Cause and Effect of Delay of Housing Project:  
The Case of Koye Feche P -16 Branch Housing Projects

A Thesis Submitted to the Department of Business and Management as  
Partial Fulfillment to the Requirements for the Award of Masters of  
Business Administration in Construction Management

Addis Ababa Science and Technology University  
College of Natural and Social Sciences  
Department of Business and Management

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November 2018  
Addis Ababa, Ethiopia
DECLARATION

I hereby declare that this thesis entitled “cause And effect Of Delay on Housing Construction Project The case of KoyeFeche P-16 Brabch Housing Project” was composed by Myself, with the guidance of My advisor, that the work contained herein is My own except where explicitly stated otherwise in the text, and that this work has not submitted, in whole or in part, for any other degree or professional qualification.

Submitted by: Kidanemariam Hailu
Signature:  
Date: 1/1/2018
Approval Sheet

This is to certify that the thesis prepared by Kidanemariam Hailu entitled "cause And effect Of Delay on Housing Construction Project The Case of Koye Feche P-16 Brabch Housing Projects" and submitted in fulfillment of the requirements for the Degree of Mater of Science complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Approved By

Signature Date:

Advisor Name: Geremew Teklu (PhD) 2018
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Abstract
Construction industry plays an important role in social, economic and political development of our country Ethiopia. The construction activities in Ethiopia are increasing, however, most of public projects are facing problems related to delays in completion time or time overrun, cost overrun, the final deliverables become inferior in quality, detrimental variations and reworks and dissatisfaction by other party lead to disputes. The research work has addressed the main causes of delay, the effect of the delays, and the possible solutions that minimizing the project delays in KoyeFeche project 16 branches Housing Construction Project. The main tools for the collection of data included questionnaires and interviews were used to identify the various efforts that have been made in the past to evaluate and examine the causes and effect of housing construction projects. Simple statistical relative importance index analysis involving tables and percentages were used in analyze the results from the questionnaire. Some of the finding that are related to consultant, contractor and client are ranked according to the Relative Importance Index. The cause factors includes, lack of funds to finance the project to completion, changes in drawings, lack of effective communication among the parties involved, lack of adequate information from consultants and slow decision making on the project work and time overrun, increase in final cost of project, dispute among parties are the effect of delay. Some important solutions to minimize the cause of delay are offer incentive for early project completion contractors, ask for extension of time accurate initial project cost estimation, utilization of the latest construction technology method, proper project planning and scheduling avoid bureaucracy, ensure the availability of resources timely decision making by all role player of the housing construction.

Key words: Construction delay, housing project, Koye Feche P-16
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RII = Relative Importance Index .................................................................................. 39
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DEDICATION

I dedicate this work to God Almighty for His support through this study. I also dedicate it to my wife Yordanos Fitsum and my children Sidon And Robel.
CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Many problems may arise during construction project implementation; one main concern is delay. Delay is the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project (Assaf and Al-Hejji, 2006). There are many reasons that cause delays. According to Ogunlana (2008), although the main reasons for delays are comparable across developing countries, several factors pertaining to local industry, social-economic, cultural issues and project characteristics also contribute to delays. Delays may occur as a result of the actions or inaction on the part of owner, contractor, subcontractors, consultants or the government. In addition, delays are always interrelated which led to the more complicated situation.

Delays in construction projects are considered one of the most common problems causing a multitude of negative effects on the project and its participating parties. Along with delay, the frequently faced consequences are project failure, reduction of profit margin, and loss of belief of citizen in government funded projects. When delays do occur, they are either accelerated or have their duration extended beyond the scheduled completion date. These are not without some cost consequences. Delays also give rise to disruption of work and loss of productivity, late completion of project increased time related costs, third party claims, abandonment and termination of contract (Abdul-Rahman H., 2006).

Delays caused by the client such as failure to allocate sufficient fund, slow decision making coupled with delay caused by consultant such as late submission of drawings and specifications, frequent change orders, and inadequate site information generates claims from both the main contractors and subcontractors which many times entail lengthy court proceedings with huge impacts. Delays caused by contractors generally attributes to poor managerial skills, lack of effective planning and poor financial management have led to a contractor’s downfall (Ogunlana, 2008).

The effect of delay may include time overrun, cost overrun, disputes, litigation and total abandonment (Murali and Yau, 2006). Some studies directly examine delays, attempt to identify their causes and recommend ways to avoid them. Construction project delays have a weakening effect on parties (Owner, Contractor, and Consultant) to a contract in terms of
a growth in adversarial relationships, distrust, litigation, arbitration, cash-flow problems, and a general feeling of apprehension towards each other (Assaf and Al-hejji, 2002). Therefore, the major purpose of this study is to assess the causes and the effects of delay on housing construction projects.

1.2. Background of the Project
Addis Ababa Housing Construction Project Office was established in 2004 to implement the integrated Housing Program. The integrated housing development program was introduced as a government led intervention to implement the first strategy indicated earlier. The implementation of the Integrated Housing Development Program (IHDP) has brought remarkable achievements in availing affordable housing to the low and middle income groups of the society and creating an enabling environment through job creation.

Some Major Facts about the Projects
The project Office started its activities in 2004 by constructing 750 model houses around Gerji

- 276,634 houses have been constructed and under construction.
- Until the end of 2016, over 175,000 condominium houses were transferred in the past 11 rounds.
- More than 94 thousand houses are under construction. The 10th and 11th rounds were different from the previous 9 rounds. This is because condominium houses constructed under 10/90 Housing Development Program were transferred to lowest income group residents registered specially for this program. Totally, 23,976 condominium houses were transferred under 10/90 program. Of which, 960 were transferred in the 10th round and the rest 23,016 houses in the 11th one. No one is left without having a house in this program. Therefore, all city residents registered for 10/90 program have become owners of their houses. The rest were transferred to low and middle income group residents under 20/80 Housing Development Program. The following table indicates condominium houses transferred to residents and those under construction.(AAHPO, brusher June, 2018)
<table>
<thead>
<tr>
<th>No.</th>
<th>Construction Year</th>
<th>Number of Houses</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2004–2010</td>
<td>81,266</td>
<td>Transferred</td>
</tr>
<tr>
<td>2</td>
<td>2011</td>
<td>17,171</td>
<td>Transferred</td>
</tr>
<tr>
<td>3</td>
<td>2012</td>
<td>44,876</td>
<td>Transferred</td>
</tr>
<tr>
<td>4</td>
<td>2013</td>
<td>39,249</td>
<td>Transferred</td>
</tr>
<tr>
<td>5</td>
<td>2014</td>
<td>52,651</td>
<td>Under construction</td>
</tr>
<tr>
<td>6</td>
<td>2015—2018</td>
<td>41,421</td>
<td>Under construction</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>276,634</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Source (AAHPO, Number of transferred and under constructions houses, brusher June, 2018)

Therefore, the background of the organization would enable the researcher in analyzing and interpreting results and making recommendations.

1.3 Statement of the Problem

Delays in a construction project is counted as a common problem and became a cause for projects completion with huge cost overrun (requiring higher budget than estimated), extended completion time, inferior quality deliverables and contract termination. In recent time it was an accepted phenomenon to have delays in construction projects completion time. For the client, construction delay is a loss of revenue, lack of productivity, dependency on existing facilities (Cheung et al., 2001).

For the contractor, construction delay is the higher costs, longer work duration, increased labor cost, higher material and equipment costs etc. Completion of construction projects on specified time or time agreed by the parties indicates their efficiency. The delays in construction projects happen because of various factors or causes. These causes lead to the delay in construction completion, and this delay ultimately leads to negative effects on the construction project (Assaf S. A. & Al-Hejji S. (2006)
Thus it is necessary to identify causes and consequence of housing projects construction delay which contribute to low quality housing in relation to physical aspects such as structural failure, wall cracking, and sanitary and electrical installation problems. Construction or design faults are the main factors, which contribute to low quality construction. Construction fault may be a result of poor workmanship, poor quality material, and lack of technical know-how, lack of commitment, lack of stakeholders’ and cooperation.

According to annual report (2009 E.C) of housing construction and development office The city administration of Addis planed 20 billion birr have been provide for the construction housing project for year 2004 to 2010 E.C budget year this shows the government is committed to minimize the gap of housing supply and demand.

According to p-16 branch office semiannual report, (2018) 6326 house under construction were the contract time (calendar day) was 545 for G+4 and 725 for G+7 but elapsed time to date is 1182 for each. The commencement date 23/07/2006 the plan to completion date 30/10/2007 e.c but the project going on until the end of 2010 E.C

Nevertheless, with less effort to minimize delays in construction project, it is possible for the construction industry performance become lower when compare to other industries. This will show that construction industry is too dependent to the government in order to settle down the impact of delays issue such as abandoned projects.

Hence, it is essential to identify the causes of this problem in early stages of construction project. This research was diagnose the main causes and effects of delays in Addis Ababa Yeka Abado Housing Construction Project.

To achieve the major objective of the study, the following research questions were addressed. These are:

1. What are the main causes of delay in Koyefeche project 16 branches Housing Construction Project?
2. What is the effect of the delays in Koyefeche project 16 branches Housing Construction Project?
3. What are the possible solutions that minimizing the project delays in Koyefeche project 16 branches Housing Construction Project?
1.4 Objectives of the study

1.4.1 General Objective

The general objective of the study is to analyzing the cause and effect of delay on housing construction project in Addis Ababa housing project yekaabado project. The specific objectives of this study are as follows:

1.4.2 Specific Objective

1. To identify the main causes of delays in Koyefeche project 16 branches housing project

2. To examine the effect of the delays in the Koyefeche project 16 branches housing project.

3. To identify the possible solution that minimize the project delays in Koyefeche project 16 branches Housing Construction Project.

1.5 Significance of the study

The significance of establishing the issues related to the construction project delays was to provide a greater insight and understanding on the causes of delays particularly among the main project players: contractors, (to minimize unnecessary cost and time that have lost in delayed projects) client (to achieve their objective and creating good governance) and consultants (to care their protection and ethics. This can be achieved by applying theoretical concepts discussed in many literatures into practice in real projects. It is hoped that these findings are a guide efforts to improve the performance of the construction industry is useful to the construction players. Therefore, these findings might encourage the practitioner to focus on delay problem that might have existed in their present or future projects.

Other than that, this study is expected to provide a better ways and methods in delivering construction projects by minimize the major causes of delays.

1.6 Scope of the study

The scope of the study was concerned only on the idea of internal and external cause of delay in the operational performance of the Koyefeche housing construction project. As the housing project in Addis Ababa is a hugs topic. It only covers the geographical area of koyefechesub
city site. This study covers the of construction delay and its effect which cover only the time range of 2006-2010 E.C

1.7 Limitation of the Study
This study’s limited to the concept of cause and effect of housing construction performance KoyeFeche housing projected site. The data were collected are concern related only in the client /government/ consultant and contractor. The data collecting was limited within range sample population will be calculated.

1.8 Definition of Operational Terms
Delay: Delay usually has time-associated cost effects on a contract which may be measured in terms of time, money, or a combination thereof.
Cost overrun: Amount by which the actual cost exceeds the budgeted, estimated, and original or target cost.
Effect: a change that is caused by an event, action
Housing: a home, a store room and a show case for possessions; a mark of status; a base from which everything else necessary for livelihood (Bethel, 2003).

1.9 Organization of the study
The followings are the summary for each chapter on this research project paper.
This project paper organized into six chapters which can be summarized as follow:
a) Chapter 1: Introduction
This chapter presents the background and general information which comprises of introduction, issues and problem statements, research question objectives the study, scope of the study, significance of the study, limitation of the study and organization of the study.
b) Chapter two review of the related literature:
From the available literature, this chapter composed an overview of the definition and various types of delay encountered in a project. It also includes the overall delays concept along with the causes and further classification of delays, responsibilities that the parties have in a delay, procedure taken when delays and the documentation of delays.
c) Chapter three: Research design Methods
This chapter gives an overall view of research methodology for the research and includes the method of data collection and questionnaire structure, population of the study, research design and related one.

d) Chapter four: Analysis and Findings
This chapter focuses on analyzing collected data and discussing the findings. It contains the analysis of the information gathered through the questionnaire survey, identifies the critical causes of delay based on the chance of occurrence. Various suitable techniques and methodologies are used in analyzing the data gathered appropriate with the information needed and the types of data collected. Analysis and discussion in this chapter is carried out with regards to fulfilling the objectives of the research.

