

# **EFFECT OF RISK MANAGEMENT STRATEGIES ON PROJECT PERFORMANCE OF SMALL AND MEDIUM INFORMATION COMMUNICATION TECHNOLOGY ENTERPRISES IN NAIROBI, KENYA**

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## **Abstract**

*The main objective of this study is to establish the effects of risk management strategies on the project performance of small and medium information communication technology (ICT) enterprises in Nairobi, Kenya. The study was governed by four theories including Logical Framework Approach, Project Risk Analysis and Management model, Network Theory and Portfolio theory. The independent variables were the risk management strategies while dependent variable was the project performance of the SME ICT project. A descriptive research design was adopted. Target population was 48 ICT SMEs in Nairobi, Kenya. The study adopted random sampling technique to select sample size of the project staff in the target population. Primary data was collected using a questionnaire which was self-administered through drop and pick questionnaires to sampled members of the employees working in the ICT SMEs. The data was then summarized, coded and tabulated. A multiple regression model was applied to determine effects of risk management strategies on project performance of ICT SMEs in*

*Nairobi, Kenya. An effective risk management practices encourages the ICT enterprises to identify and quantify risks and to consider risk containment and risk reduction policies. The study established that there existed a positive relationship between risk management strategies affecting project performance and ICT project performance for SMEs in Kenya and were statistically significant at 0.05 level. The study concluded that many (ICT) enterprises in Nairobi, Kenya have realized the importance of risk management practise in ICT project management to achieve process success. They carry out risk management to maximize the performance. ICT enterprises that manage risk effectively and efficiently enjoy financial savings and greater productivity, improved success rates of new projects and better decision making.*

*Keywords: Project Risk Management: Project Performance, Risk Management Strategies*

## **INTRODUCTION**

Project risk management has a prominent position in the framework of project management theory and methodology (Project Management Institute, 2008). The reason is that unexpected events will usually occur during a project (Pinto, 2007). Given the importance of project risk management in project management functioning, the efficiency of risk management is expected to significantly influence project performance (Bannerman, 2008). Studies on the impact of risk management strategies on project performance has indicated that effective risk management strategies improve project performance by enhancing productivity (Voetsch, cioffi and Anbari, 2004). With today's dynamic change and increase in competition, it is not enough for enterprises to have a good project plan or have a good monitoring and control systems in achieving project success but they should focus on constituting effective project risk management strategies including risk avoidance, risk reduction, risk transfer and risk retention strategy to contribute to the success of the project (Olsson, 2008). Risk management strategies must be carried out throughout the life cycle of the ICT project, from initiation stage until the decommissioning of the project. Failure to manage the project risks throughout the life cycle of ICT projects will lead to poor project performance (Abdul, Ayub, Nordiana Mohd and Ilias, 2007). The use of effective risk management strategies for instance is increasing and has been the center of focus recently in order to achieve ICT project performance and also have emphasize on contractual obligations (Chacko and Harris, 2006). Kululanga and Kuotcha (2010) indicated that low implementation of project risk management strategies in practice causes the projects failure such as meeting deadlines, cost targets and quality performance. However, it is still inconclusive as to what extent does the risk management strategies improve performance of

SMEs ICT projects in Kenya thus the need to determine the effects of risk management strategies on SMEs ICT project performance in Kenya.

Achieving project performance forms the basis to adoption and implementation of effective project risk management strategies. ICT project risk management strategy is embedded to organizational internal control and audit, a condition necessary for effective project risk management measures in the ICT project (Speklé *et al.* 2007). This hence influences the enterprise management focus on project control and technological control which supports project requirements and governance to attain the success in project performance. Risk management strategies essentially influences the success of project performance (Jin and Yean, 2005). This is so because effective risk management strategies and successful project performance has an intimate relationship. For instance, risk identification identified the potential risks that might influence the project objectives (Baloi & Price, 2002). Sundararajan (2004) stated that if risk events are not handled and managed properly, consequences such as increasing the financial costs, changing the capital structure, delaying the building or facility operations, overrun in the budget, loss of cash inflow, lead to liquidated damages claims, production of poor quality end product, project rework after completion and so on might occur. Therefore, mitigation actions against these risks and uncertainties are vital to ensure achievement of the desired project performance.

Due to the long development of lead-times, rising development costs and high failure rate for ICT SMEs projects, effective risk management strategies is important to the SME in ICT industry to influence project performance (Ward and Chapman, 2003). SME ICT project presents a level of risks and management adopts project risk management strategies to influence achievement of the project performance.

### **Statement of the Problem**

Small and Medium Enterprise project in telecommunication industry have grown more heavily dependent on the successful delivery of information systems (IS). However, Small and medium enterprises information systems project failures are common (Wenk, 2005). The Standish Group International (2009) indicated that 44 percent of software projects for Small and medium enterprises were unable to be delivered on schedule, within budget, or with the required functions, and that 24 percent of all software projects were cancelled hence 68 percent of the ICT SME projects have failed to achieve their target functions. SMEs are challenged by risks and uncertainty hindering the success and competitiveness of the SMEs projects (World Bank, 2004). In Kenya, there are 238 ICT SMEs drawn from the Computer Society of Kenya (CSK, 2012) and 68% of organizations in ICT experience project failure despite adoption of project risk

management strategies (KPMG, 2011). According to CSK (2012), 45% of customers complained that the IT products from the Small and medium technology firms failed to satisfy their needs with 35% indicating the IT service delivered to them failed to achieve the intended objective. CCK (2012) also indicated that almost 48% of Small and medium technology projects registered lost forcing firms to decline in performance. This has been despite increase in high investment in small and medium IT firms projects. This study therefore sought to determine the effects of risk management strategies on SMEs ICT projects in Kenya and help to generate more light in this area.

### **Research Objectives**

The general objective of this study was to establish the effects of risk management strategies on the project performance of small and medium information communication technology (ICT) enterprises in Nairobi, Kenya. The specific objectives of this study were;

- i. To determine the effects of project risk assessment on ICT project performance.
- ii. To establish the extent to which project risk identification influences the ICT project performance.

## **REVIEW OF LITERATURE**

### **Theoretical Review**

The importance of practising project risk management strategies is to increase the significance to project performance. The study was guided by the following theories. A network is an abstract structure capturing only the basics of connection patterns and little else. Since it is a generalized pattern, tools developed for analysing, modelling and understanding networks can theoretically be implemented across disciplines. Network theory originality lays in the application of some network theory indicators to the project risk management field (Olsson, 2008). Tools that are currently employed in risk assessment are often sufficient, but model complexity and limitations of computational power can tether risk assessors to involve more causal connections and account for more Black Swan event outcomes. By applying network theory tools to risk assessment, computational limitations may be overcome and result to a broader coverage of events with a narrower range of uncertainties. Decision-making processes are not incorporated into routine risk assessments; however, they play a critical role in such processes. It is therefore very important for risk assessors to minimize confirmation bias by carrying out their analysis and publishing their results with minimal involvement of external factors such as politics, media, and advocates.

