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INFLUENCE OF PROJECT MANAGEMENT SOFTWARE TECHNOLOGY ON THE PERFORMANCE OF CONSTRUCTION PROJECTS IN NAIROBI COUNTY

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ABSTRACT
The overall objective of this study was to investigate the influence of project management software technology on the performance of construction projects in Nairobi County. This study adopted a descriptive research design. The study targeted 1,391 registered contractors within Nairobi. Stratified and systematic random sampling was employed to obtain a sample of 139 respondents. The study employed questionnaire as the data instrument which comprised of open and closed ended questions. Primary data was collected and analyzed using quantitative and qualitative techniques and then presented using narratives, tables and graphs. Secondary data was obtained from journals, magazines, internet and textbooks. Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics and inferential statistics such as Pearson's correlation and Multiple Regression analysis were used. The study found out that majority of construction companies recognise the need to move to a higher level of project management maturity. Companies that fully understand and leverage the project management software have a higher propensity to achieve project success. Additionally, the study established that many projects fail due to failure to utilize the appropriate project management software to manage the budget, schedule, project activities and labour. The study recommends that project management software training should be adopted in an organization and should be transformative in order to help employees share and support organizational vision, mission and goals. Likewise, the study recommends that organizations should come up with work policies that ensure that strategies adopted in response to project management software technology do not conflict with government policies and regulations.

Keywords: construction industry, project management, software technology

INTRODUCTION

The construction industry worldwide is undergoing a transition from being paper based to a digital one. This transition puts a document management challenge on all members of the construction team, but most specifically the general contractor which has to ensure that the appropriate information reaches the intended party in a usable format (James, 1991). The submittal process has historically been very paper intensive with multiple copies being distributed to various parties. Construction projects by their nature are complex, typically one-of-a-kind structures built on varied substrates. The multifaceted responsibilities of the owner, designer, engineer, contractor and subcontractor rely on the accuracy and timeliness of information provided. This information can be relayed down to the field from the design team, or up to the design team from field operations (Jason, 2011).

The use of web-based information management systems has a definite use in such a complex setting. The use of computers can accelerate the transmission of information, provide ease of formatting routine documents, and maintain accurate logs of document transfer. Many of the advantages extend down to the field operation level, but places extreme amounts of adaptation concerning document management at the

general contractor level (Jason, 2011). There may be capital costs associated with equipment and software that are needed to be purchased depending on the current assets a company possesses.

The construction industry in Kenya is regulated by the National Construction Authority that was enacted under an act of parliament of 2011. This body was instituted to streamline the construction industry in Kenya that was experiencing numerous challenges, ranging from loopholes in contractors registration, irregularities in contracts award, unprecedented project failures, lack of capital and corruption in the building sector among others. The main purpose of this Bill is to provide a legal and institutional framework for the development of the local construction industry. This is achieved through capacity building, training and the regulation of contractors. The Authority is mandated to oversee the construction industry and co-ordinate its development. Among its functions are the promotion of the development of the industry, registration of contractors, the standardization and improvement of construction techniques and materials and accreditation and certification of skilled construction workers and construction site supervisors. The Authority is empowered to, among other things, establish or promote the establishment of construction companies (National Construction Authority Bill, 2011).

Most construction companies in Kenya are Small Medium Enterprises (SMEs). SMEs have been identified as one of the growth engines for many countries in the world, since SMEs make up over 90 per cent of all enterprises (Daley, 2001; Lev, 2001). Asia-Pacific Economic Cooperation (APEC) (2002) points out that SMEs are deemed as supporters to larger enterprises as well as an important foundation in expanding business activities and sustaining economic growth. SMEs play a vital role in contributing to the economy and are likely to be increasingly important as the economy becomes more global. Daley (2001) argued that SMEs play a vital role in the development of a country in various ways such as job creation, providing desirable sustainability and innovation in the economy as a whole. Project management software plays a vital role in supporting the operations of SMEs.

Increased training of employees including project management software training may lead to higher productivity and enhanced creativity (Bontis, 2002). Managerial skills must be combined with relational and structural elements in the organisations to create value (Cabrita & Bontis, 2008). Managerial skills of the entrepreneur are considered the primary element of intellectual capital and the most important source of sustainable competitive advantage (Ashour & Bontis, 2004). Lev (2001) considers that intangible resources such as project management software skills are those that can generate value in the future but have no physical or financial form. Project management software skills are of key importance to project managers of today's projects that operate under immense competitive business environment.

Kenya as a developing country is faced with myriad challenges especially in the construction sector (Mwangi, 2011). However, according to the statistics derived from the Kenya National Bureau of Statistics' website, it is adept to reiterate that the building and construction sector in Kenya contributes up to 7% of the country's gross domestic product (GDP). It is therefore important for the scarce project resources to be utilized effectively and efficiently to ensure construction projects succeed and consequently contribute to the growth of the economy. The construction industry plays primal role in providing employment opportunities, enhancing income distribution and alleviating poverty all over the world. The increase in population and rural to urban migration has presented numerous opportunities for investors, especially in the housing sector (Loise, 2011).

The Economic Pillar of Kenya Vision 2030 seeks to improve the prosperity of all regions of the country and all Kenyans by achieving a 10% Gross Domestic Product (GDP) growth rate by 2015. Infrastructure development is one of the flagship projects under this pillar. Construction industry therefore can be seen as a central vehicle through which economic and social pillars will be realised. Through proper management to projects resources (i.e. time, money and manpower) this dream can be achieved. Utilization of project management software in construction project could help alleviate myriad challenges in construction and enhance projects' success and consequently eliminate the so called 'white elephants'. This study seeks to find out the influence that project management software have on the success and performance of construction projects in Nairobi County.

Statement of the Problem

Despite the recent growth of construction industry in Kenya, some challenges still persist. This has led to stalled projects and unoccupied complete properties (Mwangi, 2011). Road projects in many Counties that were commissioned back in 2009 by the former president have not been completed to date for example the multimillion-shilling road projects in Mosop and Chesumei constituencies have delayed and this has dealt a heavy blow on the delivery of farm produce to markets. Many construction firms fail to complete their contracts in time, within budget and within the specified specifications (Mwangi, 2011). In Kenya, the number of public roads construction projects is increasing. However, it becomes difficult to complete projects within the allocated cost budgets. Taking into account the scarce financial resources of the country, cost overrun is one of the major problems in Kenya. Statistics from the republic of Kenya report show that KeNHA has been experiencing cost overruns in its Roads projects. For instance, in the construction of Thika Super Highway, the cost escalated from 26.44 billion to 34.45 billion (World Bank, 2014). In addition, the initial deadline of the Thika super highway project was July 2011, which was later revised to July 2013. Data from Republic of Kenya report show that cost overruns lead to stagnation of economic development and the realization of the vision 2030 (RoK, 2014). Nairobi County has the most number of failed projects (Mwangi, 2011).

