

CAUSES AND TECHNIQUES FOR MINIMIZING DELAY IN COMPLETION OF BUILDING PROJECTS BY CONSTRUCTION TEAMS IN KANO METROPOLIS

By

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ABSTRACT

The study determined the causes and techniques for minimizing delay in completion of building projects by construction teams in Kano Metropolis in Kano State, Nigeria. Three research questions and two null hypotheses were formulated to guide the study. Relevant literature in line with the objectives of the study was reviewed. Mean and standard deviation were used as statistical tools to analyze data for the research question, while ANOVA was employed to test the null hypotheses at 0.05 level of significance. Descriptive survey research design was employed for the study. The population for the comprised of 215 Clients of ongoing building projects, 71 Contractors and 71 Project Managers in Functional construction industries in Kano Metropolis, making a total of 357 respondents. The instrument used to collect data was questionnaire titled: Questionnaire for Techniques for Minimizing Delay in Completion of Building Projects by Construction Teams (QTMDCBPCT) containing 46 items. The reliability coefficient of the instruments was found out to be 0.83 using Cronbach Alpha statistics. The findings of the study revealed that shortage of construction material, inadequate consultant experience, incompetent project team, inadequate contractor experience and others are causes of building project delay in Kano Metropolis. More so findings revealed contractor's financial stability have positive impact in minimize building project delay, contractor ability to supply tools and equipment will minimize building project delay and Contractor level of experience help in minimize building project delay. Based on the findings of the study it was recommended that construction teams should develop adequately work productivity strategies in which extensive review of the causes of building delay be put into consideration before the commencement of building project in a view to avert delay.

Key Words: Causes, Techniques, Delay, Building Project, Construction Teams

Introduction

Building construction project delay is a global problem. Delay is defined as the extension of time beyond planned completion dates traceable to the contractors (Kaming et al 1997). Delays are incidents that impact a project's progress and postpone project activities; delay causing incidents may include weather delays, unavailability of resources, design delays, etc. Lee et al. (2017) conducted a research in China on the effects of construction delays, the results shows additional costs, decline in quality and rework, loss of productivity, late completion of the project, increased time related costs, third party claims, and termination of contract are some effects of construction delays.

Delay of building projects according to Assaf and Al-Hejji (2006) is a time over-run either beyond the completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. (Majid, 2006) describes delay as time loss. Tawil et al. (2014),

Afshari et al. (2011) and Acharya et al. (2006) defined construction delay as a situation when the client and contractor collectively contribute to the late execution of the project within the contract completion date as agreed in the contract terms. Delay in construction project can occur due to many sources such as characteristics of the project, experience and qualification of construction project team, internal and external factors affecting the construction organization, social, economic and cultural issues. These issues can be associated with the project construction team, namely: clients, contractors, subcontractors, consultants and external factors (such as statutory agencies). Building construction project delays have an adverse impact on the project sponsor, client, project team member and participant involved in the entire project, which frequently result to disagreement, suspicion, financial problem and claims, lawsuit, and renegotiations (Megha & Bhatt 2013). Also, according to Ahmad et al (2003), seven out of ten projects suffered delays in their completion.

The performance of construction project team is one of the factors that basically determine the long term effect of construction works they produce in terms of quality and completion. Motwani et al (2017), construction project team is a group of construction professionals and personnel from one or more organizations who combine to fulfill the necessary design, detailing and construction functions comprising the construction of the project. Durdyev and Mbachu (2011) further defined construction project team as the project manager, site engineer, contractors, specialists and others who come together to design, manage and construct a building Project. A construction team is a professional group of people responsible for the planning, designing and construction of a project.

The professionals in the industry include the Architects, Quantity Surveyors, Engineers (Civil, Mechanical, Structural, Electrical), the Building Contractors, Artisans and the suppliers. All these professionals perform different roles in order to enhance the success of any construction project. So many issues have over the years constituted as problems for construction professionals, most importantly is the issue of time frame for which they have to execute construction works. Mohamed (2014) discovered that lack of experience of construction project team do not have the ability to prepare accurate aesthetic and structural drawings and quantity take off and billing for the proposed structures due to client's requirements which is most times a very short period of time.

