5 Top ten factors which cause performance difference between local and foreign contractors described by foreign contractors.

Question no	Factors causes performance difference b/n local and	E.S	V.S	M.S	S.S	N.S	Remarks	sum	RII	RII %	RANK
6	Lack of foreign currency	11	3	0	0	0		14	0.9464	94.64%	1
14	Lack of working culture	9	5	0	0	0		14	0.9107	91.07%	2
1	Poor Enterprise management system	9	4	1	0	0		14	0.8929	89.29%	3
	b) Economical	8	5	1	0	0		14	0.8750	87.50%	4
2	Poor site organizational management	8	5	1	0	0		14	0.8750	87.50%	4
13	Lack of finance	9	3	2	0	0		14	0.8750	87.50%	4
10	Lack of technological Experience	8	4	2	0	0		14	0.8571	85.71%	5
12	Poor Enterprise resource Management and delivery	6	6	1	0	0		13	0.8462	84.62%	6
4	Lack of asset management	8	3	3	0	0		14	0.8393	83.93%	7
2	Lack of equipment in variety	6	7	1	0	0		14	0.8393	83.93%	7

As one can see from the above table both contractors the locals and the foreign contractors and other stakeholders agrees that the main cause of performance difference between local and foreign contractors are the shortage of foreign currency and lack of working culture of the working force. If foreign currency shortage reduced both contractors (Local and Foreign) and other stakeholders believes that the capacity of local contractors will be developed and these contractors even can be competent on international projects.

The second factor which causes performance difference between local and international contractor as local contractors, foreign contractors and other stakeholders describes is the working culture. Based on their perspective the working culture of the working force is very low from top managerial level to the bottom labor force hence this factor becomes the second major factor that causes performance difference between local and foreign contractors.

Based on local contractors and other stakeholders description lack of technological experience is the third factor that cause performance difference between local and foreign contractors but on the other hand based on foreign contractors and other stakeholders poor enterprise management system of local contractors is the third factor which causes performance difference between local and foreign contractors. Hence this shows that in one way or another local contractor lack scientific approach to the implementation of the construction of high rise building.

The fourth factor that is described as causes of performance difference by local contractors and other stakeholders is lack of international financing. Here in international business it is accustomed that there is international financing to the firm in some countries but as per the author knowledge this term is new for our country and difficult to exercise. The other fourth factor that cause performance difference as described by foreign contractors and other stakeholders is that the country's economic situation, as per the respondents if the country's economic status is developed the local contractors capacity will be developed directly or indirectly.

The fifth factor that cause performance difference as per local contractor and other stake holders is that economic situation of the country which is described as the fourth factor by foreign contractors and other stakeholders this shows that economic situation of a country is very related to the development of high rise building construction as well as the construction industry.

The foreign contractors and other stake holders described that poor site organizational management is the fifth factor which cause performance difference between local and foreign contractors. Site organizational management is the main activity on the performance of project implementation. Once site organizational management well organized and sustained up to the project life cycle the performance will be higher.

Lack of managerial experience ranked as the sixth main factor that cause performance difference by local contractors and other stakeholders. Indeed local contractors have managerial experience on other small projects but for higher once complex projects like high rise building the specialized managerial experience is mandatory. As we all know local contractor's managerial experience is low on high rise building constructions.

The sixth factor that cause performance difference as per foreign contractors and other stakeholders is lack of finance for local contractors. Even if contractors are eligible for advance payment by submitting advance bond most of the time they will face financial shortage until each payment this may be because of either their winning price is very small or they were not manage the advance bond properly. But whatever the case the local contractors should have enough liquid asset access for the unpredictable financial shortage.

As per local contractors and other stakeholders lack of political support from government is ranked as the seventh factor which causes performance difference. It is known that large complex civil engineering projects needs every support from government including political support but here as per the responders currently there is no enough support for the local contractors from the government. Local contractors have to be supported by government in every aspect including political support as per the stakeholder's response.

The seventh factor that causes performance difference as per foreign contractors and other stakeholder's perspective is that local contractors don't have enough technological experience in every aspect. If one doesn't have enough technological usage and experience can't perform the implementation of high rise building construction. When it is said that technological experience it includes all technological disciplines those are deployed to get the intended result such as time management tools, financial management tools, quality management tools and many others tools used on the construction of high rise buildings.

Poor enterprise management system is ranked as the eighth factor that cause performance difference between local and foreign contractors as per local contractors and other stakeholder's description. It is obvious that once enterprise management system is not well the site organization and management only can't make the intended result. Enterprise management system is like the central processing unit in the computer device hence without well-developed enterprise management system one can't achieve the intended result at the project site as well as at the head office.

Poor enterprise resource management and delivery is the eighth factor that causes performance difference between local and foreign contractors as foreign contractors and other stakeholders describes. The overall resource management is mainly attached with top management and middle

(Functional) management hence the local contractors should strengthen these posts with qualified, capable, disciplined and willing professionals those have the capacity to innovate and exercise ideas along with their day to day responsibility.

Poor quality management is the ninth factor that causes performance difference as per local contractors and other stakeholder's description. Even if quality performance analysis is not the target of this research it shows the reason of hiring foreign contractors instead of engaging local contractors on high rise building construction projects but in addition to that poor quality management causes rework, change order and modifications hence it causes variations on time and cost.

As per foreign contractors and other stakeholders lack of asset management is the ninth factor which causes performance difference between local and international contractors. As discussed above for almost all projects in a country there is advance payment for the contractor but that can't be the source of all needed assets. Existing assets should be there for the coming project hence previous accumulated assets including its management is very crucial and that is why foreign contractors and other stake holders point out that asset management for existing and for the coming projects is mandatory and should be developed by local contractors.

Even if electromechanical works are not directly structural works they have great influence on large and complex civil engineering structural constructions on projects like high rise building construction. To fix electromechanical equipment on buildings construction of structural elements should be accurate and within reasonable time otherwise modification and rework of these structural elements will cause considerable variation in cost and time. And as per the respondent local contractors are prone to error on the accurate construction of civil structural elements that is why they rank it the tenth major factor that cause performance difference.

Lack of equipment in variety is the tenth factor that causes performance difference between local and foreign contractors as per foreign contractors and other stake holder's perspective. Local contractors most of the time they have few equipment which help them to get the construction license only in addition to that this machines are old and have little or no productivity on the site. Hence the local contractors urged to rent from another party and that consume considerable time in searching the one in addition to that the rented machine also can be low in productivity.

4.5. The rest of four parts and open questionnaires

In the above section the researcher were present the top fifteen factors which mainly cause the performance difference according to the responders. In order to have a better vision on the actual situation of the different performance between the local and foreign contractor it is advisable to see other mentioned factors based on each section.

As the questionnaire designed by part the discussion will be continue in each part. The questionnaire has four parts that is General, Managerial, Technological and Technical. To compare between parts the researcher use the mean, median, mode, range and average of relative importance index of each parts.

4.5.1. Part 1 General

In this part there are 22 questionnaires from which the five of them are presented in the top 15 part this shows that 33.33 % of factors which cause performance difference between local and foreign contractor is fall in this part and that shows considerable general factors cause performance difference. As it can be seen from the table even the next 6 (six) factors have the relative importance index above 70% therefore one can conclude that other different general factors have great influence on the performance difference of local and foreign contractors.

In other words half of the general questions have an impact on performance difference with relative importance index greater than 70 percent. There are also five factors which have relative importance index between 60% - 70% those factors also can't be undermine their contribution on the performance difference. Hence from Part 1 that is the General part 68% of factors have considerable influence in the performance difference on local and foreign contractor and the general part has the second stage among the four part in contributing on the performance difference based on the top fifteen factors.

