

# Determinants of Effective Management of Telecommunication Network Maintenance Projects under Safaricom Limited. A Case Study of Turkana County

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## Abstract

The study was aimed at assessing the determinants of effective management of telecommunication network maintenance projects under Safaricom limited in Turkana County. The study's specific objective was determine the effect of technology capability on performance of telecommunication network maintenance projects under Safaricom Limited Kenya. The study was informed by systems theory, maintenance jungle theory and human capital theory. Descriptive research design was used in this study. The researcher used questionnaires as a tool for data collection In order to test the reliability of the instrument, the Cronbach alpha test which is a measure of internal consistency was used in which closely relates a set of items are taken as a group. Descriptive statistical procedures including cross-tabulations and frequency distributions were used, inferential statistical analysis which included multiple regression model and bi-variate correlation analysis was also used. The target population was two managers and 31 technicians supporting the project in Turkana County. Purposive sampling technique was used to select the project managers and financial managers to participate in the study. The data was analyzed by the regression tools and ANOVA using the Statistical Package for Social Sciences (SPSS) version 22. Both correlation coefficient and regression analysis and the ANOVA test were established in order to statistically determine the relationship between the independent variable and dependent variable. The findings showed that the regression effect was statistically significant and indicated a reliable prediction of the dependent variable. The F calculated ( $F = 22.755$ ) which was greater than 5% level of significance that showed the overall model was significant where the independent variables explained 83.2% of the effective management of telecommunication network maintenance projects. The findings from this study would therefore be of importance because they would have the capacity of being used to formulate positive fiscal policies which are relevant and sensitive to the forces influencing the telecommunication industry performance in Kenya. The study would be beneficial to various stakeholders; it will be a source of information to the telecommunication sector as they would be able to evaluate the logistics, practices and performance. To the academicians the study would contribute to the existing literature in the field of project management. It should also act as a stimulus for further research to refine and extend the present study especially in Kenya.

## 1.0 Introduction

Performance of the project is considered as a source of concern to both public and private sector clients. Project success requires creating a well-planned project schedule as well as understanding of the key success factors also. It helps the project manager and the stakeholders to take the right decisions and act towards the project success. Most popular determinants of projects successes accepted by research community are-project mission, top management support, project schedule/plan, client consultation, personnel, technology to support the project, client acceptance, monitoring and feedback, channels of communication, troubleshooting expertise (Munns and Bjeirmi, 2010). Quality can be assured by identifying and eliminating the factors that cause poor project performance

Different studies have identified different determinants and a lack of consensus of opinion among researchers on the criteria for judging project success and the factors that influence that success (Fortune and White, 2006). In addition, several studies addressing critical success factors (CSFs) have observed the impact of context on which factors are considered most critical as well as whether certain CSFs are indeed related to success. In most construction companies, management activities in construction project can be a better understanding by exploring the (CSFs) for improving the performance of their building projects. The CSFs approach has been established and popularized over the last 20 years (Chan, *et al.* 2004). Nevertheless, the

majority of the studies focus on the traditional “iron triangle” which are cost, quality and schedule (criteria for measuring project success) of conventional construction process rather than sustainable buildings (Walker & Shen, 2002).

Information systems researchers have empirically demonstrated that Information technology (IT) investments enhance firms’ productivity, consumer welfare, and comparative advantage (Barua *et al.* 2000). Further, other studies have demonstrated that IT management capabilities, or the managerial skills associated with acquisition, management and use of information technologies, have significant impact on business performance (Bharadwaj 2000; Santhanam *et al.* 2003). However, not enough attention has been devoted toward understanding how and why these investments and capabilities impact project performance. Literature suggests that some of leadership styles on implementation of project can be related to incomplete constructions (Yang, Huang & Wu, 2011). In addition, the manager’s relationship with rest of people in the institution can determine the success or failure of the implementation of the project (Nixon, Harrington & Parker, 2012). In Pakistan, Pheng and Chuan (2006) observed that project managers’ styles have a key role in the success of a project. It is clear that any good leadership style can bring about better management skills in the implementation of project (Hyvari, 2006). Leadership styles may vary depending on the scenarios (Yang *et al.*, 2011).

