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Construction Project delays in Lusaka, Zambia: Causes and Effects

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Abstract: This paper assesses the construction professionals' perception on the major causes of construction project delays and their consequential effects on the Lusaka – Zambia, construction industry. This is due to the fact that the Zambia construction industry is a major key sector in the development and economic growth of Zambia. Despite this belief, the industry has not escaped the challenges facing other countries worldwide in terms of construction projects performance with regards to the delivery of projects on time as stipulated in the contracts. Data used in this study were derived from both primary and secondary sources. The secondary data was collected through a detailed review of related literature. The primary data was collected through a structured questionnaire survey, distributed to construction professionals, who include: architects, quantity surveyors, builders, civil engineers, land surveyors and project managers. Out of the 50 questionnaires sent out, 32 were received back representing 64% response rate. The primary data from the questionnaires was analyzed using descriptive statistics procedures. Hence, findings from the study revealed that delay in progress payments, difficulties in financing projects by the contractor, delay in approving major changes in the scope of work amongst others, were the major causes of construction delays. The study also revealed that extension of project time and cost over runs are the two major effects of construction project delays in Lusaka, Zambia. The study contributes to the body of knowledge on the subject of the causes and the effects of delay construction project delays in Lusaka, Zambia.

Keywords: *Delays, Construction Industry, Lusaka, Zambia*

1. Introduction

The construction industry is a key sector in the development and economic growth of Zambia according to the National Council for Construction report (2004). However, the construction industry in Zambia has not escaped the challenges facing other countries worldwide in terms of delivering projects on time as stipulated in the contracts. Projects or construction works that are not delivered on time to the client are referred to as delayed projects. Mohamad (2010) Defines delay as an act or event that extends the time to complete or perform an act under the contract. Also, Assaf and Al-Hejji (2006), defined delay as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is basically a project slipping over its planned schedule and is considered as common problem in construction projects worldwide. Assaf and Al-Hejji (2006) further illustrates that, to the owner, delay means loss of revenue through lack of production facilities and rent-able space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labour cost increases.

Theodore (2009) classifies delays into two, those caused by the client and those caused by the contractor. Delays caused by the client such as late submission of drawings and specifications, frequent change

orders, and incorrect site information generates claims from both the main contractors and sub-contractors which many times entail lengthy court battles with huge financial repercussions (Theodore, 2009). Delays caused by contractors can generally be attributed to poor managerial skills. Lack of planning and a poor understanding of accounting and financial principles have led to many a contractor's downfall (Theodore, 2009). Hence, this paper is aimed at identifying the causes and effects of construction project delays in Lusaka, Zambia. This is because the aim of any construction project is to successfully complete the project on time, within budget and with high quality. This study focuses on the completion of projects on time thus overcoming delays. Alkhathami (2004) states that delay can be defined as extra time required to finish a given construction project beyond its original planned duration, whether compensated for or not.

2. Causes and effects of construction project delays

Causes of delays are factors or events that occur before and during the construction process that will affect the time of completing a project. Ali et al. (n.d) states that here are 4 factors of delay categorized in broad categories, namely contractor- related factors, consultant-related factors, client-related factors and external factors. Motaleb and Kishk (2010) identifies at least five factors that can cause time overrun and these include change orders, slow decision making by client, lack of capability of client representative, construction financial difficulties and late delivery of materials. Further, Sambasivan and soon (2007), Assaf and Al-Hejji (2006), Wei (2010) and Theodore (2009) identified seven categories of causes of construction project delays and grouped them as follows; owner related, contractor related, consultant related, material related, equipment related, labour related and causes by eternal factors. Literature reviewed showed that the scholars identified individual causes of delays in each of the seven categories. In the owner related category of causes of delays, the scholars identified the following as the causes of delays; delay in progress payments, delay to furnish and deliver the site, change of orders by owner during construction, late revising and approving design documents, delay in approving shop drawing and sample materials, poor communication and coordination, slowness in decision making process, conflicts between joint-ownership of the project and suspension of work by owner. The scholars further identified the following cases in the contractor related category of causes of delays; difficulties in financing project, conflicts in sub-contractors schedule in execution of project, rework due to errors during construction, conflicts between contractor and other parties, poor communication and coordination, ineffective planning and scheduling of project, improper construction methods implement, delays in sub-contractors work, inadequate contractor's work, frequent change of sub-contractors, poor qualification of the contractor's technical staff and delays in site mobilization.