In addition, the manner in which construction professionals adapts to this unfavourable working condition depends on the working experience which they have attained over time, this has constituted another problem in the construction industry as most construction professionals in recent times are fresh graduates who, though might be intelligent but does not have the required experience to manage these conditions and perform at the highest level of productivity. Hence, the need for the study to determine the causes and techniques for minimizing delay in completion of building project by construction teams in Kano Metropolis.

Objectives of the Study

The study sought to find out:

1. Causes of delay in building projects completion in Kano Metropolis
2. Project manager responsibilities in minimizing building project delays in Kano Metropolis.
3. Contractor responsibilities in minimizing building project delays in Kano Metropolis.

Research Questions

Based on the objectives, the following research questions were formulated:

1. What is the perception of respondents on causes of delay in building projects completion in Kano Metropolis?
2. What is the perception of respondents on project manager responsibilities in minimizing building project delays in Kano Metropolis?
3. What is the perception of respondents on contractor responsibilities in minimizing building project delays in Kano Metropolis?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

HO₁: There is no significant difference in the mean responses between the contractors and project managers (Site Engineer and Architect) on the perception of project manager responsibilities in minimizing building project delays in Kano Metropolis.

HO₂: There is no significant difference in the mean responses between the contractors and project manager (Site Engineer and Architect) on the perceptions of respondents on Contractor responsibilities in minimizing building project delays in Kano Metropolis.

Methodology

The study determined the Causes and Techniques for Minimizing Delay in Completion of Building Project by Construction Teams in Kano Metropolis, Nigeria. three research questions and two null hypotheses were formulated to guide the study. Descriptive survey research design was employed for the study. Mean and standard deviation were used as statistical tools to analyzed data for research question, while ANOVA was employed to test the null hypotheses at 0.05 level of significance. The respondents for the study were 142 subjects comprised of 71 Contractors and 71 Project Managers from a functional construction industries in Kano Metropolis. The instrument used was questionnaire titled: Questionnaire for Techniques for Minimizing Delay in Completion of Building Projects by Construction Teams in Kano Metropolis (QTMDCBPCT) containing 46 items. The reliability coefficient of the instruments was established to be 0.83 using Cronbach Alpha statistic yielding an index of 0.83.

Results

4.1 Research Question 1

What is the perception of respondents on causes of delay in building projects completion in Kano Metropolis?

Table 1: Mean and Standard Deviation of Respondents on the Perception of Respondents on Causes of Delay in Building Projects Completion in Kano Metropolis
N = 357

S/N	Items	\bar{x}	SD	R
1	Shortage of construction materials	3.73	0.45	Agreed
2	Inadequate consultant experience	3.87	0.45	Agreed
3	Incompetent project team	4.22	0.47	Agreed
4	Inadequate contractor experience	4.17	0.5	Agreed
5	Poor design and delays in design	4.19	0.45	Agreed
6	Lack of communication and coordination	4.06	0.5	Agreed
7	Incomplete drawing/ detail design	4.21	0.43	Agreed
8	Slow mobilization of labour	4.3	0.48	Agreed
9	Equipment allocation problem	4.09	0.59	Agreed
10	Late delivery of materials	4.24	0.37	Agreed
11	Unforeseen ground condition	3.89	0.35	Agreed
12	Inappropriate construction methods	3.76	0.57	Agreed
13	Improper project planning and scheduling	3.98	0.25	Agreed
14	Improper project feasibility study	4.23	0.56	Agreed
15	Insufficient numbers of equipment	4.15	0.52	Agreed
16	Shortage of equipment parts	4	0.65	Agreed
17	Slow response and poor inspection	3.61	0.61	Agreed
18	Escalation of material prices	3.91	0.49	Agreed
19	Unreliable subcontractor	3.98	0.57	Agreed
20	Poor procurement of construction materials	4.22	0.55	Agreed
21	Bad weather condition	4.17	0.63	Agreed
22	Unforeseen ground bad condition can cause productivity delay	4.47	0.5	Agreed
23	Conflict and civil commotion among construction participant	4.24	0.53	Agreed
24	Frequent equipment breakdown causes delay	4.32	0.5	Agreed
25	Strike by worker in the construction site	4.09	0.47	Agreed

