

Top Construction Delay Factors for Kenya

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Thirteen studies to identify major delay factors for construction projects in Kenya have been reported in the literature. Nine of these studies were based on self-administered questionnaire survey of views of project participants and four studies were based on site records of actual construction projects. Thirty-three of the more than forty construction delay factors reported in the literature were identified as one of the top construction delay factors by the thirteen studies on Kenya. This is illogical, misleading and confusing. A thorough review of these thirteen studies is undertaken to identify top delay factors for construction projects in Kenya. With respect to the construction delay factors identified, remedial measures to improve the schedule performance of construction projects in Kenya are presented.

Keywords: Kenya, Delay factors, Survey.

Introduction

As in many other developing countries, government is the major construction client in Kenya and the market for major projects tends to be dominated by foreign contractors because of deficiencies in indigenous construction capacity. Kenya is regarded as the regional hub for trade and finance in East Africa. In the last fifty years, construction projects had advanced to higher levels of size, cost, time and intricacy of construction. Construction delay is a prevalent problem for construction projects in Kenya. For example, the National Social Security Fund took five years to complete as opposed to the original estimate of two years. The construction of Migori District Headquarters commenced on 31 July 2009. It was initially planned to be completed in two years but was completed only recently. There were frequent complains of under-priced tender bids, the manner of tender evaluation and the technical qualification required in the process. Corruption and unfair distribution of construction projects, procurement process that often-caused unnecessary delay of payments and erratic change of prices of construction materials were some of the challenges. The problems of unskilled engineers and draftsmen, and quack contractors led to many cases of collapsed buildings in various parts of Kenya especially the low-cost residential flats in Nairobi resulting in loss of properties and lives.

Schedule performance is one of the most important criteria in assessing construction project success. Identifying the top delay factors is the first step in understanding the top factors affecting schedule performance. Appropriate measures can then be implemented to address issues related to the top delay factors to achieve good schedule performance. The problem of delays in construction projects is a global phenomenon. This is evident from the large number of studies to identify top construction delay factors. The type of contract in most of the studies reported was a traditional one and not design and build contract. There were only 20 studies that were based on analysis of the delays of construction projects. The other studies used questionnaire surveys, mostly self-administered, of views of owners, contractors and consultants.

A small number of studies relied on interviews or panel discussions of owners, contractors and consultants. A self-administered survey questionnaire was sent to contractors, consultants and owners (including civil servants in charge of construction projects). The questionnaire was developed based on construction delay factors reported in the literature or open-ended interviews with selected panels of contractors, consultants and owners. The top construction delay factors were established by statistical analysis of the survey data.

In particular, there are thirteen studies to identify the top delay factors for construction projects in Kenya reported in the literature. Some of these studies are confined to specific regions of Kenya. All these studies were carried out after 1996. Nine of these studies were based on self-administered questionnaire surveys of views of project participants and four studies were based on site records of construction projects. Thirty-three of the more than forty construction delay factors reported in the literature were identified as one of the major construction delay factors by the thirteen studies on Kenya. Kenya is not a large country in its physical size, the wide diversity of top construction delay factors identified is illogical and misleading. This has created confusion among the practitioners of the construction industry in devising appropriate measures to improve schedule performance of construction projects. This is a major problem and this state of affairs is definitely not acceptable. A thorough review of these thirteen studies is undertaken in the present study to identify the top major construction delay factors for construction projects in Kenya. The methodology for the present study is the same as the methodology adopted in Kog (2017a, 2017b, 2017c, 2017d, 2018). The number of times each major construction delay factor identified by the thirteen studies was counted. The top major construction delay factors were those identified by the greatest number of studies. The rationale is obvious. The major construction delay factors must be factors identified by the greatest number of respondents in the thirteen studies.

Standardization of Construction Delay Factors

One of the major difficulties in summarizing various construction delay factors identified is the lack of standardization of the construction delay factors. Reclassifications as shown in Table 1 must be made.

Top Construction Delay Factors in Kenya

Table 2 tabulates the top construction delay factors identified by each of the thirteen studies. The top construction factors are summarized in Table 2 under five categories, namely all project participants related factor, owner related factors, contractor related factors, consultant-related factors and other factors. Each construction delay factor is placed in the category linked to the party which can exert the most influence, though may not be totally, on the effect of that factor. The 'other factors' category is for delay factors that are beyond the control of the project participants.

