



The Copperbelt University School of Graduate Studies

Exploring the causes and effects of delay in construction projects: Case of Luapula Province

A thesis submitted in partial fulfilment of the requirements of Copperbelt University,
for the award of Master's Degree in Science-Project Management

BY

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Declaration

I hereby declare that this Thesis towards the Master's Degree and material contained therein is my genuine work, and have ensured that wherever information was retrieved from previous publications-journals, seminars, textbooks, references have been outlined accordingly.

StudentSignatureDate

Mary Chungu Kaoma

RECOMMENDATION

This research has been submitted for examination with my approval as the University supervisors.

Certified by:

Supervisor Signature Date



Dedication

This research is especially dedicated to my late father who passed on in 1998 on 18th April, may his soul rest in peace. He had a dream of ensuring that I excel academically.

My mother Regina Chola Kaoma, my husband Mr. Mered Mwelwa and our children who stood by my side the time I was carrying out this study. Not forgetting my brothers and sisters for the continued support financially and morally. My niece Professor Precious Sipuka for her tireless support morally and Dr. Kaoma Fredrick who has always wanted me to succeed in in my education.

Acknowledgement

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ABSTRACT

Delay is something that causes troubling in any construction project. The parties that involved ensuring the success of a construction project are clients, contractors and consultants. Construction delays will lead to bad relations between these parties and the cost of a construction project will be increased along the addition of the time given. Delays generally regarded as the most common problem, complex, risky and frequently encountered in a construction project. The objective of this study was to identify the causes of delays and the effects of delays in construction industry. Next, the correlation between the causes and effects of delays will be made. The data obtained from the survey will use a Likert Scale and analysed using Relative Important Index (RII). The study found that the three highest ranking causes of the delay by overall respondents are subcontractors, site management and owner interference. While the effects of the delays in declaring the three highest effects are time overrun, cost overrun and total abandonment. It is expected that this study can help the studies that will be done in the future.

Key words: *Construction projects and delays*



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Operational Definitions

Project: Shenhar & Dvir, (2007) defines a project as a sequence of tasks that must be completed to attain a certain outcome

Construction: Candy, (2011) defines construction as the process, art, or manner of constructing something

Delay: are records that provide patients demographics, medical history, intolerance, allergies and lab test histories for management and decision support. (Hill, 2007)



Chapter 1:

1.1 Introduction

Delays in a construction project can be such a problem and a very serious issue for the parties involved such as client, consultants and contractors. There are many adverse effects that can occur as the results of the delays. To reduce this problem from occurring, site management should be made carefully. Since Zambia is advancing towards industrialisation, the role of the construction industry is greatly enhanced. When project is delayed, the client or user will have an impact not only the building cannot be used, but they had to postpone their early planning in addition to bear the cost overruns that will increase. This issue is a major problem in the construction industry not only in Zambia but the phenomenon is a global problem for the construction industry worldwide [1]. This study was conducted as the result of a various problems that arise in along with the delays in construction. There are different procedures to be observed by all parties so that unwanted things will not happen. Delays in construction projects are of the utmost priority. Delay is something that causes troubling in construction project. The parties that involved ensuring the success of a construction project are clients, contractors and consultants. Construction delays will lead to bad relations between these parties and the cost of a construction project will be increased along the addition of the time given. According to research by [2], delays generally regarded as the most common problem, complex, risky and frequently encountered in a construction project. The importance of time is very important for both parties, namely the owner or client (in terms of performance) and contractors (in terms of money) and often disputed and loss can lead to legal action.

1.2 Problem Statement

Since independence in 1964 Zambia has gone through a number of infrastructure projects done by the government or donors. The funding has been releases by the ministry of finance and national planning to spearhead infrastructure projects in all the 10 provinces of Zambia among the Luapula province.

Every construction projects have faced various problems. Delay is one of the major problems in many construction projects. Most construction project in Zambia and Luapula specifically have serious delay problems. Failure to achieve the specific target time, budgeted cost, changes in design or errors, changes by user, weather conditions,

late material and labor deliveries and specified quality result in various unexpected effects that are negative on the projects and are the reason that delay occur in many instances. When the projects are delayed, its either they are extended or accelerated and therefore incur additional cost

Despite the huge allocation of funds by Ministry of Finance for construction projects there has always been a delay in the completion. For instance in the 2023 national budget presented by the UPND government projects have been imitated and given to both local and international contractors. The huge and challenging projects notwithstanding the construction in industry in Zambia has not kept the pace with advancement to be able to effectively handle complex issues.

In addition, projects in Zambia particularly in rural provinces such as Luapula experience cost overruns and time, resulting in failed quality in standards and more increased litigation. Sidwell 1990 defines complexity in projection construction as the diversification of the operating environment which of course is influenced by the size, cost and intricacy. Furthermore, if this problem continues, those working in the construction industry will then face challenges in regulation and procedure even before its awarded a project. Typically, the delay caused by a variety of causes and reasons beyond the contractor or the client's expectations. Star, (2012) illustrates that delays also cause much annoyance among the residents and users due to the slow pace of work and the shortage of workers, a strong indication that the project would failing its scheduled and extended time frame. Moreover, the delay in construction project has a big impact such as it will effect to the relationship between client, funder and contractor. Wei (2010) study also shows that the most serious problem will send bad signals to foreign investors thereby slowing down the national progress

This delay in completion has raised a lot of concerns from all the stakeholders especially the end users and local leaders. There has been numerous back and forth arguments involving government, contractors, as well as traditional leadership as regards who is at fault. This research will therefore assess the factors that are causing delay in construction projects and the effect thereof.

