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EFFECT OF PROJECT CONTROL PRACTICES ON THE PERFORMANCE OF BUILDING CONSTRUCTION FIRMS IN LAGOS STATE, NIGERIA

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ABSTRACT

The study aimed to empirically assess the level of project control practices in building construction firms in Lagos State, Nigeria and to evaluate the effect of project control practices on their performance. A survey was conducted to establish the current control practices among 200 respondents from firms registered with the Federation of Construction Industry (FOCI). The variables used in the questionnaire were based on synthesis from existing literature. A list of 34 standard control practices were developed for four key project control tasks: Planning, Monitoring, Analysing and Reporting. These were ranked based on the level of relevance to the construction firms, using mean response rating. The results revealed that development of a programme of work for project (8.75), ensuring the programme of work is realistic (7.68) and ensuring all activities have costs allocated to them (7.49) were the top three project control practices, while analysing performance using S-curve (4.33), ensuring people are inclined to information on time (4.64) and utilisation of cost value comparison (4.83) were rated least among the control practices. It can be observed from the result that planning is the most practiced among other project control tasks in the building construction firms. In addition, the study discovered a significant relationship between project control practices and firm performance. Based on this observation, it is recommended that project control practices are adequately followed by consulting and contracting organisations to improve their overall performance of the industry.

Keywords: Project control; Cost control; Time control; Project performance; Practices

1. Introduction

In the construction industry, the aim of project control is to measure project performance against project plan, so that the project objective is achieved (Olawale and Sun, 2015). One of the distinguishing features is that projects are normally required to be completed within a specified time and cost (Olawale and Sun, 2015). There are factors having a potential impact on time and cost during project delivery. In the construction industry, these factors impose uncertainties that necessitate the need for effective management control. According to Baguley (2008), control is a management tool that is widely accepted by the Association for Project Management (APM, 2006) and Project Management Institution (PMI, 2008). APM (2006) defines control as the application of processes to measure project performance against project plan and to enable variances to be identified and corrected so that project objectives are achieved. However, in recent years, there have been numerous studies on the identification of factors that influence both project time and cost control worldwide, such as unstable government policies, weak regulation and control, inflation of price of materials, inaccurate evaluation of project time duration and design changes. Among the listed factors, design changes and the inflation of price of materials are reported to be the major factors causing time delay and cost overrun (Olawale and Sun,

2010). Mansfied *et al*. (1994) posit that variables causing construction delay and cost overrun are related to poor contract management, changes in site conditions, shortage of materials and design changes, price fluctuation and inaccurate estimates. Consequently, a study by Ali and Kamaruzzaman (2010) mentioned that many countries are facing many severe problems on cost overrun. In Nigeria, time delay and cost overruns have led to building project abandonment and building collapse (Anyanwu, 2013).

In terms of firm performance, Hatush and Skitmore (1997) and Raisbeck *et al*. (2010) described firm performance as the successful execution of a construction project based on an agreed budget and scope of work delivered. Thus, in an effort to improve the effectiveness and viability of a building construction firm, key operational variables are needed (Tucker, 2014). Similarly, Rush *et al.* (2007) affirmed that operational variables are key abilities needed by firms to turn their technological competence into strategic competitive advantage. It is believed that operational variables such as management skills, financial, marketing and technological capabilities are directly proportional to the development of construction firms. Bell (2017) noted that firms' abilities to develop from low to higher levels of capability determine their performance. Contractor performance, as noted by Yang *et al*. (2009) is evidence of a contractor fulfilling his responsibilities in the contract. In this study, the concept of "operational variables" as applied to construction companies is thus taken to mean their capacities and capabilities. Contractor grading programmes in most developing countries are a means of improving the capacity and capability of contractors by enabling contractors to gain the necessary competence, experience, track record and financial capital (Construction Industry Development Board, 2010).

Over the years, it has been revealed that monitoring and control phases during project execution is always being by-passed, moving straight from planning (determination of project budget and schedule) to project reporting at the closure phase (Olawale and Sun, 2015). A critique reviewed by Olawale and Sun (2013) on existing project control practices showed that most control practices focus traditionally on project output instead of emphasising project process inputs, including project monitoring and control. This has led to an increase in the number of building abandonment due to a lack of control mechanisms during project execution. Consequently, this high rate of abandonment has impacted on infrastructural development negatively and has caused prospective investors not to invest in the economy (Anyanwu, 2013).

In Nigeria, the literature has centered on project control techniques, project cost estimates and negative consequences arising from poor project time and cost control. However, hardly any studies exist on the level of project control practices in building construction firms and on the effect of project control practices on construction firm performance success, particularly in Lagos State, Nigeria. This article bridges the gap by analysing the project control practices in building construction firms in Nigeria to provide information on the extent of control practices and their significant effect on firm performance, with a focus on building construction companies in Lagos State, Nigeria, particularly those registered under the Federation of Construction Industry (FOCI).

