

An Assessment of the Factors Causing Delays on Building Construction Projects in Uganda

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Abstract Building construction projects in Uganda's construction industry are experiencing a wide spread of delays. The purpose of this study was to assess the factors causing delays and their effects on building construction projects in Uganda. Eighty one (81) project delay attributes were identified through detailed literature review. Structured interviews and questionnaire survey were conducted across stakeholders that included among others; consultants, contractors and clients on four selected building projects to gather their views on causes of delay in delivery of projects. This research categorized the causes of delay under four main groups of consultant related, contractor related, client related and external related and then assessed their impacts on delay using relative importance index (RII) as a basis for analysis. The RII for all delay factors and group of categories was computed so as to rank the factors. The most significant factors of construction delays were identified as: (1) delay in assessing changes in the scope of work by the consultant; (2) financial indiscipline/dishonesty by the contractor; (3) inadequate contractor's experience; (4) design errors made by designers; (5) inadequate site investigation by the consultant. The study concluded that consultant related category had the highest impact (RII = 0.745), followed by client related (RII = 0.698), then contractor related (RII = 0.697) and external related (RII = 0.615) exhibited the least impact. Identification of the causes of potential delay factors that are likely to affect the timely delivery of projects can help to avoid extra costs through claims and disputes that arise among parties when delays are experienced.

Keywords Building construction projects, Delays, Relative importance index

1. Introduction

Several factors can contribute to delays on a project and analyzing the causes of delays is an essential task for ameliorating any potential conflicts or claims. According to Schumacher (1996)[1], most delay claims are complicated and whereas many researchers emphasize the high cost and the associated risk related to litigating delay claims, few emphasize the responsibility for project delays. While the importance of Ugandan construction sector over the past five years has grown significantly, lack of sophistication across the construction supply chain is one of the key issues in the industry. There is strong evidence of inconsistent performance of Ugandan construction projects both by international firms and local construction contractors (LCC) and the trend is growing rapidly. Projects are reportedly failing across all the key performance measures of cost, time and quality.

Like in many developing nations, construction projects in Uganda are experiencing widespread delays. The dramatic

shift in the capacity and volume of the Ugandan construction sector over the last decade warrants a systematic analysis of the delays.

It is therefore imperative to ascertain the key factors impacting delays in the Ugandan context and establish the relationship between the critical attributes for assessing the impacts of these factors on delay. For instance, it took 56 months to complete Mapeera House on Kampala road instead of the original 13 months, representing a total delay period of 43 months (tripling the construction period); the current church house project under construction was expected to be completed within 18 months from the date of commencement of works (April 2011), but by May 2013 the works had already taken 25 months and was yet to be completed.

The delay in these projects and many others motivated the researcher to assess the relative impact of the various delay factors in the building construction industry in Uganda and propose possible remedies to improve this deplorable situation. There is limited study regarding the intrinsic factors affecting all these key performance measures in the Ugandan context and therefore this research was necessary in an attempt to assess the factors affecting delays on building construction projects in terms of timely delivery. It is envisaged that the results obtained from this

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study could be generalized to other locations within the country operating under similar conditions.

2. Delay Factors in Construction Projects

2.1. Previous Studies on Causes and Categorization of Delay Factors on Construction Projects

A number of studies have been conducted in regard to delays in construction projects for decades with scholars advancing various factors and groups of factors that contribute to causing delays. Available literature reviewed indicate categorization of the various factors in groups of up to eleven (11) categories of consultant-related, contractor - related, design-related, equipment-related, externality - related, labour-related, material-related, owner-related, project-related, engineer-related and human-behaviour related among others [2] and [3]. This study however re-clustered these factors into four (4) broad categories of consultant-related, contractor-related, client-related and external-related factors.

2.2. Consultant Related Delay Factors

The literature review was done through books, engineering journals, conference papers, masters and academic theses, the internet, and interview with experts from the construction industry to identify factors that are responsible for delays in delivering construction projects globally. Several studies have identified consultant related factors to cause schedule delays. Aibinu and Odeyinka [4] assert that incomplete drawings, late issuance of instructions and inadequate supervision critically impacted on consultant related group of delays. Al-Khalil and Al-Ghafly [5] concluded that inadequate site supervision by the consultant was the major cause of delay. Al-Kharashi and Skitmore [6] identified delays in approving major changes in the scope of works, inadequate experience of the consultant and late in reviewing design documents as critical. In a separate study, Arditi *et al.*, [7] identified delays in design work and inadequate site inspection as the main causes of consultant related delays. Assaf and Hejji [8] identified the consultant related delay factors as; delay in performing inspection and testing by consultant, delay in approving major changes in the scope of work by consultant, inflexibility (rigidity) of consultant, poor communication and coordination between consultant and other parties, late review and approval of design documents by consultants, conflicts between consultant and design engineer, inadequate experience of consultant. Assaf *et al.*, [9] identified design errors made by designers, changes in types and specifications during construction, insufficient communication between owner and consultant during design stage as critical.

