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An Investigation Into The Factors Of Delay On Public Sector Building Projects In Luanshya

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Abstract
Delay is one of the major problems faced on construction projects world-over and is more severe in developing nations like Zambia. The main objective of conducting this study was to identify the major factors of delay on public sector building projects (PSBP) in Luanshya district on the Copper belt province and recommend effective and practical methods of minimizing the problem. The research design used was descriptive survey and 71 respondents were randomly selected from contractors, clients and consultants involved in the implementation of PSBP in Luanshya. The primary data collected through a questionnaire were analyzed using descriptive statistical techniques and content analysis which went through a multi-stage process. Formulae of relative importance index (RII) and risk were used to determine the prominence, severity, and risk level (R) of the factors of delay.

The ten most prominent (frequent) factors of delay on PSBP were mistakes and discrepancies in design documents (RII=0.775), work stoppages due to conflict over site ownership (RII=0.765), difficulties in financing the project by the contractor (RII=0.755), poor site management and supervision (RII=0.755), and delay in performing final inspections and certification by a third party (RII=0.73). Others were delay in financing and payments of completed works by the client (RII=0.706), delay in site mobilization by the contractor (RII=0.701), unrealistic contract duration (RII=0.691), reworks due to errors during construction (RII=0.691), and unclear and inadequate contract drawings (RII=0.681).

The ten most severe factors of delay were: delay in financing and payments of completed works by the client (RII=0.779), difficulties in financing the project by the contractor (RII=077), work stoppages due to conflict over site ownership (RII=0.775), delay in site mobilization (RII=0.735), and lack of communication between the parties (RII=0.716). Others are: delay in material delivery (RII=0.711), slow decision making by the client (RII=0.686), mistakes and discrepancies in design documents (RII=0.672), poor site management and supervision (RII=0.672), and inappropriate storage of material leading to damages (RII=0.672).

The ten most risky or critical factors of delay were: difficulties in financing the project by the contractor (R=0.581), work stoppages due to conflict over site ownership (R=0.577), delay in financing and payments of completed works by the client (R=0.55), mistakes and discrepancies in design documents (R=0.52), and delay in site mobilization (R=0.515). Others are; poor site management and supervision (R=0.507), delay in performing final inspections and certification by third party (R=0.473), lack of communication between third parties (R=0.463), unclear and inadequate details in drawings (R=0.454), and unavailability of utilities on site such as (electricity, water, etc.) (R=0.441).
Keywords—Factors; delays; public; sector; building; projects.

1: INTRODUCTION

1.0 Overview

Chapter 1 of this paper introduces the background information and then proceeds to defining and explaining delay in the context of project management and building construction projects. It then presents the concept of project triangle, generally explaining the intertwining factors considered as focal points for project success. This is followed by the problem statement, research objectives, research questions, and significance of the study. Others are limitations of the study, conceptual framework, and operational definitions of the concepts.

1.1 Background to the study

Escalation of building infrastructure is an important mechanism for achieving sustainable development and fosters equal provision of social-economic amenities to all citizens in a country. Studies have revealed that, escalation of public sector building projects (PSBP) in the construction industry is imperative for all regions of national and international economy, as well as everyone involved in the industry like contractors, clients, and the communities at large (Haseeb et al, 2011). However, inadequate building infrastructure continues to be the main challenge to economic growth, economic diversification, and human development as many parts of the country still lack in the key building infrastructure needed for effective delivery of social services. In its quest to develop the nation, the government of the republic of Zambia has prioritized infrastructure development as one of the major drivers of the economy. This was upheld in the Sixth National Development Plan which expired in 2017 and was maintained in both the country's Seventh National Development Plan (SNDP) as well as in the National Vision 2030 (Zambia Development Agency (ZDA), n.d.). As a result, government, in its annual budgets allocates funds towards the implementation of various construction projects. A fair share of this sector allocation goes towards the construction of building projects across the nation.

In Luanshya, a number of building projects like schools, health posts, police posts, office blocks, and markets are launched yearly. However, delays that prevail on these projects are significant and pose great challenges to their implementation and the intended purposes (Nasser, Monty, & Heap-Yih, 2014). To this effect, meeting project objectives within the specified time limit is one of the project success criteria and is considered as an indicator of efficiency (Divya & Ramya, 2015). But the inability to complete projects on time continues to be a chronic problem and is worsening (Ahmed et al, 2002). Research has revealed delay as one of the major problems facing construction projects in general and building projects in particular. Azhar & Farouqui (2008) observed that, though the trend is common worldwide, it is more severe in developing countries like Zambia.

1.1.1 Delay defined

Mohamad (2010) defines delay as an act or event that extends the time to complete or perform an act under the contract. Also (Assaf & Al-Hejji, 2006) defines delay as the time overrun either beyond the completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. And (Alkhathami, 2004) defines delay as the extra time needed to complete a construction project beyond its original planned duration, whether compensated for or not. Therefore, project delay is basically a project slipping over its planned schedule. In other words, project delay means loss of income to the client; and in the case of a contractor, delay refers to the higher costs due to longer work time, labor cost increase, and higher fabrication costs (Alkhathami, 2004).

Project delays are a large and prevalent problem in the construction industry, and delays can definitely affect project duration, budget, and also community needs (Shahid, et al., 2018). Project delay is caused by a number of factors that affect either the

project schedule, budget, or scope. In project management, the three are collectively known as the "Project triangle" or the "Triple constraint" (Fred, 2015). It is in this regard that project management skills, knowledge, tools, and techniques are applied on projects to manage the trade-off between the cost, scope, and time in order deliver projects on time (Dogdson, et al., 2014).

1.2 Statement of the problem

The specific problem facing public sector building projects in Luanshya is delay. On average, projects with a planned schedule of one year took more than four years to complete. In July 2017, the government through the then District commissioner, Joel Chibuye summoned Shaftex Zambia Limited following the delay in the completion of the K14.6 million Fisenge Day Secondary school project which started in 2011 and was scheduled to complete in 2013 (Nkole, 2017). This project was delayed by more than 6 years and the contractor at some point had deserted the project site for more than 7 months. And on 3 August, 2017, Mr. Andrew Chella the then special assistant to the president for project implementation and monitoring, while inspecting projects in Luanshya expressed concern over the delays in completing many government projects in the district (Zambia Daily Mail, 2017). Among the delayed projects he inspected were the construction of the Youth Skills training Centre, Roan police post, Section 25 and section 3 clinics, and the paediatric ward at Roan General Hospital.

Delay on PSBP affects the client (government), the contractor, and the community members who are the intended beneficiaries in many ways. To begin with, government cherishes much the availability of building infrastructure as it is the means through which social amenities like health, education, justice, and security are provided to its citizens. However, delays to complete the projects on time hampers these efforts and as a result, delivery of services to the people are delayed or completely denied in cases where delays escalate to total project abandonment. Additionally, delay increases the final cost of the project especially where a "Time and Material Contract (T&M)" was entered into with the contractor. In the case of capital projects such as in real estates, the client's capital is tied down due to non-completion of the project which in turn delays the payback start up (Owolabi et al, 2014: Beradette & Jacob, 2013). To the contractor, delay results into wastage and under-utilization of human resources and reduction in revenue (Haseeb et al., 2011). This is as a result of the project team remaining longer on a single project than planned. In this case, the contractor continues to pay labour costs beyond the planned project duration including the periods when the project works have stalled. On the other hand, reduced profits are due to cumulative labour costs incurred by the contractor especially where a "Firm Fixed Price Contract (FFP)" was entered. Furthermore, court disputes between project parties, litigations, arbitrations, and total project abandonment are other common effects of project delay (Owolabi et al., 2014).