26	Changes in laws and regulations delay construction	4.03	0.63	Agreed
27	Unavailability of materials on the market for purchase	4.22	0.61	Agreed
28	Transport and logistics delays slow down productivity	4.05	0.48	Agreed
29	Accessibility of locally manufacture plant and equipment	4.47	0.68	Agreed
30	Government policy (control and development)	4.49	0.59	Agreed
31	The geographical position of a project, land situation and climate	4.16	0.84	Agreed
32	kidnapping of expatriate construction workers and militancy	4.14	0.5	Agreed
Grand Mean		4.04	0.49	

Key: \bar{x} = Mean, SD= Standard deviation, D = Remark, A = Agreed, N= Number of Respondents

The results in Table 1 revealed that the respondents agreed with all items on causes of delay in building projects completion in Kano Metropolis with mean ranging from 3.61–4.47. The grand mean of 4.04 showed that the respondents agreed generally on causes of delay in building projects completion in Kano Metropolis. The result further showed that the standard deviation of the items ranges from 0.25 - 0.65. The 20 items had their standard deviation less than 1.96 showing that the respondents were not too far from the mean and were close to one another in their responses.

Research Question 2

2. What is the perception of respondents on project manager responsibilities in minimizing building project delays in Kano Metropolis?

Table 2: Mean and Standard Deviation of Respondents on the Perceptions of Respondents on Project Manager Responsibilities in Minimizing Building Project Delays in Kano Metropolis

S/N	Items	N = 357		
		\bar{x}	SD	R
1	Project manager understand and interpret building design quickly will facilitate building project completion on time	4.08	0.63	Agreed
2	Project manager cordial relationship with contractor speedy executing building project	4.14	0.56	Agreed
3	Project manager qualification in leading building project construction facilitate completion of building project at right time	3.87	0.67	Agreed
4	Pro decision making by project manager facilitate good coordination and improve productivity in the construction site	3.79	0.70	Agreed
5	Project manager that always carry out inspection of material to sort out the bad ones at right time for timely building projects completion	3.90	0.58	Agreed
6	Project manager ability to interpret design modification improve building project productivity prompt completion	3.95	0.55	Agreed
7	Project manager constant report to client progress reports of work facilitate building project completion	4.20	0.51	Agreed
8	Good experience of project manager in forecasting and planning facilitate the building project completion	3.92	0.67	Agreed
9	Timely project manager advise the client facilitate building project	4.14	0.71	Agreed
10	Lack of project manager commitment retarded construction of building project	3.92	0.60	Agreed
11	Project manager ability to determine the percentage of work done for payment of contractor within that stage lead to timely completion of building project	4.33	0.68	Agreed
12	Project manager ability to ensure good relationship between the client and contractor will facilitate building project completion	4.03	0.50	Agreed
13	Project manager ability to report to client exactly the situation of the construction site make client delay building project completion	3.81	0.93	Agreed
Grand Mean		4.01	0.64	

Key: \bar{x} = Mean, SD= Standard deviation, R = Remark, A = Agreed, N= Number of Respondents

The results in Table 2 revealed that the respondents agreed with all items on project manager responsibilities in minimizing building project delays in Kano Metropolis with average mean ranging from 3.71–4.33. The grand mean of 4.01 showed that the respondents agreed generally on project manager responsibilities in minimizing building project delays in Kano Metropolis. The result further showed that the standard deviation of the items ranges from 0.50 - 0.93. The 13 items had their standard deviation less than 1.96 showing that the respondents were not too far from the mean and were close to one another in their responses.

