

Factors Causing Construction Delays in Developing Countries: A Focus on Malawi

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Abstract

Delays in the delivery of construction projects remain a major challenge facing construction project managers and the industry as a whole. Delays are also deemed counterproductive to governments' efforts in developing countries to use construction as an engine of economic growth. This paper focuses on factors causing construction delays in developing countries with Malawi as a case study. The main aim of the study was to explore significant factors that cause construction delays. A comprehensive review of relevant literature and an empirical study of public construction projects in Malawi were carried out. The latter was conducted through a cross-sectional questionnaire survey. A response rate of 50.3% was achieved from a sample of 157 potential respondents drawn from contractors, consultants and public client organizations provided by the National Construction Industry Council (NCIC). The findings indicate that the top five significant factors causing delays in Malawi are economic problems, escalation of materials' prices, delayed monthly payments, financial difficulties faced by contractors and lack of materials on the market. Furthermore, the most frequent and severe effects of construction delay are cost escalation and time overrun. Additionally, there appears to be a skills gap among construction professionals in the management of delays.

Keywords

Construction delay, Developing countries, Malawi, Project management

1. Introduction

Delay is one challenge that clients, contractors and consultants grapple with in the delivery of construction projects world over. Delays do not only affect completion dates but also have cost implications on the project as a whole. The severity of the problem is different between developed countries and developing countries. Shebob *et al.* (2012) demonstrated that construction projects in developing countries suffer more delays compared with those in developed countries. The outcome points toward the need for more research on construction delays in developing countries. Furthermore, the issue of construction delays is a concern in developing countries because of the close link between the construction industry and economic growth. In contrast, the impact of delays leads to poor performance and is counterproductive. Therefore, investigations into construction delay are essential to assist policy makers and stakeholders in formulating robust mitigating measures. Despite several academic studies being conducted on the subject across developing countries, no such study has been undertaken in Malawi.

2. Literature Review

A detailed review of the literature on the subject was conducted to establish the extent of the problem. This yielded research themes which included factors causing delays, delay types, impact of delay, schedule as a Project Time Management (PTM) tool, schedule formats, delay analysis techniques, role of construction projects in developing countries and performance of public construction projects in Malawi.

Assaf and Al-Heijji (2006) define construction delay as the time overrun either beyond completion date specified in a contract or beyond the set date that the parties agreed upon for project delivery. Therefore, a delay occurs when a project slip-ups over its planned schedule against the intentions of one or all parties to a contract. A review of recent studies on the topic from developing countries demonstrated that construction delays are commonplace in most developing countries. The findings as presented in figure 1 demonstrate that the major factors causing delays are similar but the ranking differs from country to country. The main sources of delay on a project are the contractor, client, consultants and external forces. Ahmed et al. (2003) suggest four types of delays: non-excusable caused by the contractor and supply chain; excusable non-compensable caused by external forces; excusable compensable delays caused by client or agents; and concurrent delays caused simultaneously by both contractor and the client. Aibinu and Jagboro (2002) identified six impacts of construction delays in Nigeria. These are time overruns, cost overruns, dispute, total abandonment, arbitration and litigation. Accordingly, delays escalate project budgets through cost overrun and reduce profit margins for the contractor through liquidated damages and acceleration. Delays can also lead to adversarial relationships on a project resulting in arbitration, litigation and termination.

The review also demonstrated that knowledge of PTM is crucial in the successful delivery of construction projects. Sears et al. (2008) describe PTM as devising a project plan and schedule during planning stage and implementing the plan on site using set procedure for progress monitoring and reporting. APMBOK defines scheduling as a process used to establish the total project period and determine when activities start and complete (APM, 2006). Trauner (2009) gives four types of schedules: *narrative* which simply describes the planned construction sequence of work and is applied to small projects; *Gantt chart* or bar chart that displays the sequence of work activities in relation to start and completion dates; *linear schedule* portrayed as a graph on x-axis and y-axis is used on projects that are linear in such as pipelines, roads, and power lines; and *Critical Path Method* (CPM) which is similar to the bar chart but includes a critical path. However, no project plan is infallible hence delays will always occur on a project (Sears et al., 2008). Delay analysis is a process to determine the events that led to project delay and measure the time lost in order to apportion responsibility and assess compensation or damages. Five commonly used delay analysis techniques are as planned vs. as built; impacted as-planned; collapse as-built or but for; window analysis; and time impact analysis (Braithwaite & Ndekugri, 2008; Lovejoy, 2004).