In Nigeria, according to Chan and Kumaraswamy (2002), some leadership styles can help in fast implementation of project if there is effective relay of information between the manager and the people in the institution. The relationship between these two key people within a project can be the main attributable factor to success or failure (Makins, 2011). Great sponsors ensure the project has the right resources to get the work done and great project managers articulate clear resource requests and "right size" the ask to the need (Pacelli, 2009). Effective sponsors are an advocate, coach and battering ram for the project and effective project managers know how to leverage a sponsor and listen to the sponsor's counsel (Pacelli, 2009).

Kenya’s Telecommunication market has grown tremendously over the last few years. Competition has significantly increased with there being four network mobile operators on the market. There being several players on the market and with Kenya communications Authority (CA) of Kenya being a body mandated to level play and control the market, this has resulted in the prices dropping by over 70% in the past four years. Established in August 2003 by Safaricom Limited, The Safaricom Foundation is one of the largest corporate Foundations in Kenya. Since its inception, it have invested over Kshs 1.8 billion (approximately US\$ 21 million) in education, health, economic empowerment, the environment, arts and culture, music and sports. In addition, it has also responded to disasters and humanitarian emergencies. Knowing how to relates and manage the opposite person is a key skill in understanding how to achieve the best results for the project or business case for the project manager and project sponsor respectively. Thus, it will be imperative to study on the critical success factors affecting telecommunication network maintenance projects under Safaricom Limited Kenya.

A project will be considered totally successful if it gets completed on time, within budget and performs exactly to the designer’s specifications. But this is a tall order and many projects would not meet these requirements (Choudhury, 2002). Project implementation varies among various options. In all the implementation options, various factors will play out to determine if the project will be implemented successfully. It is however established that investors have an interest in project being completed in a timely way and according to the budget and that it will meet quality expectations.

However, in maintenance project, Gwayo *et al.* (2014) noted, there is a growing concern regarding the reasons why the requisite objectives are not achieved as per the projects’ client’s expectation. Muchung’u (2012) lamented that, some projects takes as many as 3 years before they are completed; a scenario that is usually accompanied by huge cost overruns. projects implementation are open to all sorts of external influence, unexpected events, ever growing requirements, changing constraints and fluctuating resource flows. This clearly shows that if projects are applied and steps are not taken in order to manage them effectively and efficiently, the chance of failure is high. The foregoing has resulted in evitable cost overruns, time overrun, idling resources, and also inconveniences to the targeted beneficiaries of such projects (Kikwasi, 2012). Though many of the construction contractors including consulting companies are progressive enough to aspire to automate their processes, the numerous subcontractors and partners working under them often lack the necessary resources, and sometimes are not technologically advanced enough to embrace the essential elements of automation (Neelamkavil *et al.*, 2008).

Previous studies have addressed factors affecting performance project, however this studies have given little attention to how the relationship between critical successes factors such as client and project sponsor relationship in Kenya. In Jiang (2014), leadership was rarely considered by the critical success factors of the project Turner and Muller (2005) contemplated that probably the project manager’s neglect themselves or leadership is not covered in research. Therefore the study seeks to analyze effect of technology capability on performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County.

## 2.0 Effect of Technology Capability on Performance of Projects

Technological capability has been recognized as an important input in performance of telecommunication network maintenance projects. Technological capability incorporates the additional and distinct resources needed to generate and manage technical change, including skills, knowledge and experience, and institutional structures and linkages (Bell and Pavitt, 2003). The level of economic growth and development of a country depend on its ability to accumulate these technological capabilities. Studies have shown that the performance of telecommunication network projects in South-East Asian countries notably described as the Newly Industrializing Countries (NICs) such as Singapore, Taiwan, Hong-Kong, and China has been brought about by building up relatively good technological capabilities compared to international standards and that this was a major factor in their rapid growth and technological upgrading (Wignaraja, 2001). In these economies, foreign technology is first adapted for incorporation in telecommunication network maintenance projects facilities, at which time the original technology may be improved on or adapted for the specific situation, and later modified to conform to changes in input and product markets.

