

# **COST AND TIME PERFORMANCE OF CONSTRUCTION PROJECTS: A COMPARATIVE STUDY OF SOUTHERN PENINSULAR MALAYSIA AND LAGOS, NIGERIA**

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This paper compares the performance of construction projects with respect to time and cost performance in Southern Peninsular Malaysia and Lagos, Nigeria. In an attempt to establish this, an empirical comparison of research conducted in both Southern Peninsular Malaysia and Lagos, Nigeria was made. Findings reveal that both Southern Malaysia and Lagos experience substantive cost and time overrun in the delivery of its construction projects. However, the pattern of the overrun vary, Southern Peninsular Malaysia experience mostly 10-15% of time overruns on its projects while the construction projects in Lagos mostly experience between 5-10% of time overrun. Both study area however experience cost overruns of between 5-10% of its initial budgeted cost. The study further identified important factors that can affect cost and time performance and thereafter provided measures to reduce the effects of time and cost performance. It is anticipated that the results presented in this paper will assist both construction clients, contractors and all project team members to deliver construction projects more successfully.

**KEYWORD:** Cost, Overruns, Performance, Time

## **INTRODUCTION**

A construction stream begin with perceive need for a new or improved building, this leads to the commissioning of project team and contractor whose duty is to ensure that the project is delivered as scheduled. However, construction projects all over the world is bedeviled with the problem of time and cost overruns which results in none performance (Ali & Kamaruzzaman, 2010). Generally, the criteria for measuring project success had been adjudged to be scheduled time, budgeted cost and required quality (Atkinson, 1999; Chan, 2001; Cooke-Davies, 2001; Koelmans, 2004). Frimpong, Oluwoye and Crawford (2003) sees a project as achieving optimum performance if it is executed within cost-budgeted, projected time schedule, meets the technical performance specifications, meets clients' requirement and has a high level of satisfaction among the principal participants (Frimpong, Oluwoye & Crawford, 2003).

Cost, time, quality, participants' satisfaction, absence of disputes, effects on the environment, stakeholders participation etc are commonly used metrics for measuring construction projects success. Wright (1997) however, suggested that only two parameters are of importance, time and budget. This assertion was further corroborated by the findings of Bennet and Grice (1990) that majority of construction projects are being procured only on the basis of time and cost parameters. Jha and Iyer (2006) opined that projects managers are majorly concerned about cost and time performance and have so dedicated much time to the achievement of this. This therefore speculates that project managers and construction stakeholders generally places much emphases on cost and time performance of projects.

Azhar, Farooqui and Ahmed (2008) considered cost a major factor that should be accorded importance throughout the project management life cycle and an important parameter in determining project success. However, not many constructions have been able to achieve cost and time performance (Chimwaso, 2001; Sambasivan and Soon, 2007; Enshassi, Al-Najjar and Kumaraswamy, 2009). In Nigeria for example, construction projects have suffered many setbacks in term of completing the project within the predetermine sum and time schedule (Kasimu & Abubakar, 2012; Fatoye 2012). Improving cost and time performance of construction projects is therefore a challenge facing the construction industry, especially in developing countries like Nigeria.

Globally, none performance of construction projects generally in terms of cost and time has been a subject of concern among construction stakeholders. In a study of projects and project managers; Kaming, Olomolaiye, Holt and Harris (1997) reported that cost overruns are common scenarios than time overruns with construction project in Indonesia. Materials cost increases due to inflation, inaccuracy of estimates, and lack of experience of project type were identified as the major causes of time and cost overruns. Olawale and Sun (2010) in an attempt to find the inhibiting factors against cost and time performance, observed that many UK construction projects do suffer cost overruns. However, it was posited that design changes; risks and uncertainties; inaccurate evaluation of project time/duration; complexity of works; and non-performance of subcontractors were identified as the major factors inhibiting cost and time performance. Delays and cost overruns are two main concerns of notable magnitude out of many problems arising during construction implementation (Le-Hoai, Lee and Lee, 2008). Cost performance is an emerging problem to both the client and project contractors. To the client if cost issues are not properly addressed it may lead to cost overrun and to the contractor if cost issues are not properly addressed it may lead to project delay.