Furthermore, the review revealed that construction plays an important role in the economic development of developing countries, hence the need to improve the delivery of construction projects. Myers (2013) suggests that in newly developing countries, the construction sector can contribute up to 20 percent of GDP. However the performance of public construction projects in Malawi is hampered by delays, which are counterproductive to government efforts to stimulate economic growth through infrastructure development (Faiti, 2005).

The concept of how construction delays occur and are managed can thus be summarized by a model as indicated in figure 2. The model illustrates that during the planning stage of a construction project the as-planned schedule is produced by the contractor and approved by the client. During project implementation stage, delays occur as a result of actions/inactions of the contractor, client, consultant and external forces. The resulting delays lead to various impacts. On the other hand, the occurrence of delays necessitates the revision of the schedule which enables delay analysis to be carried out in order to determine responsibility and damages. The outcome of delay analysis also leads to various impacts.

Study	Major Causes of Delays									
	1	2	3	4	5	6	7	8	9	10
Doloi <i>et al.</i> , 2012 (India)	Lack of commitment	Inefficient site management	Poor site coordination	Improper planning;	Lack of clarity in project scope	Lack of communication	Substandard contract			
Kaliba <i>et al.</i> , 2009 (Zambia)	Delayed payments	Financial processes and difficulties by contractors and clients	Contract modifications	Economic problems,	Materials procurement	Changes in drawings,	Staffing problems	Equipment unavailability	Poor supervision	Construction mistakes
Sambasivan & Soon, 2007 (Malaysia)	Contractor's improper planning	Contractor's poor site management	Inadequate contractor experience	Inadequate client's finance and payment for completed work	Problems with subcontractors	Shortage in material	Labour supply	Equipment availability and supply	Lack of communication between parties	Mistakes during construction stage
Alaghbari <i>et al.</i> 2007 (Malaysia)	Owner financial difficulties and economic problems	Contractor's financial problems	Supervision too late and slowness in making decisions by consultant	Consultant slow to give instructions & Lack of materials on market	Poor site management & Materials shortages on site by contractor	Construction mistakes and defective work by contractor	Delay in delivery of materials to site	Slowness in making decisions by owner	Lack of consultant's experience	Incomplete documents
Assaf & Al-Hejji, 2006 (Saudi Arabia)	Changes in orders by owner during construction	Delay in progress payments	Insufficient planning and scheduling	Shortage of labour	Difficulties in financing contract					
Aibinu & Odeyinka, 2006 (Nigeria)	Contractors' financial difficulties	Clients' cash flow problem	Architects' incomplete drawing	Subcontractors' slow mobilisation	Equipment breakdown and maintenance problems	Suppliers' late delivery of ordered materials	Incomplete structural drawings	Contractors' planning and scheduling problems	Price escalation	Subcontractors' financial difficulties
Long <i>et al.</i> , 2004 (Vietnam)	Incompetent designers/contractors	Poor estimation and change management	Social and technological issues	Site related issues						
Frimpong <i>et al.</i> 2003 (Ghana)	Monthly payment difficulties	Poor contractor management	Material procurement	Poor technical performance	Escalation of material prices					

Figure 1: Comparison of Ranking of Significant Factors Causing Delay from Different Countries