Literature showed the following as causes in the consultant related category of causes of delays; delay in approving major changes in the scope of work, poor communication and coordination, inadequate experience of consultant, mistakes and discrepancies in design documents, delays in producing design documents, unclear and inadequate details in drawings, insufficient data collection and survey before design and lack of advanced engineering design software. Further, the scholars identified the following in the material related category of causes of delays; shortage of construction materials in market, changes in material types during construction, delay in material delivery, damage of sorted material while they are needed urgently, delay in manufacturing special building materials and late procurement of materials. In the equipment related category of causes of delays, the following were identified; equipment

breakdowns, shortage of equipment, low level of equipment-operator's skill, low productivity and efficiency of equipment and lack of high technology mechanical equipment. Further, in the labour related category of causes of delays, the following were identified as the factors that cause delays; shortage of labour, obtaining of working permit for workers, low productivity level of workers and personal conflicts among workers.

In the final category of causes by external factors the following were identified; effects of subsurface and ground conditions, delay in obtaining permits from municipality, weather effect on construction activities, traffic control and restriction at job site, accidents during construction, changes in government regulations and laws, delay in providing services from utilities and delay in performing final inspection and certification. Effects of delays are the consequences that will occur when the causes of delays are not identified and worked on effectively. The study of Pourrostan and Ismail (2011: 454) identifies and ranks the effects of construction delays as follows; time overrun; cost overrun; dispute; arbitration; litigation; and total abandonment of projects. These findings are in general agreement with other studies as carried out by Aibinu and Jagboro (2002) and Motaleb and Kishk (2010). However, the study of Baki (1999) brings in the aspect of claims as one of the effects of delays in construction projects.

3. Methodology

The data used in this paper were derived from both primary and secondary sources. The primary data was obtained through the survey method, while the secondary data was derived from the review of literature and archival records. The primary data was obtained through the use of a structured questionnaire survey. This was distributed to a total of 50 construction professionals that included; quantity surveyors, civil engineers, architects, builders, land surveyors, and contractors who are currently involved in construction works in Lusaka, Zambia. This yardstick was considered vital for the survey in order to have a true reflection of the causes and effects of construction project delays. All professional and contractors in Lusaka had an equal chance to be drawn and participate in the survey. Out of the 50 questionnaires sent out, 32 were received back representing a 64% response rate. This was considered adequate for the analysis based on the assertion by Moser and Kalton (1971) that the result of a survey could be considered as biased and of little value if the return rate was lower than 30–40%. The data presentation and analysis made use of frequency distributions and percentages of all the respondents. The research was conducted between the months of June to August, 2013.

Mean Item Score (MIS): A five point Likert scale was used to determine the causes, effects and methods of minimising construction project delays in Lusaka with regards to the identified factors from the reviewed literature. The adopted scale was as follows:

1 = Strongly disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly agree

The other scale used was as follows;

1 = Extremely unlikely

2 = Unlikely

- 3 = Neutral
- 4 = likely
- 5 = Extremely likely

The five-point scale was transformed to mean item score (MIS) for each of the factors of causes and effects delays as assessed by the respondents. The indices were then used to determine the rank of each item. The ranking made it possible to cross compare the relative importance of the items as perceived by the respondents. This method was used to analyse the data collected from the questionnaires survey. The mean item score (MIS) was calculated for each item as follows;

$$\text{MIS} = \frac{1n1 + 2n2 + 3n3 + 4n4 + 5n5}{\Sigma N} \quad (1)$$

Where;

- n1 = Number of respondents for extremely unlikely or strongly disagree;
- n2 = Number of respondents for unlikely of disagree;
- n3 = Number of respondents for neutral;
- n4 = Number of respondents for likely or agree;
- n5 = Number of respondents for extremely likely or strongly agree;
- N = Total number of respondents

After mathematical computations, the criteria are then ranked in descending order of their mean item score (from the highest to the lowest).