Chan and Kumaraswamy [10] identified delays in design information, inadequate design team experience and

mistakes and discrepancies in design documents. In a separate study, El-Razek *et al.*, [11] concluded that design changes during construction, changes in material types and specifications during construction and design errors made by designers contributed to delays. Faridi and El-Sayegh [12] identified slow preparation and approval of drawings, incomplete drawings, specifications and or documents and change in drawings as factors of consultant related delays. Gündüz, *et al.*, [2] identified delay in performing inspection and testing, poor communication and coordination with other parties, and conflicts between consultant and design engineer as the most significant in causing delays. In a study analyzing factors affecting delays in Indian construction projects, [3] concluded that lack of commitment and Architect's reluctance for change contributed to delays. Iyer and Jha [13] identified the factors of inadequate project formulation in the beginning and reluctance in timely decision by the consultant as key causes of delay. Kumaraswamy and Chan [14] identified the factors of unforeseen ground conditions, delays in design information and necessary variations of works as key consultant related delays. Ling and Hoi [15] looked at the causative factors in terms of technical risks that included design failure, estimation error and new technology failure. Lo *et al.*, [16] identified the factor of poor site management and supervision as the main cause of consultant related delay. Mansfield *et al.*, [17] highlighted the problems of poor contract management, mistakes and discrepancies in contract documents and inspection and testing of completed portions of work as key causes of consultant related delays.

Olawale and Sun [18] identified the factors of inadequate evaluation of project's duration, discrepancies in contract documentation and contract and specification interpretation disagreement as causes of delay under consultant-related. Sambasivan and Soon [19] identified contract management, preparation and approval of drawings, quality assurance and control and waiting time for approval of tests and inspections as factors causing delays under the consultant-related categories.

2.3. Contractor Related Delay Factors

Available literature contend that proper project planning, availability of materials, equipment and adequate labour are key critical success factors for the successful implementation of building construction projects. A number of studies have been carried out in those key critical dimensions in order to assess their relative contributions to schedule delays in the construction industry.

Aibinu and Odeyinka [4] identified financial difficulties, equipment breakdown and maintenance problems, planning and scheduling problems, material and equipment shortages, slow mobilization and shortage of manpower as main contributors to this category of delay factors. Al-Khalil and Al-Ghafly [5] observed that financing and cash flow challenges, poor project management and inadequate manpower were key considerations. Al-Kharashi and

Skitmore [6] contend that poor qualification of contractor's technical staff, poor site management and supervision and difficulty in financing the project were critical. Arditi *et al.*, [7] observed that inadequate supply of materials, and contractor's financial difficulties were the main causes of delay. Assaf and Al-Hejji [8] identified the contractor related delay factors as; difficulties in financing project by contractor, conflicts in sub-contractors schedule in execution of project, rework due to errors during construction, conflicts between contractor and other parties (consultant and owner), poor site management and supervision by contractor, poor communication and coordination by contractor with other parties, ineffective planning and scheduling of project by contractor, improper construction methods implemented by contractor, delays in sub-contractors work, inadequate contractor's work, frequent change of sub-contractors because of their inefficient work, poor qualification of the contractor's technical staff, delay in site mobilization. Assaf *et al.*, [9] identified inadequate contractor finance, shortage of manpower, slow delivery of materials and errors committed during construction works affected delivery of the projects.

Chan and Kumaraswamy [10] identified the factors of poor site management and supervision and improper project planning and scheduling that contribute to causes of delays. El-Razek *et al.*, [11] observed that contractor's inadequate financial resources and slow delivery of materials were the major causes of delays. Faridi and El-Sayegh [12] identified shortage of manpower, poor site supervision and management and non-availability of materials on time as lead causes of delays under contractor related category. In a separate study, [2] concluded that inadequate contractor experience, ineffective project planning and scheduling, and poor site management and supervision respectively ranked highly. Hemanta *et al.*, [3] using factor analysis conclude that site accidents due to lack of safety measures, use of improper or obsolete construction methods, and delay in material delivery contributed the highest impact. In a separate study, [13] identified the factors of poor human resource management and labour strike and uniqueness of the project activities requiring high technical know-how as causes of delay during construction process. Kumaraswamy and Chan [14] identified poor site management and supervision, inadequate contractor experience and delays in subcontractor's works as key causes of delay. In a separate study, [15] assessed the vulnerability of Singaporean firms undertaking construction projects in India in terms of economic risks (materials supply, labour supply, and equipment availability), financial risks (relating to credit rating, capital supply and cash flow), managerial risks (relating to productivity, quality assurance, cost control and human resource management) and technical risks (relating to equipment and systems failure, collision and accidents).