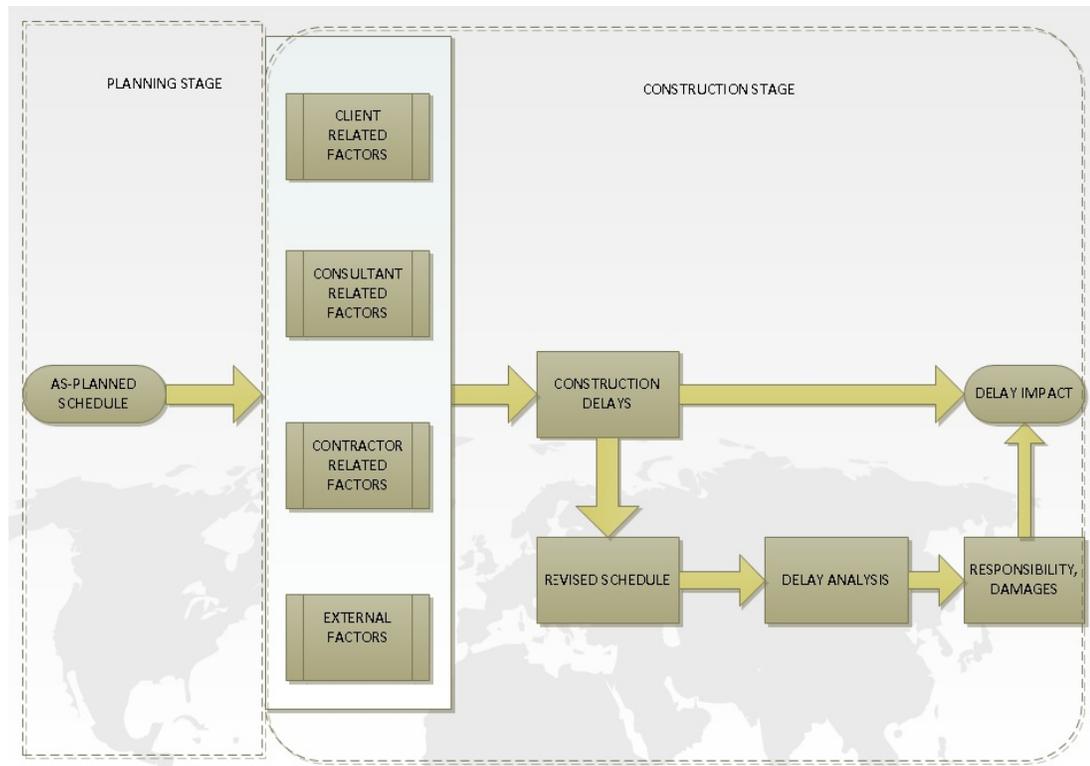


Figure 2: Construction Delay Conceptual Model

Thirdly, the review exposed a gap in the body of knowledge because despite the high number of studies reviewed, no academic research has been undertaken in Malawi to address the issue of construction delays. Most of the reported studies predominantly relate to developing countries whose economies are more advanced compared with Malawi. The World Bank (2013) classifies Malawi as a low income Sub-Saharan African country with GDP of US\$ 5.621 billion. The dearth of literature on similar studies conducted in Malawi suggests that little attention has been paid to this area of investigation in the past. It is against this background that a research was conducted to establish significant factors causing delays in public construction projects in Malawi.

3. Methodology

An empirical study was conducted in Malawi in March 2013 using web-based survey. A survey was chosen because it enables collection of data from a reasonably large sample within a relatively short time frame (Naoum, 2013). The objectives of the research were to identify significant factors causing delays in public construction projects in Malawi, to establish the main impact of delays in Malawi and to assess level of skills in managing delays. A sample of 157 consultants, contractors in the unlimited category and public client organizations was targeted basing on information provided by the National Construction Industry Council (NCIC), a body that regulates and promotes the construction sector in Malawi. Data was collected using a questionnaire that was administered thorough SurveyMonkey. The response rate was 50.3 percent comprised of 42 percent clients, 43 percent consultants and 15 percent contractors.