G) Chapter five : Summary, Conclusion and Recommendation. This chapter is provides the conclusions of the research. There are also several recommendations discussed in this chapter.
CHAPTER TWO: REVIEW OF THE RELATED LITERATURE

2.1 Theoretical Review

2.1.1 The Concept of Construction Delay

Delay in construction is a state in which the actual progress of the phases of a construction project becomes slower than as planned or completing the project late (CIOB, 2008). Delay in the setting of construction refers to prolonged period of construction and interruptions of events that distracts the programmed of the construction. Delay is acknowledged as the most risky, costly, common, and complex problem encountered during projects (Cheung et al., 2001). Delays are synonymous with construction projects. Delay has been established as one of the commonest experience in the construction project globally (Ahmed, et al, 2003). Multiple studies have identified incident of delay as a major problem facing construction projects in the world (Kaliba, etal, 2009). A project is considered delayed only when its postulated time of completion has been accomplished (Majid, 2006). According to Pourrostamet al. (2011) project delays form the major challenges for the industry of construction in the emerging countries. However, delays are not only experienced in the emerging countries, delays are a global phenomenon (Memon et al., 2011).

2.1.2 Classification of Delays

Delays related to construction projects are caused as result of a number of factors. Ahmed et al. (2003) grouped delay in two broad categories: the internal causes which come from parties involved in a particular contract; and external ones come from the proceedings that exceed the parties’ control. These include the act of God, actions of the government, as well as material supplies. Scott (1993) identified three categories of delays namely; employer’s responsible delays; contractors responsible delay and external delays. However, Ahmed et al, (2003) and Ochoa (2013) believe that, delay can be grouped to be under concurrent, excusable, and non-excusable delays. In addition, Trauner et al. (2009) came out with an opinion based on study conducted that construction delays could be as: non-excusable or excusable, non-concurrent or concurrent, non-critical or critical, and non-compensable or compensable.
The type of delay has an impact on critical activities which need a more detailed analysis to determine whether additional time extension is warranted or not. Excusable delays can be further classified into excusable with compensation and excusable without compensation. Terry Williams (2003) revealed that there are four basic ways to classify delays: Excusable or non-excusable delay, Concurrent or non-concurrent delay, and Compensable or non-compensable delay. The types of delays mentioned above have internal or external sources on project process. Internal causes of delay include causes that come from the owner, designers, contractors, and consultants. External causes of delays are originated from outside of construction projects such as utility companies, government, subcontractors, suppliers, labor unions and nature.

2.1.2.1 Excusable non-excusable delays

Construction project delays are fundamentally excusable or non-excusable. According to Ahmed et al (2003) delay is excusable or non-excusable depending on the sections contained in the terms of contract. An excusable delays generally is as a result of an unanticipated occurrence that exceed the control of contractor and the subcontractors (Trauner et al., 2009). The writer also believe that delays coming from issues such as labour unrest, flood, differing site conditions, forced majeure or Acts of God, client variation, delays from unexpected occurrences result in a control that exceed that of the contractor which is referred to as excusable delays.

An excusable delay is a delay that is due to an unforeseeable event beyond the contractor’s or the subcontractor’s control. If the delay is considered compensable, then the contractor is entitled to additional financial compensation as well as extra project time. Under certain circumstances where non-compensated excusable delays occur, the contractor receives extra time but not compensation money for the additional completed work.

Excusable delays are known as “force majeure” delays, and commonly called “acts of God” because they are not the responsibility or fault of any particular party. Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money (Alaghbari et al 2007).
2.1.2.2 Delays with Compensation
A delay is deemed compensable to the contractor when its cause is within the control of, is the fault of, or is due to the negligence of the project owner (Sweet 1977). According to Alkass et al, (1996), contractors are entitled to a time extension as well as monetary compensation due to this type of delays. However, the contractor must show that the delay was "unreasonable" and prove the extent of the additional expense involved (Clough, 1975). These delays result from circumstances such as:

1. Failure of the owner to have the work site available to the contractor in a timely manner;
2. Owner initiated changes in the work;
3. Owner delays in issuing a notice to proceed;
4. Architect/Engineer supplied designs which are defective;
5. Owner not properly coordinating the work of other contractors;
6. Owner not providing owner furnished equipment in a timely manner;
7. Owner providing misleading information;
8. Owner interfering with the performance of the contractor;
9. Owner, or the Architect/Engineer, delaying the approval of contractor submitted shop drawings;
10. Owner, or the Architect/Engineer, using the shop drawing process as a means by which to change the contract requirements
11. Contractor encountering differing site conditions (Yates and Epstein, 2006)

2.1.2.3 (Compensable) versus non-compensable delays
With Non-compensable delays, Ahmed et al. (2003) and Mubarak (2005) grouped both excusable non-compensable and that of the compensable one; the delays that are compensable are caused by the client or the designer (i.e. architect/engineer). Under conditions like that, the contractor may be given an extension of time or the opportunity will be given to him to reclaim for cost relating to the delays or both. Mubarak (2003); Ahmed et al. (2003); Trauner et al. (2009); and Ochoa (2013) established that, for an excusable delay, one can classify it as excusable non-compensable as well as excusable compensable. Delays that are compensable result either through the client or the architect/engineer as Mubarak (2005) opines.
Trauner (2009) claimed that, factors specified within the terms of the contract that causes delays like contradictory site conditions are the factors that regardless of them being excusable they do not render to the contractor any compensation. According to Mubarak (2005), delays that are excusable non-compensable are usually above the client or the contractor’s control like fire, conflicts, labour unrest, weather conditions, national cries etc. Trauner et al. (2009) stressed that whether delays are non-compensable or compensable, it depends essentially on the contract condition. The contract condition will have some effect on the kinds of delays which require extension of time or fiscal compensation.

2.1.2.4 Concurrent Delays

Levy (2006) describes this type of delay to be an overlapping one. The author identified concurrent delays to be generated by either the clients or the contractor. Levy (2006) further stressed that, when these delays happen the two parties are held accountable where none of the two parties can repossess damages. Concurrent delays comprise of more than one independent cause that occur in the same frame of time (Mubarak, 2005). These delays sometimes include non-excusable and excusable delays.

If only one factor is delaying construction, it is usually fairly easy to calculate both the time and cost resulting from that single issue. A more complicated but also more typical situation is one in which more than one factor delays the project at the same time or in overlapping periods of time. These are called concurrent delays (Alaghbari et al 2007).

Concurrent delays occur when both owner and the contractor are responsible for the delay. Generally, if the responsible parties of the delays are intertwined, neither the contractor can be held responsible for the delay (force to accelerate, or be liable for liquidated damages) nor can he recover the delay damages from the owner. Until the development of CPM schedule analysis, there was no reliable method to differentiate the impact of contractor caused delays from owner caused delays. (Alwi et al 2002). Concurrent delays arise when one event causes a delay simultaneously with another event. For example, if an owner denies access to a project site for two weeks, and a severe storm prevents a contractor from working on the project for one of two weeks as well, there will be a concurrent delay of one week. The contractor will be able to recover for delay damages for one week, as a severe
storm is not a cause of delay that is compensable and would have prevented the contractor from performing even if the owner did not deny access to the site.

Harry (1995) in his study show that the concurrent delay is considered an additional delay only to the extent it prolongs the delay to the contract completion time beyond the date that the one it is concurrent with had already delayed that date. Concurrent delays are often more complex.

2.1.2.5 Critical or non-critical delays

Almost all studies carried out on delays seek to find out the effect of the delays on the entire project life even as the project progresses (Trauner et al., 2009). They stress again that, delays in which the outcomes cause an extension in the time of the project is considered to be non-critical delays and critical delays that have no effect on the project completion. Again, Trauner et al. (2009) claim that challenge of critical delays result from the forecast of a critical path method. All projects have what is called critical path and should it happens that these critical undertakings along the path as they delayed then the completion of the project date ought to be extended. The researchers believe that the critical factors used in determining the date of completion of a project are contractor's duration as to the critical path's activities, the project itself, the project's physical restraints, and the activity sequence and phasing.

2.1.3 Causes of Delays in Construction Projects

Construction delay is considered to be one of the most recurring problems in the construction industry and it has an adverse effect on project success in terms of cost, time, quality, and safety. There are several factors that cause delay in construction. Delay may be caused by Clients, Users, Consultants, Designers, Owners, Contractors and Suppliers (Sambasivan & Soon, 2007).

In a study of the significant factors that cause delay of construction projects (Alaghbari, et al. 2007), classified the factors into four major groups, these are contractor factor, consultant factor, client factors and external factors. Financial problems, shortage of materials and poor site management practices were considered the top most factors. Client related factors included delayed payments, slow decision-making, frequent change orders, bid award for lowest price and contract scope changes. The most important factors by
consultant were provision of incomplete design, poor supervision, slowness to give instructions and lack of experience. External causes identified included shortage of materials availability, poor site conditions and lack of equipment and tools in the market. In a related study of the causes and effects of delay in Malaysia construction industry (Sambasivan & Soon 2007) found poor site management, inadequate experience’ and poor subcontractors among the major causes of time delays on construction projects. Projects can be delayed for a large number of reasons and usually impact on cost and time. Battaineh et al. (2002) studied causes of construction delay in Jordan. Results of the survey indicated Contractors and Consultants agreed that Owner interference, inadequate Contractor experience, financing and payments, labor productivity, slow decision making, improper planning, and Sub-contractors are among the top ten significant factors.

Mansfield et al (1994) studied the causes of delay and cost overrun in construction projects in Nigeria. The results showed that the most important factors are financing and payments, poor contract management, changes in site conditions, shortage of material, and improper planning. Similarly, Aibinu et al (2002) made a research on effects of construction delays in Nigeria. The findings showed that time and cost overruns were frequent effects of delay. Delay had significant effect on completion cost and time of 61 building projects studied. Client-related delay is significant in Nigeria.

Assaf et al. (2006) conducted a survey on time performance of different types of construction projects in Saudi Arabia to determine the causes of delay and their importance according to each of the project participants, i.e., the Owner, Consultant and the Contractors. The survey included 23 Contractors, 19 Consultants, and 15 Owners. Seventy-three causes of delay were identified during the research. 76% of the Contractors and 56% of the Consultants indicated that Average of time overrun is between 10% and 30% of the original duration. The most common cause of delay identified by all the three parties is “change order”. Surveys concluded that 70% of projects experienced time overrun and found that 45 out of 76 projects considered were delayed. Neal (2007) in his study showed that 40% of the projects studied in the UK have over-run their original contract period.
Ogunlana et al. (1996) studied the delays in building project in Thailand, as an example of developing economies. He concluded that the problems of the construction industry in developing economies could be nested in three layers: (1) problem of shortages or inadequacies in industry infrastructure, mainly supply of resources; (2) Problems caused by Clients and Consultants; and (3) Problems caused by incompetence of Contractors.

Sambasivan et al. (2007) surveyed causes and effects of delays in Malaysian construction industry. The study identified 10 most important causes of delay from a list of 28 different causes and 6 different effects of delay. Ten most important causes were: (1) Contractor’s improper planning, (2) Contractor’s poor site management, (3) inadequate Contractor experience, (4) inadequate Client’s finance and payments for completed work, (5) problems with Sub-contractors, (6) shortage of material, (7) labor supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage. Rizwan et al. (2007) conducted a research on delays in construction industry of Pakistan. A delay criticality index was used to identify the major delay causes in the industry which, in descending order of criticality, were found to be: change orders, labor productivity issues, poor site management and supervision, inspections/audits, poor cost estimation and control, inadequate project scheduling, defective design, inefficient construction methods, delayed payments, and incomplete construction drawings. In addition, the percentage allocation of responsibility for overall delay causes, according to Contractors’ perceptions, was as follows: Contractors=48.75%, Consultants=17.5%, Owners=16.25 %, government=8.75%, and shared =8.75%.

Kumaraswamy et al. (1997) carried out a study on causes of time overruns in Hong Kong construction projects. He revealed that the five principal and common factors of delays are: (1) poor risk management and supervision, (2) unforeseen site conditions, (3) slow decision making, (4) Client-initiated variations, and (5) necessary variations of works.

Shakeel et al. (2006) made an investigation of significant causes of delay in the UAE construction industry. In the study, they indicated that the effects of construction delays are
not confined to the construction industry only, but influence the overall economy of a
country like UAE, where construction plays a major role in its development and contributes
14% to the GDP. Thus, it is essential to define the most significant causes of delay in order
to avoid or minimize their impact on construction projects. The research disclosed that 50%
of the construction projects in UAE encounter delays and are not completed on time. The
top 10 most significant causes of construction delays have been identified by this research.
Approval of drawings, inadequate early planning and slowness of the Owners’ decision-
making process are the top causes of delay in the UAE construction industry.