Although construction projects are known majorly for its non performance, it suffices to say that the degree of non performance will vary from projects-to-projects. Basheka and Tumutegyereize (2013) posited that specialized clients have a better chance of having successful projects. Naoum (1991) argued that type of client – public or private, definite project mission at inception, ability to make brief, determine project scope and make decisions have been found to significantly contribute to project performance. Walker (1994) identified that project characteristic - project scope, nature of the project and complexity of the project can have influence on the performance of projects; in addition to the environment in which a project operates.

## **PROJECT DELAY**

The timely completion of a construction project is seen as a major criterion of project success by clients (Bowen, Hall, Edwards, Pearl & Cattell, 2002). The inability of a project to be completed in accordance with the proposed time schedule maybe as a result of delay. Stumpf (2000) viewed delay as an incident that extends the time required to perform the tasks under a contract. It usually shows up as additional days of work or as a delayed start of an activity (Sweis, Sweis, Hammad & Shboul, 2008). Assaf and Al-Hejji (2006) defined construction delay as the time overrun either beyond the contract date or beyond the date that the parties agreed upon for delivery of a project. This involves some cost consequences and may cause adversarial construction relationship between parties involved (Aibinu & Jagboro, 2000; Sweis, *et al.* 2008).

In a study of the significant factors that cause delay of construction projects in Malaysia, Alaghbari, Kadir, Salim and Ernawati (2007) classified the factors into four major factors, these are contractor factor, consultant factor, client factors and external factors. Financial problems, shortage of materials and poor site management practices were considered the top most factors. Client related factors included delayed payments, slow decision-making and contract scope changes. The most important factors by consultant were poor supervision, slowness to give instructions and lack of experience. External causes identified included shortage of materials availability, poor site conditions and lack of equipment and tools in the market. In a related study of the causes and effects of delay in Malaysia construction industry Sambasivan & Soon (2007) found poor site management, inadequate experience' and poor subcontractors among the major causes of time delays on construction projects.

Causes of delays as identified from previous studies include labour productivity, inadequate contractor experience, number of change orders, financial constraints and owners' lack of experience in construction, ground conditions, poor site management and supervision by consultants, environmental restrictions, exceptionally low bids (Odeh & Battaineh, 2002; Koushki, Al-Rashid & Kartam, 2005; Lo, Fung, & Tung, 2006).

## **PROJECT COST OVERRUN**

The problem of cost overrun, especially in the construction industry, is a worldwide phenomenon. Its effects are normally a source of friction between clients, project managers and contractors on the issue of project cost variation. Cost overrun is a situation whereby a project incurs expenses in excess of its expected costs outlined in the budget for the project. This expresses that an extra expenses incurred in any construction process which is over the estimated budget is termed to be cost overrun on the project. A project that has reached cost overrun requires money in excess of the original budget to complete the work. Danso and Antwiz (2012), described cost overrun as the amount by which actual costs exceed the baseline or approved costs for a project.

Fetene (2008) categorized some of the major causes of cost overrun under faults of the clients, consultants, contractors, government and others. Morris (1990) considered inadequate project preparation as the most important factor that underlie cost overrun, which often lead to scope changes during implementation. The inadequacies cover deficiencies in demand forecasts, ground surveys and technology choice. Murali and Yau (2006) in their research identified contract-related factors such as change orders, mistakes and discrepancies in the contract document as the major causes of cost

overrun. Dolo and Young (2009) reported among these three categories, the five most significant sources of cost overruns as perceived by the consultants, clients and contractors which are extent of completion of pre-contract design, escalation of material prices, mistakes and discrepancies in contract documentation, client initiated variations and shortage of materials.

Previous studies in the Nigeria construction industry have shown that the issue of cost overrun is prevalent. Elinwa and Buba (1993) found that the most important cause of cost overruns were the increase in the cost of the materials, fraudulent practices, materials' prices increment, high cost of machineries and poor planning. Mansfield, et al. (1994) in their study added that the lack of geotechnical studies before starting the construction and the delays caused by the involvement of complicated rules to check and approve construction processes, can also be reasons for cost overruns in Nigerian constructions. Kasimu (2012) classified the causes of cost overrun in Nigeria into five: financial factor, construction parties, construction items, environmental factors and political factors. Factors of note in each category include market condition, experience of parties involved in contract works, insufficient time devoted to planning and design, project locations and monopoly of material supplier.