Indjikian and Siegel (2005), van Ark and Piatcovski (2004) studied ICT investment patterns and their impact on performance of telecommunication network maintenance projects using two sets of countries considered to be at different levels of economic development as reference points the old and the new Europe respectively. They concluded that there is a trend toward convergence in investment in ICT capital which was also found to be an important source of performance of telecommunication network maintenance projects in both types of countries.

McKinsey (2004) however argue that a higher performance of telecommunication network maintenance projects in the USA is attributable to a more favorable regulatory environment, stronger competition, and superior corporate organization that define its operating system rather than ICT investment. Evidence from more recent studies suggest a positive relationship between ICT investment and performance of telecommunication network maintenance projects (Becchetti, Bedoya and Paganetto, 2003; Hernando and Nunez, 2004; Bayo-Moriones and Lera-L Chinese information and communication technology (ICT) firms have developed in the past 20 years into internationally competitive players and major contributors to their country's performance of telecommunication network maintenance projects (Ramirez, 2006). To reach this position they have innovated new products that are competitive on the world market. This achievement is particularly significant since China remains a poor country in terms of per-capita income, and other developing countries have failed to make similar breakthroughs. Hence, there is a need to research into how this has been accomplished. The global competitiveness of any economy depends on its science, technology and innovation (STI) capabilities (Adeoti et al., 2008; Malerba and Nelson, 2010). STI are increasingly recognized as a major determinant of economic growth and sustainable development (Nobuo, 2005).

Technological capability is the ability to create new technologies and to develop new products, processes or new industries in response to changing economic environment (Kim, 1997). Technological capability is a specific collection of equipment, skills, knowledge, aptitudes, and attitudes that confer the ability of a firm to operate, understand, change and create production processes and product (Marcelle, 2004). The advancement in the level of technical know-how and widespread application of technological innovations resulting in high productive capability and economic growth is not new in developed nations. For developing countries that are on the path to technological and economic catch-up, strengthening such technological capability and innovations are their pursuits (Adeoti and Adeoti, 2010). This is because acquiring advanced knowledge and technologies have no value if the acquiring nation doesn't possess the necessary technological capabilities that can allow such nations to seize such technological opportunities for promoting innovations (Morrison et al., 2008; Hong, 2009).

Building local technological capability therefore, is a necessary condition for any nation aspiring to develop technologically (Adeoti, 2002). The totality of STI activities includes scientific and technological research, experimental development, scientific and technological services, innovation and diffusion (Iloriet et al., 2002). New capabilities (absorptive and innovation) is of central importance in almost all economic sectors as they are the key elements in the change of the key economic system (Malerba and Nelson, 2010). The capabilities are required in order to adopt, adapt and modify technologies developed elsewhere, introduce modifications and incremental innovations and eventually generate totally new products and processes (Miller and Morris 1999). Research has shown that innovative technological capability building is a key to technological and economic progress of countries throughout history. To study technological capabilities, the basic elements need to be identified: the components, their attributes or functions, and their relationships (Carlsson et al., 2002). Capabilities are generated by complex interactions within firms, technological collaboration arrangements between competing and complementary firms, and through linkages with innovation-oriented organizations such as universities and research organizations (Kline and Rosenberg, 1986; Bell and Pavitt, 1993). Collaboration can be formal or informal (Storper and Venables 2004, Asheim et al., 2007). Third, firms tend to move along particular trajectories within which past learning contributes to particular directions of technical change and the experience derived from those paths of change reinforces the existing stock of knowledge and expertise (Bell

and Pavitt, 1993).

