IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 19, Issue 11. Ver. I (November. 2017), PP 17-28
www.iosrjournals.org

Influence of Integrated Project Management Information Systems on Performance of Construction Projects in South Rift Construction Companies, Kenya

Kiprotich Elijah Bor; Dr Geoffrey Kimutai Kiptum[2],
[1] *Masters Student, School of human resource management, Jomo Kenyatta University of science and technology, Kenya*
[2] *Lecturer, School of human resource management, Jomo Kenyatta University of science and technology, Kenya*
Corresponding Author: Kiprotich Elijah Bor

Abstract: *Integrated project management information system (I-PMIS) acquired by construction companies are meant to provide project teams with softwares needed for effective project performance. However little is known on what extend the I-PMIS contribute to project performance. This study looked into the influence of integrated project management system on performance of construction projects in South Rift construction companies, Kenya. The study sought to determine the influence of project management information system efficiency. The study used descriptive survey design. This study accessible population was 95 respondents .The researcher used census inquiry. The study was guided by Technology Acceptance Model (TAM) and DeLone and McLean Information System Success Model (ISSM).Reliability and validity of questionnaire was tested and the analysis of data on hypothesized relationships was done using Multiple Regression Model. Assumptions of analysis model was tested before running analysis and results presented in tables and charts. The findings of this study indicated project management information system efficiency had significant relationship with project performance p=0.000 and R=0.54. The study further concluded that integrated project management information systems makes significant contribution to project performance and should continue to be subject of further research. The study recommends that, construction companies in South Rift to achieve levels of efficiency and effectiveness in construction projects, the management of the company must ensure adoption of the use of integrated project management information system. Secondly management of South Rift construction companies, to take cognizance of technical training on the I-PMIS software's this will ensure up to date proficiency and productive team; they should also acquire latest information systems infrastructure with web-based utility. This will enable them to benefit from uncorrelated I-PMIS attributes.*

Keywords: *Project Management, Information System Efficiency and Performance*

Date of Submission: 24-10-2017 Date of acceptance: 04-11-2017

I. Introduction

Globalization and internationalization of markets have accelerated aggressive pressures on enterprise establishments. This has led organizations to have critical focuson initiatives that are crucial to their overall performance, if not their survival. The evolution of world competitive markets has led to a fact that projects in a regular commercial enterprise together with engineering, records era; production, and many others, want to be enormously controlled, in terms of planning, scheduling, organizing, tracking, and controlling (Liberatore, 2003).

In order to accomplish this, groups must manage projects within decided time, finances, and in excess of performance even as handling risks. Although project management structures help a business enterprise decrease product and service development time to marketplace, exploit constrained resources and enlarge worldwide marketplace competition, task managers nevertheless need to utilize equipment that allows in overcoming diverse demanding situations such as: uncontrollable time and budget regulations; inconsistent mission groups; unpredictability of corporation's resources; lack of readability in prioritizing tasks; delays in undertaking choice-making; and shortage of clarity in collaboration among task group members (Cavalieri, 2007). Therefore, whilst initiatives managers continue to conflict with these issues, they are obligated on the same time to make choices in one of these manner that chance is managed, uncertainty minimized and in which every selection made by using them will ideally be beneficial to the challenge. This can be accomplished while the organization acquires an Integrated Project Management Information System as a means to offer top managers with the vital tools that are useful for the decision making process on the subject of deciding on making plans, organizing, and controlling projects and portfolios.

The project management systems currently used inside the production enterprise may be divided into two kinds. The first one is off-the-shelf commercial software program, wherein projects are controlled by use of Gantt Charts, the Program Evaluation and Review Technique (PERT) (Kerzner, 2005) and the Critical Path Method (CPM) (Woolf, 2007). These control techniques have speedily unfolded in many private companies. Thus, a variety of the associated business software packages cater for the aforementioned strategies; examples consist of Microsoft Project, Primavera Project Planner and Application Service Provider. The second type of venture management system is custom in-residence software program, when business software program does not meet the precise necessities of an engineering mission or firm; a few companies will develop custom in-house project control software to fulfill their desires. Examples of this encompass Bechtel (Schmitz, 1991, Parsons, 2004, Kajima, 2000).

Traditional project management systems mainly provide text, basic graphs, and complicated network schedules for controlling projects and making decisions. Today's projects are becoming ever more complex and time driven, especially as the amount of project information and active project participants increases. Thus, we require more effective project tools for integration, management and communication. The question then arises about multi-dimensional information integration, management, and visualization of engineering projects. It therefore follows that an effective project management system should not only provide sufficient and comprehensive information to facilitate project management, but also provide the various visualization tools to assist with information distribution and communication. Among various IT solutions, the internet-based (or web-based) Project Management Information Systems has been highlighted because of its strong advantages such as low cost compared with traditional communication methods, location-free access, speedy and reliable data transfer and storage, and efficient information sharing among parties (Jung, 2011).

In Korea and Japan web based Project Management Information Systems is one of the most widely used tools that supports and enhances the collaboration and communication between construction project participants. The reason for the swift adoption of web-based Project Management Information Systems in the Korean and Japan construction industry closely relates not only to the above-mentioned advantages, but also to the well-established internet infrastructure and users' familiarity with web-based computing environment (Jung, 2011). Besides these technical reasons, the Korean construction management guidebook specifies the use of Project Management Information System by construction managers hired by government or government agencies for efficient information management has strongly facilitated the adoption of web-based Project Management Information Systems in the Korean construction industry.

