



ASSESSING THE EFFECT OF TECHNOLOGICAL CAPABILITIES ON FIRM PERFORMANCE: CASE STUDY OF NZOIA SUGAR COMPANY

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Abstract:

The idea of technological capabilities plays a key role in the analysis of organizational processes because it offers a potential solution to the quest for sustained competitive advantage through the realization of organizations objectives. The importance of technological capabilities suggests that the long-term, continuous renewal of the firm rests on both the exploitation of existing capabilities for the furtherance of the institutions objectives. This is mainly achieved by the creation and development of specific organizational capabilities. This study therefore, sought to evaluate the effects of technological capabilities in Nzoia Sugar Company Limited. The study was based on the Resource Based View Theory. A case study and survey designs were employed in this research. The study targeted a total of 1,403 employees comprising of 790 lower level employees, 422 Supervisory level employees, 182 middle level management and nine top level management. Random stratified sampling technique was used to select 210 respondents. Data collection instruments comprised of questionnaires and interview schedules. Validity was determined by content validity and reliability using Cronbach alpha method which had Cronbach Alpha Coefficient of 0.783 which was greater than 0.7. Data was collected and analyzed using descriptive while inferential statistics at 95% confidence level. The results were presented in form of frequency tables and pie charts. It was concluded that an increase in customer service management capability constructs like repeat purchase, confidentiality of customer information and different customer needs once enhanced could translate to higher firm performance; attributes of marketing capabilities like employee training on basic marketing skills, e-marketing and marketing intelligence information should be enhanced; internet

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penetration, automation of processes, use of e-marketing and procurement could lead to improved firm performance and setting targets for the company which are attainable, monitoring and evaluation of all activities would lead to improved firm performance. The findings of this study shall be useful to the policy makers, strategists and the researcher in making informed conclusions and recommendations. The findings shall give guidance to the managers of different departments in coming up with proper policies in management. The stakeholders in management will find the study useful in identifying challenges faced by Firms who do not invest and emphasize on organizational capabilities.

Keywords: technology, performance, firm, capability, competitive advantage

1. Introduction

Customer Service management is widely regarded as one of the most important sources of sustainable competitive advantage in an increasingly changing environment, because it leads to product and process improvements, makes continuous advances that helps firms to survive, allows firms to grow more quickly, be more efficient and ultimately be more profitable than non-innovators (Thierren *et al.*, 2011). Customer Service managements is a complex process related to changes in productive functions and processes with whereby firms seeks to acquire and built upon their distinctive technological competence, understood as a set of resources a firm possesses and the way in which these are transformed by innovative capabilities. Innovation at a firm level refers to a firm's receptivity and propensity to adopt new ideas that lead to development and launch of new products (Rubara, 2012). Sharma and Lacey 2004, argues that innovative new products when first introduced in the market faces limited direct competition, and as a result allow firms to enjoy high profits over time. These high profits are likely to erode due to immigration and competition, but firms that continue introducing innovative new products may be able to achieve high profitability for a sustained period. The ultimate reason for firms to engage in Customer Service management is to improve firm performance and success.

Cahill, Rich and Cozzarin (2016) assert that a number of Customer Service management achieved by firms had a positive effect on their operating profit margin. Adoption of new technology such as IT is an enabler of process innovations from the perspective of the adopter in the implementation succeeds, the routines are changed and the new system is actually utilized. Newly adopted technology can also act as an enabler of product or service innovations from the perspective of the adopter .If it is

successfully used to offer a new service or to deliver products to consumers in a way that is new to the enterprise, for example a company that adopts and implements new online shop software usually changes the routine of how incoming orders are processed. Researchers also believe that superior technological capability can increase efficiency and higher differentiation through improved process and product innovations (Wang et al. 2006). Organizations with remarkable technological competencies are able to produce higher differentiation through innovative products in response to rapid changes in the market needs since they can secure efficiency benefits by pioneering innovation activities. Therefore, firms are able to create greater value than their competitors which allows them to achieve an above-average return on investment (Latip, 2012) Omondi (2016) investigated aligning technical capability with IFMIS and supply chain measures in the Kenyan public sector.