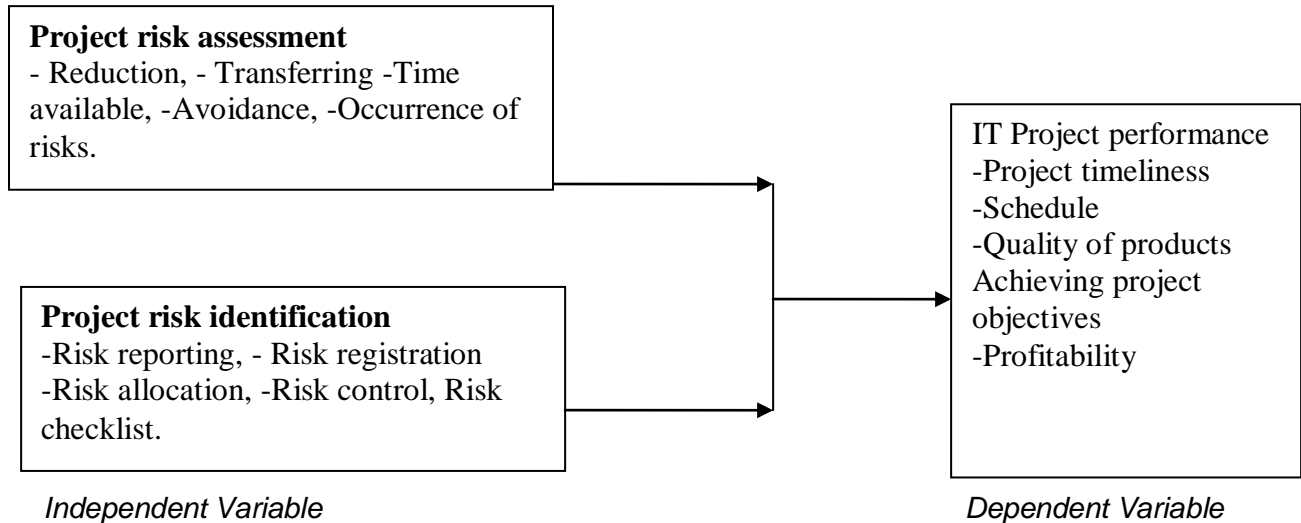
Risk assessment is a very important tool to acquire a present and future risk status of the network information system project. Many risk assessment approaches consider the present system security status, while the future security status which also has an impact on assessing the system risk is not taken into consideration (Meeampol & Ogunlana, 2006). The study is based on network theory to deal with risk assessment and interactions in ICT enterprise projects. Indeed, such projects are exposed to numerous and interdependent risks of various nature, which makes their management more difficult. In this study network theory is presented with aiming at identifying key elements in the project structure of interrelated risks potentially affecting a project (Hamimah & Adnan, 2008). This analysis serves as a powerful complement to classical project risk analysis. The construction of the risk network requires the involvement of the project manager and other team members assigned to the risk management process.

Portfolio Theory on the other hand was developed in the 1950s through the early 1970s and was considered an important advance in enterprises management. Since then, many theoretical and practical criticisms have been levelled against it. These include the fact that enterprise returns do not follow a Gaussian distribution or indeed any symmetric distribution, and those correlations between asset classes (Zwikael & Ahn, 2011). Portfolio theory of project investment which tries to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return, by carefully choosing the proportions of the project (Hamimah, 2008) Portfolio Theory is a mathematical formulation of the concept of diversification in investing, with the aim of selecting a collection of investment project that has collectively lower risk than any individual project. A collection of both types of project units can therefore have lower overall risk than either individually. Diversification on the other hand lowers risk even if projects returns are not negatively correlated indeed, even if they are positively correlated (Ritchie & Bridley, 2005).

More technically, portfolio theory models project performance as a normally distributed such that it defines project risk as the standard deviation of project objective and model a portfolio as a weighted combination of project so that the achieved success of a portfolio is the weighted combination of the project performance. By combining different project units whose returns are not perfectly positively correlated, portfolio theory seeks to reduce the total variance of the portfolio return. Portfolio theory also assumes that investors are rational and markets are efficient (Sharpe, 2004). Project Risk Analysis and Management (PRAM) model has been in use for many years. A variety of PRAM procedures have been developed to measure the impact of concealed technical, economic, political, managerial and even social risks and to adopt an appropriate risk strategy to minimize the loss due to those risks (Bannerman, 2008). PRAM has now been formally integrated into project management body of knowledge (PMBOK) and APM

has a specific interest group that is actively involved with the development of theoretical and practical PRAM. Simister (2010) suggests that there are some evidence that interest in the use of PRAM is growing.

Figure 1. Conceptual Framework



### Empirical Review

The keys to successful project risk management at SMEs and micro companies are to always embed risk management into project management and to communicate about risks (Bart, 3004), which is a much easier step to be done at smaller than at bigger scale of operation. A one-time risk assessment for an IT project is not sufficient for achieving comprehensive risk management. In fact, the evaluation of the project risks and controls should be repeated over the whole project life cycle, and further measures should be defined and implemented, if necessary. In this context, risk indicators as well as control indicators, which represent an objective measure for changes to the risk and control situation, are helpful instruments for defining and monitoring risk and control levels. In the technology project area, the complexity of an IT project could be monitored by the risk indicator number of interfaces (Minato, 2003). There are several studies on influence of project risks management strategies on information technology (IT) projects performance.

Roque and de Carvalho (2013) carried a study on understanding the impact of project risk management, assessment of risks on project performance in Brazillian Vendor companies. The objective of the study was to comprehend the impact of risk assessment on IT project performance and to investigate the degree of diffusion of project risk assessment in Brazilian

Vendor companies. The methodological approach involved a survey of 415 projects at different companies in IT sectors in Brazil. The results demonstrate that adopting risk assessment and planning has a significant positive impact on project success as project staff were able to identify and take measures to mitigate occurrence of risks to a greater extent. The study found that assessing uncertainties during the project, making use of the risk management strategies and deeply understand the business environment are critical success factors had a significant impact on project performance ( $P < 0.05$ ,  $r = 0.002$ ,  $b = 0.413$ ). The results demonstrated that the impact of project risk assessment on project success was positive.

Jun, Qiuzhen and Qingguo (2010) investigated the effects of project risk planning on IT project performance focusing on a case of China vendor firms. The study sought to test the hypothesis, Project risk planning and control makes a greater significant positive contribution to project performance at low levels of inherent uncertainty than at high levels. The study used questionnaire to collect data from a 181 sample of software project managers and other key informants from software houses in Hangzhou City, China, by mail and email. The respondents were requested to provide information with respect to one or more recently completed outsourced IS development projects. From the finding the study found that there existed a significant positive relationship between project risk planning and project performance ( $P < 0.05$ ,  $r = 0.015$ ,  $b = 0.813$ ). The results indicated that project risk planning and control improve project performance making project complete within time schedule, at the budgeted and vendor firm improved on profitability level.