In England, there are two types of Project Management Information Systems in the construction field: One is that which is developed and used by individual construction companies. The other is the ASP (Application Service Provider)-based Project Management Information System which is developed for general construction projects but can be customized for specific construction projects. The former can be considered as one of the information systems (e.g. MIS and ERP systems, etc.) used in a company exclusively, while the latter are generally used by various project participants such as client, architect, constructor, sub-contractor and construction manager, and their quality is considerably more dependent on the capability of service providers (Stewart, 2004). In South Africa, ERP systems are being used by construction companies to improve responsiveness in relation to customers, strengthen supply chain partnerships, enhance organizational flexibility, improve decision making capabilities and reduce project completion time and lower costs. These information systems are designed to integrate and partially automate many of the company's business processes such as human resources, financial management, manufacturing, procurement, construction, operations and maintenance. In Kenya an Act of parliament , 2011 which established The National Construction Authority in order to streamline ,overhaul and regulate construction industry achieve quality construction , the construction industry is a crucial sector for growth of the economy. According to the Kenya National Bureau of statistics (KNBS; 2015) the construction industry contributed 4.8%, 5.6 %, 5.8% and 6.1 % towards Gross Domestic Product (GDP) for the years 2012, 2013, 2014 and 2015respectively. This is an average of 5.6 % as compared to 10% for the developed economies (Hillebrandt, 2000).

In South Rift, many construction firms have got computer based material management systems (MMS), which stores, sort, combine and print data files pertaining to materials requisition, purchasing, vendor evaluation and warehouse inventories. The use of these systems not only gives the firms competitive edge against their competitors but also enhances the effectiveness of construction projects throughout their life cycle and across the different construction business functions. According to (Kaiser, 2010), the use of Project Management Information System is based on the belief that their cost will be offset by the benefits that come along with it. They continue to say that the broadening of Project Management Information System scope enables organizations to not only manage individual projects but whole project portfolios. In general, Project Management Information System support most of the project life cycle phases from the idea generation, risk management, stakeholder management to the management of knowledge created long after the project completion.

1.2 Statement of the Problem

Construction projects are commonly acknowledged as successful when they are completed on time, within budget, and in accordance with specifications and to stakeholders' satisfaction. Many projects exceed the original cost; get cancelled prior to completion, while others fail in terms of the delivered functionality (Burns, 2008). While large amounts of time and resources are dedicated to selecting and designing projects, it remains of paramount importance that projects should be adequately managed in organizations if they are to achieve their performance objectives. For instance according to 2015 report from the Ministry of Public Works, contractors give poor service through poor documentation, poor decision making and extension of time during project implementation leading to stalling of projects or total failure, a case in mind is the management of Thika Super highway project whose construction budget was initially Ksh27 billion eventually consumed Ksh31 billion. A project manager simply cannot make and execute meaningful decisions without relevant and timely information (Cleland, 2004).

Projects need to be effectively managed, that is, they need to be planned, staffed, organized, monitored, controlled, and evaluated (Liberatore, 2004). In order to succeed, companies must deliver projects on time, within budget and meet specifications while managing project risks. Peterson, (1992).Identified that project management has long been considered an important characteristic of successful companies and is more than ever necessary to efficiently and effectively manage these projects and to support project managers in their decision-making. Cleland states that project managers necessitate accurate and timely information for the management of a project. Project planning, organizational design, motivation of project stakeholders, and meaningful project reviews simply cannot be carried out without information on the project together with how it relates to the larger organizational context in which the project is found (Cleland, 2004).

However, with Integrated Project Management Information System being increasingly used by project managers in all types of industry, not much is known on the characteristics of these systems that contribute to project performance. Thus the purpose of this study was to explore the influence of Project Management Information System on performance of projects in construction industry in South Rift with regard to the System, Quality of Information, the System user and the System use during the entire project life cycle to increase project performance rate. With the system, performance rate and success in projects will seamlessly be achieved in Bomet, Kericho and Narok counties.

1.2 Objectives of the Study

To determine the influence of project management information system software efficiency on performance of construction projects in South Rift, Kenya.

II. Literature Review

2.1. Review of Theories

This section presents a discussion of theories which form a basis for the conceptualized relationship between project management information systems and project performance. The theories are; Technology Acceptance Model and Information System Success Model.

2.1.1 Symbolic Interactionist theory

2.1.1 Technology Acceptance Model (TAM)

The study was guided by Technology Acceptance Model (TAM) byTsai, (2014). who attempted to determine the elements of the success or failure of the introduction of enterprise resource planning (ERP) systems that are widely utilized in construction enterprises with the purpose of contributing to assessing, planning, and conducting a project for introducing and establishing an ERP in an enterprise. In the research, the success factors of the ERP system are divided into two categories; the first category is user-related variables, including output, job relevance, image and result, demonstrability, compatibility, and system reliability. The second category is project-related variables, including internal support, function, and consultant support. It can be said that this research has a high level of completion in that it suggested a success model for construction ERP systems through extensive data collection and empirical analysis. Nevertheless, the success model suggested has limitations in its application to other types of IS because it was verified by focusing on ERP systems.

Hjelt, (2007) analyzed factors related to end-users' attitudes toward Electronic Document Management (EDM) systems that are used for large-scale construction projects. The research conducted a survey to draw factors that affect acceptance of an EDM system to a construction project. Technology Acceptance Model (TAM) (Davis, Bagozzis and Warshaw 1989). This study was thus founded on the recurrent constructs of antecedents and consequences of IS use developed in DeLone and McLean's IS success model (ISSM) (1992), later updated (2003), technology acceptance model (TAM). The ISSM incorporates information quality and system quality as antecedents of IS use, leading to individual IS impacts, that is, on users and their work (e.g., in

regard to their effectiveness), and in turn to organizational impacts (e.g., in regard to business strategy and performance) Raymond, (2007). While the TAM explains IS use in a similar manner by the system's perceived usefulness and perceived ease of use. Both the ISSM and the TAM offer widely accepted and validated representations and explanations of the IS use phenomenon. The success of IT reforms depends upon the capacity of the organization to change, to manage the change and to survive whilst changing (Peterson, 2008). Resistance to change may come from various stakeholders in the organization, such as individuals with vested interests who benefited from previous methods, civil servants who see it as a threat to their jobs and people who resist change simply for fear of the unknown. Technology acceptance model is relevant to the study as it shows how the success of various IT reforms depends upon the capacity of the organization to change, to manage the change and to survive whilst changing.