The factors identified from literature were put under four groups related to contractors, clients, consultants and external factors as indicated in table 1. Respondents were requested to give their opinion for each factor on a rating scale, which was chosen in order to determine the intensity of judgements made by respondents (Naoum, 2013). The response rating categories were highly disagree (one point weight), disagree (two points weight), slightly disagree (three points weight), slightly agree (four points weight),

agree (five points weight) and highly agree (six points weight). Rating average (RA) for each factor was calculated using the equation below.

$$RA = \left[\frac{(F_1 \times R_1 + F_2 \times R_2 + F_3 \times R_3 + F_4 \times R_4 + F_5 \times R_5 + F_6 \times R_6)}{(F_1 + F_2 + F_3 + F_4 + F_5 + F_6)} \right]$$

Where F is the total number of respondents choosing each rating category on the rating scale and R is the response category on the rating scale both ranging from 1 to 6. A factor was considered significant if it scored a minimum RA of 4.5. Factors were ranked based on the value of RA scored. A one-way analysis of variance (ANOVA) was carried out using SPSS to measure any significant differences among the perceptions of respondents' groups (Pallant, 2010)

Table 1: Categories of Factors Causing Delay

CODE	CONTRACTOR RELATED FACTORS	CODE	CONSULTANT RELATED FACTORS
2A	Construction mistakes and defective work	4A	Architects' incomplete drawing
2B	Contractor's poor site management and assistance	4B	Changes in drawings
2C	Equipment breakdown and maintenance problems	4C	Consultant slow to give instructions
2D	Equipment unavailability	4D	Improper planning
2E	Financial difficulties faced by the contractor	4E	Incompetent designers
2F	Inefficient site management	4F	Incomplete structural (or engineering) drawings
2G	Materials shortages on site	4G	Lack of communication
2H	Poor planning and scheduling by the contractor	4H	Lack of consultant's experience
2I	Poor site coordination	4I	Poor supervision by consultant
2J	Presence of unskilled labourers	4J	Slowness in making decisions by consultant
2K	Shortage of technical professionals with the contractor		
2L	Subcontractors' financial difficulties		
2M	Subcontractors' slow mobilisation		
	CLIENT RELATED FACTORS		EXTERNAL RELATED FACTORS
3A	Contract modifications	5A	Adverse/inclement weather conditions
3B	Delayed monthly payments	5B	Economic problems (inflation, fuel shortages and lack of foreign exchange)
3C	Design Change	5C	Escalation of materials' prices
3D	Financial processes and difficulties on the part of clients/owner	5D	Lack of materials on the market
3E	Lack of clarity in project scope	5E	Suppliers' late delivery of ordered materials to site
3F	Lack of commitment by client		
3G	Slowness in making decisions		
3H	Substandard contract		
3I	Too many change orders from the owner		

4. Results and Findings

4.1 Significant Factors Causing Delays in Malawi

From the initial list of 37 factors, respondents picked 27 significant factors as shown in table 2. Economic problems are ranked first (5.63), followed by escalation of material prices (5.56) and delayed monthly payments (5.44) in second and third positions, respectively. This ranking is different from previous results as presented in figure 1.

Table 2: Significant Factors Causing Delays in Malawi Public Construction Projects

CODE	RANK	FACTORS THAT CAUSE DELAYS	SCORE	RESPONSIBILITY
5B	1	Economic problems (inflation, fuel shortages and lack of foreign exchange)	5.63	External
5C	2	Escalation of material prices	5.56	External
3B	3	Delayed monthly payments	5.44	Client
2E	4	Financial difficulties faced by the contractor	5.42	Contractor
5D	5	Lack of materials on the market	5.27	External
3D	6	Financial processes and difficulties on the part of clients/owner	5.13	Client
5E	7	Suppliers' late delivery of ordered materials to site	5.09	External
2G	8	Materials shortages on site	5.04	Contractor
2K	9	Shortage of Technical professionals with the contractor	5.03	Contractor
3G	10	Slowness in making decisions	4.95	Client
2H	11	Poor planning and scheduling by the contractor	4.94	Contractor
4J	12	Slowness in making decisions by consultant	4.91	Consultant
2D	13	Equipment unavailability	4.90	Contractor
4C	14	Consultant slow to give instructions	4.87	Consultant
2F	15	Inefficient site management	4.85	Contractor
2B	16	Contractor's poor site management and assistance	4.84	Contractor
4I	17	Poor supervision	4.81	Consultant
4A	18	Architects' incomplete drawing	4.81	Consultant
2I	19	Poor site coordination	4.81	Contractor
2L	20	Subcontractors' financial difficulties	4.70	Contractor
3C	21	Design Change	4.68	Client
4B	22	Changes in drawings,	4.68	Consultant
4G	23	Lack of communication	4.66	Consultant
4D	24	Improper planning	4.65	Consultant
2C	25	Equipment breakdown and maintenance problems	4.59	Contractor
3I	26	Too many change order from the owner	4.56	Clients
3E	27	Lack of clarity in project scope	4.53	Client