4. Findings and Discussion

Findings from the 32 usable questionnaires revealed that 25% of the respondents had diploma degree as their highest qualification while 75% had bachelor’s degrees. Further findings revealed that 53% of the respondents, who were all construction professionals, were government employees, 25% were employed by consultants and 22% were employed by contractors. The statistical mode for years of experience of the respondents was in the range of 1-5 years while majority (65%) of the respondents were handling an average of 3-4 construction projects in Lusaka. The following sections present the causes of delay as classified.

Owner-related causes of delays: Based on the ranking (R) of the weighted average of the mean item score (MIS) for the listed causes of delays, it was observed that the most dominant cause of delays that are client related on construction project delivery time in Lusaka were delay in progress payments (MIS=3.91; R=1), slowness in decision making process (MIS=3.44; R=2), change of design by owner during construction (MIS=3.38; R=3) and poor coordination (MIS=3.29; R=4). Other factors identified in the study include; conflicts between joint-ownership of the project (MIS=2.66; R=7), suspension of work by owner (MIS=2.63; R=8), delay in approving shop drawing (MIS=2.59; R=9) and delay in approving sample materials (MIS=2.48; R=10) as shown in Table 1. These findings were in agreement with the studies of Theodore (2009), Assaf and Al-Hejji (2006) and Hasseb et al. (2011) who all identified delay in progress payments as the major cause of client related delays. However, the study of wei (2010) identified late revising and approving design documents as the major cause of delays cause by the client.

Contractor-related causes of delays: The study further revealed the causes of delays that are contractor related and the following were the results as presented in Table 2. Difficulties in financing projects (MIS=3.87; R=1), poor coordination (MIS=3.67; R=2), ineffective planning and scheduling of projects (MIS=3.61; R=3) and poor qualification of the contractor's technical staff (MIS=3.41; R=4) were all found to be the major contract-related causes of delay in construction project in Zambia. Other contractor related causes of delays that were identified in the study include; Poor communication (MIS=3.16; R=7), conflicts between contractor and other parties (Construction team members) (MIS=2.94; R=8), conflicts in sub-contractors schedule in execution of projects (MIS=2.90; R=9) and frequent change of sub-contractors (MIS=2.61; R=10). These results are in agreement with the study by Assaf and Al-Hejji (2006) and Theodore (2009) where difficulties in financing projects by contractors was the major cause of delays identified. However the studies of Wei (2010) and Hasseb et al (2011) identified delays in sub-contractors work as the major cause of contractor related causes of delays.

Table 1: Owner-Related causes of delays

Owner-related factors	MIS	RANK (R)
Delay in progress payments.	3.91	1
Slowness in decision making process.	3.44	2
Change of design by owner during construction.	3.38	3
Poor coordination.	3.29	4
Late revising and approving design documents.	3.03	5
Delay in handing over the site.	3.03	5
Poor communication.	3.00	6
Conflicts between joint-ownership of the project.	2.66	7
Suspension of work by owner.	2.63	8
Delay in approving shop drawing.	2.59	9
Delay in approving sample materials.	2.48	10

Table 2: Contractor-Related causes of delays

Contractor-related factors	MIS	RANK (R)
Difficulties in financing projects.	3.87	1
Poor coordination.	3.67	2
Ineffective planning and scheduling of projects.	3.61	3
Poor qualification of the contractor's technical staff.	3.41	4
Delays in site mobilization.	3.32	5
Rework due to errors during construction.	3.32	5
Improper method statements.	3.19	6
Delays in sub-contractors work.	3.16	7
Improper construction methods implementation.	3.16	7
Poor communication.	3.16	7
Conflicts between contractor and other parties (Construction team members).	2.94	8
Conflicts in sub-contractors schedule in execution of projects.	2.90	9
Frequent change of sub-contractors.	2.61	10

Consultant-related causes of delays: Likewise, when the respondents were asked to rate the consultant related causes of construction project delays in Lusaka, the following results were obtained as shown in Table 3. Delay in approving major changes in the scope of work, insufficient data collection and survey before design, delays in producing design documents, poor coordination, and poor communication were top in this category. Also, lack of advanced engineering design software and inadequate experience of consultant were rated as not major causes of delay in Zambia. These results concur with the studies by Wei (2010) and Theodore (2009) where delay in approving major changes in the scope of work was identified as the major cause of delays that are consultant related. Whilst, the studies of Sambasivan and Soon (2007) and Hasseb et al (2011) identified contract management by consultants as the major cause of delays of construction projects in their study. Further, Motaleb and Kishk (2010) identified that inadequate consultant experience was the major cause of delays associated with consultants in their study.