2.1.2 DeLone and McLean Information System Success Model (ISSM) (1992)

DeLone and McLean (1992), introduced the first IS success model which was based on Shannon and Weaver's, (1949) model of communication. DeLone and McLean's model present different features differentiated by the two essential concepts: system quality and information qualityby Urbach & Müller, (2011). The utilizing of the system has a clear impact on the way individuals accomplish their performance. This impact may eventually effect on the organizational performance. It was among the first studies to impose some order in IS researchers' choices of success measures (Seddon, 1999). The model is based on theoretical and empirical research conducted by a number of researchers in the 1970's and 1980's. To construct the model, DeLone and McLean reviewed 100 papers containing empirical IS success measures published in seven publications during 1981-1987. They distilled the resulting huge range of Information system success measures into an integrated view of IS success, represented by the following the six dimensions: System Quality, Information Quality, Information Use, User Satisfaction, Individual Impact and Organizational Impact.

While the model integrates the comprehensive dependent variables used by IS researchers, it received several criticisms. Ten years later, DeLone and McLean presented an updated model reflecting the criticisms by other researchers and the situation at the time. As the service concept was added to IT with the use of the Internet, they increased the number of information system success factors to seven, including service quality, and analyzed the interdependence and correlation of these seven factors. It is relevant in a way that like actual system use, user satisfaction directly influences the net benefits provided by an information system. Satisfaction refers to the extent to which a user is pleased or contented with the information system, and is posited to be directly affected by system use. The net benefit that an information system is able to deliver is an important facet of the overall value of the system to its users or to the underlying organizationby Urbach& Müller, (2011). In the IS success model, net system benefits are affected by system use and by user satisfaction with the system. In their own right, system benefits are posited to influence both user satisfaction and a user's intentions to use the system.

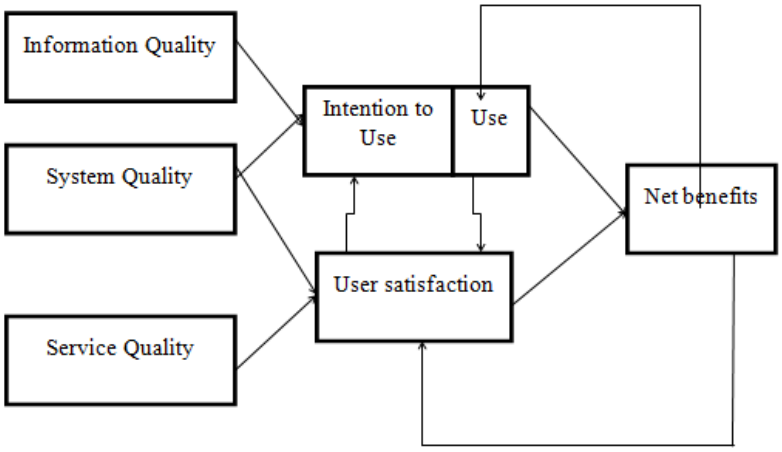

Figure: 2.1 DeLone and McLean Information System Success Model

2.1.3 Project Management Information System Software Efficiency

The nature of information systems has changed considerably over the past decade; they may be, nonetheless developing from single-consumer/unmarried-task management systems to complex, allotted, multi-functional structures that now not most effective cover task making plans (scheduling and aid management) Ahleman, (2006). Interdependence between data technology and undertaking management has reached its highest stage considering a few years. It is perceptible in the increase variety of project management packages

and the adoption of numerous control solutions including Executive Support Systems (ESS), Decision Support Systems (DSS), Knowledge Management System (KMS), Management Information Systems (MIS), Supply Chain Management (SCM), Business Intelligent Systems (BIS), virtual reality (VR), and threat control (RM) gear (Riņģis & Bērziša, 2016).

A variety of enterprise and technical forces are changing the fundamentals of undertaking management. First, advanced Information and Communication Technologies (ICT) enable cooperation in a dispersed mode. Technologies like groupware and video conferencing are an increasing number of becoming viable for companies to use in worldwide projects (Milosevic, 2003). Second, globalization of markets and opposition necessitate integration of world managerial and enterprise processes in corporations (Herroelen, 2005). This corporate integration is accomplished through human beings operating from geographically dispersed sites in a given assignment (Hamlin, 1994). Corporations anticipate organizational teams to cooperate on a worldwide scale, managing business issues with a worldwide impact.

Third, companies are increasingly more adopting a strategy of global sourcing, not best in progressive sectors like microelectronics and the semi-conductor industry, however additionally in the location of financial and commercial enterprise services in addition to production and engineering operations. As these strategies require in depth cooperation between the groups concerned in these exchanges, initiatives consisting of professionals from a couple of organizations will occur (Becerik, 2004).

Fourth, cooperation from distributed web sites round the sector allows businesses to benefit from variations of time zones among locations. Improvement of mission cycle time becomes viable in this type of distributed surroundings. Fifth, multinationals more and more organize their Research and Development (R&D) activities around globally distributed centers of excellence (Cavalieri, 2004). Coordination of sports among these facilities and integration with commercial enterprise operations require near cooperation of experts. Thus, multinational agencies tap into nearby sources of competence and leverage this expertise on a worldwide scale (Hjelt, 2007). Globally distributed initiatives permit cognizance of those blessings and increase corporate performance. The confluence of those developments has given rise to new forms of corporations which, enabled by way of advanced Information Communication Technology (ICT), are categorized `digital companies.

Project Management Information System in creation may be in large part categorized into 3 sorts of information structures: those which might be self-evolved and used in production companies; structures based totally on a widely dispensed utility service issuer (ASP); and specialized structures utilized in unique capital initiatives (Moon, 2003). The architectural, engineering, and construction (A/E/C) industry is characterized with the aid of fragmentation which exists both inside person levels in addition to across assignment phases (Hillebrandt, 2000). Because of this fragmentation, participants from numerous companies who are worried in a challenge phase or in specific challenge phases are going through ineffectiveness and inefficiency in their coordination, collaboration and verbal exchange methods. As a tool to lessen the issues generated through this fragmentation, Information Technology (IT) is robotically and substantially used in the production industry (Nitithamyong, 2004). Powerful undertaking management software has turn out to be a prerequisite to control the tasks greater effectively and correctly, and aid the challenge managers in their choice-making (Havelka, 2006). The gain of an information device is that it facilitates to sell productivity with the aid of efficiently processing and offering necessary records to an enterprise and helping their green work performance.