## **RESEARCH METHODOLOGY**

### **Study Area**

The study is a comparative study of the construction time and cost performance scenarios of Lagos, Nigeria and Southern Peninsular Malaysia; two different but yet similar regions in terms of population and economic activities. The data for Malaysia was gotten from a previous study by Memon, Rahman and Azis (2012). Southern Peninsular Malaysia is bounded by water except to the north with area is 131,598 square kilometers and a population of 23.5 million as of 2012. Lagos share similar characteristic with Southern Malaysia, it is bounded by water, the commercial nerve centre of Nigeria with a population of 21million (Campbell, 2012).

### **Research Design**

A structured questionnaire was designed for the purpose of this study. The study is a comparison of the cost and time performance of construction projects in Southern Peninsular Malaysia and Lagos, Nigeria. As such, the questionnaire designed by Memon, Rahman and Azis (2012) was used for the study; however, adjustment was made on the questionnaire to reflect the geopolitical and economic differences between Malaysia and Nigeria.

The questionnaire was divided into four sections; Section A attempted to elicit information from the respondents with respect to types of organization, academic qualifications, years of work experience and value of project being reported. Section B is on respondents' evaluation of cost and time performance of any project executed within the last 10 years, this contained 8 items that affect construction cost and time performance. Section C is on factors affecting construction cost and time performance and it contains 8 identified factors. Section D aimed to investigating measures to improve cost and time performance of construction projects. This was sub-divided into two parts, part I was for respondents to rate 13 identified measures in improving time overrun while part II focused on the 15 measures that can be adopted to mitigate the occurrence of non cost performance.

The targeted respondents of the questionnaire included all construction practitioners from the public, private and other sectors of the economy who are involved in construction activities in Lagos State. Respondents were requested to rate their degree of agreement against each of the identified factors according to a 5-point Likert scale. On the determination of the factors affecting construction cost and time performance, the Likert scale had 1=Not significant, 2=slightly significant, 3=moderately significant, 4=very significant, 5=extremely significant. While the 5-point Likert scale of measures to improve cost and time performance had 1=extremely not important 2=not important, 3=moderately important, 4=very important, 5=extremely important.

### **Collection of Research Data**

The Malaysia study administered questionnaire randomly to 200 construction professionals of whom 140 (70%) questionnaires were returned. In Lagos, a total of 120 questionnaires were distributed among construction professionals within Lagos state, 78 were returned representing 65%. The returned questionnaire were checked and found suitable for analysis. IBM-SPSS version 20 was used for the analysis. Table 1.0 shows a comparison of the data collected for the two studies.

**Table 1:** Collection of research data

Location	Administered	Returned	% Returned
Southern Peninsular Malaysia	200	140	70%
Lagos, Nigeria	120	78	65%

## DATA ANALYSIS AND RESULTS

Table 2 shows the distribution of the demography variables of respondents. Three major organization types were involved – clients (16.7%), consultants (48.7%) and contractors (34.6%). Results show that all the respondents have academic qualifications ranging from Higher National Diploma to Masters Degree, with the exception 1 (1.3%); who chose others but the qualification was not specified. Respondents with 6-10 years of work experience (44.9%) constitute the highest followed by respondents with 0.5 years of work experience constituting 29.5% of the total respondents. The distributions show that respondents are well qualified based on their work experience on project to evaluate the cost and time performances of projects they handled in time past. Professions of respondents show that quantity surveyors, builders and architects constitute the majority of the respondents with 26.9%, 25.6% and 23.1% respectively.

**Table 2:** Demography classification of respondents

	Frequency	Percent	Cumulative Percent
<b>Type of Organization</b>			
Client	13	16.7	16.7
Consulting	38	48.7	65.4
Contracting	27	34.6	100.0
<b>Academic qualification</b>			
Higher National Diploma (HND)	25	32.1	32.1
Bachelors degree	39	50	82.1
Masters	13	16.7	98.7
Others	1	1.3	100.0
<b>Years of work experience</b>			
0-5	23	29.5	29.5
6-10	35	44.9	74.4
11-15	11	14.1	88.5
16-20	8	10.3	98.7
>20	1	1.3	100.0
<b>Professions</b>			
Architect	18	23.1	23.1
Builder	20	25.6	48.7
QS	21	26.9	75.6
Structural Engr.	7	9.0	84.6
M&E Engr.	5	6.4	91.0
Others	7	9.0	100.0
<b>Size of projects</b>			
1-250 million	26	33.3	33.3
251-500 million	24	30.8	64.1
501 million-2.5 billion	23	29.5	93.6
>2.5 billion	5	6.4	100.0