Juliane and Alexander (2013) carried out a study to determine how portfolio risk management influences IT project portfolio success in IT enterprises in UK. The objective of the study was to determine whether portfolio risk management influence IT project performance. Data was collected using a questionnaire a cross industry sampling was adopted to select a sample of 176 firms. The results indicated that portfolio risk management shows a significant positive relationship with project performance ( $b = 0.16$ ,  $p < 0.05$ ). The study concluded that IT project portfolio risk management, portfolio risk identification, risk prevention, risk monitoring, integration of risk information into the project portfolio management, formalization of portfolio risk management has a positive impact on IT project performance.

Addison and Vallabh, (2002) carried out a study on impact of project risk Identification performance of software projects in IT enterprises in China. The study adopted a survey research design. Data collection was achieved through the use of a structured questionnaire, which asked respondents questions aimed at achieving the study objective. A total of 70 project managers from IT enterprises were sampled the method of sample selection referred to as 'snowball' sampling was used. Of the 70 questionnaires distributed, 36 were returned. The study



found that software project risks identification of unclear or misunderstood scope/objectives, unrealistic schedules and budgets, inadequate knowledge/skills and lack of effective project management methodology and misunderstanding the requirements identified by many researchers, subcontracting risk and regularly occur in software projects influence management adopting appropriate risk mitigation measures influencing software projects completion within time and increase profitability. The study further found that as management involvement increases, the risk of unclear or misunderstood scope/objectives appears to decrease and improve project performance. The p-value showed a relationship between project risk identification and project performance was significant at a 95% confidence level.

The failure rate of software projects has been proven to be very high, and the incidence of failure is becoming worse as more companies venture into software development. Project risk management is a collection of methods aimed at minimizing or reducing the effects of project failure. Roque and de Carvalho (2013) noted that there was need for significant risks management and controls to reduce the occurrence of the risk factors, or minimize the impact of various project risks. The assessment of project uncertainties during the project, made use of the risk management strategies and deeply understand the business environment were critical success factors had a significant impact on project performance. However, Roque and de Carvalho (2013) failed to identify measures of project performance in term of timeliness, profitability, costs and project schedules. Project risk assessment consists of three activities, identifying the risks, analyzing and assigning project priorities. For most IT projects, risk assessments are usually conducted on an infrequent and informal basis (Han & Huang 2007), and few organizations perform any formal risk assessment to find out if risks can be controlled, reduced or managed. The management of the implementation process is often complicated by the time and effort that practitioners can devote to it. Since most organizations follow some type of software project development methodology, it would be much easier to include a formal and periodic risk assessment as part of the methodology for developing systems. The study by Han and Huang (2007) failed also to indicate when project risks should be assessed the extent to which project risks were mitigated and the extent to which project performance was achieved.

Project risk management strategies in software development enterprises currently available are not comprehensive as they deal with specific types of risks (Addison & Vallabh, 2002) .The framework for identifying the project risks of IT, risk analysis process for IT project by combining qualitative and quantitative methodologies, and recovery plan to reduce IT risks occurrence has not been effective. Juliane and Alexander Kock (2013) introduced a risk prioritizing method using analytic hierarchy process for enterprise resource planning



implementation, which is a combination of software development and process reengineering project. Software project management has become a critical task in many organizations.

With new risks occurring whenever a project is implemented, there needs to be a formal method of controlling them. Juliane and Alexander (2013) asserted that a control system for software projects needs a measuring method to detect the activities performed in portfolio units for ease of adopting appropriate risk management practices and improving project performance. This however did not indicated whether portfolio project risk management influenced completion of project on time and on budget hence the need for the study current study. Given the high failure rates associated with IT projects, it is prudent for organisations to improve their ability to manage their IT risks so that projects can be delivered successfully (Han & Huang, 2007). The IT project risks considered most important in terms of their likelihood and consequences and specific risk treatment strategies that can be used to manage IT project risks are identified by practising IT project managers. The findings by Addison and Vallabh, (2002 will enable IT project managers to better understand the key risks in their projects and appropriate risk treatment strategies to manage these risks.

Projects might run on long term or short duration. Long term projects encounter budget risks and uncertainties like market changes, governmental changes, or currency fluctuation. Jun, Qiuzhen and Qingguo (2010) have presented risk management as a series of interconnected processes involving specific techniques and tools and emphasized on project risk planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk responses planning and risk monitoring and control to improve project success. Project managers should have a project risk management programme plan to contribute to project success. This project risk plan should describe risk identification, risk analysis and risk handling. Risk project planning process enable project managers to distinguish between situations and to deal with risks accordingly. There can be sufficient project risk management with risk planning as this influence defining of requirements and specifications, estimating cost and time, scheduling and risk analysis (Jun, Qiuzhen & Qingguo, 2010). Evaluation of project outcomes on overall success in regards to qualitative benefits financial benefits time and costs was not determined.

### Research Gap

Most of the studies reviewed identify and prioritize risks through empirical research in order to suggest mitigating measures. Although they are important to clients for future projects, the studies fail to provide any framework for risk management from software developers' perspective. Although a few studies introduced framework of risk management in software

development, most of them are presented from clients' perspectives and very little effort has been made to integrate this with the software development cycle. Literature reviewed on effects of risk management strategies on project performance indicates that effective risk management strategies impact positively on SME ICT project performance. The review indicate that project risks are part and parcel of IT software development projects. However, the degree of risk varies with complexity, size both in terms of schedule and budget, and location. Scope creep, lack of understanding of problems, ambiguous requirements, and lack of resources, hardware, networking, and security issues are some of the common risk elements in software development projects. Therefore, there is a need to adopt and implement risk management strategies in SME software development project. Although researchers and professional have written on risk management in software development projects, very little work in developed and developing economy have been done in examining the effects of risk management strategies on enterprise project performance. Therefore this study seeks to fill the existing research gap by determining the effects of risk management strategies on SME ICT project performance in Kenya.

## **RESEARCH METHODOLOGY**

The research adopted descriptive research designs. The descriptive design refers to a set of methods and procedures that describe variables (Mugenda and Mugenda, 2003). This research design involved gathering data that describe events and then organizes, tabulates, depicts, and describes the data. This design also helps in collecting qualitative data to provide a great depth of responses resulting in a better and elaborate understanding of the phenomenon under study. Descriptive research design portray the variables by answering who, what, and how questions. According to Mugenda and Mugenda (2004), descriptive design is a process of collecting quantitative and qualitative data in order to test hypothesis or to answer the questions of the current status of the subject under study. Descriptive research was used to describe the general characteristic of the study population and show the relationship between the dependent and independent variables. The research design was deemed fit to establish the effects of risk management strategies on the project performance of ICT SMEs in Kenya.

### **Population of the Study**

The population of the study was 48 ICT SMEs in Nairobi Kenya, (KBS, 2014). The study population in a research study comprises all those potential participants that could make up a study group (Kothari, 2004). The respondents of the study were all project team members who are directly involved in the project from the 48 ICT SMEs in Nairobi, Kenya. This was because

they are all responsible in management of the selected SMEs ICT projects and understand project risk management.