The research study adopted a descriptive survey design. The population of study consisted of five ministries under the National Government of Kenya and random sampling method was used to select 150 respondents. Primary data was collected from respondents by using questionnaire. The study concludes that there has been a moderate level of technical alignment of IFMIS in the government ministries. The study did not focus on the influence of technical capability of the performance of public sectors but examined technical capability alignment of IFMIS within the supply chain. Sunil et al (2015) focused on technology capability and firm performance: an empirical analysis in Turkey. Data from 134 firm and business units is utilized to empirically evaluate the hypotheses derived from this model. The results provide compelling evidence for the mediating effects of these dynamic capabilities. Further, our empirical tests suggest that the mediated effects model is has more validity than a model that posits direct impacts of IT infrastructure capabilities on firm performance. The study did not test for relationship between technical capability and firm performance. This current study tested the relationship between technical capacity and firm performance. Nor (2014) explored the impact of technological capability on power, trust and inter-firm relationships performance within the supply chain. This study utilized quantitative design. Data was collected by using survey questionnaires. The sample consisted of manufacturing companies which are listed in the Federation of Malaysian Manufacturers (FMM) Directory. The findings confirmed that technological capability create competitive advantage for members of the supply chain. Sampled firms from various sectors hence variation within and between different types of firms and industry sectors. The current study population was drawn from one specific industry in the manufacturing sector to test the effect of technical capability on firm performance.

2. Research Design and Methodology

2.1 Research Design

The study adopted survey and correlational designs to determine the effects of organizational capabilities and firm performance of Nzoia Sugar Company Limited. The designs aided in understanding the phenomena through the meanings that people assign to them and it aims at understanding the context (Walsham, 1997) of technological capabilities on firm performance in the Nzoia Sugar Company Limited. The purpose of using case study approach was that it has the ability to let the subject unfold naturally; to refine concepts and frames of reference while studying the phenomena and it enables the researcher to understand and capture the dynamics of the process of change (Galliers, 1992). Case studies have strong tradition of description and theory building because of their inductive characteristics. Survey design was preferred as it was used to describe and conceptualize organizational capabilities and how it affected firm performance in the Nzoia Sugar Company Limited.

2.2 Location of Study

This study was carried out in Nzoia Sugar Company Limited located in Bungoma County. Bungoma County is one of the former districts of Western province. It borders Mt. Elgon to the north-west, Trans-Nzoia County to the east and Busia County to the west and south-west. It also borders the Republic Educational of Uganda to the north-western point at Lwakhakha border point. Bungoma lies between latitude 0 degrees 253 North and 35 degrees to the East. It covers an area of 2068.5 square Kilometers with a population of about 1.4 million people. The main economic activity is agriculture. The County is endowed with factories for instance Pan African Paper Mills at Webuye, Nzoia Sugar Factory, British American Tobacco at Malakisi and Mastermind. More than 50 per cent of the labour force in the district is engaged in agriculture and livestock activities, which is dominated by small scale farming. The County has good land and soil suitable for maize and sugarcane farming.

2.3 Target Population

The study targeted a total of 1,403 employees comprising of 790 Unionisable employees, 422 Supervisory level employees, 182 middle level management and nine top level management (Nzoia Sugar Company Limited, 2017).

2.4 Sampling procedures and Sample Size

Stratified sampling technique was used to categorize into 4 strata, top level management, supervisory level employees, middle level management and Unionisable employees. Then simple random sampling was used to select 210 employees so that each and every one in the target population had an equal chance of inclusion from the target populations of 1,403 employees. This was done so that the study did not miss any parameters that were vital to the research.

The sample size of employees was determined by use of Kombo and Tromp (2006) recommendation that a sample size of 10% to 30% was representative enough for the study population. Therefore, the sample size of employees was determined on the basis of 15% recommended by Kombo and Tromp (2006): Number of employees: - $15/100 \times 1403 = 210$ employees. To get sample population proportionate to target population, the study used the following:

$$\text{Sample size for each} = \frac{N_s}{N} \times n$$

Where:

N_s is the target population for each strata

N is the target population

n is the sample size

Using the formula shown above, out of 9 top level management, 2 were selected purposively because this technique allows the researcher to use cases that had the required information with respect to the objectives of the study (Mugenda & Mugenda, 2003). Out of 422 supervisory level employees, 63 were selected randomly, 27 middle level management were selected randomly from 182 and 118 Unionisable employees were randomly selected from target of 790. The middle level management consisted of departmental head such as finance, purchase, transport, marketing while Supervisory Level Employees who directed other workers with instructions from middle level management. The Unionisable employees were those employees who were registered in workers union. The distribution is as shown in Table 3.1

Table 3.1: A Sample Frame

Strata	Population	Sample Size
Top Level Management	09	02
Supervisory Level Employees	422	63
Middle level Management	182	27
Lower Level Employees	790	118
Total	1,403	210

2.5 Methods of Data Collection

The study used both the questionnaire and interview schedules for data collection.