1.2.1 Selected public sector building projects that faced in Luanshya

Project delay records were obtained from Luanshya Municipal council which is the custodian of constituency and ward development projects, the district health office, and the ministry of works and supply which previously was in charge of such projects before the introduction of the ministry of Housing and Infrastructure development. Delay records were also obtained from contracting firms within Luanshya as well as cite visits. These records revealed that several PSBP in Luanshya faced delay while others continued to do so with some being completely abandoned by contractors, thus escalating the matter into adverse disputes between the contractors and the client. As a result, some cases ended up in the courts of law where

they tarried on for many years. Table 1.1 shows some selected PSBP that had faced serious delays. From the few examples given above, it is evident that the problem of delay on Public Sector Building Projects in Luanshya is a serious concern requiring an investigation. It was therefore against this background that this study was conducted to investigate the factors contributing to the problem of delay on PSBP.

Project	Start	Project schedul	Completion dat	Delay period
Expansion of Section 25 health post	January 2015	10 months	November 2017	2 years
Construction of Section 3 health post	November 201	6 months	December 2018	2 years 6 months
Expansion of Section 9 health post	2012	6 months	November 2017	About 3 years
Construction of Roan Skills Training Center	April 2012	12 months	Stalled at roof level	More than 8 years
Construction of Mikomfwa and Maposa market shelters	2015	6 months	On-going	More 4 years
Construction of Roan community police post	2013	6 months	Stalled at window lev	More than 6 years
Conionstruction Ndeke police post	2014	9 months	September 2018	About 4 years
Construction of Franco health post	2014	6 months	August 2016	About 2 years
Construction of Mama Rosa health post	2014	6 months	September 2016	About 2 years
Construction of Fisenge Day Secondary School	2011	2 years	2018	About 5 years
Construction of a student hostel at Luanshya technical & Business College	October 2017	1 year	Stalled at lintel level	More than 9 months

Table 1.1: Delayed PSBP in Luanshya. Source: Field survey and contract documents from Luanshya Municipal Council and ministry of Works and supply in Luanshya

1.3 Objectives of the study

1.3.1 Main objective of the study

The main objective of this study was to identify the major factors of delay on Public Sector Building Projects in Luanshya and recommend effective and practical methods of minimizing the problem.

1.3.2 Specific objectives of the study

1. To understand the experiences and knowledge of project participants regarding delays on Public Sector Building Projects in Luanshya
2. To identify the most prominent (frequent) factors of delay on PSBP in Luanshya
3. To identify the most severe factors of delay on PSBP in Luanshya
4. To determine the riskiest factors of delay on PSBP in Luanshya.

1.4 Research Questions

1. What were the experiences and knowledge of project participants concerning delays on Public Sector Building Projects in Luanshya?
2. What were the most prominent factors of delay on Public Sector Building Projects in Luanshya?
3. What were the most severe factors of delay on Public Sector Building projects in Luanshya?
4. What were the riskiest factors of delay on public sector building projects in Luanshya?

1.5 Significance of the Study

In any project execution, risk identification and management are very imperative in the realization of project objectives. Understanding delay factors is important for the clients, contractors, as well as consultants in the quest to reduce the impacts of such delays on the projects. Though the identification and assessment of delay factors is challenging, it is an essential task that yields more benefits for all project parties. And delay being a common risk on PSBP, it is therefore important that factors contributing to the problem are first identified and then thoroughly examined to identify their frequency, severity, and riskiness on the projects. This in turn provides useful information required to effectively monitor and control the risks throughout the project life cycle. As a result, this study is very significant in the sense that it did not only identify the factors of delay on PSBP but also thoroughly examined the factors to understand the

prominence (frequency) of their occurrence on the projects and the extent of the impacts (severity) they cause on the projects. Revealing the prominence and impact of the factors of delay are paramount in holistically understanding the amount of delay risk the projects are exposed to. Therefore, this study provides vital information that would greatly benefit project participants especially those implementing PSBP in identifying and prioritizing delay risks throughout the project lifecycle. In addition, this study recommended applicable and practical methods of managing delay risks. This would help to minimize and avoid delays and their effects on the client, contractor, and the intended project beneficiaries. The implication of this includes; more profits and wealth to the contractor; lesser costs to the client; fewer or no disputes among project parties; more successful projects resulting into quicker provision of social services; and stronger relationships between contractors and the government. Furthermore, the study adds more knowledge to the available literature in the country. This in turn greatly benefits the project managers, consultants, contractors, students of engineering and construction management, and various government ministries, departments, and agencies in charge of implementing similar projects.

1.6 Limitations

The following were the limitations of the study:

i. Firstly, it was not easy to contact all key government officials who had participated in some of the projects but were no longer living in Luanshya or were no longer serving in the same capacities at the time of the study.

ii. Secondly, projects and participants in the outskirts of Luanshya were not considered due to time and cost constraints.

iii. Thirdly, some contractors from other towns were no longer in Luanshya after abandoning some projects, as a result, it was not easy to locate all of them. However, all these challenges were taken care of through follow ups after the questionnaires were distributed to ensure an acceptable response rate was obtained.

1.7 Conceptual Framework

According to Miles & Huberman as cited in (Roger, 2008, p. 2), a conceptual framework is a visual or written presentation that explains either graphically or in narrative form the main items to be studied such as the key factors, concepts, or variables, and the presumed relationship among them. In order to understand the various dimensions encompassing the delay process on Public Sector Building Projects and the interrelationships between the factors of delay, a "Factor- Delay Conceptual Framework" was developed by the researcher.

1.7.1 The Factor–Delay Conceptual Framework (FDCF)

This study was guided by the Factor-Delay Conceptual Framework which was developed by the researcher to provide a holistic understanding of the entire process of delay on Public Sector Building Projects and in turn act as a mechanism for managing delay risks. This further helped to understand the various dimensions encompassing the delay process as well as the main items that were studied such as the key factors of delay, concepts used, and variables underpinning the process, and the relationship among them as shown in figure 1.1.

To develop this conceptual framework, the researcher considered a number of issues that work together in affecting the project schedule and the resultant impacts. To begin with, the study identified eight (8) broad categories of delay factors with a consideration that each broad category encompasses various specific factors related to it. The specific factors embodied in the broad categories are the independent variables with potential to cause delay on the projects. Each of them has an attribute of prominence (frequency) and impact (severity). To expand the framework

further, the study identified schedule overrun (delay) as the dependent variable. This is because schedule overrun only materializes when a delay factor is triggered by actions or inaction of any project stakeholder or party.

The arrows connecting the dependent variable to the independent variable depicts that, one or several factors can cause schedule overrun. This is then linked to the effects that result from project delay. The effects which were identified from the literature were divided into two categories. Category 1 comprised of cost overrun for both the client and the contractor depending on the type of project contract the two parties entered into, loss of revenue on the part of the contractor, disputes between the contractor and the client, and total project abandonment. The study considered these as primary effects of project delay hence they were termed as "outcomes". Category 2 comprised of delayed provision of social services, denied social services, and prolonged suffering of the communities intended to benefit from the delivery of the projects. The study considered these as secondary effects which arise from the outcomes and are more severe in nature. Therefore, they were termed as "impact"

