Cost Management and Implementation of Construction Projects in Elgeyo Marakwet County, Kenya

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Abstract

A project is believed to have been successfully implemented if it is accomplished on time, within the budget and with excellence that satisfies customers' expectations and needs. Most construction projects have experienced cost and time overruns during the implementation process. Globally, timely implementation of projects according to budget is considered a shortcoming and a major risk in implementation of construction projects. In Kenya, construction projects continue to witness cost overruns, time overruns, reworks and customers dissatisfaction that has resulted into poor implementation of construction projects, at least according to the evaluation of the customers. The objective of this paper was to investigate the influence of cost management on implementation of construction projects in Elgeyo Marakwet County and draw recommendations on management of the influencing factors. The specific objective was to determine the influence of technical imprecisions costs management on implementation of construction projects in Elgeyo Marakwet County.This paper is organized into various sections where section one provided the introduction, section two gives the scope of the study and literature review on the cost's factors influencing the implementation of construction projects both on theoretical review and empirical review. Section three provides the methodology employed in the study; the study findings and their interpretation are presented in section four, while section five has conclusions and recommendations of the study and the policy implications.

Keywords: Construction projects, cost management, cost overrun, project funding, project implementation.

INTRODUCTION

Construction project management is viewed as cross cutting foremost problem that construction sector face in their project implementation. Despite the fact that companies are dynamic in their own way due to factors that are either internal or external, in review of various literatures and reports, these dynamics are majorly attributed to by the very nature of the changing trends in technology, systemic processes, management processes and the expectations of the clients (Wysocki 2014).

Factors like time, result and means are the key indicators that play a major role in project implementation (Kazaz, Ulubeyli, & Tuncbilekli 2012). In the construction industry these dynamics are majorly mentioned to be as a result of the expanding composition of the key players in the industry, ranging from the client, consultants, regulation, authority, contractor and supply chain. In addition, the scarcity and lack of stakeholder management literature and guidelines around the world makes it more

difficult for the construction industry to crack the problems associated with the construction stakeholders' management.

The success of any project means that all or certain expectations of the participants is met, be it the customer, engineer, service provider or worker. However, the prospects are sometimes diverse for every party (Wysocki, 2014). According to Han, Yusof, Ismail, & Aun, (2012), management accomplishments, functional accomplishments, and organization success are the three principal criteria of project success. In other many studies, period, price, quality and customer satisfaction are universally accepted to be key success factors in construction projects.

In construction projects, there are four major components of project success. Elbohisi (2016) summarized the four major components of project success as user-related factors, professionals' factors, organizational factors and other minor factors that go beyond time, cost, quality and customer satisfaction to include professional fulfillments and the achievement of organizational goals. According to Atkinson (2015), many project success criteria that are categorized into four major components can be summarized by the iron triangle that involved the budget, period and quality and the information structure, benefit to the organization and finally benefit to the stakeholders including the community.

The subject of poor cost performance and in certain cases project implementation failure have been extensively published in most projects and construction management works. In several research, poor project implementation remains one of the major challenges and risk factors that companies and project implementers must grapple with. The factors that affect the overall project implementation during the conception and design phases within the construction process have been broadly examined (Ondari & Gekara, 2013).

Interestingly, studies have focused primarily on the contractor's cost-estimating skills while critical in realizing better project implementation in big and small projects is the need for contractors to have to improve their management performance related to the success of project implementation and the most vital benchmarks for measuring project success is project completion within the estimated budget, time and the actualization of the client's expectation and given the fact that firms work on narrow budget and time margins in the construction industry, completing a project within budget is even more critical and complex (Pidomson, 2016).

According Assaf and Al-Hejji (2012), application of cost control software and strategies have not significantly reduced cost and time overruns in implementation of complex construction projects because poor implementation of construction projects is still globally evident. Nonetheless, poor project management, whether due to delay or estimation errors or any other factors, do not just happen but emanate from a specific section of the people and events involved (Assaf & Al-Hejji, 2012).