Table 3: Consultant-Related causes of delays

Consultant-related factors	MIS	RANK (R)
Delay in approving major changes in the scope of work.	3.26	1
Insufficient data collection and survey before design.	3.19	2
Delays in producing design documents.	3.09	3
Poor coordination.	3.03	4
Poor communication.	2.94	5
Mistakes and inconsistencies in design documents.	2.88	6
Unclear and inadequate details in drawings.	2.88	6
Lack of advanced engineering design software.	2.65	7
Inadequate experience of consultant.	2.61	8

Material-Related causes of delays: When the respondents were asked to rate the consultant related causes of construction project delays in Lusaka, the following results were obtained; delay in material delivery (MIS=4.06; R=1), late in ordering of materials (MIS=3.78; R=2), availability of specified construction materials in market (MIS=3.50; R=3), damage of sorted material while they are needed urgently (MIS=3.13; R=4), and delivery of wrong materials (MIS=3.10; R=5) were found to be the dominant causes of materials related causes of delay in Zambia (Table 4). These results are in agreement with the results obtained from the study of Wei (2010) where delay in material delivery was identified and ranked as the highest cause of delays that are material related. Further, the studies by Assaf and Al-Hejji (2006) and Theodore (2009) identified availability of specified construction materials in market as the major causes of delays. However, work by Sambasivan and Soon (2007) and Hasseb et al (2011) identified quality of material and shortage of material as the two major causes of delays that are material related in the construction industry.

Table 4: Material-Related causes of delays

Material-related factors	MIS	RANK (R)
Delay in material delivery.	4.06	1
Late in ordering of materials.	3.78	2
Availability of specified construction materials in market.	3.50	3
Damage of sorted material while they are needed urgently.	3.13	4

Delivery of wrong materials.	3.10	5
Fluctuation in material prices.	3.00	6
Changes in material types during construction.	2.97	7
Inappropriate storage of materials leading to damages.	2.88	8

Equipment-Related causes of delays: The study further revealed the causes of delays that are equipment related and after being ranked by the respondents, the following were the results; Equipment breakdowns, use of outdated equipment, shortage of equipment, lack of high-technology mechanical equipment, low productivity and efficiency of equipment and shortages of skilled operators were all found to be major causes of delay in construction projects in Zambia (Table 5). These results are in general agreement with the work done by Sambasivan and Soon (2007), Theodore (2009) and Assaf and Al-Hejji (2006) where it was identified that equipment breakdown is the major cause of delays in construction projects that are related to the equipment hat is being used on sites. Further the study of Wei (2010) identified that the major cause of delays that are equipment related was Lack of high-technology mechanical equipment. However Hasseb et al (2011) identified the use of improper equipment as the major cause of delays on construction projects. Other causes identified by the scholarly studies above were use of outdated equipment and Shortage of equipment as some of the major causes of delays.

Table 5: Equipment-Related causes of delays

Equipment-related factors	MIS	RANK (R)
Equipment breakdowns	3.84	1
Use of outdated equipment	3.81	2
Shortage of equipment	3.63	3
Lack of high-technology mechanical equipment	3.56	4
Low productivity and efficiency of equipment	3.31	5
Shortages of skilled operators	3.00	6

Labour-Related causes of delays: The study further revealed the causes of delays that are labour related and after being ranked by the respondents, the following were the results (Table 6); low productivity level of workers (MIS=3.22; R=1), shortage of labour (MIS=3.06; R=2), conflicts among workers (MIS=2.69; R=3) and work permits of workers (MIS=2.48; R=4).

