



## Effects of Time Overrun on Construction Projects within Jos Metropolis, Nigeria

Joshua S. Mangvwat,<sup>1</sup> Ola S. Olumide,<sup>2</sup> Ajalah M. Yahaya<sup>3</sup>, Paul W. Zakka<sup>3</sup> and Fredrick O. Job<sup>1</sup>

<sup>1</sup> Department of Quantity Surveying, Faculty of Environmental Sciences, University of Jos

<sup>2</sup> Department of Estate Management, Faculty of Environmental Sciences, University of Jos

<sup>3</sup> Department of Building, Faculty of Environmental Sciences, University of Jos

### ABSTRACT

*This study was carried out to determine effects of time overrun on construction projects, contractors, clients and consultants within the study area. Using survey method, 11 contractors that completed 26 public construction projects within Jos metropolis were purposively selected to reflect direct active exposure to construction contracts with government ministries. Thirty construction professionals on these projects were randomly selected and interviewed. The most common effects of time overrun are delayed completion, supplementary agreement, strained relations among stakeholders and budget shortfalls characterized construction projects. Regression analysis shows that a unit change in time overrun led to increase in cost by a factor of 0.04. To ameliorate the effects of time overrun, the research recommends that clients engage competent hands to manage projects sites while ensuring they fulfill their own obligation of prompt payment to contractors thereby improving time performance.*

**Key words:** Time, Overrun, Effects, Cost, Construction Projects

### INTRODUCTION

Construction project is a mission undertaken to create a unique facility, product or service within a specified scope, quality, time, and cost (Memon, Rahman & Azis, 2012; Chiktara, 2004). Historically, a project is successful when it is completed on time, within cost, and in accordance with stakeholders' specification (Arditi, Akan & Gurdamar, 1997; Songer & Molenaar, 1997 and Atkinson, 1998). Going by these criteria, project success is not common place because most construction projects encounter delayed completion. Aibinu and Jagboro (2002) noted that this stems from the findings that projects are generally characterized by long delays. This is because construction projects are exposed to uncertain environments such as construction complexities, presence of various interest groups such as project owners, end users, consultants, contractors, financiers, and issues relating to materials, equipment, and funding, climatic conditions, economic, political, environmental and statutory regulations.

The construction industry is an important sector globally. Although not working to its fullest potential in most developing countries, it is still of prime significance as growth in this sector is critical for growth in national income. This is so because it is among the largest sectors that generates employment and remains a key driver for economic development (International Labour Organisation, 2001). The construction industry is therefore one of the most significant industries whose growth rapidly develops countries. The performance of construction activities in many countries is also used to regulate the economy.

Like many other developing countries, Nigeria is faced with critical project management related issues among which time overrun is prominent. According to Othman, Nasir and Nuruddin (2017), timely completion is the key criteria to achieve success in any project



despite the industry. Effective time management is among the major considerations throughout the construction process and can be regarded as one of the most important driving forces of project success. Despite its proven importance, it is not uncommon to see construction projects failing to achieve their objectives within specified time with resultant negative and inescapable effects.

Time overrun as observed by several authors is the late completion of works as compared to planned schedule (Al Saadi, Bux, & Al Nuaimi, 2018 and Kaming, Olomolaiye, Holts & Harris, 1997). It is a global phenomenon and is frequently associated with nearly all projects in the construction industry (Azhar, Farouqui & Ahmed, 2008). The inability to complete projects within time can have adverse effects on the project, client and contractor. This raises the contentious issue of who takes responsibility for the delay and often results in conflicts that frequently end up in litigations (Othman *et al.*, 2017). This trend is more severe in developing countries where time overrun has led to cost escalation that exceeded 100% of planned cost (Ahmed, Azher, Castillo & Kappagantula, 2002).

The development of Jos metropolis in Nigeria over the years necessitated the provision of infrastructural facilities by different public and private organizations. Since the provision of these facilities is known the world over to be associated with complexities among which time overrun is prominent, it is intended that this research will make a case study of the phenomenon as it affects Jos. The necessity of this study is therefore borne out of the fact that majority of construction projects overrun in time. It is against this backdrop that this study is undertaken to determine the effects of time overrun on construction projects in Jos.