Some authors have noted that in today's competitive market, organizations must engage in strategic planning and seek appropriate competitive strategies in order to survive (Wright & Gerhart, 2006). Construction companies can use a number of resources in order to compete with others. Resources when well managed can provide a company with competitive advantage (Grant, 1998). The use of appropriate emerging technologies and project management software to manage the scarce project resources such as time, money, manpower (intellectual capital), machines can help alleviate project failures.

Practitioners in the construction industry are generally resistant to change, a road map is usually required in order for the construction firm to integrate new technology and gain full acceptance of a new system (Nitithamyong & Skibniewski, 2004). Despite construction industry being an important industry that makes enormous contribution to the Kenyan economy, there appears to be no study that has addressed the link between project management software and project performance and therefore there are some gaps in the literature that ought to be filled, these include what areas can project management software be used in construction projects, what is the level of management software utilization and its relationship with project performance, what are the effects of project management software training and government policies and regulations on the projects' performance. There is a lack of studies on the impacts of project management software on the performance of engineering projects (Robert, 2013). It is expected that the knowledge gaps will be established and appropriate measures recommended on improving utilization of project management software in construction projects in Nairobi. This research study therefore seeks to investigate the influence of project management software on the performance of construction projects in Nairobi County.

Research Objectives

The general objective of the study was to investigate the influence of project management software technology on the performance of construction projects in Nairobi County.

The study was guided by the following specific objectives:

i. To determine the effects of the current trends of software on the performance of construction projects in Nairobi County.
ii. To assess the relationship between the level of use of software and the performance of construction projects in Nairobi County.
iii. To establish the effects of software training on the performance of construction projects in Nairobi County.
iv. To find out the influence of government policies and regulations of software on the performance of construction projects in Nairobi County.

Research Questions

The study was guided by the following research question:-

i. What are the effects of current trends in project management software on the performance of construction projects in Nairobi?
ii. What is the relationship between the level of use of software technology and the performance of construction projects in Nairobi?
iii. How does software training influence the performance of construction projects in Nairobi County?
iv. How do the government policies and regulations of software influence the performance of construction projects in Nairobi County?

Theoretical Review

The following is an overview of the key management theories. The link between the management theories and independent variables of this study is explained.

Scientific Management Theory - Frederick Taylor (1856 – 1915)

This theory arose in part from the need to increase productivity. In the US especially, skilled labour was in short supply at the beginning of twentieth century. The only way to raise productivity was to raise the efficiency of workers (Donna, 1986). Frederick Taylor (1856 – 1915), with his theories of Scientific Management, started the era of modern management (Daniel, 1987). In the late nineteenth and early twentieth centuries, Frederick Taylor was decrying the "awkward, inefficient, or ill-directed movements of men" as a national loss. He advocated a change from the old system of personal management to a new system of scientific management. Under personal management, a captain of industry was expected to be personally brilliant. Taylor claimed that a group of ordinary men, following a scientific method would out- perform the older "personally brilliant" captains of industry (Donna, 1986).

Taylor consistently sought to overthrow management "by rule of thumb" and replace it with actual timed observations leading to "the one best" practice. Taylor's strongest positive legacy was the concept of breaking a complex task down in to a number of small subtasks, and optimizing the performance of the subtasks. This positive legacy leads to the stop-watch measured time trials which in turn lead to Taylor's strongest negative legacy. Many critics, both historical and contemporary have pointed out that Taylor's theories tend to "dehumanize" the workers (Henderson, 1947).

Taylor's philosophy is encapsulated in his statement, 'In the past, the man has been first. In the future, the systems must be first' (Richard, 2008). The current project management software is an improvement of the Taylor's concept and theory. For example MS project breaks down a project into a series of sub tasks called work breakdown structure (WBS). Scheduling using software is actually based on Taylor's theory of management. Further, systematic training of workers as advocated by Taylor is an independent variable of this study. Therefore there is a strong link between the project management software variables of this study and Taylor's theory of management.

Henry L Gantt Theory of Scientific Management – (1861 – 1919)

He abandoned the differential rate system and felt it had little motivational impact. He came up with a new idea. Every worker who finished a day's assigned work load would win a 50cent bonus. Then he added a second motivation. The supervisor would earn a bonus for each worker who reached the daily standard plus extra bonus if all the workers reached it. This, Gantt reasoned, would spur supervisors to train workers to do a better job (Richard et al, 2008).

Gantt also built upon Owen's idea of rating an employee's work publicly. Every worker's progress was recorded on individual bar charts - in black on days the worker met the standard and in red when he or she fell below it. Going beyond this, Gantt originated a charting system for production scheduling (Daniel, 1987). The Gantt chart is still used today. Project management software can be used to generate Gantt charts and therefore this theory has a strong link with variables of this study i.e. current trend of software and the areas of use of project management software. It is worth noting that project scheduling is one of the major areas where software is in use today.

Bureaucratic Organisation Theory - Max Weber (1864 – 1920)

During the late 1800's many European organisations were managed on a personal family-like basis. Employees were loyal to a single individual rather than to the organisation or its mission. The dysfunctional consequence of this management practice was that resources were used to realise individual

desires rather than organisation goals. Weber envisioned organisations that would be managed on an impersonal, rational basis. This form of organisation was called bureaucracy (Henderson, 1947).

Weber believed that an organisation based on rational authority would be more efficient and adaptable to change because continuity is related to formal structure and positions rather than a particular person, who may leave or die. The rules and procedures are impersonal and applied uniformly to all employees. A clear division of labour arises from distinct definitions of authority and responsibility, legitimised as official duties. The manager depends not on his or her personality for successfully giving orders but on the legal power invested in the managerial positions (Richard, 2008).

However, the term bureaucracy has taken on a negative meaning in today's organisation and is associated with endless rules and red tape. We have all been frustrated by waiting in long lines or following seemingly silly procedures. However, rules and other bureaucratic procedures provide a standard way of dealing with employees. This foundation enables many organisations to become extremely efficient (Richard, 2008). Weber did not advocate bureaucracy. Indeed, his writings show a strong caution for its excesses. While Weber was fundamentally an observer rather than a designer, it is clear that his predictions have come true. His principles of an ideal bureaucracy still ring true today and many of the evils of today's bureaucracies come from their deviating from those ideal principles (Daniel, 1987). If the government set bad policies governing the software use, then this will affect the performance of construction projects. Weber was also successful in predicting that bureaucracies would have extreme difficulties dealing with individual cases. This theory therefore is a basis one of the independent variables for this study i.e. government regulations and policies on project management software use.