### **Sampling Frame**

The study adopted random sampling technique to select sample size from the SME ICT to represent the target population. According to Kothari (2003), sampling frame is a physical representation of the target population and comprises all the units that are potential members of the sample. Subsequently, in each of these firms there are a number of different professionals who are involved in the operation of the project to ensure project performance is achieved. The study focused on any member of the project team who were directly linked to the project and have diverse knowledge on the project outcomes and thus easy to identify the various kind of risks that affect the project performance. These teams are charged with the responsibilities of steering project activities in their organizations to achieve project performance.

### **Sample Size and Technique**

According to Mugenda (2005), sample size determines the precision within which population value can be estimated, for that reason, experts emphasize that the sample has to be reasonably large to obtain accurate estimates. A Mugenda and Mugenda (2000) a representative sample on the other hand is one which is at least 10% or 20% of the population therefore the choice of 40% was considered as representative for the study. The study targeted 96 respondents who were members of the project team from the ICT SME firms and who play vital roles in project implementation in their firms and thus forming the sampling size of the study.

Subsequently, the study investigated from them on what kind of risks they have experienced in the past projects and how their organizations have managed to mitigate them. The study therefore sought to identify from the respondents what strategies have earlier been used and how effective they were in achieving project performance. Since Kombo and Trump (2006) recommend that for such small population, all items be studied so that all their responses are considered in the analysis, these individuals were randomly selected to ensure that adequate data is collected for the research.

### **Data Collection**

The research used both primary and secondary methods. Primary data was collected using a semi structured questionnaire which was self- administered. Secondary data sources include journals, reports, magazines and ICT enterprises. These were the main sources of actual data

that was analyzed to enable the researcher make conclusions on the research study. . A pilot study was done to test validity and reliability of the instrument. The pilot study enabled the researcher to be familiar with research and its administration procedure as well as identifying items that require modification. The result helped the researcher to correct inconsistencies arising from the instruments to ensure the instrument measured what was intended to measure. Reliability was obtained by correlating the scores of each questionnaire for each variable. Pearson product moment correlation coefficient (r) was used to test reliability of the questionnaire. The correlation coefficient of the halves was correlated by Spearman Brown Prophecy formula. The questionnaires was considered reliable if the value for R was closer to 1.0 getting consistent responses when the same question was posed to the same respondent more than once.

### Data Processing and Analysis

The collected data was well examined and checked for completeness and comprehensibility. The data was then summarized, coded and tabulated. Data presentation was done by the use of pie charts, bar charts and graphs, percentages and frequency tables. The data was then analysed using descriptive which included frequency, percentages, means and standard deviations. For qualitative data, which was mainly gathered from open ended questions a qualitative data checklist was developed. The checklist was clustered along main themes of the research to ease consolidation of information and interpretation and then analyzed through content analysis. Content analysis is the process of analyzing verbal or written communications in a systematic way to measure variables qualitatively. A multiple regression model was applied to determine effects of establish the effects of risk management strategies on the project performance of ICT SMEs in Kenya.

## ANALYSIS AND INTERPRETATION

### Risks management affects project

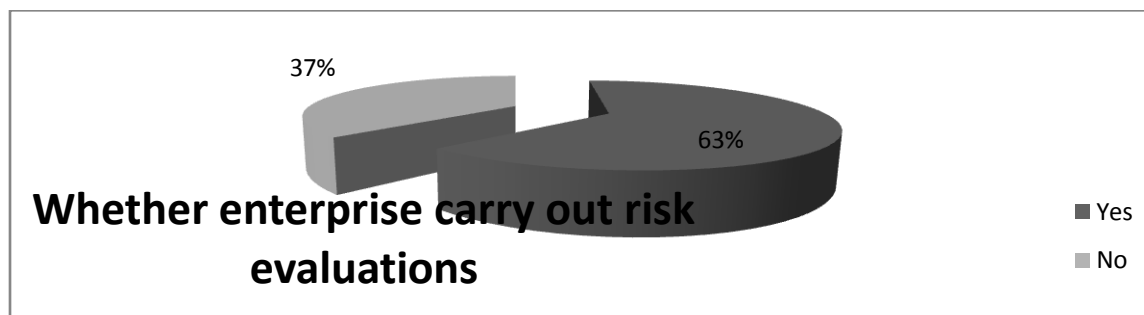
Table 1: Extent to which risks affects project at the enterprise

Project risks	Mean	Standard deviation	Z-Score
Liquidity risks	4.53	0.47	0.471
Political risks	4.06	0.15	-1.153
Market risks	4.26	0.24	0.003
Credit risk	4.17	0.19	-0.691
Operational risk	4.47	0.29	0.293
Capital Risks	4.52	0.48	2.487

From the findings in table above, majority of the respondents indicated that liquidity risk and capital risks affects project at enterprise to a very great extent as indicated by a mean of 4.53 and 4.53 with standard deviation of 0.47 and 0.48. Most of the responders indicated that operational, market, credit and political risks affects project at enterprise to a great extent as indicated by a mean of 4.47, 4.26, 4.17 and 4.06 with standard deviation of 0.29, 0.24, 0.19 and 0.16. The Z score were determined and found to be (Z score=0.003) meaning it was on the mean. This implied that variance from the mean on all the risks that affects project at the enterprise issues was low and this was a clear indication that the respondents gave reliable and accurate response. This implied that there was an existent numerous risks facing ICT enterprises on their projects that affected the project performance. The findings supports Sundararajan (2004) who indicated that if project risk events were not handled and managed properly, consequences like increasing the financial costs, changing the capital structure, delaying the building or facility operations, overrun in the budget, loss of cash inflow, lead to liquidated damages claims, production of poor quality end product, project rework after completion and so on might occur.

### Project Risk Assessment

Figure 2: Enterprise carries out risk evaluations



From the findings in the figure 2, 63% of the respondents felt that the enterprises carry out risk evaluations while 37% of the respondents indicated that enterprises carry out risk evaluations. They also indicated that enterprises carry out risk evaluations to enable them to correctly understand, evaluate and manage the risk exposure embedded in its existing and future lines of business. This is in line with Speklé (*et al.*, 2007), who stated that many firms have realized the importance of risk management in IT project management to achieve project success. This implies that the risk evaluations are carried out to maximize the project performance.

