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Evaluation of Impact of Project Management Practices on Project Success of Selected Construction Firms in Lagos State, Nigeria

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ABSTRACT
Effective project management practices have been used to accomplish successful completion of major construction projects such as road rehabilitation, road construction, road maintenance, and other projects to ensure better environment. However, a number of projects have been completed with problems and issues that include cost over-run, delayed completion time, and poor quality with overall effects on clients' satisfaction. These problems raise question as to what extent would certain project management practices enhance project success. To answer this question, this study was conducted to examine the overall contribution of project risk, project cost and project quality management practices on clients' satisfaction. Project cost, project quality and project risk management attributes were used to measure project management practices, while project success was measured by clients' satisfaction. Using a survey research method, data were collected using a validated structured questionnaire. Cronbach's Alpha was used to determine the reliability at $\alpha = 0.88$. Proportional stratification, random and purposive sampling techniques were used to select the sample size of 57 construction firms out of 71 registered construction firms with Lagos Chamber of Commerce and Industry. Cochran formular was used to determined 246 clients who participated in the study. Regression analysis was used to analyze the data collected. Out of the total number of 303 questionnaires distributed, 46 usable questionnaires were received from project managers while 230 were received from the clients, yielding a response rate of 91%. Further analysis corroborated strong association between project risk, project cost, project quality management, and client satisfaction ($R = 0.864$; $p<0.05$), ($R^2 = 0.746$). Thus, the findings of the study show that client's satisfaction is a valuable indicator of project success. Conclusively, the study asserted that quality, cost, and risk management can be used beyond their primary purposes and their roles could be switched to better serve the project, since they complement each other in contributing to the satisfaction of the client.

KEY WORDS: Project management, Project quality, Project cost, Project risk and Project success

I. INTRODUCTION

Project management as highlighted by the achievement of builders of the pyramids, architecture of ancient cities, the masons and craftsmen of great wall of China and other wonders of the world, was described to be one of the oldest and respected accomplishments of mankind (Irefin,2013)

After the second world war, the intricacy of projects and declining labour supply of wartime required new form of organizational structure. This prompted the introduction of Programme Evaluation and Review Technique (PERT) charts, and Critical Path Method (CPM) to give project managers greater control over massively engineered and extremely complex projects. Project management has been developed for the past couple of decades as researchers and practitioners have attempted to trap the essence of project failure and various criteria that could enhance project success (Orumie, 2020)

Williams (2016) explained that both the research and practice of project management have been changing away from a mere simplistic definition of project "success" as delivery within the

stipulated cost, time and performance target to a more multi-dimensional definition, which involve both objective and subjective criteria. However, in research the inter-relationship between these criteria have not been fully explored. Project success is a very familiar topic in the area of project management research, which has been discussed under many sub-topics in project management; such as success factors (Muller and Jugdev, 2012), success criteria (Wai, Yusof & Ismail, 2012), success definition (Van & Stern, 2011), and success framework (Paul, 2020).

The term, Project has been defined differently by many authors. Engineers, Architects, Managers and others have their definitions pointedly from their experiences as far as their professions are concerned. This is due to the multi-disciplinary nature of project, with different perspectives and orientations. Construction failure, abandonment and collapse of buildings are not encouraging development, and any investment in new construction projects must call for effective project management solution. New buildings and newly rehabilitated or maintained infrastructure become derelict and wrecked within a little period after opening despite the high capital commitments on them. Collapse of building facilities during construction in Nigeria could be best described as a holistic financial loss to an investor, who could have served other alternative investment opportunity in order to achieve the goal of the construction project. Project management is believed to be justified as a means of avoiding the ills inherent in the construction and production sectors of the economy and reduce the rate of project failure and abandonment of a project.

Statement of the Problem

It has been observed that managing project is one of the oldest accomplishments of mankind. Researchers in this field have attempted to identify the essence of what is behind project success and found that it is really a difficult concept. Akewushola, Olateju and Hammed (2012) argued that success and failure are difficult to define and measure since they mean different things to different people.