Administrative Principles Theory - Henri Fayol (1841 – 1925)

With two exceptions, Henri Fayol's theories of administration dovetail nicely into the bureaucratic superstructure described by Weber. Henri Fayol focuses on the personal duties of management at a much more granular level than Weber did. While Weber laid out principles for an ideal bureaucratic organization Fayol's work is more directed at the management layer (Henri, 1930).

Fayol believed that management had five principle roles: to forecast and plan, to organize, to command, to co-ordinate and to control (Henderson, 1947). Forecasting and planning was the act of anticipating the future and acting accordingly. Organization was the development of the institution's resources, both material and human. Commanding was keeping the institution's actions and processes running. Co-ordination was the alignment and harmonization of the groups' efforts. Finally, control meant that the above activities were performed in accordance with appropriate rules and procedures (Henri, 1930).

Fayol's five principle roles of management are still actively practiced today. Many project managers often write "Plan, Organize, Command, Co-ordinate and Control" on their whiteboards as their primary roles. These functions underlie much of the general approach to today's management theory (Daniel, 1979). Project management software performs these management functions today for example PRIMAVERA software is used to plan and organise tasks and also assists in project's control. This theory therefore is the basis of two of independent variables for this study i.e. current trend of software and level of use or areas of use of software. Software engineering has provided project management science with a new domain in which to test management theories and models (Carlo, 2003).

Conceptual Framework

Mugenda (2008) defines conceptual framework as a concise description of the phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study. According to Young (2009), conceptual framework is a diagrammatical representation that shows the relationship between dependent variable and independent variables. In this study, the conceptual framework will look at the relationship between the project management software and performance of construction projects in Nairobi County.

Conceptual Framework

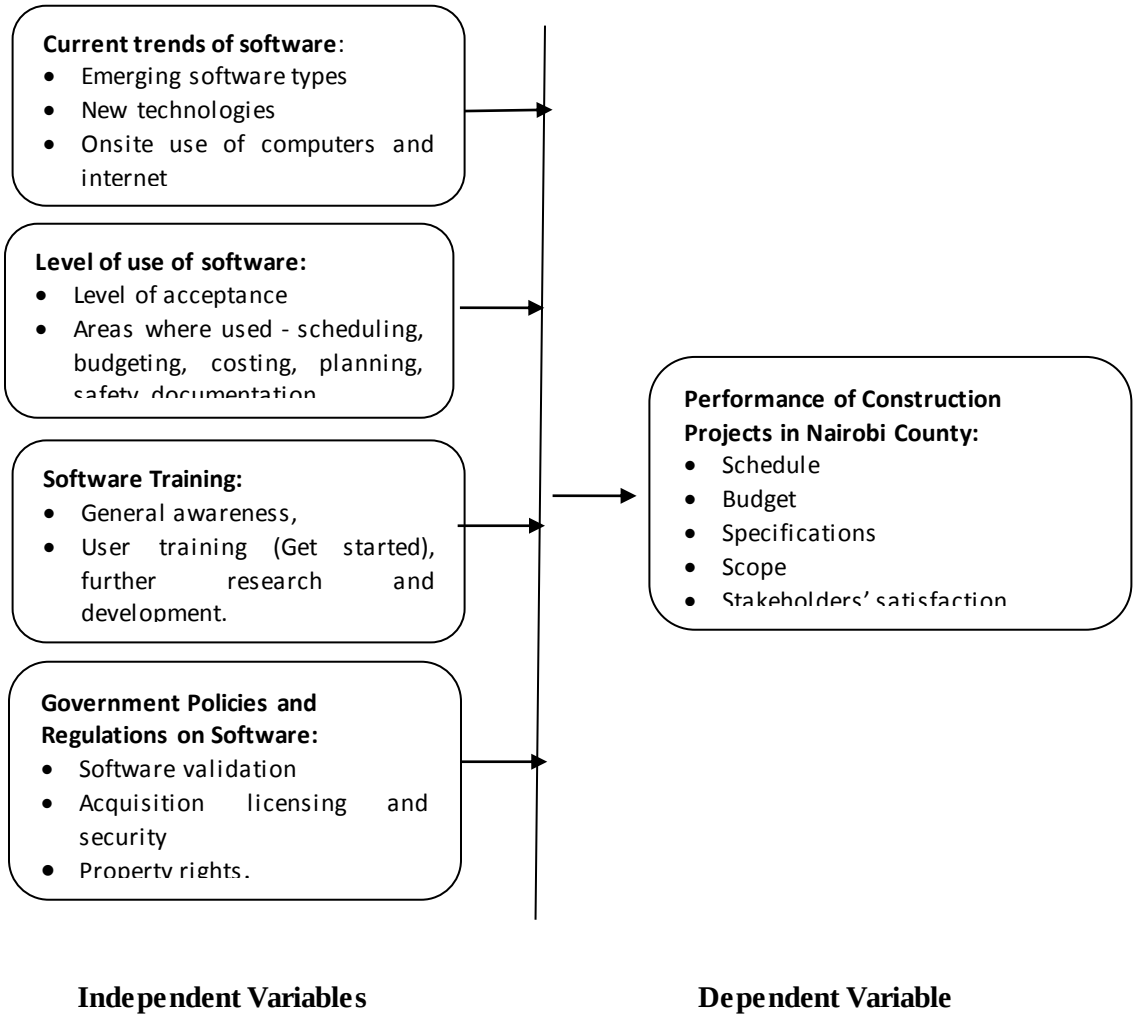

Figure 1. Influence of Project Management Software Technology on Performance of Construction Projects

RESEARCH METHODOLOGY

The method of this study was descriptive research design. This method is appropriate when the nature of the problem is well defined and when the major emphasis is to determine the relationship between two variables (Mugenda & Mugenda, 2003). This study aims to determine the relationship between the four independent variables and one dependent variable.

The target population for the study was the 1,391 registered construction and project management companies in Nairobi (Public Works Contractor register as at 14 September 2012).

A proportionate sample size of 139 companies of the total population was selected using a stratified sampling technique where the companies were first be grouped according to their function; Construction companies and Project Management companies. Then systematic random sampling technique was used to obtain the exact desired sample size using 10% as the N^{th} term as shown in Table 1.

Table 1. Sampling frame

Stratum	Population	Sample Population %	Sample
Construction companies	1,281	10	128
Project Management Companies	110	10	11
Total	**1391**	**10**	**139**

Primary data was largely used in this study. A structured questionnaire method was used to collect data using both closed-ended questions and a few open ended in order to get the opinion of the project managers of the respective companies. Questionnaires were supported by interview guide, which was administered through interviews. Collection of secondary data was achieved through journals, books, magazines and internet. However, out of 139 questionnaires distributed 109 respondents completely filled in and returned the questionnaires, this represented a 78.4% response rate.