2. Literature Review

Carcaño (2018) researched the effects of time and cost control in construction projects. The study aimed to evaluate the effectiveness of two project management methods: Earned Schedule and Earned Value to control time and cost in construction projects executed in Mexico. In achieving this, time and cost performance indicators and predictors from six projects were calculated. Results showed that construction firms need to emphasize management of project

execution time by using modern engineering methods such as Earned Schedule to control time and cost.

Olawale and Sun (2015) aimed to address the main deficiencies with the prevailing project cost and time control practices for construction projects. A questionnaire survey was carried out among 250 top companies to establish current practices and identify existing problems. This was followed by in-depth interviews with 15 experienced practitioners from these companies to gain further insight into the identified problems and how these problems could be tackled. Based on these interviews and synthesis with existing literature, a list of 65 good practice recommendations was developed for the key project controls tasks: planning, monitoring, reporting and analysing. After two rounds of the Delphi panels comprising 8 experts, the recommended project control tasks are put forward as "critical", "important", or "helpful" measures for improving project control practices in the construction industry.

Ahmadu and Ijigah (2014) stated that effective planning is vital for overall performance gain in construction endeavours. Their study examined the effectiveness of construction planning by small and medium construction firms. The results showed that construction planning exercises were mostly carried out by project managers who in most cases used the bar chart technique for planning projects.

Johnson and Babu (2018) stated that time and cost are the two main indicators of success in a construction project as it affects all the project participants with equal positive and negative effects. Yet, poor time and cost performance have been critical issues prevailing in the global construction market including the United Arab Emirates (UAE). The study adopted a concurrent mixed-methods approach, utilizing a set of questionnaire and interviews with UAE construction professionals to analyse the major causes of this poor time and cost performance. The top five causes of time overrun were concluded as design variation from clients and consultants, unrealistic schedules and completion dates projected by clients, delay in obtaining government permits and approvals, inaccurate time estimation by the consultants and change of orders from clients. The top five causes of cost overrun were summarised as design variation, poor cost estimation, delay in the client's decision-making process, financial constraints of a client and inappropriate procurement method.

Keng and Adzman (2015) revealed that shortage of labour, inaccurate quantity take-off, lack of cost information and change in architectural design are the factors affecting cost control practices in the building construction industry. To this end, the study proposes some strategies to overcome such problems. The strategies include training of staff on cost management, minimizing the change in design and constant update on cost data during measurement and managing inflation risk by allowing fluctuation of price in the contract.

Trucker (2014) identified operational variables relevant to financial performance identified through a literature review. Based on how the respondents rated these variables, it appears that contractors generally perceive four factors as having the greatest impact on corporate performance; technical ability (the possession and effective use of plant and equipment), financial management skills (to accumulate financial capital), training of staff in organisational knowledge in skills transfer and networking with industry stakeholders. The study concludes that construction companies need to prioritize the development of these key factors to improve their corporate performance.

Tan *et al.* (2007) revealed that management skills reflect a contractor's ability to provide clients with high-quality products or services. Management skills are also described as the ability of a firm to show the full potential of its employees through knowledge transfer across projects to enhance continuous growth (Dlungwana *et al.*, 2002). Management skills include the effective management of quality and striving to improve all facets of the organisation to meet the demands and expectations of the client (Delgado-Hernandez and Aspinwall, 2005; McIntyre and Kirschenman, 2000). They also involve managing risk, that is, identifying, monitoring and evaluating the activities or functions of the firm to minimise company losses and maximize company opportunities (Mbachu and Nkado, 2006).

Tam and Harris (1993), Yusuf (1995), Wijewardena and De Zoysa (2005) assert that a good management team is a performance criterion for the firms. Similarly, Abu Bakar (1993) suggests that the technical expertise of construction firms can enhance business performance. According to Thomas *et al*. (2002) and Ling *et al*. (2009), technical and management skills involve improving the quality of products or services offered in order to minimize resources and cost (including reworking), thereby increasing the profitability of construction. Wasi *et al*. (2001) concluded that adequate managerial skills enable firms to acquire experience. Strischek (1998) argues that the most influential factor for a construction firm's performance is the level and strength of its management skills, procedures, and practices.

Idoro (2012) in his study to compare the frequencies at which project monitoring and control strategies used by Nigerian contractors influence project outcome, conducted a field survey using a sample of 86 contractors selected by stratified random sampling. The data were collected using structured questionnaires and analysed using mean, t-test, and Spearman correlation test. The results of the study revealed that contractors carry out project control strategies frequently. Three of the eight monitoring and control strategies (site visits, site meetings, review of programme of work) influence the project outcome, while the remaining strategies (interim valuations, financial statements, project plans, reviewing project objectives and reviewing project scope) do not. This result indicates that while some of the strategies are effective, others are not. He concluded that contractors should thus ensure that their project monitoring and control efforts are directed towards improving the entire outcomes of their projects.