Several studies have identified material related delay factors as one of the key dimensions in contractor related delays that has contributed significantly to causes of schedule delays in construction projects. Chan and

Kumaraswamy [10] concluded that shortage of material and poor procurement of material topped as contributors to causes of delays. In a separate study, [14] identified shortage of materials in the market as a factor causing delay, poor quality of materials, escalation of material prices and late delivery of materials as factors causing delay. Assaf and Al-Hejji [8] identified the material related delay factors as; shortage of construction materials in market, changes in material types and specifications during construction, delay in material delivery, damage of sorted material while they are needed urgently, delay in manufacturing special building materials, late procurement of materials, late in selection of finishing materials due to availability of many types in market.

Other scholars examined the contribution of equipment related attributes to contractor delay factors and assessed their significance in causing schedule delays in construction projects. Chan and Kumaraswamy [10] identified the factor of shortage of equipment and improper equipment as factors that contribute to causes of delays. Assaf and Al-Hejji [8] identified equipment breakdowns, shortage of equipment, low level of equipment-operator's skill, low productivity and efficiency of equipment, lack of high-technology mechanical equipment as causes of delays.

2.4. Client Related Delay Factors

Several studies have identified owner related delay factors to cause schedule delays.

Aibinu and Odeyinka [4] concluded that Clients' cash flow problems, variation orders and slow decision making were critical. In a separate study, [3] observed that lack of incentive for contractors for early finish and slow decisions from owners were critical. Al-Khalil and Al-Ghafly considered delay in making progress payments by the client as critical. Al-Kharashi and Skitmore [5] identified lack of finance to complete the works and slow decision making by the owner as having greatest impacts to delays. Arditi *et al.*, [7] identified delay in payments to contractor and frequent change orders had the greatest effect. Assaf and Al-Hejji [8] identified the owner related delay factors as; delay in progress payments by owner, delay to furnish and deliver the site to the contractor by the owner, change orders by owner during construction, late in revising and approving design documents by owner, delay in approving shop drawings and sample materials, poor communication and coordination by owner and other parties, slowness in decision making process by owner, conflicts between joint-ownership of the project, unavailability of incentives for contractor for finishing ahead of schedule and suspension of work by owner.

Assaf *et al.*, [9] identified intermitted stoppage of works due to cash flow challenges and delays in making progress payment to the contractor as the main causes under this category. Chan and Kumaraswamy [10] identified client initiated variations, unrealistic contract durations imposed by client and low speed of decision making as key. El-Razek *et al.*, [11] identified delays in effecting payments

to contractors and slow decision making process were critical causes of delays. Faridi and El-Sayegh [12] identified slowness in owner's decision-making process and changes in materials type and specification during construction by the owner as factors that contribute to causes of delay under this category. Gündüz, *et al.*, [2] identified change orders, delay in site delivery and slowness in decision making as the most significant factors under this category. In a separate study, Hemanta *et al.*, [3] identified slow decision from owner and unrealistic time schedule imposed in contract as causes of delays. Iyer and Jha [13] identified the factors of vested interest of client's representative in not getting the project completed in time, project completion date specified but not yet planned by the owner and urgency emphasized by the owner while issuing tenders as key causes under this category. In a separate study, Kumaraswamy and Chan [14] identified client initiated variations as a major cause of delay. Lo *et al.*, [16] identified the factor of unrealistic contract duration as the major cause of delay under the client related category. Mansfield *et al.*, [17] identified the factors of financing and payment of completed works and design changes by client as key causes of delays. Nkado [20] identified the factors of specified sequence of completion, priority on construction time, financial ability and possible changes to initial design as the major causes of delay under this category. Olawale and Sun [18] identified the factors of design changes by client, and financing and payment for completed works as main causes of delays.

Sambasivan and Soon [19] identified the factors of inadequate client's finance and payments for completed works, owner interference and slow decision making as critical causes of delays under the client-related category.

2.5. External Related Delay Factors

Several studies have identified external related delay factors category as one of the groups of causes of schedule delays in construction projects. Aibinu and Odeyinka [4] observed that price escalation, inclement weather, labour disputes and strikes, government regulations, slow permit by government, civil disturbances and acts of God consecutively were critical. In a separate study, delay in obtaining work permits from authorities was ranked as the most significant cause of delay by [4]. Arditi *et al.*, [7] identified unfavourable weather conditions as the major cause of external related delays. Assaf and Al-Hejji [8] identified the external related delay factors as; effects of subsurface conditions (e.g. soil, high water table, etc.), delay in obtaining permits from municipality, hot weather effect on construction activities, rain effect on construction activities, unavailability of utilities in site (such as, water, electricity, telephone, etc.), effect of social and cultural factors, traffic control and restriction at job site, accident during construction, differing site (ground) conditions, changes in government regulations and laws, delay in providing services from utilities (such as water, electricity),

delay in performing final inspection and certification by a third party. Assaf and Al-Hejji [8] also identified legal disputes and ineffective delay penalties, shortage of construction materials in market, and delay in manufacturing special building materials as factors that contributed to delays.