The researcher carried out a pilot study to pretest the validity and reliability of data collected using the questionnaire. The reliability of the questionnaire was evaluated through Cronbach's Alpha which measures the internal consistency. The Alpha measures internal consistency by establishing if certain item measures the same construct. Cronbach's Alpha was established for every objective in order to determine if each scale (objective) would produce consistent results should the research be done later on. The findings of the pilot study shows that questions on project management software training had the highest reliability (α=0.821) followed by Government policies and regulations on software (α=0.802), then project management software level of use (α = 0.751) and project management software current trends (α=0.723). This illustrates that all the four scales were reliable as their reliability values exceeded the prescribed threshold of 0.7 (Nunnally, 1978). Face/expert validity was employed in the study. Validity was ensured through discussion with the experts including supervisors and colleagues.

Before analysis, data was checked for completeness and consistency. The data was coded, summarized and presented in form of table, graphs and charts. Simple descriptive statistics such as mean, standard deviation, frequencies and percentages was used. The descriptive statistical tools help in describing the data and determining the respondents' degree of agreement with the various statements under each factor (Creswell, 2003). Also scientific software, SPSS was used to analyse the results. Microsoft excel was used to generate quantitative reports. Karl Pearson's product moment correlation technique was used to establish the relationship between project management software current trends, usage, training and government policies and performance of construction projects in Nairobi County. Further, regression analysis was used to determine the contribution of independent variables on the dependent variable. Multiple Regression analysis as a statistical procedure is concerned with causation in a relationship between variables (Young, 2009).

Project performance was regressed against four variables namely project management software current trends, usage, training and government policies. It was hypothesized that there is a direct and positive association between construction projects performance and project management software current trends, usage, training and government regulations. The equation for construction project's performance was expressed in the following equation:

$$\mathbf{Yp = \beta 0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + \varepsilon}$$

Where,

Yp = Construction project's performance
β0 = Constant (coefficient of intercept)
X1 = Project management software current trends
X2 = Project management software level of use
X3 = Software training
X4 = Government policies and regulations on software
$\mathbf{B_1 \ldots B_4}$ = Regression coefficient of four variables.
ε = Error term normally distributed about the mean of zero

The study also used inferential statistics such non parametric test which include T-test, analysis of variance (ANOVA) and F-test to test the relationship of the variables.

RESULTS AND DISCUSSION

Demographic Characterization of the Respondents

Position held by the Respondents in their Respective Department

The study aimed to investigate position held by the respondents within their organization. From the findings (44%) of the respondents were project managers, 29% were owners of the project, 16% were technical personnel while 11% were supervisors and team leaders. This depicts that all participant of the study were under the level at which the study targeted and that the information they gave is critical to the study findings.

Table 2. Position held by the Respondents in their Respective Department

	Frequency	Percentage
Project Managers	48	44
Owners	32	29
Technical personnel	17	16
Supervisors/team leaders	12	11
Total	**109**	**100**

Working Duration

Figure 2 illustrates working duration of the respondents in their respective organization, from the findings most (36%) of the respondents had worked in the organization for a period of 1-5 years, 34% had worked for a period of 6-10 years, 19% had worked for a period of 11-15 years while the rest (11%) had served in their respective organization for a period of above 16 years. This implies that most of the respondents of this study had worked for an ample time thus they were conversant of the information that the study sought pertaining to the organization.

These finding correspond to those by Enshassi, Mohamed & Abushaban (2008) that availability of experienced personnel leads to better performance of quality, time, cost, productivity and safety of projects. This shows that work experience is an important factor in the performance of construction projects.

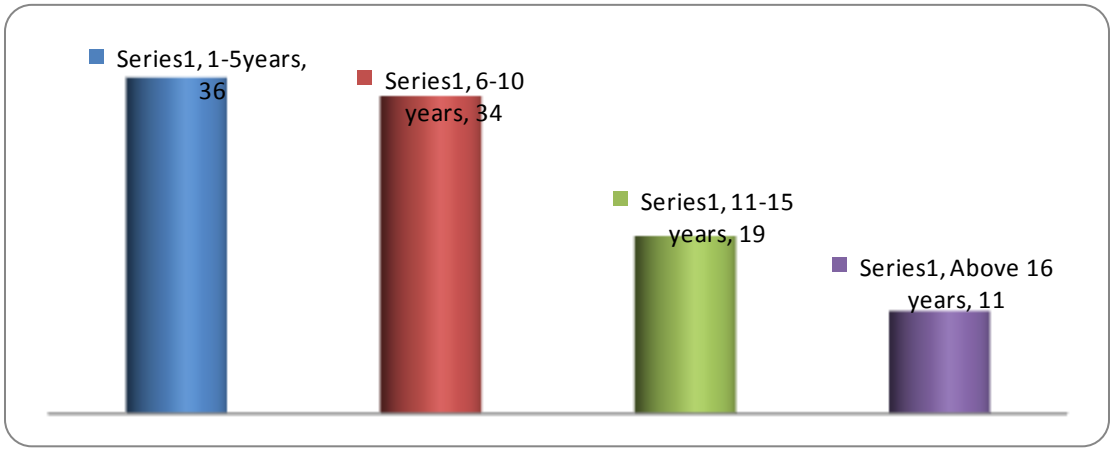

Figure 2. Working Duration

Organizations Classification

Figure 3 illustrates the finding of the study on the categories of the organization within the construction sector. Most (45%) of the respondent indicated that their organization were within the category of small construction firm, 36% were medium construction firm, 11% were large construction firm, 3% were small

project management firm and large project management firm as shown in each case while the rest 2% were medium project management firm.