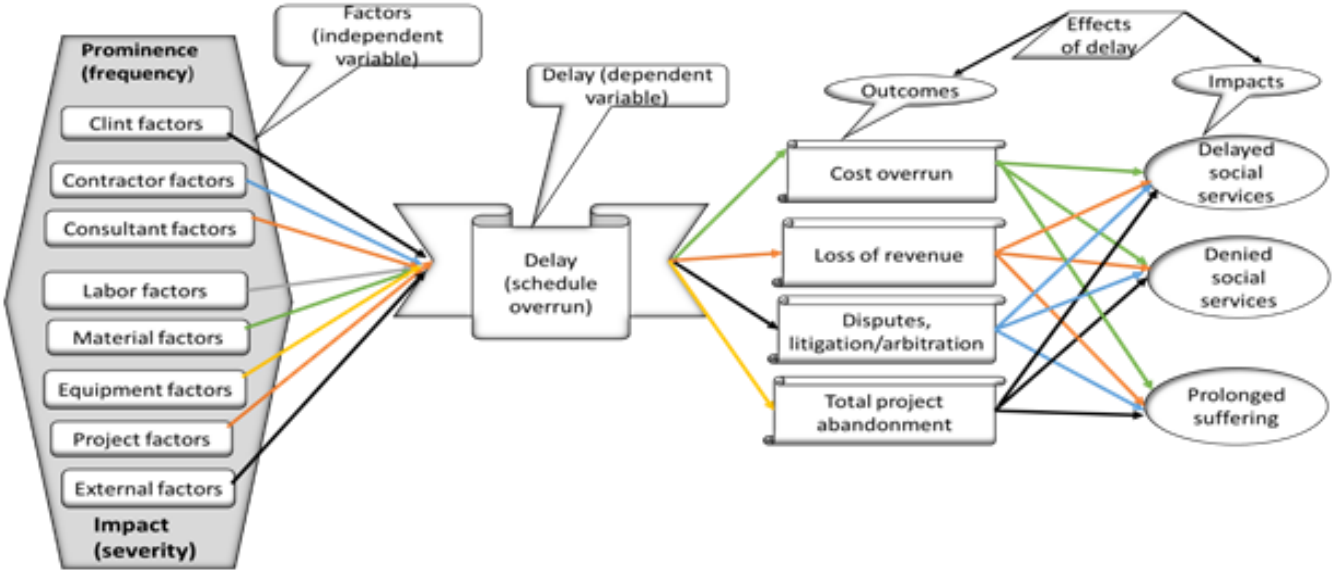

Figure 1.1: Factor–Delay Conceptual Framework

i. 1.8 Operational definitions of the concepts
ii. The following terms have been defined in accordance with the meaning and context applicable in this paper;
iii. Arbitration – the use of an independent person or body to settle a dispute other than in the courts of law
iv. Building – a structure with a roof and walls
v. Client – an organization (government ministry or department) that hires the services of another organization or individual under a legally binding contract
vi. Contractor – an organization or individual that is hired to provide services to a client under a legally binding contract
vii. Consultant – organization or individual that provides expert advice professionally under a fee
viii. Critical path - the sequence of schedule activities that determines the duration of the project. It is the longest path through the project schedule network diagram

ix. Ethical issue – a dilemma that requires an individual to choose an option that is either right or wrong (Mark et al, 2009)
x. Factor of delay - a circumstance, fact, or influence that negatively affects the project schedule (Tony, 2004)
xi. Firm Fixed Price Contracts – A category of contracts where the price for the goods or services is set at the outset and is not subject to change unless the scope of work changes
xii. Impact – a relatively long-term effect of project delay
xiii. Litigation - Ultimate legal method for settling controversies or disputes between and among persons, organizations, and the State (Business Dictionary, 2017)
xiv. Outcome – an immediate effect of project delay
xv. Project – a temporary endeavor with a definite beginning and end undertaken to create a unique product, service, or result
xvi. Statement of work (SOW) - A narrative description of products, services, or results to be supplied or worked under a project
xvii. Time and Material Contract – a category of contracts which involves payments (cost reimbursements) to the seller (contractor) for all legitimate actual costs and time incurred for completed works, plus a fee representing seller profit.

3: METHODOLOGY

3.1 Research design

A research design is the plan of settings for collection and analysis of data in a way that aims to combine relevance to the study purpose with economy in procedure (Kothari, 2004, p. 48). In other words, it is a conceptual structural arrangement which guides the process of undertaking a research and establishes the outline to collect, measure and analysis the data. The study design used for this research was descriptive survey.

3.2 Target population

The target population for this study comprised of contractors, clients, and consultants who had participated in the implementation of Public Sector Building Projects in Luanshya. The contractors were the firms who executed the actual project activities and tasks to construct the buildings such as schools, health posts, court rooms, market shelters, ablution blocks, and residential houses for government employees among others. The consultants were the firms and individuals who professionally provided technical advice and expertise to both the clients and contractors to ensure that the project deliverables met the scope, cost, and time requirements. The clients were the government ministries and department officials at district and provincial level. These were mainly selected from the ministry of health, ministry of general education, ministry of local government (Luanshya Municipal Council in this case), and ministry of works and supply, as well as the ministry of housing and infrastructure development among others. For the contractors and consultants, both foreign and local firms were considered.

3.3 Sample size and sampling procedure

3.3.1 Sample size

Progress (2016, p. 41) defines a sample as a finite part of a statistical population whose properties are studied to gain information about the whole. The sample size for this study was 71 and was drawn from 13 contracting firms, three (3) client ministries/departments, and three (3) consulting firms.

3.3.2 Sampling procedure

Sampling is the process of selecting a few (sample) from a bigger group (population) to become the basis for estimating or predicting the prevalence of an unknown piece of information, situation, or outcome regarding the bigger group (Ranjit, 2011, p. 177). The sample for this study was selected using a combination of both probability and non-

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probability sampling procedures. For probability sampling, cluster sampling was used while judgmental sampling was used for non-probability sampling. Cluster sampling helped to group contractors, clients, and consultants in different distinctive groups while the judgmental sampling procedures helped to eliminates of the population that had not participated in PSBP in Luanshya in the previous 10 years.

3.4 Data collection methods and procedures

3.4.1 Data collection instruments

This study used primary data which were collected using a questionnaire. The questionnaire comprised of 66 questions divided into three sections. The first section had five (5) questions most of which were closed-ended. These sought to obtain demographic characteristics of the respondents. The second section had ten questions (most of them being closed-ended). These probed the study respondents' experiences on Public Sector Building Projects in Luanshya. Furthermore, the third section comprised of 51 factors of delay generated from literature review and subsequent discussions with experts in the construction sector. This section sought to determine the prominence (frequency), impact (severity) as well as the risk of the factors from the perspectives of the clients, contractors, and consultants. In accordance with the Factor–Delay Conceptual Framework introduced earlier, the 51 factors were further grouped into eight broad categories namely; client related, contractor related, consultant related, and material related factors of delay. Others were labor related, equipment related, project related, and external related factors of delay. A key in form of Likert scale ranging from 1 to 4 was provided to guide the respondents in answering the questions in this section. As a result, respondents were asked to indicate the level of prominence (frequency) and impact (severity) of each particular factor according to their opinions and experience from their participation on PSBP in Luanshya. And to ascertain the prominence (frequency) of each delay factor on PSBP, the respondents were asked to indicate either 1 for "Not available", 2 for "Less prominent", 3 for "Prominent, or 4 for" Highly prominent". To ascertain the impact (severity) of the delay factors on PSBP, respondents were requested to indicate for each factor either 1 for "Not available", 2 for "Less severe", 3 for "Severe" or 4 for "More severe" as depicted in table 3.4.

Scale	Prominence (frequency)	Weight	Impact (severity)	Weight
1	Not available	1	Not available	1
2	Less prominent	2	Less severe	2
3	Prominent	3	Severe	3
4	Highly prominent	4	More severe	4

Table 3.4: Prominence (Frequency) and Impact (Severity) weighting

3.4.2 Data collection procedures

The questionnaire described above was distributed by hand to all the research respondents in Luanshya, Ndola, and Kitwe. These were the individuals from firms and government ministries who had participated on PSBP in Luanshya. And data was collected over a period of one month due to delays by some respondents in completing and handing back the questionnaire. The company profiles for the various contracting and consulting firms that were obtained from the department of engineering at Luanshya Municipal Council as well as other government departments in the district provided phone numbers for the contractors and consultants from Kitwe and Ndola who had participated on some of the projects in Luanshya. Therefore, it was easier to contact them before distributing the questionnaire. For those who were still working on some projects as well as Luanshya based contractors and consultants, they were visited to their sites as well as offices were the questionnaire was distributed by hand. After the respondents had completed the questionnaires, they were again collected by hand. And to maximize on response, several follow-ups were made through

phone calls as well as visits to the construction sites and offices.

