



# **COST AND TIME PERFORMANCE INFORMATION OF BUILDING PROJECTS IN DEVELOPING ECONOMY**

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## **ABSTRACT**

*The construction industry plays a very important role in nation development and in construction project delivery and timely provision of shelter and dwelling units for the masses. The aim of the study therefore is to study cost and time performance on building project in developing economy, with a view to finding ways of improving cost and time performance on building projects. Some of the developing in used in this context includes: Nigeria, Togo, Cameroun, and Ghana. A population size of 70 was selected, and a total sample size of 59 respondents was used in this study, with questionnaire distributed to construction professionals. Variables pertaining to the above listed targets were identified and incorporated into questionnaires as the primary source of data. The data was collated and analysed, using mean item score ranking, percentages and the use of descriptive statistics. It was discovered that variables like rising prices of building materials, inclusion of additional work as a result of clients' request, deterioration in economic situation, were identified as the top causes of variation in construction project from developing countries. Also, cost, poor planning and scheduling, delay in payment approval for additional work, work suspension by client, were identified as top causes of time and cost variations. The study recommend among other things that: full consideration should be given to projects from inception to completion, adequate and effective consultancy services for clients, as well as strict follow up of programme of works by every contractor for a construction project.*

**Key words:** Information, Performance, Cost and Time and Developing Economy.

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## **1. INTRODUCTION**

The importance of construction sector cannot be overemphasized it is regarded as one of the organs of economic control. Capital projects that are multimillion dollars' worth are being

executed yearly, thus, serves as a major channel through which billions of dollars are diffused into the economy. Construction is an inclusive global phenomenon that cut across every facet of human endeavour. The global inclusiveness is derived from the fact that construction activities are being carried out on daily basis all over the continent. However, in the millennium development goal (MCDG) as published by United Nation Development Programme (UNDP), housing provision for all by year 2020 took prominent position in world agenda.

A lot of capital investment is involved in housing provision, with little results coming forth therefrom, global housing shortage despite huge investment in housing could attest to this fact. There had been an epidemic of white elephant projects across the globe. It is however sometime accidental that a project would become a white elephant project and ultimately abandoned, perhaps on account of interplay of micro and macro-economic variables interplay during construction process. This and other factors make abandoning project inevitable. Similarly, there are several factors that could determine the fate of a project, the interplay of cost and time variables is one of such factors. Cost and time are two interrelated variables that has tendency of determining project success. Moreover, it is becoming a trend in developing economies that project there are worst affected by the twin variable of cost and time. Some of these developing economies include Malaysia, Singapore, Ghana, Saudi Arabia, Cameroun, India, South Africa and of course Nigeria among others.

Moreover, in Nigeria which has been classified as a developing economy, capital intensive projects are scattered across the nation with many of such becoming abandoned, perhaps, on account of economic recession that the country is presently experiencing or some other things. Similarly, in Ghana, Cameroun, Togo, Singapore and Malaysia, projects are abandoned on account of lack of fund and with attendant cost and time overrun.

However, comparing the rate of overrun on projects from developed economies like United States of America, United Kingdom, Germany, Japan among others, there is a wide gap between construction time and cost as compared to similar projects in developing economies. It is on this account that the study attempted at sourcing factors responsible for the disparity, the area of similarity and divergence, leveraging on the factors that promote success with a view to preventing the impact of the negative factors.

## **2. UNDERSTANDING COST AND TIME CONTROL OF CONSTRUCTION PROJECTS**

One of the main intentions of setting up a business is usually value creation and making profit. The noble objective of value creation in the form of value for money is what usually necessitates project financial and time control. If proper control is exercised on a project, the loop holes that allows financial leak on the project would be possibly avoided or blocked. Therefore, Frimpong, Oluwoye and Crawford (2003) defined cost and time control, as an art of keeping the cost and time of a project within bench mark limits.

Cost and time overrun is one of the problems confronting construction industry in the developing countries, during construction process, progress of the project is usually the priority of professionals and the construction parties, therefore clients are always keen about effective monitoring of construction process. However, cost and time overrun on a project is usually as a result of interplay of different factors and varies from one place to the other. Some of the factors have varying impact depending on the nature of the project. Some factors have severe impact than the other while factors affecting others may not, and therefore it is always necessary to identify the source of occurrence of the factors to determine their

severity. For instance, Frimpong et al.,(2012) studied twenty-six (26) factors contributing to cost and time overrun in Ghana considering the severity of their impacts. According to the study, out of the 26 factors proposed, the main factors identified are monthly payment difficulties from agencies, poor contract management, materials procurement and escalation of material prices among other factors. However, some other construction projects were severely impacted by some of the factors as documented in Azhar, Farouqui and Ahmad (2008), some of the factors include; increase in material prices and wages, scarce construction material, construction delay and deficiency in cost estimates. To this end, this study addressed the issue of cost and time performance on construction projects within the context of developing economies.