This finding confirms theory that factors causing construction delays are the same but ranking varies from country to country depending on prevailing circumstances. Malawi's economy was going through a big transition. These results could be a direct reflection of these circumstances. External related factors dominate the top seven ranking and are all related to the tough economic situation. For example, escalation of material prices is directly related to the devaluation of the currency and increase in inflation; lack of materials on the market is partly due to shortage of foreign exchange; and the supplier's late delivery of materials to site could be due to shortages of foreign exchange and fuel. Among the internal factors, delayed monthly payment is the highest ranked. It is followed by financial difficulties faced by the contractor and financial processes and difficulties on the part of clients. This outcome shows that clients are mostly responsible for construction delays in public sector projects considering that financial difficulties faced by contractor are partly caused by delayed monthly payments. The outcome supports earlier findings as indicated in figure 1. Additionally, among the 23 internal factors on the list, clients and

consultants contribute 13 factors. These are excusable compensable delays. The contractor is entitled to claim both time and money.

4.2 Major Impacts of Construction Delays in Malawi

Eight impacts of delay were identified from the literature review and the empirical results show cost escalation and time overrun as being highly significant impacts whereas abandonment/termination is significant as shown in table 3. In the table *P* is greater than 0.05 hence the differences among average scores on dependent variables can be ignored. This finding supports theory that construction delays lead to cost escalation and time overrun. It is also consistent with the findings that most of the internal related significant delay factors in table 2 are excusable compensable allowing contractors to claim both time and money.

Table 3: Impacts of Delay using ANOVA

Rank	Impact	RA	F- Value	P- Value
1	Cost escalation	5.62	.741	.480
2	Time overrun	5.60	1.089	.342
3	Abandonment	4.73	.485	.618
4	Disputes	4.43	.560	.574
5	Liquidated damages	4.06	2.605	.081
6	Acceleration	3.96	.492	.613
7	Arbitration	3.77	.174	.841
8	Litigation	3.71	.424	.656

4.3 Level of Skills in Managing Delays

Participants were requested to indicate their level of understanding for delay type, schedule type and delay analysis method identified from literature review. Results in table 4 indicate that on average, respondents have good knowledge of delay type and schedule type but they all lack adequate knowledge of delay analysis techniques. Delay analysis is performed to assess time lost and apportion damages. This finding shows that there is a knowledge deficiency in the management of delays in the Malawi construction industry.

Table 4: Summary of Results by Category

Responded	Category	Highest Factor	Highest Impact	Level of Understanding		
				Delay Type	Schedule Type	Delay Analysis Method
12	Contractor	Economic problem (5.92)	Time Overrun (5.58)	Good (4.67)	Good (5.10)	Slightly good (4.18)
33	Client	Escalation of materials' prices (5.67)	Time Overrun & Cost Overrun (5.58)	Good (4.81)	Good (4.80)	Slightly good (4.07)
34	Consultant	Economic problems (5.53)	Cost Overrun (5.53)	Good (5.06)	Good (4.92)	Slightly good (4.24)

5. Conclusion and Recommendations

Significant factors causing construction delays in Malawi have been established but the ranking is different from studies conducted in other countries. Cost escalation and time overrun are the most frequent and severe impacts of delay in Malawi followed by abandonment/termination. It has also been established that clients, consultants and contractors all seem to lack adequate knowledge of delay analysis techniques. From these findings it is clear that the local environment has a bearing on the factors causing delay. Therefore, it is essential that the local environment is scanned at the feasibility stage to identify political, economic, sociological, technological and legal (PESTEL) factors that may have influence on

the project (Fewings, 2013). Bespoke training programs in the area of project time management and delay analysis are essential to bridge the identified knowledge gap in the Malawian Construction industry.