Political reason of hiring foreign contractors found to be just below the top fifteen and has 77.68% of RII this shows that as per the respondents political influence has considerable share on the hiring of foreign contractors hence huge construction companies who participate projects like high rise building are affected by political decisions these decisions should be mainly related to the advantage of the country and the contractor should be aware of their country's political status. Lack of Managerial Experience holds RII of 77.59%. As per the respondents it also have considerable influence on performance difference of local and international contractors and it is just below the top fifteen factors. As it is discussed before construction management discipline has few years of history in Ethiopia lack of construction managerial experience of top management may

cause on the unsuccessful implementation or lower performance of high rise building construction.

Lack of technical experience in general has also a nearest factor to the top fifteen it has a RII of 76.72%. This shows as per the respondent it has considerable influence on performance difference between local and international contractors. Even if technical factor is one of the four parts of the questionnaire here as a general question it shows there must be done some development on the technical capacity of the company as well as on the professionals.

Poor economic performance of the country has RII of 71.55%. The researcher expectation here was very much. That means as per the researcher the performance difference of local and international contractors is mainly caused by countries poor economy. But as per the respondents it is even out of the top fifteen. Indeed it has considerable influence even by respondents. Poor country's economy doesn't have an opportunity to exercise huge investments hence without exposure the local contractors can't perform the contemporary art of execution of high rise building construction.

Lack of legal frame work is another factor in general part which have the RII 70.69% as per the respondent. This means our legal system doesn't give a privilege to local contractors on such a huge project. According to the responders in order to increase the performance of local contractor's legal frame of the country must be advantageous for them by providing access in every direction including resource accessibility and development of the company in general.

Lack of government recognition for local contractors has the RII 70.69% as per the respondents. When it is said lack of government recognition it can be lack appreciation of the past performance and not engage for a greater project than previous by follow up the performance. Government recognition is not all about giving professional and trading license but it needs to follow up and evaluate the performance of local contractor in specified period of time and support in such a way that is possible.

Table 4.6: - General factors which causes performance difference between local and international contractors

Question no	Factors causes performance difference between local and	E.S	V.S	M.S	S.S	N.S	sum	RII	RII %
	Part 1. General								
1	Poor Government strategy or support	10	8	7	2	2	29	0.6897	68.97%
2	Poor political stability	10	6	7	4	2	29	0.6552	65.52%
3	Country's poor economic performance	11	9	4	4	1	29	0.7155	71.55%
4	Country's poor Social awareness	7	8	8	5	1	29	0.6293	62.93%
5	Country's Poor environmental preservation system	4	7	6	7	5	29	0.4828	48.28%
6	Lack of legal frame work	8	9	11	1		29	0.7069	70.69%
7	Lack of experience on high rise building construction	17	3	8		1	29	0.8017	80.17%
8	Lack of technical experience	11	10	7	1		29	0.7672	76.72%
9	Lack of Managerial Experience	15	6	5	2	1	29	0.7759	77.59%
10	Lack of technological Experience	18	7	2	1	1	29	0.8448	84.48%
11	Lack of local knowledge that the country have	3	12	9	3	2	29	0.5948	59.48%
12	Lack of government recognition for local contractors	11	6	9	2	1	29	0.7069	70.69%
13	Lack of finance	13	11	3	0	2	29	0.7845	78.45%
14	Lack of working culture	18	7	2	1	1	29	0.8448	84.48%
15	Absence of public private partnership	4	10	11	2	2	29	0.6034	60.34%
16	Lack of understanding between local cultures	1	11	10	5	2	29	0.5345	53.45%
17	Conflict of interest between stake holders	7	7	10	3	2	29	0.6207	62.07%
	a) Political	15	3	8	2		28	0.7768	77.68%
	b) Economical	16	6	7			29	0.8276	82.76%
	c) Social	4	4	9	10	1	28	0.5000	50.00%
	d) Environmental	1	6	11	7	4	29	0.4397	43.97%
	e) Legal	5	5	8	5	3	26	0.5385	53.85%

4.5.2. Part 2 Managerial

In this part there are 25 questionnaires from which the 6 (six) of them are presented in the top 15 part this shows that 40 % of factors which cause performance difference between local and foreign contractor is fall in this part and that shows large number of managerial factors cause performance difference.

As it can be seen from the table even the next 14 (fourteen) factors have the relative importance index above 70% therefore one can conclude that other different managerial factors have great influence on the performance difference of local and foreign contractors. In other words more than half or 80% of the general questions have an impact on performance difference with relative importance index greater than 70 percent. There are also three factors which have relative importance index between 60% - 70% those factors also can't be undermine their contribution on the performance difference. Hence from Part 2 managerial part 92% of factors have considerable influence in the performance difference on local and foreign contractor and the Managerial part has the first among the four parts in contributing on the performance difference based on the top fifteen factors.

The managerial part factors are all above RII greater than 50% but that is not the only case but as it can be seen previously the gap between the minimum and the maximum is also small, this shows that managerial factors have great influence on the high rise building construction industry of Ethiopia. As one go through top to bottom the RII of managerial table after the six factors those are included in the top fifteen one can got Poor schedule Management which has a RII of 77.59%, it is the basic managerial issue that serve the project to be done on the efficient and effective manner. But schedule management is not only can be effective unless other managements support were done parallel. Schedule management is done in the condition that all other managements are on the right situation.

Next to Poor schedule Management one will find the three factors that is Poor integration Management, Poor scope Management and Poor Value and network chain management all have RII of 75.00%, Integration management is the sum of all management parts once each management field is done efficiently and effectively integration management can be done easily but if one of the management field is poorly managed it is impossible to manage integrate.

The other management factor which have RII of 75.00% is poor scope management this help us not to use our resources beyond our planned working area. Unless on define and manage his work scope he may fail to achieve the intended result as it should be. The third managerial factor which

has RII 75.00% Poor Value and network chain management this management area is mostly concerned with external factor hence if one want to manage this he have to have an eye on in early time that is before incidents happen or need of resources.

Enough estimated period should be determined before a resource reaches to the site. As value network management is new management field which is emerge with network marketing, exercising such a kind of new management area needs considerable time from inception to deliver on the site. There are three management factors which have RII of 74.14%. Lack of execution management is the next managerial factor it is 100% related with site execution. Once resources are available on the site it is the responsibility of the execution management to produce an efficient and effective product on the site. The other factor which has the RII 74.14% is Poor human resource management it is the main resource that can transform the other resources for intended part hence human resource management is the basic one in delivering the project.

A well experienced human resource manager should be appointed in order to get the best output on the site. The third factor which has RII 74.14% is Poor supply chain management this is like value network management is new management field and it is also emerge with network marketing. Supply chain management these days is a complete solely stand management field which has complicated tasks in it therefore in order to produce efficient and effective product like high rise building a dedicated supply chain manager should be appointed.

Lack of management on innovated ideas has a RII 73.28% as it is known construction projects have too much unforeseen and unpredictable situations innovated ideas have very much influence for the successful implementation of high rise building construction.

Table 4.7:- Managerial factors which causes performance difference b/n local and international contractors