Assessing the technological capabilities of a region is a function of its components, its capabilities and its interactions, and these might differ significantly between developed and developing countries. Any method assessing the role of the innovation system supporting the acquisition and development of technological capabilities in firms has to bring together both the firm and the regional technological capabilities (Padilla et al., 2009). In the last decade a growing number of scholars consider dynamic capabilities to be at the heart of firm strategy, value creation and competitive advantage (e.g. Teece et al 1997; Eisenhardt and Martin, 2000; Winter, 2003, Teece, 2007, Helfat et al. 2007). Theoretical arguments have been advanced about their nature and their relationship with firm performance. Existing research however is still loaded with vague assertions and interpretations which have not yet been confirmed by empirical analysis. Many scholars are still skeptical about the role and conceptualizations advanced about dynamic capabilities (Winter 2003, Zahra et al, 2006). Dynamic capabilities have often been criticized for being tautological (e.g. Mosakowski and Mckelvey, 1997; Priem and Butler, 2001), vague and not operational. Furthermore, while organizational performance has been a core issue in the research on dynamic capabilities since the seminal article of Teece et al. (1997), the question of whether and how they affect performance is still open (Helfat et al.2007).

A project is considered successful if the project is delivered on time, on schedule and acceptable quality. However, measuring project success is a complex task since success is tangible and can hardly be agreed upon (Xiao & Proverbs, 2010). Miklos' (2014) says a schedule is a plan with sequence of operation and list of resources as well as project scheduling techniques. Completion of projects within schedule is a major contribution towards the competitive edge in organizations. This is based on the realization that the achievement of the targeted objectives is determined by the ability to deliver the targeted output within the stipulated time. In telecommunication projects, different activities are involved and hence the need for proper management to ensure that materials and works are procured and supplied within schedule. An intention foster the growth of the industrial sector in the country. The proposed project readiness filter will ensure that implementation plans are timely formulated, counterpart funds and project team is identified before appraisal.

Wright & Taylor (2011) perception as active process of obtaining and interpreting information from environment to provide order and meaning, subjective process influenced by past experience, influenced by level of experience, stake or profit expected from project, geographical region and values and level of risk communication transmitted through news and other sources of information to way they interpret cost factors (Gichunge, 2014). Critical success factors includes Project-related factors, procurement related , project management related, Project participant-related who includes client, contractor, contractor, sub-contractor, suppliers, manufacturers. ( Salleh, 2009).

### **3.0 Methodology**

The study employed a descriptive research design. The target population This study targeted 33 electrical and Telecommunication engineering experts from Turkana County. A census method of all electrical engineering experts at the subcontracted personnel was employed since the target population was less than one hundred respondents which the maximum accepted limit for census method to be adopted. The study employed the use of questionnaires as the main primary data collection tools. After sampling, the study employed the use of the questionnaire as the main research instrument for primary data collection. A pilot study is used to test the reliability of the questionnaire . The collected data was analyzed using descriptive statistics. Descriptive Statistics entails the use of frequency distribution tables and dispersion. It was used to present quantitative descriptions in a manageable form. Descriptive statistics was also used to help the study simplify large amounts of data in a sensible way. The Statistical Package for Social Science (SPSS) version 23 and Ms. Excel was used as the data analysis tool (Orodho, 2008). The data was analyzed and then presented by use of tables, graphs and percentages that were generated by the data analysis tools.

### **4.0 Discussion**

The results indicated that 30.3% of the respondents agreed that the technological standard is a key determinant in telecommunication maintenance project success while 57.6% strongly agreed that indeed the technological standard is a key determinant in telecommunication maintenance project success. A small portion of 3.0% respectively, who strongly disagreed and disagreed that the technological standard is a key determinant in telecommunication maintenance project success with 6.1% being those respondents who remained undecided on whether or not the technological standard is a key determinant in telecommunication maintenance project success. More than 50.0% of the respondents agreed or strongly agreed in their response on whether Fast growth of technology is a key issue in telecommunication maintenance project. With 51.5% agreeing, 30.3% strongly agreeing that Fast growth of technology is a key issue in telecommunication maintenance project. A total of 18.2% however disagreed, strongly disagreed or remained undecided on whether Fast growth of technology is a key issue in telecommunication maintenance project. As concerns to the fact that Technology growth has made

troubleshooting of faults easier and less time consuming, 78.8% of the respondents agreed or strongly agreed in equal measure of 38.4% each. The final question under this objective was whether Technology standard impact directly on the quality of project performance in telecommunication maintenance projects, 45.5% of the respondents strongly agreed, 33.3% agreed while an aggregate of 21.2% fell on the negative side of the responses of undecided, disagreed or strongly disagreed respondents. From these results, the researcher concluded that there was an effect of technology capability on performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County.