Lagos State has continuously embarked on various construction projects in the areas of road rehabilitation, road construction, road maintenance and other projects to ensure better environment. Some of these projects were either completed with cost over-run or delivered beyond the expected time. Although project management has proven its success in many construction projects, some problems were found to be associated with the way the system has been selected and implemented. A number of projects have been completed late and over budget with low client satisfaction, particularly in publicly funded projects. Some projects were canceled even before they were started, resulting in wasteful spending of public money. Also, the rapidly advanced technology, increasing complexity of construction operations and growing competition require a skilled project management professional for effectiveness and efficient implementation of adequate project management practice. Project management success is measured by some criteria which means different things to different people. At times, it depends on participants, scope of service, project size, owner design of facilities. Having a clear and well-defined perception of what to be achieved to attain success may indeed contribute to achieving the seemingly evasive target of project success

A review of studies on project construction by various scholars revealed the various critical success factors. In one of the studies, Chinedu and Fidelis (2011) argued that project success relates to strategic, structural, technical, and managerial aspects of project management team. In a similar study by Kerzner (2013), it was revealed that project management capability, cost estimation, client criteria, work break structure (WBS) and project objectives were among the highly rated factors that determine project success. These studies did not asses the degree of contribution of these variables

While some projects have been completed successfully with few problems, many have been completed with cost over-run, delayed completion time, and poor quality, thereby resulting to overall clients' dissatisfaction. This raises the questions as to what extent would certain project management practices (such as quality management, cost management and risk management) enhance project success, as measured by clients' satisfaction, and what relationships exist between the aforementioned attributes of project management practices and project success?

II. LITERATURE REVIEW

A project is a group of tasks performed in a definable time period in order to meet a specific set of objectives. A project has some characteristics. It is a one-time programme, a life cycle with a specific start, end, and budgets, which are likely to require the use of multiple resources, most of which may be scarce and have to be shared among others. It may require the establishment of a projectised organisation or the crossing of traditional organizational boundaries (Harvey,1999). Fuhad

(2018) described projectised organizational structure as a teamwork based on organizational structure, in which a Project Manager has full power and authority over resources to be utilised in the project. Project Manager controls the budget, resources and assigns work to every member of the team. Traditional organizational structure or functional organisational structure only has functional manager, who has a limited role and authority. It usually has a leader and multiple subordinates. Their occupations are grouped together in divisional structure, each business units conducts its own activities, such as sales, marketing, and training. Team based-organisations are less structured and can adapt quickly to a new change in work activities.

Akarakiri (2007) defined project as "any scheme, or part of a scheme for investing resources which can reasonably be analysed and evaluated as independent unit". Spinner (1997) also defined project as "a series of tasks or activities that have several distinguishing characteristics such as: having specific starting and ending data, achieving a specific result or product, well defined objectives and a unique nonrepetitive endeavor". Although there are numbers of general definition of the term project, it must be recognized at the outset that projects are distinct from other organisational processes. Irefin (2013) defined it as a repetitive activity in which an organisation engages, while producing goods and services, processes existing systems properties and capabilities in a continuous, fairly repetitive manner. Projects, on the other hand, take place outside the normal process-oriented world of the firm. Certainly, in some organisations, such as construction, day-to-day processes center on the creation and development of project. Nevertheless, for the majority of organisations project management, activities remain unique and separate from the manner in which more routine, process driven work is performed. Project work is continuous, evolving established own work rules, and it is an antithesis of repetition in work place. As a result, it represents an exciting alternative to business as usual for many companies (Kerzner, 2013).