Mezher et al. (1998) conducted a survey of the causes of delays in the construction industry
in Lebanon from the view point of Owners, Contractors and architectural/engineering
firms. It was found that Owners had more concerns with regard to financial issues;
Contractors regarded contractual relationships the most important, while Consultants
considered project management issues to be the most important causes for delays.

Ahmed et al. (2005) under his study of construction delays in Florida identified the six (6)
most critical causes of delays in ascending order of criticality were found to be :( 1)
changes in specifications, (2) inspections, (3) Incomplete drawings, (4) changes in
drawings, (5) change order, (6) building permits approval.

The result of the research indicated that 94% of the 52 surveyed public building projects
undertaken by local Contractors between the years 1995 to 2005 have encountered delays.
Moreover, the time extension ranges from 10% to 367% and the Average delay is found to
be 89.9%. The most frequent causes of delay which in descending order of criticality were
found to be: (1) necessary variations, (2) delayed payments, (3) scarcity of materials, (4)
late material supply, (5) less emphasis to planning, (6) sub-surface condition, (7) changes
in design, (8) material and labor price escalation, (9)unrealistic time schedule, and (10)
failure to update schedules on time. Divya.R and S.Ramya (2015), mentioned the possible
following factors causing delays in construction projects in Malaysia:
2.1.4 Group Causes of Delay

There are many factors that contributed to causes of delays in construction projects. Previous researches have classified factors of delays under various categories (group) of causes. The benefit of grouping was to determine the factors which are related through a common characteristic. It was not only revealed the common factor but also helped to focus attention in generating the possible factors for a particular group. Moreover, it is essential to determine the correct factors that cause the problem in order to establish appropriate permanent corrective actions (Abd. Majid, 1997). Therefore, the groups of causes by previous researchers are used as to provide a basis in establishing the groups of delays causes with parallel to these research objectives.

Table 2.1: Group causes of delays

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Act of God,</td>
<td>Client-related</td>
<td>Client related factors</td>
</tr>
<tr>
<td>Design-related</td>
<td>Contractor-related</td>
<td>Contractor related factors</td>
</tr>
<tr>
<td>Construction-related</td>
<td>Surveyor-related</td>
<td>Consultant/Design team</td>
</tr>
<tr>
<td>Financial/Economical</td>
<td>Architect-related</td>
<td>related factors</td>
</tr>
<tr>
<td>Management/ Structural</td>
<td>Structural engineer related</td>
<td>Material related factors</td>
</tr>
<tr>
<td>Administrative</td>
<td>Services engineer-related</td>
<td>Labour and equipment</td>
</tr>
<tr>
<td>Code related</td>
<td>Supplier-related</td>
<td>related factors</td>
</tr>
<tr>
<td></td>
<td>Subcontractor-related</td>
<td>Contract related factors</td>
</tr>
<tr>
<td></td>
<td>External causes</td>
<td>Contract relationship</td>
</tr>
<tr>
<td></td>
<td>related factors</td>
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<tr>
<td></td>
<td>External factors</td>
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</tbody>
</table>

Classification of the above groups of causes may not be limited to those mentioned. The classification of groups of causes however, is depends on how the researchers derive the research’s result to meet the objective. The following section presents the factors of delays
for each group of causes that review earlier. A set of factors that belong to a group of causes are cited from literature review.

2.1.5 Category Causes of Delay

For the purpose of this research, the causes of delay that has been established by Chan and Kumarasamy (1997); Odeh and Battaineh (2002); Sambasivam and Soon (2006); Long et al. (2008) are used. Following are the classification, the sources of delays that arise from each of these factor categories were identified. All of these will be used in designing the questionnaire as to achieve the objectives of this research.

2.1.5.1 Caused of Client Related Delays

2.1.5.1.1 Lack of experience of client in construction

According to Koushki, et al. (2005) identified factors of lack of experiences of client in construction project have high influence to the causes of delays. Some of the project delay cause by client due to not enough experience especially fresh developer. Most of the time, client facing a problem and do not know how to solve it immediately because of no experience. During client finding the way to solve the problem, some of the work could not progress. Finally, the whole project delay because of some particular work delay.

Chan and Kumarasamy (1997) in their study have listed the client characteristic, project financing, client variation and interim payment to contractor. Sambasivam and Soon (2006) identified the factor of interference, slow decision making and unrealistic contract duration. Aibu and Odeyinka (2006) have added the factors of late contract award by client. Based on the literature review, there are eight factors of client related delays were identified as shown in

2.1.5.1.2 Change order

According to Odeh and Battaineh (2002) mentioned the factors of change orders that contribute to causes of delays. Client always change the design during the construction period, during the same time that will affect whole project delay. It is because contractor cannot carry out his work until the latest drawing issue by architect. Consequently contractor cannot be done within the contract period. Most of the current project delay because of change order by client. For instance, a project almost complete but client change certain part
of design and instruct contractor carry out the additional work. After done the whole project, the contractor found out was exceeding contract period.

2.1.5.1.3 Client interference
According to Long, et al. (2004) studied the factors client interference that contributes to causes of delays in construction project. Some of the client instruct contractor to carry out additional work without ask architect promise. During the contractor carry out additional work, some of the work could not progress and it will be delay immediately. On the other hand, client do not follow the procedure such as did not mention architect issue an architect instruction. Finally it will affect the whole project delay.

2.1.5.2 Causes of contractor related delay
2.1.5.2.1 Inadequate contractor experience
AbdMajid and McCaffer (1998) studied the factors of inadequate contractor experience as contributor to causes of delays. Long, ET al. (2004) mentioned the factors of inadequate contractor experience that contribute to causes of delays in construction project. Battaineh (2002) identified the factors of inadequate contractor experience as contributors to causes of delays. In construction industry, some of the delay projects are facing a problem during construction period. But at the same time contractor could not solved the problem immediately because of no experience. During the contractor finding method to solve the problem, some of the works totally stop because of that problem. After the problem was solved, those work keeping continue but run out from the schedule. Finally, the whole project will influence delay.

2.1.5.2.2 Inaccurate time estimate
According to Long, et al. (2004) identified the factors of inaccurate time estimating that contribute to causes of delays in construction project. Time estimates are important as inputs into other technique used to manage and structure for all projects. An inaccurate time estimation technique may cause a project delay. For instance, in some delay project, the contractor do not allowed time for some common problem always happen during the construction stage such as breakdown of equipment, miss deliveries by supplies, accidents and emergencies and so on. Because of this problem the actual time will run out from the estimated. So, the whole project could be facing delay.
2.1.5.2.3 Inaccurate cost estimate

According to Long, et al. (2004) also mentioned that, the factors of inaccurate cost estimating that contribute to causes of delays in construction project. Construction estimating errors can be very expensive and embarrassing. Inaccurate of cost estimate contribute a lot of cause such as wrong measurements from contract drawing, using incorrect units of measure, material improperly priced and the most common mistakes in arithmetic. Sometime contractor because of inaccurate of cost estimate measurement again for that particular work. Finally, due to re-measurement time some of the work will influence delay and it will also affect whole project to delay.

2.1.5.2.4 Poor site management and supervision

Battaineh (2002) studied that, the factors of poor site management and supervision as contributors to causes of delays. Chan and Kumaraswamy (1996) identified the factors of poor site management and supervision that contribute to causes of delays. In construction industry, some of the project team a lack of management and supervision due team member without any experience and skill such as hire person who are fresh graduate. Once they facing problem but do not know how to solve it. Besides that, some of the supervisor did not cooperation with their team member due to lack of communicated. Finally, because of cannot solve the problem immediately the whole project influence delay.

2.1.5.3 Causes of Consultant Related Delays

Chan and Kumarasamy (1997) used the term of ‘design team related factors’. They elaborate the factors into three: inadequate experience, project complexity and mistake in design. Similarly, Ahmed S.M., et al. (2002) identified the factors of design development, change order, changes in drawing and specifications, and incomplete document as contributors to this group of delays. They grouped these factors into ‘design related’.

Aibinu and Odeyinka (2006) separated the consultant related factors into each design team participant: architect, structural engineer, services engineer and quantity surveyor. They added the factors of late valuation work, late preparation of interim valuation, inadequate supervision, late issuance of instruction and delay work approval.
2.1.5.3.1 Inadequate consultant experience
According to Long, et al. (2004) studied the factors of inadequate consultant experience as contributors to causes of delays. In construction industry, they are many consultants carry out their work without experience. Besides that, there are many causes of a consultant without experience which include different site conditions, mismanagement and maladministration, site access restrictions, defective plan and/or specification. For instances, some of the architects only concentrated in certain part of building and do not have any experience in other type. Once architect design on that particular type of building without experiences, he will facing a lot of mistake and no ideas during design and because of this architect will delay issue the drawing. Finally, the works cannot process and it will affect the whole project delay.

2.1.5.3.2 Poor design and delay in design
According to Ogunlana, et al.(1996) mentioned the factors of poor design and delay in design that contribute to causes of delays in construction project. Design is every important to any project, without good design the whole project will influence delay. It is because in a project if facing poor design that will facing demolish and rebuilt again. This problem happens because of the designer lack of experience. For instance, an architect designs a column in the middle of classroom. Once the contractor without any experience and construct the work exactly shown in the drawing.

2.1.5.3.3 Poor design and delay in design
According to Ogunlana, et al.(1996) mentioned the factors of poor design and delay in design that contribute to causes of delays in construction project. Design is every important to any project, without good design the whole project will influence delay. It is because in a project if facing poor design that will facing demolish and rebuilt again. This problem happens because of the designer lack of experience. For instance, an architect designs a column in the middle of classroom. Once the contractor without any experience and construct the work exactly shown in the drawing. Finally

2.1.5.3.4 Incomplete drawing and detail design
Long, et al. (2004) identified the factors of incomplete drawing and detail design as contributors to causes of delays. Ogunlana, et al. (1996) studied the factors of incomplete
drawing and detail design that contribute to causes of delays in construction project. During construction, the contractor is carrying out the work but because of drawing is unclear and none very detail shown in the drawing. He could not continue the work with problem, so the works have to stop immediately until get more detail of that particular drawing from consultant responds. Because of without detail drawing the work could not be progress, so it will affect the particular work delay and it will also influence the whole project delay.

2.1.5.4 Causes of labor related delays

2.1.5.4.1 Labor supply

AbdMajid and McCaffer (1998) identified the factors of slow labor supply that contribute to causes of delays. Odeh and Bataineh (2002) in their research identified the factors of labor supply as contributors to causes of delays. Besides material, the labour also consider as major source in the construction industry. Generally, labour are categories into two groups such as skilled workers and unskilled workers. In construction industry without labour project could not run. For instance, during construction, materials are ready to but no worker carrying out the work. During the same time because of no worker to progress of work, the project will confront project delay.

2.1.5.4.2 Shortage of skilled worker

According to Chan and Kumaraswamy (1996) mentioned the factor of shortage of skill labor is the most important factor that contributed to causes of delays. Skilled worker is a worker who has some special skill, knowledge and ability in his job and also gets highest pay such as plasterer, carpenter, painter, and concreter. Those skilled workers are learning the skills on the job. In construction, some contractors do not hire skilled workers because of higher labour cost and he employs some unskilled workers. At the same time skilled workers do not want get the job from the contractor with lower labour cost. Finally the unskilled workers could not complete the work on time. So, because of shortage of skilled worker affect whole project delay.

2.1.5.4.3 Labor of productivity

According to Ogunlana, et al. (1996) studied the factor of labor productivity having high influence to causes of delays. Labor of productivity; generally define as output per labour hour. There are many factors that influence on the labour productivity. One of the factors is
workers experience, labour with high experience and high skills in field leads to high performance at workplace. Besides that, attitude also will affect productivity of labour. For instance, a worker can lay one meter square per hour but because of lazy. Finally he using three hours to finish laid the brick wall. Because of this factor, the progress work delay and it will also influence the whole project delay.

2.1.5.5 Causes of Material Related Delay

2.1.5.5.1 Shortage of construction materials

Koushki, et al. (2005) mentioned that, factor shortage of construction material that contribute to causes of delays. Ogunlana, et al. (1996) identified the factor of shortage of material as a factor to causes of delay. Chan and Kumaraswamy (1996) studied that factors shortage of material as contributors that contribute to causes of delays. AbdMajid and McCaffer (1998) identified the factor of shortage of material that contribute to causes of delays. Material shortage is a potential source of construction delay. The major causes of material shortage is demand exceed supply. In construction have a lot type of material and the three main courses are cement, formwork and steel bar. Besides that, material is one of the main sources in construction industry. It is because without material project cannot construct. If a project facing the material shortage problem will be delay. For instance, a project having shortage ceramic tiles even though the labours ready for tiling. In this situation, the project will facing delay project.