Assaf *et al.*, [9] identified delay in manufacturing building materials and delays in obtaining permits from authorities as the main cause of external-related delay. Chan and Kumaraswamy [10] identified unforeseen ground conditions and long waiting time for approval of drawings as critical factors. El-Razek *et al.*, [11] identified unfavourable weather conditions as key. Faridi and El-Sayegh [12] identified the factors of subsurface soil conditions and unfavourable weather conditions as contributors to delays. Gündüz, *et al.*, [2] identified delay in obtaining permits, global financial crisis and unexpected surface and subsurface conditions as the key factors. A study conducted by [3] revealed that extreme weather conditions and obtaining permission from local authorities were critical in causing delays. In a separate study, [13] identified the factors of harsh climatic conditions at the site, hostile political and economic environment and hostile social environment as key contributors to delays. Kumaraswamy and Chan [14] identified unfavourable weather conditions as a factor causing delay. Ling and Hoi [15] assessed external related delays in terms of natural risks (weather systems and geological systems) and political risks that include war, civil disorder and industrial relations actions that affect the progress of the project. Lo *et al.*, [16] identified the factors of environmental restrictions, slow coordination and seeking of approvals from concerned authorities, uncontrollable external factors and inclement weather were key in causing delays within this category.

Mansfield *et al.*, [17] identified the factors of changes in site conditions and inclement weather as causes of external related delays. Nkado [20] identified the factors of unfavourable weather and regulations are key causes of delays. Olawale and Sun [18] identified the factors of unpredictable weather conditions, dependency on imported materials, inflation of prices, weak regulation and control and unstable government policies as causes of delay. Sambasivan and Soon [19] identified the main causes under external-related delays as unfavourable weather conditions, regulatory changes, problems with neighbours and unforeseen site conditions.

3. Methodology

3.1. Population Characteristics

Since architects are normally the lead consultants, the researcher obtained a comprehensive list of all registered architectural firms from Uganda Society of Architects and stratified them in to three groups. The first group comprised firms whose trading names begun with letters A-to-D (29

no.) while the second group was for E-to-L (39 no.) and the last group with letters starting with M-to-Z (25 no.). In order to limit researcher bias and increase equal chances for participation, the researcher randomly picked two firms from each group to make a total of six as shown in Table 1. From the results of the random selection, two firms (Gepoka Associates and FBW) did not meet the selection criteria for the projects. The major criterion in selecting the firms was based on experience and scope of the works (experience of more than 10 years and project worth 10 billion and above). Gepoka Associates was found not to have any running project to the tune of UGX.10 billion while FBW (for Kingdom Kampala project on Shimoni road) had the major professional team (architect, civil/structural and M&E) coming from the same firm of which the researcher believed may not yield independent observations concerning the study.

The study population included the category for clients, architects, civil/structural engineers, quantity surveyors, electro-mechanical engineers that were all grouped as consultants and contractors for the respective projects. It comprised of three key personnel in each firm that were directly involved in the respective projects so as to generate the population per project and the accessible study population comprised a total of seventy five (75) key resource persons. The selection of the projects that constituted the study population was carefully done to ensure that cross-cutting stakeholders were brought on board that included among others; private individuals, faith based organization (FBO's), business community and government so as to understand the different perspectives with respect to the study.

Table 1. Selected Study Consultancy Firms

Category	No. of firms	Firms Chosen	Selection Criteria
A - D	29	<ul style="list-style-type: none"> ● Design Group and Associates ● Dimensions Architects and ● Interior Designers 	Random selection
E - L	30	<ul style="list-style-type: none"> ● FBW ● Gepoka Associates 	Random selection
M - Z	25	<ul style="list-style-type: none"> ● Symbion International ● Ssentoogo & Partners 	Random selection

Table 2. Study Population

Project	Location	Name of lead firm	No. firms	No. staff involved
Church House Project	Central division	Design Group and Associates	6	18
Bugolobi Village Mall	Nakawa division	Symbion International	6	18
Parliament Building	Central division	Ssentoogo and Partners	7	21
GEMS International School Uganda	Nakawa division	Dimensions Architects and Interior Designers	6	18
Total				75

The researcher endeavored to ensure that both local construction contractors (LCC) and foreign based contractors constituted the study population. The purpose of this critical selection was meant to give a comparative performance of the various stakeholders in addressing the critical aspects of schedule delays. After dropping the two firms that didn't meet selection criteria, four consultancy firms were chosen to lead the respective teams for the projects that were investigated as shown in Table 2.