## Level of risk assessment undertaken in enterprises

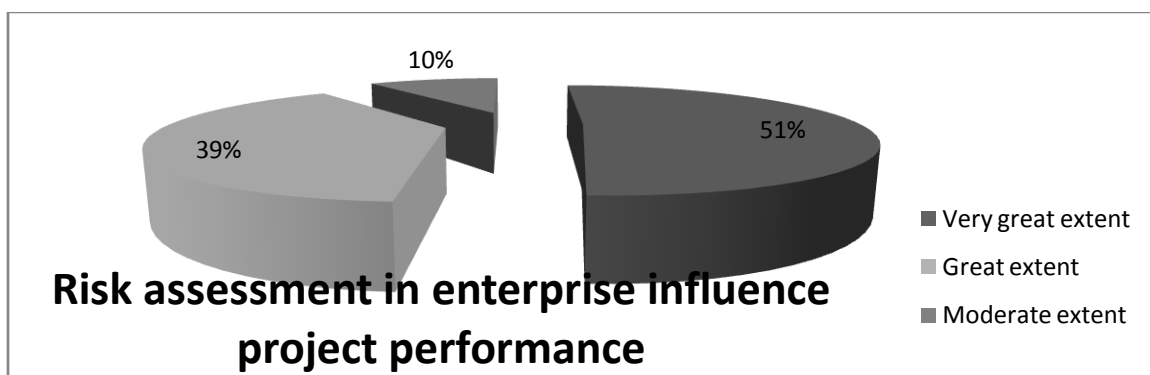
Table 2: Level of Risk Assessment Undertaken in Enterprises

	Frequency	Percent
Very high	32	40
High	31	39
Moderate	8	10
Low	9	11
Total	80	100

From the results as indicated in Table 2, 40% of the respondents indicated that there was a very high level of risk assessment undertaken in the SME ICT enterprises, 39% indicated that there was a high level of risk assessment undertaken in the enterprises was high while 10% indicated that risk assessment was moderate while 11% of the respondents indicated that level of risk assessment undertaken in the ICT enterprises was low. The results implied that the project risk assessment critically focused on identifying the risks to be mitigated, analyze and assign project priorities thus influencing the achievement of high performance. However, the findings contradict Han and Huang (2007) who found that in most ICT projects, risk assessments was usually conducted on an infrequent and informal basis and failed to indicate whether project risks assessed influenced project performance.

## Risk Assessment in Enterprise Influence Project Performance

Figure 3: Extent to Which Risk Assessment in Enterprise Influence Project Performance



From the findings in Figure 3 above, 51% of the respondents said that risk assessment in ICT enterprises influence project performance to a very great extent, 39% said risk assessment in ICT enterprises influence project performance to a great extent while 10% of the respondents indicated that risk assessment in ICT enterprise influence project performance to a moderate

extent. This implied that project risk assessment impacted on project performance to a great extent. The findings support Morledge, Smith and Kashiwagi, (2006) findings who found that project risk assessments enables project risk responses and mitigation strategies used effectively and avoid project cost overrun, delays and ensure project completion within the specified period.

### Influence of Risk Assessment on Project Performance

Table 3: Influence of Risk Assessment on Project Performance

Risk assessment	Mean	Std Dev	Z-Score
Assessing time available for the IT project reduce project risks	3.93	0.79	-0.916
Influence information sharing on risk management leading to completing software development in time	4.53	1.13	1.812
Informed reports are generated on effective risk management leading to successful website designing	3.84	0.87	-0.571
Effective communication on risks	4.33	1.14	0.001
influence acquisition of risk mitigation of project risks	4.58	1.03	1.628
Occurrence of risk and their effects on projects evaluated and determined	3.35	0.66	-0.317
Realistic project risk control is achieve influencing project success	4.65	1.06	1.013
Assessment of project risks influence avoidance technique	4.40	1.15	0.576

From the findings in Table 3, the respondents strongly agreed that realistic project risk control achieves project success, risk assessment influence acquisition of risk mitigation of project risks and that risk evaluation influence information sharing on risk management leading to completing software development in time as indicated by mean of 4.65, 4.58 and 4.53 and standard deviation of 1.06, 1.03 and 1.13.

Most of the respondents agreed that assessment of project risks influence avoidance technique, the communication on risks facing enterprises is effective, assessing time available for the IT project reduce project risks and that through assessing risks facing the ICT enterprises, informed reports are generated on effective risk management leading to successful



website designing as indicated by a mean of 4.40, 4.33, 3.93 and 3.84 with standard deviation of 1.15, 1.14, 0.79 and 0.87. The study further found that most of the respondents were neutral on whether occurrence of risk and their effects on projects were evaluated and determined as indicated by a mean of 3.35 with standard deviation of 0.66. The findings in Table indicated Z score were determined and found to be (Z score=0.001) meaning Z-Score was on the mean and deviation from the standard deviation zero. The positive Z-scores indicate that most of respondent's responses falls above the mean as the variance from the mean on all the project risk assessment issues was low and this was a clear indication project risk assessment impact positively on project performance. This implied that SME ICT project risk assessment should be done effectively by competent officers to indentified project risk challenging ICT SMEs project and achieve project performance and that given the high failure rates associated with IT projects, lack of prudent for organisations to improve their ability to manage their IT risks lead to projects failure. The findings failed to concur with Roque and de Carvalho (2013) who contradicts the findings by indicating that most ICT project failed to assess risk measures leading to poor ICS SMEs project performance in terms of timeliness, profitability, costs and project schedules.

### Risk Identification

The respondents were sought to find out the level of project risk identification as carried out in ICT enterprises. The findings were as presented in Table

Table 4: Level of project risk identification as carried out in the enterprise

	Frequency	Percent
High	52	65
Low	19	24
Medium	9	11
Total	80	100

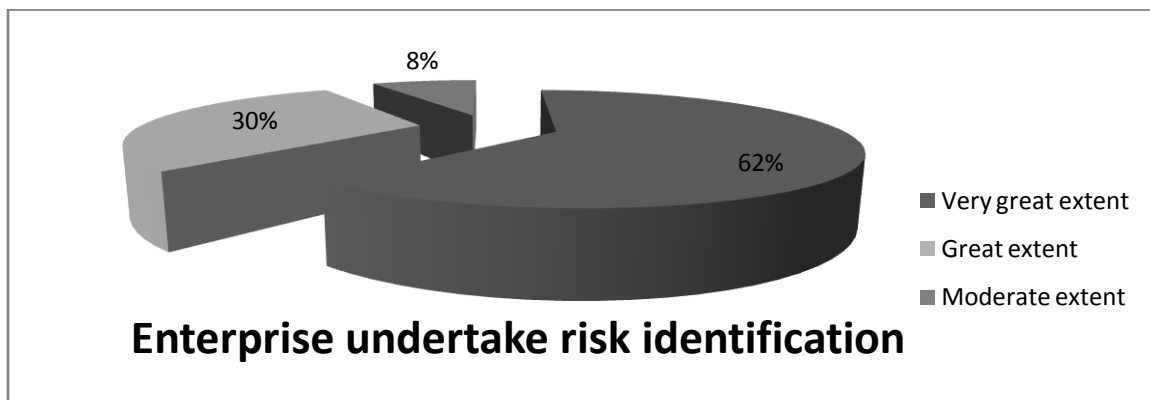
From the results, 65% of the respondents indicated that the level of project risk identification as carried out in the enterprise was high, 24% of the respondents indicated that there was low level of project risk identification as carried out in the enterprise while 11% of the respondents indicated that level of project risk identification as carried out in the enterprise was medium. The respondents explained that risks were identified to select appropriate mitigation measures for risk management. This implied that identifying the risks facing project and selecting the strategy with the best risk/reward characteristics would lead to project success. This could be due to the

importance of risk identification as the most influential process of risk communications effects, followed by risk reporting, risk registration and risk allocation, risk analysis, and finally risk control. This is in line with Morledge, Smith & Kashiwagi, (2006), who found that the identification of risks is the ultimate step that decides the end result of the project management process.