Table 6: Labour-Related causes of delays

Labour-related factors	MIS	RANK (R)
Low productivity level of workers.	3.22	1
Shortage of labor.	3.06	2
Conflicts among workers.	2.69	3
Work permits of workers.	2.48	4

These results are in agreement with the work of Sambasivan and Soon (2007) and Wei (2010) where low productivity level of workers and shortage of labour were the two major causes of delays identified. However, Assaf and Al-Hejji (2006) identified availability of qualified workforce as a major cause of delays that are labour related.

Causes of delays by external factors: When the respondents were asked to rate the causes of construction project delays in Lusaka that are caused by external factors, the following results were obtained; Weather effect on construction activities, political interference, delay in providing services from utilities, effects of subsurface and ground conditions and delay in obtaining permits from municipality. Other external factors related causes of delays that were identified in the study include; Delay in performing final inspection and certification, natural disasters, accident during construction and changes in government regulations and laws as shown in Table 7 below. Results supports the work of Sambasivan and Soon (2007) where effects of weather conditions on construction activities was identified as the major cause of delays. However, studies by Wei (2010), Assaf and Al-Hejji (2006) and Theodore (2010) identified effects of subsurface and ground conditions has the major cause of delays that is linked to causes by external factors.

Table 7: External factor - causes of delays

External factors	MIS	RANK (R)
Weather effect on construction activities.	3.59	1
Political interference.	3.41	2
Delay in providing services from utilities.	3.34	3
Effects of subsurface and ground conditions.	3.31	4
Delay in obtaining permits from municipality.	3.22	5
Change in economic factors.	3.09	6
Traffic control and restriction at job site.	2.81	7
Delay in performing final inspection and certification.	2.72	8
Natural disasters.	2.72	8
Accident during construction.	2.59	9
Changes in government regulations and laws.	2.38	10

Effects of construction project delay to the construction professionals: When the respondents were further asked to rate the effects of construction project delays to the construction professionals in Lusaka, the following result were obtained; Time overrun (extension of Time), cost overrun, bad reputation with client, bad reputation with construction team and claims were found to be the most dominant effects as a result of the delay to construction projects (Table 8). Other effects of construction project delays that were identified in the study include; Arbitration (MIS=3.26; R=7), litigation (MIS=3.06; R=8), total abandonment (MIS=2.63; R=9) and loss of un-skilled employees (MIS=2.56; R=10).

Table 8 Effects of construction project delays to Zambia professionals

Effects of delay	MIS	RANK (R)
Time overrun (Extension of Time).	4.19	1
Cost overrun.	4.19	1
Bad reputation with client.	3.78	2
Bad reputation with construction team.	3.75	3
Claims.	3.75	3
Loss of profit.	3.68	4
Termination of contracts.	3.34	5
Dispute.	3.28	6

Loss of skilled employees.	3.28	6
Arbitration.	3.26	7
Litigation.	3.06	8
Total abandonment.	2.63	9
Loss of un-skilled employees.	2.56	10

These findings are in general agreement with the studies done by Aibinu and Jagboro (2002), Motaleb and Kishk (2010), wei (2010), Sambasivan and Soon (2007) and Hasseb et al (2011) where time overrun (Extension of Time) and cost overrun were identified as the two major effects of construction projects delays.

5. Conclusion and Recommendations

Literature review showed that the causes of delays are at different level ranging from those caused by the client or owner to those that are caused by other external factors. Literature also showed that each category of causes of delays had different factors that can lead to delays on construction projects. This study examined causes of construction project delays from the seven identified categories as compiled from an extensive literature review. Findings from the study supported work done by previous researchers and scholars that not a singular factor is responsible causing delays on construction projects. Further findings revealed that there are corresponding negative effects to the professionals of construction project delays in Lusaka, Zambia. In recommendation, it has been observed that construction project delays usually occur during the construction phase and this is mostly caused by; poor coordination, ineffective planning and scheduling of projects, delay in approving major changes in the scope of work, delay in material delivery, late in ordering of materials, equipment breakdowns, use of outdated equipment, low productivity level of workers, shortage of labour, weather effect on construction activities and political interference among other causes. It is recommended that the construction team need to be aware of the factors stated above in order to minimise the construction project delays. Furthermore, the construction team should practice the identified measures of reducing construction project delays such as; Site management and supervision, effective strategic planning, clear information and communication channels, use proper and modern construction equipment, and proper project planning and scheduling among other identified measures.

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