3.5 Data analysis

Data analysis refers to the processing of data (raw facts) in order to produce meaningful information (processed data) (Mark, et al., 2012). Due to the nature of the questionnaire which had both open-ended and closed-ended questions, two methods were used to analyze the data. These were descriptive statistical techniques and content analysis method.

3.5.1 Analysis of data obtained through closed-ended questions

Descriptive statistical techniques were used to analyze the data generated through closed-ended questions in Part A, C, and a section of part B of the questionnaire. William (n.d) defines descriptive statistics as procedures for organizing, summarizing, and describing quantitative data about samples or about the population. This process had 4 steps:

Step 1: This involved cleaning and computing the data to produce summaries. Using SPSS version 16, cross tabulations displayed the summaries in form of frequencies and percentages.

Step 2: This involved in-putting into excel the frequencies of the items from part C of the questionnaire generated by SPSS to calculate the prominence (frequency) and impact (severity) of the delay factors. Hussain, et al (2018), (Mukuka, et al., 2010), (Shahid, et al., 2018), and (Adugna, 2015) have applied the Relative Importance Index (RII) method to determine the ranking of the different delay factors. The same was used in this study to calculate the relative importance index of the factors in terms of their prominence (frequency) and impact (severity) on PSBP.

Step 3: Using excel, step 3 further integrated the frequency and impact results from step 2 above to calculate the risk level of each factor of delay. Calculating the risk level was very important as it helped to determine the criticality of each factor. According to (Dennis, 2009), a risk is a product of frequency (prominence) or probability and severity (severity) of an event. Therefore, to determine the importance or criticality of each factor, it was imperative to determine the risk level of each factor. This was made possible by the use of level 1 formula for calculating risk on projects and this was aided by the use of excel.

The rationale for determining risk was that, the importance of the delay factor (risk event) is a result of the combined effect of its frequency (prominence) and severity (impact) on the projects. Therefore, two delay factors of the same frequency of occurrence would have the same importance if their score on the severity of impact is equivalent (Ruth, et al., 2012). But, if one of the factors had a more severe impact, then it would be considered more important or risky than the other.

3.5.2 Analysis of data obtained through open-ended questions

Data collected through open-ended questions in part B of the questionnaire were analyzed through the process of content analysis. This process too followed a number of steps:

The first step involved identifying the main themes by carefully going through the responses given by the respondents to each question in order to understand the meaning they communicated. The second step involved assigning codes to the themes. According to (Dawson, 2002) and (Nahid, 2003), coding is defined as the process of marking the segments of data with symbols, descriptive words, or category names. This helped to determine the frequency of each theme in the responses. The third step involved classifying the responses under the main themes or categories. This included going again through the responses and grouping them under the various categories they fell under. The fourth step involved subjecting the results from this stage to descriptive statistics using SPSS to

manipulate the frequencies into percentage summaries that were displayed in bar charts.

4: FINDINGS OF THE STUDY

4.1 Reliability test of the questionnaire

The questionnaire was subjected to reliability test so as to find out whether it was able to yield similar results if used more than once in the same setting. To achieve this, the Cronbach's alpha, aided by SPSS was used to compute the alpha of part B and C of the questionnaire. This also included computing the alpha of the prominence and impact of the 51 factors of delays that were identified. Table 4.1 shows the results of the test.

	Alpha
Part B	0.843
Part C - Prominence (frequency)	0.748
Part C- Impact (severity)	0.761

Table 4.1: Reliability test results

Table 4.1 above shows the reliability test results of the data collection instrument. Both part B and C of the questionnaire were subjected to the test. And according to (Scott & Deirdre, 2009, p. 85) and (Ruth, et al., 2010), an alpha of 0.7 and above confirms that the instrument is reliable.

4.2. Questionnaire distribution and response

The distribution of the questionnaire and the response rate of the respondents are displayed in Table 4.2 below.

	Distributed	Percent %	Reponse	Percent %	Overall percent %
Clients	23	32	14	60.87	27
Consultants	16	23	11	68.75	22
Contractors	32	45	26	81.25	51
Total	71	100	51	71.83	100

Table 4.2: Questionnaire distribution and response

4.3. Demographic distribution of respondents

The demographic distribution of the respondents is displayed in Table 4.3 to Table 4.7.

4.3.1. Gender distribution of the respondents

The gender distribution of the respondents is shown in Table 4.3 below.

	Frequency	Percent
Male	34	67
Female	17	33
	51	100

Table 4.3: Gender distribution of the respondents

4.3.2 Designation distribution of the study respondent

The designation characteristics of the respondents are depicted in table 4.4 below.

Designation	Frequency	%
Administrator	3	5.9
Architect	5	9.8
Bricklayer	5	9.8
Building inspector	3	5.9
Carpenter	3	5.9
Civil engineer	4	7.8
Director	5	9.8
Electrician	1	2
Planner	2	3.9
Plumber	4	7.8
Project coordinator	1	2
Project manager	4	7.8
Project officer	3	5.9
Quality inspector	1	2
Quantity surveyor	3	5.9
Site manager	1	2
Supervisor	3	5.9
Total	51	100

Table 4.4: Designation distribution of the research respondents

4.3.3 Respondents' years of experience on Public Sector Building Project

The respondents were asked to indicate how long they have been working on PSBP and the results are shown in table 4.5 below.

Years of experience	Frequency	Percent
1<	8	15.7
1 ≥:≤ 5	20	39.2
5 >: ≤ 10	14	27.5
10 >: ≤ 15	5	9.8
15 >:≤ 20	2	3.9
20 >	2	3.9
Total	**51**	**100**

Table 4.5: Respondents' years of experience

4.3.4 Project party of the respondents

Table 4.6 below presents the type of project party from which the research respondents were drawn.

	Frequency	Percent (%)
Client	14	27
Contractor	26	51
Consultant	11	22
Total	51	100

Table 4.6: Respondents' project party

4.3.5 Professional qualification level of the respondents

The professional qualifications of the respondents are displayed in Table 4.7 below.

	Frequency	Percent (%)
Certificate	18	35.3
Diploma	15	29.4
Degree	15	29.4
Master's degree	2	3.9
PHD	1	2
Total	51	100

Table 4.7: Professional qualifications level of the respondents

4.4. Experience and knowledge of respondents regarding Public Sector Building Projects in Luanshya

Research objective number 1 of this study sought to understand the experiences and knowledge of the project participants regarding delay on Public Sector Building Projects in Luanshya. The results are depicted in Figure 4.1 to Figure 4.9.

4.5.1. Respondents' involvement with delayed projects

The extent to which project participants encounter delay on PSBP in Luanshya is presented in Figure 4.1 below.