Project Management

Project management has evolved over decades as researchers and practitioners have attempted to identify the causes of project failure and the various factors that lead to project success. Traditional project management skills were developed from the requirements of construction and defense industries to plan, control, and manage large and complex 'tangible' projects (Morris, 1994). These are regarded "hard" concepts of project success criteria in the form of controlling and managing schedule, cost, and scope. PMI (2016) further defined Project management as an application of knowledge, skill, tools and techniques to project objectives to meet stakeholder's needs and expectation. Also, it has long been described by corporate and academics as one of several workable possibilities for organizational forms of the future that could integrate complex efforts and reduce bureaucracy.

Project management can also be viewed as being about managing change and project managers should consider themselves as change agents adding to the project management role on additional focus on so called 'soft' aspects of relationship management. Moreover, in most organisations, project managers are accountable for the successful delivery of completed projects. Increasingly, this success depends on project manager's processing and utilising skills and competencies that may initially appear contradictory. A successful project manager must demonstrate flexibility and competency in many areas, hard and soft skills, introverted and reflective, extroverted, and social behaviour. Many of the initiatives for improving the practice and profession of project management have been focused on enhancing techniques and methods associated with skill that includes effective management of time, cost, and scope (Bourne & Walker, 2004).

The Construction Industry

A Construction firm is a firm that embarks on provision of goods and services, which operates in a market with high barriers to entry (Cleland & Gareis, 2006). In order for this industry to achieve its project objective criteria, it requires mitigation for its uncertainty because it is exposed to high level of risk. In this regard, all the risk portfolio associated with all stakeholders in the project life cycle process should be considered. Risk management process needs to be initiated from the initiation stage of the project in order to avoid critical factors that are capable of impacting project success negatively. These types of risk issues are characterized by processes such as planning, monitoring, and control. The best way to identify risk is therefore to analyse and draw a conclusion from past projects that failed. (Tummala & Burchett, 1999).

Hanisch and Wald (2011) stated that construction of industry is a sensitive sector of the economy, which comprises a wide range of activities that involves alteration, repairs, demarcation, etc. The success factor within which the construction industry operates is vibrant due to the fact that the uniqueness of end product is built on risks and

uncertainties. This industry changes the natural landscape of earth and provides human beings with better living conditions. It is an industry that provides an essential service, which contains its inputs and outputs from various sectors of the economy that interacts in a complex way. This industry has a role of planning, designing, constructing, maintenance, and demolitions of building and works. Construction industry basically deals with the construction and erection of a building and structures of all type of buildings and civil engineering projects such as residential building constructions, bridge erection, railway paving/laying, excavation, demolitions and large-scale painting jobs among others.

The Process of Project Risk Management

The practice of successful management of project risk mechanisms that promotes project success lies within the context of project management practitioners. Project risk management is a value tool used by project managers during the implementation process of the project. The risk management tool is used in projects to ensure the performance of the project, to recognize all unexpected and unpredictable incidents that may occur during implementation and to assess the importance of managing project of an enterprise in general. It is also necessary to consider each individual process factor that affects the outcomes of the project (Thomas & Mullay, 2007).

Many companies fail to consider project risk within their organizational frameworks and believe that any action taken could lead to organisation performance, resulting in no action plan to define and evaluate the risk mitigation mechanism and project-related challenges (PMI, 2012). PMI claims that a successful management of project risk process relies on positive organizational conditions, specific roles and obligations, and technical analysis skills. In order to consider potential threats and to measure risks systematically and quantitatively in consideration of possible causes and effects, it is necessary to recognise the possible risk that a project would face during the initial phase of the project (Mobey & Parker, 2002).

Management of project risk is one of the ten expertise fields of project management that the project manager has to pursue to ensure the performance of the project. (PMI, 2012). Project Risk Management is aimed at reducing harm, loss, mitigating overall risk costs, detecting, monitoring and restricting the effects of risks. In addition, in order to resolve the risk problem and prevent problems in the future, it is often wise to participate in best practises such as coordination and risk evaluation from the outset of the specification of the project (Hamilton, 2000).