While poor cost management is often cited as the main cause of these failures or delays, an evaluation of the effects on overall project lifecycle or efficiency, success rates and possible mitigation remains partially explored in research. Project success can be derived from four major components of the organizational structures, supporting management practices, project management systems and very importantly the project manager skills and competencies through the project management values outline (Macharia & Ngugi, 2014).

According to Gwaya and Wanyona (2014), two major factors that contribute to projects delay and cost overruns are inefficient technical and economic appraisal as most projects begin without proper site and market studies that are important for planning purposes. Poor project implementation may occur as a result of poorly written budgets by the client or the contractor due to a poor briefing on the project. This arises majorly from the inadequacy of the project briefing or from the use of outdated estimates. They observed that inadequate tender evaluation, extreme variations in terms, constant disruptions arising from internal and external forces and lack of competent and experienced contractors and suppliers contribute to poor project implementation in construction industry.

In the emerging economies, the construction industry is fast growing with the increased need for expansion in infrastructure and property development. With this boom, it is vital for firms, government institutions and private developers to take into consideration the main challenges posing development and growth prospects of not only the industry but also enabling successful completion of different construction projects (Nitithamyong & Skibniewski, 2016).

Globally, timely project implementation is considered a major challenge and touted as one of major risk areas in the implementation of complex projects at 60%. The reasons fluctuate significantly from state to state and dependent on project implemented. It is indisputable that studies have shown a disparity in causes, prevalence and the ultimate implications on projects (Ondari & Gekara, 2013). Available literature is skewed, especially in relation to the level of economy with most researchers focusing on developed economies, thereby failing to capture the impacts of geo, social and economic differences across the globe. The proposed study aims to explore the Kenyan construction industry, noting the fact that the country has been feted recently for its outstanding performance in infrastructure and property development.

Scope of the study

The focus of the project was to investigate the factors influencing implementation of construction projects in Elgeyo Marakwet County, Kenya. The project strives to qualify or disqualify technical imprecisions as a factor that influence project implementation. The study focused majorly on physical infrastructures and specifically on civil engineering works projects within Elgeyo Marakwet County such as housing constructions, road constructions and structural constructions. The study used descriptive research design in obtaining relevant information from the sample population cutting across varied construction projects and from varied players in the building sector as construction consultants' government officials, construction contractors and construction workers. The primary data collection instrument chosen for this study was the use of a questionnaire.

Project Technical Imprecisions and Implementation of Projects

Change in project design refers to some extent alteration in the initial design on construction project after the contract has been awarded and signed off. Such changes are linked not merely to matters in accord to the delivery of the contract, but also changes in the work circumstances (Nitithamyong & Skibniewski, 2016). Construction changes refer to work state, methods or approaches that diverge from the initial construction design or specification and generally occasioned by difference in work merit and environments, scope changes or doubts that make construction dynamic and unstable.

According to Macharia and Ngugi (2015), changes are any add-ons, errors or alterations initiated on the initial defined work after signing off the contract. Since a change in the project design is inevitable as observed by past experiences of project implementation, it is therefore high time construction stakeholders accept that this is one of the current global emerging challenges that is majorly driven by the technological changes witnessed in the world today.

According to a study by Abdul-Rahman, Alashwal, Ayub and Abdullah (2013), virtually all construction projects undergo some level of design deviations at some point in the project implementation lifecycle and that **v**ariations in construction projects are expected and unavoidable in nearly all construction projects and this is meant to modify original work design. They opined that design variations in construction projects are common, where in many circumstances, these variations contribute to unnecessary dues, disagreements and disagreements in costs.

Consequently, complex, dynamic nature of construction project postures doubts and hazards in implementation. In conclusion Abdul-Rahman et al. (2013), noted that design modification often results from quality nonconformity, quality non-adherence, quality mess, faults or errors and such changes should therefore be actively and keenly monitored to try and mitigate cost overruns since this is the default expectation anyway.