The importance of information has been emphasized for enhancing communication, and the efficient management of construction information has been emerging as an element that determines the success of a project that involves many stakeholders (Lee, 2010). Thus, in construction projects, various types of IS, such as construction management or business software, have been developed, applied, and widely used in the Korean construction industry, in particular, project management information system is extensively utilized due to its numerous advantages.

Ugwa and Haupt, (2007) opined that the failure of any road contractor is mainly related to the problems associated with resource management and even political interferences. Moreover, there are many reasons and factors which attribute to this problem including poor management of the minimal resources available, low levels of technology that make the whole exercise very expensive, politics and many more.

In Kenya, there are many road contractors who have failed in performance. In the past, many road projects were finished with poor performance because of many contractors' reasons such as: obstacles by client, non-availability of materials, roads closure, amendment of the design and drawing, additional works, waiting long for the decisions, handing over, variation orders, amendments in Bill of Quantity and delays in receiving drawings. For example, project of rehabilitation of Waiyaki highway completed with problems in both time and cost performance (GoK, 2010). In addition there are other indicators of performance such as project managers, coordination between participants, monitoring, and feedback and leadership skills and achievement of milestones. However, there are three important issues related to failures and problems of performance in Kenya which are economic, environmental and socio-cultural issues like politics.

According to local studies done by Bichanga and Karani, (2012) effects of Total Quality Management implementation on business performance in service institutions: A case of Kenya Wildlife Services,they found that human 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 Rural Roads Authority. She found that political interferences and inadequate allocations of funds hinder completion of KeRRA activities even though the authority fully implemented procurement policies.

Nyamwaro, (2011) did a study on analysis of challenges facing project implementation a case study of Ministry of Roads Projects. The study deduced that poor communication and lack of awareness on PPDA which is also used in the implementation of the Ministry's Projects were the main challenges facing project implementation. Despite immense study focusing on ministry of road and its associates, no study has focus on the Factors Influencing Delay of Projects in the Construction Industry with biases to roads maintained by the Kenya National Highways Authority

H_{02}: There is no significant relationship between age diversity and and team performance in Moi teaching and refferal hospital, Uasin Gishu County.

III. Materials And Methods

3.1 Target population

Target population in statistics is the specific accessible population about which information is desired. According to Denscombe, (2008) a population is a well-defined or set of people, services, elements, and events, group of things or households that are being investigated. The study targeted a population of 95 respondents, who constitute of Resident engineers 12, Assistant Resident Engineers 15, Project Managers 13, Site Engineers 13, Project Supervisors 13 and Section Heads 29. This covered road construction companies currently in Bomet, Kericho and Narok counties. All construction projects are recorded by KeRRA headquarters, Nairobi.

Table 3.1 Accessible/ Study Population

Categories	study population	Percentage
Resident Engineers	12	12.6
Assistant Resident Engineers	15	15.8
Project Managers	13	13.7
Site Engineers	13	13.7
Project Supervisors	13	13.7
Section Heads	29	30.5
Totals	**95**	**100**

Source (KeRRA, 2017)

3.2 Census Inquiry

Churchill and Brown, (2004) noted that the correct sample size in a study is dependent on factors such as the nature of the population to be studied, the purpose of the study, the number of variables in the study, the type of research design, the method of data analysis and the size of the accessible population. Cooper & Schindler, (2003) define census as a procedure of systematically acquiring and recording information about members of a given population. This defined population is referred to as a sampling frame. Under this method data is collected for each and every unit. Thus this study applied census inquiry due the small number of respondents at ninety five.

3.3 Data Analysis and Presentation

The Statistical Package for Social Sciences (SPSS) version 24 was used in the data processing. After data collection, the data was coded, organized and edited to remove any inconsistencies, repetitions or errors that may make the analysis difficult. The cleaned data collected, wasanalyzed using both descriptive and inferential statistics. Descriptive statistics included frequencies, percentages, charts and tables, while for inferential statistics; Multiple Regression Model was used for comparison of variables. Multiple regression model has the following assumptions; Linearity, Normality, autocorrelation and multicolinearity.

Qualitative data was first organized into themes, and then descriptive statistical method is used to explain the frequencies and percentages calculated from the data obtained in the field. The data was analyzed in the most logical and meaningful way and relevant comments made appropriately. Linear Regression model was used in analysis. Quantitative data was analyzed using descriptive statistics which included mean, standard deviation and frequency distribution. Considering the quantitative nature of the data, descriptive statistics which describes the main features of the data collected (frequency, percent, mean and standard deviation) was used. Tables and bar charts were used to summarize responses for further analysis and to facilitate comparison.

IV. Results And Discussion

4.1 Influence of I-PMIS Efficiency on project performance

This study also scrutinized the opinions of the respondents on I-PMIS efficiency. The pertinent results of analysis are shown in Table 4.1. The Researcher sought to assess the I-PMIS efficiency on performance. The range was 1=Strongly Disagree, 2=Disagree, 3=Undecided, 4= Agree, 5= Strongly Agree. The Responses are summarized in Table 4.30.