1.3 Objective

Study will be conducted to review and identify the causes of delay in the construction industry and also the effects due to the delays. After both of these objectives are

identified, then the correlation between these two objectives will be made. The aim of this study was to determine the causes and effects of delays in construction project. In order to achieve the aims, the study is conducted based on the following objectives which are to identify the causes of delay in construction industry, to identify the effects of delay in construction

The objective of this study to explore the causes and effects of delay in construction projects in Luapula Province The consequence of this study is to make a future study about the cause of delays in construction in especially in government funded projects.

Specific objectives

- I. To identify the major causes of delay in construction projects.
- II. To study the effects of delay in the construction projects.
- III. To determine ways to reduce delay in construction project in Luapula Province

Research questions

- I. What are the major causes for delay in construction projects?
- II. What are the effects of delay in construction projects?
- III. What are the ways to reduce the delay in construction projects?

1.4 Significance of study

Significance of the study provides insights on avoiding and reducing delays in the construction of projects in the province. It will further introduce the 3 Es in procurement such as Effectiveness, Efficiency and Economy. Findings of this study will therefore contribute to the already existing body of knowledge for future research and practice in the field of construction. The Government as policy makers will use the findings of the study in administering of construction projects not only in Luapula but country at large.

The study will be published in a journal and contribute to the existing body of knowledge. It will further attract funding entities with interest in construction projects leading to investments in the University particular school of Built Environment.

Chapter 2: Literature review

2.1 Introduction

Chapter one gave background information pertaining to effects in delay of constructions relevance of conducting the research work in relation to these delays. In this chapter, literature related to the effect of construction projects, the effect of delays, and the cause of delays. In addition, a review of literature on the delays will be carried out.

2.2 Construction Projects in Africa

Construction projects are complicated human endeavors that entail massive planning and tight control if they're to achieve success. In any industry and any u . S . Of the Globe, they have constantly posed tough challenges to the task teams and assignment stakeholders, demanding situations together with delays in project delivery, expenses overrun, satisfactory control, and profitability. Besides, Construction, with the aid of its very nature, is a unstable commercial enterprise. Forecasting its period is part of what makes it volatile. Contractors estimating projects without a whole understanding of the time additives, that unnecessarily growing their risk and exposure to delays. Most of the tasks brought in recent years in Africa have failed under the conventional venture success standards of being added on time, on budget, to the same old and best required. These effects in a huge effect on the continent's already confined resource because it means lack of more sources to start with implement the initiatives, the need to hold infrastructure earlier than their due length, etc.

Various reasons may be cited for those. But the most outstanding motive needs to be the enterprise's lack of ability to embody professionalism. As matters stand, initiatives are incepted, deliberate, and carried out of doors the nation-states of professional venture control principles and practices. This is certain to bring about inefficiencies and ineffectiveness.

The face of the African creation enterprise is converting. Construction tasks on the continent have become bigger and more complicated. According to recent reviews, this is as a result of fast urbanization, robust monetary increase, a growing middle class, and local integration in all of Africa's nations. One of the most common issues of enterprise experts noted is the escalating fee and put off of initiatives.

This leads firms will in all likelihood struggle to preserve their margins in the coming year. When we noticed Africa's construction sports in both the numbers and overall

price of creation tasks in local approaches East Africa leads the continent and Southern Africa, North Africa, West Africa, and Central Africa holds from second to 5th ranks respectively (Edinger, 2019).

The construction region is a key detail of countrywide economies and presents vital help for social and economic improvement and it's a totally vital service region with substantial to and fro linkages in every economic system (Alagidede et al., 2016; UN.ECA, 2016). Currently, Africa's production industry goes via a growth. The production enterprise has excessive contributed to the gross home product (GDP) of the international locations. According to (Ford et al., 2020) it contributed about 7 % of Kenyan, eleven. 9% of Nigerian, 21.5% average of sub-Saharan Africa, 32.Eight% of Ethiopian, the continental chief, of their GDP over the last decade.

Overall Africa is now investing in its infrastructure on average \$108 billion in line with yr (Bank, 2018). Production play a dual function in the financial system which can be as a part of aggregate call for, determining output moves within the short run, and, by way of augmenting a kingdom's inventory of effective belongings, construction activities are important to the willpower of long-run monetary boom (Alagidede et al., 2016). There is a changing improvement pattern of the development industry primarily based on the level of improvement of a country's economy (Lopes, 2010). Inside the growing international locations, these difficulties and demanding situations are present along a preferred situation of socio-monetary pressure, chronic resource shortages, institutional weaknesses and a general incapability to address the key troubles.

There is also evidence that the issues have become greater in volume and severity in recent years. That is why China's involvement in Africa's construction and infrastructure sectors elevated.

Chinese state-owned and personal corporations are making strategic inroads into the construction and infrastructure sectors in many African economies on the cost of European and South African corporations (Burke et al., 2006). The construction industry entails a big number of projects participants like contractors, clients, consultants, suppliers, regulatory bodies, financiers, publics, and many others. It has been found that dangers and uncertainties involve in creation tasks aren't being addressed and controlled efficiently. Therefore, to improve the overall performance of the construction industry, there may be dire need to cope with these dangers and

uncertainty in an included manner to attain the achievement of a undertaking in terms of time, price, and best. Infrastructure investments in Africa have been growing rapidly.

Africa has grown to be one of the main outsourcing hubs in the world. This sector is considered to be an important key driver of the economic increase of the countries and occupies a pivotal role inside the continental development plans. It is seen that economic boom isn't always being achieved at the favoured stage because of delays. It has been discovered that now not a great deal attention is being paid to address the trouble of time overrun by the stakeholders of the construction enterprise within the continent.

Therefore, it is an pressing want to discover real reasons of time delays/overruns in order that the delay in time may be minimized.