Question no	Factors causes performance difference between local and	E.S	V.S	M.S	S.S	N.S	sum	RII	RII %
	Part 2. Managerial								
1	Poor Enterprise management system	16	10	1	1	1	29	0.8362	83.62%
2	Poor site organizational management	14	11	2		2	29	0.8017	80.17%
3	Poor management of conflict of interest	4	13	6	3	2	28	0.6250	62.50%
4	Lack of asset management	15	7	5		2	29	0.7845	78.45%
5	Lack of execution management	10	13	3	1	2	29	0.7414	74.14%
6	Poor managerial and leader ship skill of P. Manager	12	6	8	1	2	29	0.7155	71.55%
7	Poor integration Management	13	8	5	1	2	29	0.7500	75.00%
8	Poor scope Management	12	9	5	2	1	29	0.7500	75.00%
9	Poor schedule Management	13	9	5	1	1	29	0.7759	77.59%
10	Poor cost Management	13	11	4		1	29	0.8017	80.17%
11	Poor quality Management	16	7	4	1	1	29	0.8103	81.03%
12	Poor Enterprise resource Management and delivery	13	8	6		1	28	0.7857	78.57%
13	Poor communication Management	8	13	6	1	1	29	0.7241	72.41%
14	Poor procurement Management	11	9	6	2	1	29	0.7328	73.28%
15	Poor Risk Management	11	6	8	2	1	28	0.7143	71.43%
16	Poor stake holders Management	10	9	8	1	1	29	0.7241	72.41%
17	Poor predictability	8	7	12	1	1	29	0.6724	67.24%
18	Poor supply chain management	13	4	9	1	1	28	0.7411	74.11%
19	Poor site access and traffic management	5	7	13	2	2	29	0.5948	59.48%
20	Poor health and safety management	10	9	5	3	1	28	0.7143	71.43%
21	Poor multidisciplinary controlling system	7	13	4	3	1	28	0.6964	69.64%
22	Lack of management on innovated ideas	9	12	6	1	1	29	0.7328	73.28%
23	Poor human resource management	9	13	5	1	1	29	0.7414	74.14%
24	Poor Value and network chain management	10	10	7		1	28	0.7500	75.00%
25	Lack of political support	3	9	11	4	2	29	0.5603	56.03%

Therefore a good project manager should have a capacity to support innovators at work and manage innovated ideas. Poor stake holders Management with RII 72.41% is another factor which have great influence on construction implementation process. Good will is a back bone of any business hence a company as well as a good project manager should have a smooth relationships with every stakeholders unless the company have better communications with all stakeholders deliverables and financing becomes hinder for the successful implementation of a high rise building construction.

Poor managerial and leader ship skill of P. Manager which have a RII 71.55% is also a performance factor. As it is discussed before human resource is a basic resource for managing the overall project hence as a leader project manager should be well experienced, having great technical and managerial skill and capable of working with changing environment. As a researcher I believe that most of the time the project managers should be situational managers because of the continuous changing environment.

Risk Management is the modern management area which focuses on preparedness before something unexpected happen and as per the respondents it has a RII of 71.43%. As it is known risk has both negative and positive impact on the implementation of any project hence unless one can find the risk in advance he may lose so many advantage and even catastrophe may happen. In big civil engineering project there should be a risk management department which is dedicated to asses a risk in advance.

Poor health and safety management which have a RII 71.43% as per the respondents and it currently emerged as the obstacle on the performance of our contractors especial on narrow and inaccessible construction sites. But these days it becomes the critical issue on big construction projects that why the clients are asking a contractor to have safety officer on the site. This safety officers should not be undermined because as it has seen so many projects exposed to additional considerable cost because of accidents and other safety and health issues.

4.5.3. Part 3 Technological

In this part there are 24 questionnaires from which the 2 (Two) of them are presented in the top 15 part this shows that 13.33 % of factors which cause performance difference between local and foreign contractor is fall in this top 15 part and that shows small number of technological factors cause performance difference.

As it can be seen from the table even if two of them are in top 15 the next 9 (Nine) factors have the relative importance index above 70% therefore one can conclude that other different technological factors have great influence on the performance difference of local and foreign contractors. In other words fewer less than half or 45.83% of the general questions have an impact on performance difference with relative importance index greater than 70 percent. There are also (six) factors which have relative importance index between 60% - 70% those factors also can't be undermine their contribution on the performance difference. Hence from Part 3 technological part 70.83% of factors have considerable influence in the performance difference on local and foreign contractor and the technological part has the **fourth** among the four part in contributing on the performance difference based on the top fifteen factors. .

Lack of proper construction planning is also have great influence on the performance of local and international contractor. The respondents entitled it the RII of 77.78% which is just below the top fifteen factors. Construction planning is wider field which encompasses the technological issues together with technical and managerial issues. Construction planning considers what resource or inputs one can deploy and what outputs and product he get based on a predefined execution period. Lack of proper construction planning can cause stack of the project site and even cause bankruptcy for the main company.

Lack of use of contemporary technology generally have the RII of 76.85%. As it is discussed before being not equipped with contemporary technology our contractors can't be competitive in a huge civil engineering structures such as high rise building in our case. Contemporary technology needs follow up of new findings in the construction industry and a capacity to use them.

Less productivity of equipment on hand, this issue is familiar in our country because our contractors use older equipment, Hence this factor is expected in top fifteen but as per the respondent it gets RII of 76.79% which is below top fifteen. Less equipment productivity can be caused by equipment age, equipment capacity, operator's capacity and suitability for the intended work.

Lack of technological innovation has RII of 76.72%. When it is said lack of technological innovation it includes adaptation to our country, to specific site, to specific environment and so on.

Table 4.8:- Technological factors which causes performance difference b/n local and international contractors.

Question no	Factors causes performance difference between local and	E.S	V.S	M.S	S.S	N.S	sum	RII	RII %
Part 3. Technological									
1	Lack of the use of contemporary technology generally	10	12	3	1	1	27	0.7685	76.85%
2	Lack of equipment in variety	10	11	2	1	1	25	0.7800	78.00%
3	Less productivity of equipment on hand	13	6	8		1	28	0.7679	76.79%
4	Lack of knowledge of material science	8	9	10		1	28	0.7054	70.54%
5	Lack of PESTEL support of the country	8	10	9		1	28	0.7143	71.43%
6	Lack of construction engineering support	4	14	6	1	1	26	0.6827	68.27%
7	Lack of knowledge of legal frame	2	10	12	2	1	27	0.5926	59.26%
8	Lack of the use of ICT and information gathering	5	12	7	2	1	27	0.6667	66.67%
9	Lack of proper execution	7	10	10		1	28	0.6964	69.64%
10	Lack of proper construction planning	10	12	4		1	27	0.7778	77.78%
11	Lack of technological innovation	9	15	4		1	29	0.7672	76.72%
12	Lack of risk mitigation mechanism	7	13	6	1	1	28	0.7143	71.43%
13	Lack of exercising statutory obligations	2	10	12	1	2	27	0.5833	58.33%
14	Lack of exercising contractual obligations	8	8	13			29	0.7069	70.69%
15	Lack of exercising social obligations	1	9	12	5	1	28	0.5357	53.57%
16	Lack of exercising environmental sustainability	2	7	9	6	3	27	0.4907	49.07%
17	Lack of the use of statistical data of CSA or metrology	1	6	10	7	3	27	0.4537	45.37%
18	Lack of Health, safety and welfare protocols on the site	5	12	7	1	2	27	0.6574	65.74%
19	Poor calibration of equipment	10	7	9	1	2	29	0.6897	68.97%
20	Lack of strategic alliance with stake holders	2	12	11	1	1	27	0.6204	62.04%
21	Lack of international financing	14	9	3		2	28	0.7946	79.46%
22	Lack of national, regional and global economic prospect	7	10	7	1	1	26	0.7019	70.19%
23	Lack of awareness of international legal system frame work	2	10	11	3	1	27	0.5833	58.33%
24	Lack of local construction materials	4	4	11	7	2	28	0.5089	50.89%

Lack of PESTEL support of the country has RII 71.43%. Unless the government support local contractors in PESTEL frame work one can't get competitive company not only in international market but also within the country and our country will continue hand over big projects like high rise building projects to the foreigners. Hence government support should be in every direction to make a capacity building to local contractors. Lack of exercising contractual obligations is seen not only on local contractors but also on foreign ones but the degree of application differs, the influence of lack of contractual obligations get a RII of 70.69% according to the respondents. Sometimes a contractor used an offer that he already know he can't afford it and when he enters the construction stage it causes stack of the project and the contractor become liable to that and that causes bankruptcy.

Lack of knowledge of material science has RII of 70.54%. This science is basic on the quality workmanship of a project. International contractors have well trained material engineer who is dedicated to the management of construction material. Indeed our contractors also have material engineer on the site but its influence and management of material is very limited. In order to be competitive in international construction a contractor should have a material management department.