### 3. REVIEW OF RELATED LITERATURES

Several research efforts have contributed to advancing positions in the construction cost and time performance research, interestingly, it has become a global phenomenon not limited to developing economies. In this section therefore, summaries of research carried out in developed economies and developed economies is presented. For instance, Koushki, Al-rashid and Kartam(2005) carried out a research in Saudi Arabia, measuring performance of construction projects in Saudi Arabia, coincidentally; Saudi Arabia has also been categorized as developing economy. The study identified 42 performance indicators, with the aid of comprehensive literature profiling. The study used random sampling technique to identify the samples, the study presented 10 key performance indicators that could be used to measure the performance of time and cost on a project. According to the study, traditional financial measure is no longer the sole determinant of project performance, but there are a number of other factors that affects project cost and time performance. Some of the factors articulated include: customer satisfaction, business efficiency and planning effectiveness among others.

Similarly, in Singapore and Korea, also, developing countries, Lee and Kim (2013),conducted a research on project executed by Korean construction firms, in a bid to establish performance of the firms on the construction project executed. The study adopted random sampling technique and survey in picking samples and in conducting the research.

The study identified key performance index of cost and time of construction projects completed by Korean construction firms, the study submitted that the construction projects met the cost and time requirement, also fulfilled customers need meeting the cost and time delivery target. Similarly, Gohari, Ahmadloo, Boroujeni and Hossenipour(2013) studied relationship among reward, employee performance and cost-time performance on construction project. The study sampled 77 employee in Malaysian tourism companies. It was noted that the extent of relationship between employee and reward, according to the study, has tendency to impart company's delivery, which was proved in the study. Also, the study used backward multiple regression technique in the data analysis. The results highlighted that, there is direct relationship between project cost and time performance and company's reward types vis-à-vis positive relationship with employees.

In another related study by Abdulahi, Azis and Rahman(2009) quality of construction process was studied in Nigeria. The study researched into the factors that influence project cost and time looking at the quality of some projects' construction process. The study identified the following factors as determinant factors in cost and time performance of construction projects; the factors include: quality of construction methods adopted, good equipment, effective site management among others. If the construction methods and management used is apt and equipment is closely managed achieving good cost and time performance of the projects is inevitable since the project would be completed in good time.

Moreover, in Ghana, Frimpong and Kofi(2003) conducted a research on factors that contributes to time and cost overrun on selected Ghana construction projects. The study came up with 26 factors. Some of the main factors identified include monthly payment difficulties, poor contract management, material procurement difficulties, poor technical performance of machine and equipment on project, escalated cost of procuring human resources and materials among others.

In another related study, Kaming et al.,(2013) identified cost overrun instigators on construction projects executed in Britain as unpredictable weather, high material cost, inaccurate project cost, project complexity, contactors lack of experience in conventional project cost, government regulation and time management. Similarly, in developed economies like United States of America, United Kingdom, Union of Soviet and Socialist Republic(USSR), Japan, Germany and France among others, common factors were identified as responsible for cost and time overrun in Kaming et al.,(1997) and Bowen and Chimwaso(2011). Some of these factors include alteration of original design, client characteristics, procurement styles, coordination and leadership skill of project managers, coordination among project professionals, social and economic condition and climatic condition, and force majeure among other factors.

Finally, Bowen and Chimwaso(2011, conducted a research on perception of time, cost and quality management on building projects in South Africa. The study used stratified random survey in the study. Surveyed participants comprised of architect, engineer, quantity surveyors, construction managers, builders, and project managers using membership directory of South Africa. The study found out among other things that, on residential projects, sampled cost overrun was recorded with averagely \$20,000,000 per project and time overrun to the range of 2 to 3 years project duration.

#### 4. METHODOLOGY

The key method of data collection used for this research is the surveying method using structured questionnaire designed in Likert scale, the questionnaire was designed in such a way that it helps to collate basic information from the respondents. Data collection for this research work was also achieved by the use already existing data from previous work of researchers and this is known as secondary data. A population size of seventy (70) was selected, and a total sample size of 59 respondents was used in this study, with questionnaire distributed to construction professionals. Variables pertaining to the above listed targets were identified and incorporated into questionnaires as the primary source of data. The data was collated and analysed, using mean item score ranking, percentages and the use of descriptive statistics.