## PERFORMANCE OF CONSTRUCTION PROJECTS

### Time performance of construction projects

Figure 1 below is a bar chart of the comparison of the time performance of construction projects in both Malaysia and Nigeria. From the figure, 7.9% of construction project in Malaysia were completed on time schedule and do not have time overrun (delay), compared with 1.3% in Nigeria. The majority of time overrun experienced on Malaysia construction

project is between 10-15% of the scheduled time representing 34.4% of while in the Nigerian scenario, construction projects time performance is between 1-5% and 5-10% of the time scheduled, representing 41% and 42.3% respectively.

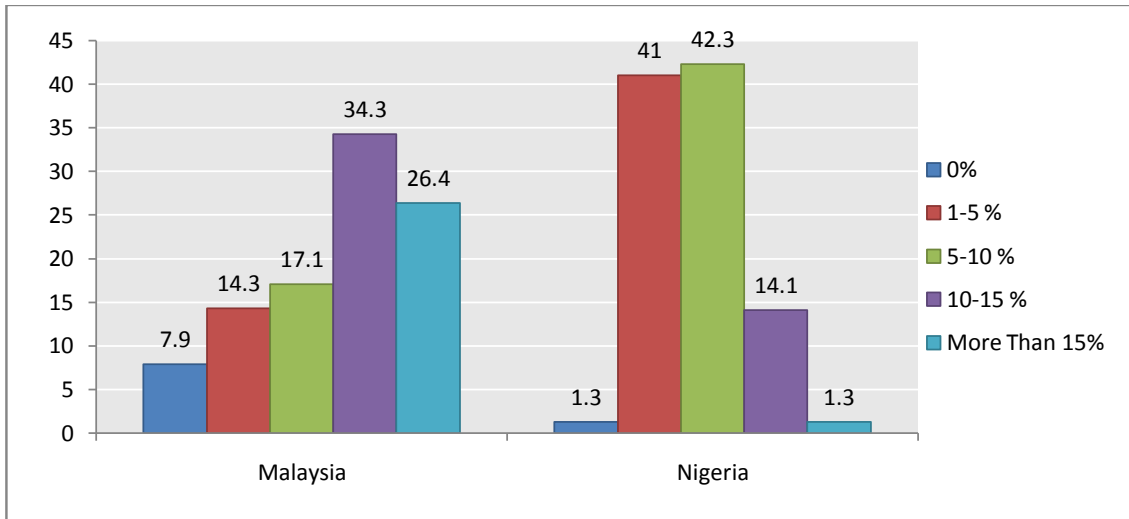


Figure 1: Malaysia and Nigeria comparison of the time performance of construction projects

**Cost performance of construction projects**

Figure 2 below presents the distribution of the cost performance of construction projects in the two study area. The pattern of cost overrun on Malaysia projects as shown, reveal that most construction projects in Malaysia experienced an average of between 5-10% of cost overrun over the initial budgeted sum. This situation also repeats itself in the Nigeria case, however, while higher cost overruns of 10-15% of initial budgeted sum constitutes the next majority of project experiencing cost overruns in Malaysia; the reverse was the case in Nigeria as a lower cost range of 1-5% over budgeted cost was observed. While the pattern of cost and time overruns in Nigeria seem to follow the same pattern that of Malaysia had a different pattern.