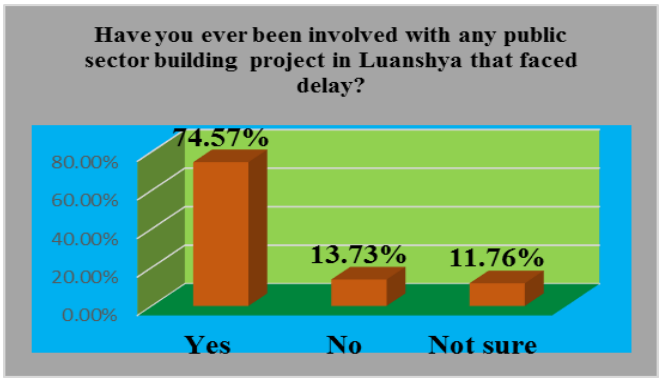

Figure 4.1: Respondents involvement with delayed projects

The respondents were asked to indicate whether they had encountered delay on any Public Sector Building Project in Luanshya. And as shown in Figure 4.1, majority (74.51%) of the respondents answered in the affirmative, while 13.73% indicated that they had never engaged in any delayed project. Meanwhile, 11.76% were not sure of ever encountering delay on any of the PSBP they had undertaken in Luanshya.

4.5.2 Additional project time due to delay

Respondents who agreed to have had encountered delay on PSBP were asked to estimate the percentage of extra time that was added to the last delayed project they have had. The results are presented in Figure 4.2.

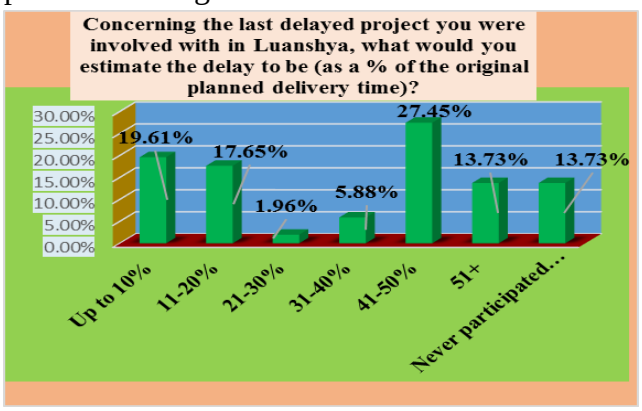

Figure 4.2: Additional project time due to delay

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Figure 4.2 displays the respondents' responses regarding the extent of extra time that is added to the original project time plan as a result of delay. Majority of the respondents (27.45%) indicated a delay of 41–50% while 19.61% of the respondents estimated a delay of up to 10%. Furthermore, 17.65% of the respondents indicated a delay estimate of 11-20% while 13.73% indicated a delay of 51% and above. Another 13.73% of the respondents indicated that they had never participated in any delayed project, whereas 5.88% indicated a delay estimate of 31–40%. Additionally, 1.96% of all the respondents estimated a delay of 21–30%.

4.5.3 Additional cost due to delay

Figure 4.3 shows the percentage of additional cost of the projects as a result of delay.

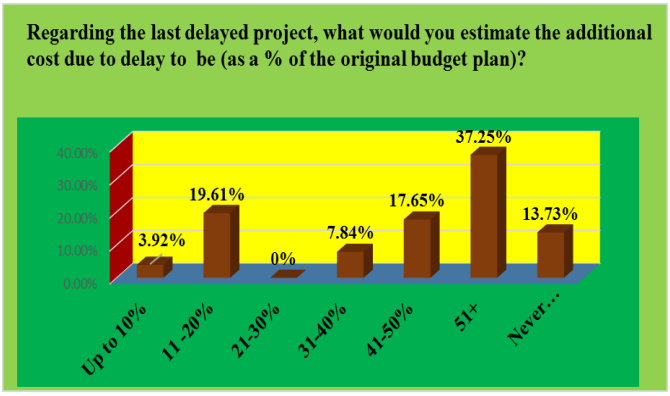

Figure 4.3: Additional cost due to delay

Respondents who agreed to have had encountered delay on the projects were asked to indicate the additional cost of the projects as a result of delay. As depicted in Figure 4.3, 37.25% of all the respondents surveyed indicated a cost-overrun of 51% and above. Additionally, 19.61% of the respondents estimated a cost overrun of 11–20% while 17.65% gave an estimate of 4–50%. Furthermore, 7.84% of the respondents estimated an additional cost of 31–40% while 3.92% estimated additional cost of up to 10%. Whereas 13.73% indicated that they had never participated in any delayed project.

4.5.4 Extent of Public Sector Building Projects subjected to delay in Luanshya

Respondents were asked to indicate the proportion of PSBP in Luanshya that were subjected to delays. The results are displayed in Figure 4.4 below.

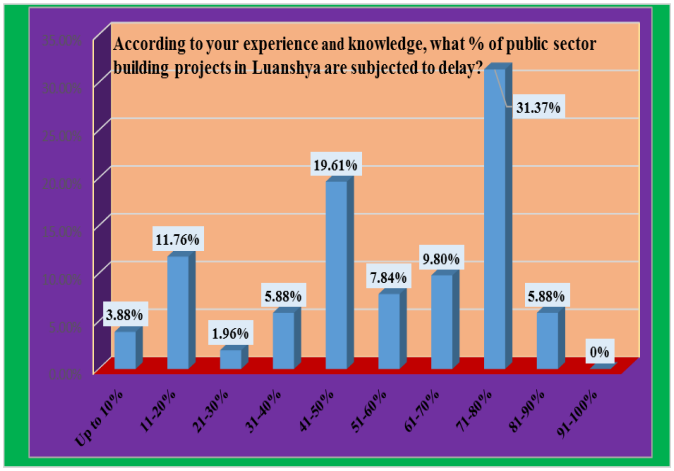

Figure 4.4: Extent of PSBP subjected to delay in Luanshya

Figure 4.4 above presents the views of the research respondents regarding the percentage of PSBP subjected to delays in Luanshya. As shown, 31.37% of the total respondents surveyed indicated that 71–80% of PSBP are subjected to delay whereas 19.61% were of the view that 41– 50% of these projects face delay. Additionally, 11.76% of the total respondents gave an estimate of 11-20% whilst 9.80% of the respondents estimated that 61-70% of PSBP face delay. Moreover, 7.84% of the respondents had a view that 51-60% of all the projects face delay while 5.88% of the respondents indicated that 81–90% of PSBP in Luanshya are subjected to delay. Furthermore, another 5.88% of the respondents indicated that 31 – 40% of projects are subjected to delay while another 5.88% gave an estimate of up to 10%.

4.5.5 The Project party that is mostly blamed for delay

Figure 4.5 below shows the respondents answers regarding the project party that is most blamed for delay.

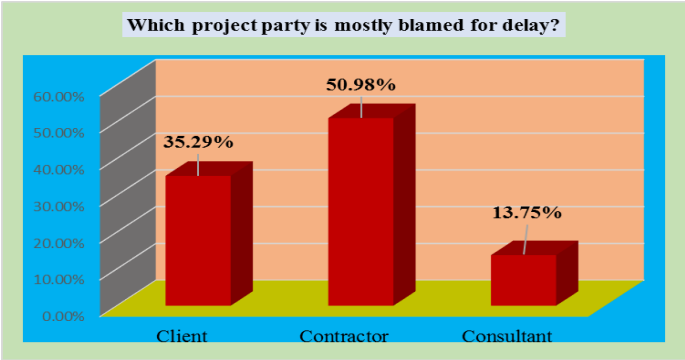

Figure 4.5: Most blamed project party for delay

The respondents were asked to indicate the project party that is mostly blamed for project delay. And as shown in Figure 4.5, 50.98% of the total respondents surveyed cited the contractor while 35.29% cited the client, and 13.73% cited the consultant.

4.5.6 Effects of delay on Public Sector Building Projects

Respondents were asked to indicate the effects of delay on PSBP in Luanshya. The results are shown in Figure 4.6 below.