## LITERATURE REVIEW

Improper planning, financial problems, contractual relationships, lack of effective communication, management issues, design errors and shortage of supply rank high as causes of delays in construction industry (Maura, Teixeira & Pires, 2007; Assaf, Al-Khalil & Al-Hazmi, 1996; Mezher & Tawil, 1998; Maghareh, Imani, Karimi & Ostovan, 2011; Abdul-Rahman & Berawi, 2006; Mohammed & Isah, 2012). The findings on financial issues further agree with similar studies in other developing countries. For example, Frimpong *et al.* (2003) found that financial problems are the main factors that cause delay in the construction of groundwater projects in Ghana. Alaghbari *et al.* (2007) study in Malaysia indicated that from a list of thirty-one (31) factors, clients, contractors and consultants agreed that financial problems were the main factors causing delay. The inability of clients to honour payments on time was determined as the first major factor that causes delays in building construction projects in Ghana (Fugar & Agyakwah-Baah, 2010). Sweis *et al.* (2008) studied the causes of delay in residential projects in Jordan and concluded that financial difficulties faced by the contractor and too many change orders by the owner are the leading causes of construction delay. Abd El-Razek *et al.* (2008) in a similar study in Egypt found that the most important cause of delay is tied to project financing during the construction phase.



According to Othman et al (2017), timely completion remains the key criteria to achieve success in any project despite the industry. However, the delays that lead to time overrun have been shown in the literature to be almost inescapable. Since the persistent failure to meet stipulated timeline have their attendant unpleasant effects and are phenomenon worth unraveling; the questions one may ask are – what are the effects of time overrun? Who bears the brunt of the overrun? How best can these be tackled? Time overrun therefore requires in-depth and continuous investigation until there is significant improvement in project delivery that is capable of bringing down the negative effects to their barest minimum.

## METHODOLOGY

Survey method was used in this study. This is a non-experimental, descriptive research method that suites collection of data on the phenomena of time overruns. The methodology combined a library/desk search and personal interviews. Project files used on the construction sites were examined and interview questions developed that enable collection of data. The contractors responsible for delivery of these projects were interviewed. The research targeted completed state government projects across Jos metropolis. A list of all construction contracts awarded within the metropolis by the state Ministry of Works and that of Housing and Urban Development form the population of the study. The choice of these ministers is because they have been actively involved in awarding various types of construction project contracts for the Plateau State government since its creation.

Using a combination of purposive and simple random sampling techniques, 51 contractors without cases of multiple registrations who recently completed projects with the aforementioned ministries were selected and administered questionnaire. Thirty (30) out of the 35 responses received, representing 59% of total questionnaires administered were found to be valid. Also, 30 construction professionals working with the contractors were interviewed. Responses from the questionnaire, supplemented with the interviews conducted form the basis of analysis. The data collected was analyzed and presented using descriptive tools of percentages, frequency, cross tabulations and simple analysis of perception. The inferential statistical method of Regression Analysis was used to test the impact time overrun has on cost as it affects project budget. To achieve this, a linear regression model is specified using time overrun as independent variable and project budget as dependent variable.

$$Y = l + x(X_1)$$

Where:

$Y$  = Construction project budget

$x$  = Coefficient of time overrun

$l$  = Intercept

$X_1$  = Time overrun



## PRESENTATION AND DISCUSSION OF RESULTS

Table 1: Response Categories

Profession	Frequency	Percentage (%)	Years of Experience	Frequency	Percentage (%)	Type of Project	Frequency	Percentage (%)
Engineer	15	50	1 – 10 years	23	76.6	Building	2	6.7
Builder	2	6.7	11 – 20 years	3	10	Civil Engineering	27	90
Quantity Surveyor	8	26.7	21 – 30 years	2	6.7	Specialist	1	3.3
Architect	5	16.6	31 – 40 years	2	6.7	Others	0	0
Total	30	100	Total	30	100	Total	30	100

Table 1 show three response categories, namely construction professionals dominated by Engineers (50%) and Quantity Surveyors (26.7%); their work experiences with the highest number (76.6%) having 1–10 years experience – an indication of more junior professionals being guided and supervised by the more experienced few; and types of projects studied with a 90% response of them being civil engineering projects. This explains the dominance of Engineers in the professionals' category of responses received.



The effects of time overrun on construction projects are as presented as follows.