Irefin (2013) evaluated the effect of project management on the performance of a construction firm in Nigeria using the Blackstone Construction firm as a case study. A survey research design was adopted and copies of questionnaire were administered on 40 top and middle management staff of the company, using simple random and judgmental sampling techniques. The data collected were analysed using descriptive statistics and chi-square statistical analysis. The questionnaire was validated using content validity. The reliability of the questionnaire was confirmed by determining the correlation coefficient of the data collected at two different periods. The study discovered that project quality management has a significant relationship with business success and project quality has a significant relationship with technical success. It was therefore recommended that measures should be taken to ensure that project management skills and strategies are adequately considered in the planning and execution of construction projects.

Milosevic and Patanakul (2005) reviewed companies that frequently opt to implement standardized project management (SPM), which can be defined as a standardized set of project management practices. These companies expect that such an approach will carry significant potential for improving project performance. To investigate this potential, an exploratory study into the impact of SPM on project performance in development projects in high-velocity

industries was carried out. Research started with the qualitative method using case study research to identify the major factors in SPM efforts on the organisational project management level (as opposed to the individual project level). Then, a hypothesis was developed based on these factors and hypothesis testing was performed to identify factors that impact project success. In addition, follow-up interviews to enrich and refine findings were carried out. Three major findings came out of this study. First, the variables of SPM tools, leadership skills, and process showed themselves to be of higher interest to standardization than the other independent variables because they may impact project success; second, these variables of higher interest are typically customized to fit the strategic purpose of the company; and third, companies tend to standardize project management practices only to a certain level.

2.1.Research framework

The framework proposed in this study involves the component of project control and firm performance. In the initial step, based on a comprehensive literature review that focused on studies regarding the project control task and firm performance proxy, several indicators are derived. Planning, Monitoring, Reporting, and Analysing are project control task indicators while Financial ability and Management skills are indicators of firm performance. A total of 53 components are derived from these six indicators grouped under project control and firm performance. The underlying component of these variables is identified and explained below.

Project control task

The indicator of project control task is determined as 'planning', 'monitoring', 'reporting' and 'analysing'.

i. Planning: This is the task to determine project objectives and activities needed to achieve these objectives. Time schedules are decided by sequencing the project activities, with interim milestones. At the same time, detailed cost estimates and cost plans are also produced.
ii. Monitoring: Once the execution of project plans starts, project progress needs to be monitored to ensure that activities are carried out as planned and costs and spending occur for the correct amount and at the correct time. Any variations to time and cost plans need to be identified.
iii. Reporting: The information gathered during the monitoring step will need to be presented in some agreed format and transmitted via the appropriate medium to the appropriate department or personnel for further action e.g. analysis. The report is where the information collected during monitoring is contained and it is the analysis of this information that shows the status of the project as described below.
iv. Analysing: Having gathered the data, the team must determine whether the project is behaving as predicted, and if not, calculate the size and impact of the variances.

Firm performance

The study measured firm performance through performance operational variables; financial ability and management skills. These components are identified and explained below.

i. Financial Ability: Finance is defined as the amount by which the firm's readily convertible liquid or current asset exceeds the firm's current liabilities. In other words, this is the working capital of the company (including the company's cash, investment bills receivable, stock, book debts and similar floating assets) minus trade creditors, bank overdraft, bills payable and similar floating liabilities (Armstrong, 2006). Finance in this report is primarily concerned with how an organisation deals with financial resources to maximize profit over the long term. Financial availability and adequate

cash flow of firms enhance performance (Abu Bakar, 1993; Cannon and Hillebrandt, 1990).

ii. Management Skills: Management skills reflect a contractor's ability to provide clients with high quality products or services (Tan *et al.*, 2007). They are described also like the ability of a firm to release the full potential of its employees through the transfer of knowledge across projects embedded in the capability to enhance the continuous growth of firms (Dlungwana, 2000). Management skills include the effective management of quality and striving to improve all facets of the organisation to meet the demands and expectations of the client (Delgado-Hernandez and Aspinwall, 2005; McIntyre and Kirschenman, 2000).