2.2.1 Empirical Review

Albert (2009) found that there have been significant improvements on project completion within planned time and budgeted cost for projects undertaken after establishment of TANROADS compared to projects implemented by then under the Ministry of Works.

The study at also found out critical factors contributing to projects time and cost overruns consisting of fluctuations in materials in phrases of satisfactory and value; fluctuations in labour such as plant fees; construction delays (related to time overruns); insufficient planning; inadequate design of initiatives; unexpected occasions due to 1/3 parties and variation orders issued via customers.

In November 2009, Eng. Isaack Aloyce Kamwelwe did a research on Analysis of Financial Management System as Applied in Various Road Projects in Tanzania; A Case of TANROADS Dar es Salaam.

The research established that, the monetary management competencies among or inside the road area enterprise is not well practiced. Majority of the interviewed indicated that they've just simple abilities in economic 12 control, implying the existing illiteracy as regard to monetary control in street initiatives. Many research had been performed to discover the reasons of put off in production tasks. Chan et al. (1997) indicated that the five main causes of delays in Hong Kong production projects are: terrible web page control and supervision, unforeseen ground conditions, low velocity of choice making related to all project groups, client initiated variations and vital versions of works.

2.2.2 Effects of delays in Africa Construction

Construction undertaking is a venture, to be undertake to create a completely unique facility, services or products within the distinct scope, great, time and price. In practice, but, many creation initiatives encounter price overrun, delay on crowning glory time or terrible workmanship upon of entirety. Beside many different motives for these issues, the money and time which is lost because of controversies arising from claims will be raised as one cause. Since construction enterprise in the continent, in fashionable, is comparatively less prepared and desires the involvement of trained specialists as compared to different sectors, due to a large amount of cash invested in the zone from the united states of America's scarce financial system, extended of entirety time of tasks and greater fees due to claims ought to be averted or reduced and also it requires in-depth investigation to enhance the out places of the enterprise. There are various results of production delays on mission overall performance. The postpone in production tasks has large impacts on time and value overrun. Time overrun, price overrun, wastages and underutilization of manpower, reduced income, arbitration, litigation, disputes between parties, decreased financial boom, frustration and dissatisfaction of clients, tying down of client capital due to non-crowning glory and total abandonment of tasks are determined the fundamental outcomes of postpone on African construction industry (Khair et al., 2016; Nyoni, 2018). However, value overrun is considered as the hugest impact which may droop or even terminate the assignment earlier than of entirety. According to Oshungade (2017) create strain at the contractors, cost overrun, time overrun, and poor quality of labor the four maximum crucial results common to all of the contributors. Due to undertaking postpone inside the long time, expenses of substances, device, and exertions charges could be incurred. Besides, economic inflation, the greater quantity of financial institution hobby, and indirect fee like salaries of the staff, and condo price of challenge workplaces growth. All these results incurred a great quantity of fee and immediately increase mission cost (Bajjou et al., 2018; Hareru et al., 2016).

2.3 Global Perspective

Also in Malaysia, Sambasivan and Soon (2007) concluded that the ten maximum critical reasons of delays the development enterprise were: contractor's incorrect planning, contractor's negative website online management, insufficient contractor experience, inadequate client's finance and payments for finished work, troubles with subcontractors, scarcity in material, labour shortages, device availability and failure,

lack of verbal exchange between events, and errors for the duration of the development stage

2.4 Delays in Construction Project a Zambian Perspective

The construction industry is a key quarter in the improvement and financial growth of Zambia in keeping with the National Council for Construction document (2004).

However, the construction enterprise in Zambia has now not escaped the challenges dealing with other international locations global in phrases of handing over projects on time as stipulated inside the contracts. Projects or construction works that are not added on time to the customer are called delayed initiatives.

Mohammad (2010) Defines delay as an act or occasion that extends the time to finish or carry out an act under the agreement.

Also, Assaf and Al-Hejji (2006), defined delay because the time overrun either beyond finishing touch date laid out in a contract, or past the date that the events agreed upon for shipping of a task. It is largely a task slipping over its planned schedule and is considered as not unusual problem in creation initiatives global.

Assaf and Al-Hejji (2006) similarly illustrates that, to the proprietor, put off means lack of revenue thru loss of manufacturing facilities and lease-in a position area or dependence on present centers. In some instances, to the contractor, delay way better overhead fees due to longer paintings length, better material expenses through inflation, and due to labour cost increases.

Construction put off refers to a situation where a production mission does no longer come to final touch in the deliberate time (Kaliba, Muya and Mumba (2009). According to Kaming, Olomolaiye, Holt, and Harris (1997), Frimpong et al (2003), Assaf and Al-Hejji (2006), production delay is defined as the time overrun both beyond of completion date laid out in a contract, or beyond the date that the events agreed upon for transport of a assignment.

These studies findings show that there may be unanimous agreement most of the construction individuals within the ranking of 26 delay elements which indicates that behind schedule fee is the maximum important issue. This is much like Mezher and Tuwil (1998) in Lebanon, Frimpong et al (2003) in Ghana and Kaliba et al (2009)

In Zambia wherein cash problems (financing and price for completed work) have been also ranked as the most vital thing for production delays. Building production initiatives

contain huge amount of cash and most contractors will revel in economic problems to hold on creation strategies whilst bills aren't made by customers as at when due.

Kaliba et al. (2009) determined that inclement weather, scope changes, environmental protection and mitigation expenses, scheduled put off and strikes had been the large reasons of cost escalation in road creation tasks in Zambia. In evaluation, Muya et al. (2013) discovered the prevalence of cost escalation inside the Zambian construction enterprise, specifically because of insufficient preliminary fee analysis and trade orders.