Table 2: Effect of Time Overrun on Construction Projects

Project	S/N	Proposed completion (Months)	Actual completion (Months)	Time Overrun (Months)	% Time overrun	Contract Sum (=N=)	Cost at completion (=N=)	Cost Overrun (=N=)	% Cost overrun
Road Constructions	1	12	23	11	92%	1,426,352,595	2,777,121,122	1,350,768,528	95.0%
	2	12	21	9	75%	505,171,273	620,829,870	115,658,597	23.0%
	3	12	20	8	67%	1,234,636,237	1,738,518,165	503,881,928	41.0%
	4	12	19	7	58%	1,169,793,450	1,500,524,010	330,730,560	28.0%
	5	9	14	5	56%	150,000,000	231,133,011	81,133,011	54.0%
	6	24	37	13	54%	2,855,763,366	4,806,767,837	1,951,004,471	68.0%
	7	6	9	3	50%	6,944,375	8,976,876	2,032,501	29.0%
	8	14	19	5	36%	831,086,942	1,269,756,722	438,669,779	53.0%
	9	12	16	4	33%	81,921,397	99,402,450	17,481,053	21.0%
	10	12	16	4	33%	1,340,016,955	1,506,987,568	166,970,613	12.0%
	11	14	18	4	29%	1,270,074,966	1,605,447,701	335,372,735	26.0%
	12	9	11	2	22%	836,307,927	874,374,824	38,066,897	5.0%
	13	12	14	2	17%	189,695,849	189,198,670	-497,179	-0.3%
	14	12	12	-	0%	500,937,400	500,321,687	-615,713	-0.1%
	15	12	11	-1	-8%	315,000,000	314,080,458	-919,542	-0.3%
	16	6	5	-1	-17%	407,856,095	407,361,920	-494,175	-0.1%
Dualization of Road	17	12	24	12	100%	1,731,536,526	2,832,154,018	1,100,617,492	64.0%
	18	12	22	10	83%	1,358,671,388	2,045,197,183	686,525,795	51.0%
	19	12	18	6	50%	589,525,642	691,559,240	102,033,598	17.0%
	20	14	20	6	43%	2,025,128,240	2,832,154,018	807,025,778	40.0%
	21	10	13	3	30%	1,161,985,277	1,305,631,045	143,645,768	12.0%



	22	12	12	-	0%	1,402,589,665	1,367,153,308	-35,436,357	-3.0%
Road Rehabilitatio n	23	9	13	4	44%	984,911,797	1,295,473,539	310,561,742	32.0%
	24	9	8	-1	-11%	293,591,713	293,128,575	-463,138	-0.2%
	25	19	16	-3	-16%	2,311,097,301	2,175,880,330	-135,216,971	-6.0%
Erosion Control	26	6	7	1	17%	39,535,650	38,910,968	-624,682	-2.0%



### Effects of Time Overrun on Construction Projects

Table 2 shows the effect time overruns has on the construction projects studied. From analysis carried out, 20 out of the 26 projects representing 77% of the projects suffered time overrun and in consequence 18 out of the 20 that overrun in time also overrun in cost. For instance, when the road dualization project (serial number 17) overrun in time by 100%, the contract sum was exceeded by as much as 64%. This got worst on the road construction project (serial number 1) in which a time overrun of 92% resulted in a cost overrun of 95%. However, two projects that overrun in time did not overrun in cost (serial numbers 13 and 26). A rare exception however occurred in these projects which have 2 and 1 months' time overrun respectively without the resultant effect of cost overrun. Strangely enough, there was a saving of 2% on project number 26. Four projects representing 15% of the samples studied were completed before their earmarked dateline. This is reflected on projects with serial numbers 15, 16, 24 and 25 in the Table. Savings of as much as 6% of the contract sum was realized as a result of completion of project with serial number 25 three months ahead of the dateline, that is, by saving 16% of the allotted completion time, 6% of the budget for the contract was saved. Only two projects representing 7.5% of the sample studied were completed exactly on schedule and these timely completions resulted in marginal savings ranging from 0.1% to 3.0% of budget. The implication of this is that all things being equal, the more adherent the execution of a construction project is to the scheduled, the less the effect of cost overrun on the project, that is, the tendency overshoot initial budget.

### Effects of Time Overrun on Contractor, Client and Consultants

Apart from affecting construction projects, the effects of time overrun also extends to the contractor, client and consultant. The responses obtained on these effects were subjected to a simple percentage analysis and the results are presented in Tables 2 to 4.

**Table 3: Effect of Time Overrun on Contractor**

Response	Frequency	Percentage Response
Reduction in profit margin	2	6.7
Reduce chances of future contract awards	2	6.7
Increase in cost of Operation	2	6.7
Loss of productive time	3	10
Threats of termination of contract	4	13.2
Disruption of programme of work	8	26.7
Delay in the completion of project	9	30
<b>Total</b>	<b>30</b>	<b>100</b>

The simple percentage analysis on Table 3 shows that the most dominant effect of time overrun on the contractor is the delay in the completion of project. This is followed by disruption of programme of work and the threats of possibility of termination of the contract.