**Table 1** Professions of Respondents

S/N	PROFESSIONALS	FREQUENCY	PERCENTAGE
1	Builders	15	30
2	Architects	15	30
3	Engineers	12	24
4	Quantity surveyors	4	8
5	Land surveyors	4	8
		50	100

The profile of the professionals that took part in the study is presented inTable 1.1.Thirty percent (30%) of the respondents were builders, thirty percent (30%) were architects, 24% were engineers, while 8% were quantity surveyors and land surveyors. Builders and Architects have the same percentage composition of the respondents, this trend support the

fact that reliable information was used for the work as obtained from those directly involved in the managing of building construction process.

**Table 2** Respondents' Years of Working Experience

S/N	YEARS OF WORKING EXPERIENCE	FREQUENCY	PERCENTAGE
1	1- 5 years	10	22
2	5- 10 years	30	40

On the percentage of working experience, it is shown according to Table 4.3 that 22% of the respondents have worked for a number of 1 to 5 years, 40% of the respondents have worked in the industry for 5 to 10 years, 15% of the respondents have 10- 15 years working experience, and 8% have over 20 years of working experience. The profile indicate the fact that majority of the respondents are highly experienced professionals.

**Table 3** Respondents' Length of Extension Experienced

LENGTH OF EXTENSION	R.A.I	RANK
1- 6 months	0.896	1
6- 12 months	0.716	2
18-24 months	0.640	3
More than 24 months	0.628	4
12- 18 months	0.548	5

It should be noted that according to the research carried out, all the respondents, reported to have experienced extension in time. From the Table 1.3 above, 1-6 months length of extension, ranked the highest amongst the length of extension experienced by the respondents', with M.I.S of 0.896. This was followed by 6-12 months length is extension, ranking 2<sup>nd</sup> with M.I.S of 0.716. Ranking 3<sup>rd</sup> on the length of extension experienced is 18-24 months, with M.I.S of 0.640, followed by length of extension of above 24 months, ranking 4<sup>th</sup> with M.I.S of 0.628 and lastly 12 -18 months, ranking 5<sup>th</sup>. The highest extension time as recorded on Nigerian construction sites is 6 months 12 months and 24 months maximum for residential building projects. However, there are projects that ended up being extended for over three years, especially high capital intensive projects.

**Table 4** Comparative Analyses of Percentage Cost Overruns

PERCENTAGE OF COST OVERRUN	R.A.I Nigeria	R.A.I Benin	R.A.I Ghana	R.A.I Cameroun	R.A.I Togo
0-25%	0.688(i)	0.678(v)	0.695(iii)	0.687(i)	0.675(v)
25-35%	0.678(ii)	0.689(iv)	0.783(i)	0.677(ii)	0.688(iv)
35-45%	0.608(iii)	0.892(ii)	0.773(ii)	0.607(iii)	0.890(ii)
45-55%	0.576(iv)	0.887(iii)	0.572(vi)	0.574(iv)	0.886(iii)
55-65%	0.548(v)	0.578(vi)	0.657(v)	0.546(v)	0.577(vi)
65% and above	0.795(vi)	0.980(i)	0.694(iv)	0.574(iv)	0.886(iii)

It should be noted that according to this research, all the respondents reported to have experienced cost overrun on Nigerian, Cameroun, Benin Republic, Togo and Ghana project sites. According to Table 1.4 , most of the correspondents have experienced cost overrun at different degrees. On Nigerian construction site, cost overrun of 0-20% cost increase was recorded on the site and ranked first. 25-35% increase is ranked second while 35-45% cost overrun is ranked third. However, on Republic of Benin project sites, 65% cost overrun was ranked first; the implication of this is that most of the projects on the sampled sites are 65%

excess of original construction cost. Also, 35-45% increase on original cost is ranked third while 45-55% increase is ranked fourth. However on Ghana construction project sites, 65% increase in cost is the most ranked, 35-45% increase ranked second while 0-25% was ranked third this is similar to situation on Nigerian construction sites. Generally, from the profile presented above highest cost overrun is occurred on project executed in Nigeria and Republic of Benin, reason behind this trend could be traced to an economic recession that the two countries are currently experiencing coupled with unstable foreign exchange.