2.1.5.5.2 Late delivery of materials

Ogunlana, et al. (1996) identified the factor of late delivery of material as a factor to causes of delay. AbdMajid and McCaffer (1998) studied the factor of late delivery of material that contribute to causes of delays. Late delivery of material as a supplier fault due to high market demand; however the long procedure of the purchasing order from head office was complained. In construction, it factor is similar to the material shortage such as the labour ready for work but no material to do their work. Once contractor cannot receive the material on time that will be delay work and it will also affect project delay. For example, workers want to install the windows but without frame because of late delivery to site. So, the work will be delay and it will affect project delay.
2.1.5.5.3 Poor quality of construction materials
Koushki, et al. (2005) mentioned that factor poor quality of material that contribute to causes of delays. Ogunlana, et al. (1996) identified the factor of poor quality of material as a factor to causes of delay. AbdMajid and McCaffer (1998) studied the factor of poor quality of material that contribute to causes of delays. Poor quality of material is construct building with using poor quality of material. The contractor has intention to cheat owner to earn more profit by change the quality of material such as concrete. For instance, a contractor cast a column with using Y 20 steel bar but actual in contract drawing is Y 25. After site staff done the inspection for this column and found that the steel bar inside column is Y 20 and ask contractor demolish the column to rebuild. In this case, time taken to rebuild the column will also affect project delay.

2.1.5.5.4 Escalation of Material Prices
Ogunlana, et al. (1996) identified the factor of escalation of material prices as a factor to causes of delay. Wiguna and Scoot (2005) studied the factor of escalation of material prices was one factor that contribute to causes of delays. Escalation of material prices will cause shortage material in construction. It is because the market rate is keeping increasing. Some of the contractor does not buy the expensive material. During same time, the construction without material cannot run so the project will influence the project delay. For instance, a contractor because of material cost of market demands higher and does not make any order for material until material shortage. Finally, the construction cannot run without material and it will affect delay project also.

2.1.5.6 Causes of Equipment Related Delays

2.1.5.6.1 Insufficient number of equipment
According to Ogunlana, et al. (1998) identified the factors of insufficient numbers of equipment is the most significant factors that contribute to causes of delays. In construction stage, contractors are facing not enough machinery to produce work. It is because some of the contractors do not have a large capital to purchase that machinery due to higher cost. Once the projects carry out with not enough machinery, it will influence whole project delay. For instance, there are two works to be done by using towel crane but in site only one towel crane available. Finally, two of work could not be done at the same time due to not enough towel cranes.
2.1.5.6.2 Frequent equipment breakdown
McCaffer (1998) studied the factors of equipment breakdown as contributors to causes of delays. Ogunlana, et al. (1998) mentioned the factor of frequent equipment breakdown is the most significant factors that contribute to causes of delays. In construction industry, some of the machinery always breakdown due to improper using by worker such as do not follow the instruction. For instance, machinery only can support for five hundred kilograms of material but during worker using that machinery and his carry out six hundred kilograms of material. Finally, the machinery will breakdown. Once machinery breakdown, the work will be stop immediately and affect some work delay. Finally, because of machinery breakdown the whole project will also influence delay.

2.1.5.6.3 Shortage of equipment Parts
According to Chan and Kumaraswamy (1996) identified the factor of shortage of equipment parts that contribute to causes of delays. After machinery breakdown, the technical carry out the repair work for the breakdown of equipment. During the same time, some part of machinery none have stock in market. Because of no spare part to repair the machinery, some of the works facing stop progress immediately. Consequently, it will influence whole project to be delay.

2.1.5.7 Causes of Financial Related Delays
2.1.5.7.1 Cliental financial difficulties
According to Chan and Kumaraswamy (1996) identified the factors of clientinancial difficulties as contributor to causes of delays. During the construction, client will face some financial problem arise from unanticipated emergencies or financial mismanagement such as global financial crisis. Besides that, a client proposes a new development without borrow term loan or bridging loan from the bank. On the other hand, improper cost planning is a most serious problem for those clients facing in current delay project. For instance, during pre-construction stage a client do not planning cost properly and he will facing a lot of problem in construction stage such as no enough capital to pay contractor payment. Finally, because of contractor did not receive payment to influence whole project delay.
2.1.5.7.2 Delay payment to suppliers/subcontractor
According to AbdMajid and McCaffer (1998) mentioned the factors of inadequate fund allocation and delay payment to subcontractor/suppliers as contributor to causes of delays in construction project. Due to sub-contractor do not take their responsibility to done the work on time. The contractor will delay the payment until they complete the job. But at the same time, the sub-contractor refuse to work because of not yet receive payment. As a consequently, the whole project will be influence delay due to sub-contractor refuse to work.

2.1.5.7.3 Contractor financial difficulties
According to Ogunlana, et al. (1996) studied the factors of contractor financial difficulties having high influence to causes of delays. Poor financial management has been known as one of the factors why certain project cannot complete within contract period. Because of contractor lack of experience and could not manage their capital properly. On the other hand, because of delay payment by client contractor not enough money to cover up all sub-contractors and suppliers payment. Finally, the sub-contractor and suppliers refuse to work and supply material to the site and because of this factor the whole will influence delay.
Odeh and Battaineh (2002) identified the factors of inadequate contractor experience, inappropriate construction methods, poor site management and supervision and unreliable subcontractor as contributors to causes of delays. Aibinu and Odeyinka (2006) elaborated this group cause into contractor financial difficulties, inadequate site supervision and planning and Schedule problem.

2.1.5.8 Causes of External Related Delays
2.1.5.8.1 Weather condition
Odeh and Battaineh (2002) identified the factors of weather condition as contributors to causes of delays. Long, et al. (2004) mentioned factors weather condition as factors of external related delays. AL-Momani (2000) studied the factor of weather condition as contributors to causes of delays in construction project. During the construction period, weather is a factor to influence the whole project delay. It because weather condition that interfere with planned activities. Some activities can process but other cannot. For instances, during the worker cast the ground floor slab, but because of raining that particular work to be delay.
2.1.5.8.2 Slow site clearance

According to Long, et al. (2004) identified factors of slow site clearance as factors of external related delays. During begin of construction stage, the responsibility party should have to carry out their work for site clearance immediately. Without clearance the site construction work cannot process. In some delay project found that, the third party did not take their responsibility to finish the site clearance within the period. Consequently, the whole project delay because of site clearance works delay.

Table 2.2 Summary of Categories and causes of delays in construction projects (Divya.R and S.Ramya (2015))

<table>
<thead>
<tr>
<th>Origin Agent</th>
<th>Causes of Delays</th>
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<tbody>
<tr>
<td>Owner related</td>
<td>Delay in progress payments</td>
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<td></td>
<td>Delay in delivering the site to the contractor</td>
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<td></td>
<td>Poor communication and coordination</td>
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<td></td>
<td>Change orders by owner during construction</td>
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<td></td>
<td>Late in revising and approving design documents</td>
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<tr>
<td>Contractor related</td>
<td>Rework due to errors during construction</td>
</tr>
<tr>
<td></td>
<td>Poor communication and coordination</td>
</tr>
<tr>
<td></td>
<td>Ineffective planning and scheduling of project</td>
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<td></td>
<td>Poor qualification of contractor’s technical staff</td>
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<tr>
<td>Consultant related</td>
<td>Delay in sub-contractor’s work</td>
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<tr>
<td></td>
<td>Inadequate experience of consultant</td>
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<tr>
<td></td>
<td>Poor communication and coordination</td>
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<tr>
<td></td>
<td>Mistakes and discrepancies in design documents</td>
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<td></td>
<td>Unclear and inadequate details in drawings</td>
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<tr>
<td>Materials related</td>
<td>Un-use of advanced engineering design software</td>
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<tr>
<td></td>
<td>Shortage of construction materials</td>
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<tr>
<td></td>
<td>Delay in materials delivery</td>
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<tr>
<td>Equipment related</td>
<td>Changes in material types during construction</td>
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<tr>
<td></td>
<td>Late procurement of materials</td>
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<tr>
<td></td>
<td>Equipment breakdowns</td>
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<td></td>
<td>Shortage of equipment</td>
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<tr>
<td>Labour - related</td>
<td>Low level of equipment operator’s skill</td>
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<td></td>
<td>Low productivity and efficiency of equipment</td>
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<td></td>
<td>Shortage of labours</td>
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<tr>
<td>External factors</td>
<td>Low skill of labours</td>
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<td></td>
<td>Personal conflicts among labours</td>
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<td></td>
<td>Delay in obtaining permits from municipality</td>
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<tr>
<td>Origin Agent</td>
<td>Causes of Delays</td>
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<tr>
<td></td>
<td>Regulatory changes</td>
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<td></td>
<td>Weather effect on construction activities</td>
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<td></td>
<td>Accidents during construction</td>
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<td></td>
<td>Rise in prices of materials</td>
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<td></td>
<td>Delay in providing services from utilities (Such as water, electricity, etc.)</td>
</tr>
</tbody>
</table>

### 2.1.6 Effects of Delays

The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the Owner, Contractor and Consultant. Delay usually result in losses of one form or another for everyone. Murali Sambasivam, et al (2007) studied the effects of construction delays on project construction industry.

B.P. Sunjka, et al stated that poor quality completed projects and bad public relations are also the effects caused due to delay in construction projects in addition to the above six effects. Cost, time, and quality have proven their importance as the primary success factors of a project.

According to Ahmed, et al delays on construction project are a universal phenomenon. They are usually accompanied by cost overruns. Delay has a negative effect on clients, contractors, and consultants in terms of growth in adversarial relationships, mistrust, litigation, arbitration, and cash-flow problems. A project may be regarded as a successful endeavor until it satisfies the cost, time, and quality limitations applied to it. However, it is not uncommon to see a construction project failing to achieve its goal within the specified cost, time, and quality.

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. The six effects of delay that were identified includes: time overrun, cost overrun, dispute, arbitration, total abandonment and litigation.

Koushki and Kartam (2004) concluded that time and cost overruns were the impact of the material selection time, their availability in the local market and the presence of the supervising engineer. It is important to improve the estimated activity duration according to the actual skills levels, unexpected events, efficiency of work time, mistakes and misunderstanding (Lock, 1996). Delays influence negatively on the contractors...
performance and contribute to adverse impacts in construction projects such as contract disputes, low productivity and increase in construction costs that will also influence on the pre-determined of construction project objectives. From the comprehensive literature review, six major effects of delay in the construction projects were identified as follows:

Similarly, Sambasivan et al. (2007) identified six most frequently observed effects of delays in his survey on causes and effects of delays in Malaysian construction industry. These were: (1) time over-run, (2) cost overrun, (3) disputes, (4) arbitration, (5) litigation, and (6) total abandonment.

2.1.6.1 Time Overrun
Murali et al., (2007) argued that contractor related factors and client related factors such as inadequate contractor experience and owner interference have impact on time overrun. On the other hand, Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. They identified time overrun as one of the major effects of delay. Time overrun it mean contractor could not carry out their work within contract period. In generally, time overrun can be categories into two group which include excusable delays and non-excusable. Once the project facing time overrun, it will affect the progress of work cannot finish on time. Besides that, the fault party will take the responsibility to pay the relevant parties for damages because of delay. For instance, during the project almost completed, but at the same time contractor because of exceptionally implement weather cannot completed the project within contract period. In this situation the contractor entitle to claim extension of time. On the other hand, if that contractor cannot complete the work within contract period due to his own fault. So the contractor no entitle to claim extension of time and he need to pay liquated damages

2.1.6.2 Cost Overrun
Regarding cost overrun Koushki et al., (2005) identified three main causes that were contractor related problems, material-related problems, and owners financial constraints, whereas Wiguna and Scott (2005) identified the most critical factors included: high inflation/increased material price; design change by client; defective design; weather conditions; delayed payment on contracts and defective construction work.
2.1.6.3 Disputes
Disputes are the effects of major causes of delays in construction projects such as causes of Client related, Contractor related, Consultant related and external related that may be arisen during the construction projects among the project parties. Lack of communication may also leads to misunderstandings, conflicts and disputes. Hence it necessitates the project managers to have effective communication skills which are one of the significant soft skills (People skills) with the project parties involving in construction projects. Based on Murali et al., (2007) the factors such as lack of communication between the various parties, problem with neighbors, unforeseen site conditions, delay in payments for completed work, improper construction method, delay caused by the subcontractor and discrepancies in contract documents will give rise to disputes between the various parties. Furthermore, if the disputes cannot be solved amicably or easily it can lead to arbitration or litigation.