Geographical factors have a massive impact, in keeping with Cantarelli et al. (2012), who finished research on cost overruns of different infrastructure projects.

According to Kaliba et al. (2009) price overruns in Zambian initiatives are frequently as a result of extreme weather, environmental stability, scope modifications, abated expenses, agenda overruns, technology obstacles, and high inflation.

Based at the research of Le-Hoai et al. (2008), the primary reasons for cost overruns in Vietnam are inflated resource charges, inaccurate design requirements, and increase in employment charges due to environmental constrains.

In Zambia, Literature confirmed the subsequent as reasons within the representative related category of reasons of delays; delay in approving essential modifications in the scope of work, bad communique and coordination, insufficient experience of consultant, mistakes and discrepancies in design files, delays in generating layout files, doubtful and inadequate info in drawings, insufficient data series and survey earlier than layout and absence of advanced engineering layout software program.

Chapter 3: Methodology

3.1 Introduction

This chapter introduces the research area, and looks into the various methods that are going to be employed in the collection of data and the sampling techniques that are going to be devised to arrive at the various factors that influence the delays in the construction of projects in Luapula province.

3.2 Study area

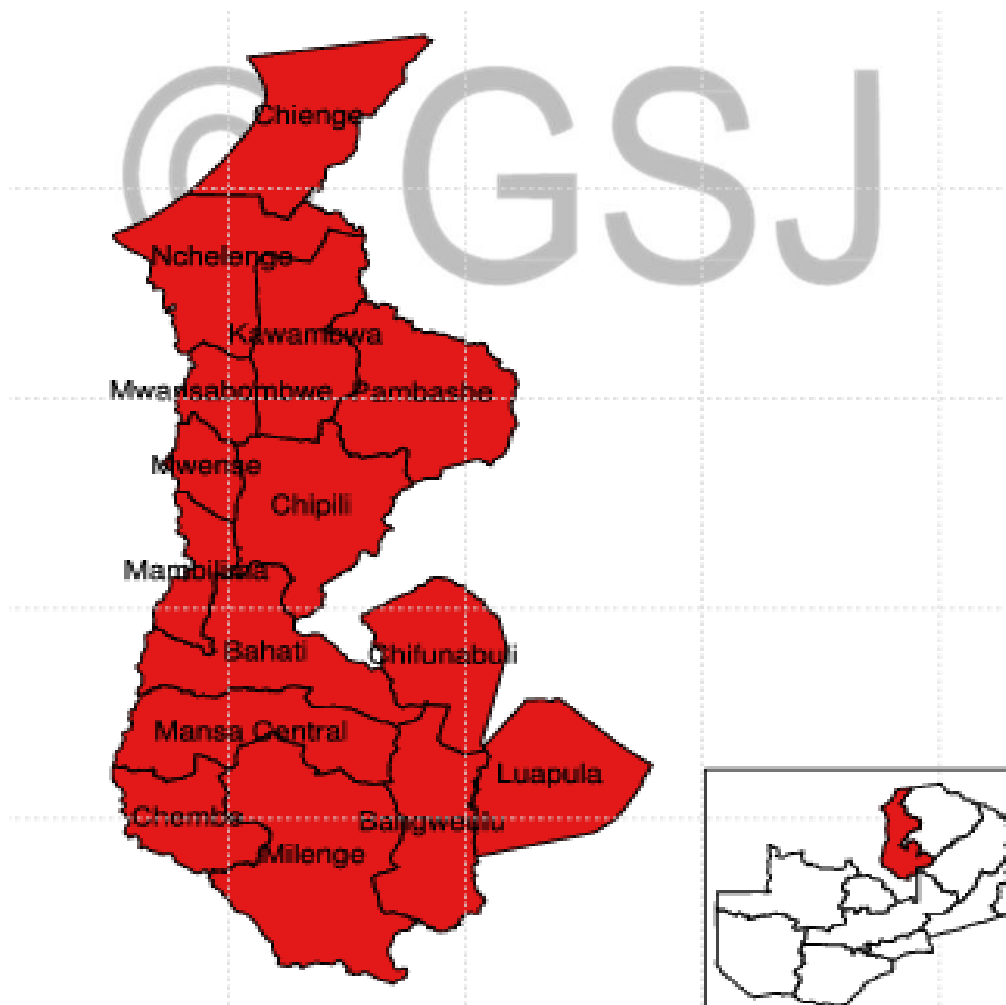


Figure 1: map of Zambian Luapula Province

3.3 Research Design and Collection

The research methodology is a description of how the objectives can be realised. The data collection can be found through qualitative and quantitative methods. The data collection through these methods was analysed and the results are presented. In this study, a questionnaire was developed to assess the perceptions of consultants and contractors on the relative importance of causes and effects of delays in construction in Luapula Province.

The questionnaire was divided into three parts. The first part requested background information about the respondents. The second part of the questionnaire focused on causes of construction delay. The respondents were asked to indicate their response category on 32 well-organised construction delay factors adopted by Sambasivan & Soon (2007); Odeh and Battaineh (2002) and some other additional causes from the literature review that is suitable. These causes were categorised into the following eight major groups:

- I. ***Client related factors:*** finance and payments of completed work, owner interference, slow decision making, unrealistic contract duration and requirements imposed and permits from municipality.
- II. ***Contractor related factors:*** sub-contractors, site management, construction methods, improper planning, mistakes during construction stage, inadequate contractor experience, financing by contractor during construction and mistakes in preliminary stage (soil investigation).
- III. ***Consultant related factors:*** contract management, preparation and approval of drawings, quality assurance and waiting time for approval of test and inspection.
- IV. ***Material related factors:*** quality of material and shortage in material.
- V. ***Labour and equipment related factors:*** labour supply, labour productivity and equipment availability and failure.
- VI. ***Contract related causes:*** change orders and mistakes and discrepancies in contract document.
- VII. ***Contract relationship related causes:*** major disputes and negotiations, inappropriate overall organisational structure linking to the project and lack of communication between the parties.
- VIII. ***External factors:*** weather condition, regulatory changes, problems with neighbours, unforeseen site condition and accidents during construction.