Lack of national, regional and global economic prospect is give a RII of 70.19% by the respondents. Local contractors shouldn't limit on the local market only rather their scope should be far from it, in order to upgrade their performance and further development they have to be aware of regional, continental and global market. Otherwise they can't be competitive not only in international market but also on domestic ones because our world is in global market now once local contractor is not developed well foreign contractor can be chosen by client based on its offer and competitiveness for huge construction works.

4.5.4. Part 4 Technical

In this part there are 26 questionnaires from which the 2 (Two) of them are presented in the top 15 part this shows that 13.33 % of factors which cause performance difference between local and foreign contractor is fall in this top 15 part and that shows small number of technical factors cause performance difference. As one can see from the table "Lack of foreign currency" is the top number one factor from all 97 questionnaires that shows one specific technical issue has great influence on the performance difference between local and foreign contractors. In other hand even if two of them are in top 15 the next 9 (Nine) factors have the relative importance index above 70% therefore one can conclude that other different technical factors have great influence on the

performance difference of local and foreign contractors. In other words fewer less than half or 46.15% of the general questions have an impact on performance difference with relative importance index greater than 70 percent. There are also 12 (Twelve) factors which have relative importance index between 60% - 70% those factors also can't be undermine their contribution on the performance difference. Hence from Part 4 technical part 92.31% of factors have considerable influence in the performance difference on local and foreign contractor and the technical part has the third among the four parts in contributing on the performance difference based on the top fifteen factors.

Lack of experience on high rise building construction has weight 76.72% of RII. Specific experience on high rise building construction is an input for the coming new similar project, if a contractor previously engaged on high rise building construction automatically he is ready for the new one which can have lots of pros and cons. Experience makes perfect, so if someone have previous construction experience on something similar to the current one he can overcome or prepared in advance to tackle the current problem.

Poor execution control has given a RII of 75.89% by the respondent. Execution control should not be only done the consultant engineer rather there should be control by contractors officials. Unless thorough control and evaluation done by the contractor sustainably the output become low productive, defective workmanship and becomes costly. Once the key performance indicators are not well the overall work becomes defective. Our contractors may be exposed for considerable lack of execution control that causes performance difference with international ones.

Theoretically almost all higher grade local contractors have organizational structures but usually they are not implementing it in practice. Even some times the professional employees are not capable of exercising their knowledge. Hence the company runs his work by rule of thumb. Lack of organizational structure has given 75.86% of RII. Generally organization structures usually are not implemented by local contractors and it is one of the factors which cause performance difference between local and international contractors.

Lack off efficient use of resources has a RII of 75.00% it is near to the top fifteen. This factor is seen on local contractors in greater scale. Indeed it is mainly attached with management it is the technical issue to determine type and volume of resource at the particular time on the site. Each resource should be deployed only on the scale of the work needs required. But the actual situation on the local contractors is differing than this. It is seen that shortage of resource and over deployed of resources by local contractors and that cause wastage of materials and delay on the performance of execution on the construction site.

Lack of effective product delivery is one great factor that is seen from the final products which are done by local contractors and it has a RII of 74.14% as per the respondents. Because of much defective workmanship of local contractors some final constructed buildings urged to be modified. This modification usually causes additional time, cost and poor quality. Hence to alleviate such problem the technical staffs should be well experienced and dedicated for their task. In addition to that permanent, that is from starting of execution the project to the end thorough inspection, monitoring and evaluation should be done.

Lack of performance on finishing works which have a RII of 73.28% is another factor that causes performance difference between local and international contractors. Our contractors finishing performance problem is not only related to finishing work rather previous structural and other works cause problem on the finishing performance. It is seen that our contractors wasted their resource to correct previous defects. In addition to that many finishing type of works are innovated this days hence local contractors should train their staffs before they reach to the finishing works that means before execution the company should be familiar with the finishing work. Lack of proper workman ship is usually caused by lack of technical knowledge. Before executing an activity one should have detail knowledge on the work. Unless a company has knowledge and experience on the execution of activities it becomes time taking, costly and will have poor workman ship 72.41%. Without diligence one can't get the desired product. As proper workmanship is not found with careless working environment companies should focus on upgrading their staff's skill and working culture.

Lack of pricing mechanism which is given a RII of 71.55% by the respondent is a critical factor that is seen on local contractors. As the construction tendering system of Ethiopia is the least responsive bidder most of local contractors offer very low price in order to get the job. But when they inter to the execution they can't perform because of lack of finance. Such a type of incidence is familiar in Ethiopians local contractors but such a kind of pricing causes both the execution of the project to be interrupted and may cause bankruptcy on the company even it can cause the main company from participating any further in the construction industry.

Poor contract administration has a RII of 70.69% this shows that it has considerable effect on the execution of the project. Here our local contractors even have contract administration department but the scientific application is in question. Contract administration if done well it can cause greater performance hence our local big contractors should rely on the performance of their contract administration department because it is the task of the contract administration department to

follow and support each project from head office.

Table 4.9:- Technical factors which causes performance difference between local and international contractors

Question no	Factors causes performance difference between local and	E.S	V.S	M.S	S.S	N.S	sum	RII	RII %
	Part 4. Technical								
1	Lack of organizational structure	13	8	5	2	1	29	0.7586	75.86%
2	Lack of skillful local Professional staffs	4	12	8	2	2	28	0.6250	62.50%
3	Lack off efficient use of resources	10	13	3	2	1	29	0.7500	75.00%
4	Lack of effective product delivery	9	13	5	1	1	29	0.7414	74.14%
5	Lack of proper workman ship	8	13	6	1	1	29	0.7241	72.41%
6	Lack of foreign currency	22	5	1		1	29	0.9052	90.52%
7	Lack of construction planning	14	6	6	1	1	28	0.7768	77.68%
8	Lack of performance on finishing works	7	17	2	2	1	29	0.7328	73.28%
9	Lack of performance on electromechanical works	12	12	3		1	28	0.8036	80.36%
10	Lack of performance on substructure works	5	10	10	2	2	29	0.6207	62.07%
11	Lack of performance on supper structure works	6	10	9	2	1	28	0.6607	66.07%
12	Lack of experience on High Rise Building Construction	13	7	8		1	29	0.7672	76.72%
13	Type of contract delivery system	4	14	9	1	1	29	0.6638	66.38%
14	Poor adjacent structures support poor adapting site characteristics and geological information	5	10	10	3	1	29	0.6293	62.93%
15	Lack of pricing mechanism	9	13	2	4	1	29	0.7155	71.55%
16	Poor contract administration	7	15	3	3	1	29	0.7069	70.69%
17	Poor execution control	10	12	4	1	1	28	0.7589	75.89%
18	Poor change order administration	4	16	4	3	1	28	0.6696	66.96%
19	Lack of exercising contract document	4	11	9	3	2	29	0.6034	60.34%
20	Lack of value engineering activities	4	15	5	3	2	29	0.6379	63.79%
21	Poor geotechnical information	4	8	11	5	1	29	0.5776	57.76%
22	Poor foundation construction	6	9	7	4	2	28	0.6161	61.61%
23	Lack of selection of proper responsive bidder	6	12	8	1	1	28	0.6875	68.75%
24	Defective stability analysis of adjacent structure	4	7	8	4	2	25	0.5700	57.00%
25	Lack of skilled and semiskilled labor force	7	11	6	4	1	29	0.6638	66.38%
26	Lack of usage of communication technologies such as barcode system, soft wares, GPS, GIS and BIM	6	11	9	2	1	29	0.6638	66.38%

4.6. Comparing all the four parts

To compare and contrast the influence of each part one has to see each data with different statistical measurements. Hence for this case researcher use the Average, Median, Mode, Range, Minimum and Maximum.

As one can see from the table the average relative important index of the managerial part is higher than the rest of the three that is 73.11%, hence this shows in partial that number of managerial factors have great influence on the performance difference of local and international contractors and that implies or tell as that our country have to work on managerial issues of high-rise building construction. Most projects with poor management are going to stack at one point or causes bankruptcy for the company. Even if the final product of the project is delivered the efficiency and effectiveness of the final product is always in question.