2.1.6.4 Arbitration
According to Murali et al., (2007) delays caused by either client or contractor related factors such as change order, delayed progress payment, contractor’s non-performance and lack of communication between parties which may rise disputes will be settled through arbitration process. For these circumstances, it is necessitate having a competent third party that can settle the disputes amicably or easily without going to court.

2.1.6.5 Litigation
Based on Murali et al., (2007) when the delays caused by client related, contract related, labor related and external related factors such as delay in payment for completed works, problems with site conditions and less labor supply where eventually rise the disputes to be settled by the litigation process. The parties involved in the construction projects use litigation as a last alternative to settle the disputes.

2.1.6.6 Total Abandonment
The most critical adverse effect of delays in construction projects is abandonment that could be temporary or in worse condition for permanent duration. The major causes of client related, consultant related, contractor related and external related may lead to project abandonment that will lead to delays in construction projects. Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. They identified total abandonment as one of the major effects of delay.
2.2 Empirical Review
2.2.1 Causes of Delay

Traditional contractual approach is still dominant in developing countries construction sector and this may likely continue to be a trend. Developing countries construction sector comprises the clients or project owners, contractors, subcontractors, suppliers, and others key professional actors responsible for design and supervision of projects. These professionals include architects, engineers and quantity surveyors. Due to this mixed variety of parties involves in projects, they often encounter difficult situations and some degree of pressures. Many of these problematic conditions are beyond control and often lead to delays or project time overrun (Odeh and Battaineh, 2002).

Bramble and Callahan (1992) cited a project may be delayed as a result of the direct action of major parties, or of their failure to act especially if they have a duty to act in the circumstances. The outside forces also could intervene to delay a project. Hence, it is important to describe the causes of delay by looking at factors relating to actions and inactions of project participants.

Naha, Norelina (2008) studied the causes of delay in construction projects limited in Johor Bahru study found that (1) contractor’s financial problems, (2) shortage in material, (3) fluctuation of materials price, (4) poor management and planning, (5) poor subcontractor performance, (6) inclement weather, (7) inadequate of contractor’s experience, (8) construction mistake and (9) poor monitoring and controlling were the major causes of delays at the time.

Sambasivam and Soon (2007) conducted a study by taking an integrated approach and analyze the impact of specific causes on specific effects of delays in Malaysia. Based on their survey, the most important causes of delay were: (1) contractor’s improper planning, (2) contractor’s poor site management, (3) inadequate contractor experience, (4) inadequate client’s finance and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labor supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage.

Majid, I.A. (2006) carried out a study on causes and effect of construction project delays in Aceh Indonesia. Contractor-related delays was ranked the most significant groups that cause
delays, followed by equipment-related delay, client-related delays, material-related delays, finance related delays, consultant-related delays, external-related delays, and labour related delays.

Aibinu and Odeyinka (2006) have assessed the causes of delays in Nigeria. They have analyzed quantitative data from completed building projects to assess the extent of delays factors contributed to overall delays on a project. By using a Pareto analysis, they revealed that 88% of the factors (representing 39 highest priority factors) were responsible for 90% of the overall delays. The result of the study indicated that financing projects in Nigeria continue to be one of the major sources of project delays and of poor time performance.

Ahmed S.M. et al. (2002) conducted an empirical study regarding construction delays in Florida. Based on the contractor surveyed the most critical categories of delays are Code-Related Delays followed by Design-Related Delays and Construction-Related Delays. Odeh and Battaineh (2002) evaluated the result of their survey aimed at identifying the most important causes of delays in construction projects with traditional type contracts. The results indicate that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labour productivity, slow decision making, improper planning, and subcontractors were among the top ten most important factors.

Mezher and Tawil (1998) carried out a study on causes of delays in Lebanon from the viewpoint of owners, contractors and architectural/engineering firms. It was found that owners had more concerns with regard to financial issues, contractors regarded contractual relationships the most important, while consultants considered project management issues to be the most important causes of delays.

Chan and Kumaraswamy (1997) conducted a survey to determine and evaluate the relative importance of the significant factors causing delays in Hong Kong construction projects. They analyzed and ranked the main reasons of delays according to different groups classified on the basis of the role of the parties in the local construction industry (i.e. whether clients, consultants or contractors) and the type of projects. Results indicate that the five principal and common causes of delays are: 'poor site management and supervision', 'unforeseen ground conditions', 'low speed of decision making involving all project teams', 'client-initiated variations' and 'necessary variations of works'.
Ogunlana and Promkuntong (1996) studied the delays in building project in Thailand. They concluded that the problems of the construction industry in developing economies could be nested in three layers: (1) problem of shortages or inadequacies in industry infrastructure, mainly supply of resources; (2) problems caused by clients and consultants; and (3) problems caused by incompetence of contractors.

Assaf et al. (1995) have addressed 56 main causes of delay in Saudi Arabia large building construction projects and their relative importance. Based on the contractors surveyed the most important delay factors were: preparation and approval of shop drawings, delays in contractor’s progress, payment by owners and design changes. From the view of the architects and engineers the cash problems during construction, the relationship between subcontractors and the slow decision making process of the owner were the main causes of delay. However, the owners agreed that the design errors, labour shortages and inadequate labour skills were important delay factors.

There were many possible causes that contribute to construction project delay. However, according to Ogunlana (2008), although the principle reasons for delays are comparable across developing countries, several factors pertaining to local industry, social-economic and cultural issues and project characteristics also contribute to delays.

### 2.2.2 Effects of Delay in Construction Project

Delays in construction project completion seem to be a perennial problem. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date.

Delays are usually accompanied by cost increases. The subject of delay has been addressed by several researchers and they found that delay always led to the negative effects. Abd.Majid (1997) state that delay may lead to disputes, low productivity and increases in cost. Alkasset al. (1994) addressed that delay are costly and often result in prolonged litigation by the parties. Additionally, associated delay problems can also result in total abandonment of project (Aibinu and Jagboro, 2001).

Abdul-Rahman H. et al. (2006) in their study found that delays effect to the disruption of work, loss of productivity, late completion of project, increased time related costs, third party
claims and termination of contract. Li et al. (2000) have shown that additional costs, decline in quality and rework, are three possible situations due to the delay.

Some extent the contract parties through claims usually agree upon the extra cost and time elongation associated with delay. This has in many cases given rise to heated arguments between the owner and contractor. Thus, delay could generate distrust and create tension between the contractor, owner and the owners’ project management team (Aibinu, 2009). It reduces the ability of the parties to resolve the claims expeditiously due to delay. These have a debilitating effect on clients, contractors, and consultants in terms of growth in adversarial relationships, mistrust, arbitration, cash-flow problems, and a general feeling of trepidation towards each other (Ahmed, et al., 2002).

Aibinu and Odeyinka (2006) added that processing time and cost related claims associated with delays always generate dispute and further delays. Disputes may arise from questions relating to causal factors, contract interpretation, and quantum of the claims. In some instances delays occur that are neither the fault of the owner, nor their consultants or contractors, or that may have concurrent or multiple causes which have to be carefully analyzed in order to properly assess responsibility (Yates and Epstein, 2006). Enormous amounts of time and energy are expended to resolve issues related to the causes of delays.

According to Aibinu and Jagboro (2002) identified the effects of construction delays on project delivery in Nigerian construction industry. They also said that the six major effects of delays follow by rank which include time overrun, cost overrun, dispute, arbitration, litigation, and total abandonment as shown in the table below.

<table>
<thead>
<tr>
<th>NO</th>
<th>Effect of delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time overrun</td>
</tr>
<tr>
<td>2</td>
<td>Cost overrun</td>
</tr>
<tr>
<td>3</td>
<td>Dispute</td>
</tr>
<tr>
<td>4</td>
<td>Arbitration</td>
</tr>
<tr>
<td>5</td>
<td>Litigation</td>
</tr>
<tr>
<td>6</td>
<td>Total Abandonment</td>
</tr>
</tbody>
</table>

Table 2.3 Effects of Delay According to Aibinu and Jagboro (2002)
Delay Management in Construction Projects

Delays in construction projects are known to be among the commonest problem facing the industry as it causes a number of negative impact on both the project itself and the parties involved. Thus, it is very important to pinpoint the main causes of these delays so as to reduce and do away with them as well as their corresponding outlays. According to Aibihu and Odeyinka (2006), construction projects still continue to face the challenge of delays even in this current phase of knowledge in technology as well as organization management. Pickarance (2005) stated that, delay in the setting of construction refers to a project happening later than the anticipated time specified in terms and conditions of the contract or exceeding the date set by parties involved. According to Aibihu and Odeyinka (2006), construction projects still continue to face the challenge of delays even in this current phase of knowledge in technology as well as organization management. Pickarance (2005) stated that, delay in the setting of construction refers to a project happening later than the anticipated time specified in terms and conditions of the contract or exceeding the date set by parties involved.

According to Akinsola (1996), when project are delayed, they are either giving time extension or the project activities augmented and thus causing extra cost. Even though parties involved in the project would agree up on the additional cost and time that are related with the delay, in most cases problems exist between the contractors and the clients as regards whether a contractor has the right to claim for extra cost (Akinsola, 1996). Abdullah et al. (2011) stated that, countries are assessed as—underdeveloped, —developed, and developing on the basis of quality and quantity of accomplished construction projects inside their territory. Long et al. (2004) established that, many researchers have carried out a number of studies concerning the factors that causes delays as well as cost overruns and their effects on output, quality, and safety form the common problems in some project types. According to Ochoa (2013), a project’s success or failure, which is for commercial construction projects, it depends largely on the schedule of the project and whether that schedule is reality and is attainable. Delays that pertains to construction schedule have negative impact on both the contractors and the owners to the extent that delays cause owners to absorb or pay additional cost and still are not able to use or occupy their property for it

Table 2.11 Effects of Delay According to Aibinu and Jagboro (2002)
intended purpose (Ochoa, 2013). Several attempts by researchers as well as project professionals to tackle the effect and causes of delays in construction project have not met the positive results needed as Sambasivan and Soon (2007) suggests. Dayi (2010) concluded on his study conducted in Ankara Turkey that, delay could occur in the preconstruction stage described as the beginning to the stage of contract signing between the client and the contractor, but many construction projects delay in the stage of the construction. Keane and Caletka (2008) also said industry of construction is one that involves dynamic and complex process. Delays in construction are usually experienced in the public sector but at times too in the private sector as well according to Yang et al. (2010)

2.2.4 Methods of Minimizing Construction Delays

According to Nguyen, et al. (2004), studied the factors that can be applied as a method of minimizing of construction delays as follows: competent project manager; frequent progress meeting; accurate initial cost estimates; accurate initial time estimates; awarding bids to the right/experience consultant and contractor. During pre-construction stage, a client should employ a depth knowledge project manager to organize a good project team member to progress the work. Besides that, the project team member should be always discussing with the problem having during the site progress. On the other hand, contractor should be employs some employee with experience such as quantity surveyor. So that, during the time or cost estimate they can add on some unforeseen event to avoid the cost and time overrun. Furthermore, the developer should be hire some experience consultant and contractor. It is because once they facing problem, they can refer previous project to solve the problem immediately. So, the project can process with smoothly. According to Aibinu and Jagboro (2002), identified two methods to minimize or if possible eliminate time overrun were: acceleration of site activities, and contingency allowance. During construction stages, the contractor should carry out his responsibility to make sure the work progress can complete in time. If found that work progress are not equal to the estimate schedule. The contractor may carry out with acceleration such as hire additional worker. Besides that, the client may allow contractor standby some extra cost for unforeseen event such as accidents.

According to Koushki, et al. (2005), revealed that the minimization of time delays and cost overruns would require: ensure adequate and available source of finance until project
completion; ensure timely delivery of materials. During pre-construction, a client may prepare a good cash flow within the contract period. Once the client does not enough money to cover up construction cost, he can borrow a term loan or bridging loan from the bank to cover the cost until the whole project completed. It will avoid project delay due to client not enough capital. Besides that, the contractors make sure that material are order with a reliable suppliers and can receive it on time.

According to Odeh and Battaineh (2002), recommended to improve the situation of construction project were require: enforce liquidated damage clauses and offering incentives for early completion; developing human resources in the construction industry through proper training and classifying of craftsman. During construction stage, client does not want to get any loss and expense and he impose the liquidated damages clauses. Once client find out contractor due to his own fault, so client can claim for loss and expense. But at the same time, if contractor completed the whole project early than deadlines and he can claim for incentive. Besides that, human resource are playing important role in the construction. It is because due to this process to improve their skill such as make training for construction management and supervisor to increase of knowledge. It can be creating an innovative, responsive training delivery system to maintain skill currency

Chan and Kumarasamy (1997) suggested that the minimization of time overrun would require: strong management teams; thorough investigation of site conditions, together with the design of groundwork and foundations. They added that developing communication systems linking all project teams was the significant way to mitigate this matter.

