

**EFFECT OF INFORMATION TECHNOLOGY INFRASTRUCTURE ON EFFECTIVE
IMPLEMENTATION OF ICT PROJECTS IN MANUFACTURING ENTERPRISES IN NAKURU
COUNTY, KENYA**

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Abstract: *Adopting IT projects is one factor which increases the effectiveness and efficiency in an organization. However, implementing information technology projects affects the organization to a great degree and be a major change for an organization's processes; for instance, it requires employees to change. Many companies have found that implementing such changes is the most difficult part of information systems implementation. In addition, information technology projects can affect individuals, groups, and a whole organization when the project is introduced into that organization.*

Methodology: *The study used the descriptive research design. The target population for this study was manufacturing enterprises in Nairobi County. Purposive sampling strategy was used to select the firms in the manufacturing sector. The target population was 148 IT projects. Simple random sampling procedure was used to derive a sample size of 104 IT project supervisors.*

Findings: *The study findings revealed that the effect of Information technology infrastructure affected effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya to a moderate extent. The results of the study show that Information technology infrastructure and effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya had a positive and significant relationship. This finding implies that an effective Information technology infrastructure leads to improvement in effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya.*

Keywords: *IT Projects, Information Technology Infrastructure, Project Management Practices*

1. Information Communication Technology Projects

There is no clear and globally accepted definition of what entails effective implementation of ICT projects. However, several scholars and researchers have attempted to define success of IT projects. He and King (2008) term IT project success as the way the system works in general in line with how efficient and useful it is. Thomas and Fernandez (2008) suggest that success is achieved when an information system is perceived to be successful by stakeholders.

Globally the swift development of Information Technology (IT) in industries today has both opportunities and problems. Deeds added that IT presents many opportunities in that companies have used it to help them gain a competitive edge. It also presents challenges in the management of IT has at the same time a major problem to

several companies. In effect, cost-effective deployment and usage of IT resources has become a strategic success factor for business firms (Breakfield & Burkley, 2002).

Businesses today face a stark reality of competition and are required to anticipate, respond and react to the growing demands of the marketplace in order to remain relevant (Bryman, 2007). In the fiercely competitive environment, effective business strategy centers on aggressive and efficient use of Information Communication Technology (ICT). Both governments and organizations are investing heavily and relying highly on ICT to improve productivity through streamlining of business process in order to enhance efficiency and effectiveness. Many researchers have evaluated benefits of investing in ICT Projects (Yang & Seddon, 2004), and all agree that information systems are designed to help manage organizational resources in an integrated manner. The level of integration that is promoted across functions in an enterprise closely relates to the primary benefits that are expected as a result of their implementation. The issue of ICT failure can be analyzed by assuming that learning from IS failures will provide us with important lessons for formulating successful strategies for the planning, development, implementation and management of information systems. While discussing dimensions of ICT failure, Beynon-Davies (2002) considers both the horizontal and vertical dimensions of the informatics model. The horizontal dimension is expressed in terms of the difference between development failure and use failure. The vertical dimension is expressed in terms of failure at the levels of ICT systems, IS projects, or organization, or at the level of the external environment.

The Six types of IS failures are identified as follows: Technical failure, Project failure, Organizational failure, Environmental failure, Developmental failure; and Use failure. Beynon-Davies supports the argument with and several case studies and quotes other models for IS failure put forward by Lyytinen and Hirschheim (1987). ICT success or failure in developing countries can be categorized into three types depending on the degree of success (Heeks, 2002). First, is the total failure of an initiative never implemented or in which a new system was implemented but immediately abandoned. Secondly, it is a partial failure of an initiative, in which major goals are unattained or in which there are significant undesirable outcomes. Associated with partial failure is the sustainability failure where an initiative first succeeds but is then abandoned after a year or so. The last is success of an initiative where most stakeholders attain their major goals and do not experience undesirable outcomes.

In Africa, most society's today's are being transformed by continuously evolving technologies that are changing the way we do things at the most fundamental levels (Hilsenrath & Paletta, 2008). At a macro level, IT is one of the driving forces behind globalization of world economies and at an enterprise level, it is playing a crucial role in re-engineering and restructuring of business processes in response to increased competition (Claessens et al., 2010). On an individual level, every aspect of our daily lives is subject to technological innovations. We have become dependent on the flexibility, access, and services that they provide us. Computers, fax machines, networks, cable television, fiber optics, and ATMs have all played a pivotal role in the way we communicate, work, play, and do business (Shachmurove, 2011).

Several recent studies related to information communication technology (ICT) implementation frameworks have identified key ICT implementation drivers and barriers which are useful in providing a strategic view of its success. These studies explored barriers to ICT use and adoption. Common highlighted barriers include low ICT literacy and investment levels (Love, et al., 2001).