3.2. Choice of Study Area

The study was carried out within Kampala Capital City Authority (KCCA). The choice of the location was based on three main factors: i) Kampala is currently experiencing a high concentration of multi-million physical development projects (PDP) compared to other parts of the country both by private developers and government agencies. ii) the current urban renewal projects that have either been completed or are under construction have a complete team of various stakeholders that are responsible for delay causes that was useful to the study and iii) most of these projects were being financed by banks and other development partners coupled with the high level of investments in them; the developers are under pressure to complete on time, within budget and to the desired quality so as to put them to use immediately to get quick returns to service the loans and therefore time is of great concern to the developers.

3.3. Selection Criteria for Study Projects

The study was conducted in Kampala comprising the stakeholders involved in the four projects of church house located on plot 34 Kampala road and Remodification of Parliamentary Building on parliament avenue, Bugolobi Village Mall, Extension of Parliament building and GEMS international school Uganda on plots 102 – 104 Butabika road, all located in Kampala. These projects were selected based on the following criteria:

- That the project cost should be above Uganda Shilling ten billion;
- The project should have all key professional stakeholders involved (i.e. architects, civil/structural, quantity surveyors, M&E);
- That all the four categories of the professional team should be from different firms and;
- The project must be on-going and must have started 2008 and 2013.

A self-administered questionnaire was developed and administered to key project team players to assess their perceptions on the causes of delay in delivery of building construction projects in Uganda. A total of eighty one (81) factors were identified through detailed literature review and grouped under four (4) broad categories of causes of schedule delays in construction projects in Uganda by the researcher:

- i. Consultant related factors
- ii. Contractor related
- iii. Client related and;
- iv. External factors

Primary and secondary sources of data were collected using structured questionnaires on a 5- point likert scale and interviews which were also conducted as well as documentary reviews on scholarly materials on schedule delays. Respondents were requested to indicate which factors they considered to have significant effects on delay of projects based on their experience and other factors. The questionnaire adopted a 5-point likert scale ranging from 5(strongly agree) to 1(strongly disagree), the higher the number, the greater the influence on schedule delays.

The researcher stratified the accessible population by category (client, architect, civil/structural engineer, quantity survey, mechanical and electrical engineer and the contractor), then adopted the generalized scientific guidelines developed from a table of [21] as extracted from [22] to determine the sample size. The study used purposive sampling to select key informants from all the categories of respondents so as to ensure that the right respondents with the relevant knowledge, authority and experience on the different themes were adequately selected. The following formula was used to generate the required sample:

$$[s = (p/P) \times S] \quad (1)$$

where s is the sample required from each participating

project, p is the number of key resource persons in each project, P the study population and S the total sample size.

A total of 63 respondents constituted the sample size. Sixty three (63) questionnaires were distributed to the identified respondents and out of these; fifty two (52) were returned which represents 82.54%.

Data Analysis

The analysis was aided by the use of Statistic Package for Social Science (SPSS) where the scores assigned to each factor by the respondents were entered and consequently the responses from the 52 questionnaires were subjected to statistical analysis for further insight. The contribution of each of the factors to overall delays was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of Relative Importance Index (RII) which was computed using equation (2) and the results of the analysis are presented in Table 3 to Table 6.

$$RII = \frac{\sum W}{A \cdot N} (0 \leq RII \leq 1) \quad (2)$$

Where:

W – is the weight given to each factor by the respondents and ranges from 1 to 5, (where “1” is “strongly disagree” and “5” is “strongly agree”);

A – is the highest weight (i.e. 5 in this case) and;

N – is the total number of respondents.

Table 3. Consultant Related Category

S/No	Causes of delay	RII	Rank
1	Delay in assessing/evaluating major changes in the scope of work	0.927	1
2	Design errors made by designers	0.877	2
3	Inadequate site investigation	0.865	3
4	Unclear and inadequate details in drawings	0.865	3
5	Delay in preparing interim payment certificates	0.850	5
6	Delay in reviewing and approving design changes	0.842	6
7	Delay in performing inspection and testing	0.823	7
8	Complexity of the project	0.819	8
9	Lack of experience of consultant in construction projects	0.800	9
10	Conflicts between consultants	0.788	10
11	Insufficient data collection and survey before design	0.758	11
12	Poor communication and coordination with other parties	0.758	11
13	Misunderstanding of owner's requirements	0.742	13
14	Inadequate project management assistance	0.738	14
15	Insufficient estimation of original contract duration	0.504	15
16	Unfavourable contract clauses	0.488	16
17	Inadequate definition of substantial completion	0.485	17
18	Poor use of advanced design software	0.485	17