Aibinu and Jagboro (2002) conducted a study on the effect of delays on project delivery in Nigeria. They identified two methods to minimize or if possible eliminate time overrun. There were acceleration of site activities and contingency allowance.

Odeh and Battaineh (2002) recommended the following to improve the delays situation in Jordan: enforcing liquidated damage clauses; offering incentives for early completion; developing human resources through proper training and classifying of craftsmen; adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors; and adopting new approaches to contracting, such as design-build and construction management types of contracts.
Ahmed S.M. et al. (2002) in their study of delays in Florida have recommended streamlining the Buildings Permit Approval Process as much as possible. The issues such as changes in drawings, incomplete and faulty specifications and change orders must be controlled with proper design process management and timely decision making.

Abdul-Rahman H. et al (2006) identified the procedures taken by contractor as to recover delays. From their survey, recommended procedures were increasing the productivity by working overtime hours or working by shifts, followed by asking for extension of time. If the problem was shortage of resources, they suggested rescheduling the activities within the available resources, using skilled labours and by using subcontractors. The respondent also agreed that site meetings are essential in solving the problems with the condition that it should not be too frequent.

Kaliba, Muya and Mumba (2009) studied the schedule delays in road construction projects in Zambia. They suggest the following recommendation to minimize the causes and effect of schedule delays: project timing and scheduling; well defined scope; accurate cost estimate; availability fund for project; effective communication; deliberate scheme to build capacity building; and legislation and good corporate government.
CHAPTER THREE: RESEARCH DESIGN AND METHODS

3.1 Introduction
This chapter attends to the detailed discussion of the research methodology engaged in the study. Important subjects upsetting the philosophical stance of the researcher including the strategies espoused for this research is discussed explicitly. Likewise, a brief discussion of the strategy used in the questionnaire design, the target respondents, the sample size required and the questionnaire administration. Finally, the mode of data presentation in addition to the statistical tools to be used for the critical analysis of the data gathered is discussed.

3.2 Research Design
A research design is a scheme used to generate answers to the issues and problems reported. The research design employed in this study was descriptive survey. This design is preferred because it allows for prudent comparison of the research findings. It was the descriptive survey that helped to determine delay factors in the cause of implementation of large civil engineering projects especially in developing countries. This required primary data collection on quantitative data for comparison. It has been used in similar studies notably.

3.3 Population of the study
In this study determined numbers of volunteer participants are included as this study is intended to get in-depth information about the knowledge and practice in Housing building projects particularly. The participants that are included in this research were selected based on the following inclusion criteria’s. The participant must be registered as Contractor, Consultants and project Owners (client) and willing to participate in the research. So population of the study the whole directly participant of that project which are both contractors consultants and client the techniques for this study is census survey. The selection of participants in terms of answering the questionnaire was just limited to contractors consultants and client or government bodies under the stated study area. Total Target Population were 63
contractors, 15 consultant and 8 from client. Additionally an open ended questionnaires will prepare to client or government body at project office.

### 3.4 Data Collection Tool

The required data were collected by using a well prepared and pretested questionnaire. The questionnaire are divided into four parts. The first part consisted of questions about the general profile, information and background of the respondents. The second part comprised of questions regarding the most frequent and important causes of construction delay were asked in two forms. The third part focused on the most important and frequent effects of construction delay. The fourth part focused on how to minimize project delay. The questionnaire was designed to be a close ended questions including with few comment spaces. In addition, unstructured one-to-one interview has been conducted with selected individuals those who represented the housing project officials.

### 3.5 Data Analysis Technique

The data analysis is determined to establish the relative importance of various factors that contribute to causes and effects of construction delays. Analysis of data consists of calculating easily by excel sheet the Relative Importance Index (RII) and Ranking of factors in each category based on the response from questioner.

\[
\text{Relative Importance Index (RII)} = \frac{1n1+2n2+3n3+4n4+5n5}{AN} \quad \text{(Tam and Le, 2006)}
\]

Where,
Relative, Importance Index, Number of respondents answer each factor 1, 2, 3, 4, 5 = weight given for each factor (ranging from 1 to 5),
\(A = \) highest weight (i.e. 5 in our case),
\(N = \) total number of respondents.

The importance indices were calculated for all delay causes and the delay causes were ranked accordingly. In order to identify how project delay can be mitigated, it is important to identify the responsible party. Therefore, the responsibility of the delay causes is illustrated in the factor or category column.
Finally, the findings are presented using tables graphs pie chart and different diagrammatical tools plus supported with further descriptions.

The relative important index result were in between 0 to 1 (Tam and Le, 2006)

3.6 Validity and Reliability

3.6.1 Validity

According to Leedy et al (2005), validity is the ability of an instrument used to measure what it is designed to measure. Validity refers to the degree to which a test or other measuring device is truly measuring what was intended to measure (Kisilu, et al 2003) In order to check content validity for the descriptive survey studies, the researcher using standardized questioners on the same topics of studies, and having 6 expert reviewing on the draft of questioners By taking these tactics into account, the researcher measures the validity of the study

3.6.2 Reliability

According to (Cameron et al (2005), reliability is a measure of the extent to which the result of the research can be repeated with the same result if the research is replicated. Furthermore, it states that in order to increase reliability, the researcher should use the same template as far as possible and use static methods.

Reliability is synonymous with the consistency of a test, survey, observation or other measuring device. This measure is important to ensure that the data collected is consistent and a representative of what we want to achieve from the research. Content validity helped the researcher to ascertain whether they had included or represented all the content of the research in the study. Test – retest approach enabled the researcher to test consistency among different questionnaires as filled by the respondents. The researcher used the Crobanch Alpha method in SPSS computer program to test the reliability of the instrument. And the result is computed as follows.

$$
\alpha = \frac{\text{Kr'}}{(1 + (K - 1)r'))} \quad \text{(Lee Cronbach in , 1951)}
$$

Reliability Test on Causes of Delay $\alpha = 91\%$ it implies Excellent Reliability

Reliability Test on Effects of Delays $\alpha = 72\%$ Acceptable Reliability

Reliability Test on solution to minimize Delays $\alpha = 85\%$ Good Reliability
3.7 Ethical Issues
According to Leedy et al (2005), there are a number of key ethical issues that protect the rights of research participants. These are protection from harm, informed consent, the right to privacy and honesty with professional colleagues. The principle of informed consent requires that respondents not be forced to participate in research. In this study, the participants were well informed about the nature of the study and participation was on voluntary basis.
CHAPTER FOUR: FINDINGS AND DISCUSSION

4.1. Introduction

The findings and discussion below is divided in two part score responding to the research questions and also the sections of the questionnaire. The first part presents survey distribution and response rates by sector organization, respondents’ designation and experience in the Housing construction Projects. The second part of the results and discussion contains the findings of the questions directed towards identifying the importance of delay causes and raking in the level of rating scale. 33 potential delay causes were selected from previous studies and grouped in category wise. These delay causes had a five point scale ranged from 1 to 5 in a level of importance from Non important to Extremely Important cause to project delays and the results are discussed. Similarly to the causes, nine potential effects were selected from previous studies pre tested with the practical housing projects. These effects of delay had also a five point scale ranged from 1 to 5 and the results of the questions are presented and discussed accordingly.

4.2. Survey Distribution and Response Statistics

4.2.1. Survey Response

A total of 63 questionnaires were distributed among the respondents of different backgrounds working on Housing construction projects. The distribution mainly focused to the people working in project owners, contractors and consultants. Out of 63 questionnaires distributed, 49 (77.8%) were returned. There were 8 (100%) questionnaires from project owners and professionals from client side related to construction, 30 (75%) from contractors and 13 (78.9%) from consultants and engineers.

4.2.2. Statistics of Respondents

The following tables, Table 4.1 and 4.2 show the distribution profile of the respondents’ organization in terms of type and respondents designation respectively.
Table 4.1- Respondents Organizational profile

As shown on the above table, a total of 63 questionnaires were distributed among the respondents of different parties working on Housing construction projects are The owners, contractors and consultants. Out of 63 questionnaires distributed, 49 (77.8%) were returned. There were 8 (100%) questionnaires from client side related to construction, 30 (75%) from contractors and 13 (78.9%) from consultants and Totality 77.8% are returned.

Table 4.2 Respondents organization profile, Source own survey, 2018

Source: Own survey, (2018)
The designation of the respondents shows a relatively wider variety of professionals which are relevant to the construction delay analysis. The respondents have been assigned as senior project managers, quantity surveyors, contract administrators, site engineer and construction supervisors.

Table 4.3 below shows respondents’ general work experience in the Housing construction and construction industry projects in general

**Table 4.3 - Respondents Experience**

<table>
<thead>
<tr>
<th>Number of Years</th>
<th>General Experience</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 5 years</td>
<td>5</td>
<td>10.2</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>8</td>
<td>16.32</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>11</td>
<td>22.45</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>15</td>
<td>30.6</td>
</tr>
<tr>
<td>Above 20 years</td>
<td>10</td>
<td>20.4</td>
</tr>
</tbody>
</table>

Source: Own survey, (2018)

On the percentage of years of work experience of the respondents, (5) 10.2% of the respondents have 0-5 years of work experience, (8) 16.32% of the respondents have 11-15 years of work experience, (15) 30.6% of the respondents have 16-20 years of work experience, (10) 20.4% of the respondents have more than twenty (20) years of work experience in housing construction and in construction sector in general.

**4.3. The importance and ranking of delay causes by respondents**

The construction delay is universally evident reality and is counted as a common problem in construction projects. Delays in construction projects happen because of various factors and causes. These causes classified by four factor groups.

- Clients related factors
- Contractors related factors
- Consultant related factors
- External factors
The respondents were asked to rank the importance of delay causes using five points scale (strongly agree, agree, slightly agree, disagree and strongly disagree). Participants were also asked to add in the space provided for each factor group. The importance and ranking of delay causes resulted by the research methodology of questionnaire survey and evaluated by statistical formula for each factor group are shown below.

Table 4.4- Ranking of Contractor related delay causes

<table>
<thead>
<tr>
<th>No</th>
<th>Delay cause in housing construction</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>TOTAL</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Poor site management and supervision</td>
<td>5</td>
<td>17</td>
<td>13</td>
<td>8</td>
<td>6</td>
<td>154</td>
<td>0.63</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Financial difficulties</td>
<td>20</td>
<td>17</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>201</td>
<td>0.82</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Unsuitable construction method</td>
<td>6</td>
<td>4</td>
<td>15</td>
<td>15</td>
<td>9</td>
<td>130</td>
<td>0.53</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Mistakes during construction</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>12</td>
<td>14</td>
<td>127</td>
<td>0.52</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Inadequate contractor experience</td>
<td>10</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>151</td>
<td>0.62</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Defective works</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>11</td>
<td>7</td>
<td>150</td>
<td>0.61</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Poor subcontractor performance</td>
<td>14</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>1</td>
<td>174</td>
<td>0.71</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Improper planning of contractor</td>
<td>9</td>
<td>11</td>
<td>15</td>
<td>9</td>
<td>5</td>
<td>157</td>
<td>0.64</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Shortage of skilled manpower</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>137</td>
<td>0.56</td>
<td>7</td>
</tr>
</tbody>
</table>

As shown on the above table, the most important and highly ranked contractor related delay causes in the housing construction projects, are Financial difficulties (RII=0.82), Poor subcontractor performance (RII=0.71), Improper planning of contractor (RII=0.64), poor site management (RII=0.63), Inadequate contractor experience
(RII=0.62), Defective works (RII=0.61), Shortage of skilled manpower (RII=0.56) and Unsuitable construction method (RII=0.53). Mistakes during construction (RII=0.52).