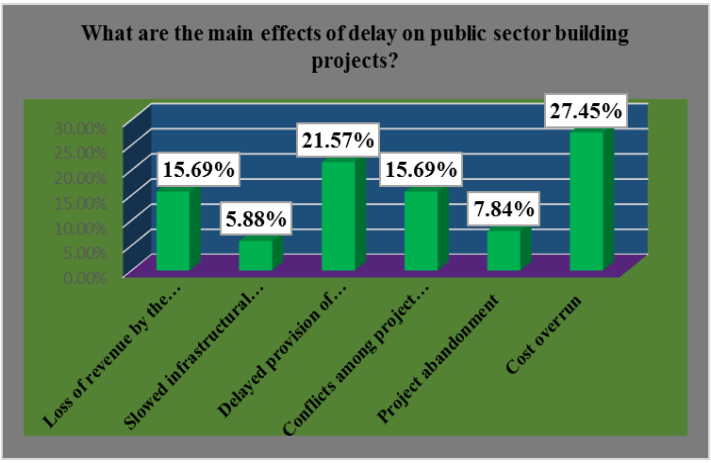

Figure 4.6: Effects of delay on PSBP

The main effects of delay on PSBP in Luanshya as given by the clients, contractors, and consultants were displayed in Figure 4.6. As shown, majority (27.45%) of them cited project cost overrun while 21.57% cited delayed provision of social services to the intended beneficiaries. Still, 15.69% of the total respondents cited conflicts among project parties especially between the contractor and the client, while another 15.69% cited loss of revenue by the contractor. Furthermore, 7.84% cited project abandonment while 5.88% cited slowed infrastructural development in the district.

4.5.7 Most disadvantaged project party as a result of delay on PSBP

The respondents' views regarding the most disadvantaged party as a result of project delay are shown in Figure 4.7 below.

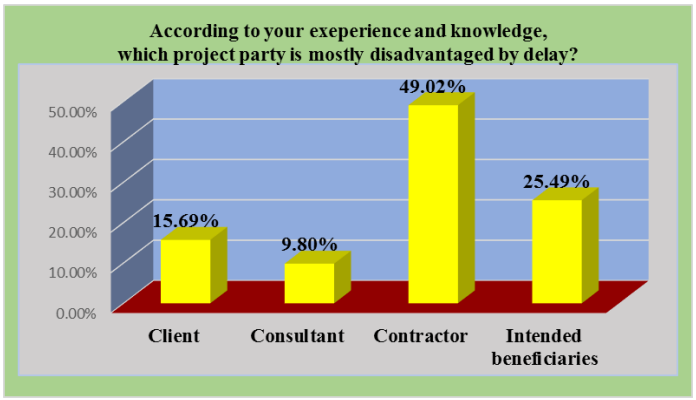

Figure 4.7: Most disadvantaged project party as a result of delay

The research participants were asked to indicate the project party that is mostly disadvantaged by project delay. And as displayed in Figure 4.7 above, most respondents (49.02%) mentioned the contractor while 25.49% cited the intended beneficiaries. Still others (15.69%) cited the contractor, whereas 9.80% cited the consultant.

4.5.8 Effective application of project management tools, skills, and techniques on public sector building projects in Luanshya

Figure 4.8 displays the views of the research respondents concerning the extent to which project management skills, tools, and techniques are effectively applied on PSBP in Luanshya.

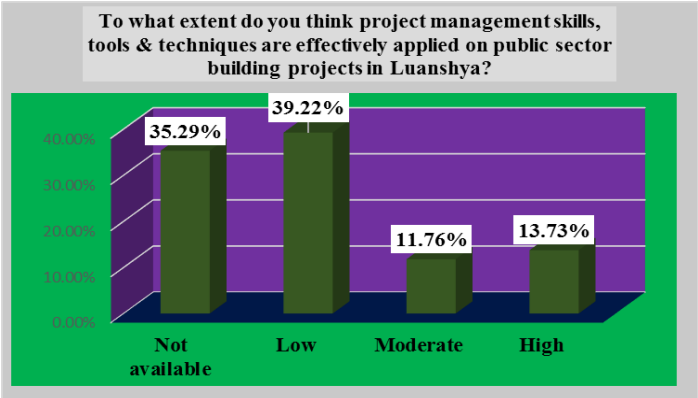

Figure 4.8: Effective application of project management skills, tools & techniques on PSBP in Luanshya

Respondents were asked to indicate their views regarding the extent to which project skills, tools, and techniques are effectively applied in the implementation of PSBP in Luanshya. As displayed in Figure 4.8, 39.22% of all the respondents surveyed indicated low application while 35.29% indicated non availability of effective project management skills and techniques on the projects. Additionally, 13.73% indicated high application, while 11.76% indicated moderate application of project management skills, tools, and techniques on the project.

4.5.9 Comparison of local and foreign contractors on delivery time of projects

The research respondents were asked to compare between local and foreign contractors with regard to timely delivery of PSBP. The results are displayed in Figure 4.9 below.

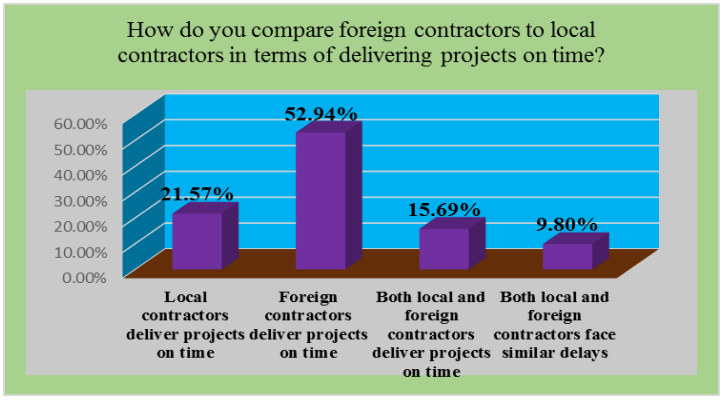

Figure 4.9: Comparison of local to foreign contractors on delivery time of projects

Figure 4.9 displays a comparison of local to foreign contractors in terms of delivering projects on time. As shown, more than half (52.94%) of the respondents said foreign contractors complete their projects on time whereas 21.57% indicated that local contractors deliver their projects on time. Still, others (15.69%) were of the view that both local and foreign contractors' complete projects on time and 9.80% indicated that both local and foreign contractors face project delay.

4.6 Prominence (frequency), impact (severity), and risk (criticality) of the delay factors

Research objective number 2 sought to identify the most prominent (frequent) factors of delay, research objective number 3 sought to identify the most severe factors of delay, while research objective number 4 sought to determine the riskiest (critical) factors of delay on PSBP in Luanshya. The results are shown in table 4.7 to table 4.9 as well as figure 4.10 to figure 4.12.

4.6.1 Ten (10) most prominent (frequent) factors of delay

The ten most prominent (frequent) factors of delay are displayed in Table 4.7 while Figure 4.10 shows the category distribution of the same factors.

No_	Delay factor	RII-Prominence (frequency)	Rank	Category
1	Mistakes and discrepancies in design documents	0.775	1	Consultant
2	Work stoppages due to conflicts over site ownership	0.765	2	Project
3	Difficulties in financing the project by the contractor	0.755	3	Contractor
4	Poor site management and supervision	0.755	3	Contractor
5	Delay in performing final inspection and certification by third party	0.73	4	External
6	Delay in financing and payments of completed works by the client	0.706	5	Client
7	Delay in site mobilization	0.701	6	Contractor
8	Unrealistic contract duration	0.691	7	Client
9	Rework due to errors during construction	0.691	7	Contractor
10	Unclear and inadequate details in drawings	0.681	8	Consultant

Table 4.7: Ten (10) most prominent (frequent) factors of delay

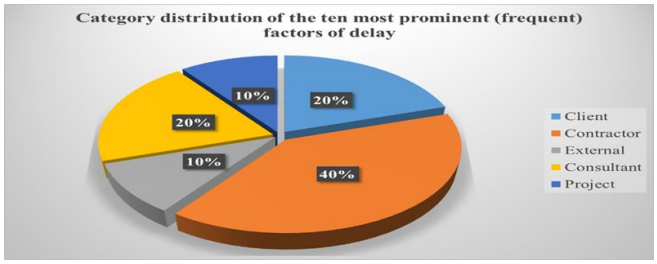

Figure 4.10: Category distribution of the ten most prominent (frequent) factors of delay

As shown in Table 4.7, the ten most prominent factors of delay on PSBP were mistakes and discrepancies in design documents (RII=0.775) in 1st position, work stoppages due to conflict over site ownership (RII=0.765) in 2nd position, difficulties in financing project by the contractor (RII=0.755) in 3rd position, poor site management and supervision (RII=0.755) in 3rd position, and delay in performing final inspection and certification by a third party (RII=0.73) in 4th position. Others were delay in financing and payments of completed works by the client (RII=0.706) in 5th position, delay in site mobilization (RII=0.701) in 6th position, unrealistic contract duration (RII=0.691) in 7th position, reworks due to errors during construction (RII=0.691) in 7th position, and unclear and inadequate contract drawings (RII=0.681) in 8th position.