Project Cost Management Function

Serpong (2003) clarified that the cost of the construction project is determined by a number of phases. At the calculation point, the approximate cost is tendered and the proposed price is awarded to the successful contract. As defined by the various authors, integrated project cost management includes the tasks of forecasting and tendering, budgeting or disseminating estimated costs and expected revenues, and managing costs by contrasting real costs with estimated costs. Cost estimation and cost management applications are also not being used in a satisfactory manner. The present training effort should be designed to improve the skills of contractors based on the use of comparable and parametric estimations, cost adjustments and earned value.

The project cost estimation is primarily concerned with the cost of the materials needed to complete the planned project activities and is the most critical component of the construction management process used to predict the cost of undertaking the construction work. Although tendering is a mechanism in which, provided the cost estimates, the contractor translates it to a project proposal that will eventually be submitted to the client. If the invitation to tender is given to the client and approved by the contractor, the contractor shall provide estimates for the performance of the work and the tendering process shall begin. The first decision to be taken by the contractors when they are invited to tender is whether or not a proposal will be submitted. If the contractor wishes to bid, he must settle on the price of the bid. In a competitive bidding climate, contractors are eager to send a bid at a low price to win the award with a safe profit margin. Analog analysis, detailed estimation, parametric estimation, best guess estimation, variances, cash flow / S-curve, and Earned Value (Olawale and Sun 2010) are the most common tools embraced in cost estimation and control.

The need for quality management

Meeting stakeholders need and expectations are part of the importance of project quality management. One of the major responsibilities of project team was to develop a cordial relationship with major stakeholders, especially the sponsor and end users of the project. Poor project evaluations arise when the project team focused on meeting up with the written requirements as the main outputs' determinants at the detriments of other stakeholders'

needs and expectations. If a project owner is not satisfied with the outcome of the project, the project team will need to adjust scope, schedule and budget to satisfy. The project sponsors' needs and expectations on scope, schedule and budget must be satisfy and reflect in the outcome of project. The stated or implied needs of project management development must be incorporated by project teams for developing understandable working relationship with all other stakeholders (PM4DEV, 2016).

Clients Satisfaction

Client satisfaction and its benefit are not really straightforward in construction as compared with other areas of production. Construction endeavor are temporary, unique and one-off nature. Thus, the evaluation of success in construction solely lies on clients' expectation. Client's expectations are used to determine the satisfaction of client in construction industry as regards the practices of the contractor. In selecting a particular contractor, the clients would have envisaged expectations as to how realistic are their objective with the particular contractor. Client's personal needs, his personal experience with the contractor and other contractors, the contractor words of mouth are factors that determine client expectation. Also, the image and client's investment in the project, contractor's marketing strategies and the effect of the relationship on customer's expectations (Sami, Juha-matti, Aripekka & Paiv,2013).

Theory of Project Management from the Industrial Era to the Knowledge Society

Project management is not just a great business for software firms and publishers. Also, it is for consulting, thriving in the light of the widely extended belief that projectised organisation and teamwork is the major way for the future of an organisational. It is an idea that determines future success of an organisation to most of its advocates. A well-known one of the early researchers in the field of project management is Alvin Toffler who published his influential book "The Third Wave" in 1980 (as cited in Erno-Kjolhede, 1999), suggested in his book that post industrialism (third wave) will require new ways of flexibility, adaptively of organisation to drastic changes in the work place. The practical consequence of this is that the individual ability and interpersonal skills of employees will be more in focus. This assertion was also emphasized in some books on knowledge management, which dwells more on empowering individual interpersonal skills and flexibility. This corroborates with the observations on the essentials of research management, this assertion promotes projectised organisation, where project manager capability and skills could be effectively utilised due to authority at his disposal compared to traditional approach. This gives an organisation the opportunity to adapt easily to variation. (Erno-Kjolhede, 1999).