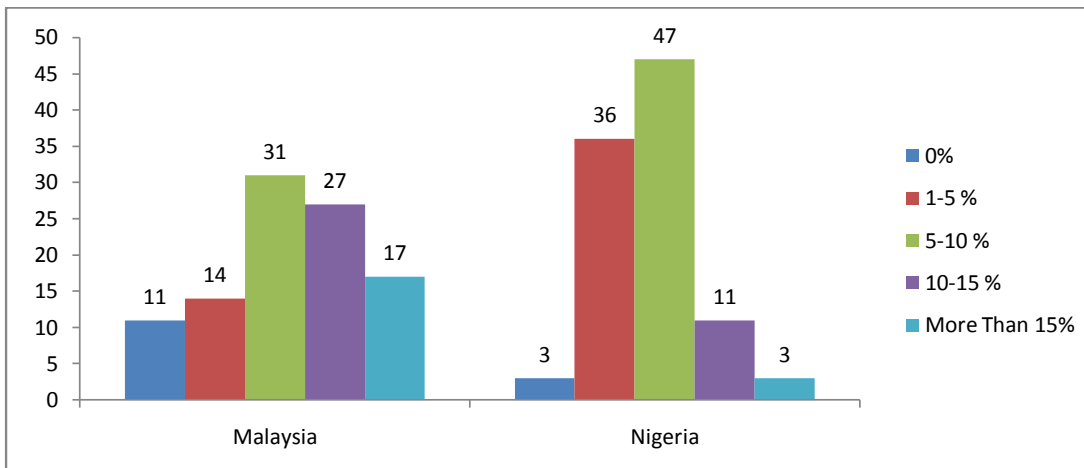


Figure 2: Malaysia and Nigeria comparison of the cost performance of construction projects

**MAJOR FACTORS AFFECTING TIME AND COST PERFORMANCE**

The table 3 summarizes the relative importance index and ranking of the factors that respondents considered the most affecting construction time and cost performance. Design and documentation issues, financial resource management, project management and administration and contract site management were ranked the most factors that affect project

performance in Malaysia. However, project management and administration was considered the most important factor in Nigeria followed by materials and machinery resource, financial resource management and contract site management. A huge difference was however observed in the importance of design and documentation issues; it ranked 1<sup>st</sup> in the Malaysia scenario however, it was ranked 7<sup>th</sup> in Nigeria. This mean there is a huge difference in the way and manner this affect project performance in the two countries. Factors of common effects on project performance in the two study areas are information and communication technology, labour human resource and external factors.

**Table 3:** Factors affecting time and cost performance

Factors affecting time and cost performance		Malaysia		Nigeria	
		RII	Rank	RII	Rank
<b>DDF</b>	Design and Documentation Issues	0.80	1 <sup>st</sup>	0.48	7 <sup>th</sup>
<b>FIN</b>	Financial Resource Management	0.79	2 <sup>nd</sup>	0.55	3 <sup>rd</sup>
<b>PMCA</b>	Project Management and Contract Administration	0.79	3 <sup>rd</sup>	0.61	1 <sup>st</sup>
<b>CSM</b>	Contractors Site Management	0.78	4 <sup>th</sup>	0.54	4 <sup>th</sup>
<b>ICT</b>	Information and Communication Technology	0.78	5 <sup>th</sup>	.52	5 <sup>th</sup>
<b>MMF</b>	Material and Machinery Resource	0.74	6 <sup>th</sup>	0.58	2 <sup>nd</sup>
<b>LAB</b>	Labour (Human) Resource	0.74	7 <sup>th</sup>	0.59	6 <sup>th</sup>
<b>EXT</b>	External Factors	0.71	8 <sup>th</sup>	0.41	8 <sup>th</sup>

### MEASURES TO IMPROVE CONSTRUCTION TIME AND COST PERFORMANCE

Table 4 presents the mean and rankings of the factors respondents perceived to mitigate the prevalence of time overruns. 13 factors were identified from the previous studies by Memon, Rahman and Azis (2012). These identified factors were however ranked in Nigeria to determine the factor respondents considered has the most effect of improving construction time and cost performance. The provision of knowledge training to unskilled works, proper work planning, measurement of performance against other project, the hiring of skilled workers and committed leadership and management were considered the most important factors. They had mean of 2.93, 2.70, 2.65, 2.53 and 2.47 and ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> respectively. There had been dearth in knowledgeable unskilled and skilled labour force in Nigeria. This in particularly results in re-work of construction projects from time-to-time and effectively affects the time scheduled. Proper work planning can significantly led to project delay. Morris (1988) reveal that projects are often embarked upon without sufficient preparations. This was corroborated by Leeman (2002) that the failure of projects has increased in construction projects because the project contractors and owners do not use management methodologies that are useful to distribute resources properly and plan the project effectively.

The least ranked factors that affect project performance include focus on clients need, send clear complete message to worker to ensure effective communication, use of new construction technologies (IBS), and focus on quality cost and delivery of project. Several studies are however in variance with the issues of focusing on client needs, the non focus on client's need or client's inability to determine his project requirement has contributed to non performance of projects (Odeh & Battaineh, 2002; Koushki, Al-Rashid & Kartam, 2005; Lo, Fung, & Tung, 2006).