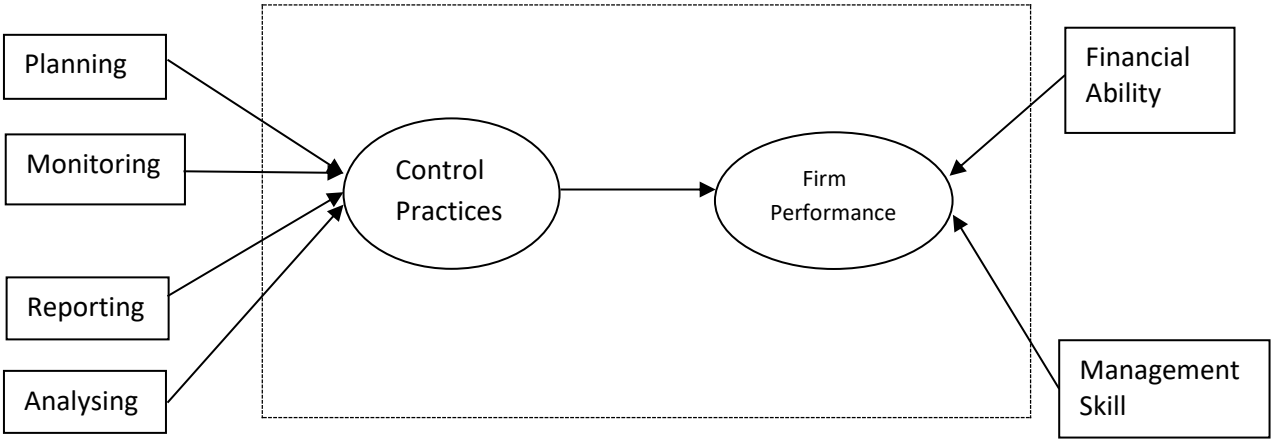

Figure 1: Conceptual framework

3. Methodology

In the opinion of Abowitz and Toole (2010) the research method and process must be followed, used and implemented even if the research work is not large enough. This study was conducted by using a quantitative approach to obtain relevant data from various building construction firms in Lagos State, Nigeria. The quantity surveyors, architects, builders, civil engineers, and each company's cognate department were targeted for the study because they are experienced in construction cost and time control. The list of project control practices that were obtained from the literature was presented in the questionnaire on a 10-point rating scale, where 1 represents the least and 10 the highest. Two hundred and ten copies of questionnaire were distributed to the firms to obtain necessary information about their project control practices and processes. A total of two hundred respondent firms completed and returned the questionnaire. This represents 95% response rate and was considered adequate for the study. The results were analysed to assess the level of control practices in the building construction firm and to evaluate the effect of project control practices on the performance of the firms using different statistical techniques. First, the descriptive statistics of the respondents' gender, age, profession, year of working experience, academic qualification, nature of the firm, year of establishment, the total number of technical staff and firm annual turnover are presented. Then, mean item rating was performed to assess the level of project control practices while factor analysis and linear regression were used to analyse the effect of project control practices on performance.

4. Results and Discussion

The demographic information of the respondents and the firms are presented in Table 1. The table provides the necessary information to check the quality of the obtained data. The

characteristics of the respondents and the firm include the profession of the respondent, academic qualification, the nature of firm and annual turnover.

Table 1 presents the demographic characteristics of the respondents. The result reveals that 35.0% of the respondents were Civil Engineers, 33.0% were Quantity Surveyors, 14.0% were Architects, 17.5% were Builders and 0.5% were Estate Valuers. The result on the academic qualification of the respondents reveals that, at the time of the study, 16.5 % held Higher National Diplomas, 39.5% held Bachelor of Science or Bachelor of Technology degrees, 43.5% held a Master of Science or Master of Technology degree while 0.5% held a doctorate degree. Furthermore, 58.5% of the firms were indigenous, 20% were foreign while the remaining 21.5% were joint ventures. On firm annual turnover, the result in Table 1 shows that 0.5% of firm annual turnover was less than a million Naira, 7% had between 1 to 10 million Naira annual turnover, 31.5% had an annual turnover of between 11 to 50 million Naira, 16.5% had between 51 to 100 million Naira annual turnover, 17.5% had between 101 to 500 million Naira annual turnover while 27% of the firms had above 500 million Naira annual turnover.

Table 1: Demographic Information of Respondents and the Firms

Variables	Classification	Frequency	Percentage
Profession	Quantity Surveying	66	33.0
	Architect	28	14.0
	Builders	35	17.5
	Civil Engineer	70	35.0
	Estate Valuer	1	0.5
	Total	**200**	**100**
Academic qualification	HND	33	16.5
	B. Tech/B. Sc	79	39.5
	M.Tech/M. Sc	87	43.5
	Ph. D	1	0.5
	Total	**200**	**100**
Nature of Firm	Indigenous	117	58.5
	International	40	20.0
	Joint Venture	43	21.5
	Total	**200**	**100**
Firm annual turnover	< 1 million	1	0.5
	1-10 million	14	7.0
	11-50 million	63	31.5
	51-100 million	33	16.5
	101-500 million	35	17.5
	Above 500 million	54	27.0
	Total	**200**	**100**

Source: Authors' Field Study, 2019

Table 2: Level of Control Practices for Planning

Control practices for Planning	Mean	SD	Rank
Development of programme of work for project	8.755	1.599	1
Ensuring the programme of work is realistic	7.680	2.234	2
Establishing critical path on the programme	7.185	2.834	4
Setting of tangible milestones within the programme	6.66	3.417	8
Involvement of sub-contractor advice and input	7.075	2.234	6
Ensuring proper handover of tender from QS	7.005	1.858	7
Making sure project team understands budget	7.165	2.441	5
Ensuring all activities have costs allocated to them	7.495	2.427	3
Integration cost and time	5.815	3.253	9

Source: Authors' Field Study, 2019

4.1. Level of control practices for planning

This section focuses on the major objective which is to assess the level of control practices in the building construction firms. The result in Table 2 reveals the level of relevance on control practices for planning, monitoring, reporting and analysing.