In the view of this assertion Harris (1994), also observed that in R&D, things tend to 'go wrong' in almost as they tend to 'go right'. This makes continuous organisational learning in research projects to be highly needed in a firm, because the planning and scheduling tools of project management theory have difficulties in accounting for most of these problems. The principle of operations research is indeed a reference point of an approach set to calculate reality only to realise that reality rarely carried out to pre-calculated standards. Indeed, it was perceived that the technical tools of project management theory have highly been influenced by "scientific management" and contain a strong streak of Taylorism approach of management. This could be described as a conveyor belt approach to project work, viewing the project as a linear activity from stage A to B to C to D. This is the view of this school of thought.

This 'scientific' approach metamorphosed from the Project Management methodology's origins in industrial environment and in military projects. There is a desirable conduct of "command and control" which are to be found in the foundations of the basic principles of technical tools of Project Management Theory: The postindustrial era "third wave" or knowledge society. This basic principle of mechanistic approach seems not be more relevant. The Project Management Theory of today devotes more attention to the human approach which is referred to as soft side of Project Management and not just concentrating on the technical structure aspects of project alone. It refers to the hard side - such as the tools of planning, scheduling and controlling as means of success criteria of a project.

Conceptual Model

Based on the review of literature, it can be argued that cost, safety, user satisfaction, environmental performance, and quality are the major constraints of project success. This study assessed the usage of Project cost, project quality and project risk management against the existing project management triangle model of cost, quality, and time. This study evaluates the impact of project management practices on project success of selected construction firms in Lagos state. The researcher used project risk management, project cost management, and project quality management to

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establish a conceptual model for this study. Based on this model, it was asserted that the project management constraints needed to attain project success are project risk management, project cost management, and project quality management. The argument was that if these variables are properly managed in the organisation, client satisfaction will be enhanced. The model is illustrated in Figure 1.

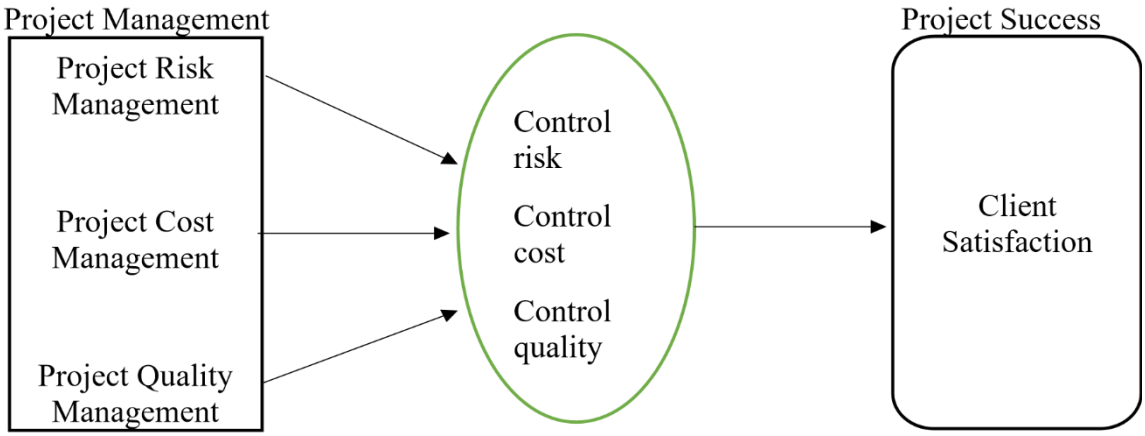

Fig 1 Conceptual model

III. MATERIAL AND METHODS

A survey research design was adopted for the purpose of this study, with aids of structured questionnaire to collect primary data from both the project managers of the participating construction firms and their clients. The questionnaire was validated using both content and contruct validity approach. Cronbach alpha was used to determine the reliability of the instrument with $\alpha = 0.88$. The population of this study comprised project managers of 71 construction firms registered with the Lagos Chamber of Commerce and Industry (LCCI) with their clients. Several of these firms engage in both residential and commercial construction. Their geographical distribution is presented in Table .1