Table 4.1: Influence of I-PMIS Efficiency on Project Performance

	N	Mean	Std. Deviation
The system is able to ensure availability of data on time	94	3.3723	1.28669
The system is able to support Multi-project Capability	95	3.2737	1.35617
It enhances Querying Ease of the systems	95	3.2316	1.20683
It makes the Accessibility of required data easy to use	95	3.8105	1.29889
It enhances System Integration with other components in the industry	95	3.7789	1.06370

The study findings established that respondents were in agreement that efficiency I-PMIS efficiency influenced performance of project , on whether the system is able to ensure availability of data on time with responses with a mean of 3.3723 and a standard deviation of 1.28669, on whether the system is able to support multi-project capability respondents also agreed with a mean of 3.2737 and a standard deviation of 1.35617,on whether the system enhances querying ease of the systems respondents also agreed with a mean of 3.2316 and a standard deviation of 1.20683, on whether the system makes the accessibility of required data easy use respondents also agreed with a mean of 3.8105 and a standard deviation of 1.29889, on whether the system enhances System Integration with other components in the industry ,respondents also agreed with a mean of 3.7789 and a standard deviation of 1.06370. This implies that the I-PMIS efficiency is a critical factor in performance of projects of South Rift construction companies; this is because their responses were between 3.23 to 3.81, implying a strong relationship between variables. Also the standard deviation was between1.06 and 1.35 which was higher than 0.5 indicating homogeneity of data.

These findings are in consistent to that of Shaddi & Fallah, (2010) who stated that with efficient PMIS organizations and project manager's crucial roles of planning proper scheduling, regulating and controlling the project assurance of project performance and success. Further, Marjolen, (2011) stipulated in his study that with efficient PMIS better decision making and thus better project performance.

This concurs with DeLone and Mclean ISSM model in this study. This theory consists of relevant constructs especially the system quality (efficiency,) the theory validates the construct posited that utilizing efficient I-PMIS system has a clear impact on the organizational; performance. The theory integrates the efficiency in success factors among the six factors theorized.

4.2. Inferential Statistics

Multiple regression model was used as a form of inferential statistics analysis to determine the relationship between the dependent and independent variables.

4.2.1 Results of Regression Analysis Assumptions

The study test for multivariate assumptions which were; linearity, normality, autocorrelation, multicollinearity and homoscedasticity

4.2.1.1 Linearity Assumption Test

Linearity assumption was evaluated using scatter diagrams and residual plots. Results of scatter diagrams of PMIS efficiency and project performance are shown in Figure 4.1

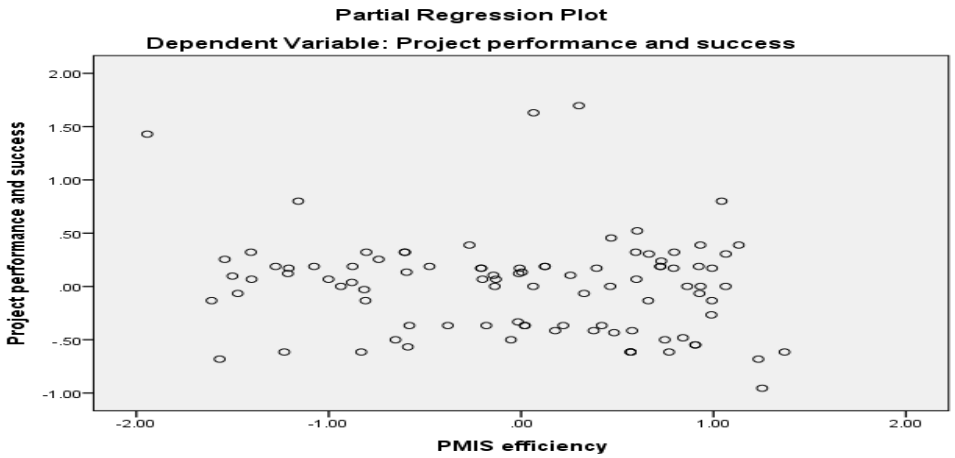

Figure: 4.1Scatter Plot Project Performance And I-PMIS Efficiency

From the scatter plot (from SPSS) followed a linear pattern above the indicating that there is a linear relationship between the I-PMIS and project performance.

4.2.2.1 Homoscedasticity Assumption Test

This was tested by plotting the standardized residuals against the standardized predicted values of the dependent variable using Levene's test of equality of variances was conducted as shown in Table 4.2.

Table 4.2: Levene's Test for Equality of Variances

Levene's Test for Equality of Variances			
		F	**Sig.**
Unstandardized Residual (system efficiency)	Equal variances assumed	.728	.394
Unstandardized Residual (quality of information output)	Equal variances assumed	2.086	.150
Unstandardized Residual (I-PMISuser knowledge)	Equal variances assumed	5.589	.019
Unstandardized Residual (project cost ,time and risk control)	Equal variances assumed	2.336	.127

The findings in Table 4.2 indicate that all the four variables statistical significance level ($p>0.05$).Based on this results there was no heterostaticity problem on the data; therefore the homoscedasticity assumption was met.

4.2.2.2 Normality test

To find out whether residuals follow a normal probability distribution, histograms and normal probability plots were used. The results of graphical analysis are shown in Figure 4.4.

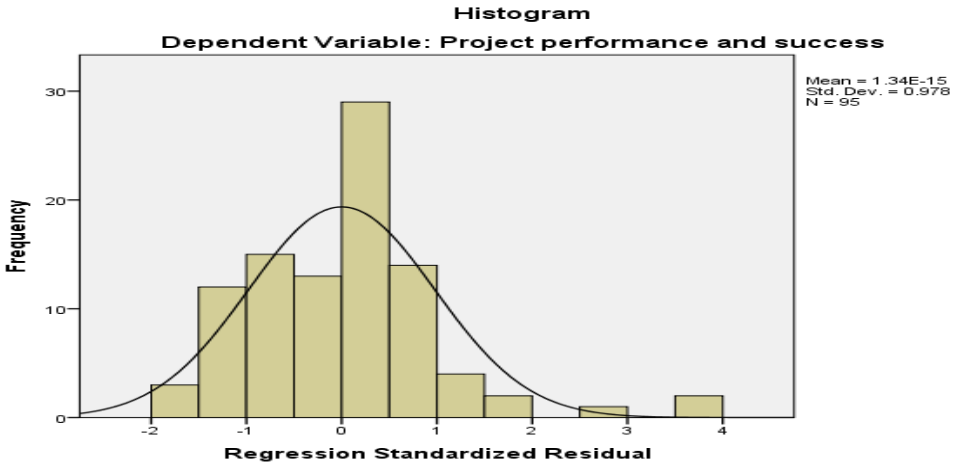

Figure: 4.2: Histogram of Standardized Residual

The black line superimposed on the histogram represents the bell-shape normal curve.There's is symmetry of skewness; it is positivelyskewed distributionwith score clustered to the right with the tail extending to the left as shown on Figure 4.4. Normal probability plots were also used to test for normality assumption. The relevant results are shown in Figure4.3

