

EFFECT OF PROJECT MANAGEMENT PRACTICES ON THE SUSTAINABILITY OF THE ROAD PROJECTS IN KENYA: A CASE STUDY OF ROAD CONTRACTORS IN KIAMBU COUNTY

¹JUDITH PHOEBE ATIENO ODHIAMBO, ²DR. SAMSON NYANG'AU PAUL

Abstract: Good project management practices are key to the success and sustainability of construction projects. Success in construction projects is indicated by its performance achievement of project time, cost, quality and stakeholders satisfaction. This study sought to establish the effect of project management practices on sustainability of roads projects in Kenya. The study was guided by these specific objectives; to determine the effect of project risk management on sustainability of roads projects in Kenya, to investigate how project team affects sustainability of roads projects in Kenya, to find out the effect of project budget on sustainability of roads projects in Kenya and to find out how project technology and innovation affect sustainability of roads projects in Kenya. The study was anchored in the extreme value theory, Project management competency theory; Resource based view theory and the social construction of technology theory. This study adopted a descriptive survey research design. The target population was the junior and senior staff of construction companies in Kenya who have initiated and completed projects or is in the closure phase in Kiambu County. Stratified sampling technique was used to select the sample size. A structured questionnaire was used to gather primary data. To test validity and the reliability the questionnaires were pilot tested before they were fully given to the respondents. The sample size of the study was 135 respondents. Information was sorted, coded and input into the statistical package for social sciences (SPSS) version 21.0 for generation of descriptive statistics as well as inferential statistics. The study concluded that project risk management practices can significantly affect project performance. The study also concludes that project team has a significant and positive effect on the project performance. The study indicated that project budget is considered to be a factor necessary for a successful project. The study further concluded that project technology and innovation has a positive effect on project performance. To ensure success in Construction projects in terms of Quality work, timely completion, within the budget and stakeholders satisfaction the study recommends that contractors should set up responsibility centres for risk management. Professionals in the construction field should be trained on risk management. The study recommends use of highly skilled labor in construction projects. Communication, trust, commitment and integration are expected to bridge the physical and knowledge gap between different project participants. From this study

Finally the study also recommends that project managers should work hand in hand with IT experts to ensure they keep up with emerging trends and technologies. They should also ensure that the staffs are fully trained on any new technology that is implemented within the firm by organizing seminars and workshops to enhance their skills and expertise in their practice as professionals.

Keywords: Project Management, Construction, Risk and Risk management.

1. INTRODUCTION

The road construction industry is a key industry in the economy of any country worldwide. It is one of the biggest industries in the world contributing to around 10% of the global GDP (Nguyo, 1988). The resources utilized in this industry add to 50% of the world resources (Economy Watch, 2010). With such an impact on the world economy and resources, it is prudent that activities within this industry are efficiently and effectively planned. Cost and schedule performance are the primary measures of a projects success. A project is said to be successful if its completed within the planned cost and time. Developing countries are faced with the problem of scarce financial resources. Road construction comprises of five major phases namely planning, programming and design, procurement, construction and project closure.

Statement of the problem

The road construction industry is vital to every country's economy. The role and the importance of the industry in the development of a country need not be overemphasized. According to the Kenya Bureau of Statistics, the road construction industry contributed 4.2%, 4.1%, 4.2%, and 4.4% towards the Gross Domestic Product (GDP) for the years 2013, 2014, 2015 and 2016 respectively (Republic of Kenya, 2014). This is apparent that the output from the road construction industry is a major and integral part of the national output, accounting for a sizeable proportion in the Gross Domestic Product (GDP) of the country. The industry also generates products that are the necessary public infrastructure and private physical structures for many productive activities such as services, commerce, utilities and other industries (Republic of Kenya, 2017).

Success in construction projects is indicated by its performance in the achievement of project time, cost, quality and environmental sustainability objectives (Zhou et al 2007). Despite the efforts of all players in the construction industry, many road construction projects in Kiambu and generally in Kenya run a high risk of poor performance by well being over the budget and significantly late. The construction industry has a reputation for time and cost overruns. One of the reasons of the bad performance is that the construction industry is one of riskiest of all business types (Clough et al 2005). Within the sphere of a given project there are several project management activities. Several ways of carrying out these activities emerge and become accepted as day to day practices. Personnel involved in project management may also adopt certain PM practices and stick to them for purposes which may however not relate to the project success. Several practices are therefore carried out in the management of projects but not recognized as PM practices.