Project design changes happen as a result of both internal and external influences that may arise due to natural causes beyond stakeholders' control despite the fact that suggestions to have a settled price with the customer to be used for discrepancies and ensuring the project and cost evaluation are reorganized as the design changes as a best practice for project implementation control (Abdul-Rahman et al. 2013). In conclusion the study reaffirms that alterations in construction projects design unavoidably contribute to cost overrun or delay in schedule.

According to Ahzahar, Karim, Hassan and Eman (2011), despite the fact that major improvements have been made on construction drawings from merely sketched and drawn by hand to new techniques including use of drawing software such as 3D CAD software, specifications still do not focus on the materials, installation techniques, and quality standards leading to poor cost management. Minus decent design the entire project may experience delay, cost and quality challenges that are the tripod indicators of project implementation (Ahzahar et al. 2011).

The study concluded that in previous ten to fifteen years decline has been witnessed in the quality of construction projects design in terms of drawings being produced and documentation that affects the implementation process. Drawing and design quality therefore remains a major concern to the very many stakeholders in the construction industry where incomplete drawing and detail design is a key contributor to causes of delays and cost overruns.

According to a study by Chileshe and Kikwasi (2014), there exist several consultants who engage and perform construction related work with limited experience in the construction industry. Besides that, there are several causes of an expert without familiarity and technical know-how which include variations of site conditions, malpractice and maladministration, location admission limitations, faulty plan and specification as well as motivated by inadequate advisers' expertise. Contractor competency and experience is a massive impact on construction implementation and

for a contractor, consultant, managers to perform satisfactorily in construction projects, they must have specific knowledge and skills and understanding of their roles.

In conclusion Chileshe and Kikwasi (2014), affirmed that contractors, consultants and clients who have built projects before and the specialized ones especially those who have repeated similar projects have a better chance of successful accomplishment of their projects within budget, quality than novice.

METHODOLOGY

Research Design

According to Creswell & Zhang (2014), descriptive research design assist in obtaining relevant information from the sample population. They defined survey as the process of investigating the opinions or experience of a group of people by asking them questions. This study adopted descriptive research study focusing on gathering information to investigate the influence of cost management on construction projects in Elgeyo Marakwet County. Data collection happened primary by use of questionnaires administered to the sample group and the information gathered critically analyzed to evaluate whether the research questions are indeed answered. This study also utilized qualitative and quantitative research methods.

Empirical Model

This research employed Multiple Linear Regression model for Project Implementation stated as.

$PI = \beta_0 + \beta_1 X_1 + e$

Where PI Project Implementation.

β_0 Constant

β_1 Beta coefficient

X_1 Technical imprecisions

This model can be used, verified and measured with good software to ascertain discrete factor contributions to the project success.

Target Population

The target population in this study was 100 existing construction projects in Elgeyo Marakwet County cutting across road construction projects, public works construction projects, multipurpose dam construction projects and bridges structural construction projects.

Sampling Design

A sample size of (30%) of the targeted population is sufficient in a descriptive study and the larger the sample the higher the probability that the sample reflects the general population despite the fact that sample size alone does not generate the ability to generalize a pattern (Yin, 2014). The sample size for this study was (30%) of entire target population and therefore a sample size of 30 construction projects were interviewed by use of questionnaire.

The focus of the study was to ensure that representatives from all categories of construction projects as well as all levels of management were selected for the study. Focus was made that reproducing of samples from a single subgroup is minimized at all costs. Organizations are organized into three levels of management such as the uppermost management level, intermediate management level and lowest management level (Kaiser, Craig, Overfield & Yarborough, 2011).