Table 4. Contractor Related Factors

S/No	Factor category	RII	Ranking
1	Financial indiscipline/dishonesty	0.923	1
2	Inadequate contractor experience	0.885	2
3	Incompetent project team	0.850	3
4	Inappropriate construction methods	0.842	4
5	Poor site management and supervision	0.835	5
6	Poor procurement of construction materials	0.800	6
7	Absenteeism	0.792	7
8	Ineffective project planning and scheduling	0.792	8
8	Late delivery of materials	0.781	9
9	Rework due to errors	0.777	10
10	Poor communication and coordination with other parties	0.773	11
11	Unqualified / inadequate experienced labour	0.769	12
12	Low motivation and morale of labour	0.712	13
13	Low productivity of labour	0.700	14
14	Improper equipment	0.646	15
15	Obsolete technology	0.638	16
16	Frequent equipment breakdowns	0.627	17
17	Unreliable subcontractors	0.615	18
18	Shortage of equipment	0.612	19
19	Poor quality of construction materials	0.608	20
20	Subcontractor turn-over	0.596	21
21	Shortage of labour	0.588	22
22	Slow mobilization of labour	0.585	23
23	Low efficiency of equipment	0.581	24
24	Slow mobilization of equipment	0.565	25
25	Damage of materials	0.562	26
26	Strike	0.554	27
27	Personal conflicts among labour	0.512	28

Table 5. Client Related Factors

S/No.	Factor category	RII	Ranking
1	Corruption tendencies	0.854	1
2	Intermittent stoppage of work due to cash flow constraints	0.854	1
3	Change orders	0.850	3
4	Delay in payments	0.827	4
5	Changes in material types and specifications during construction	0.819	5
6	Delay in approving design documents	0.812	6
7	Design changes by owner or his agent during construction	0.804	7
8	Poor communication and coordination with other parties	0.750	8
9	Slowness in decision making	0.712	9
10	Conflicts between joint-owners	0.708	10
11	Inadequate information during project feasibility study	0.592	11
12	Delay in site delivery	0.531	12
13	Lack of incentives for contractor to finish ahead of schedule	0.500	13
14	Lack of capable representative	0.454	14
15	Lack of experience of owner in construction projects	0.400	15

Table 6. External related factors

S/No.	Factor category	RII	Ranking
1	Unfavourable weather conditions	0.865	1
2	Legal disputes between project participants	0.773	2
3	Shortage of construction materials	0.773	3
4	Unexpected surface & subsurface conditions (such as soil, high water table)	0.750	4
5	Delay in manufacturing materials	0.712	5
6	Accidents during construction	0.708	6
7	Environmental and social factors	0.673	7
8	Geopolitical and regional stability	0.627	8
9	Escalation of local material prices	0.623	9
10	Global financial crisis	0.623	9
11	Price fluctuations on the international market	0.592	11
12	Unreliable suppliers	0.577	12
13	Conflict, war, and public enemy	0.565	13
14	Ineffective delay penalties	0.531	14
15	Delay in obtaining permits from local authority	0.515	16
16	Natural disasters (flood, hurricane, earthquake)	0.515	17
17	Changes in government regulations and laws	0.508	18
18	Delay in providing services from utilities (such as water, electricity)	0.477	19
19	Problem with neighbours	0.462	20
20	Loss of time by traffic control and restriction at project site	0.423	21

4. Presentation and Discussion of Research Findings

4.1. The Effect of Consultant Related Delay Factors on Building Construction Projects

The first objective was to assess the extent to which consultant related delay factors affect building construction projects in Uganda. The research undertaken established that consultant related factors had a high impact building construction projects in Uganda with an aggregated relative importance index of 0.745 and was ranked as the top most cause of delays. From the summary of results in Table 3, it can be observed that the key factors that contributed most to delays in building construction projects in Uganda were; delay in assessing/evaluating major changes in the scope of works (RII = 0.927), design errors made by designers (RII = 0.877), inadequate site investigation (RII = 0.865), unclear and inadequate details in drawings (RII = 0.865) and delay in preparing interim payment certificates (RII = 0.850). Consequently, the research hitherto established that poor use of advanced design software, inadequate definition of substantial completion, unfavorable contract clauses, and insufficient estimation of original contract duration had less effect on causing delays in building construction projects. Therefore, in as far as evaluating the impact on delays was

concerned in the Ugandan context, the factors that registered $RII < 0.599$ were considered insignificant in causing delays in building construction projects in Uganda.