**Table 5** Impacts Of Cost And Time On Project Performance.

EFFECTS	R.A.I	RANK
Time overrun	0.796	1
Tied-up Capital	0.772	2
Loss of investment	0.756	3
Materials are effectively put to use	0.728	4
High tendency for the occurrence of dispute between the clients and contractors.	0.724	5
Project abandonment.	0.704	6
Excessive increase on the entire project cost.	0.656	7
Client's dis-satisfaction	0.640	8
Profit loss.	0.632	9
Consultant dissatisfaction	0.632	9
Payment delay	0.628	11
Good completion time	0.616	12
Maximized project profit	0.600	13
Reduced building component quality.	0.576	14
High level of material wastage	0.528	15

Impact of cost and time on project summarized from Ghana, Cameroun and Nigeria is as presented above. Time overrun, tied-up capital, clarity in project coordination, high tendency for the occurrence of dispute between the clients and contractors. Project abandonment top the list of identified factors as common to the countries, this is a divergent from factors identified in Malaysia, Hong kong and some developed economies. Factors in developed economy is project and client oriented while those of developing countries are economy dependent. This is supported by Aftab, Mohammad, Nornashima (2014), Azhar, Farooqui and Ahmed (2008) and Long, Ogunlana, Quang, and Lam (2004).

**Table 6** Analysis of the Causes of Variation On Construction Projects' Cost And Time

CAUSES OF VARIATION	R.A.I	RANK
Poor planning and scheduling	0.840	1
Delay in payment approval for extra work and variations	0.824	2
Work suspension by client/owner	0.804	3
lack of funds to finance the project to completion	0.804	3
Financial difficulties faced by contractors	0.800	5
Change/errors in design in specifications and drawings	0.796	6
Presence of unskilled labour force/ shortage of labour	0.776	7
Slow decision making process	0.744	8
Agreement to non-feasible project duration.	0.740	9
Delay in handling over of site to contractor	0.716	10
Improper handling and monitoring of project progress	0.712	11
Unavailability/failure of equipment as at when needed	0.712	11
Omissions in contract documents	0.696	13
Bad weather conditions on site	0.656	14
Material damages during transport and in storage	0.616	15

Poor planning and scheduling with M.I.S value of 0.840, ranked as the 1<sup>st</sup> cause of variation in construction project time. When the entire project work is not appropriately scheduled from start to finish, it would lead to a case of variation in project completion time for that particular project. This variable is followed by delay in payment approval for additional work, ranking 2<sup>nd</sup> with M.I.S value of 0.824. Payment approvals being delayed would cause a variation in construction project time as it is a delay on a stage of the work, leading absolutely to a delay on the entire project delivery time. Another cause of variation in construction project time, is work suspension by client which was ranked 3<sup>rd</sup> with M.I.S value of 0.804. The client is the key financier of the project and so suspension of the project by the client is definitely a temporary stop of work, and this would automatically extend the delivery time of the project. Lack of fund to finance the project to completion, also ranked 3<sup>rd</sup> with same M.I.S value of 0.804, which could also be said as a reason for suspension of work by the client. Financial difficulties faced by contractor, is the 5<sup>th</sup> ranked variable with M.I.S value of 0.800 and when a financial difficulty on the side of the contractor leads to an extension in the project delivery time, the contractor would have to bear the consequences as this is not resulting from the clients deficiency. This is closely followed by change in design specifications and drawings which has ranked 6<sup>th</sup> with M.I.S of 0.796. sometimes during construction work, changes occur in design specifications, sometimes changes as a result if errors in these drawings, these disorganizes the scheduling and causes an overall extension. The next ranked variable for this research work is the shortage of labour force and presence of unskilled labour force, which undeniably slows down the progress of work, this was ranked 7<sup>th</sup> with M.I.S value of 0.776. Slow decision making process ranked 8<sup>th</sup> on the causes of variation in construction project time with M.I.S value of 0.744, closely followed by agreement to non-feasible project duration with M.I.S value of 0.740, ranking 9<sup>th</sup>. A lot of contractors tend to agree to a particular project duration knowing well that the agreed project duration is not feasible. Delay in handing over of site to the contractor is another cause of variation in construction project time with M.I.S value 0.716 ranking 10<sup>th</sup>. Also, when project progress is not properly handled and monitored, it leads to increase in the project delivery time, for this research, improper handling and monitoring of project progress ranked 11<sup>th</sup> with M.I.S value of 0.712. This has the same 11<sup>th</sup> ranking with unavailability/failure of equipment as at when needed, which also has M.I.S value of 0.712. Followed by this, are omissions in contract documents, which also in turn leads to a time extension. This variable ranked 13<sup>th</sup> with M.I.S of 0.696. Bad weather conditions is also a factor that causes delay n some project sites and this has ranked 14<sup>th</sup> with M.I.S value of 0.656. The last variable, ranking 15<sup>th</sup> with M.I.S value of 0.616, is material damages during transport and in storage e project, some of the materials eventually go to waste. Similarly the survey in the table 1.6 indicates that all categories of the professionals have experienced cost overrun at one time or the other. Among the cadre of professionals, Builders constitute 50% of the professionals that have experienced cost overrun. The above trend toes the line of submissions in Aftab Hameed Memon, Ismail Abdul Rahman, Ade Asmi Abdul Azis, Quaid-e-Awam. (2012) and Frimpong, Oluwoye J. and Crawford, (2003).