3.3.1 Data Collection

This part of the questionnaire focused on effects of construction delay in construction industry. The six effects of construction delay identified were: times overrun cost overrun, dispute, arbitration, litigation and total abandonment. A five point Likert Scale range from 1 (not important) to 5 (extremely important) was adopted to capture the importance of causes and effects of delays. The sampling method used in this study is based on previous research by Sambasivan and Soon (2007) which have 150 respondents. With confidence level of 95% and confidence of interval is 8.5%, the sample size is 70. The questionnaire was distributed by hand directly to the respondents that are in consultant and contractors firms in Luapula Province. From the 70 sets of questionnaire, 35 sets are distributed to the consultants and another 35 sets to the contractors. Of the 70 questionnaire only 44 (63%) sets were returned and there were 21 sets from consultants and 23 sets from contractors.

3.4 Data Analysis

3.4.1 Relative Importance Index (RII)

Calculation of Relative Importance Index (RII) Kometa et al. (2008), Aibinu & Jagboro (2002) and Faridah Binti Hasbullah (2014) used the relative importance index (RII) method in their research. The same method was adopted in this study for analysis of objective 1 and objective 2 within various groups (overall, consultants and contractors). The five point scale ranged from 1 (not important) to 5 (extremely important) was transformed to relative importance index (RII) for each factor as follows:

$$RII = \frac{\sum W}{A \times N} \quad (1)$$

Where W is weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (in this case is 5) and N is the total number of respondents. The RII value is range from 0 to 1 which the higher the value of RII, the more important was the cause and effect of delays. The RII was used to rank the different causes. The RII is then being classified based on the RII classification table as shows in Table 1. The discussion will be made when the RII was classified as most preferred causes and effects of delay only.

Table 1: Classification of RII

Scale	Level of preference	RII
1	Not preferred at all	$0.0 \leq RII \leq 0.3$

2	Slightly preferred	$0.2 < RII < 0.4$
3	Moderately preferred	$0.4 < RII < 0.6$
4	Preferred	$0.6 < RII < 0.8$
5	Most preferred	$0.6 < RII < 1.0$

3.4.2 Correlation analysis

The method of analysing for objective 3 is by using correlation analysis using Microsoft Excel. The correlation is to see whether the two variables are linear to each other (negatively and positively correlated) using Pearson Product-Moment Correlation (PPMC) Coefficient Table of Critical Value (Stephanie, 2009).

3.4.3 Analysis

The demographic characteristics of respondents are given in Table 2.

Table 2: Demographic characteristic of respondents

Demographic Characteristic	Frequency	Percentage
SEX		
Male	26	59
Female	18	41
AGE		
≤20 years old	0	0
21-29 years old	17	38
30-39 years old	21	48
≥50 years old	6	14
Education		
Lower secondary (F1-F3)	0	0
Upper secondary (F4-F5)	3	7
Pre-university (F6)	0	0
University	38	86
Post-graduate	3	8
Organization		
Consultants	21	48
Contractors	23	52
Occupation level		
Executive	8	18
Non-executive	24	55
Management	12	27
Number of years working experience		

≥2 years	11	25
3-5 years	18	41
6-10 years	8	18
≤11 years	7	16
Fields of specialization		
Building and infrastructure	44	100
Mechanical and electrical	0	0
Others	0	0

3.4.4 Cronbach Alpha Reliability Test

Cronbach Alpha Reliability Test In a statistical test, Cronbach Alpha was used as an estimation of the reliability of psychometric test. In statistics, Cronbach's Alpha (Cronbach, 1951) is a coefficient of internal consistency. It is commonly used as an estimate of the reliability of a psychometric test for a sample of examinees. It was first named alpha by Lee Cronbach in 1951, as he had intended to continue with further coefficients. Standard Cronbach Alpha formula is

$$\alpha = \frac{kr'}{(1+(k-1)r')} \quad (2)$$

Where k is the number of respondents and r' is average correlation.

$$\text{Reliability Test on Causes of Delay } \alpha = \frac{32(0.595)}{(1+(32-1)0.595)} = 0.97 \text{ or } 97\% \quad (3)$$

$$\text{Reliability Test on Effects of Delays } \alpha = \frac{6(0.477)}{(1+(6-1)0.477)} = 0.85 \text{ or } 85\% \quad (4)$$

This indicates that 97% of the causes answered by the respondents have excellent reliability and 85% of the effects answered by the respondents are good reliability.

3.4.5 Causes of Delay

The primary data collected from the second part of the questionnaire was analysed from the perspective of consultants and contractors. Each individual cause's RII perceived by all respondents was computed for overall analysis. The RII was computed for each cause to identify the most significant causes. The causes then discussed based on the RII classification class. From the RII value, 0.8 to 1.0 is the most preferred level of preference and being the most important causes as the results.