Table 1: Geographical Distribution of Participating Firms

ADMINISTRATIVE DIVISION OF LAGOS STATE	NUMBER OF CONSTRUCTION FIRMS	PERCENTAGE (%)
Lagos Island	37	52
Ikeja	25	35
Ikorodu	4	6
Badagry	3	4
Epe	2	3
TOTAL	**71**	**100**

Source: LCCI Business Yearbook, 2012

A multi-stage sampling procedure was used for the study. This involved Proportional stratification, random, and purposive sampling techniques, while the formular developed by Krejcei and Morgan and Cochran were used to determine the sample size of project 57 managers of the construction firms and 246 of their clients. The data collected was analyzed using correlation and regression analysis.

IV. RESULTS AND DISCUSSIONS

Based on the research methodology discussed above. Fifty-six (57) copies of the questionnaires were distributed to the members of staff of each participating construction firms registered with Lagos Chamber of Commerce and Industry (LCCI) and two hundred and forty-six (246) of the participating clients of the construction firms. Forty-six (46) returns were received from the construction firms, while two hundred and thirty

(230) returns were received from their clients for a grand total return rate of 91%. The questionnaire was divided into two sections. Section one was given to the project managers of the participating construction firms using purposive sampling technique to gather information about the project management practices of the participating construction firms in line with the identified variables in this study. Section two questions were given to the clients of the participating construction firms by liaising with the participating construction firms to gather information about their perceived satisfaction with past projects delivered by the firms. Inferential statistics, using correlation, and regression analysis were used to analyse the data collected from both project managers of the construction firms and their clients.

Analysis of Research Hypotheses

Project risk, project cost, and project quality management practices do not have any significant contribution to project success as measured by client satisfaction.

Regression analysis was used to analyse this question by using the overall responses of the project managers and the clients as dependent and independent variables. This is to determine the overall contribution of project quality, cost, and risk to the clients' satisfaction by reporting the value of co-efficient of Multiple determination (r squared).

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.864[a]	.746	.643	.12594

a. Predictors: (Constant), Project Cost Management, project Quality Management, Project Risk Management

Table 3: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	.018	3	.006	.386	.036[b]
Residual	.666	42	.016		
Total	.685	45			

a. Dependent Variable: Clients' Satisfaction

b. Predictors: (Constant), Project Cost Management, Project Quality Management, Project Risk Management

Table 4: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
1 (Constant)	4.692	.377		12.450	.000
Project Risk Management	.009	.072	.022	.120	.005
Project Quality Management	.074	.085	.160	.877	.035
Project Cost Management	.016	.069	.039	.233	.017

a. Dependent Variable: Clients' Satisfaction

Tables 2.3and 4 present the model summary, analysis of variance, and coefficient of determination of the findings, respectively. The model summary table (Table2.) shows that project risk management, project cost management, and project quality management have strong positive relationship with client's satisfaction (R = 0.864). This implies that a holistic approach to project risk management, cost management, and quality management is more likely to lead to client's satisfaction. The model further

shows the extent to which project risk management, project cost management and project quality management account for variation in client satisfaction. The coefficient of multiple determination (R^2 = 0.746) shows that 74.6% of the change in client's satisfaction is accounted for by project risk management, project cost project quality management.

Table 3 indicates the degree to which the regression model predicts the dependent variable, as indicated by the statistical significance of the regression model. The *p*-value (0.036) shows that the regression model statistically significantly predicts the outcome variable (i.e., it is a good fit for the data). An evaluation of the unstandardized coefficients of project risk management, project cost management, and project quality management in the coefficient table (Table 4) and their associated p-values show that project risk management (β_{TC} = 4.692, $p < 0.05$), project cost management (βCC = 4.692, $p < 0.05$), and project quality management (βRC = 4.692, $p < 0.05$) are statistically significant and can be used in enhancing client's satisfaction.