Delay factors 'dispute over variations' and 'dispute over claims' identified by Takukhaba (1999) are not included in Table 2 because they are contractual problems that should be resolved contractually. Delay factor 'delayed shop drawing preparation' identified by Takukhaba (1999)

is not included in Table 2 because it is not clear whether the contractor or one of the consultants is responsible for the preparation. Delay factors ‘operating environment’ and ‘infrastructure’ identified by Musa (1999) are not included in Table 2 because it is not clear what they mean.

Table 1: Standardization of construction delay factors.

Reference	Delay factor in reference	Standardized construction delay factor
Mwawasi (2015)	<ol style="list-style-type: none"> ‘poor or inadequate specifications in the contract’ and ‘inaccuracy of bill of quantities’ ‘inadequate planning by the client’ ‘underestimation of project durations’ ‘poor resource planning by contractor’ 	<ol style="list-style-type: none"> ‘substandard contract’ ‘owner’s lack of experience/ incompetent project team’ ‘ineffective planning and scheduling’ ‘late delivery/shortage of construction materials or fuel’
Takukhaba (1999)	<ol style="list-style-type: none"> ‘architect’s instructions’ ‘presence of rock’ ‘late payment to subcontractors’ and ‘late payment of wages to workers’ ‘poor workmanship’ 	<ol style="list-style-type: none"> ‘variation orders/changes of scope by owner during construction’ ‘inadequate site investigation/ unforeseen subsurface conditions’ ‘financing by contractor’ ‘rework due to construction defects’
Sebora (2015)	<ol style="list-style-type: none"> ‘proximity to borrow pit and quarry’ 	<ol style="list-style-type: none"> ‘late delivery/shortage of construction materials’
Mwandali (1996)	<ol style="list-style-type: none"> ‘slow project selection methods’ 	<ol style="list-style-type: none"> ‘slow decisions making by owner’
Musa (1999)	<ol style="list-style-type: none"> ‘lack of capacity of contractor’ ‘quality of project management’ ‘organization of project team’ ‘inadequate resources’ ‘motivation of workers’ 	<ol style="list-style-type: none"> ‘inadequate contractor experience/ incompetence contractor’ ‘owner’s lack of experience/ incompetent project team’ ‘lack of professionals/incompetent project team’ of contractor ‘late delivery/shortage of construction materials or fuel’ and ‘equipment (or operator) availability and failure’ ‘low productivity level of labors’

Table 2a: Summary of major construction delay factors from existing literature on Kenya, legend and references.

Legend			
S = study is based on a survey of views of owners, contractors and consultants.		P = study is based on actual construction projects.	
I = open ended interviews.		A = Building, road, water and sewer etc. projects.	
B = Building projects.		C = Civil engineering infrastructural projects such as highway, water and sewer projects.	
? = number of respondents not stated in the reference.		@ = not able to check.	
References			
#	Reference	#	Reference
1	Mwawasi (2015)	8	Kariungi (2014)
2	Seboru (2015)	9	Takukhaba (1988)
3	Takukhaba (1999)	10	Kagiri and Wainaina (2008)
4	Awuor (2015)	11	Kwatsima (2015)
5	Kahiga (2015)	12	Mwandali (1996)
6	Wambugu (2013)	13	Musa (1999)
7	Ondari and Gekara (2013)		

Table 2b: Summary of major construction delay factors from existing literature on Kenya.