Research Question 3

3. What is the perception of respondents on contractor responsibilities in minimizing building project delays in Kano Metropolis?

Table 3: Mean and Standard Deviation of Respondents on the Perceptions of Respondents on Contractor Responsibilities in Minimizing Building Project Delays in Kano Metropolis

N = 357				
S/N	Items	\bar{x}	SD	R
1	Contractor's financial stability have positive impact in minimize building project delay	4.36	0.48	Agreed
2	Contractor ability to supply tools and equipment will minimize building project delay	4.06	0.47	Agreed
3	Contractor level of experience help in minimize building project delay	4.27	0.48	Agreed
4	Contractor with good cost estimate assist in minimize building project delay	4.11	0.51	Agreed
5	Contractor delivery of building material at right time minimize building project delay	4.27	0.50	Agreed
6	Contractor with good skill workforce in the construction site lead in minimizing building project delay	4.01	0.61	Agreed
7	Contractor with reliable subcontractors will minimize building project delay	4.11	0.53	Agreed
8	Contractors with good consultants personnel help in minimizing building project delay	4.18	0.57	Agreed
9	Contractor that ensure required materials are available at the right time lead to minimizing building project delay	4.15	0.50	Agreed
10	Contractor with modern equipment for fast execution of work will minimize building project delay	3.93	0.50	Agreed

11	Contractor with good procurement record of construction materials lead to minimizing building project delay			Agreed
		4.06	0.58	
12	Contractor with good time estimate on site improve and minimize building project delay			Agreed
		3.87	0.59	
13	Contractor with good site management and supervision facilitate building project completion			Agreed
		4.02	0.40	
14	Contractor with good knowledge of different construction methods facilitate building project completion			Agreed
		4.44	0.60	
	Grand Mean			Agreed
		4.13	0.52	

Key: \bar{x} = Mean, SD= Standard deviation, R = Remark, A = Agreed, N = Number of Respondents

The results in Table 4.4 revealed that the respondents agreed with all items on the contractor responsibilities in minimizing building project delays in Kano Metropolis with mean ranging from 3.71–4.33. The grand mean of 4.13 showed that the respondents agreed generally on contractor responsibilities in minimizing building project delay in Kano Metropolis. The result further showed that the standard deviation of the items ranges from 0.40 - 0.61. The 14 items had their standard deviation less than 1.96 showing that the respondents were not too far from the mean and were close to one another in their responses.

Hypothesis One

There is no significant difference in the mean responses of contractors and project managers (Site Engineer and Architect) on project manager responsibilities in minimizing building project delays in Kano Metropolis

Table 4: Analysis of Variance Mean Scores of Respondents on the Project Manager Responsibilities in Minimizing Building Project Delays in Kano Metropolis

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	18.036	2	9.018	47.088	.000
Within Groups	67.798	354	.192		
Total	85.834	356			

Result in Table 4 showed the T-test analysis of significant difference in the mean response of respondents on perceptions of respondents on project manager responsibilities in minimizing building project delay in Kano Metropolis. Result showed that an f-ratio of 47.088 was obtained with a significant value of 0.00. Since the significant value of 0.00 is less than 0.05 set of level of significance for testing the hypothesis, this means that the null hypothesis was accepted. Inference drawn therefore is that there was no significant difference in the mean responses of

contractors and project managers (Site Engineer and Architect) on project manager responsibilities in minimizing building project delays in Kano Metropolis

Hypothesis Two

There will be no significant difference in the mean responses of contractors and project manager (Site Engineer and Architect) on contractor responsibilities in minimizing building project delays in Kano Metropolis.