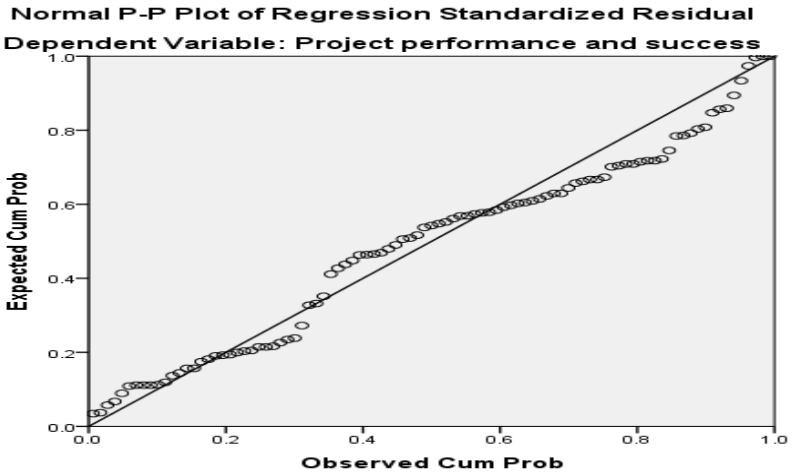

Figure: 4.3: Normal P-P Plot

The findings indicate that points approximately form a straight line in the above Figure 4.3 shows how closely two data setsagree which plot the two cumulative distributions /probability evaluate skewers of distribution. Deviations from the straight line suggest departure from normality. They are closely related therefore normality test was therefore met on data. Kolmogorov-Smirnov and Shapiro-Wilk tests were also used. The results are shown in Table 4.4.

Table 4.4: Normality tests

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual	.047	95	.071	.992	95	.093

a. Lilliefors Significance Correction

The findings indicate that….Any Kolmogorov-Smirnovvalue less than 0.035 is not normal. .071>.035 alsovalue for Shapiro-Wilk less than 0.05 indicate non –normality 0.093>.05 therefore data is not different from normal. Assumption is met

4.2.2.3 Multicollinearity Test Assumption

The assumption of multicollinearity was tested using variance inflation factor and tolerance. The results are shown in Table 4.5.

Table 4.5: Collinearity Statistics

Model		Tolerance	VIF
1	(Constant)		
	Quality of information output	.724	1.382
	I-PMIS user knowledge	.756	1.322
	I-PMIS efficiency	.905	1.105
	Cost ,time and risk control	.962	1.040

The findings indicate that Quality of information output had variance inflation factor of 1.382,I-PMIS user knowledge(1.322)I-PMIS efficiency(1.105),Cost ,time and risk control(1.040), V.I.F < 10 this implies that evaluations of relative strength of predictor variables and their joint effect were reliable. Hence beta weights and R-squares were reliably interpreted.

4.2.2.6 Autocorrelation Test

Durbin-Watson statistic was used to test for autocorrelation. The value of the Durbin-Watson coefficient was 2.244. This implies that there was negative autocorrelation of error terms as the Durbin-Watson statistic was above 2. According to Garson (2012), this means that it was correct to assume independent observation as it is expected that the value of Durbin Watson statistic should be between 1.5 and 2.5 if the multiple regression modelis to be correctly fitted to the data. Hence, the study assumed that residuals were independent.

4.3 Inferential Analysis, Findings and Discussions

This section presents the results of correlation and multiple regression analysis in line with the specific objectives of this study. Correlation analysis involves examining the relationship between the dependent variable and independent variables. The influence of independent variables on the dependent variable is depicted in the multiple regression analysis sub-section.

4.3.1 Relationship between I-PMIS efficiency and project Performance

The study examined the relationship between I-PMIS efficiency and project performance of construction companies in Kericho, Bomet and Narok counties. The correlation analysis results are presented in Table 4.6.

Table 4.6: Correlation betweenI-PMIS efficiency and project Performance

		Performance
I-PMIS efficiency	Pearson Correlation	.356**
	Sig. (2-tailed)	.000
	N	95

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4.6, the relationship between I-PMIS efficiency and project performance was a, positive association and significant ($r = 0.356$; $p < 0.01$). This means that the more the efficient the I-PMIS system is the more project performance is improved and vice versa. This implies that engineers should adopt efficient system in order to improve project success. The findings concur with , Louise and Bergeron,(2014) who observed that higher I-PMIS efficiency contributed to successful project performance.

4.4 Test of Hypothesis

In this study, a multiple regression analysis was conducted to test the influence among predictor variables and project performance. To determine the linear statistical relationship between the independent and dependent variables for this study, all the four hypotheses were tested using the multiple regression models. For each hypothesis, the regression equation was first obtained using the B coefficients on the line of best fit. The decision rule was that if the p-value is less than conventional 0.05 the null hypothesis is rejected and when its above 0.05 we fail to reject the null hypothesis,

H_{01}: There is no significant relationship between Project Management Information System efficiency and performance of construction projects in South Rift construction companies, Kenya.

A regression model containing the independent variable (I-PMIS efficiency) was run to find out its causal effect on the dependent variable project performance. As shown in Table 4.43.

Table 4.7: Model Summary between I-PMIS efficiency and project performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.271[a]	0.74	0.64	.65881

a. Predictors: (Constant), PMIS efficiency

Table 4.7 illustrates the model summary used in this study, Adjusted R squared is coefficient determination of which tells us the variation in the dependent variables of the study due to changes in the independent variables, from the findings , the value of adjusted R squared was 0.64 and indication there was variation of 64 % on project performance due to changes in I-PMIS efficiency, R is correlation coefficient which shows the relationship between the study variables R indicated a positive relationship between I-PMIS efficiency and project performance.