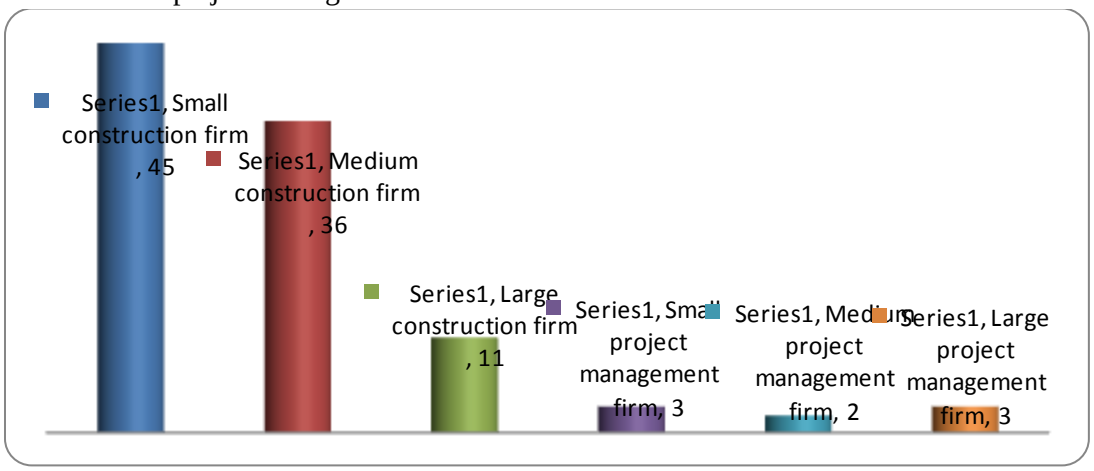

Figure 3. Organizations Classification

Organization Success Rate in Construction Projects

The researcher requested respondents to indicate the success rate of their organization in the construction projects. Majority (58%) of the respondent indicated that their organization performed extremely well between 75-100% success rates while the rest 42% indicated that their success rate ranged between 50-75%. These findings correspond to those by Diana & Joyce (2002) that 43% are described as giving rise to unexpected side effects.

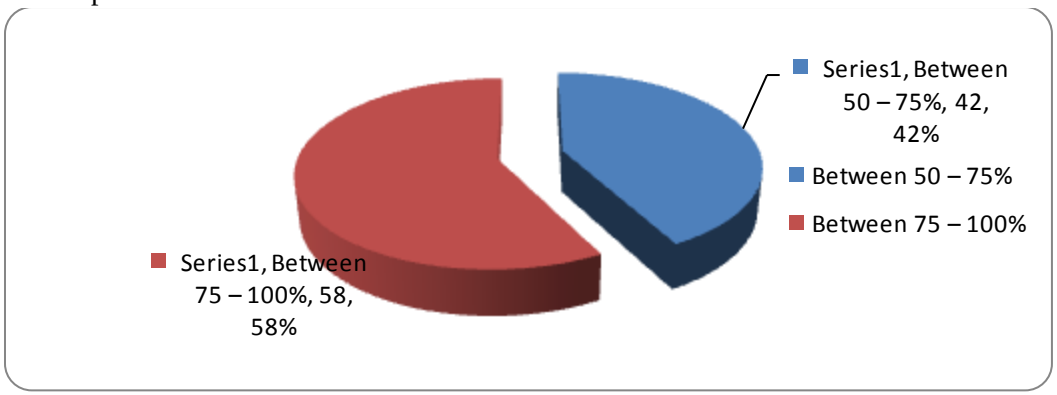

Figure 4. Organization Success Rate in Construction Projects

Project Performance

Experience of Failed Project

Figure 5 shows the summary of the study findings on whether the organization has failed project. From the findings, majority (80%) of the respondents pointed that they have not experienced project failure while 20% indicated that they have experienced few of their projects they were managing or constructing fail. These findings concurs with those of Pinto & Slevin (1988) who found that while many projects reach successful outcomes, it is also a reality that some projects fail to do so.

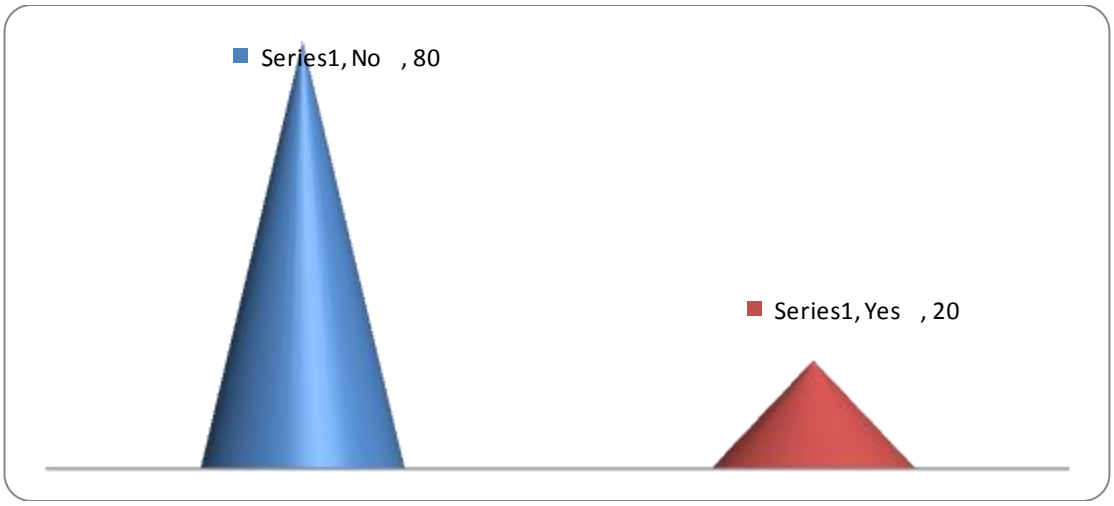

Figure 5. Experience of Failed Project

Reasons for Project Failure

Figure 6 depicted the results of the findings on reasons project fails. From the findings, 86% pointed that their projects failed due to failure to utilize the appropriate project management software to manage the budget, schedule, project activities and labour, 77% pointed out that their project failed due to cost overrun, 59% pointed out that their projects failed due to scope creep and lack of stakeholders involvement, 41% indicated that the project failed due to lack of management support while 36% pointed out schedule slippage resulting to project failure.

These findings correspond to those of Pinto & Slevin (1988) that over 60% of project failures are linked to internal project issues (missed deadlines, insufficient resources among others). In fact, the top three reasons for project failure — bad estimates/missed deadlines, scope changes and insufficient resources — are internal project factors. Leading-practice companies determine whether a project is successful based on whether it achieves benefits that are in line with strategic objectives, and establish mechanisms to track progress along the way.