Based on the level of preference in class 5 which classified as most preferred factor as perceived by consultant, there are 5 causes can be found which is sub-contractor

(RII=0.876), site management (RII=0.829), improper planning (RII=0.829), mistakes during construction stage (RII=0.829) and inadequate contractor experience (RII=0.829). The causes as perceived by contractor that can be found is, sub-contractor (RII=0.904) and site management (RII=0.852)

Table 3: The ranking of causes of delay based on consultant and contractors's review

Causes of Delays	Consultant		Contractor	
	RII	Rank	RII	Rank
Client Related Factor				
Finance and payments of completed work.	0.676	14	0.713	10
Owner interference.	0.781	6	0.783	3
Slow decision making.	0.648	21	0.609	25
Unrealistic contract duration and requirements imposed.	0.610	27	0.722	9
Obtaining permits from municipality.	0.629	25	0.643	19
Consultant Related Factor				
Contract management.	0.590	29	0.583	26
Preparation and approval of drawings.	0.600	28	0.661	17
Quality assurance.	0.638	23	0.730	6
Waiting time for approval of drawings.	0.657	17	0.661	17
Contractor Related Factor				
Sub-contractor.	0.876	1	0.904	1
Site management.	0.829	2	0.852	2
Construction methods.	0.781	6	0.635	20
Preparation and approval of drawings.	0.829	2	0.617	23
Mistakes during construction stage.	0.829	2	0.539	30
Inadequate contractor experience.	0.829	2	0.539	30
Mistakes in preliminary stage (soil investigation).	0.648	21	0.670	16
Financing by contractor during construction.	0.781	6	0.678	15
Material Factor				
Quality in material.	0.752	10	0.557	27
Shortage in material.	0.714	12	0.757	5
Labour and Equipment Related Factor				
Labour supply.	0.762	9	0.730	6
Labour productivity.	0.743	11	0.696	13
Equipment availability and failure.	0.667	16	0.713	10

Table 4: The ranking of causes of delay

Contract Related Factor				
Change orders.	0.695	13	0.617	23
Mistakes and discrepancies in contract document.	0.638	23	0.730	6
Contract Relationship Related Factor				
Major disputes and negotiations.	0.657	17	0.704	12
Inappropriate overall organisation structure linking to the project.	0.619	26	0.548	28
Lack of communication between parties.	0.657	17	0.696	13
External factor				
Weather condition.	0.676	14	0.783	3
Regulatory changes.	0.571	30	0.635	20
Problem with neighbours.	0.514	32	0.452	32
Unforeseen site condition.	0.657	17	0.548	28
Accidents during construction.	0.552	31	0.635	20

This is interesting to compare the causes as perceived by consultants and contractors. Most often, one party were blaming the other. Two of the top causes perceived common between consultants and contractors are: sub-contractor and site management. The consultants blaming contractor’s improper planning, contractor’s mistakes and contractor’s experience as the important causes of delay.

Table 5: Contract Relationship Related Factor

Contract Relationship Related Factor							
Major disputes and negotiations.	0.0	13.6	40.9	36.4	9.1	0.682	15
Inappropriate overall organisation structure linking to the project.	11.4	22.7	38.6	18.2	9.1	0.582	31
Lack of communication between parties.	4.5	11.4	34.1	40.9	9.1	0.677	16
External Factor							
Weather condition.	0.0	6.8	31.8	38.6	22.7	0.755	4
Regulatory changes.	9.1	22.7	31.8	29.5	6.8	0.605	27
Problem with neighbours.	11.4	47.7	29.5	11.4	0.0	0.482	32
Unforeseen site condition.	6.8	15.9	50.0	25.0	2.3	0.600	28
Accidents during construction.	0.0	25.0	59.1	9.1	6.8	0.595	29

Table 6: Factor according to the category that perceived by consultants and contractors

Category	Consultant		Contractor		Overall	
	RII	Rank	RII	Rank	RII	Rank
Client Related Factors	0.669	4	0.694	3	0.682	4
Consultant Related Factors	0.621	7	0.659	5	0.641	7
Contractor Related Factors	0.805	1	0.709	2	0.755	1
Material Related Factors	0.733	2	0.657	6	0.693	3
Labour and Equipment Related Factors	0.724	3	0.713	1	0.718	2
Contract Related Factors	0.667	5	0.674	4	0.670	5
Contract Relationship Related Factors	0.644	6	0.649	7	0.647	6
External Factors	0.604	8	0.610	8	0.607	8

Contractor related factor (RII=0.805) is the most preferred causes as perceived by consultant that need to be considered in construction delay. From the views of contractors, there are no factors that can be classified as most preferred factors of delays in construction industry based on this study

3.4.6 Effects of Delays

The primary data that collected from the third part of the questionnaire was analysed from the perspective of consultants and contractors. The calculation of RII and ranking were done like previous section. Based on the RII, the value that classified as most preferred effects are in range 0.8 to 1.0 and the result we found shows that there is 1 effects of delays that perceived by consultants which is time overrun (RII=0.886) and 2 effects of delays that perceived by contractors which are time overrun (RII=0.913) and cost overrun (RII=0.896)

Table 7: The Ranking of effects based on consultant and contractor's view

Category	Consultant		Contractor		Overall	
	RII	Rank	RII	Rank	RII	Rank
Time Overrun	0.886	1	0.913	1	0.900	1
Cost Overrun	0.771	2	0.896	2	0.836	2
Dispute	0.676	6	0.687	5	0.682	5
Arbitration	0.686	4	0.696	4	0.691	4
Litigation	0.686	4	0.539	6	0.609	6
Total Abandonment	0.771	2	0.704	3	0.736	3