Table 4.8: ANOVA of I-PMIS efficiency and project performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.207	1	3.207	7.389	.008[b]
	Residual	40.365	93	.434		
	Total	43.572	94			

a. Dependent Variable: Project performance and success

b. Predictors: (Constant), PMIS efficiency

Table 4.8 illustrates the Analysis of Variance (ANOVA) which assesses the overall significance of the model. According to the table P<.05, (0.008), indicating that the regression model was useful in explaining project performance of construction companies in Narok, Kericho and Bomet counties.

Table 4.9: Regression results on the relationship between I-PMIS efficiency and project performance

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.174	.281		14.877	.000
	PMIS efficiency	-.212	.078	-.271	-2.718	.008

a. Dependent Variable: Project performance and success

From the data in the above table the established regression equation was $Y=4.174 -0.212X_{1.}$ From the above regression equation it was revealed that I-PMIS efficiency is statically significant in influencing the project performance with p- value less than 0.05. Null hypothesis was therefore rejected. The findings is supported by DeLone and Mclean ISSM theory in this study further concurs findings of Ogero,(2006) who observed that efficient I-PMIS was significant in achieving project performance.

V. Conclusion

The study concluded on the influence of integrated project performance on project performance. One of the objectives was to determine the influence of project management information system software efficiency , establish the influence of quality information output, assess the influence Project Management Information System user Knowledge and lastly establish influence Project Management Information System on project cost, time, and risk control on performance of construction projects in South Rift, Kenya.

5.1 Recommendation of the Study

Based on the findings of this study, the following recommendations were made: Construction companies in South Rift to achieve levels of efficiency and effectiveness in construction projects, the management of the company must ensure adoption of the use of integrated project management information system

5.2 Suggestion for Further Research

The study recommends further research on a number of areas. First, the influence of I-PMIS user knowledge should be examined. Secondly, the influence web based integrated project management on performance of construction companies.

References

[1]. Ahlemann, F. (2009).Towards a conceptual reference model for project management information systems. International Journal of Project Management, 27(1), 19-30

[2]. Ahlemann, F. (2009).Towards a conceptual reference model for project management information systems. International Journal of Project Management, 27(1), 19-30.

[3]. Amami, M., Beghini, G., & La Manna, M. (1993).Use of project-management information system for planning information-systems development projects. International Journal of Project Management, 11(1), 21-28

[4]. Besner, C., & Hobbs, B. (2012).An Empirical Identification of Project Management Toolsets and a Comparison among Project Types. Project Management Journal, 43(5), 24-46.

[5]. Bichanga, W. O., & Karani, S. R. (2012). Effects of Total Quality Management implementation on business performance in service institutions: A case of Kenya Wildlife Services. International Journal of Research Studies in Management, 1(1).

[6]. Brady, M. (2008). The Good Research Guide: For Small-Scale Social Research Projects Martyn Denscombe The Good Research Guide: For Small-Scale Social Research Projects Open University Press Edition:. Nurse Researcher, 15(2), 88-88.

[7]. Cavalieri, S., Terzi, S., & Macchi, M. (2007). A Benchmarking Service for the evaluation and comparison of scheduling techniques. Computers in Industry, 58(7), 656-666.

[8]. Cheung, S. O., Suen, H. C., & Cheung, K. K. (2004). PPMS: a Web-based construction Project Performance Monitoring System. Automation in Construction, 13(3), 361-376.

[9]. Cleland, D. I., & King, W. R. (n.d.).Project Owner Strategic Management of Projects. Project Management Handbook, 165-188.

[10]. Dang, C. N., Le-Hoai, L., & Lee, Y. (2012). Critical Success Factors of Large Design-Build Projects in Vietnam. Journal of Construction Engineering and Project Management, 2(3), 30-39.

[11]. Executive Project Management Structure and the Challenges Facing its Adoption in the Nigerian Construction Industry.(2013). International Journal of Architecture, Engineering and Construction, 2(3).

[12]. Fugar, F. D., &Agyakwah-Baah, A. B. (2010).Delays in Building Construction Projects in Ghana. Construction Economics and Building, 10(1-2), 103.

[13]. Gelbard, R., Pliskin, N., &Spiegler, I. (2002).Integrating system analysis and project management tools. International Journal of Project Management, 20(6), 461-468.

[14]. Hair, J. F. (2007).Research Methods for Business20072Research Methods for Business. New York, NY: Wiley 2007. , ISBN: 0 470 03404 0. Education + Training, 49(4), 336-337.

[15]. Hall, M., & Tomkins, C. (2001). A cost of quality analysis of a building project: towards a complete methodology for design and build. Construction Management and Economics, 19(7), 727-740.

[16]. Han, S. H., Kim, D. Y., Kim, H., & Jang, W. (2008).A web-based integrated system for international project risk management. Automation in Construction, 17(3), 342-356

[17]. Havelka, D., & Rajkumar, T. M. (2006).Using the Troubled Project Recovery Framework: Problem Recognition and Decision to Recover. e-Service Journal, 5(1), 43-73.

[18]. Herroelen, W. (2009).Project Scheduling-Theory and Practice. Production and Operations Management, 14(4), 413-432

[19]. Hillebrandt, P. M. (2000). Economic Theory and the Construction Industry.

[20]. Hillman, A. J., & Keim, G. D. (2001). Shareholder value, stakeholder management, and social issues: what's the bottom line? Strategic Management Journal, 22(2), 125-139.

[21]. Hjelt, M., &Björk, B. (2007). End-User Attitudes toward EDM Use in Construction Project Work: Case Study. Journal of Computing in Civil Engineering, 21(4), 289-300.

[22]. Iyer, K. C., & Banerjee, P. S. (2016). Measuring and benchmarking managerial efficiency of project execution schedule performance. International Journal of Project Management, 34(2), 219-236.

[23]. Kahura, M. N. (2013). The Role of Project Management Information Systems towards the Success of a Project: The Case of Construction Projects in Nairobi Kenya. International Journal of Academic Research in Business and Social Sciences, 3(9).