The factor which has the second average relative importance index is technical which have 69.35%. Technical factors are basic working tactics they should not be compromise on implementation. As technical issues are critical one should have to update his technical capacity in a periodic manner and in sustainable way. Once technical capacity of the company is in poor situation one can't talk about other issues. There for as a professional company the technical performance should not be in question rather always should be checked and make appropriate upgrading. Technical factors are not once gained and acquired they are rather should be a solution for each specific work by adapting to the specific site.

According to the respondents general factors have the third average factor that have influence on performance difference between local and international contractors and having an average relative index of 67.46%. When it is said general factors mainly external factors plays the primary role. Some of the general factors are presented as a summary of the rest of the three that is as managerial, technological and technical. As one can see the general part questionnaires they include governmental influence, countries economy, political stability, social culture, conflict of interest and other general factors which are within the company and external factors such as countries stability and world situation.

The last but not the least factor is the technological factor which has an average importance scale of 66.50%. From this one can understand that using of technology on high rise building construction is that not much good but it seems in a better position based on the respondent but as per the researcher personal perspective technological factors have great influence on performance difference of local and international contractors. Technological skills are also should be updated and acquired continuously. Today our world is using technologies more than in any other previous

time hence to be competitive any organization should be supported by technological systems.

The median of each part is also presented on the table which helps as to acknowledge the middle situation of the all part. Here again one can found the higher median is in managerial part which is 74.11%, that shows that most of managerial questionnaires have greater importance relative index than any the other part. The second highest median found in general part which is 69.83% this also shows that next to managerial part the general part has more factors which cause performance difference between local and international companies.

Even if the technological part is on the third place it is much nearer to the general part. As it is said earlier the technological factor is a key to be competitive in the current world market hence as per the respondent technological factors are critical next to managerial based on the median data. Indeed it has an importance relative index of 69.30%.

Based on median statistics data one can found technical part performance difference factors on the bottom of the three having an importance relative index of 67.86%. But as one can see in general factor the gap between each median is so small that one can't undermine any of them, indeed managerial median is few far from others.

Considering the mode statistics it shows the most factors those have almost similar importance relative index in each part. As one can see from the summarized table the mode is between 60%-85% and that shows many factors in every group have considerable important index on the execution of high rise building.

The range also gives us the distribution of the relative important index with in each part. As one can see from the table the managerial part has little range than others only 27.59% gap between minimum-maximum (43.97%-84.48%). Having minimum 43.97% means many of IRR are above 50% and that shows the managerial part again has the most significant value of IRR, hence again our progressive work relies on the managerial part. The second smallest range is found on the technical part which have only 33.52% gap between minimum-maximum (57.00%-90.52%). But as one can see from the data all technical factors are above 50% that means all 100% of technical factors have greater than 50% RII and it shows how much the technical issues are critical on the high rise construction industry and leads us to work on them.

The third smallest range becomes the technological part which has only 34.09% gap between minimum-maximum (45.37%-79.46%). Again from the whole data one can found that 22 out of 24 (91.67%) questionnaires have RII more than 50%. Again this shows that how much the technological part is need some development in the high rise building construction of Ethiopia.

The last range which is relatively having huge gap is the general part which have 40.52% gap be-

tween minimum-maximum (43.97%-84.48%). But from the whole data only 2 out of 22 questionnaires have below 50% RII. In other words 90.91% of factors have considerable influence on the high rise building construction industry of Ethiopia. As it can be seen from the respond one can summarizes the findings below

Table 4.10:- Different statistical data of the four parts

No	Part Name	Average	Median	Mode	Range	Minimum	Maximum
1	General	67.46%	69.83%	84.48%	40.52%	43.97%	84.48%
2	Managerial	73.11%	74.11%	75.00%	27.59%	56.03%	83.62%
3	Technological	66.50%	69.30%	71.43%	34.09%	45.37%	79.46%
4	Technical	69.35%	67.86%	66.38%	33.52%	57.00%	90.52%

To sum up from the respondents data one can see that the managerial part has higher point on average, median and have small gap with minimum to maximum these points show that greatest actors on the performance difference of local and international contractors on the high rise building construction fall in managerial part.

According to the summarized table the second top influencer that causes performance difference between local and international contractors is the technical part which has an average of 69.35% RII but the median is the least of the four which is 67.86% and the range is the second smallest range which is 33.52%. In addition to that as it is discussed before all RII are above 50% this shows that its influence on the Ethiopian high rise building construction industry.

Even if the range of general is greater than technological when one see the average and the minimum-maximum the general part has more influence in performance difference between local and international contractors. Hence general factors are more influencer than technological.

Finally it can be seen that the technological part as the least cause of performance difference between local and international contractors in high rise building construction of Ethiopia.

In order to reveal the degree of variance between all factors and with all responders ANOVA test have been made and the output shows that there is significance influence between each respondents and between each factors on the performance of high rise building construction. On the other hand it is observed that there is no significant influence between interactions.

Local 1		0.58	0.67	0.75	0.75	0.42	0.75	0.83	0.67	0.75	0.92	0.67	0.83	0.75	1.00	0.58	0.42	0.50	0.83	0.50	0.58	0.50	0.50	
Local 2		0.42	0.58	0.75	0.50	0.42	0.50	0.83	0.58	0.75	0.75	0.58	0.50	0.67	0.75	0.58	0.58	0.50	0.58	0.83	0.50	0.33	0.17	
Local 3		1.00	0.67	0.75	0.67	0.25	0.83	1.00	1.00	1.00	1.00	0.83	0.83	0.92	1.00	0.75	0.50	0.50	0.75	0.83	0.33	0.25	0.67	
Local 4		0.58	0.67	0.67	0.67	0.67	0.50	0.33	0.67	0.67	0.67	0.50	0.67	0.67	0.67	0.50	0.50	0.67	1.00	1.00	0.83	0.33	0.67	
Foreign 1		0.63	0.44	0.63	0.56	0.69	0.56	0.83	0.81	0.94	0.94	0.63	0.75	0.94	0.94	0.75	0.63	0.81	0.75	1.00	0.75	0.58	0.75	
Foreign 2		0.67	0.67	0.83	0.50	0.50	0.58	1.00	0.83	0.83	0.92	0.75	0.58	0.92	0.83	0.58	0.50	0.67	0.58	0.83	0.17	0.17	0.33	
Foreign 3		0.83	0.58	0.67	0.67	0.50	0.75	0.92	0.75	0.75	0.83	0.33	0.67	0.83	0.92	0.50	0.58	0.50	0.67	0.75	0.42	0.50	0.33	
Foreign 4		0.75	0.69	0.56	0.50	0.50	0.69	0.63	0.42	0.69	0.75	0.63	0.81	0.81	0.94	0.50	0.44	0.63	0.69	0.88	0.25	0.31	0.50	
Factors causes performance difference between local and international contractors	General																							
	Poor Government strategy or support	1																						
	Poor political stability	2																						
	Country's poor economic performance	3																						
	Country's poor Social awareness	4																						
	Country's Poor environmental preservatio system	5																						
	Lack of legal frame work	6																						
	Lack of experience on high rise building construction	7																						
	Lack of technical experience	8																						
	Lack of Managerial Experience	9																						
	Lack of technological Experience	10																						
	Lack of local knowledge that the country have	11																						
	Lack of government recognition for loca contractors	12																						
	Lack of finance	13																						
	Lack of working culture	14																						
	Absence of public private partnership	15																						
	Lack of understanding between local cultures	16																						
	Conflict of interest between stake holders	17																						
	a) Political	18																						
	b) Economical	19																						
	c) Social	20																						
	d) Environmental	21																						
e) Legal	22																							