**Table 4: Effect of Time Overrun on Client**

Response	Frequency	Percentage Response
Paying more than necessary	12	40
Delayed takeover of project	6	20
Disorganizes client programme	4	13.3
Delayed accrual of revenue	3	10
Compelled to seek legal council	1	3.3
Dissatisfaction due to unmet expectations	4	13.3
<b>Total</b>	<b>30</b>	<b>100</b>

Prominent among the effects of time overrun on the client shown in Table 4 is that the client ends up paying more than necessary to complete the project. Another effect is the delayed takeover of project which in turn delays any revenue due to the client in cases where the project is commercially oriented. This disorganizes the client's programme; leaving him dissatisfied due to unmet expectations.

**Table 5: Effect of Time Overrun on Consultants**

Response	Frequency	Percentage Response
Loss of reputation	6	20
Constrained to work extra	8	26.7
Monotony sets in	4	13.3
Burdened to seek for solutions	6	20
Underpaid for services rendered	1	3.3
Risk of sanction by regulatory bodies	3	10
Affects professional practice	2	6.7
<b>Total</b>	<b>30</b>	<b>100</b>

Table 5 shows that the consultant is 26.7% of the time constrained to work extra to resolve issues when confronted with overruns. There is a risk of loss of reputation rated at 20%. This places a burden on the professional to seek new techniques and skill for solutions as indicated by 20% of the responses. Another group representing 13.3% say the work becomes monotonous.

## SUMMARY

The most critical effect of time overrun was found to be cost overrun. Identification of cost effect of time overrun is a prerequisite to avoiding or at least minimizing time overrun and other avoidable effects on construction projects. This research therefore, investigated and identified the critical effects of time overrun on public construction projects and stakeholders in Jos. The implication of this is that all things being equal, the more adherent the execution of a construction project is to the scheduled programme with





respect to completion time, the less the tendency to overrun in time and in consequence overrun in cost thereby mitigating the tendency to overshoot budget. From this research, the client is worst affected by time overrun since the client is compelled to look for additional funds to complete the construction project. However, it should be noted that the projects, consultants, contractors, and even the economy of the country are all affected in the end.

## CONCLUSION

Majority of the construction projects studied in Jos experience time overrun thereby exceeding initial contract amount. Taking into account the scarce financial resources available to the state, time overrun is a major problem. This research was carried out to unearth their effects on public construction projects. The most common effects of time overrun identified were delayed completion, supplementary agreement, strained relations among stakeholders, and budget shortfall of project owners. It is hoped that these findings will guide efforts to improve the time performance of construction projects.

## RECOMMENDATIONS

Since clients are the most influential parties who invest money for realization of construction project and since they are the key role players starting from conception through construction and up to operation of the project; the following recommendations are presented to the client who ultimately bears the brunt of time overrun.

1. Clients should allow sufficient time to prepare project briefs. Allow sufficient time for proper feasibility studies, planning, design, information documentation and tender submission. This helps to avoid errors and omissions that consequentially help in avoiding or minimizing time overrun.
2. Ensure comprehensive articulation and communication of owner and end-user needs and requirements during briefing sessions. Client goals should be sufficiently accurate and realistic.
3. Fulfill contractual obligations, especially as regards to payment of contractors for works duly executed, or settlement of fees accounts of consultants and possession of construction site. Clients should ensure that adequate funds are available before projects are started
4. Accept and implement cost reduction incentives proposals presented to them.
5. The contractual provisions which allow contractors to claim interest on delayed payments must be strictly enforced to serve as deterrent to defaulting clients.

In order to curb consultants/contractors' ineptitude which correlates directly with delay factors such as underestimation of cost, time of completion and complexity of projects, poor scheduling and control and poor site management, the research recommends the following:

1. The regulatory bodies that oversee activities of construction professionals and contractors must institute measures to ensure its members go through continual education so that their technical and managerial competences can be improved.
2. The acquisition of a certain number of credit hours in the continual education should be mandatory criterion for renewal of membership.



3. The government body responsible for the registration and classification of contractors wishing to execute public projects must insist on its requirement that contractors must have in their employment certain key technical staff as a condition for registration. This applies to consultants as well.
4. Effective ways must be designed to verify the list of staff produced by contractors and consultants in support of their application and to ensure that these key staff positions are continually filled by technically competent individuals.

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