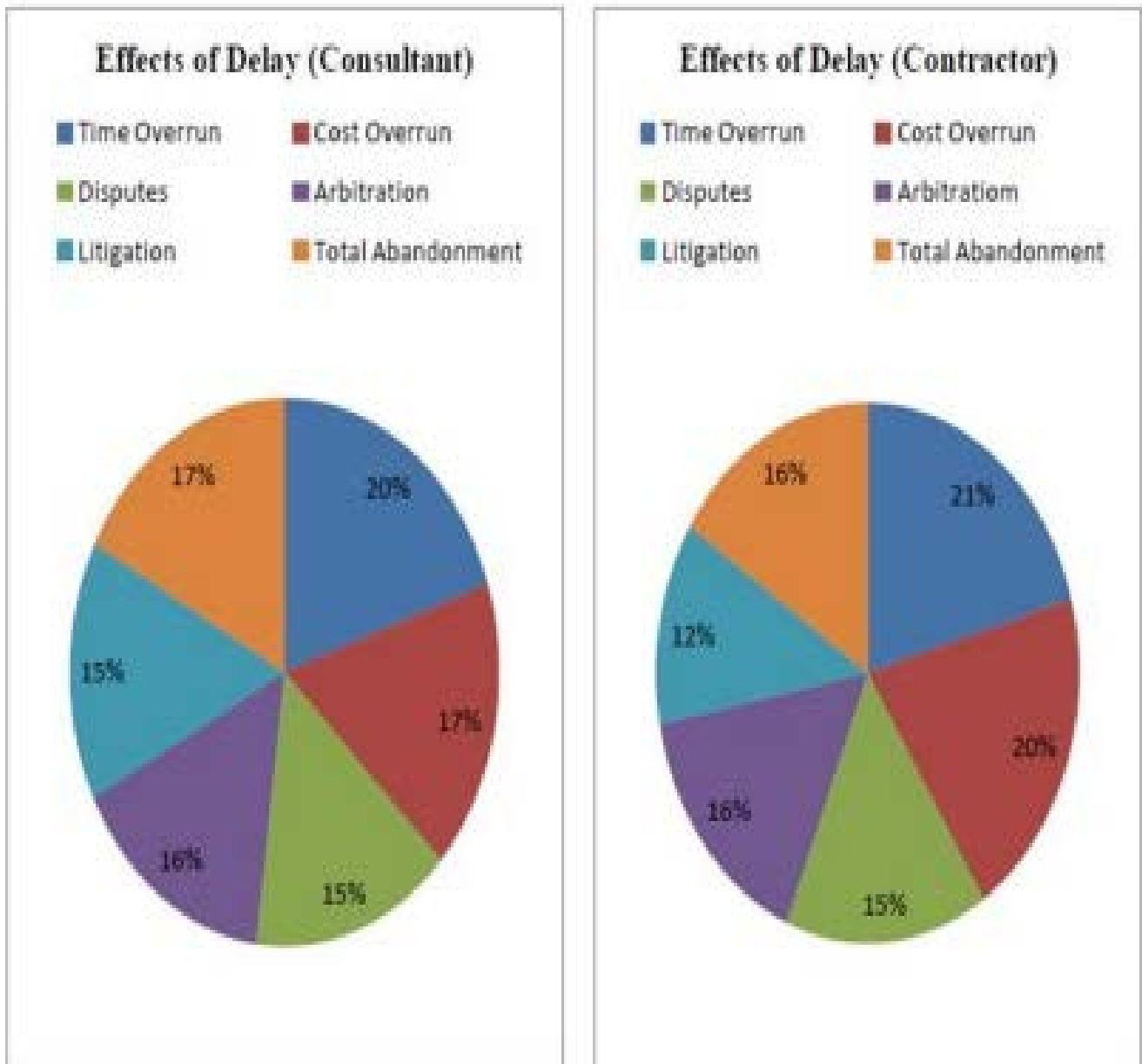


Figure 2: Pie chart on effects of delay by consultant and contractor

3.4.7 Categories of Causes and Effects of Delays

The next analysis was to identify the empirical relationship between the causes and the effects. In short, empirical relationship attempt to describe, explain and make prediction through observation. In this research, relationship between causes and effects through observable data were successfully attempted. Since the data that been collected through survey is based on Likert Scale, it can be considered as interval data. Therefore, a correlation analysis was done to study the empirical relationship between the categories

of causes and effects of delay. Table 8 gives the result of analysis. Highlighted coefficient shows the coefficients are significant at 0.05 significance level.

Table 8: Correlation between the categories of causes and effects of delays

	Client Related	Consultant Related	Contractor Related	Material Related	Labour and Equipment Related	Contract Related	Contract Relationship Related	External
Time Overrun	0.116	-0.136	0.669	0.268	0.301	0.011	-0.098	-0.307
Cost Overrun	0.399	0.081	0.918	0.626	0.708	0.430	0.253	-0.087
Disputes	0.919	0.756	0.748	0.965	0.881	0.955	0.903	0.754
Arbitration	0.673	0.498	0.805	0.611	0.532	0.457	0.469	0.360
Litigation	0.829	0.776	0.433	0.802	0.671	0.863	0.873	0.850
Total Abandonment	0.832	0.760	0.753	0.612	0.622	0.662	0.729	0.603