4.2. The Effect of Contractor Related Delay on Building Construction Projects

The second objective of the study was to establish the extent to which contractor related delay factors affect building construction projects in Uganda. The research undertaken established that contractor related factors came third overall in hierarchy in as far as causing delays in building construction projects in Uganda was concerned with an aggregated relative importance index of 0.697. The respondents attributed this to the top five factors of; financial indiscipline/dishonesty with RII (0.923), inadequate contractor experience with RII (0.885), incompetent project team with RII (0.850), inappropriate construction methods with RII (0.842) and poor site management and supervision with RII (0.835) respectively as presented in Table 4. The research revealed that one of the most critical factors of construction delay under contractor related is financial indiscipline/dishonesty. This finding is indeed in tandem to the findings of [11] that financial problem of the contractor is the most important cause of delays on building projects. Inadequate contractor

experience and incompetent project team most notably, among the critical factors causing delays in Ugandan construction industry. This result supports the findings by [3] for a similar study carried out in Indian construction projects who noted that this is a result of probably lack of formal training among site professionals who usually develop their supervisory skills by experience.

The research however revealed that eight (8) factors had minimal influence on causing delays and they include; personal conflicts among labour (RII = 0.512), strike (RII = 0.554), damage of materials (RII = 0.562), slow mobilization of equipment (RII = 0.565), low efficiency of equipment (RII = 0.581), Slow mobilization of labour (RII = 0.585), Shortage of labour (RII=0.588) and Subcontractor turn-over (RII = 0.596) since their RII was below 0.599. This however, was contrary to the findings of several scholars who investigated delay factors in construction projects and concluded that the eight factors that were ranked very low in the Ugandan context actually did get high rankings in studies carried out in Turkey, Saudi Arabia, UAE and India [2]; [12]; [7] and [3]. This probably could be explained by the high level and sophistication of technology used in those countries compared to the more labour-intensive construction techniques currently used in Uganda.

4.3. The Effect of Client Related Delay Factors on Building Construction Projects

The study also sought to establish the extent to which client related delay factors affect building construction projects in Uganda as a third objective. The research undertaken established that client related delay factors emerged as the second most important cause of delays overall in building construction projects in Uganda with an aggregated relative importance index of 0.698. The respondents attributed this to the top five factors of; intermittent stoppage of works due to cash flow constraints with RII (0.854), Corruption tendencies with RII (0.854), change orders with RII (0.850), delay in payments with RII (0.827) and changes in material types and specifications during construction with RII (0.819) respectively. The study however revealed that five (5) factors had minimal influence on causing delays and they include; Lack of experience of owner in construction projects (RII = 0.400), Lack of capable representative (RII = 0.454), Lack of incentives for contractor to finish ahead of schedule (RII = 0.500), Delay in site delivery (RII = 0.531) and Inadequate information during project feasibility study (RII = 0.592) since they fell short of the minimum required RII = 0.599 as considered by the researcher to be substantive to substantially cause delays in building construction projects in Uganda.

The results of the study presented in Table 5 could be explained in many different ways by different scholars and various interpretations can be debatable. However, the researcher argues that the outcome of the results was due to the fact that the Client in most cases is not necessarily

expected to be technical and knowledgeable in building construction so as to embark on a development project and therefore, it is because of this that they go ahead to hire the services of experts like consultants and contractors to execute the work on their behalf and to their satisfaction. In as far as lack of incentives for the contractor to complete the works is concerned, many respondents alluded to the fact that since the contractors provided a quotation (priced bill of quantities) and work schedule as a basis not only to win the contract, but also as a tool to execute the whole of the assignment, there was no need for the Client to make alternative provisions for incentives for early completion especially, monetary incentives. The researcher equally contends with that line of argument since the contractor is bound to deliver the whole of the works within the triple constraint of cost, time and quality as per the provisions of the signed contract document.

4.4. The Effect of External Related Delay Factors on Building Construction Projects

The fourth and final objective of the study sought to establish the extent to which external related delay factors affects building construction projects in Uganda. The research undertaken established that the last group of factors to cause delays in building construction projects in Uganda was external related delay factors and this category demonstrated the least aggregated relative importance index of 0.615 overall in as far as causing delays in building construction projects in Uganda in concerned. The respondents attributed this to the top five factors of; unfavorable weather conditions (RII = 0.865), legal disputes between project participants (RII = 0.773), shortage of construction materials (RII = 0.773), unexpected surface and subsurface conditions such as soil and high water table (RII = 0.750) and delay in manufacturing materials (RII = 0.712) consecutively as presented in Table 6. The study however revealed that five (5) factors had minimal influence on causing delays and they include; loss of time by traffic controls and restriction at project site (RII = 0.423), problem with neighbors (RII = 0.462), delay in providing services from utility organizations (RII = 0.477), changes in government regulation and laws (RII = 0.508) and natural disasters (RII = 0.515). With the exception of legal disputes between project participants and problem with neighbors, most of the factors originate from sources outside the project stakeholders and of which they have no direct control of making it very difficult to address as and when they occur. Some of these factors like natural disasters are acts of nature that the stakeholders have no control over, although ample strategies must be put in place to address the challenges in the event of occurrence.