As listed in Table 2, the variables are ranked based on the level of significance and relevance. Results reveal that the development of programme of work for project was the most used control practice for planning with a mean score of 8.755. The observation from the table shows that the development of programme of works for project is a "must practice" by firms where the level of significance was agreed as being critical to the project control process. This finding supports the assertion of Dey et al. (1994) that the division of a project into controllable work packages through the Work Breakdown Structure (WBS) makes project control more effective. Ensuring the programme of work is realistic is the second most used control practice with a mean score of 7.680. Ensuring all activities have cost allocation has a mean score of 7.495 and was ranked as the third most used control practice while establishing critical path on programme was ranked the fourth most significant practice with a score of 7.185. Making sure project team understand cost budget was ranked the fifth most significant practice with a score of 7.165. The involvement of sub-contractor's advice and input was ranked the sixth most significant practice with a score of 7.075. Ensuring proper handover of tender from Quantity Surveyor was ranked the seventh with a score of 7. 005, while setting of tangible milestones within the programme and ensuring that cost and time control are always integrated were ranked as the eighth and ninth most significant practice with a score of 6.66 and 5.815 respectively. Development of programme of works for project and ensuring programme of work developed is realistic were rated as the most prevalent practices by firms. This corroborates the assertion of Olawale and Sun (2015) who reported that the development of programme of work for project and ensuring that the programme of work is realistic is highly critical.

Table 3 reveals that regular monitoring regime (weekly/monthly) was the most effective control practice for monitoring with a score of 7.010. The result shows that most firms and companies in Lagos State carry out this aspect of control practice. This is in line with Olawale and Sun (2014) that regular monitoring regime embedded in a project as a good practice recommendation for monitoring is highly critical and significant during project monitoring phase. Monitoring from the office regularly, visiting the project site as realistic is the second most effective control practice with a mean score of 6.475.

Table 3: Mean Rating of the listed Control Practices for Monitoring

Control Practices for Monitoring	Mean	SD	Rank
Regular monitoring regime	7.010	2.215	1
Monitoring project time against critical part	5.935	3.108	4
Constantly monitoring of design changes	6.310	2.289	3
Specifying the deliverables of project cost and time	5.110	2.620	9
Constantly monitoring against key milestone	5.705	3.255	6
Having a system that checks sub-contractors' cost	5.175	3.142	8
Monitoring procurement within allocation in tender	5.710	2.092	5
Monitoring from office regularly	6.475	2.171	2
Making sure site personnel are trained on control	5.470	2.948	7

Source: Authors' Field Study, 2019

This finding supports the assertion of Olawale and Sun (2014) that project progress monitoring through site visitation is important but not as critical as having a monitoring regime. Constantly monitoring design changes with a score of 6.310 ranked as the third most effective control practice while monitoring project time against critical path was ranked the fourth most significant practice with a score of 5.935. Monitoring procurement within allocation in tender was ranked the fifth most significant practice with a score of 5.710. Constantly monitoring against key milestone was ranked the sixth most significant practice with a score of 5.705, making sure site personnel are trained on control was ranked the seventh with a score of 5.470 while having a system that checks sub-contractor's cost and specifying the deliverables of project cost and time are ranked as eighth and ninth with a score of 5.175 and 5.110 respectively.

Table 4: Mean Rating of the listed Control Practices for Reporting

Control Practices for Reporting	Mean	SD	Rank
Making sure cost and time information being reported	6.210	3.235	4
Making sure the report is always honest and true	6.495	2.719	2
Regular reporting of project cost and time	5.435	3.135	6
Accurately recording information	6.995	2.046	1
Ensuring open and trusted relationship by management	6.420	2.525	3
Presentation of report using quantitative tools	5.965	3.363	5
Avoiding use of complex IT for reporting	5.065	2.609	7
Incorporating qualitative report into qualitative graph	4.85	2.701	8

Source: Authors' Field Study, 2019

As listed in Table 4, accurately recording information is the most effective control practice for reporting with a score of 6.995. Making sure the report is always honest and true is the second most effective control practice with a score of 6.495. Ensuring open and trusted relationship between management with a score of 6.420 ranked as the third most effective control practice while making sure cost and time information was reported was ranked the fourth most effective

practice with a score of 6.210, presentation of report using quantitative tools was ranked the fifth most effective practice with a score of 5.965. Consequently, regularly reporting project cost and time was ranked the sixth most effective practice with a score of 5.435, avoiding the use of complex IT for reporting was ranked seventh with a score of 5.065 while incorporating qualitative reports into a qualitative graph ranked eighth with a score of 4.85. The result shows that the information gathered during the monitoring stage is highly significant and critical in control practices for reporting. This finding corroborates Olawale and Sun (2014) who posited that timely and realistic information in reporting is an important attribute of a cost control system. Making sure the report is honest and true, and ensuring open and trusting relationship between the firm management is important in control practices for reporting.