In order to ensure that the directors, project managers, supervisors and support staff were sampled for the study, subdivision of the population into strata happened and the participants in the study selected through simple stratified random sampling. Stratified random sampling technique is an equal opportunity for selection method that gives every item or unit in the target population an equal opportunity to be selected as a part of the sample.

Data Collection Instruments

The primary data gathering tool chosen for this study was a questionnaire. Questionnaire is a research instrument composed of a sequence of questions that are either printed or written with choices of answers planned for the purpose of a survey or statistical study. In use of a questionnaire a formalized engagement is arranged where the questionnaires are mailed or delivered manually to the respondents for answers (Bradburn, Sudman & Wansink, 2004).

Raw data collection was conducted via questionnaire and the questionnaire was based on likert scale and closed ended questions that included prewritten possible responses from which the respondents chose their answers.

The questionnaire was divided and organized in different sections from section one to four. The first section gathered information on personal information of the respondents, section two gathered information linked to the first objective of the study on technical imprecisions, section three obtained information on second objective of the study focusing on funding for projects, and section four obtained information on objective three of the study on regulatory policies.

Data Analysis and Presentation

In this study, analysis of data was done through descriptive and inferential analysis method. Descriptive and inferential analysis is a study, a science of gathering, organizing, exploring, understanding, interpreting, and presenting data and uncovering patterns and trends (Almalki, 2016).

Descriptive analysis describes the elementary features of information and displays or summarizes data in a rational way. To facilitate attainment of the research objectives, researcher used descriptive statistics that compares various variables in the study statistically such as the mean, mode and median. This method was further used to determine the variability of various variables through establishing the frequency of distributions, percentages, range, standard deviation and variance using the data obtained from the field.

Prior to analyses, cleaning up information collected from the field was prioritized where errors were identified and corrected and organized in a way that allows for statistical analysis. Analysis of data was done by use of statistical package for social science (SPSS), Microsoft excel computer program and presented by use of tables and percentages. Finally, the researcher used descriptive statistics to evaluate central respondent attribute to the cause.

Ethical Considerations

In this study, the major ethical considerations revolved around data protection, confidentiality and consent of the participants. The first ethical consideration was on obtaining approval of the research project from Kenyatta University that provided authenticity to this study by ensuring that validity of the study is achieved. This also

ensured that the research is conducted according to the prevailing academic research standards, norms and practices.

As a component of ethical consideration, the researcher recognized the contributions of other researchers in the study topic for providing guidance and in-depth information in supporting this study. This was achieved by way of acknowledging such research through references and citations. The researcher together with the research assistants ensured that the participants in the study have a clear understanding of the objective of the study that increased the participants' confidence in participating objectively in the study.

The participants' permission was sought as a form of official consent as a way of their acceptance to participate in the study willingly. Finally, the study took into consideration confidentiality issues whereby the collected data was solely used for the research and study purposes and no other purpose. Confidentiality also meant that anonymity of the participants was held throughout the study.

RESULTS AND DISCUSSIONS

Levels of cost, time and quality challenges in project implementation

The study sought to determine the levels of cost, time and quality challenges witnessed among the surveyed construction projects as represented in Table 1.

Table 1: Level of cost, time and quality challenges in project implementation

Case Processing Summary

		N	Marginal Percentage
PI	3.67	2	7.1%
	4.00	7	25.0%
	4.33	4	14.3%
	4.67	4	14.3%
	5.00	11	39.3%
Is the project implementation within time, budget and quality?	Strongly disagree	16	57.1%
	Disagree	11	39.3%
	Strongly Agree	1	3.6%
Does poor cost management affect project implementation budget estimates?	Neutral	1	3.6%
	Agree	8	28.6%
	Strongly Agree	19	67.9%
Does poor cost management affect project implementation time estimates?	Agree	12	42.9%
	Strongly Agree	16	57.1%
Does poor cost management affect project implementation quality?	Neutral	2	7.1%
	Agree	15	53.6%
	Strongly Agree	11	39.3%
Valid		28	100.0%
Missing		0	
Total		28	

According to Table 4.1 (96.4 %) of the respondents reported that their projects witnessed budget, quality and time overruns during the implementation of their

projects. Individually, 100 percent of the respondents reported that their projects had witnessed budget and time overruns while 92.9 percent of the respondents mentioned that their projects had witnessed quality challenges.