Table 5: Analysis of Variance Mean Scores of Respondents on Contractor Responsibilities in Minimizing Building Project Delays in Kano Metropolis

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	17.444	2	8.722	219.263	.000
Within Groups	14.081	354	.040		
Total	31.525	356			

Result in Table 5 showed the T-test analysis of significant difference in the mean response of respondents on perceptions of respondents on contractor responsibilities in minimizing building project delays in Kano Metropolis. Result showed that an f-ratio of 219.263 was obtained with a significant value of 0.00. Since the significant value of 0.00 is less than 0.05 set of level of significance for testing the hypothesis, this means that the null hypothesis was accepted. Inference drawn therefore is that there was no significant difference in the mean responses of contractors and project managers (Site Engineer and Architect) on contractor responsibilities in minimizing building project delays in Kano Metropolis.

Discussion of Findings

The findings of this study were discussed in the order of the research questions and hypotheses formulated. Finding on research question one on the causes of delay in building projects completion in Kano Metropolis revealed that shortage of construction materials, inadequate consultant experience, incompetent project team, inadequate contractor experience, poor design and delays in design, lack of communication and coordination, incomplete drawing/ detail design, shortage of equipment parts, slow response and poor inspection, escalation of material prices, unreliable subcontractor and poor procurement of construction materials were the causes of delay in building projects completion in Kano Metropolis.

The findings are in consonance with the findings of Pourostam and Ismail (2011) that, the major factors that cause construction delay in Nigeria are cash flow problems, shortage of construction materials, clients financial difficulties, inadequate consultant experience, incompetent project team, inadequate contractor experience, poor design and delays in design, lack of communication and coordination, and incomplete drawing. Also in agreement are the findings by Mohamed (2014) who posited that regular monitoring of the construction materials will easily signal when there is shortage. Thus this will reduce the risks of delay due to material shortages. AlKharashi and Skitmore (2009) classified causes of delay in building project into seven group which include the project owner,

engineers, consultant, materials, human resource, contract and relationship-related causes and focused on the prolonged nature and the diversity in the view of the different stakeholders.

The findings is also in agreement to Hampton et al. (2012) and Le-Hoai et al. (2008) findings in their studies which they enumerated some of the project-related variable that can cause delay (and influence cost overruns), such as complexness; environment; size; and scope. Although Lowsley and Linnett (2006) in their research made reference to other variables such as changing climate conditions, unanticipated ground conditions, accessibility of resources and incomplete design details. In support of the findings is Fugar and Agyakwah-Baah (2010) in their research on delay in building construction project in Ghana enumerated numerous causes of delay and then classified them into nine distinct categories analysed them and concluded that the major causes of time overrun are delay in getting permission from council, poor estimation of project cost, underrating the complications of a projects, bank transaction challenges, inconsistency in price of materials and poor site supervision. Furthermore, in support of the findings is Sweis et al. (2009) in their research on the causes of construction delay in Jordan and concluded that financial problem encountered by the contractor and client's inability to finalised decision are the primary causes of project delay.

Findings on research question two on the perceptions of respondents on project manager responsibilities in minimizing building project delays in Kano Metropolis revealed that project manager understand and interpret building design quickly will facilitate building project completion on time, project manager cordial relationship with contractor speedy executing building project, project manager qualification in leading building project construction facilitate completion of building project at right time and others are the techniques for project manager to minimize building project delays in Kano Metropolis.

In agreement with the findings is Ashford (1986) who is of the that the responsibility for complying with specifications is firmly placed with the contractor representative, the unspoken assumption is made that unless a client maintains his own representative (the project manager) on the site to watch and inspect the works, the resultant structure or building will not be in conformity with specified quality standard. While one may agree with the statement, one will like to believe that it is in recognition of this statement of fact that all the standard form of building contracts always has a condition for the client to have a representative on site for completion of building project at right time.