2.5.1 Questionnaires for Employees

Questionnaires are useful instrument of collecting the primary data since the respondents can read and then give responses to each item and they can reach a large number of subjects (Orodho, 2004). This explains why the questionnaires were used to capture data from the employees who were deemed to have acquired the requisite educational levels. This instrument was also used in the study because it was convenient to administer when handling a large group of respondents. These instruments were confidential, save on time, no bias and covered wide area (Mugenda, Mugenda, 2003).

2.6 Validity and Reliability of Research Instruments

2.6.1 Validity

According to Mugenda and Mugenda (2002) validity refers to the accuracy and meaningfulness of inferences made based on results obtained. It is asking a relevant question framed in the least way. White (2005) describes validity as the agreement between the researcher's conclusion and the actual reality. The research adopted the content validity to measure the validity of the instruments to be used. Content validity enables data being collected to be reliable in representing the specific content of a particular concept. Supervisors and the research experts in the Department of Business Administration and Management evaluated the applicability and appropriateness of the content, clarity and adequacy of the research instrument from a research perspective. Borg and Gall (1985) points out that validity of an instrument is improved through expert judgment. Validity was also checked during piloting to ensure all the items in the questionnaire were relevant and functional. Moreover, to ensure validity of the instruments, content validity was established (Cozby, 1977) from the pretest and re-test method that was done before the actual research. The pre-test retest was carried out

in one out of the ten (10) departments whose twelve (12) respondents were not involved in the final data collection and analysis. The twelve (12) respondents looked at the questionnaire items; ascertained the content and whether the items measured what they intended to measure. .

2.6.2 Reliability

According to Mugenda and Mugenda (1999), reliability of an instrument is a measure of the extent to which a research instrument yields consistent results or data after repeated trials in the study. The consistency of questionnaire was established through test re-test method where research tools were administered twice to the same people under identical conditions, this procedure revealed the questions that are vague that can lead to respondents interpreting them differently hence adjustments accordingly. Reliability measures the relevance and correctness of the instruments (Mugenda and Mugenda, 2003).

After piloting, the internal consistence procedure was used to determine the reliability of the instruments. This was determined from scores obtained from a single test administered to a sample of subject. A score obtained in one item was correlated with scores obtained from other items in the instrument. Finally, Cronbach Alpha Reliability coefficient value was computed to determine how items correlate among themselves. The threshold value acceptable in this study was 0.783 which was higher than an alpha of 0.7 according to Fraenkel and Wallen (2000) and Mugenda and Mugenda (2003). On the basis of the results of piloting process, the instruments were then duly modified to meet performance standards before being used for actual data collection.

2.7 Data Collection Procedure

The researcher obtained a research permit and a research authorization letter from the National Commission for Science Technology and Innovation before embarking on data collection process as dictated by ethics. The instruments were administered through personal visits to the Nzoia Sugar Company Limited where the questionnaires were administered in the presence of the researcher after agreeing on the dates and then collected personally or by use of research assistants. The researcher took time to explain any issues arising from the research instruments.

2.8 Model Specification

The study used multiple linear regression analyses. Linear regression was used to test relationship between variables due to linear relationship between the variables. The

following regression model was used for quantitative procedures examining the relationship between independent and dependent variables;

$$y = \alpha + \beta_1 + \beta_3 X_3 + \varepsilon$$

Where;

Y = Firm performance

α = constant

β_1, \dots, β_3 = Regression Coefficients

X_3 = Technological capabilities

ε = the error of term.

3. Data Analysis, Presentation and Discussion

3.1 Questionnaire Response Rate

A representative sample of 210 employees participated in the research. 180 respondents completed the questionnaires properly and returned them to the researcher giving a response rate of 86%.

3.2 Demographic Characteristics of the Respondents

The background information of the respondents included gender, age, education and number of years worked for the company. The results were as discussed below

3.3 Gender of the Respondents

The first part of the background information was on the gender of respondents. The results revealed that 62.2 % of the respondents were male while the remaining 37.8% were female. This indicates that majority of employees in Nzoia Sugar Company are male as compared to female. The results are as shown in the Table

Table 3.1: Gender of the Respondents

Gender	Frequency	Percentage
Male	112	62.2
Female	68	37.8
Total	180	100.0

Source: Research data, 2016

3.4 Age of the Respondents

The second part established the age of the respondents. The results revealed that 20% of the respondents were aged between 18 to 24 years, 3.7% were aged between 25 to 34 years, 22.8% were between 35 to 47 years while the remaining 25.6% were 48 years and above. The results reveal that majority of the respondents were aged between 18 to 47 years. Lopez et al., (2006) found out that age of employee has a significant effect on organizational capabilities. The most affected capability was technical capabilities where old guards were found to less interested as compared to managerial capability. The results were as shown in Table 3.2.