According to the National Planning Commission Report (2017) Elgeyo Marakwet County registered poor projects implementation in terms of cost, time and quality by 25-75 percent. This could be confirmed by this report where the projects reported cost, time and quality overruns by a range of 35 percent, 35 percent and 30 percent respectively falling squarely within the range put forth by the National Commission Report (2017).

Influence of technical imprecision cost on implementation of construction projects
The study sought to determine the influence of technical imprecisions costs on implementation of construction projects in Elgeyo Marakwet County. The technical imprecision costs were reviewed in terms of project design changes, drawing and design quality, competency and experience. Table 2 presents the findings on the technical imprecision cost factors influencing implementation of projects.

Table 2: Technical imprecision costs on project implementation.

Descriptive Statistics			
Is the project implementation within time, budget and quality?	Mean	Std. Dev.	N
Is the project implementation within time, budget and quality?	1.54	.838	28
Does design changes costs management affect project implementation	4.79	.418	28
Does drawing and design costs management affect project implementation?	4.64	.621	28
Does competency and experience costs management affect project implementation	4.68	.548	28

The analysis data was obtained using a 1 to 5 point likert scale with 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree. The respondents were asked to indicate their levels of agreement with the technical imprecision costs factors influence on project implementation. The scale was considered to allow the respondents show their level of agreement or disagreement with a particular statement.

Responses were then coded into numerical value used to compare their perceptive value under study. The score strongly disagrees and disagree were combined into one to represent a variable with a mean score of 0 to 2.5 on the continuous likert scale. The scores of neutral represented a variable with a mean score of 2.5 to 3.4 on the continuous likert scale and the score of agree and strongly agree were combined to represent a variable with a mean score of 3.5 to 5.0 on the same scale. A standard deviation of greater than 1.0 indicated a significant difference on the impact of the variables among the respondents of the study

According to the respondents, majority of them were of the opinion that design changes costs had the greatest impact on project management scoring a mean of 4.79. A further majority were of the opinion that competency and experience cost managements and drawing and design costs managements impact on project management with a mean score of 4.68 and 4.64 respectively. The overall results indicated that the technical imprecision costs have an influence on the implementation process of construction projects.

This results into a positive debate on technical imprecisions costs management and project implementation. A study by Abdul-Rahman, Alashwal, Ayub and Abdullah (2013), confirms these findings where they noted that virtually all construction projects

undergo some level of design deviations and changes at some point in the project implementation lifecycle. They opined that these technical imprecisions are occasioned by project design changes, drawing design quality and competency and experience. When such changes occur, they affect project implementation regarding time, cost and overall quality by a large margin.

The study findings are also in concurrent with another study findings by Chileshe and Kikwasi (2014), where they noted that there are many consultants who carry out their work without experience in the construction industry. Besides that, there are several causes of an expert without familiarity and technical know-how which include variations of site conditions, malpractice and maladministration, location admission limitations, faulty plan and/or specification as well as motivated by inadequate advisers' expertise. Contractor competency and experience is a massive impact on construction implementation and for a contractor, consultant, managers to perform satisfactorily in construction projects, they must have specific knowledge and skills and understanding of their roles.

Table 3: Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.721[a]	.519	.448	.38080	.519	6.039	3	24	.003	1.982

a. Predictors: (Constant), Technical imprecisions, Funding for projects, Regulatory policies
b. Dependent Variable: Project implementation.

From the Table 4.3 established above, the study recognized the linear dependence of the major factors influencing the implementation of construction projects in Elgeyo Marakwet County. The study realized a correlation coefficient of 0.721 which is a strong positive correlation depicting a near perfect linear dependence between the dependent and independent variable.