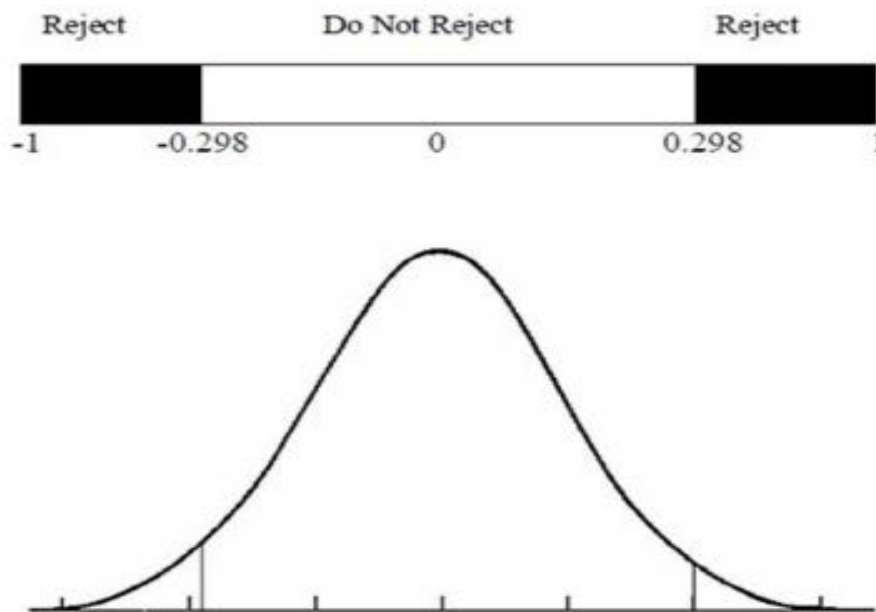


Figure 3: correlaion diagram

For example the correlation coefficient is 0.116 does not fall into the reject region, so there isn't enough evidence to state a strong linear relationship exists in the data.

3.5 Ethical Consideration

The study was be conducted according to the ethical codes of the Copperbelt University and standard ethical practices required. The respondents will be informed verbally and in writing about the purposes of the research their consent will be confirmed before filling the questionnaires respectively

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Chapter 4: Discussions

4.1 Discussion

Causes of Delay. The result above show that the causes of delays that can be classified as most preferred causes are subcontractor (RII=0.891) and site management (RII=0.841)

4.1.1 Subcontractor

Sub-contractors failure is a clear problem. One of subcontractor mistakes that need to know is they deferring all decision to the main contractor. While it's possible that the contractor we hired may be indecisive by nature, we can minimise this problem by creating rules that the subcontractors can use whenever they're hesitant to make decision

4.1.2 Contractor's poor site management

Contractor's poor site management is one of the most significant causes in causing the construction delay. The results of this research find that site management is an important factor to make the project run smoothly. Usually this problem might happen to contractor that is still new in this field. Poor site management will causes negative impact on the overall work progress.

4.1.3 Effects of Delay

The most preferred effects of delay perceived by all the respondents were time overrun (RII=0.900), and cost overrun (RII=0.836)

4.1.4 Time overrun.

Contractor related, material related, labour equipment related and external related factors have impact on time overrun. Out of the most important causes of delay discussed earlier, the causes are belonging to the contractor factors. When we see the RII that classified as preferred causes in class 4, we can see the causes are from the factors that stated above. Factors such as problem with subcontractor, management in site and delay in payments are most affected causes of delay in construction project and cause time overrun.

4.1.5 Cost overrun.

Usually factors that related to cost overrun is the contract that been made early before the construction starts. Client related, contractor related, material related and labour equipment related factors also lead to cost overrun. Mistakes and discrepancies in the contract document may come from the resources available, payment terms and project

duration. If there is discrepancies happen, then cost overrun will occur. Time overrun leads to cost overrun.

4.1.6 Correlation between causes of delays and effects of delays.

Table 8 shows the correlation between the causes of delays by category with the effects of delay. Most of the causes and effects are correlates linearly to each other. From the results, we can say that the effects of delays happen in the project site have linear relationship with the causes of delays, for example the higher the causes by the contractor, the higher time overrun happen on the construction site.

4.1.7 Prescription to reduce delays.

The prescription will be divided into three groups which is (1) prescription for clients (2) prescription for consultants and (3) prescription for contractors.

4.1.8 Prescription for clients

We know that clients usually select the contractors which give lowest bid. But to prevent any problem that might happen in future, clients should select contractors that have sufficient experience, enough technical and financial capability and have sufficient manpower to make sure the project run smoothly. Secondly, client should not frequently interfere during the project for example keep making changes about the requirement. This can interrupt contractor's productivity of work. Thirdly, client should have enough money to pay the contractors just in time. Client should work carefully so that bank or any finance institution will released the payment on schedule

4.1.9 Prescription for consultants

Consultant should work on drawing carefully and on time. Consultants also should monitor the work done by the contractor closely and making inspection time to time. Contractors also should include the duration and the solution to settle disputes during the making of the contract between the clients and consultants in early stage

4.1.10 Prescription for contractors.

The most important thing is contractor should take the project that they have expertise on it only. Secondly, contractors should have enough money based on the cash flow to start the project in order to run the project smoothly. Third, contractors should provide proper planning and schedule to the clients and they also have to make sure the subcontractors, materials, labour and equipment is sufficient enough to start the project.

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Chapter 5: Conclusion and recommendations

5.1 Conclusion

Through this study, the construction industry is still facing the delay in project and this study come out with the causes and effects of the delays. A questionnaire is designed and distributed among the contractors and consultants firm in Luapula Province. This study identified that most preferred causes of delay in construction industry are (1) subcontractors (RII=0.891) and (2) contractor's poor site management (RII=0.841). This study come out with the most preferred effects of construction delay which is (1) time overrun (RII=0.900) and (2) cost overrun (RII=0.836). As an important contribution, this study comes out with empirical relationship between causes and effects of delays as the third objective as discussed in the discussion above. Hope that this study can be a help to the practitioners (clients, consultants and contractors) and also academicians to a better understand about the project management and make efforts to reduce the construction delays.

5.2 Limitation

There are several limitation in this study which is the questionnaire that been produced not represent all the causes and effect of construction industry around the world. That may be a small portion of causes and effect that being find during this study. The questionnaire also being distributed in Luapula Province area only due to time lack during the study

5.3 Recommendation

The recommendation will be on how to improve the questionnaire production which researcher should have read more journal, thesis and books in order to get many ideas of the questions that we want to ask. Secondly, the method of analysing should be added so that the results produced are more detailed.

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