Table 5: Mean Rating of the listed Control Practices for Analysing

Control Practices for Analysing	Mean	SD	Rank
Having personnel to assess the report to ascertain	5.595	2.597	1
Forecasting time and cost at completion as analysis	4.995	3.155	5
Ensuring people are inclined to information on time	4.645	2.848	7
Ensuring cost and time are integrated during analysis	5.380	3.521	3
Analysing performance using S- curve	4.335	2.843	8
Utilisation of cost value comparison when analysing	4.835	2.851	6
Focusing on labour efficiency in project cost and time	5.440	2.714	2
Determination of cost for the period, earned value	5.155	3.021	4

Source: Authors' Field Study, 2019

Table 5 presents the relevance of control practices for analysing. The results show that having the personnel assess the report is the most effective and practiced control practice for monitoring with a score of 5.595 while focusing on labour efficiency of project cost and time is the second most effective control practice being used with a score of 5.440. Ensuring cost and time are integrated during analysis with a score of 5.380 ranked as the third most effective control practice while determination of cost for the period, earned value was ranked the fourth most significant practice with a score of 5.155, forecasting time and cost at completion as analysis was ranked the fifth significant practice with a score of 4.995. Consequently, utilisation of cost value comparison when analysing was ranked the sixth most significant practice with a score of 4.835, ensuring people are inclined to information on time was ranked the seventh with a score of 4.645 while analysing performance using S-curve ranked eighth with a score of 4.335. In sum, the study reveals that having the personnel to assess reports to ascertain as the most significant and critical control practice for analysing in Lagos State. This finding is in agreement with the assertion made by Olawale and Sun (2014) that having independent personnel at the next higher management level to assess reports to ascertain if it is optimistic, factual or pessimistic. Thus, the presence of an independent higher management level personnel to ascertain if a report is optimistic, factual or pessimistic is a highly rated control practice.

4.2. Level of control practices in the building construction firms

The mean response rating values for the 34 good control practices recommended in the existing literature are reported in Table 6. The control practice with a mean response rating value between 8.0 to 6.0 is grouped as an "important" control practice.

Table 6: Level of Relevance for Key Control Practices

Packages	Code	Control Practice	Mean	SD	Rank
CPP	CPP_1	Development of programme of work for project	8.755	1.599	1
	CPP_2	Ensuring the programme of work is realistic	7.680	2.234	2
	CPP_3	Establishing critical path on the programme	7.185	2.834	4
	CPP_4	Setting tangible milestones within the programme	6.660	3.417	10
	CPP_5	Involvement of subcontractor advice and input	7.075	2.234	6
	CPP_6	Ensuring proper handover of tender from QS	7.005	1.858	8
	CPP_7	Making sure project team understand cost budget	7.165	2.441	5
	CPP_8	Ensuring all activities have cost allocation to them	7.495	2.427	3
	CPP_9	Ensuring cost & time control is always integrated	5.815	3.253	18
CPM	CPM_{10}	Regular monitoring regime(weekly/monthly)	7.010	2.215	7
	CPM_{11}	Monitoring project time against critical part	5.935	3.108	17
	CPM_{12}	Constantly monitoring of design changes	6.310	2.289	14
	CPM_{13}	Specifying the deliverables of project cost and time	5.110	2.620	28
	CPM_{14}	Constantly monitoring against key milestone	5.705	3.255	20
	CPM_{15}	Having a system that check subcontractors' cost	5.175	3.142	26
	CPM_{16}	Monitoring procurement within allocation in tender	5.710	2.092	19
	CPM_{17}	Monitoring from office regularly, visit the site	6.475	2.171	12
	CPM_{18}	Making sure site personnel are trained on control	5.470	2.948	22
CPR	CPR_{19}	Making sure cost & time information being reported	6.210	3.235	15
	CPR_{20}	Making sure the report is always honest and true	6.495	2.719	11
	CPR_{21}	Regularly reporting of project coat and time	5.435	3.135	24
	CPR_{22}	Accurately recording information	6.995	2.046	9
	CPR_{23}	Ensuring trusted relationship btw management	6.420	2.525	13
	CPR_{24}	Presentation of report using quantitative tools	5.965	3.363	16

	CPR_{25}	Avoiding use of complex IT for reporting	5.065	2.609	29
	CPR_{26}	Incorporate qualitative report into qualitative graph	4.850	2.701	31
CPA	CPA_{27}	Having personnel to assess the report to ascertain	5.595	2.597	21
	CPA_{28}	Forecasting time & cost at completion as analysis	4.995	3.155	30
	CPA_{29}	Ensuring people are inclined to information on time	4.645	2.848	33
	CPA_{30}	Ensuring cost and time are integrated	5.380	3.521	25
	CPA_{31}	Analysing performance using S- curve	4.335	2.843	34
	CPA_{32}	Utilisation of cost value comparison	4.835	2.851	32
	CPA_{33}	Focusing on labour efficiency project cost and time	5.440	2.714	23
	CPA_{34}	Determination of cost for the period, earned value	5.155	3.021	27

Source: Authors' Field Study, 2019
Control Practices for planning (CPP), Control Practices for Monitoring (CPM), Control Practices for Reporting (CPR) and Control Practices for Analysing (CPA).