### Extent to which enterprises undertake risk identification

The study required the respondents to indicate the extent to which enterprise undertook risk identification for the purposes of mitigating risk facing projects.

Figure 4: Extent to Which Enterprise Undertake Risk Identification



From the figure 4 above, 62% of the respondents indicated that enterprises undertook risk identification for the purposes of mitigating risk facing projects to a very great extent, 30% indicated to a great extent while 8% enterprise undertook risk identification for the purposes of mitigating risk facing projects to a moderate extent. This implied that the enterprises distinctive risk identification effort to influence achievement of project performance. This communication of identifying project risks was found as an appropriate way of risk mitigation thus influencing the project success. The finding supported Bakker *et al.* (2012) who found that project risk identification was the most influential process in project management through communications of risk, reporting, risk registration and risk allocation, risk analysis and risk control at influencing project's performance.

### Importance of Risk Identification Practices in Project Risk Management

The respondents were requested to rate the importance of risk identification practices in project risk management in the enterprises. The findings were presented in Table 5 .

Table 5: Rating Importance of Risk Identification Practices in Project Risk Management

Risk identification practices	Mean	Standard deviation	Z-scores
Risk management is established throughout the whole enterprises	4.61	0.88	2.683
Insuring against financial loss	4.48	0.47	0.001
Develop risk management strategy	4.30	0.43	-1.142

From the findings as indicated in Table 5 above, majority of the respondents indicated that it is very important for risk management function to be established throughout the whole enterprises as indicated by a mean of 4.61 and standard deviation of 0.88. Most of the respondents said that it's important for insuring against financial loss and develop risk management strategy to allocate resources efficiently and influence less costing of the project as indicated by a mean of 4.48 and 4.30 with standard deviation of 0.47 and 0.43. This implied that risk identification plays a key role in the success of project risk management. The findings indicated Z-score were determined and found to be (Zscore=0.001) meaning it was on the mean and deviation from the standard deviation zero. The Zscore =2.683 indicated that most of respondents responses' falls above the mean. This clearly indicated that project risk identification had a significant positive impact of project performance. The finding failed to support earlier findings by BartJutte, (2004) who found that it was not easy to undertake project risk identification being not sufficient for achieving comprehensive risk management and achieving project performance.

### Risk Identification Lead to Project Performance

The study sought to rate the extent to which risk identification leads to project performance. The findings were as illustrated in Table 8 below.

Table 6: Risk identification lead to project performance

Risk identification practices	Mean	Standard deviation	Z-Score
Screening of project risks and taking measure influence project being completed within time	4.67	0.59	1.283
Use of checklist enhance risk identification in small and medium technology firms	4.75	0.73	1.857
Risk controls enhance project risk identification process	4.69	0.64	2.797
Effective risk identification process enable organization taking correct measures that influence projects less costly	4.11	0.27	-1.001

Effective risk management planning that reduces project delays in achieve	4.20	0.30	-0.421
Risk registration influence identification and management of project risk	4.78	0.75	1.692
Risk registration is effectively influencing project success	4.44	0.38	0.011
The enterprise undertake risk allocation mitigating occurrence of project loss	4.48	0.47	0.387
Increasing of risk awareness hence mitigation of project against incurring high costs	4.31	0.32	-1.298
Increase in project risk reporting influence quality IT products	4.35	0.36	-0.463

From Table 6 it could be seen that majority of the respondents indicated that risk registration influence identification and management of project risk, use of checklist, risk controls and screening of project risks and taking measure enhance risk identification in small and medium technology firms to a very great extent as indicated by a mean of 4.78, 4.75, 4.69 and 4.67 with standard deviation of 0.75, 0.73, 0.64 and 0.59. Most of the respondents stated that the ICT enterprises undertake risk allocation mitigating occurrence of project loss, risk registration is effectively done influencing project success and that Increase in project risk reporting influence quality in ICT products to a great extent as indicated by a mean of 4.48, 4.44 and 4.35 with standard deviation of 0.47, 0.38 and 0.36.

Increasing of risk awareness hence mitigation of project risks against incurring high costs, Effective risk management planning that reduces project delays to achieve project deliverables and Effective risk identification process enable organization taking correct measures that influence projects less costly to a great extent as indicated by a mean of 4.31, 4.20 and 4.11 with standard deviation of 0.32, 0.30 and 0.27. The findings indicated Z-Score were determined and found to be (Zscore=.011) meaning it was on the mean and deviation from the standard deviation zero. The Zscore =2.797 indicated that most responses on responses rise identification falls above the mean.

This clearly indicated that effective project risk identification influence achievement of project performance. The results could have been influenced by effective risk responses on identification leading to earning of high profits, reduction in project costs hence completion of the project within schedule and sufficient allocation of resources to mitigate against risks. This clearly indicated that risk planning has a positive impact on the performance of enterprise project.

## Risk Management Strategies and Project Performance

Table 7: Planning for occurrence of risks influence enterprises

	Frequency	Percent
Yes	66	82
No	14	18
Total	80	100

From the findings in Table 6 above, majority 82% of the respondents indicated that planning for occurrence of risks influence enterprises to complete projects within the budgeted cost allocation while 18% of the respondents indicated otherwise. This indicates project planning impacts on project performance. The findings concurred with Liang Wenchao and Zhan Baochao (2010) who posited that high-tech SMEs in China showed a range of performance of small technology firms through production of quality IT products, completion of projects within expected time, expected budget and improved customer satisfaction.

### Assessing of Risks Influence Completion of Web Designing in Time

Table 8: Assessing of risks influence completion of web designing in time

	Frequency	Percent
Very great extent	64	80
Great extent	16	20
Total	80	100

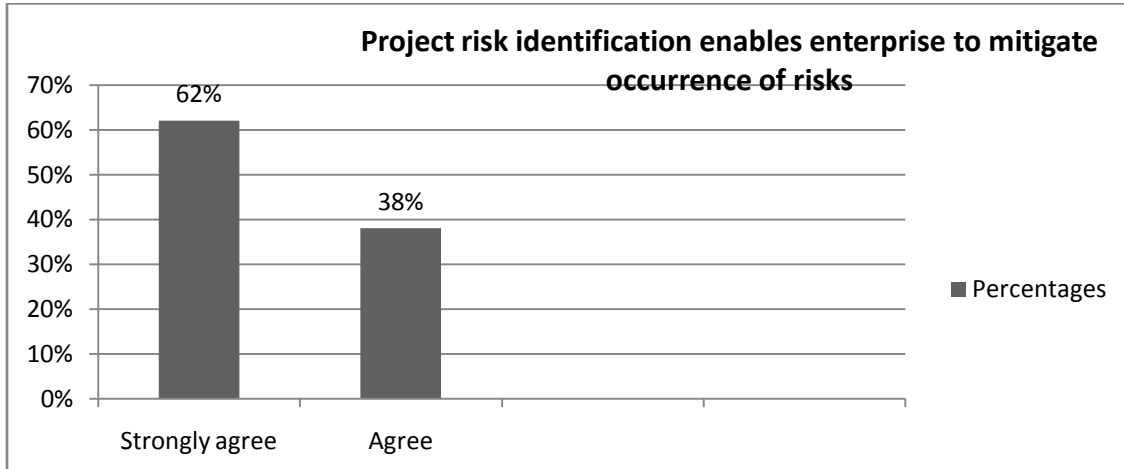
From the findings in Table 8, majority 80% of the respondents indicated that assessing of risks in enterprises influence completion of web designing in time to a very great extent while 20% said to a great extent. This clearly indicated that assessment of project risks influence completing project as scheduled. The finding were similar to Kululanga and Kuotcha, (2010) who found that project risk assessment for technological small businesses influence timeliness, budget project advantages and higher returns.