[24]. Karani, S. R., &Bichanga, W. O. (2012). Effects of Total Quality Management implementation on business performance in service institutions: A case of Kenya Wildlife Services. International Journal of Research Studies in Management, 1(1).

[25]. Khazanchi, D., & Reich, B. H. (2008). Achieving IT project success through control, measurement, managing expectations, and top management support. International Journal of Project Management, 26(7), 699.

[26]. Lategan, L., Lues, L., & Friedrich-Nel, H. (2011).Doing Research.

[27]. Lee, S., & Yu, J. (2011).Critical Success Factors for Project Management Information System in Construction. Journal of Construction Engineering and Project Management, 1(1), 25-30.

[28]. Liberatore, M., & Pollack-Johnson, B. (2003).Factors influencing the usage and selection of project management software. IEEE Transactions on Engineering Management, 50(2), 164-174.

[29]. Lind, A.D., Marchal, G.W., &Wathen, A.S. (2012).Statistical techniques in business & economics (15th Ed.). New York, USA: McGraw-Hill/IrwinLocke, E.A., & Latham, G.P (2006). Newdirections in goal-setting theory. Retrieved October 27, 2016,

[30]. Lunenburg, F.C. (2011). Goal-setting theory of motivation.International Journal of Management, Business, and Administration, 15(1), 1-6.

[31]. Lunsford, R.T., & Lunsford, R.B. (1995). The research sample, part 1: Sampling. Journal of Prosthetics and Orthotics, 7(3), 105-112.

[32]. Lupaşc, A. (2017). Project Management Information System Based on Web Technologies.

[33]. Martinelli, R. J., & Milosevic, D. Z. (2015).Project Management Toolbox.

[34]. Mönch, L. (2007). Simulation-based benchmarking of production control schemes for complex manufacturing systems. Control Engineering Practice, 15(11), 1381-1393.

[35]. Mudzana, T., &Maharaj, M. (2015).Measuring the success of business-intelligence systems in South Africa: An empirical investigation applying the DeLone and McLean Model. SA Journal of Information Management, 17(1).

[36]. Nel, D., Van Heerden, G., Chan, A., Ghazisaeedi, M., Halvorson, W., &Steyn, P. (2011). Eleven years of scholarly research in the Journal of Services Marketing. Journal of Services Marketing, 25(1), 4-13.

[37]. New Products, New Solutions: Making Portfolio Management More Effective. (2001). Journal of Product Innovation Management, 18(1), 52-53.
[38]. Ng, S., Palaneeswaran, E., & Kumaraswamy, M. M. (2002).A dynamic e-Reporting system for contractor's performance appraisal. Advances in Engineering Software, 33(6), 339-349.
[39]. Nitithamyong, P., & Skibniewski, M. J. (2004). Web-based construction project management systems: how to make them successful? Automation in Construction, 13(4), 491-506.
[40]. Oke, A. E., &Ugoje, O. F. (2013). Assessment of rework cost of selected building projects in Nigeria. International Journal of Quality & Reliability Management, 30(7), 799-810.
[41]. Pillai, A., Joshi, A., &Rao, K. (2002). Performance measurement of R&D projects in a multi-project, concurrent engineering environment. International Journal of Project Management, 20(2), 165-177.
[42]. Rajapakse, R. (2017). Construction Management. Construction Engineering Design Calculations and Rules of Thumb, 411-428.
[43]. Raymond, L., & Bergeron, F. (2008). Project management information systems: An empirical study of their impact on project managers and project success. International Journal of Project Management, 26(2), 213-220.
[44]. Riņģis, M., & Bērziša, S. (2016).Efficiency Measurement of Project Management Software Usage at State Social Insurance Agency. Information Technology and Management Science, 19(1).
[45]. Saurin, T. A. (2017). Removing Waste While Preserving Slack: The Lean and Complexity Perspectives. 25th Annual Conference of the International Group for Lean Construction.
[46]. Sibiya, M., Aigbavboa, C., &Thwala, W. (2015). Construction Projects' Key Performance Indicators: A Case of the South African Construction Industry. ICCREM 2015.
[47]. Software Project Management: Methods and Techniques. (2004). IEEE Transactions on Engineering Management, 51(3), 375-375.
[48]. Theory-Generating Methods.(2011). Statistics in Psychology Using R and SPSS, 471-519.
[49]. Tsai, C. (2014). Integrating Social Capital Theory, Social Cognitive Theory, and the Technology Acceptance Model to Explore a Behavioral Model of Telehealth Systems. International Journal of Environmental Research and Public Health, 11(5), 4905-4925.
[50]. Ugwu, O., & Haupt, T. (2007).Key performance indicators and assessment methods for infrastructure sustainability—a South African construction industry perspective. Building and Environment, 42(2), 665-680.
[51]. Urbach, N., & Müller, B. (2011).The Updated DeLone and McLean Model of Information Systems Success. Information Systems Theory, 1-18.
[52]. Wang, E. T., Chang, J. Y., Jiang, J. J., & Klein, G. (2011).User advocacy and information system project performance. International Journal of Project Management, 29(2), 146-154.
[53]. Wang, Y., & Liao, Y. (2008).Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. Government Information Quarterly, 25(4), 717-733.
[54]. Ward, R. (n.d.). Engineering management: past, present, and future. Technology Management : the New International Language.
[55]. Xiao, H., & Proverbs, D. (2012). An Investigation into Factors Influencing Construction Costs Based on Japanese, UK and US Contractor Practice. Australasian Journal of Construction Economics and Building, 2(2), 27.
[56]. Zarei, B., &Naeli, M. (n.d.). Critical Success Factors in Enterprise Resource Planning Implementation. Enterprise Information Systems and Advancing Business Solutions, 74-85.

Kiprotich Elijah Bor Influence of Integrated Project Management Information Systems on Performance of Construction Projects in South Rift Construction Companies, Kenya?." IOSR Journal of Business and Management (IOSR-JBM), vol. 19, no. 11, 2017, pp. 17-28.