6. References

- Ahmed, S.M., Azhar, S., Kappagantula, P. & Gollapudi, D. 2003, "Delays in construction: A brief study of the Florida construction Industry ", *Associated schools of construction (ASC) proceedings of the 39th annual conference*, ed. C.W. Berryman, Clemson University - Clemson, South Carolina, April 10-12, 2003, Berryman, Charles W., Miami, pp. 257.
- Aibinu, A. & Odeyinka, H. 2006, "Construction delays and their causative factors in Nigeria", *Journal of Construction Engineering and Management*, Vol. 132, no. 7, pp. 667-677.
- Aibinu, A.A. & Jagboro, G.O. 2002, "The effects of construction delays on project delivery in Nigerian construction industry", *International Journal of Project Management*, Vol. 20, no. 8, pp. 593-599.
- Alaghbari, W., Kadir, M.R.A., Salim, A. & Ernawati, 2007, "The significant factors causing delay of building construction projects in Malaysia", *Engineering, Construction and Architectural Management*, Vol. 14, no. 2, pp. 192-206.
- Assaf, S.A. & Al-Hejji, S. 2006, "Causes of delay in large construction projects", *International Journal of Project Management*, Vol. 24, no. 4, pp. 349-357.
- Association for Project Management, 2006, *The APM body of knowledge*, 5th edn, Ingmar Folkmans, Buckinghamshire.
- Braimah, N. & Ndekugri, I. 2008, "Factors influencing the selection of delay analysis methodologies", *International Journal of Project Management*, Vol. 26, no. 8, pp. 789-799.
- Doloi, H., Sawhney, A., Iyer, K.C. & Rentala, S. 2012, "Analyzing factors affecting delays in Indian construction projects", *International Journal of Project Management*, Vol. 30, no. 4, pp. 479-489.
- D. Faiti Hon. 2005, *Development projects in Malawi: Progress assessment*. Ministry of Economic Planning and Development, Malawi Government, Lilongwe.
- Fewings, P. 2013, *Construction project management: An integrated approach*, 2nd edn, Routledge, Oxon.
- Frimpong, Y., Oluwoye, J. & Crawford, L. 2003, "Causes of delay and cost overruns in construction of groundwater projects in a developing countries; Ghana as a case study", *International Journal of Project Management*, Vol. 21, no. 5, pp. 321-326.
- Kaliba, C., Muya, M. & Mumba, K. 2009, "Cost escalation and schedule delays in road construction projects in Zambia", *International Journal of Project Management*, Vol. 27, no. 5, pp. 522-531.
- Lovejoy, V.A. 2004, "Claims schedule development and analysis: Collapsed as-built scheduling for beginners", *Cost Engineering*, Vol. 46, no. 1, pp. 27-30.
- Myers, D. 2013 *Construction economics: a new approach*, 3rd edn, Routledge, Oxon.
- Naoum, S. G. 2013, *Dissertation research & writing for construction students: Shamil G. Naoum*, Routledge, New York.
- Pallant, J. 2010, *SPSS survival manual: A step-by-step guide to data analysis using SPSS*, Open University Press, Buckingham.
- Sambasivan, M. & Soon, Y. W. 2007, "Causes and effects of delays in Malaysian construction industry", *International Journal of Project Management*, Vol. 25, no. 5, pp. 517-526.
- Sears, S.K., Sears, G.A., & Glouch, R.H. 2008, *Construction project management: a practical guide to field construction management*, 5th edn, Willey, Hoboken
- Shebob, A., Dawood, N., Shah, R. & Xu, Q. 2012, "Comparative study of delay factors in Libyan and the UK construction industry", *Engineering Construction and Architectural Management*, Vol. 19, no. 6, pp. 688-712.
- The World Bank 2013, *Malawi home* [online]. Available at: <http://www.worldbank.org/en/country/malawi> [Accessed April 15, 2013].
- Trauner, T. J. 2009, *Construction delays: Understanding them clearly, analyzing them correctly*. 2nd edn, Elsevier Butterworth-Heinemann, San Diego, California.