Table 6 reveals that the development of programme of work for a project ($CPP_{1)}$ is the most critical and effective among the thirty-four (34) recommended control practices with a mean score of 8.755. Ensuring the programme of work is realistic (CPP_2) is the second most effective and important control practice with a score of 7.680. Furthermore, ensuring all activities have cost allocated to them (CPP_8) is the third most effective and important control practice with a score of 7.495, establishing critical path on the programme (CPP_3) is the fourth most effective and important control practice with a score of 7.185. Making sure the project team understands the cost budget (CPP_7) with a score of 7.165 is an important control practice. Involvement of subcontractors' advice and input (CPP_5) with a score of 7.075 is also important, regular monitoring regime (weekly and monthly) (CPP_{10}) with a score of 7.010 is also an important control practice, ensuring proper handover of tender from the Quantity Surveyor (CPP_6) with a score of 7.005 is also seen as an effective and "important" control practice. Accurate recording of project information (CPR_{22}) with a score of 6.995 and setting of tangible milestones within the programme (CPP_4) with a score of 6.660 are also grouped as the most important control practices. Project control practices with mean scores below 6.0 are grouped as "helpful" control practices. However, the result revealed that analysing performance using the S-curve (CPA_{31}) was the "most helpful" practice with a score of 4.335 among all others which makes it the least effective practice used by the respondent building construction firms. Ensuring people are inclined to information on time (CPA_{29}) has the second least mean score of 4.645. It can be concluded from the result that the most prevalent control practice on time and cost by most construction firms in Lagos State is project control practices on planning. These include development of programme of work for project time estimate, ensuring programme of work is realistic, ensuring all activities/packages in the project have their allocation in terms of cost carried out, establishment and identification of critical path on the programme schedule and making sure the project team understand the cost budget and setting of milestones within the developed programme. Consequently, result from Table 6 is in line with Ahmadu and Ijigah (2014) which posited planning practice as mostly carried out by project managers in different construction firms.

4.3. Effect of project control practices on the performance of building construction firms

To evaluate the effect of project control practices on the performance of building construction firms, factor analysis was used to obtain the factor scores for both the control practices and construction firms' performance in Tables 7, 8 and 9 respectively. Thereafter, ordinary least square regression was conducted to reveal the relationship between project control practices on the performance of building construction firms.

Before proceeding with factor analysis to obtain the factor score of the variables, Table 7 results contains results to show that the data collected was appropriate for factor analysis. For instance, it is recommended that a minimum of five subjects per variable is required for factor analysis to be suitable (Coakes and Steed, 2003; Hair, Black, Babin and Anderson, 2010). Tabachnick and Fidell (2007) also recommended that a sample size within the range of 150-300 will be suitable for the analysis. Therefore, with more than 34 variables, a sample size of 70 with at least three representatives from each firm provided the study with a total of 210 respondents which is more than the minimum requirement recommended for factor analysis. Consequently, the suitability of the data was assessed before the principal component analysis was carried out. However, to examine if the distribution of the data was adequate for factor analysis, the Kaiser-Meyer-Olkin (KMO) Test was employed. Tabachnick and Fidell (2007) suggested 0.60 as the minimum value of the KMO index suitable for factor analysis. Field (2009) opined that a data set that attained a KMO index of 0.50 and Bartlett's test of sphericity where $p < 0.05$ is good enough for factor analysis. It is observable from Table 7 below that a KMO index of 0.826 (greater than 0.5) was obtained and Bartlett's test of sphericity was significant ($p = 0.000$). These results confirm that the data collected for control practices and firm performances were appropriate for factor analysis.

Table 7: KMO and Bartlett's test for the effect of Control Practice on Performance

KMO and Bartlett's Test		
KMO of Sampling Adequacy		.826
Bartlett's Test of Sphericity	Approx. Chi-Square	961.2
	df	15
	Sig	.000

Source: Authors' Field Study, 2019

Table 8 reveals that 2 components with eigen values greater than 1.0 were extracted using a factor loading of 0.3 as the cut-off, as recommended by Pallant (2005). The Total Variance Explained (TVE) by each component extracted are as follows: factor 1 (63.65%), factor 2 (18.83%). Therefore, the final statistics of the principal component analysis and the components extracted accounted for approximately 74% of the total cumulative variance.