#### 4.1 Inferential Analysis

This a section that uses correlation analysis, regression analysis, analysis of variance (ANOVA) and coefficient analysis to deduce more meaning of the data for the purpose of concrete results, findings and conclusion. These tests were conducted to verify existence of relationship between the independent variables and the dependent variable.

**Table 4.1: Model Summary**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.921 <sup>a</sup>	.832	.841	0.37573

a. Predictors: (Constant), Technology Capability

b. Dependent variable: Project Performance

The overall contribution of Client & Sponsor Relationship, Technology Capability, Employee Skills, and Leadership Style accounted for 83.2% ( $R^2 = 0.832$ ) of the variance on project performance as shown in table 4.11 above, with the difference of 16.8% to 100% representing variable other than those dealt with by this research (predictors), that caused variations in the dependent variable, Project Performance.

**Table 4.2: Analysis of Variance**

ANOVA<sup>a</sup>

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	44.622	4	11.156	22.755	.001 <sup>b</sup>
	Residual	27.454	32	.490		
	Total	72.076	36			

a. Dependent Variable: project performance

b. Predictors: (Constant), Technology Capability,

The ANOVA table provided an F-test for the null hypothesis that the explanatory variables are related to performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County. The analysis led to the researcher rejecting the null hypothesis  $F = 22.755$ ,  $p < 0.001$  and concluded that the predictor variables; Technology Capability are related to performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County.

**Table 4.3: Coefficient Analysis**

Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients Beta	T	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	1.314	1.854		2.036	.050		
Technology capability	.671	.400	.150	.555	.583	.289	3.461

a. Dependent Variable: project performance

This section reported the results of the relationship between project performance (dependent variable) and the independent variable (Technology Capability).

There was a significant relationship between technological capability and project performance. It predicted 67.1% of the project performance with a positive coefficient of 0.671; similarly the set of standardized beta coefficients suggested that adjusting for the effect of other explanatory variables, technological capability had a strong effect on project performance thereby contributing 67.1%. The hypothesis, technology capability has no significant effect on performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County, revealed that technology capability had a significant effect on the performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County. As shown in table 4.13 above, the coefficient of technological capability ( $\beta = 0.671$ ) was positively related. Statistically ( $t = 0.555$ ,  $p > 0.05$ ) resulted in rejecting the null hypothesis  $H_{02}$ ; hence concluding that technology capability had a significant effect on the performance of telecommunication network maintenance projects under Safaricom

Limited Kenya in Turkana County.

## 5.0 Conclusions and Recommendations

The objective of the study was to examine the effect of technology capability on performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County. The results of the study indicated that performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County had a good project performance rate as indicated by the majority of the respondents who agreed or strongly agreed to the questions in the questionnaires. The technological standard is a key determinant in telecommunication maintenance project success, this was evidenced by 88.2% of the respondents who agreed or strongly agreed to this question. This conclusion was arrived at from the second specific variables' data collected and analyzed on the effect of technology capability on performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County. The correlation statistics data output for the study enabled the researcher to conclude, with the F-statistic ( $P = .000$ ) and  $F = 22.755$ ), that there was a strong relationship on the effect of technology capability on performance of telecommunication network maintenance projects under Safaricom Limited Kenya in Turkana County as per the outcomes of the regression variables.

The researcher made the following recommendations from the research results; according to the research findings and conclusion above, top level management of Safaricom Limited Kenya in Turkana County should strive to since Technology growth has made troubleshooting of faults easier and less time consuming, Safaricom limited should strive to be always up to date on technology issues.

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