Table 4.11 a: - ANOVA Data input 1-22

Local 1		0.92	1.00	0.92	0.50	0.50	0.67	0.50	0.83	0.75	0.75	0.83	0.58	0.75	0.67	0.58	0.58	0.67	0.50	0.75	0.67	0.83	0.58	0.50	0.58			
Local 2		0.50	0.58	0.58	0.58	0.67	0.58	0.50	0.50	0.67	0.83	0.75	0.92	0.50	0.67	0.50	0.42	0.42	0.67	0.33	0.58	0.83	0.83	0.83	0.42			
Local 3		0.92	0.83	0.92	0.83	0.67	0.83	0.83	0.67	0.83	0.83	0.83	0.92	0.92	0.83	0.58	0.58	0.58	0.75	0.75	0.67	1.00	0.83	0.50	0.58			
Local 4		0.67	0.67	0.67	0.67	0.67	0.50	0.50	0.67	0.50	0.67	0.67	0.50	0.50	0.33	0.33	0.17	0.17	0.67	0.67	0.50	0.67	0.67	0.50	0.67			
Foreign 1		0.88	0.81	0.88	0.81	0.75	0.69	0.63	0.75	0.67	0.67	0.94	0.94	0.81	0.75	0.81	0.75	0.50	0.83	0.75	0.75	0.81	0.69	0.63	0.63			
Foreign 2		0.83	0.92	1.00	0.83	0.67	0.75	0.75	0.58	0.92	1.00	0.83	0.75	0.58	0.83	0.58	0.50	0.67	0.67	0.67	0.67	0.83	0.83	0.75	0.75			
Foreign 3		0.67	0.83	0.58	0.67	0.83	0.83	0.67	0.67	0.58	0.75	0.67	0.58	0.58	0.63	0.42	0.25	0.50	0.58	0.83	0.50	0.50	0.58	0.50	0.42			
Foreign 4		0.81	0.81	0.81	0.69	0.81	0.75	0.56	0.69	0.56	0.75	0.81	0.56	0.56	0.63	0.50	0.44	0.44	0.56	0.50	0.56	0.67	0.83	0.63	0.44			
Factors causes performance difference between local and international contractors	Technological	Lack of the use of contemporary technology generally	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71		
		Lack of equipment in variety																										
		Less productivity of equipment on hand																										
		Lack of knowledge of material science																										
		Lack of PESTEL support of the country																										
		Lack of construction engineering support																										
		Lack of knowledge of legal frame																										
		Lack of the use of ICT and information gathering																										
		Lack of proper execution																										
		Lack of proper construction planning																										
		Lack of technological innovation																										
		Lack of risk mitigation mechanism																										
		Lack of exercising statutory obligations																										
		Lack of exercising contractual obligations																										
Lack of exercising social obligations																												
Lack of exercising environmental sustainability																												
Lack of the use of statistical data of CSA metrology																												
Lack of Health, safety and welfare protocols on the site																												
Poor calibration of equipment																												
Lack of strategic alliance with stake holder																												
Lack of international financing																												
Lack of national, regional and global economic prospect																												
Lack of awareness of international legal system frame work																												
Lack of local construction materials																												

Table 4.11 c: - ANOVA Data input 48-71

Local 1	0.83	0.42	0.75	0.75	0.75	0.83	0.67	0.75	0.75	0.67	0.75	0.83	0.63	0.67	0.67	0.75	0.75	0.58	0.58	0.67	0.67	1.00	0.75	0.83	0.75	0.67	
Local 2	0.67	0.50	0.75	0.42	0.42	0.92	0.58	0.33	0.75	0.25	0.33	0.58	0.50	0.50	0.75	0.75	0.67	0.75	0.67	0.67	0.67	0.33	0.58	0.42	0.50	0.75	
Local 3	0.75	0.83	0.83	0.83	0.83	1.00	0.88	0.92	0.92	0.83	0.83	0.83	0.75	0.58	0.83	0.75	0.83	0.75	0.75	0.75	0.67	0.83	0.50	0.50	0.75	0.67	
Local 4	0.67	0.50	0.67	0.67	0.67	0.67	0.67	0.50	0.67	0.50	0.67	0.50	0.33	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.58	0.58	0.50	0.50	0.67	0.67
Foreign 1	0.75	0.75	0.81	0.81	0.81	1.00	0.69	0.69	0.75	0.56	0.63	0.75	0.69	0.63	0.75	0.69	0.81	0.56	0.56	0.69	0.63	0.63	0.69	0.63	0.69	0.75	
Foreign 2	0.92	0.83	0.83	0.83	0.83	1.00	1.00	1.00	0.83	0.92	0.83	0.83	0.67	0.67	0.67	0.83	0.83	0.83	0.75	0.67	0.50	0.67	0.83	0.58	0.67	0.33	
Foreign 3	0.83	0.25	0.58	0.67	0.67	0.92	0.83	0.75	0.83	0.50	0.42	0.67	0.83	0.58	0.67	0.67	0.88	0.88	0.67	0.67	0.50	0.63	0.75	1.00	0.42	0.42	
Foreign 4	0.69	0.63	0.75	0.69	0.75	0.88	0.75	0.81	0.81	0.69	0.67	0.75	0.81	0.69	0.63	0.56	0.69	0.63	0.50	0.50	0.50	0.50	0.81	0.44	0.50	0.50	
Factors causes performance difference between local and international contractors Technical Lack of organizational structure Lack of skillful local Professional staffs Lack off efficient use of resources Lack of effective product delivery Lack of proper workman ship Lack of foreign currency Lack of construction planning Lack of performance on finishing works Lack of performance on electromechanice works Lack of performance on substructure work Lack of performance on supper structure works Lack of experience on High Rise Buildin Construction Type of contract delivery system Poor adjacent structures support poor adapting site characteristics and geologic Lack of pricing mechanism Poor contract administration Poor execution control Poor change order administration Lack of exercising contract document Lack of value engineering activities Poor geotechnical information Poor foundation construction Lack of selection of proper responsive bidder Defective stability analysis of adjacent structure Lack of skilled and semiskilled labor forc Lack of usage of communication technologies such as barcode system, sof	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	

Table 4.11 d: - ANOVA Data input 72-97

Anova: Without Replication						
<i>SUMMARY</i>						
	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
	Local 1	97.00	68.71	0.71	0.02	
	Local 2	97.00	58.29	0.60	0.02	
	Local 3	97.00	74.88	0.77	0.02	
	Local 4	97.00	57.58	0.59	0.02	
1	Poor Government strategy or support	4.00	2.58	0.65	0.06	
2	Poor political stability	4.00	2.58	0.65	0.00	
3	Country's poor economic performance	4.00	2.92	0.73	0.00	
4	Country's poor Social awareness	4.00	2.58	0.65	0.01	
5	Country's Poor environmental preservation system	4.00	1.75	0.44	0.03	
6	Lack of legal frame work	4.00	2.58	0.65	0.03	
7	Lack of experience on high rise building construction	4.00	3.00	0.75	0.08	
8	Lack of technical experience	4.00	2.92	0.73	0.03	
9	Lack of Managerial Experience	4.00	3.17	0.79	0.02	
10	Lack of technological Experience	4.00	3.33	0.83	0.02	
11	Lack of local knowledge that the country have	4.00	2.58	0.65	0.02	
12	Lack of government recognition for local contractors	4.00	2.83	0.71	0.03	
13	Lack of finance	4.00	3.00	0.75	0.01	
14	Lack of working culture	4.00	3.42	0.85	0.03	
15	Absence of public private partnership	4.00	2.42	0.60	0.01	
16	Lack of understanding between local cultures	4.00	2.00	0.50	0.00	
17	Conflict of interest between stake holders	4.00	2.17	0.54	0.01	
18	a) Political	4.00	3.17	0.79	0.03	
19	b) Economical	4.00	3.17	0.79	0.04	
20	c) Social	4.00	2.25	0.56	0.04	
21	d) Environmental	4.00	1.42	0.35	0.01	
22	e) Legal	4.00	2.00	0.50	0.06	
23	Poor Enterprise management system	4.00	3.08	0.77	0.02	
24	Poor site organizational management	4.00	2.92	0.73	0.02	
25	Poor management of conflict of interest	4.00	2.17	0.54	0.01	
26	Lack of asset management	4.00	2.92	0.73	0.01	
27	Lack of execution management	4.00	2.50	0.63	0.02	
28	Poor managerial and leader ship skill of P. Manager	4.00	3.00	0.75	0.01	
29	Poor integration Management	4.00	2.92	0.73	0.01	