Table 8: Total Variance Explained (TVE) for Project Control

Initial Eigenvalue			Extraction Sum of Squared Loadings				
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.819	63.651	63.651	3.605	60.085	60.085	3.546
2	1.130	18.829	82.481	0.847	14.109	74.194	1.653
3	0.552	9.202	91.683				
4	0.252	4.205	95.887				
5	0.177	2.943	98.830				
6	0.070	1.170	100.000				

Source: Authors' Field Study, 2019

Table 9 contains the pattern matrix of project control practices on firm performance. Four variables, Control Practices for Planning, Monitoring, Reporting and Analysing, are loaded under the first factor. Two variables, Management Skills and Financial Ability, are loaded under the second factor. According to Sekaran (2003), a Cronbach's Alpha of 0.6 to 0.7 indicates an acceptable level of reliability, and 0.8 up to 0.95 is considered to be satisfactory. Otherwise, the Cronbach's Alpha value might be an indication of redundancy. Clearly, the Cronbach's Alpha values in Table 9 are within the acceptable thresholds.

Table 9: Pattern Matrix[a] of Variable

	Factor Loading	
Component	**1**	**2**
Control Practices for Planning	0.847	
Control Practices for Monitoring	0.865	
Control Practice for Reporting	0.920	
Control Practice for Analysing	0.969	
Management Skills		0.938
Financial Ability		0.408
Cronbach's Alpha **(Reliability test)**	0.944	0.614

Ordinary least square regression was conducted to determine the relationship between project control practices and performance of building construction firms. Tables 10, 11 and 12 revealed the result. Table 10 illustrates the strength of the relationship between project control practices and the performance of building construction firms. R, the regression coefficient in Table 10 has a value of .444 or 44.4% which shows that a relationship exists between independent and dependent variables. The determination coefficient result shows R^2 value to be 0.197. This shows that 19.7% of the variation in the performances of the building construction firms is explained by Project control practices. Also, Table 11 (ANOVA-table) tests the significance of the relationships between variables (independent and dependent variables). It can be seen from the table that these relationships are jointly significant ($F= 48.671$; $p = 0.000$). This finding is in agreement with the assertion made by Arasa and Obonyo (2012) that a good relationship exists between project control (strategic planning) and firm performance.

Table 10: Model Summary

Model	R	R^2	Adjusted R^2	St. Error of Estimate
Control Practices	444[a]	.197	.193	.82605084

Source: Authors' Field Study, 2019

Table 11: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	33.211	1	33.211	48.671	000[b]
Residual	135.107	198	.682		
Total	168.319	199			

Source: Authors' Field Study, 2019

Table 12: Co-efficients

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	St. Error	Beta	Sig	
(Constant)	1.260E-15	.058		.000	1.00
Control Practices	.415	.060	.444	6.976	.000

Source: Authors' Field Study, 2019

From the result in Table 12, $\beta 1 = 0.444$ which indicates a 1% increase in control practices results in an increase in performance indicators variable by 44.4% keeping other variables constant, T value of 6.98 and it is significant at a value of 0.000. With the result shown in the table, the null hypothesis is rejected accepting the alternate hypothesis; project control practices have a significant and positive impact on the performance of building construction firms. The finding also corroborated the assertion made by Ling, Low, Wang and Lim (2009); Milosevic and Patanakul (2005) that the key project management practices affecting project performance are significantly correlated with project performance.

5. Conclusion and Recommendations

This paper was able to explore the level of control practices in the building construction firms in Lagos State, Nigeria. The study concludes that the most prevalent control practices applied to manage time and cost by most construction firms in the study area are project control practices on planning. Other control tasks such as monitoring, analysing and reporting are not given due consideration by firms. Among thirty-four recommended control practices, the most frequently applied ones include development of programme of work for the project, ensuring the programme of work is realistic, ensuring all activities in the project have cost assignment and identification of critical path on the programme schedule. It is evident that monitoring is a weak link for both time and cost control in the building construction firms.

Furthermore, the study concludes that the key variables on performance include management skills and financial ability. However, an examination of the significance of the relationships suggests that postulated relationships were statistically significant. Based on the findings, it is generally concluded that project control practices impact the performance of building construction firms. It is recommended that contractors should ensure that their project monitoring and control efforts are directed towards improving the entire outcomes of their

projects. However, early and sustained integration of the key functionaries into planning and control processes would help to improve planning effectiveness and accuracy. For monitoring, the study recommends that a well-established standard procedure can help to smooth-out the usually difficult task of monitoring. For the analysis process, it is recommended that variance and trend analysis can be performed before the completion of each activity to allow for corrective action. For reporting, the study found timely and realistic information in reports as an important attribute of a cost control system. It is recommended that more research should be conducted especially in the area of project control practices since the volume of research in this area are limited and the importance of control on time and cost cannot be overemphasised in the building construction industry.

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