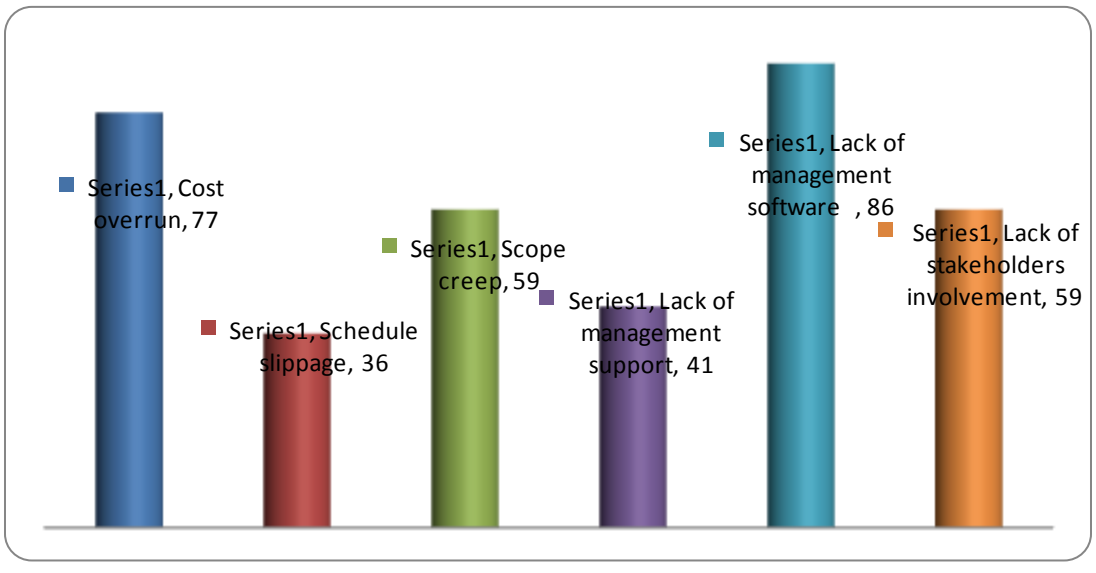

Figure 6 Reasons for Project Failure

Management Software Factors that Influence the Construction Projects Performance

Table 3 illustrates the findings on factors that influence the performance of construction projects performance. From the findings, most of the respondents pointed that project management software current trends influence the construction projects performance to a great extent as shown by mean score of 4.01, project management level of use and project software training affects construction projects performance to a great extent as shown by mean score of 3.77 and 3.70 respectively. Likewise, respondents agreed that government licensing and regulations on software influence the construction projects performance to a great extent as shown in mean score of 3.52.

These findings concur with those of Price Waterhouse Coopers Surveys (2007) that the current software trends such as emerging management software and new technologies have a great impact to the success to today's construction projects. Further, the findings concur to those of Raymond & Bergeron (2007) that the less performing projects present significantly lower project management software utilization levels than other projects. Also, according to Cash and Fox (1992) project management software training contribute to the success of construction projects. Furthermore, the findings correlate with those of Cash and Fox (1992) who found that where there is favourable software licencing policies, the level of software use is high and the rate of project's success is equally high.

Table 3. Factors Influence the Construction Projects Performance

	Mean	SD
Government licensing and regulations on software	3.52	0.168
Project management level of use	3.77	0.297
Project software training	3.7	0.198
Project management software current trends	4.01	0.196

Current Trends of Software Technology

Software Technology on Construction Project Success

The researcher requested the respondents to indicate the impact that the software technology have on project success. From the finding most of the respondents agreed that new technologies impact project success as depicted by mean score of 4.65, respondent agreed that influx of affordable internet providers and packages impact project success as shown by mean score of 4.33, also respondents agreed that emerging software types impact project success as illustrated by mean score of 4.12. Lastly, respondents agreed that onsite use of computers and internet impact project success as shown by mean score of 4.04.

These findings concur with those of Gido (1999) that adopting new software current trends such as implementing new software technologies help a company to manage its scarce resources better.

Table 4. Software Technology on Construction Project Success

	Mean	STDev
Emerging software types	4.12	0.784
New technologies	4.65	0.947
Onsite use of computers and internet	4.04	0.047
Influx of affordable internet providers and packages.	4.33	0.81

Level of Software Use

Use of Project Management Software

The respondents were requested to indicate whether they use any project management software to manage their construction projects. Figure 4.6 show the percentage of respondents who indicated presence of project management software in their organization. Majority of the respondents (73%) indicated that they use project management software to manage their construction projects and 27% stated that they don't use any project management software to manage their construction projects. These findings concur with those of Cash & Fox (1992) that over 70% of firms are currently using some type of project management

software. Project management software has the capacity to help plan, organize, and manage resource pools and develop resource estimates, Project Management Institute Inc. (2004).

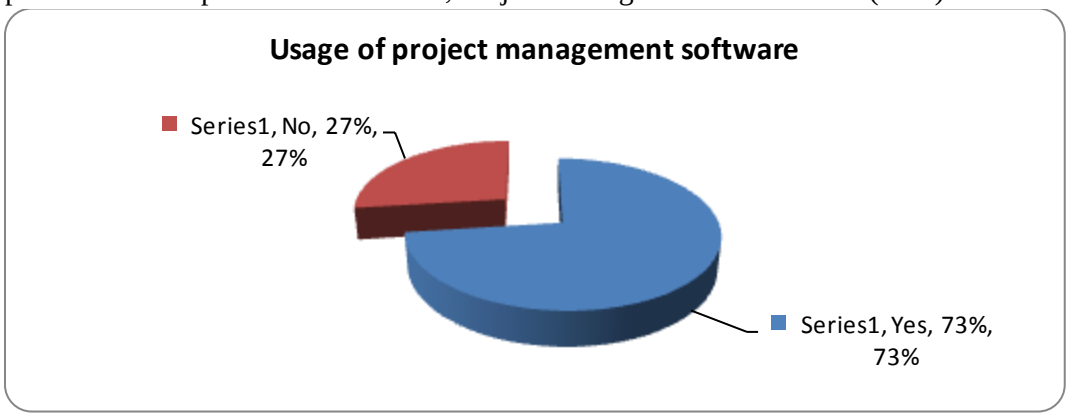

Figure 7. Use of Project Management Software

Reasons for not Using Project Management Software

Respondents who said they don't use any project management software to manage their construction projects were further asked to indicate why they don't use project management software. Table 4.10 shows the study findings. In relation to the findings, most (32%) argued that they do not use project management software due to lack of software training, 27% due to lack of top management support, 24% due to Lack of funds/prohibitive cost of software while the rest 17% due to government software licensing restrictions.

These finding correlates with those of Stewart & Mohamed (2004) that lack of sufficient training and lack of top management support are some of the reasons why most firms have not embrace project management software to manage their projects. A research by Mark, Arun, Joan & Zhang (2003) suggest that managers who are willing to invest in project management tools, techniques, and training, particularly in the areas of specification, estimation, monitoring and control could reap substantial benefits in terms of reducing the incidence of runaway projects.

Table 5. Reasons for not Using Project Management Software

	Frequency	**Percentage**
Lack of software training	9	32
Lack of funds/prohibitive cost of software	7	24
Government software licencing restrictions	5	17
Lack of top management support	8	27
Total	**29**	**100**

Utilization of project management

Respondents who said they use project management software to manage their construction projects were further asked to indicate what they use project management software for. Figure 4.7 shows the study findings. Majority (29%) of the respondents said that they use project management software for activity planning, 21% for cost management, 13% for construction activities management, 10% for document control and management, 9 % for estimating process management, 7% for procurement management, and 5% for engineering process management.