30	Poor scope Management	4.00	2.75	0.69	0.03		
31	Poor schedule Management	4.00	2.83	0.71	0.01		
32	Poor cost Management	4.00	3.08	0.77	0.01		
33	Poor quality Management	4.00	3.08	0.77	0.03		
34	Poor Enterprise resource Management and delivery	4.00	3.00	0.75	0.00		
35	Poor communication Management	4.00	2.75	0.69	0.03		
36	Poor procurement Management	4.00	2.83	0.71	0.02		
37	Poor Risk Management	4.00	2.92	0.73	0.02		
38	Poor stake holders Management	4.00	2.50	0.63	0.01		
39	Poor predictability	4.00	2.83	0.71	0.02		
40	Poor supply chain management	4.00	2.83	0.71	0.04		
41	Poor site access and traffic management	4.00	2.42	0.60	0.04		
42	Poor health and safety management	4.00	2.67	0.67	0.00		
43	Poor multidisciplinary controlling system	4.00	2.75	0.69	0.01		
44	Lack of management on innovated ideas	4.00	2.67	0.67	0.01		
45	Poor human resource management	4.00	2.83	0.71	0.01		
46	Poor Value and network chain management	4.00	2.71	0.68	0.01		
47	Lack of political support	4.00	2.17	0.54	0.00		
48	Lack of the use of contemporary technology generally	4.00	3.00	0.75	0.04		
49	Lack of equipment in variety	4.00	3.08	0.77	0.03		
50	Less productivity of equipment on hand	4.00	3.08	0.77	0.03		
51	Lack of knowledge of material science	4.00	2.58	0.65	0.02		
52	Lack of PESTEL support of the country	4.00	2.50	0.63	0.01		
53	Lack of construction engineering support	4.00	2.58	0.65	0.02		
54	Lack of knowledge of legal frame	4.00	2.33	0.58	0.03		
55	Lack of the use of ICT and information gathering	4.00	2.67	0.67	0.02		
56	Lack of proper execution	4.00	2.75	0.69	0.02		
57	Lack of proper construction planning	4.00	3.08	0.77	0.01		
58	Lack of technological innovation	4.00	3.08	0.77	0.01		
59	Lack of risk mitigation mechanism	4.00	2.92	0.73	0.05		
60	Lack of exercising statutory obligations	4.00	2.67	0.67	0.04		
61	Lack of exercising contractual obligations	4.00	2.50	0.63	0.04		
62	Lack of exercising social obligations	4.00	2.00	0.50	0.01		

63	Lack of exercising environmental sustainability	4.00	1.75	0.44	0.04		
64	Lack of the use of statistical data of CSA or metrology	4.00	1.83	0.46	0.05		
65	Lack of Health, safety and welfare protocols on the site	4.00	2.58	0.65	0.01		
66	Poor calibration of equipment	4.00	2.50	0.63	0.04		
67	Lack of strategic alliance with stake holders	4.00	2.42	0.60	0.01		
68	Lack of international financing	4.00	3.33	0.83	0.02		
69	Lack of national, regional and global economic prospect	4.00	2.92	0.73	0.02		
70	Lack of awareness of international legal system frame work	4.00	2.33	0.58	0.03		
71	Lack of local construction materials	4.00	2.25	0.56	0.01		
72	Lack of organizational structure	4.00	2.92	0.73	0.01		
73	Lack of skillful local Professional staffs	4.00	2.25	0.56	0.03		
74	Lack off efficient use of resources	4.00	3.00	0.75	0.00		
75	Lack of effective product delivery	4.00	2.67	0.67	0.03		
76	Lack of proper workman ship	4.00	2.67	0.67	0.03		
77	Lack of foreign currency	4.00	3.42	0.85	0.02		
78	Lack of construction planning	4.00	2.79	0.70	0.02		
79	Lack of performance on finishing works	4.00	2.50	0.63	0.07		
80	Lack of performance on electromechanical works	4.00	3.08	0.77	0.01		
81	Lack of performance on substructure works	4.00	2.25	0.56	0.06		
82	Lack of performance on supper structure works	4.00	2.58	0.65	0.05		
83	Lack of experience on High Rise Building Construction	4.00	2.75	0.69	0.03		
84	Type of contract delivery system	4.00	2.21	0.55	0.03		
85	Poor adjacent structures support poor adapting site characteristics and geological information	4.00	2.42	0.60	0.01		
86	Lack of pricing mechanism	4.00	2.92	0.73	0.01		
87	Poor contract administration	4.00	2.92	0.73	0.00		
88	Poor execution control	4.00	2.92	0.73	0.01		
89	Poor change order administration	4.00	2.75	0.69	0.01		
90	Lack of exercising contract document	4.00	2.67	0.67	0.00		
91	Lack of value engineering activities	4.00	2.75	0.69	0.00		
92	Poor geotechnical information	4.00	2.58	0.65	0.00		
93	Poor foundation construction	4.00	2.75	0.69	0.09		
94	Lack of selection of proper responsive bidder	4.00	2.33	0.58	0.01		
95	Defective stability analysis of adjacent structure	4.00	2.25	0.56	0.03		

96	Lack of skilled and semiskilled labor force	4.00	2.67	0.67	0.01		
97	Lack of usage of communication technologies such as barcode system, soft wares, GPS,GIS and BIM	4.00	2.75	0.69	0.00		
ANOVA							
Source of Variation		<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Rows		2.18	3.00	0.73	47.87	0.00	2.64
Columns		3.43	96.00	0.04	2.36	0.00	1.30
Error		4.37	288.00	0.02			
Total		9.98	387.00				
Local		Rows=There is significant performance difference between local contractors as per client, local contractors and consultant respondents.					
Factors		Columns=There is significant difference between factors which cause performance difference between local and foreign contractors as per client, local contractors and consultant respondents.					

5. CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusions and recommendations based on the findings of the study.

5.1. Conclusions

Stakeholders and professionals should work to have better and enhanced means of execution. Based on the discussion it has been seen that there are four major parts which comprise factors which may cause performance difference these are General Factors, Managerial Factors, Technological Factors and Technical Factors. As per the outcome of this research's analysis and findings the following conclusions are forwarded:

Majority of responders agrees by lack of foreign currency factor and the researcher believes that once this problem is solved in the industry the performance difference will be reduced provided that other factors also should be in progress than they exist now.

However still the managerial part found to be the most factors which causes the performance difference between local and international contractors and it contributes 6 (six) factors on the top fifteen. Hence according to the research all stake holders in the high rise building construction should upgrade themselves and the industry on managerial issues by sustainable on job and off job training.

Special attention should be given to the rest three parts (General, Technological and Technical) each contribute three factors each in the top fifteen factors the technical issue found to be the second major part that causes performance difference. Technical issue including financing contributes 3 (three) factors in the top fifteen, Hence all stakeholders should work on technical issues including on professionals at each level.

As a sum in order to avoid performance difference between local and international contractors and to build most high rise buildings by local contractors the gap in foreign currency, managerial performance, technical performance, technological performance and other general performance should be resolved in step by step manner with in short period of time by arranging platform for studying, training, experience sharing, market communication like bazar with all stakeholders including government very closely.