### Project Risk Identification Enables Enterprise to Mitigate Occurrence of Risks

From the findings in Figure 5, majority 62% of the respondents strongly agreed that project risk identification enables enterprise to mitigate occurrence of risks and improve profit margin of the enterprise to a great extent while 38% indicated that they agreed that project risk identification influence project performance. Thus risk identification plays a critical role in planning for risk management to achieve project success. The finding support Besner and Hobbs (2006) who

found that early identification of project risks and the timely taking of project control measures lead to a reduction of overall project costs and achieving of project success.

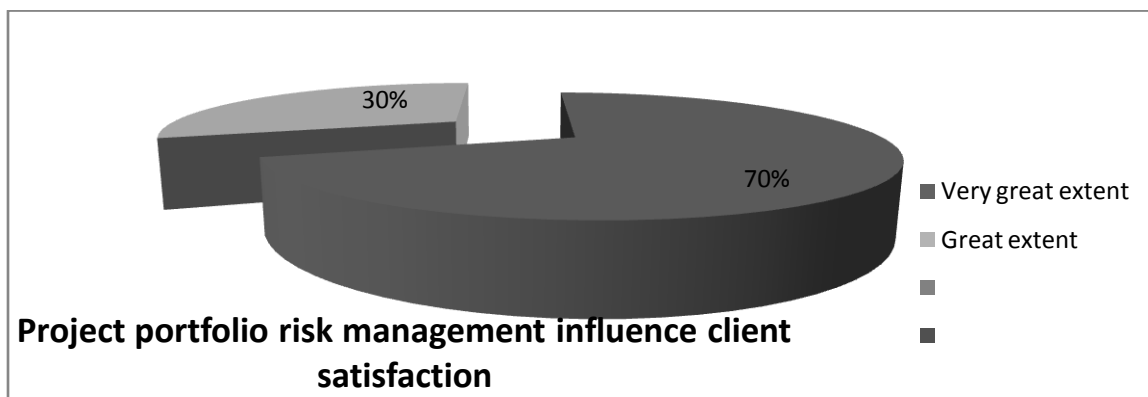
Figure 5: Project risk identification enables enterprise to mitigate occurrence of risks



### Project portfolio risk management influence client satisfaction

The respondents were sought to show the extent to which project portfolio risk management influence client satisfaction. The findings were as illustrated in Figure 6.

Figure 6: Project portfolio risk management influence client satisfaction



From the findings in Figure 6, majority 70% of the respondents indicated that project portfolio risk management influence client satisfaction to a very great extent while 30% said to a great extent. This could be due to effective project portfolio management applications such as provision of solutions, project leadership effectiveness, collection and analyzing the necessary information to proactively manage project risk. This implied that project portfolio risk

management ensured development of quality technological products. The findings were similar to Jin and Yean, (2005) who found that effective portfolio risk management influence successful development of quality project products.

### **Project Performance Achievement Due to Project Risk Management Strategies Adopted by the Enterprise**

The respondents were as asked to show the extent to which project risk management influence achieving of project objectives in enterprises and the findings were as presented in Table 9.

Table 9: Project performance achievement due to project risk management strategies adopted by enterprise

	Mean	Standard deviation	Z-Score
The enterprises develop reliable project output	4.61	0.55	1.021
The enterprises developed secured ICT products	4.51	0.42	-0.531
The enterprises achieve higher returns	4.65	0.53	0.000
The enterprises completed ICT products for the clients within schedule	4.68	0.68	1.488
Project risk management strategies improve efficiency in provision of technologies services clients	4.85	0.86	2.947

From the findings in Table 9, the respondents strongly agreed that project risk management strategies improve efficiency in provision of technologies services clients as indicated by a mean of 4.85 with standard deviation of 0.86. Most of the respondents strongly agreed that the enterprises completed ICT products for the clients within schedule, achieve higher returns, develop reliable project output and develop reliable project output as indicated by a mean of 4.68, 4.65, 4.61 and 4.51 with standard deviation of 0.68, 0.55, 0.53 and 0.42 and Z-Score 1.488, 1.021 and 0.531. The findings indicated Z-score was found to be (Zscore=0.000). This meant that meaning Z-Score was on the mean and deviation from the standard deviation zero. The Z-score =2.947 indicate that the finding were significant as the variance was low. This clearly indicated that project risk management strategies influence achievement of performance of projects. This implied that SMEs ICT effectively use risk management strategies to influence project performance. This contradicts Standish Group International (2009) which found that software projects for small and medium enterprises were unable to be delivered on schedule, within budget due to ineffective risk management. The study sought determine effects of



establish the effects of project risk management strategies on the project performance of ICT SMEs in Kenya. The study sought to establish the extent to which study variables project risk assessment project risk identification, project risk planning and project risk portfolio management impact on project performance.

### Regression Analysis

The study sought determine the effects of project risk management strategies on the project performance of ICT SMEs in Kenya. The study sought to establish the extent to which study variables project risk assessment, project risk identification, project risk planning and project risk portfolio management impact on project performance. Below were the findings as illustrated in Table 10.

Table 10: Model Summary

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Sig. Change	F
1	.812(a)	.659	.647		0.34	0.001(a)	

a Predictors: (Constant) Project risk assessment, Project risk identification,

b. Dependent: Project Performance

The result on Table 10 indicates that the goodness of fit of the model was satisfactory. These findings are supported by a correlation coefficient ( $R^2$ ) of 0.659 and an adjusted  $R^2$  of 0.647. This means that all the independent variables; Project risk assessment project risk identification, project risk planning and project risk portfolio management contributes 64.7 percent of the variations in project performance.

### Analysis of Variance (ANOVA)

Table 11: ANOVA (b)

Model		Sum of Squares	Df	Mean Square	F-Test	Sig.
1	Regression	3.841	5	.307	5.191	0.01(a)
	Residual	33.159	75	.059		
	Total	37.000	80			

a Predictors: (Constant) Project risk assessment and project risk identification,

Dependent: Project Performance.