One recent study of 134 architectural, engineering and construction professionals identified IT implementation barriers and coping strategies at the industry, organization, and project level (Stewart, et al., 2004). Review of the literature however, reveals that few empirical studies explain ICT implementation constraints from an

innovation diffusion perspective at the organization, workgroup and individual level (Peansupap & Walker, 2005). One recently completed study (Peansupap, 2004) differs from, previous IT innovation research in two important ways. First, by organization-wide ICT diffusion such as groupware or intranet applications is assumed to differ from stand-alone ICT innovation such as CAD systems or non-integrated project planning and scheduling. This is because organization-wide ICT innovation requires a commitment from a greater number of users than does IT innovation focused upon individual stand-alone ICT.

Nakuru County is a county in Kenya. The capital and largest town is Nakuru, although Naivasha is another major significant urban centre. With a population of 1,603,325 (2009 census), it is the fourth largest county in Kenya after Nairobi, Kakamega and Kiambu in that order in terms of population. Nakuru County has an area of 2,325.8 km². Until August 21st 2010, it formed part of Rift Valley Province.

Nakuru County has a high youthful population where 15-34 year olds constitute 49% of the total population. Labour migration from the rural areas in search for jobs is the main reason why the county has a very high proportion of the working age population of those aged between 15-64 years old who form 68% of the total population. Gichoya (2005) studied on factors affecting the successful implementation of ICT Projects in Government in Kenya found evidence that there was a higher rate of failure than success in implementation of IT projects. Chege (2014) study on factors affecting the success of information technology projects within the Kenyan banking industry found that none of the projects completed during the survey period had delivered on their intended business benefits. This was supported by Wamoto (2015) study on E-government Implementation in Kenya, an evaluation of Factors hindering or promoting e-government successful implementation which revealed that many e-government initiatives also failed to achieve their objectives in developing countries.

2. Statement of the Problem

Studies (Cooke-Davies, 2012; Cleland & Gareis 2014) have agreed that PM practices do ensure effective and successful project management. Matende and Ogao (2015) argued that ICT projects failures may largely be classified as human/organizational, technical, and economic. While each of these is important, there appears to be a growing consensus among researchers those human factors, more than technical or economic, are critical to the success of IT projects. Nasir and Sahibuddin (2011) show that many of ICT projects have failed in the combination of budget and/or schedule overruns and/or for not meeting stakeholders' requirements. Marr (2016) reports that 25 % of information technology projects fail outright; 20 to 25 % don't show any return on investment; and as much as 50 % need massive reworking by the time they're finished. The importance of effective implementation of ICT projects was based on the use and application of ICT in day to day operations of an enterprise. However, there is less evidence to show the determinants to effective implementation of ICT projects in manufacturing enterprises in Nakuru County, a research gap that the study intends to fill by examining the influence of top management commitment, staff competence, information technology infrastructure and budgetary allocation on effective implementation of ICT projects. Basing on the above this study assisted in filling in the gaps.

3. Specific objectives

The aim of the study was to establish determinants of effective implementation of ICT projects with a specific objective to determine the effect of information technology infrastructure on effective implementation of ICT projects in manufacturing enterprises in Nakuru County, Kenya.

4. Research Methodology

This research was grounded on the Management by objectives, stakeholder, Technology Acceptance Model, and resource based theory. The study used the descriptive research design. The target population for this study was manufacturing enterprises in Nairobi County. Purposive sampling strategy was used to select the firms in the manufacturing sector. The target population was 148 IT projects. Simple random sampling procedure was used to derive a sample size of 104 IT project supervisors. The research instruments were validated by use of a pilot study, which was assessed by the project managers. Data collected was analyzed by use of Statistical Package for Social Sciences (SPSS).

5. Research Findings and Presentations

Pilot Test Results

Cronbach (1951) recommends that a Cronbach’s alpha α , of 0.7 and above to establish reliability. The study established the Cronbach’s alpha value for the case. The values were gauged against a cutoff point of 0.7 which is acceptable as opined by (Cooper & Schindler, 2008). The results are tabulated in the table 1 below.

Table 1: Reliability Analysis

Variable	Cronbach's Alpha	No of Items
IT Infrastructure	0.725	4
Effective implementation of ICT Projects	0.700	3

Effect of security threats on effective implementation of projects

The first question under Information Technology Infrastructure was to establish the effect of security threats, on effective implementation of information technology projects. From the information gathered in this study, out of the 92 respondents, 14.1% they were effective to a very great extent, 15.2% indicated to a great extent, 40.2% said to a moderate extent, 16.3% indicated to a less extent and 14.1% no extent. The results are shown in the table 2 below.