Local scholars such as madukani (2013), Chinyio & Olomaliye (2010) and Kihara (2012) among others have studied importance of road construction projects. These scholars have focused on different studies that include: Wambui et al 2015 did a study on factors affecting roads Construction Projects delivery in Nairobi City County. Musa (2012) did a study on effects of total quality management on performance of Companies in Kenya a case study of Inter build Company Limited. He found that human resource management and resource management affects performance of the building company to a great extent. Bundi (2011) did a survey on challenges in the management of procurement services within Kenya Urban Roads Authority. She found that political interferences and inadequate allocations of funds hinder completion of KURA activities even though the authority fully implements procurement policies. Nyamwaro (2011) did a study on analysis of challenges facing project implementation a case study of Ministry of Roads Projects.

Despite previous studies focusing on roads, offices construction, gated communities, bridge works, and hospitality institutions among others, none has focused on the effect of project management practices on project performance of road construction projects in Kiambu County, Kenya. This has created a shortage in empirical evidence and studies on the local scene. This study will seek to fill this gap by investigating the effect of project management practices on project sustainability of construction projects in Kenya.

Objectives

- i. To determine the effect of project risk management on sustainability of the road projects in Kenya?
- ii. To investigate how project team affect sustainability of the road projects in Kenya?
- iii. To find out the effect of project budget on sustainability of the road projects in Kenya?
- iv. To find out how project technology and innovation affect sustainability of the road projects in Kenya?

2. THEORETICAL REVIEW

Extreme Value Theory

In 1709, Bernoulli discussed the mean largest distance from the origin when n points lie at random on a straight line of length (Johnson *et al.*, 1995). A century later Fourier stated that, in the Gaussian case, the probability of a deviation being more than three times the square root of two standard deviations from the mean is about 1 in 50,000, and consequently could be omitted (Kinnison, 1985). The construction companies with significant amounts of project activity proved to be very vulnerable to extreme market movements and, in time, the measurement of market risk became a primary concern for regulators and also for internal risk control. This calls for indicators showing the risk exposure of firms and the effect of risk reducing measures. Value-at-Risk (VaR) has been established as a standard tool among construction companies to depict the downside risk of a portfolio projects. It measures the maximum loss of the portfolio value that will occur over some period at some specific confidence level due to risky project factors (Jorion, 1997).

Project Management Competency Theory

The work of (McClelland & McBer 1980) established the competence theory. The authors defined competency as the underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation. Since then a number of competency frameworks have been developed by different project management institutes. Crawford (as cited in Boyatzis, 1982 & Spencer, 1993), puts a model of competence that integrates knowledge, skills, demonstrable performance, and core personality characteristics, noting the last, personality characteristics, as challenging to develop and assess through training.

Resource Based View Theory

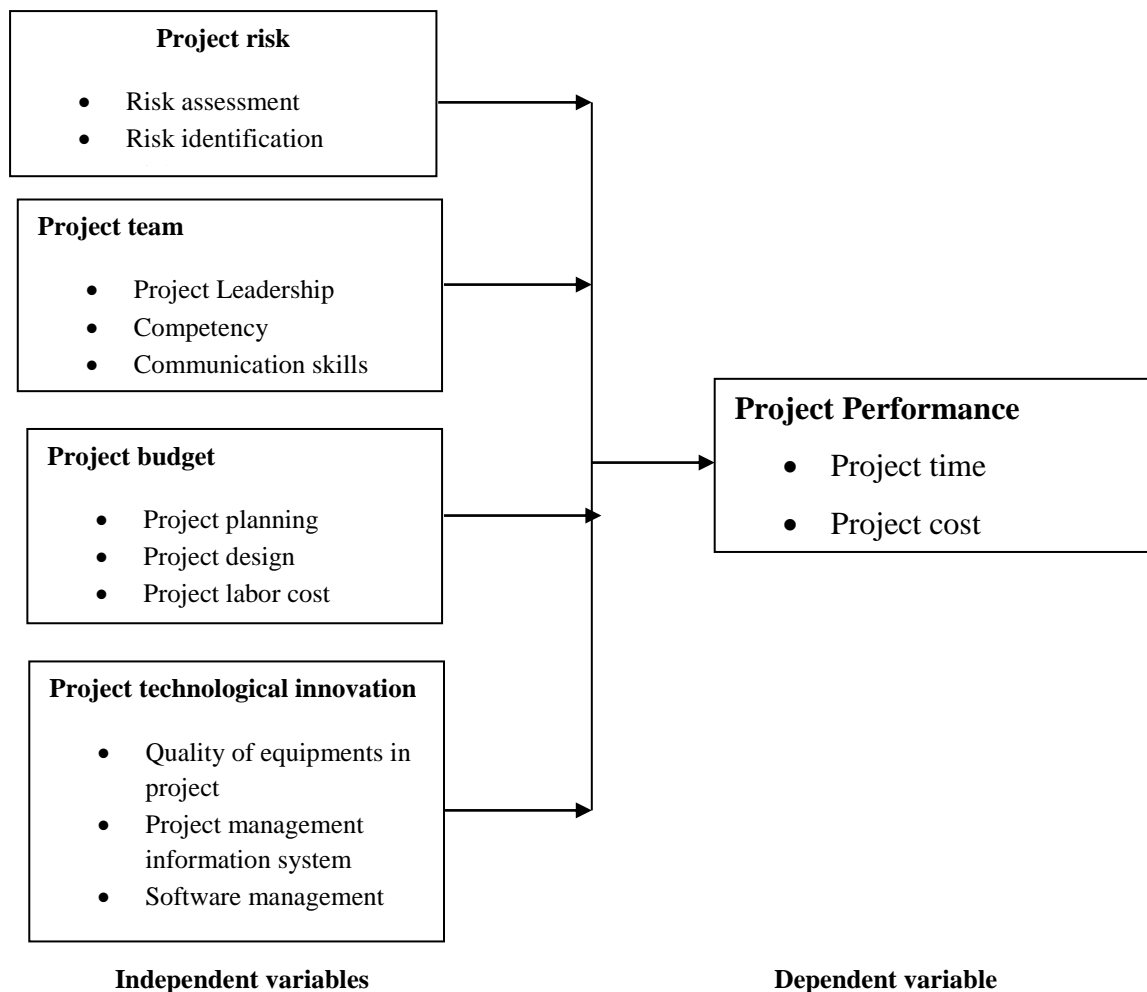
The resource based view (RBV) of the firm is a strategic management theory that is widely used by managers in project management. The RBV has to date been a promising theory that examines how resources can drive competitive advantage, especially project management (PM) capabilities that have been customized to a specific organizational environment and developed over time. . The model assumes that each organization is a collection of unique resources and capabilities (Ireland *et.al*, 2011).