V. DISCUSSION OF FINDINGS

The findings of this revealed that project risk, project cost, and project quality contribute significantly to client's satisfaction. ($R = 0.864$; $p<0.05$), ($R^2 = 0.746$). Therefore, the null hypothesis was rejected, and the alternative was accepted. This implies that a firm with project quality, cost, and risk management practices would more likely promote client's satisfaction that could also lead to client's loyalty. This finding is in agreement with the work of Thomas (2017) who affirmed that there is certain complementarity between Quality and Risk Management. The author further explained that based on the consequences obtained on the project while using these tools, it was found that using Quality Management technique would lead to solving quality problems of the project, and because these issues were sources of risks, it was easy to either mitigate or avoid them. Risk management is intended to reduce risk levels that affect the quality of a project. Thus, it appears that Quality and Risk Management can be used beyond their primary purposes and their roles can be switched to better serve the project, since both are contributing to the satisfaction of the client.

Mohammed and Mahsa (2015) affirmed that project cost management is an integral part of project management practice that enhances client satisfaction. The author explained that mismanagement during design and construction could cause some activities to be repeated or trigger shortcomings that could hinder the success of the project goal. This study discovered that, there is no existence study where project quality management, project cost management, and project risk management are being studied together as tool of enhancing client satisfaction of construction firm.

Moreover, in a situation where tight budget was experienced on the project, Project cost Management could help to proffer solutions to carry out the project under this budget constraints and avoid deviation from clients' needs. Similarly, Quality Management ensured that client needs were met by improving quality. Regarding the approach of these practices of project management: project quality management, project cost management, and project risk management, it was discovered that their goals are the same, since the approaches intend to bring the project to a successful end, in terms of budget, safety, clients' needs, and project design. The findings of this study were in line with the view of project management theory from industrial era to knowledge society which suggested shift in focus on mechanical approach of project management which was rooted from Taylorism to knowledge management of classical school theory. This theory calls for the integration of project management mechanical approach with modern management practice that focus more on human perspective of enhancing project success. This perspective incorporates different disciplinary origins from management background to strengthen the knowledge-based project management that was prescribed in project management professional book (PMBOK) as the 10 knowledge areas of project management. These practices were transformed into empirically tested hypotheses, which resulted into the outcome of this findings.

Summary of the study

This study was conducted to evaluate the impact of project management practices on project success of selected construction firms in Lagos state, Nigeria. Project success was measured by client's satisfaction. The study used project management practices as the major variables for assessing project success. The opinions of project managers of the selected construction firms were obtained on their project management practices, using structured survey questionnaires Also, the same research design was used to examine the perception of their clients on their level of satisfaction with contractors' project management practices and the services they received.

The findings of this research show that client satisfaction is enhanced when project management practices of a firm are highly effective.

VI. CONCLUSION

In the client-focused paradigm, a highly quality deliverable will strengthen competitiveness, raise market share and will provide a long-term relationship between the client and the construction firm. In order to manage risk effectively and efficiently, the project manager must understand the following: risk responsibilities, risk event conditions, risk preference and risk management capabilities. Project risk management is an important part of decision making in construction industry because their clients are exposed to high degree of risk due to the nature of micro and macro environment associated with construction. in a situation where tight budget was experienced on the project. Project cost Management helped to investigate solutions to carry out the project under this budget, which avoided deviation from clients' needs

Effective project cost management will clearly define actual project cost, which will prevent many future problems and ultimately it will create a situation where a significant portion of capital will be maintained. This study finds out that if these management practices are well managed, there is a very high possibility of having a viable project that will guarantee a sound client satisfaction.

VII. RECOMMENDATIONS

1. Identification and management of risk should be part of an acceptable and functioning of quality and cost management strategy of the firm, based on the links between these variables as they complement each other.
2. Construction firms should develop and maintain holistic management program that coordinates quality, cost, and risk silo, since their overall objective are the same.

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