**Table 4:** Mitigation measures to improve time performance

Mitigation Measure To Improve Time Performance	N	Mean	Rand
Provide knowledge training to unskilled workers	78	2.93	1 <sup>st</sup>
Proper work planning	78	2.70	2 <sup>nd</sup>
Measure performance against other projects	78	2.65	3 <sup>rd</sup>
Hire skilled workers	78	2.53	4 <sup>th</sup>
Committed leadership and management	78	2.47	5 <sup>th</sup>
Adoption of tools and techniques	78	2.40	6 <sup>th</sup>
Training and development	78	2.35	7 <sup>th</sup>
Fully utilized the construction team	78	2.33	8 <sup>th</sup>
Close monitoring	78	2.29	9 <sup>th</sup>
Focus on clients need	78	2.23	10 <sup>th</sup>
Send clear complete message to worker to ensure effective communication	78	2.23	11 <sup>th</sup>
Use of new construction technologies (IBS)	78	2.17	12 <sup>th</sup>
Focus on quality cost and delivery of project	78	1.83	13 <sup>th</sup>

Table 5 reveal the important factor respondents chose as a mitigating measure to avert the incessant cost overrun being experienced. Factors such as proper emphasis on past project executed by the contractor, use of appropriate

construction methods, clear information and communication channels, site management and supervision as well as use of up-to-date technology were ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> with mean score of 2.93, 2.70, 2.65, 2.53 and 2.47 respectively. Emphasis on past project is particularly important as this will help in evaluating the scope and complexity of project previously executed by the contractor. This was also affirmed by Olawale and Sun (2010) where the complexity of construction project was found a factor that affects cost performance.

**Table 5:** Mitigation measures to improve cost performance

Mitigation Measure To Improve Cost Performance	N	Mean	Rank
Proper emphasis on past experience	78	2.99	1 <sup>st</sup>
Use of appropriate construction methods	78	2.92	2 <sup>nd</sup>
Clear information and communication channels	78	2.87	3 <sup>rd</sup>
Site management and supervision	78	2.86	4 <sup>th</sup>
Use of up-to-date technology utilization	78	2.69	5 <sup>th</sup>
Develop human resources in construction	78	2.68	6 <sup>th</sup>
Proper project planning and schedule	78	2.67	7 <sup>th</sup>
Use of experience sub-contractor and supplier	78	2.54	8 <sup>th</sup>
Perform a pre-reconstruction planning of project tasks and resources needs	78	2.49	9 <sup>th</sup>
Frequent progress meeting	78	2.47	10 <sup>th</sup>
Comprehensive contract administration	78	2.46	11 <sup>th</sup>
Systematic control mechanism,	78	2.44	12 <sup>th</sup>
Effective strategic planning	78	2.38	13 <sup>th</sup>
Frequent coordination between parties	78	2.33	14 <sup>th</sup>
Improving contract award system by giving less weight to prices and more weight to capabilities and past performances of contractors	78	1.85	15 <sup>th</sup>

## CONCLUSION

From the study, time and cost performance of construction project is very important in achieving project performance. The influence of this two performance metric determines the success of a project more than any other. The analysis has shown that most construction projects in Malaysia Southern Peninsula and Lagos, Nigeria experience time and cost overruns which hinder project success. These have evidently proven that there is need to develop measures to ensure that the incessant occurrence of time and cost overruns in construction projects is reduced to the minimum. It is in the best interest of not only the project client but the project participants to ensure that projects are delivered on schedule.

It can be adduce from the study that some key factors are very important in ensuring project success performance. Design and documentation issues, financial resource management, project management and contract administration, contractor's site management, information and communication technology, material and machinery resource. The ability of the client and the construction team to effectively manage these identified issues can help in achieving project performance. Also of note is project manager's competence, top management support, project manager's coordinating and leadership skill, monitoring and feed back by the participants, coordination among project participants and owner's competence and favorable climatic condition are other factors identified from literatures.

In this study respondents ranking of measures to improve time and cost performance show that all factors are important to project performance. However, the availability of knowledgeable workmen and proper work planning is considered very important in avoiding project delay. Other factors identified from the study that can mitigate the effect of cost overruns include proper emphasis on past experience, use of appropriate construction methods, clear information and communication channels, site management and supervision.

In conclusion, all the factors identified from this study should be considered important as affecting project performance, all efforts should therefore be put to ensure that the identified factors contributes positively than otherwise.

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