Table 2: Effect of security threats on effective implementation of projects

	Frequency	Percentage
Very great extent	13	14.1
Great extent	14	15.2
Moderate extent	37	40.2
Less extent	15	16.3
No extent	13	14.1
Total	92	100.0

Effective computer technologies

However, to be able to find out how computer technologies affected effective implementation of information technology projects, it was important to identify how effective computer technologies are in enhancing Information Technology Infrastructure. The respondents were asked to indicate how effective they are; 20.7% indicated they were very effective, 28.3% which was the highest response stated they were effective, 21.7% said the computer technologies are moderately effective, 15.2% said they were less effective and 14.1% stated they were not effective. The results are shown in the table 3 next page.

Table 3: Effective referrals

	Frequency	Valid Percentage
Very effective	19	20.7
Effective	26	28.3
Moderately effective	20	21.7
Less effective	14	15.2
Not effective	13	14.1
Total	92	100.0

Monitoring the progress of interconnectivity of the information technology framework

In an attempt to respond to the questions on often Information Technology Infrastructure was done, it was important to identify how often monitoring was conducted. From the findings of the study, 17.4% said that they are conducted weekly, 20.7% were of the opinion they are conducted monthly, 31.5% stated that they conducted quarterly and 12.0 % said they are conducted semiannually while 18.5% are conducted annually.

The results as presented in the table below depict that monitoring the progress of interconnectivity was conducted quarterly which is appropriate.

Table 4: Monitoring the progress of interconnectivity of the information technology framework

	Frequency	Valid Percentage
Weekly	16	17.4
Monthly	19	20.7
Quarterly	29	31.5
Semi annually	11	12.0
Annually	17	18.5
Total	92	100.0

Correlations Analysis

According to (Pallat, 2010), correlation explores the relationship among variables. By so doing, they help in assessing presence of multicollinearity, an assumption of regression model. A correlation matrix was used to illustrate correlations between study variables. Correlation is a value running from -1 to 1. According to (Farndale, Hope-Hailey & Kelliher, 2010) correlation values not close to the above outlined range indicates that the factors are sufficiently different measures of different variables thus eliminating presence of multicollinearity thereby utilizing the independent variables. Table 5 next page shows the correlation matrix.

The study established that there was a strong positive correlation between IT infrastructure and effective implementation of ICT projects ($r= 0.956, p=0.000$).

Table 5: Correlations

		IT Infrastructure	Effective Implementation of ICT projects
IT Infrastructure	Pearson Correlation	1	.956**
	Sig. (2-tailed)		.000
	N	92	92
Effective Implementation of ICT projects	Pearson Correlation	.956**	1
	Sig. (2-tailed)	.000	
	N	92	92

**.

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

Regression Analysis for Information technology infrastructure

A simple linear regression was calculated to predict effective implementation of ICT projects based on IT infrastructure. The results of the simple linear regression analysis suggested that budget allocation predicted 46.2% of the variance, $R^2 = 0.462$, $(F(1, 90) = 77.384, p < .001)$ ($\beta = 0.680, t(92) = 6.457, p < .001$). A significant regression equation was found $(F(1, 91) = 41.695, p < .001)$. Further, budget allocation significantly predicted effective implementation of ICT projects ($\beta = 0.563, t(92) = 8.797, p < .001$). Table 6 below indicates the model summary for the regression between budget allocation and effective implementation of Information technology projects.

Table 6: Regression Analysis for Information technology infrastructure

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.680 ^a	.462	.456	.26003

a. Predictors: (Constant), IT Infrastructure

ANOVA

One way between subjects ANOVA was run with IT infrastructure completed as the predictor variable and effective implementation of ICT as the criterion variable. The results of the ANOVA indicated that there was a statistically significant difference between top management support and effective implementation of ICT projects $(F(1, 90) = 77.384, p < .001)$.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.232	1	5.232	77.384	.000 ^b
	Residual	6.085	90	.068		
	Total	11.318	91			

a. Dependent Variable: Effective Implementation of ICT projects

b. Predictors: (Constant), IT Infrastructure

Coefficients^a

Model	Unstandardized Coefficients		Standardized t Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	.737	.214		3.443 .001
1 IT Infrastructure	.719	.082	.680	8.797 .000

a. Dependent Variable: Effective Implementation of ICT projects

6. Summary of Findings

The study findings revealed that the effect of Information technology infrastructure affected effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya to a moderate extent. The results of the study show that Information technology infrastructure and effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya had a positive and significant relationship. This finding implies that an effective Information technology infrastructure leads to improvement in effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya.

The study established that there was a positive correlation between, Information technology infrastructure and effective implementation projects. It can be concluded that there is a positive relationship between Information technology infrastructure and the effective implementation of Information technology projects in manufacturing enterprises in Nakuru County, Kenya. The study concludes that proper Information technology infrastructure should be facilitated and enhanced to ensure effective implementation of projects.

This study recommends that Information technology infrastructure should be facilitated and integrated; the project managers and project team should meet very frequently in order to effectively monitor and evaluate the Information technology infrastructure in place. The project activities should be well monitored and evaluated as they are critical to the effective implementation of Information technology projects.

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