This implies that majority of the respondents use project management software for activity planning and cost management and this concurs with a research by Cash & Fox (1992) that revealed that majority of construction firms (over 50%) use project management software scheduling and cost management.

Figure 8. Utilization of project management

Opinion on statements regarding level of Software use

The respondents were requested to indicate their level of agreement on the following statements in relation to level of Software use. The responses were rated on a five point Likert scale where: **5** = Very great extent; **4** = Great extent; **3** = Moderate extent; **2** = Low extent and **1** = Very low extent. The mean and standard deviations were generated from SPSS and are as illustrated in table 6.

Table 6. Opinion on statements regarding level of Software use

Statement	Mean	SD
Construction projects that use project management software to manage different project parameters accrue more profit margins than projects that do not	4.23	0.445
The stiff competition for survival of construction companies increases the need to use the project management software to manage projects better.	4.03	0.862
The length of time per day in which the project management software is used in a project has an impact on project performance.	3.06	0.196

Majority of the respondents agreed to a very great extent that construction projects that use project management software to manage different project parameters accrue more profit margins than projects that do not (M=4.232), and that stiff competition for survival of construction companies increases the need to use the project management software to manage projects better (M=4.029). In addition, respondents expressed moderate view on the statement that the length of time per day in which the project management software is used in a project has an impact on project performance (M=3.061). This implies that construction projects that use project management software to manage different project parameters accrue more profit margins than projects that do not to a very great extent. This finding corroborates the findings of (Raymond & Bergeron, 2007) that the less-performing projects present significantly lower system utilization levels than the other projects.

Software Training

Opinion on statements regarding Software training

Table 7 shows the finding of the study on aspects relating to project management software training. Majority of the respondents agreed to a very great extent that project management software training should be conducted on a continuous basis throughout the construction project's life cycle (M= 4.742), and that the manner in which project management software training is handled in a construction project affects the project performance and eventual profitability (M=4.145). This implies that project Management software training should be conducted on a continuous basis throughout the construction project's life cycle. This finding concurs with that of Jason (2011) that employee training program should be implemented by the general contractor on a continuous basis. The training is conducted in a manner to close the gap between a demonstrated level of performance, and the level where the organization hopes to perform.

Table 7. Opinion on statements regarding level of Software training

Statement	Mean	SD
The manner in which project management software training is handled in a construction project affects the project performance and eventual profitability.	4.145	.57678
Project Management software training should be conducted on a continuous basis throughout the construction project's life cycle.	4.742	0.0465

Usefulness of Project Management Software Training

The respondents were asked to indicate how useful project management software training in doing the work is. The study findings are illustrated in figure 4.8 below. From the study findings in figure, majority (46%) of the respondents indicated that project management software training is very useful in doing the work they do, 35% indicated it's useful and 10% indicated not very useful. The study finding reveals the importance of project management software training in execution of a project. This concurs with a research by Cash & Fox (1992) that pointed out that project software training contribute to the success of construction projects. The training is conducted with set standards of evaluation and implementation (Seymour, 1992).

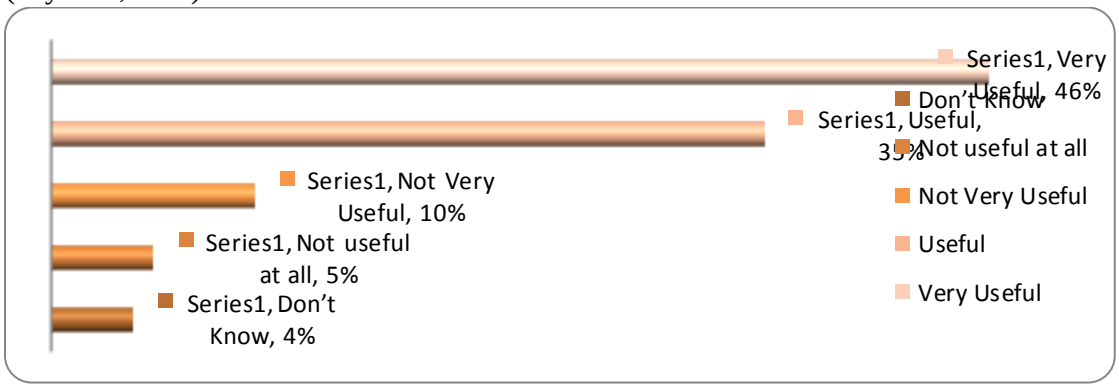

Figure 9. Usefulness of Project Management Software Training

Impact of Software Training on Construction Project Success

The respondents were requested to indicate their level of agreement on impact of software training factors on construction project success. The responses were rated on a five point Likert scale where: **5** = Very great impact; **4** = Great impact; **3** = Moderate impact; **2** = Low impact and **1** = Very low impact. The mean and standard deviations were generated from SPSS and are as illustrated in table 8. Majority of the respondents agreed that user training (Get started) (M= 4.432), and further research and development (M=4.123) has very great impact on construction project success. This implies that user training and further research and development have very great impact on construction project success.

These findings agree with those of Seymour (1992) that training enables further research and development of software thereby improving current software. Project management software training also creates general awareness and eliminates resistance among the project team members. Training needs to be fully supported by the management team, if not the software will not get used as a result of unfamiliarity; therefore the investment will not reap the planned dividends (Gido, 1999).

Table 8. Impact of Software Training on Construction Project Success

Statement	Mean	STDev
General awareness seminars	3.124	0.1144
User training (Get started)	4.432	0.2125
Further research and development	4.123	.01655

Government Policies and Regulations of Software

Government Policies and Regulations on Construction Project Success

The respondents were requested to indicate their level of agreement on impact of government policies and regulations on software on construction project success. The responses were rated on a five point Likert scale where: 5 = Very great impact; 4 = Great impact; 3 = Moderate impact; 2 = Low impact and 1 = Very low impact. Majority of the respondents agreed that Software licensing (M= 4.535), and Software acquisition (M=4.531) have very great impact on construction project success. In addition, software validation (M= 3.724), and software security – anti piracy (M= 3.125) have very great impact on construction project success. This implies that software licensing and software acquisition have very great impact on construction project success.

This finding concurs with that of Cash & Fox (1992) that in countries with favourable software licencing policies, the level of use of project management software is quite high. These include policies on software validation, acquisition, licensing and security i.e. Confidentiality, Integrity and Availability. Government policies on property rights are also included. In Kenya, piracy of software as it is the case with music and movies goes on unabated. This has put in strain in the research and development of project management software in Kenya (Mwangi, 2011).