Reference	1	2	3	4	5	6	7	8	9	10	11	12	13
Methodology	S	S	P	S	S	S	S	S	P	S	S	P	P
Number of respondents / construction projects	208	31	38	75	94	96	170	?	86	@	57	@	@
Type of construction project	C	C	B	B	C	C	C	C	A	C	C	C	C
All project participants related factor													
Communication problems/lack of adequate project coordination												X	
Owner-related factors													
Finance and payments of completed work by owner	X	X	X		X		X	X	X	X	X		
Variation orders/changes of scope by owner during construction	X	X	X						X		X		
Contractor selection methods (negotiation, lowest bidder)					X								
Slow decisions from owner		x										x	
Owner's lack of experience/incompetent project team	X						X				X	X	
Excessive bureaucracy in project-owner organization		X			X		X			X			
Late release of site/land acquisition problems/Delay or non-payment of compensation to the communities	X									X			
Unrealistic/optimistic deadline set by client									X				
Contractor-related factors													
Inadequate contractor experience/incompetence contractor					X		X				X	X	X
Lack of technical professionals/incompetent project team				X									X
Ineffective planning and scheduling	X	X		X		X		X	X		X		
Poor site management and supervision				X	X	X	X				X		
Poor site coordination						X							
Late delivery/shortage of construction materials or fuel	X	X	X	X		X	X	X					X
Financing by contractor			X				X		X	X	X		
Subcontractor problems			X										
Rework due to mistakes in construction/construction defects			X			X	X						
Low productivity level of labors													X
Shortage of labor											X		
Unqualified workforce/low skilled labor				X									
Equipment (or operator) availability and failure			X	X			X					X	X
Consultant-related factors													
Inadequate site investigation/unforeseen subsurface conditions	X	X	X										
Mistakes and discrepancies in design documents by consultants		X											
Delay in inspection and approval of works, approval of shop drawings, materials, and documents submitted by contractor			X										
Late issuance of instructions, information or drawings/Delay due to issuance of certificate			X						X				
Poor contract management by consultants/Substandard contract	X										X		
Other factors													
Inclement weather	X	X	X	X				X					
Rise in prices of materials				X	X								
Lack of community buy-in							X						
Delays by utility agencies/relocation/inaccurate as-built utility drawings	X	X	X										
Natural disaster/acts of God											X		
Government regulation and permit approval			X										

Delay factors such as ‘owner interference’, ‘inaccurate estimating of construction materials quantities/price’, ‘labor disputes/strikes/personal conflict among labors’, ‘lack of clarity in project scope’, ‘corruption’, ‘lack of constructability reviews in design’, ‘staff recruitment delay’, ‘economic conditions’, and ‘security/political situations/ border closures/segmentation’, that are common among the major construction delay factors for other developing Asian, African and Middle Eastern counties are found to be not significant by the thirteen studies.

The accuracy of findings of studies based on self-administered questionnaire surveys hinges on the quality of the survey data. It is obvious that the concern to the quality of the survey data in questionnaire survey studies varies. For example, despite the importance of the sample size in a questionnaire survey, the number of respondents of the questionnaire survey was not even mentioned in Seboru (2015), Kahiga (2015), Kariungi (2014), Ondari and Gekara (2013), and Wambugu (2013). The number of years of working experience of respondents is crucial because respondents’ views and perceptions are formed based on their working experience. According to Kog and Loh (2012), views and perceptions of the survey respondents are affected by the duration of working experience of respondents. Views of respondents with less than 15 years were found to be not consistent with respondents with more than 15 years. This seems reasonable considering that the construction period for a reasonably sized project will be around 3 years. A respondent with 15 years working experience will have completed several projects equivalent to about 5 reasonably sized construction projects that enable a broader and more incisive understanding of the delay factors affecting the construction projects. On the other hand, a respondent with less than 6 years of experience will only have completed one project. Some of the construction delay factors identified by them are unique to the project they completed only and not typical for the construction industry. This is evident from the fact that the top delay factors identified by these studies are not among the top delay factors identified by the present study. Therefore, validity and reliability of major construction delays for each study reported must consider the profile of working experience of respondents. Of the nine studies of Kenya using self-administered questionnaire survey, no information on the profile of working experience of respondents was reported in Seboru (2015), Kahiga (2015), Kariungi (2014), Ondari and Gekara (2013), and Wambugu (2013). This shows a lack of appreciation of the importance of working experience to the quality of the survey data and the validity and reliability of the top construction delay factors identified. There are only three out of the thirteen studies using questionnaire survey that provided information of the profile of working experience of respondents. Out of the 28 respondents of Mwawasi (2015), there were only 6 respondents (21.4%) with more than 15 years working experience. When the minimum working experience is reduced to 10 years, the respective proportions are: 8/28 (28.6%) in Mwawasi (2015), 11/57 (19.3%) in Kwatsima (2015) and 19/75 (25.3%) in Awuor (2015). There is no breakdown for the number of respondents with more than 15 years working experience in Kwatsima (2015) and Awuor (2015). It must be noted that the respondents in Awuor (2015) were school administrators such as principals and chairmen of management board who were involved in school’s construction projects. The low proportion of ‘experienced’ respondents common in these studies again shows a lack of appreciation of the importance of working experience to the quality of the survey data and the reliability of the top construction delay factors identified. Despite the above criticisms, the studies summarized in Table 2 are not without values. The top construction delay factors identified by combining the findings of the thirteen studies are more credible because of the larger number of respondents.