**Table 4.5- Ranking of Client Related Cause of delay according to all respondents**

<table>
<thead>
<tr>
<th>No</th>
<th>Delay cause in housing construction</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>TOTAL</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Client interference</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>6</td>
<td>155</td>
<td>0.63</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>slow in decision making &amp; response</td>
<td>14</td>
<td>14</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>177</td>
<td>0.72</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Contract modification</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>8</td>
<td>143</td>
<td>0.58</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>Change order</td>
<td>13</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>1</td>
<td>170</td>
<td>0.69</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Supply Financial difficulties of client</td>
<td>22</td>
<td>17</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>205</td>
<td>0.84</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Uncooperative client</td>
<td>8</td>
<td>9</td>
<td>13</td>
<td>10</td>
<td>9</td>
<td>144</td>
<td>0.59</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>Slow payment of completed work</td>
<td>23</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>194</td>
<td>0.79</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Unrealistic contract duration</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>136</td>
<td>0.56</td>
<td>11</td>
</tr>
<tr>
<td>9</td>
<td>Material procurement problem</td>
<td>16</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>176</td>
<td>0.72</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>Material fabrication delay</td>
<td>16</td>
<td>13</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>176</td>
<td>0.72</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>Lack of communication between</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>12</td>
<td>11</td>
<td>139</td>
<td>0.57</td>
<td>10</td>
</tr>
</tbody>
</table>

From Table 4.5 the results show that the respondent ranked the most important client related delay causes in the housing construction projects suggested by The respondents were consider are Supply Financial difficulties of client is one of the potential cause of project delay (RII=0.84), Slow payment of completed work (RII=0.79), Low in decision making & response (RII=0.721), Material procurement problem (RII=0.72), Change order (RII=0.69), Client interference (RII=0.63) and Uncooperative client (RII=0.59) Contract
modification Lack of communication between Unrealistic contract duration(RII=0.58, 0.57 0.56) respectively.

Table 4.6- Ranking of Consultant related causes of delay

<table>
<thead>
<tr>
<th>No</th>
<th>Delay cause in housing construction</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>TOTAL</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mistakes in design</td>
<td>14</td>
<td>11</td>
<td>10</td>
<td>12</td>
<td>2</td>
<td>170</td>
<td>0.69</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Changes in drawings/design/specifications</td>
<td>19</td>
<td>17</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>199</td>
<td>0.81</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Incomplete documents/drawing</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>7</td>
<td>8</td>
<td>157</td>
<td>0.64</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Inadequate supervision to contractor</td>
<td>15</td>
<td>14</td>
<td>12</td>
<td>6</td>
<td>2</td>
<td>167</td>
<td>0.68</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Delay of work approval</td>
<td>12</td>
<td>16</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>175</td>
<td>0.71</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Late issue of instruction</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>12</td>
<td>4</td>
<td>156</td>
<td>0.64</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>Slow correction of design problem</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>9</td>
<td>4</td>
<td>168</td>
<td>0.69</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Slow inspection of completed works</td>
<td>12</td>
<td>11</td>
<td>12</td>
<td>11</td>
<td>3</td>
<td>165</td>
<td>0.67</td>
<td>6</td>
</tr>
</tbody>
</table>

The results of the questionnaire survey showed that, the most important and highly ranks Consultant related delay causes in the housing construction projects, are changes in drawings/design/specifications (RII=0.81), delay of work approval (RII=0.71), Mistakes in design (RII=0.69), Slow correction of design problem (RII=0.69), Inadequate supervision to contractor (RII=0.68), Incomplete documents/drawing (064), Late issue of instruction (RII=0.64)

Table 4.7- ranking of External Factor related delay causes

<table>
<thead>
<tr>
<th>No</th>
<th>Delay cause in housing construction</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>TOTAL</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>weather condition</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>112</td>
<td>0.46</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Price fluctuation</td>
<td>15</td>
<td>14</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>176</td>
<td>0.72</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Government regulation</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>14</td>
<td>17</td>
<td>112</td>
<td>0.46</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Problem with neighbour head</td>
<td>3</td>
<td>3</td>
<td>12</td>
<td>16</td>
<td>15</td>
<td>110</td>
<td>0.45</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Unforeseen site condition</td>
<td>3</td>
<td>6</td>
<td>13</td>
<td>12</td>
<td>15</td>
<td>117</td>
<td>0.48</td>
<td>2</td>
</tr>
</tbody>
</table>
As shown on Table 4.7 above, the most important and highly ranked external factor of delay causes in the housing construction projects, price fluctuation (RII=0.72),
Unforeseen site condition (RII=048), Government regulation (RII=0.46) weather condition (RII=046), Problem with neighbor heed (RII=0.477).

**Table 4.8 - Importance Index for Most Important Factors from Overall Results**

In Table 4.8 above, as ranked by the respondent, 20 most factors causing delay in construction Housing construction project are summarized and presented blow.

Supply Financial difficulties of client, Financial difficulties of the Contractors and Changes in drawings/design/specifications by the Consultants by with RII=0.83,0.82,0.81 respectively are 1-3 suggested as the main factor causing delay on housing construction projects. This is closely followed Slow payment of completed work 4th, Low in decision making& response 5th, Material procurement problem 6th and Material fabrication delay by client 7th factor with RII of 0.79,0.72,0.71 followed an external factor of price fluctuation 8th with RII=0.71. Delay of work approval by consultant ie 9th, Poor subcontractor performance 10th, Change order of client 11th Mistakes in design, Slow correction of design problem, Inadequate supervision to contractor and Slow inspection of completed works 12-15th respectively. But there are many more causes, but we discussed the main and more important causes. These causes lead to the effects on the construction projects.

**Table 4.9 Distribution of Top Delay Causes by its origins**

<table>
<thead>
<tr>
<th>NO</th>
<th>Delay cause</th>
<th>Average of RII</th>
<th>RANK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Client factor</td>
<td>33.5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Consultant factor</td>
<td>29.32</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Contractor factor</td>
<td>26.72</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>External factor</td>
<td>10.81</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Own survey, (2018)

Table 4.9 above shows, according to respondents’ ranking, the most potential delay causes, 33.5% originated by the clients, 29% originated by the consultants, 27% ranked as originated by contractors and delay causes originated by external factors ranked 10.81%. According the survey conducted the main cause potential is from client, consultant, contractor and external factor respectively. So the project should focus on all role player responsibility to avoid delay cause in the project.
4.4. The Importance and Ranking of Effects of Delay by respondents

The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the Owner, Contractor and Consultant. Delay usually result in losses of one form or another for everyone. The causes lead to the effects of delay on construction projects. The nine effects of delay identified were:

1) Time overrun
2) Cost overrun
3) Wastage and underutilization of resources
4) Tying down of Client’s capital due to non-completion of the project
5) Abandonment of the project
6) Dispute between parties
7) Reduced profit or total lose
8) Arbitration
9) Litigation and court case

In this respect the respondents asked to rate their agreement on the effect of delay by correlating to delay causes using five points scale (Strongly disagree, disagree, slightly disagree, agree and strongly agree) having a score from 1 to 5 respectively. Participants were also asked to correlate the effects with causes of delay and space is provided to give their comment (Appendix B). The importance and ranking of effects of delay resulted by the research methodology of questionnaire survey and evaluated by statistical formula for each factor group are shown below.

Table 4.10- Ranking Effect of delay in pro 16 housing projects

<table>
<thead>
<tr>
<th>Effect of delay</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>TOTAL</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Overrun</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>219</td>
<td>0.89</td>
<td>1</td>
</tr>
<tr>
<td>Cost Overrun</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>32</td>
<td>213</td>
<td>0.87</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Wastage and underutilization of manpower and resources</td>
<td>8</td>
<td>15</td>
<td>13</td>
<td>13</td>
<td>178</td>
<td>0.73</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Tying down of Client’s capital due to non-completion of the project</td>
<td>3</td>
<td>6</td>
<td>15</td>
<td>13</td>
<td>172</td>
<td>0.70</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Abandonment of building project</td>
<td>18</td>
<td>13</td>
<td>12</td>
<td>3</td>
<td>107</td>
<td>0.44</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Dispute between parties involved</td>
<td>12</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>125</td>
<td>0.51</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Reduced profit or total lose</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>15</td>
<td>145</td>
<td>0.59</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Arbitration</td>
<td>8</td>
<td>8</td>
<td>18</td>
<td>8</td>
<td>145</td>
<td>0.59</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Litigation and court case</td>
<td>19</td>
<td>15</td>
<td>5</td>
<td>3</td>
<td>111</td>
<td>0.45</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>
Results from Table 4.10 show that Time overrun ranked the highest with RII of 0.89, while cost overrun or increase in final cost of the project is ranked second with RII of 0.87. Wastage and under-utilization of man-power and resources has RII value of 0.73. Time in every phase of project life is really essential, when a contract is done and the date is given, the effect of delay really affects time and money. Time affects every other factor, the increase in final cost; more money has to be spent. Delay will also cause wastage and underutilization of man power and resource. Tying down of client capital due to non-completion of the project is ranked fourth with RII of 0.70 because; the client cannot get the intended service if the work is not completed on time. Reduced profit or total loss RII of 0.59 and Abandonment of the project, Arbitration and litigation were ranked with RII values of 0.0.59, 0.0.450.45 respectively. There is a close interrelation among these three effects. Dispute among parties involved can induce litigation and arbitration and if the decision of the arbitration panel is not acceptable to either of the parties involved, this can lead to big time legal battle which can truncate the progress of the work.

The correlation between the causes and effects of delay shows that the time overrun refers to late completion or late delivery, from the time specified or agreed by all parties, of construction project. The main causes for the time overrun are financial problems, late payments for the completed work and ongoing work, change orders, inefficient planning and scheduling, poor site management, delay in material delivery, etc.

Cost overrun refers to the increased costs of labor, working force, materials and equipment etc. The main causes for the cost overrun are change orders, mistakes in the contract, changes in drawings, inaccurate cost estimation, etc.

Wastage and underutilization of resources refers to idle manpower, lower productivity of workers and equipment, etc. The main causes for the underutilization of resources are late procurement and material delivery, slow response and approval, change orders, inadequate material supply, changes in drawings, weather condition, unforeseen site condition, etc.

Disputes among parties refer to the disagreement between different parties in the construction project. The main causes for disputes are slow or late payments for completed or ongoing work, poor communication and coordination, client interference.
Litigation and court cases refer to a legal proceeding in a court to solve the problems and it takes a long time to solve the problems. The main causes of litigation and court cases are late or no payments for completed work rise in material price, etc.

Abandonment refers to stopping every work or suspending the project for long time. The main causes for abandonment are regulatory changes, finances and payments, natural disasters etc.

Table 4.11 Proposed solution to Minimize Delay

<table>
<thead>
<tr>
<th>No</th>
<th>Item (Proposed solutions)</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Total</th>
<th>RII</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Utilization of the latest construction technology method</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>7</td>
<td>3</td>
<td>175</td>
<td>0.71</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Frequent site meeting with all functional parties</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>3</td>
<td>162</td>
<td>0.66</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>Not awarding contract based on the lowest bid/fixed price</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>15</td>
<td>131</td>
<td>0.53</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>Increase productivity by working overtime, shift, etc</td>
<td>15</td>
<td>13</td>
<td>11</td>
<td>5</td>
<td>5</td>
<td>175</td>
<td>0.71</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Offer incentive for early project completion</td>
<td>18</td>
<td>15</td>
<td>11</td>
<td>3</td>
<td>2</td>
<td>191</td>
<td>0.78</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Ask for extension of time</td>
<td>17</td>
<td>13</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>184</td>
<td>0.75</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Execute delayed activities by subcontractors</td>
<td>13</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>165</td>
<td>0.67</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>Promote team working among project participants</td>
<td>13</td>
<td>11</td>
<td>13</td>
<td>6</td>
<td>6</td>
<td>166</td>
<td>0.68</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Developing human resources management (training, day courses, employee recur event etc)</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>3</td>
<td>161</td>
<td>0.66</td>
<td>14</td>
</tr>
<tr>
<td>10</td>
<td>Timely decision making by all functional group</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>9</td>
<td>6</td>
<td>162</td>
<td>0.66</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>Proper project planning and scheduling</td>
<td>12</td>
<td>14</td>
<td>13</td>
<td>7</td>
<td>3</td>
<td>172</td>
<td>0.70</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>Developing appropriate communication system linking to all functional group</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>136</td>
<td>0.56</td>
<td>20</td>
</tr>
<tr>
<td>13</td>
<td>Early in obtaining permit and approval from relevant authority</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>139</td>
<td>0.57</td>
<td>19</td>
</tr>
<tr>
<td>14</td>
<td>Through project feasibility study and site investigation</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>13</td>
<td>136</td>
<td>0.56</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>Accurate initial project cost estimation</td>
<td>15</td>
<td>11</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>183</td>
<td>0.75</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>Hire experienced personnel for project implementation</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>13</td>
<td>12</td>
<td>132</td>
<td>0.54</td>
<td>22</td>
</tr>
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<td>Build a systematic project control and monitoring mechanism</td>
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<td>Ensure the availability of resources (<em>finance, materials, equipment, workmen, etc</em>)</td>
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<td>Select the competent project manager</td>
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<td>23</td>
<td>Use the appropriate construction methods</td>
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</table>

From Table 4.11, the results show that out of 23 items, the respondent ranked the most important by all participant (client, consultant, contractor) they propose solutions in the housing construction projects suggested by the respondents. Considered are the top ten propose solutions are: Offer incentive for early project completion by client is one of the potential solution of project delay (RII=0.78), Ask for extension of time (RII=0.75), Accurate initial project cost estimation (RII=0.71), Utilization of the latest construction technology method (RII=0.71), Proper project planning and scheduling (RII=0.70), Absence of bureaucracy (RII=0.69), Timely decision making by all functional group (RII=0.68), Promote team working among project participants (RII=0.68), Execute delayed activities by subcontractors (RII=0.67) and Ensure the availability of resources (*finance, materials, equipment, workmen, etc* (RII=0.67).
CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter includes the conclusions and recommendations that would help in solving the cause of delay and its effects at the housing construction project in Addis Ababa housing koye Feche project. The first objective of this study was to identify the causes of delays. The second objective was to identify the effect of construction delay in housing construction project in Addis Ababa housing Koye Feche project. And discussing the possible solutions of delays the construction of housing construction project in Addis Ababa housing Koye Feche project is the third one.