Social construction of Technology Theory

The social construction of technology (SCOT) is a theory within the field of science and Technology studies which argues that technology does not determine human actions but rather, human actions shapes technology. They also argue that the ways a technology is used cannot be understood without understanding how that technology is embedded in its social context. SCOT is not only a theory, but also a methodology: It formalizes the steps and principles to follow when one wants to analyze the causes of technological failure or successes.

Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of inquiry and used to structure a subsequent presentation (Reichel & Ramey, 2010). It is a tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny. It helps the research to explain the relationship among interlinked concepts such as the dependent and independent variables (Kombo, 2006). In this study, the researcher seeks to establish the effect of project management practices on project performance of construction projects in Kenya. It will be conceptualized within the dependent-independent variable components and their indicators. The figure below shows a diagrammatic representation of the relationship between the dependent and independent variables.

Conceptual framework**Figure 2.1: Conceptual framework****Research gaps**

A lot of researches on project management practices have been carried out both in Kenya and globally. From the literature review it has emerged that very little has been done to relate project management practices and project delivery in terms of meeting all the critical project objectives. Where research has been carried out in this area it has not attempted to establish the effect of project management practices on the project performance in construction projects. Most of the studies carried out have concentrated on only two objectives, that is, cost and time. For example, Gichunge (2000) looked into how project management practices influence both project cost and project time. Wanyona (2005) has looked into project management practices in the cost planning and control of building projects by considering the Quantity Surveying profession in Kenya. Talukhaba (1988) has researched on project time and cost performance of construction projects. Based on this therefore, there is need for a study to identify effect of project management practices on project performance of construction projects in Kenya with a focus on road project Construction projects in Kiambu County

3. RESEARCH METHODOLOGY

The research design used in this study was descriptive research design. The study was undertaken at Kiambu County. The target population therefore comprised of 350 respondents who were drawn from construction companies in Kenya who initiated and completed or is in the final stages of the project in Laikipia County (NCA, 2014). The study utilized a sample size of 135. The statistical Package for Social Sciences (SPSS) was used for data analysis purpose.

Model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

Y = Performance of construction projects

X1: project risk

X2: project human resource

X3: project budget

X4: project technological innovation

β_0 = Constant

ε = the error term

$\beta_1, \beta_2, \beta_3$ = Independent variables' regression coefficients

4. REGRESSION RESULTS**Coefficients of Regression Model****Table 4.1: Significance of Independent Variables**

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.820	.562		4.785	.000
Project Risk management	.650	.215	.687	4.810	.000
Project Team	.375	.250	.455	1.708	.000
Project budget	.275	.185	.380	1.671	.001
Project technology & innovation	.227	.170	.315	2.086	.002

As per Table 4.1, the equation ($Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$) becomes:

$$Y = 2.820 + 0.65X_1 + 0.375X_2 + 0.275X_3 + 0.227X_4$$

Where Y is the dependent variable the performance of construction projects.