Table 11 gives an F-test to determine whether the model had a good fit for the data. The F Statistics of 5.191 (P value=0.01< 0.05) indicated that the model formed between project risk strategies and project performance was significant. The calculated F= 5.191 exceeds the F critical of 0.105. These ANOVA results established that there existed a significant strong positive variation between predictor values project risk assessment, project risk identification, project risk planning and project risk portfolio management and the dependent variable, project performance at 0.01 significant levels. The results also showed that the independent variables are good predictors of project performance.

### Regression Analysis of Variance

Results on Table 12 display the regression analysis of the independent variables and the dependent variable. The findings indicate that independent variables project risk assessment, project risk identification, project risk planning and project risk portfolio management are positively related to project performance

Table 121: Regression Coefficients (a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	0.768	.275		3.640	0.01
	Project risk assessment	0.883	.405	.857	2.931	0.03
	Project risk identification	0.717	.546	.722	2.803	0.04
	Project risk planning	0.868	.520	.791	1.906	0.02
	Risk portfolio management	0.791	.690	.729	1.672	0.01

a Predictors: (Constant) Project risk assessment, project risk identification,  
Dependent: Project Performance

The resultant study model was,

$$Y = 0.768 + 0.883 X_1 + 0.717 X_2 + e$$

The study established that there existed a significant positive effects of project performance holding project risk management strategies constant as  $r = 0.768$ ,  $t = 3.640$ ,  $P = 0.01 < 0.05$ . From the regression coefficient analysis, the study established that there existed a significant positive relationship between project risk assessment and project performance as  $r = 0.883$ ,  $t = 2.93$ ,  $P = 0.03 < 0.05$ . The study also established that there existed a significant positive relationship between Project risk identification and project performance of ICT SMEs in Kenya as  $r = 0.717$ ,  $t = 2.803$ ,  $P = 0.04 < 0.05$ . Therefore project risk identification through risk reporting, registration,

allocation, control and checklist would impact positively on IT project performance. The study findings resulted in a linear model. This implied that project risk management strategies have a significant positive relationship with project performance in SMEs in ICT. The finding concurred with Zwikael and Ahn (2011) who also established that project risk management strategies, even when moderated, had a positive relationship with levels of project risk strategies and project success.

## **SUMMARY OF THE FINDINGS**

The study established that risk assessment in enterprises influence project performance to a very great extent. To successfully maintain enterprises, there has been a comprehensive, broad based approach that is widely understood and used regularly to clearly articulate where risks and opportunities exist throughout the enterprises. Realistic project risk control was achieved influencing project success, risk assessment influences acquisition of risk mitigation of project risks and that risk evaluation influence information sharing on risk management leading to completing software development in time. Assessment of project risks influence avoidance technique, the communication on risks facing enterprises is effective, assessing time available for the IT project reduce project risks and that through assessing risks facing the enterprises, informed reports are generated on effective risk management leading to successful website designing. The study established that the level of project risk identification as carried out in the enterprise was high, as it was found that specific actions are identified to enhance the risk management activities on each significant risk. Enterprises facilitated a distinctive risk identification effort as they undertook risk identification for the purposes of mitigating risk facing projects to a very great extent. It was very important for risk management function is established throughout the whole enterprises and insuring against financial loss and develop risk management strategy to allocate resources efficiently and influence less costing of the project. Risk registration influenced identification and management of project risk, use of checklist, risk controls and screening of project risks and taking measure enhance risk identification in small and medium technology firms to a very great extent.

Enterprises also undertake risk allocation mitigating occurrence of project loss, risk registration is effectively done influencing project success and that Increase in project risk reporting influence quality IT products. Increasing of risk awareness hence mitigation of project against incurring high costs, effective risk management planning that reduces project delays in achieve and effective risk identification process enable organization taking correct measures that influence projects less costly . The study established that project risk management strategies improve efficiency in provision of technologies services clients. The enterprises

completed ICT products for the clients within schedule, achieve higher returns, develop reliable project output and develop reliable project output. With Z-score (Zscore=0.000) and Z-score =2.947 indicate that the finding were significant as the variance was low indicated that project risk management strategies influence achievement of performance of projects. The study established that there existed a significant positive relationship between project risk assessment and project performance. The study also established that there existed a significant positive relationship between Project risk identification and project performance of ICT SMEs in Kenya where project risk identification through risk porting, registration, allocation, control and checklist would impact positively on IT project performance. This clearly indicated that there existed a positive relationship between risk management strategies affecting project performance and IT project performance for SMEs in Kenya

## **CONCLUSIONS**

The study concluded that SME ICT project risk assessment influence mitigation of project risks, information and risk evaluation leading to successful risk management leading to completing software development in time .The assessment of project risks led to adoption of avoidance technique to risks, the communication on risks facing enterprises is effective, assessing time available for the IT project reduce project risks and that leading to successful website designing. From the findings, the study concluded that there existed a positive significant impact of project risk identification and on SME in ICT through risk registration, use of checklist, risk controls and screening of project risks influencing project success and improve quality in ICT products such as website and software development to a great extent and achievement of project goals. This because SME project risk identification and management by use of checklist, risk controls and screening of project risks reducing of project loss and development of quality in ICT products to a great extent.

## **RECOMMENDATIONS**

The study recommends that management in SME project should increase level of project risk identification as it enhances the risk management activities on each significant risk. SME in ICT facilitated a distinctive project risk identification effort as they undertook risk identification for the purposes of mitigating risk facing projects to a very great extent. Thus project risk identification function is established throughout the whole enterprises and insuring against financial loss and develop risk management strategy to allocate resources efficiently and influence less costing of the project. Risk management in the ICT enterprises project management context is a

comprehensive and systematic way of identifying, analyzing and responding to risks to achieve the project objectives.

The research results show that many (ICT) enterprises in Nairobi, Kenya significantly adopt risk management practices which in turn have influenced the enterprise to improve quality, productivity and reduce costs. Reduced maintenance costs, ability to hire new staff, improved security and improved productivity with new methods and tools. The study recommends that SME in ICT projects should enhance project risk management strategies as this would improve efficiency in provision of technologies services clients. The enterprises completed ICT products for the clients within schedule, achieve higher returns, develop reliable project output and develop reliable project output. The study recommends that SME in ICT should adopt project risk assessment as its significantly influenced project performance.

There existed a significant positive relationship between Project risk identification and project performance of ICT SMEs in Kenya where project risk identification through risk porting, registration, allocation, control and checklist would impact positively on IT project performance. The study recommend that management of SME in ICT should sought to increase project risk planning as there existed a significant positive relationship between project risks planning project performance where project risk planning would lead to positive impact on IT Project performance. The study also recommend that SME in ICT needed to enhance Project risk portfolio management involving portfolio management, risk based assessment, administrative task of collecting and governance rules would lead to positive impact on IT Project performance.

## RECOMMENDATIONS FOR FURTHER STUDY

The study recommends that a further study should be carried out to investigate the effects of risk management strategies on the project performance on small and medium information communication technology not discussed in this study. A further study should be carried out to determine strategies that should be adopted to maintain the positive effects of risk management strategies on the project performance of small and medium information communication technology.

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