4.9 Ten (10) most severe factors of delay

Table 4.8 below presents the overall severity (impact) of the ten (10) most severe factors of delay according to their RII while Figure 4.11 displays the category distribution of the same.

No_	Delay factor	RII-Impact (severity	Rank	Category
1	Delay in financing and payment of completed works by the client	0.779	1	Client
2	Difficulties in financing the project by the contractor	0.77	2	Contractor
3	Work stoppages due to conflicts over site ownership	0.755	3	Project
4	Delay in site mobilization	0.735	4	Contractor
5	Lack of communication between the parties (third and project part	0.716	5	External
6	Delay in material delivery	0.711	6	Material
7	Slow decision making	0.686	7	Client
8	mistakes and discrepancies in design documents	0.672	8	Consultant
9	Poor site management and supervision	0.672	8	Contractor
10	Inappropriate storage of material leading to damages	0.672	8	Material

Table 4.8: Ten (10) most severe factors of delay

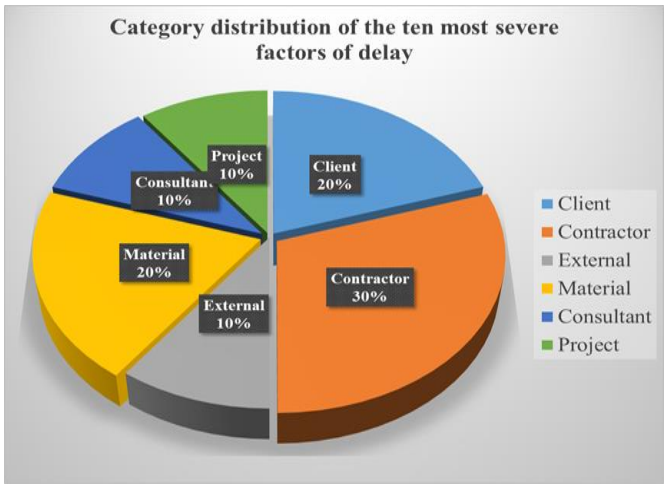

Figure 4.11: Category distribution of the ten most severe factors of delay

As displayed in Table 4.8 above, the ten most severe factors of delay were: delay in financing and payments of completed works by the client (RII=0.779) in 1st position, difficulties in financing the project by the contractor (RII=077.) in 2nd position, work stoppages due to conflict over site ownership (RII=0.775) in 3rd position, delay in site mobilization (RII=0.735) in 4th position, and lack of communication between the parties (RII=0.716) in 5th position. Others are: delay in material delivery (RII=0.711) in 6th position, slow decision making by the client (RII=0.686) in 7th position, mistakes and discrepancies in design documents (RII=0.672) in 8th position, poor site management and supervision (RII=0.672) in 8th position, and inappropriate storage of material leading to damages (RII=0.672) in 8th position.

4.10 Ten (10) most risky (critical) factors of delay

Table 4.9 below displays the ten most risky or critical factors of delay ranked according to the risk level which is a product of frequency and severity of the factors while Figure 4.18 displays the category distribution of the same factors.

No_	Delay factor	Risk level	Rank	Category
1	Difficulties in financing project by the contractor	0.581	1	Contractor
2	Work stoppages due to conflicts over site ownership	0.577	2	Project
3	Delay in financing and payments of completed works by the client	0.55	3	Client
4	Mistakes and discrepancies in design documents	0.52	4	Consultant
5	Delay in site mobilisation	0.515	5	Contractor
6	Poor site management and supervision	0.507	6	Contractor
7	Delay in performing final inspection and certification by third party	0.473	7	External
8	Lack of communication between parties (third and project parties)	0.463	8	External
9	Unclear and inadequate details in drawings	0.454	9	Consultant
10	Unavailability of utilities on site such as electricity, water, etc	0.441	10	Project

Table 4.9: Ten (10) most critical (risky) factors of delay

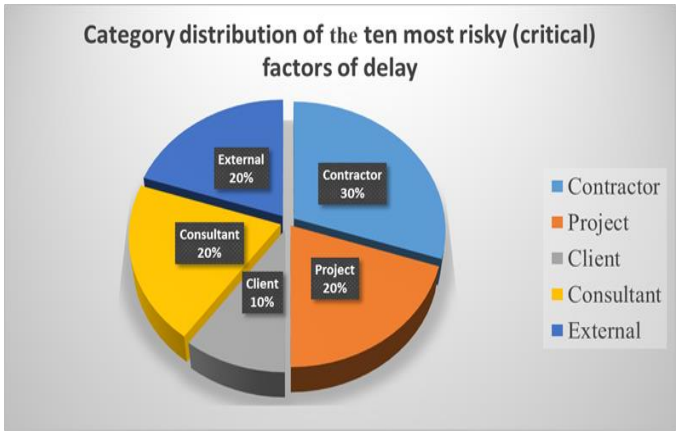

Figure 4.12: Category distribution of the ten most risky (critical) factors of delay

As displayed in Table 4.9: the ten most risky or critical factors of delay were: difficulties in financing project by the contractor (R = 0.581) in 1st position, work stoppages due to conflict over site ownership (R = 0.577) in 2nd position, delay in financing and payments of completed works by the client (R = 0.55) in 3rd position, mistakes and discrepancies in design documents (R = 0.52) in 4th position, and delay in site mobilization (R = 0.515) in 5th position. Others are poor site management and supervision (R = 0.507) in 6th position, delay in performing final inspections and certification by third party (R = 0.473) in 7th

position, lack of communication between third parties (R = 0.463) in 8th position, unclear and inadequate details in drawings (R = 0.454) in 9th position, and unavailability of utilities on site such as (electricity, water, etc.) (R = 0.441) in 10th position.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The results revealed that most PSBP in Luanshya face delay resulting into a number of effects. Among them are; cost overrun of the project, delayed provision of social amenities to the intended beneficiaries, loss of revenue by the contractor, and conflicts between the contractors and the clients to a larger extent. And to a smaller extent, delay results into project abandonment by the contractor and slowed infrastructural development in the area. Limited qualification and inexperience of most project participants in addition to lack of effective application of project management skills, tools, and techniques greatly contributed to these delays. While most of these delays were generally blamed on the contractor, the findings revealed that most foreign contractors delivered their projects on time.

Categorically, the findings revealed that contractor related factors greatly contributed to project delay than any other category. They were followed by clients, consultants, and project related factors respectively. And contributing less to project delays on Public Sector Building Projects in Luanshya are; equipment related factors, labor related factors, and external related factors of delay respectively.