X1 – Project risk management

X2 – Project team

X3 – Project budget

X4 – Project technology and innovation

The regression equation above has established that taking all PM practices into account (Project risk management, project team, project budget and project technology and innovation)

The results in Table 4.14 indicate that project risk management significantly and positively influenced construction project performance in Kiambu County ($\beta = 0.650$; $t = 4.810$; $p < 0.05$). This implies for the project performance to be enhanced, the risk management should involve the identification of influencing factors which could negatively impact on cost, schedule or quality objective of the project, quantification of the impact of potential risk and implementation of measures to mitigate the potential impact of the risk. In other words, Project team should identify the risk related to a project, analyze these risks and determine the actions to avert the threats on any of the project objectives. All the steps of the risk management process should be included to deal with risk in order to enhance the processes of the project management.

Further, project team has a significant and a positive effect in construction project performance in Kiambu County ($\beta = 0.375$; $t = 1.708$; $p < 0.05$). This result indicates that where highly capable project team workforce is utilized, the effect of

competency manpower in the construction sector is very visible in its end products. This is because they are directly involved in the early realization of projects completion since they handle the technical phase of such contract. This has an implication that a skilled project team helps to raise efficiency, decrease accidents, less management, increased organization stability which in turn enhances the performance of the projects. On the other hand, the significance of a more skilled project team cannot be ignored as they have the possibility of reducing inefficiencies owing to poorly constructed projects. This has an implication that the quality and availability of a skilled project team is considered a vital factor in the effectiveness of the project performance.

Project budget had a significant and positive effect on construction projects performance in Kiambu County ($\beta = 0.275$; $t = 1.671$; $p < 0.05$). These results indicate that the availability of an adequate budget is considered to be a factor necessary for the successful completion of construction projects. This budget helps manage expectations and gives the project sponsor information to develop a cost-benefit for the project. However, it should be noted that premature depletion of projects' resources can be caused by bureaucratic bottle-necks that lead to delays in resource requisition and delivery. This could be attributed to poor communication and co-ordination between the construction project site and the funders or between project management and organizational authority.

Project technology & innovation had a significant and positive effect on the construction project performance in Kiambu County ($\beta = 0.227$; $t = 2.086$; $p < 0.05$). This indicates that technology by helping store, develop, and share information and knowledge of past and present projects helps develop detailed specifications and reduce the extent and impact of such uncertainties as well as helping to streamline and standardize project management processes. Furthermore, technology & innovation provide tools for planning and web-based support systems, which are essential for communication, conflict resolution, knowledge sharing, and integration of complex projects which in turn enhances the performance of projects.

5. CONCLUSION

The study established that most of the respondents were satisfied with the project achieving its goals and objectives. This is because most of the projects engaged professional experts prior to the commencement of the projects leading to good preparation.

The study established that many respondents believed that it affected project performance to a great extent. However, it was the preserve of the experts because all the architectural designs were done by professional experts such as architects, quantity surveyors, environmental experts. During the pre-contracting stage of the project planning was done using tools such as work breakdown structures, critical path analysis as well as Gantt charts.

The study also established that the skills and experience of the project manager and the management committee in general influence the implementation of construction projects in the study area. The project manager is responsible for steering and controlling the activities of the implementation team and ensures that the project realizes its goals.

The study finally concludes that technology and innovation has a direct influence on the performance of a project. Contractors who used emerging technologies and software reported quality work which was completed on time hence stakeholders' satisfaction. The project was also reported to be quite efficient with minimal resources loss. Most of the staff were reported to be conversant with most common ICT equipment's and infrastructure used in managing the projects and implementing the project.

6. RECOMMENDATION

The study recommends that professionals in the construction field should be educated in risk management and thus both formal and informal systems of risk management training needs to be developed.

The study further recommends that project managers need to establish a highly co-operative project team in which competent specialist contractors and skilled laborers are staffed. Hiring the right project players in terms of talent and commitment could yield a much higher productive team in terms of creativity and innovation hence success is achieved.

The study also recommends that project consultants should be more interested in design cost by using multi-criteria analysis and choosing the most economical criteria in order to improve their performance and to increase owners' satisfaction. Through this analysis, the team identifies and highlights the outset of the project, ensuring the data estimates are accurate and consistent and a comprehensive report can be compiled based on the estimates.

The study finally recommends that project managers need to be aware of their project technology preferences and provide the tools and equipment to the project team as they can be more motivated. Implementation of technological systems can either act as a medium for change or be the means of achieving a desired change in a project. Integrating technology into project management process could be one of the best ways that contribute to project completion

Suggestions for Further Research

This study was conducted at a single County Government. It is recommended that further studies be conducted in other County government across the country and consider other factors that might influence project performance. Further research should be conducted in all building firms and construction to investigate into the challenges facing project implementation. The same study should also be conducted in other types of organizations

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