The number of times each top delay factor was identified by these studies summarized in Table 2 is calculated. The top ten construction delay factors most cited in the thirteen studies are summarized in Table 3. It is noted that the top two construction delay factors were identified by 69.2% of the thirteen studies and the tenth construction delay factors were identified by 30.8% of the thirteen studies. This amply illustrates the wide diversity of the views of the respondents of the thirteen studies. This can be explained by the low proportion of respondents with more than 15 years working experience in the thirteen studies.

Table 3: Top ten construction delay factors for construction projects in Kenya.

Rank	Construction delay factor	Identified in studies	
		Number	Proportion (%)
1	Finance and payments of completed work by owner	9	69.2
2	Late delivery/shortage of construction materials	8	61.5
3	Ineffective planning and scheduling	7	53.8
4	Variation orders/changes of scope by owner during construction	5	38.5
4	Inadequate contractor experience/incompetence contractor	5	38.5
4	Poor site management and supervision	5	38.5
4	Financing by contractor	5	38.5
4	Equipment (or operator) availability and failure	5	38.5
4	Inclement weather	5	38.5
10	incompetent project team of owner	4	30.8
10	Excessive bureaucracy in project-owner organization	4	30.8

Mwandali (1996) identified ‘communication problems/lack of adequate project coordination’ was a top construction delay factor. Wambugu (2013) identified ‘poor site coordination’ as a top construction delay factor. Takukhaba (1999) identified ‘subcontractor problems’ and ‘government regulation and permit approval’ as top construction delay factors. Seboru (2015) identified ‘mistakes and discrepancies in design documents by consultants’ as a top construction delay factor. Kahiga (2015) identified ‘contractor selection methods (negotiation, lowest bidder)’ as a top construction delay factor. Ondari and Gekara (2013) identified ‘lack of community buy-in’ as a top construction delay factor. Takukhaba (1988) identified ‘unrealistic/optimistic deadline set by client’ as a top construction delay factor. Musa (1999) identified ‘low productivity level of labors’ as a top construction delay factor. Kwatsima (2015) identified ‘shortage of labor’ and ‘natural disaster/acts of God’ as top construction delay factors. Awuor (2015) identified ‘unqualified workforce/low skilled labor’ as a top construction delay factor. However, none of these factors was identified by other studies as a top construction delay factor. It will be of interest to note that almost every study has identified at least one construction delay factor that does not feature as one of the top delay factors in other studies. This shows that the views with respect to construction delays among the respondents are very diverse as a result of the low proportion of ‘experienced’ respondents.

Measures to Improve Schedule Performance of Construction Projects

The top construction delay factors summarized in Table 3 can be grouped under three categories, namely owners, contractors and consultants. The construction delay factors under the owner category are: ‘finance and payments of completed work by owner’, ‘variation orders/changes of scope by owner during construction’, ‘incompetent project team of owner’, and ‘excessive

bureaucracy in project-owner organization'. The root cause of slow progress payment to the contractor may be attributed to the financial problem encountered by the owner. Financing of the construction private sector projects depends on the financial strength of the owner/developer and the general economic conditions, in particular the real estate sector, of the country. One measure that can be implemented to address this issue is to require the owner/developer to submit all the necessary financial documents for an exclusive bank account to be set up strictly for the project only prior to the issuance of the permit to commence construction work for the project. In other words, the owner/developer must secure all the financial arrangement prior to the commencement of the construction project. The purpose is to ensure that the owner/developer possess the financial capability to undertake such a development project. Similar administrative measure may be set up for public sector construction projects. If the funding is from an overseas aid agency, then all the necessary documentations required for the release of the fund must be expeditiously forwarded to the funding agency so that monthly progress payment to the contractor will not be delayed. If financing of the project is no longer a problem with the measure discussed earlier, there is a strong need to professionalize the project management teams of owners so that decisions and progress payments to the contractors can be made within the stipulated period. The issue of excessive bureaucracy in project-owner organization can be rectified by a truly professional project management team. Owners must be educated to understand and reminded repeatedly that any delays in making decisions and progress payments to contractors may lead eventually to construction delays. The costs of construction delays will be more than any benefits that can be obtained from slow decision making and progress payment to contractors.