Also in agreement with the finding is Dennis (1990) who said that role of the project manager in the site is to inspect quality of materials and the workmanship to ensure that they all comply with drawings and specifications and report to the client for appropriate action promptly to facilitate completion of project without delay. The person capable of inspecting materials and the workmanship of works must be a professional that is well trained in building construction, and with training in project management. However, the size, type and complexity of a particular building project may make it necessary to have in addition to the project manager, a resident builder, resident engineers and a resident architect. When they are all on site representing the interest of the client, their roles are complementary.

The findings on hypothesis one revealed that there was no significant difference in the mean responses of clients, contractors and project managers (Site Engineer and Architect) on the perceptions of respondents the perceptions of respondents on project manager responsibilities in minimizing building project delays in Kano Metropolis. The data supported the hypothesis one, $F, (2, 354) = 47.088, p (sig) = .000$. The hypothesis three was therefore upheld (accepted). This result implies that, the perceptions of respondents are similar on project manager responsibilities in minimizing building project delay in Kano Metropolis.

Findings on research question three on the perceptions of respondents on contractor responsibilities in minimizing building project delays in Kano Metropolis revealed that contractor's financial stability have positive impact in minimize building project delay, contractor ability to supply tools and equipment will minimize building project delay, contractor level of experience help in minimize building project delay and others are techniques for contractor to minimize building project delays in Kano Metropolis

In corroborating with the findings Wibowo (2009) opined that acceleration of site activities as action taken by the main contractor in order to speed up the progress of the project to accomplish early completion or to make up for lost time. In addition Abudul-Rahman et al. (2006) identified it as the procedures taken by the contractor as to the recovery of construction delays. Again materials suppliers are reluctant to supply materials on credit, because contractors will normally pay suppliers only when they themselves are paid. These can cause delay of the projects. Fugar and Agyakwah-Baah (2010), also continued by saying, the extensive use of major equipment is rare on many projects, where equipment is required; the contractors have the option to hire. In the rare cases where some plants and equipments are owned by a contractor, breakdown is a major delay factor, perhaps, owing to old age or lack of planned maintenance. It was observed that plant and equipment procurement is an important factor by the contractors, because in an extreme case, where a project requires a special plant and it seems impossible or there is a delay in procurement, this will lead to the delay and at times, abandonment of the project.

The findings on hypothesis two revealed that there was no significant difference in the mean responses of clients, contractors and project managers (Site Engineer and Architect) on the perceptions of respondents on contractor responsibilities in minimizing building project delays in Kano Metropolis. The data supported the hypothesis one, $F, (2, 354) = 219.263, p (sig) = .000$. The hypothesis one was therefore upheld (accepted). This result implies that, the perception of respondents on contractor responsibilities in minimizing building project delays in Kano Metropolis is similar.

Conclusion

From the findings of this study, it was concluded that shortage of construction materials, inadequate consultant experience, inappropriate construction methods, improper project planning and scheduling, improper project feasibility study, insufficient numbers of equipment, shortage of equipment parts, slow response and poor inspection, escalation of material prices, unreliable subcontractor and poor procurement of construction materials are the causes of delay in building projects completion in Kano Metropolis. It was also concluded that project manager understand and interpret building design quickly will facilitate building project completion on time, project manager cordial relationship with contractor speedy executing building project, project manager qualification in leading building project construction facilitate completion of building project at right time and others are the techniques for project manager to minimize building project delays in Kano Metropolis. It was also concluded that contractor's financial stability have positive impact in minimize building project delay, contractor ability to supply tools and equipment will minimize building project delay, contractor level of experience help in minimize building project delay and others are techniques for contractor to minimize building project delays in Kano Metropolis.

Recommendations

Based on the findings from this study, the following recommendations were made:

1. Contractors should not see application of financial reward as a burden, beside workers salary, other financial incentives like appreciation of efforts, bonus and promotion opportunity be considered in order to encourage productivity for on time completion of building project without delay.
2. Clients should appoint project manger that is experience, capable of inspecting materials and have good relationship with workers professionally and having being well trained in building construction, and with training in project management.
3. Contractors should ensure they apply good project planning and scheduling technique in order to avoid cost and time overrun.

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