**Table 7** Cost And Time Overrun Survey Information On Residential Building Projects

<b>ASSESSMENT STATEMENTS</b>	<b>Architect</b>	<b>Builder</b>	<b>Structural</b>	<b>Quantity surveyor</b>
I have been involved in a building project before	30%	40%	10%	10%
I have experienced extension in project delivery time	20%	50%	17%	13%
<b>LENGTH OF EXTENSION</b>				
1-6 months	0.89(i)	0.87(i)	0.85(ii)	0.86(i)
<b>6-12 months</b>	0.84(vi)	0.86(ii)	0.86(i)	0.83(ii)
<b>12-18months</b>	0.85(v)	0.85(iii)	0.82(iv)	0.82(iii)
<b>18-24 months</b>	0.87(iii)	0.85(ii)	0.84(iii)	0.81(iv)
<b>More than 24 months</b>	0.86(iv)	0.83(iv)	0.78(v)	0.82(iii)
<b>I have experienced cost overrun in a building project</b>				
<b>PERCENTAGE OF INCREASE</b>				
<b>0-15%</b>	0.78(vi)	0.65(vi)	0.66(vi)	0.65(vi)
<b>15-30%</b>	0.79(v)	0.76(iv)	0.73(v)	0.72(v)
<b>30-45%</b>	0.80(iv)	0.85(ii)	0.85(ii)	0.89(i)
<b>45-60%</b>	0.82(ii)	0.89(i)	0.87(i)	0.88(ii)
<b>60-80%</b>	0.81(iii)	0.71(v)	0.78(iii)	0.75(iv)
<b>80% and above</b>	0.83(i)	0.75(iii)	0.76(iv)	0.79(iii)

Also some of the projects identified also experienced extension of time, extension time of 1-6months and 6-12 months was recorded on different projects, also, Architects and Builders also indicate extension of 80% above budgeted cost for the project, this is not common among the project but was recorded among few projects. According to the survey, similar trend could be linked to the cost overrun experienced. This could be attributed to the inseparable nature of time and cost. This is supported in Abdullah, Azis and Rahman (2009) and Aftab, Mohammad and Nornashima (2014) that extension of time on a project would always translate to extension of cost, the more a contractor stays longer on a project the more cost incurred.

## 5. CONCLUSIONS

It is therefore concluded that the research objectives for this research work has been achieved, on this account, the study has attempted at sourcing factors responsible for the disparity in the time and cost performance of projects in some selected developing economies using as a template for other developing construction economies. Also, areas of similarity and divergence have been identified while ways of leveraging on the factors that promote success on construction project have been articulated, with a view to preventing the impact of the negative factors.

Moreover, for instance, from the stand point of respondents, Seventy-six(76%) of the respondents in the four countries in consideration have experienced between 0 and 30 percentage increase in their final construction cost, as to the originally budgeted cost and 92% of the respondents have also experienced between 1 to 24 months of time extension. It is therefore established that the current cost and time performance of construction project is poor; this research has also established the most frequent causes of this poor performance. The major causes of variation in construction cost and time performance which often leads, to poor cost performance include the following: rising prices of building materials, inclusion of

additional work as a result of clients' request, deterioration in economic situation, changes in design, and lack of proper planning from design stage.

Also, it was discovered also according to the study, that the most frequent causes of poor time performance are as follow: Poor planning and scheduling, delay in payment approval for additional work, work suspension by client, lack of funds to finance the project to completion and financial difficulties faced by contractors.

## 6. RECOMMENDATIONS

The study recommend the following as panacea to solving the peculiar cost and time challenges in developing economies: Proper planning and scheduling of construction variables, prompt release of fund for project funding, ensuring continuity in construction process flow, provision of project cost and time control system and eliminating financial difficulty usually encountered by contractors among others. Finally, full consideration should be given to projects from inception to completion, adequate and effective consultancy services for clients, as well as strict follow up of programme of works by every contractor for a construction project.

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