Table 8. Government Policies and Regulations on Performance of Construction Project Success

Statement	Mean	StDev
Software validation	3.724	.2456
Software acquisition	4.531	.1462
Software licensing	4.535	.2474
Software security – anti piracy	3.125	.0245
Property rights	3.0125	.2475

Inferential Analysis

Coefficient of Correlation

Table 9. Coefficient of Correlation

		Construction project's performance	software current trends	software level of use	Software training	Government policies and regulations
Construction project's performance	Pearson Correlation Sig. (2-tailed)	1				
Software current trends	Pearson Correlation Sig. (2-tailed)	.523 .0032	1			
Software level of use	Pearson Correlation Sig. (2-tailed)	.6140 .0021	.3421 .0014	1		
Software training	Pearson Correlation Sig. (2-tailed)	.7460 .0043	.1240 .0120	.0621 .0043	1	
Government policies and regulations on software	Pearson Correlation Sig. (2-tailed)	.5210 .0172	.3420 .0031	.0000 1.000	.1660 .0031	1

To compute the correlation (strength) between the study variables and their findings the researcher used the Karl Pearson's coefficient of correlation (r). From the findings, it was clear that there was a positive correlation between construction project's performance and software current trends as shown by a

correlation figure of 0.523. It was also clear that there was a positive correlation between construction project's performance strategies and software level of use with a correlation figure of 0.6140, there was also a positive correlation between construction project's performance and software training with a correlation value of 0.7460 and a positive correlation between construction project's performance and government policies and regulations on software with a correlation value of 0.5210. This shows that there was a positive correlation between construction project's performance and software current trends, software level of use, software training and government policies and regulations on software. These findings agree with the findings of Cash and Fox (1992) who established that the projects that embrace project management software technology have a high chance of success.

Coefficient of Determination – R^2

Further the researcher conducted a multiple regression analysis so as to determine the influence of project management software technology on the performance of construction project. The researcher applied the statistical package for social sciences (SPSS) to code, enter and compute the measurements of the multiple regressions for the study.

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (construction project's performance), that is explained by all the four independent variables (software current trends, software level of use, software training, and government policies and regulations on software) (Young, 2009).

The four independent variables that were studied, explain only 83.4% of the construction project's performance as represented by the adjusted R^2. This therefore means that other factors not studied in this research contribute 16.6% of the construction project's performance. Therefore, further research should be conducted to investigate the other factors (16.6%) that influence construction project's performance.

Table 9. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.913	0.834	0.751	0.4538

ANOVA Results

In trying to test the significant of the model, the study used ANOVA. From table 4.17 the significance value is 0.009 which is less that 0.05 thus the model is statistically significant in predicting how software current trends, software level of use, software training, and government policies and regulations on software influences performance of construction projects. The F critical at 5% level of significance was 2.46. Since F calculated is greater than the F critical (value = 3.512), this shows that the overall model was significant.

Table 10. ANOVA

Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	3.500	4	.700	3.512	.009
	Residual	9.368	104	.199		
	Total	**12.868**	**108**			

Regression Coefficient

Multiple regression analysis was conducted so as to determine the relationship construction project's performance and the four variables. As per the SPSS generated table 11, the equation

($\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$) becomes:

$Y= 1.308+ 0.558X_1+0.731X_2+ 0.785X_3+ 0.620X_4$

The regression equation above has established that taking all factors into account software current trends, software level, software training, and government policies and regulations on software) constant at zero,

construction project's performance will be 1.308. The findings presented also shows that taking all other independent variables at zero, a unit increase in software current trends will lead to a 0.558 increase of construction project's performance; a unit increase in software level of use will lead to a 0.731 increase of construction project's performance; a unit increase in software training will lead to a 0.785 increase in construction project's performance and a unit increase in government policies and regulations on software will lead to a 0.620 increase construction project's performance.

Table 11. Regression Coefficient

	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.308	1.342		1.623	0.357
Software Current Trends	0.558	0.310	0.172	4.342	.0276
Software level of use	0.731	0.156	0.210	3.532	.0285
Software training	0.785	0.322	0.067	3.542	.0202
Government policies and regulations	0.620	0.245	0.148	3.458	.0249

CONCLUSION

The study concluded that many projects fail due to failure to utilize the appropriate project management software to manage the budget, schedule, project activities and labour. In addition, the study concludes that software current trends influence the construction projects performance to a great extent and found out that there is a positive correlation between construction project's performance and software current trends.

The study concludes that respondents use project management software to manage their construction projects. Further lack of software training is the major reason for not using any project management software. In addition, project management software is used majorly for activity planning and cost management. Moreover the study concludes that construction projects that use project management software to manage different project parameters accrue more profit margins than projects that do not to a very great extent. The study concludes there exists a positive correlation between construction project's performance and software level of usage.

The study finding concludes that there is the importance of project management software training in execution of job. In addition, user training and further research and development have very great impact on construction project success. The study also concludes that there is a positive correlation between construction project's performance and software training. The study also concluded that software licensing and software acquisition have very great impact on construction project success. Also there exists a positive correlation between construction project's performance and software training.

As organisations increasingly leverage project management as a method to achieve critical business objectives, effective project management practices are - more than ever - vital to a company's success. Realising the role that project management plays in the successful execution of business strategies, senior management should continue to support key initiatives, such as project management certification, development programmes and portfolio management capabilities. Certainly, there are many opportunities to improve existing project management practices to meet the ever-growing demands of the business landscape.

RECOMMENDATIONS

The study established that current trends of software greatly influence the performance of construction project in Nairobi County. In this regard, recommends that construction firms must embrace the emerging

new technology, new software types and use computers and internet on site in order to manage the project resources better and accrue more profits eventually.

The study further established that construction firms use project management software to perform different tasks ranging from activity planning, cost management among other functions. Also the firms that use management software more hours per day have high chances of project's success. In this regard, the study recommends that construction firms in Nairobi and in deed in Kenya must utilize project management software to manage different tasks in their projects and actually put in more hours of software use in order to realize higher chances of project's success.

The study also established that government policies on software influence the performance of construction projects. In this respect, the study recommends continual harmonization of government regulatory policies to the changes taking place in business environment. Particularly, there is need for review of regulatory policies on project management software. Sufficient environmental analysis should be conducted so that all stakeholders in the construction industry air their view on regulatory policies to be adopted. This will ensure that policies adopted are widely accepted hence encourage healthy competition. The study recommends that organizations should come up with work policies that ensure that strategies adopted in response to project management software technology do not conflict with government policies and regulations.

The study establishes that software training positively influence the performance of construction projects. In the light of this, the study recommends that project management software training should be adopted in an organization and should be transformative in order to help employees share and support organizational vision, mission and goals.

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