Variation orders that affect schedule performance of the construction project must be kept to a bare minimum to minimize construction delays whenever possible. One way is to allow more time for the consultants to obtain all necessary government approval prior to calling tender for the construction project to minimize the number of variation orders arising from government requirements. There is no point to 'fast track' a construction project when the contract document is not ready. In fact, some of the 'fast track' projects suffered lengthy construction delay worse than that for normal projects. Some of the variation orders for building contracts can be minimized by joint review by the design team during the working drawing stage to minimize any discrepancies in the architectural, structural, mechanical, and electrical drawings that may lead to variation orders. Once the construction contract commences, changes that affect critical activities must be avoided whenever possible. The owners or engineers/architects must convene regular project meetings to be attended by all consultants and contractor to achieve better communication and co-ordination among project participants. It is also necessary to discuss jointly among all project participants to resolve any issue that may arise that requires the issuance of variation order so that the necessity for variation orders can be minimized.

The construction delay factors under the contractor category are: 'late delivery/shortage of construction materials', 'ineffective planning and scheduling', 'equipment (or operator) availability and failure', and 'poor site management and supervision'. The non-compensable construction delay factors such as 'late delivery/shortage of construction materials', 'ineffective planning and scheduling', 'equipment (or operator) availability and failure', and 'poor site management and supervision' identified by the present study are strong evidences that there is a need to professionalize contractors in Kenya. One of the crucial steps is for contractors to

employ technical professionals so that a competent project team will be involved in the project. This is consistent with the findings of Kog et al. (1999) and Chua et al. (1999) that project manager competency is one of the critical success factors in schedule performance. The aim is to improve their planning and scheduling (including the ordering and delivery of construction materials and procurement of equipment), site management and supervision, and site coordination of the project. Most of the local contractors are family business and they are very reluctant to trust technical professionals outside the family. More importantly, they fear that the overheads of the contractor's company will be increased resulting inevitably in higher tender prices. This may lead to failure in securing any project in the cut-throat 'destructive' competition in tender. Fortunately, with better educated second generation taking over the helm, there will be increasingly a changing trend towards professionalizing the project team. The younger contractors recognize that the benefits of a professional project team outweigh its costs. Despite the existence of the classification system for contractors in Kenya, the schedule performance of contractors needs to be improved further judging from the findings of the present study. Annual review of the classification system of contractors is needed. The contractor's classification system has to be tightened by including feedbacks from owners and consultants on the schedule performance of construction projects for the last 5 years when assessing the appropriate class of the contractor during the annual review in addition to the current criteria. This requirement is only for higher classes of contractors. Contractors with inadequate appropriate experience will not be awarded the tender for any construction projects if the contractor classification is administered correctly without political influence.

Many of the studies reported herein are related to road construction. Once it starts to rain, it is no longer possible to carry out any works. It is not possible to control the weather. However, it is possible to standardize the entitlement for extension of time for inclement weather. The average numbers of raining days for the last 10 years for each month can be collected from the Metrological Office and spelled out in the contract document. The extension of time will be calculated based on the site record of raining days and the average numbers in the contract. This measure is to prevent inconsistency in the granting of extension of time.

Conclusion

Good schedule performance can only be achieved by identifying the truly top construction delay factors so that appropriate measures can be implemented to address issues related to the top construction delay factors. A review of the thirteen studies to identify top construction delay factors is performed in the present study. Top construction delay factors for construction projects in Kenya identified by the present study include: 'finance and payments of completed work by owner', 'late delivery/shortage of construction materials', 'ineffective planning and scheduling', 'variation orders/changes of scope by owner during construction', 'inadequate contractor experience/incompetence contractor', 'equipment (or operator) availability and failure', 'poor site management and supervision', 'financing by contractor', 'inclement weather', 'incompetent project team of owner', and 'excessive bureaucracy in project-owner organization'. Remedial measures to address issues related to the top delay factors include requiring the owner to submit all the necessary financial documents for an exclusive bank account to be set up strictly for the construction project only. The current contractor classification system must be tightened by

including the contractor's schedule performance of past years during the annual review. There is a strong need to professionalize the project team of owners and contractors. The construction delay can be further minimized by improving communication by timely design review meetings for owner and consultants, and regular project meetings for owner, consultants and contractor. The practical implication for the construction industry in Kenya is the level of improvement in the schedule performance of construction projects in Kenya will depend on the extent the various remedial measures have been implemented rigorously.

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