5.1 Summary of Findings

The outcome of analysis from this study can be said to be of great relevance to the Housing construction projects. Majority of the respondents are fully involved in the construction industry with at least 6-10 years of construction experience, meaning that the respondents have wealth of knowledge for the necessary information on the question sent out in the questionnaires. The professionals represented were the Contractors having the highest percentage of followed by the Consultants and the Clients.

There are many factors that induce delay on construction projects, however in this study the factors are limited to 33 factors causing delay and they were ranked according to the Relative Importance Index. The cause factors includes: lack of funds to finance the project to completion, changes in drawings, lack of effective communication among the parties involved, lack of adequate information from consultants, slow decision making, unrealistic contract duration and variations. Also, project management problem, mistake and discrepancies in contract document, equipment availability and Failure, mistakes during construction, fluctuation in prices, and ineffective planning and scheduling, low labor productivity and many more.

Analysis was also carried out on the effect of delay on the project work. Time overrun, increase in final cost of project, wastage and under-utilization of man-power and resources, tying down of client capital due to non-completion of the project, dispute among parties involved were ranked highest. Time is factor that is very essential in all
activities that has to be carried out, in the contract document a specific time phase is given for delivery of project and if the time is being exceeded more money is often spent which could lead to increase in final cost of project and also wastage and under-utilization of man-power and resources. The client’s capital has to be withheld due to non-completion of the project which could result into dispute, litigation and arbitration among the workers and management. Also delay can lead to reduced profit for Contractor, dis satisfaction of public and . Some important solutions to minimize the cause of delay wich are the respondent (client , consultant, contractor) they propose solutions in the housing construction projects are Offer incentive for early project completion by client, Ask for extension of time Accurate initial project cost estimation, Utilization of the latest construction technology method, Proper project planning and scheduling avoid bureaucracy Timely decision making by all functional group. Promote team working among project participants, Execute delayed activities by subcontractors, and ensure the availability of resources (finance, materials, equipment, workmen, are the top ten propose solutions.

5.2. Conclusions
Based on the literature reviews, the results of questionnaire responses the most potential delay causes on the projects are changes in drawings/design/specifications, Delay of work approval, Mistakes in design, Slow correction of design problem, Inadequate supervision to as consultants’ responsibility; and Financial difficulties of contractor . Poor subcontractor performance, Improper planning of contractor , poor site management, Inadequate contractor experience as contractor’s responsibility; and Supply Financial difficulties, Slow payment of completed work, slow in decision making ; Material procurement, Change order, Client interference and Uncooperative client as client’s responsibility. Price fluctuation, unforeseen site conditions are found external causes. The main effects of delay identified are time overrun; cost overrun wastage and underutilization of resources tying down of Client’s capital due to non-completion of the project are the effects of the delay encountered so far.
5.3. Recommendations

Delays are badly affecting the construction of the Koyefache project 16 Housing Construction projects and it is needed to find a solution for countering the delays. The solution to avoid and/or to counter delays is to avoid and lessen the causes related with delays, and in result there will be lesser effects of delays on the Housing projects. It is suggested to deal with the causes and find a solution so that these causes not happen or happen very less. Based on the findings of the research, the following recommendations were proposed.

5.2.1. Recommendation to Contractor

- The entry payment and advance payment should utilize properly on the project site and should have prepare cash flow

- Contractor wants to make more profit and therefore, may not be willing to pay highly skilled staff. This all results in poor site management which results in delay. It is therefore very important that contractors come up with a well structured form of organization that will help in alleviating problems that come as a result of poor management accompanied with the desire to save money by the contractors.

- Contractors prepare proper plan and achievable schedule using the appropriate scheduling techniques (Critical path method)

- It is helpful while Contractors apply effective site management system for different activities of the project so as to avoid rework of activities and low labor productivity that will result time and cost overruns.

- To avoid time and cost overruns, Contractors should plan properly and should secure required construction materials especially that are scarce in the local markets.

- To avoid Poor site management contractor should give training, technically support for subcontractors and use effective management system in construction projects

5.2.2. Recommendation to Consultants

The survey results indicated that there are a lot of delay factors are relevant to Consultants. Therefore, the following corrective measures are needed from consultants

- Consultants should produce a clear and adequately detailed design and working drawings as early as possible

- In order to avoid delays caused by change orders and design changes during construction, consultant should prepared as built design, material and payment.
Consultants should respond as quickly as possible to contractor and client questions and requests for clarification to avoid associated delays.

Consultants should improve work approval time by checklist inspection certificate and payment process.

Consultants should prepare standard time for inspection of completed works and correction of design problem and follow the presiding and subsiding activity by checklist.

Improve the Late issue of instruction through giving awareness, training to site inspector and inspection certificate.

5.2.3. Recommendation to Client

Clients Ensure the availability of Finance, materials resources and pay progress payments on time within the standard.

The client should determine the required duration of project and impose realistic duration to avoid time and cost overruns.

Client must give proper construction project time

The Client should make timely decisions as much as possible to avoid cost and time overruns.

Smooth communication among parties is very important to improve decision making.

The Client should exercise to work with various consultancy firms, this will provide them competitive consultancy fee, adequate consultancy service and better achievement.

The client should pay the contractor according to the terms of contract to avoid disappointments. And generally infrastructure facilities should be complete before the project starting, complete design before the site hand over, secured land owner compensation early, prepared BOQ clearly by consultant, Complete infrastructure facilities, Prepare Complete design and drawing before site hand over, at least main material must be supplied by contract or to save time and money.

Good communication channel must be used by the contracting parties to entirely free flow of information to avoid delays.

Support for early project completed contractor.
References


Addis Ababa housing project office brusher number of transferred and under constructions houses June, 2018


APPENDIX I

Structured Questionnaire

“Cause and Effects of Delay On KoyeFeche project 16 branch Housing construction Projects“

Dear respondent,

The objective of these questionnaires is to collect information in order to analyzing the cause and effect of delay in condominium housing construction the case of KoyeFeche Housing projects Addis Ababa, Ethiopia. The study is seriously for research purposes and the collected information is to be confidentially handled fulfillment of master’s degree in Construction Management from Addis Ababa Science and Technology University and to this there is no need in writing a name.

Thanks a lot in advance!

Addis Ababa Science And Technology University
Prepared by kidanemariamhailu
For Detail information please contact@
    Phone No 0910195042
    E-Mail : kidanehailu2017@Gmail.com
Advisor : Dr. Geremew Teklu (PHD)
INSTRUCTIONS : THIS QUESTIONNAIRE CONSISTS OF FOUR (4) SECTIONS:

Section A: Company Respondent Profile and Project Description

Section B: The Causes Of construction Delay

Section C: Effect of Delays
Section D: Methods of Minimizing Project Delays

Please take a look at the following questionnaire and try to answer correctly and accurately. All the information gathered here will be kept strictly confidential and will be used only for research and analysis without mentioning names of persons and companies.
SECTION A: RESPONDENT DETAILS

1) All the answers in this questionnaire will be treated with the strictest confidentiality. Please tick the box and fill in the blanks if you select others.

2) Name: (Optional) ..........................................................

3) Company Name (optional) .................................

4) Email (optional): ..........................................................

5) Which organization do you represent?
   - Client [Owner]  □
   - Consultant  □
   - Contractor  □
   - Others  ..............................................

5.5) Respondent Designation in the Company
   - Office Engineer
     □ Owner  □ Project Manager  □ Site Engineer
     □ Resident Engineer  □ Site Supervisor  □ Others

6) Years of Work Experience (General) contract administration
   - 0 to 5 years  □ 6 to 10 years  □ 11 to 15 years
     □ 16 to 20 years  □ Above 20 years  □

7) Years of Work Experience (building Construction projects)
   - 0 to 5 years  □ 6 to 10 years  □ 11 to 15 years
     □ 16 to 20 years  □ Above 20 years  □
Read through the list. For each option, please circle to show your answers based on the rating scale given below and fill in the blanks if you select others.

**Question 1**: Please rank for the following related causes of delays associated with in your project(s)?

**Rating Scale for Question 1**

1 = Strongly Disagree  
2 = Disagree  
3 = Slightly Disagree  
4 = Agree  
5 = Strongly Agree

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<th>Rating scale</th>
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</thead>
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<tr>
<td>2</td>
<td>Financial difficulties</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>3</td>
<td>Unsuitable construction method</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>4</td>
<td>Mistakes during construction</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>5</td>
<td>Inadequate contractor experience</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>6</td>
<td>Defective works</td>
<td>5 4 3 2 1</td>
</tr>
<tr>
<td>7</td>
<td>Poor subcontractor performance</td>
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<td>8</td>
<td>Improper planning of contractor</td>
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<td>9</td>
<td>Shortage of skilled manpower</td>
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<tr>
<td>10</td>
<td>Client interference</td>
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</tr>
<tr>
<td>11</td>
<td>Law in decision making &amp; response</td>
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<td>Contract modification</td>
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<td>13</td>
<td>Change order</td>
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<td>Uncooperative client</td>
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<td>Unrealistic contract duration</td>
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<td>Material procurement problem</td>
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<td>Lack of communication between</td>
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<td>Mistakes in design</td>
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<td>22</td>
<td>Changes in drawings/design/specifications</td>
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<td>23</td>
<td>Incomplete documents/drawing</td>
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<td>24</td>
<td>Inadequate supervision to contractor</td>
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<td>Delay of work approval</td>
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<td>Late issue of instruction</td>
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<tr>
<td>27</td>
<td>Slow correction of design problem</td>
<td>5 4 3 2 1</td>
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</table>
### Section C: Effects of Delay in Construction projects

Please rank with a circle effects of delay below in what you consider to be the most influential effect of delay. The five point scale ranged from 1 to 5.

1= Strongly Disagree  
2= Disagree  
3= Slightly Disagree  
4= Agree  
5= Strongly Agree

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<td>Cost Overrun</td>
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<td>Wastage and underutilization of manpower and resources</td>
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<td>Tying down of Client's capital due to non-completion of the project</td>
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<td>6</td>
<td>Dispute between parties involved</td>
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<td>4</td>
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<td>Reduced profit or total loss</td>
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<td>8</td>
<td>Arbitration</td>
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<td>5</td>
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<td>9</td>
<td>Litigation and court case</td>
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SECTION D: METHODS OF MINIMIZING PROJECT DELAYS

Please, circle for your selected answer based on the rating scale given below and fill in the blanks if you select others.

Questions 3: How did the effectiveness of the following methods minimize delays?

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<tr>
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<td>Frequent site meeting with all functional parties</td>
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<td>Not awarding contract based on the lowest bid/fixed price</td>
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<td>4</td>
<td>Increase productivity by working overtime, shift, etc</td>
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<td>4</td>
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<td>5</td>
<td>Offer incentive for early project completion</td>
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<td>4</td>
<td>3</td>
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<tr>
<td>6</td>
<td>Ask for extension of time</td>
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<td>7</td>
<td>Execute delayed activities by subcontractors</td>
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<td>8</td>
<td>Promote team working among project participants</td>
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<td>9</td>
<td>Developing human resources management (training, day courses, employee recur event etc)</td>
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<td>Developing appropriate communication system linking to all functional group</td>
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<td>Early in obtaining permit and approval from relevant authority</td>
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<td>14</td>
<td>Through project feasibility study and site investigation</td>
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<tr>
<td>15</td>
<td>Accurate initial project cost estimation</td>
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<tr>
<td>16</td>
<td>Hire experienced personnel for project implementation</td>
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<td>17</td>
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</table>

Thank you for completing this questionnaire  May 2018