From all the 51 factors analyzed, the ten (10) most prominent factors of delay were mistakes and discrepancies in design documents, work stoppages due to conflict over site ownership, difficulties in financing the project by the contractor, poor site management and supervision by the contractor, and delay in performing final inspection and certification by a third party. Others are delay in financing and payments of completed works by the client, delay in site mobilization by the contractor, unrealistic contract duration by the client, reworks due to errors during construction, and unclear and inadequate details in drawings.

The ten (10) most severe factors of delay were: delay in financing and payments of completed works by the client, difficulties in financing the project by the contractor, work stoppages due to conflict over site ownership, delay in site mobilization, and lack of communication between the parties. Others are: delay in material delivery, slow decision making by the client, mistakes and discrepancies in design documents, poor site management and supervision, and inappropriate storage of material leading to damages.

The ten (10) most risky or critical factors of delay were: difficulties in financing the project by the contractor, work stoppages due to conflict over site ownership, delay in financing and payments of completed works by the client, mistakes and discrepancies in design documents, and delay in site mobilization. Others are poor site management and supervision by the contractor, delay in performing final inspections and certification by third party, lack of communication between the parties, unclear and inadequate details in drawings, and unavailability of utilities on site such as electricity and water

5.3. Recommendations

5.3.1 Recommendations by the research respondents

The research respondents were asked to suggest practical measures that can address the problem of delay on Public Sector Building Projects in Luanshya. The following were the recommendations:

i. Contractors and consultants should apply effective project management skills, tools, and techniques throughout the project life cycle to complete the project on time.

ii. Project parties should always promote effective communication linkages and liaisons among themselves at every stage of the project to avoid late and costly scope changes

iii. Contractors should introduce resource calendars to encourage on-time delivery of project materials.

iv. Clients (government) should always first mobilize and make project funds fully available before awarding contracts to avoid intermittent funding of project and delayed payment of completed works.

v. Price and material contracts should only be awarded to contractors with financial muscle to avoid situations where the contractor fails to fund the project to completion

vi. Clients should always conduct a thorough scrutiny and evaluation of project bidders before awarding the contract to ensure that the contractor being awarded has the necessary qualifications and experience to deliver the project on time.

6.4 Recommendations by the study

i. Contractors should make use of the various project management applications tools available on the market such as Prince 2 projects and Microsoft projects among others to effectively plan, monitor, and control the project. Use of project management application tools have a great capability of developing comprehensive schedule, cost, resource allocation, and scope plans as well aiding effective monitoring and control of the project triangle

ii. Access to project funding is a major constraint among most local contractors. Even with great proficiency and experience, they are unable to easily access credit facilities from commercial banks due to the stringent policies and conditions the banks have put in place. Therefore, government should enact laws and policies to compel banks to relax terms and conditions required to access project loans by local contractors. With relaxed credit conditions and policies, and all things being equal, local contractors can easily and quickly access project funds which can allow them to commence and complete projects on time.

iii. Government should put in place a deliberate policy to ensure that every Public Sector Building Project is managed by a competent and experienced project manager. Project management competence requires proficiency and experience to effectively deliver the project against the time, scope, and cost plan as well as meet the quality specifications. To achieve this, the project manager needs to be proficient in his or her technical field as well as in the discipline of project management.

iv. Government (client) should avoid the long-practiced norm of awarding several projects at one particular time to a single contractor. Awarding a contractor only one project at a time allows the firm to commit all of its resources to a single project thereby allowing timely delivery of projects.

v. Further improvement to the "Factor-Delay Conceptual Framework (FDCF)" is required in order to make it an effective tool in the management of delay risks on Public Sector Building Projects. Once fully developed, the FDCF will greatly help project participants in PSBP to easily identify, analyze, and manage delay risks at any stage of the \

REFERENCES

[1] M. Haseeb, A. Xinhai-Lu, Maloof-ud-Dyia and R. Wahab, "Problems of projects and effects of delays in the construction industry of Pakistan," Australian Journal of Business and Management, vol. 1, no. 50, pp. 41-50, 2011.

[2] A. Nasser, S. Monty and C. Heap-Yih, "Managing Critical Factors Causing Delays in Public Construction Projects in Kingdom of Saudi Arabia," Perth WA, 2014.

[3] R. Divya and S. Ramya, "Causes, Effects and Minimisation of Delays in Construction Projects," 2015. [Online]. Available: www.internationaljournalssrg.org. [Accessed 13 February 2019].

[4] N. Azhar and R. Farooqui, "Cost Overrun Factors In Construction Industry of Pakistan," Research Gate, Karachi, 2008.

[5] M. Mohamad, "The factors and effect of delay in government Construction project, Case study in kuantan," University Malaysia , Pahang, 2010.

[6] M. Omayma and K. Mohammed, "An Investigation into Causes and Effects of Construction delays in UAE. Leads," Association of Researchers in Construction Management, pp. 1149-1157, 2010.

[7] S. A. Assaf and S. Al-Hejji, "Causes of delay in large construction projects," International Journal of Project Management, vol. 24, no. 4, pp. 349-357, 2006.

[8] M. Alkhathami, "Examination of the correlation of critical success and delay Factors in construction projects in the kingdom of Saudi Arabia," University of Pittsburgh, 2004.

[9] H. Shahid, Fangwei, A. Zaigham, D. A. Hassan and H. Abasal, "Critical Delaying Factors: Public Sector Building Projects in Gilgit-Baltistan, Pakistan," MDPI, 2018.

[10] M. Dogdson, D. Gann and N. Phillips, "The Oxford Handbook of Innovation Management," Oxford University Press., New York, 2014.

[11] M. Nkole, "Contractor summoned over delayed project," Zambia Daily mail, Lusaka, 2017.

[12] Zambia Daily Mail, "Special assistant to the president for project monitoring and implementation inspects goverment projects on the Copperbelt," Zambia Daily Mail, Lusaka, 2017.

[13] J. Owolabi, L. Amusan, C. Oloke and O. Olusanya, "Causes and effects of delay on project construction delivery time," International Journal of Education and Research, vol. 2, no. 4, pp. 8-12, 2014.

[14] S. Beradette and U. Jacob, "Significant causes and effects of project delays in the Niger Delta region, Nigeria," University of the Witwatersrand, Stellenbosch,, 2013.

[15] C. Kothari, Research Methodology: Methods and Techniques., 2nd ed., New Delhi: New Age International Ltd, 2004.

[16] S. C. Progress, Effectiveness of Client involvement in Construction Projects: A Contractor Perspective, University of KwaZulu-Natal, 2016.

[17] S. Mark, L. Philip and T. Adrian, Research methods for business students, Pearson education ed., 15th, 2012.

[18] Hussain, S. et al.,, "Critical Delaying Factors: Public Sector Building Projects in Gilgit-Baltistan, Pakistan," Buidings, vol. 8, no. 6, 2018.

[19] M. Mukuka, C. Aigbavboa and W. Thwala, "Construction Professionals' pperceptions on the causes and Effects of Delays in Lusaka," Lusaka, Zambia, , 2010.

[20] N. T. Adugna, "A study of causes of delay and cost overrun in office construction projects in the eThekwini Municipal Area, South Africa,," Durban University of Technology, Durban, 2018.

[21] L. Dennis, Project Management: Project and Programme Management Resources for Students, 9th ed., Hampshire: Gower Publishing Limited, 2009.

[22] C. Dawson, "Practical Research Methods," UBS Publishers' Distributors, New Delhi, 2002.

[23] G. Nahid, "Understanding Reliability and Validity in Qualitative Research," University of Toronto, 2003.

[24] A. Ruth, A. Henry and D. Tindiwensi, "An Investigation into the Causes of Delay and Cost Overrun in Uganda's Public Sector Construction Projects," Kampala, 2010.

[25] Zambia Development Agency , n.d. Infrastructure Sector Profle, Lusaka: ZDA.