5. Conclusions and Recommendations

Delays are inevitable; however, they can be avoided or minimised when their causes are effectively identified and analyzed. The aim of this study was to assess the effect of

delays on building construction projects in Uganda, using Kampala as the case study so as appropriate mitigation measures are put in place to ameliorate the effects of delay. Four objectives were investigated using a detailed literature review and interviews with stakeholders in the building construction industry in Uganda. A total of 81 delay attributes were identified and categorized into four groups of consultant related delay factors, contractor related delay factors, client related delay factors and external related delay factors. The computed RIIs provided a benchmark for ranking all the attributes and group of delays so as to inform the basis for determining the most significant and insignificant factors in the Ugandan context. Fifty four (54) factors with $RII \geq 0.599$ were considered significant while factors that yielded $RII < 0.599$ were considered insignificant and a total of twenty seven (27) factors fell into this range as indicated in the summary of results in Tables 3.3 to 3.6.

Although some of the major causes of delays for the Ugandan building construction industry follow the same trend as those found by other scholars elsewhere, one key factor that was ranked among the top ten lead causes of delay that emerged as a new attribute in this area of study is “Corruption tendencies” not only in the Ugandan context, but also taking up the regional trend across the value chain. Corruption tendencies are slowly getting entrenched in not only the construction industry, but across all sectors in the wider context of service delivery both in public and private sector. The results of the study also demystifies the opinion that has for a long time been held by many individuals both within and without the construction industry that alluded the major cause of delays to contractors without any viable study carried out to support their claims. According to the results and findings of this study, the following recommendations can be made as ways to minimise and control delays in construction projects:

5.1. Consultant Related Recommendations

- Consultants should ensure that all design changes during the execution of the works are handled explicitly while not compromising the desired outcome of the final project.
- Any design errors made by consultants must be immediately rectified to avoid delays in the progress of works.
- The consultants should ensure that adequate site investigations are carried out both during feasibility study and conceptual design so as to ensure that appropriate measures are taken care of during the detailed design so as to avoid suspension of works during the construction phase to address the design challenges.
- All working drawings must be clearly drawn indicating all the dimensions and labels to scale so as to avoid ambiguity during construction.
- The consultant should ensure that there is a competent representative on the site to make quick

decisions that are binding and to ensure that works that have to be measured prior to covering are done so as to facilitate preparation of interim payment certificates.

- The lead consultant should ensure that there is timely, accurate and adequate communication between all stakeholders during pre-contract, contract and post-contract period.
- The consultants should ensure that adequate due diligence is made prior to recommending a contractor for award of project to ensure that the right contractor with the required capabilities is sieved out of the bidders.

5.2. Contractor Related Recommendations

- Contractors should pay particular attention to the requirements of the assignment during the pre-contract and bidding period so as to go for works that they have competitive advantage.
- Contractors should ensure that they have enough cash flow to execute the works and desist from the practice of diverting particular project funds to non-project activities to avoid being cash-strapped during the execution of the works.
- The contractors should ensure that they have adequate experience for a required assignment, deploy competent project team and employ appropriate construction methods for the required assignment.
- The contractor should ensure proper planning and scheduling of the works and ensure effective site management and supervision of the works so as to keep watch on critical activities and strive to complete projects within the specified time while meeting quality and cost requirements.

5.3. Client Related Recommendations

- Clients must ensure that their demand in design changes during the construction period should have no adverse effects on the critical activities so as to avoid causing delays.
- All change order demands must be evaluated to assess their impact on quality of work envisaged, scope and cost, possible claims and disruption to work so as to avoid unnecessary disputes and litigation.
- Clients should ensure that proper planning and costing of the works are made during the pre-contract period so as to avoid intermittent stoppage of works as a result of funding constraints since this not only increases the construction period but also impacts on the contractors overhead costs and costs associated with mobilization and demobilization during the period within which the works were suspended.
- Clients should ensure that interim payment certificates are paid in time within the stipulated time-frame so as not only to avoid having interest penalty clauses invoked, but also to facilitate the progress of works to ensure timely completion.

5.4. External Related Recommendations

- All project stakeholders should work together and ensure that all disputes are mitigated during the construction period so as to avoid prolonging the planned executing time during the litigation process.

- All stakeholders should ensure that proper planning must be done to cater for unforeseen events that may prolong the construction period, increase cost and cause damage to property and injury to project participants. Such risks should be transferred to competent stakeholders like insurance companies so as to help reduce the effect of costs in the event of delay occurrence.

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