An R-square of 0.519 was determined and adjusted to 0.448 with the coefficient of determination depicting that technical imprecision, brings about (51.9%) variation in construction projects implementation in Elgeyo Marakwet County while (49.1%) of the disparities are contributed to by factors not captured by the objectives of this particular study.

The Durbin Watson value of 1.982 realized illustrated that there is lack of autocorrelation in the model residuals.

Table 4: Regression analysis Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.886	1.725		-1.093	.285
	TI	.428	.221	.330	1.936	.005
	FP	.171	.474	.076	.360	.026
	RP	.749	.385	.400	1.944	.004

a. Dependent Variable: PI

In determining critical factors influencing construction projects implementation in Elgeyo Marakwet county, the study conducted a regression analysis. One variables of

critical factors considered was the technical imprecisions in relation to project design changes, drawing and design quality and competency and experience in projects in Elgeyo Marakwet county.

$PI = \beta_0 + \beta_1 X_1 + e$
The regression equation becomes
$PI = \beta_0 + \beta_1$ Technical imprecision + e
$PI = 1.886 + 0.428 X_1 + e$ $P < 0.003$
From the findings, the regression model depicts that when technical imprecisions have a null value, the construction projects implementation would be 1.886. This means that when all other factors are constant, a unit increase in the perceptive value of technical imprecisions would yield a 0.428 decrease in the construction project implementation.

Summary
The general objective of the study was to investigate the cost factors influencing implementation of construction projects in Elgeyo Marakwet County, Kenya. The specific objective was to determine the influence of technical imprecisions costs on implementation of construction projects in Elgeyo Marakwet County, Kenya.

The study was organized into various where section one provided the research background, research objectives, significance of the study, the scope of the study, and the limitations encountered in the course of the study. Section two presented literature review on the cost's factors influencing the implementation of construction projects in Elgeyo Marakwet county both on theoretical review and empirical review, summary of a literature review and research gaps and a conceptual framework.

Section three dealt with the methodology employed in the study; the study findings and their interpretation were presented in section four, while section five has conclusions of the study and the policy implications.

The study adopted a descriptive survey design. A sample size of (30%) was used for data collection. Data was collected through questionnaire and was based on five point likert scale and closed ended questions that included prewritten possible responses from which the respondents chose their answers. The collected data was analyzed through descriptive and inferential analysis. Finally, the data was organized and presented in percentages and tables.

Based on the responses from the respondents this research came up with findings and were used to make conclusions and give recommendations. In regard to influence of technical imprecisions costs on implementation of construction projects in Elgeyo Marakwet County, majority of the respondents were of the opinion that design changes costs had the greatest impact on project management. Again, competency and experience cost managements and drawing and design costs managements also impact on project management. The overall findings showed that the technical imprecision costs have an influence on the implementation process of construction projects whereby a unit cost increase in the perceptive value of technical imprecisions would yield a 0.428 decrease in the construction project implementation.

CONCLUSION

According to the above discussions and summary, the following conclusions can be drawn from the study. With regards to influence of technical imprecisions costs management on implementation of construction projects in Elgeyo Marakwet county,

there was a statistically significant relationship between the two variables. Technical imprecision costs influence construction projects implementation and a project supported by adequate technical imprecision cost management is likely to be implemented to successfully within the budget, time and quality.

RECOMMENDATIONS

To overcome the risk associated with technical imprecision during the implementation process, the construction project should have a mechanism in place that ensures that project technical imprecisions costs are adequately covered in the budget and timelines provided for such changes. Perceived technical imprecisions creates anxiety among the stakeholders and especially those directly involved in the project and may lead to total rejection and failure of the project. It is of high importance to take in the stakeholders early in the project stages to ensure that they understand and own the foreseeable changes.

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