5.2. Recommendations

1. The researcher recommends that the government should help the contractors in getting foreign currency in systematic way such as participating them in foreign trade and some tax free mechanisms for imported construction materials. In other hand the contractors themselves should participate on foreign trade by themselves or in joint venture with another exporter to reduce the shortage of foreign currency. For example the contractor may work with exporters in order to have the importing materials cost with foreign currency.
2. Managerial skill cannot happen within a short period of time, it takes continuous and uninterrupted working environment and training. Hence it requires the construction industry to be stable. If the construction industry is not stable the management issue faces high up and downs. Therefore all stakeholders in the construction industry must work for the stability of the industry in order to have highly equipped managers in all aspects.
3. Every stakeholders in the construction industry should upgrade themselves in technical competency in periodically scheduled manner and sustainably by provide training and certification for every level of personnel and all resources.
4. Local contractors should be well equipped with technology like high skilled professionals, detail knowledge of material supply management and material science, use and handling of contemporary construction equipment and tools and communication system.
5. To manage general factors stake holders must use some technics such as risk identification mechanism. For example lack of working culture is a basic problem in our country's working industry in every aspect. Hence the government, any concerned party and the construction companies should give a sustainable training on motivational issues for the work force in the country.

Hence to stop hiring foreign contractors in our high rise building construction it is mandatory to build up our economy and that should be the concern of all citizens in the country and continuous effort from all.

Nevertheless the following issues are identified and suggested for future studies as the contemporary construction industry requires them critically.

- High rise building finishing works
- High rise building electro-mechanical work
- Construction of sky scrapers

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Appendix A: - Questionnaire

**ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES
SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING**

Questionnaire Survey for Thesis paper on

PERFORMANCE ANALYSIS OF LOCAL AND INTERNATIONAL CONTRACTORS ON HIGH RISE BUILDING CONSTRUCTION PROJECTS IN ADDIS ABABA

The purpose of this questionnaire is to study practices of local and international contractors on high rise building construction projects in addition to that to identify the problems and challenges incurred with regard to high rise building construction projects in Addis Ababa. Please answer all questions as possible. All the information gathered will be kept confidentially and will be used only for academic research and analysis without mentioning the names of individuals companies involved.

Thank you in advancing for your precious time and kind cooperation!

Sincerely Yours

Mekonnen W/yohannes

Supervised by: - (Pr.Dr. Ing) Abebe Dinku

Mr. Fasil Tebeje

General Information

Please add (☐) as appropriate:

1. Type of Organization (Respondents designation)

Client ☐	Consultant ☐	Contractor ☐
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2. Type of Project in Story

☐ 1-6 Story	☐ 6-20 Story	☐ More than 20 story
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Closed Questioners

The given below are numbers of root causes for the problems, challenges and unwanted effects in high rise

building construction projects of local contractors in Addis Ababa. Please indicate the significance of each factor by ticking the appropriate boxes and add any remarks relating to each factor as alleviation majors such as the reasons, the critical factors &/or the solutions.

E.S. = Extremely Significant [4]

V.S. = Very Significant [3]

M.S. = Moderately Significant [2]

S.S. = Slightly Significant [1]

N.S. = Not Significant [0]

Comparison: - Causes of performance difference between local and international contractors

PESTEL (Abbreviation) =Political, Economic, Social, Technological, Environmental and Legal.

Question No.	Factors causes performance difference b/n local and international contractors	E.S [4]	V.S [3]	M.S [2]	S.S [1]	N.S [0]	Remarks
Part 1. General							
1	Poor Government strategy or support						
2	Poor political stability						
3	Country's poor economic performance						
4	Country's poor Social awareness						
5	Country's Poor environmental preservation system						
6	Lack of legal frame work						
7	Lack of experience on high rise building construction						
8	Lack of technical experience						
9	Lack of Managerial Experience						
10	Lack of technological Experience						
11	Lack of local knowledge that the country have						
12	Lack of government recognition for local contractors						
13	Lack of finance						
14	Lack of working culture						
15	Absence of public private part-						

	nership						
16	Lack of understanding between local cultures						
17	Conflict of interest between stakeholders						
18	What is the main reason of hiring foreign contractors						
	a) Political						
	b) Economical						
	c) Social						
	d) Environmental						
	e) Legal						

Question No.	Factors causes performance difference b/n local and international contractors	E.S [4]	V.S [3]	M.S [2]	S.S [1]	N.S [0]	Remarks
Part 2. Managerial							
1	Poor Enterprise management system						
2	Poor site organizational management						
3	Poor management of conflict of interest						
4	Lack of asset management						
5	Lack of execution management						
6	Poor managerial and leadership skill of P. Manager						
7	Poor integration Management						
8	Poor scope Management						
9	Poor schedule Management						
10	Poor cost Management						
11	Poor quality Management						
12	Poor Enterprise resource Management and delivery						

13	Poor communication Management						
14	Poor procurement Management						
15	Poor Risk Management						
16	Poor stake holders Management						
17	Poor predictability						
18	Poor supply chain management						
19	Poor site access and traffic management						
20	Poor health and safety management						
21	Poor multidisciplinary controlling system						
22	Lack of management on innovated ideas						
23	Poor human resource management						
24	Poor Value and network chain management						
25	Lack of political support						

Question No.	Factors causes performance difference b/n local and international contractors	E.S [4]	V.S [3]	M.S [2]	S.S [1]	N.S [0]	Remarks
Part 3. Technological							
1	Lack of the use of contemporary technology generally						
2	Lack of equipment in variety						
3	Less productivity of equipment on hand						
4	Lack of knowledge of material science						
5	Lack of PESTEL support of the						

	country						
6	Lack of construction engineering support						
7	Lack of knowledge of legal frame						
8	Lack of the use of ICT and information gathering						
9	Lack of proper execution						
10	Lack of proper construction planning						
11	Lack of technological innovation						
12	Lack of risk mitigation mechanism						
13	Lack of exercising statutory obligations						
14	Lack of exercising contractual obligations						
15	Lack of exercising social obligations						
16	Lack of exercising environmental sustainability						
17	Lack of the use of statistical data of CSA or metrology						
18	Lack of Health, safety and welfare protocols on the site						
19	Poor calibration of equipment						
20	Lack of strategic alliance with stake holders						
21	Lack of international financing						
22	Lack of national, regional and global economic prospect						
23	Lack of awareness of international legal system frame work						

24	Lack of local construction materials						
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Question No.	Factors causes performance difference b/n local and international contractors	E.S [4]	V.S [3]	M.S [2]	S.S [1]	N.S [0]	Remarks
Part 4. Technical							
1	Lack of organizational structure						
2	Lack of skillful local Professional staffs						
3	Lack off efficient use of resources						
4	Lack of effective product delivery						
5	Lack of proper workman ship						
6	Lack of foreign currency						
7	Lack of construction planning						
8	Lack of performance on finishing works						
9	Lack of performance on electromechanical works						
10	Lack of performance on substructure works						
11	Lack of performance on supper structure works						
12	Lack of experience on High Rise Building Construction						
13	Type of contract delivery system						
14	Poor adjacent structures support poor adapting site characteristics and geological information						
15	Lack of pricing mechanism						

16	Poor contract administration						
17	Poor execution control						
18	Poor change order administration						
19	Lack of exercising contract document						
20	Lack of value engineering activities						
21	Poor geotechnical information						
22	Poor foundation construction						
23	Lack of selection of proper responsive bidder						
24	Defective stability analysis of adjacent structure						
25	Lack of skilled and semiskilled labor force						
26	Lack of usage of communication technologies such as barcode system, soft wares, GPS, GIS and BIM						

Open Questioners

1. What do you think the main performance difference between local and foreign companies?

If local companies found poor what remedial action should be done?

Please discuss them briefly.

— _____

2. What problem do you observe engaging foreign contractors in high rise building and PESTEL of the country?

Please discuss briefly.

— _____

3. How do you see government support on the capacity building of local contractors?

Please discuss briefly.

4. How do you see local contractors experience on supply management of deliverables and material science?

Please discuss briefly.

5. Do you think public private partnership can be a solution in capacity building of local contractors on HRB?

Please discuss briefly

— _____

6. Do you think electromechanical and finishing work are more difficult than civil structure work for local contractors?

Please discuss

—

THANK YOU!