Table 3.2: Age Distribution

Age Distribution	Frequency	Percentage
18-24 years	36	20.0
25- 34 years	57	31.7
35-47 years	41	22.8
48 and above	46	25.6
Total	180	100.0

Source: Research data, 2016

3.5 Sampling Adequacy

The study further used Kiser Meyer-Olkin (KMO) test of sampling adequacy thereby determining validity of research instrument and Bartlett's test of Sphericity is used to test the strength of the relationship among variables. This enabled the study identify whether the items were appropriate for further analysis. The Table below shows Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett's test of Sphericity.

Table 3.3: Sampling Adequacy

Variable	KMO Test	Bartlett's Test of Sphericity			Determinant
		Approx. Chi-Square	df	Sig.	
Customer Service mgmt.	0.764	423.846	28	0.000	0.089
Marketing capabilities	0.717	465.629	36	0.000	0.071
Technological capabilities	0.728	340.347	10	0.000	0.145
Management capabilities	0.731	372.946	15	0.000	0.120
Performance	0.821	423.535	35	0.000	0.089

The test results show that the scales had values above the threshold of 0.4 as established by Williams *et al.*, 2012): Customer Service management (0.764), Marketing capabilities (0.717), Technological capabilities (0.728), Management capabilities (0.731) and performance (0.821). Williams et al (2012) stated that KMO of 0.50 is acceptable degree

for sampling adequacy with values above 0.5 being better. Bartlett's Test of Sphericity which analyzes if the samples are from populations with equal variances produced p-values less than .05 ($p < .001$) thus indicating an acceptable degree of sampling adequacy. Customer Service management had a chi-square value of 423.846 ($p < .01$), marketing capabilities (465.629, $p < 0.01$), technological capabilities (340.347, $p < 0.01$), management capabilities (372.946, $P < 0.01$) and performance (423.535, $p < 0.01$). Determinant values are more than 0: Customer Service management (0.089), Marketing capabilities (0.071), Technological capabilities (0.145), Management capabilities (0.120) and performance (0.089). Thus, it was acceptable to proceed with the analysis.

3.6 Effect of Technological Capacity on Firm Performance

Adoption of new technology such as IT is an enabler of process innovations from the perspective of the adopter in the implementation succeeds, the routines are changed and the new system is actually utilized. The third objective of the study was to assess the effect of technological capabilities on the performance of the firm. The objective tested the third hypothesis of the study which posits, H_03 : There is no significant relationship between technological capabilities and the performance of the firm. This was achieved through correlation and simple linear regression analysis at significance level of 0.05. The results are as discussed below

3.7 Descriptive Results of Technological Capacity

The employees were asked questions on five aspects of Technological Capabilities. Table 4.12 gives the percentage of respondents who responded to each of the questions according to the Likert scale of 1-5 where 1-SD (Strongly Disagree), 2-D (Disagree), 3-U (Undecided), 4-A (Agree) and 5-SA (Strongly Agree). The results are as shown in Table 4.12

3.8 Descriptive statistics of Technological Capability

Question(s)	SD (%)	D (%)	U (%)	A (%)	SA (%)
Every staff is IT compliant	0(0)	2(1.1)	31(17.2)	41(22.8)	106(58.9)
Internet penetration in the organization is high	0(0.0)	2(1.1)	20(11.1)	24(13.3)	134(74.4)
The organization carries out e-marketing and e-procurement.	5(2.8)	3(1.7)	18(10)	25(13.9)	129(71.7)
There is reduced hiring of staff due to internet penetration.	1(0.6)	1(0.6)	14(7.8)	47(26.1)	117(65)
Technological capability is the main competitive advantage of the firm	2(1.1)	2(1.1)	47(26.1)	50(27.8)	79(43.9)

Source: Research Data, 2016

From the Table above, the response on every staff is IT compliant had 22.8% agreed while 58.9% strongly agreed. The second response on internet penetration in the organization is high scored 13.3 % agreed while 74.4% strongly agreed. The response on the organization carries out e-marketing and e-procurement had 13.9 percent agreed while 71.7 percent strongly agreed. The question on here is reduced hiring of staff due to internet penetration had 26.1 % who agreed while those who strongly agreed were 65%. Other response on technological capability is the main competitive advantage of the firm recorded 27.8% as agreed while 43.9% was strongly agreed.

The interview revealed that company has been up scaling various technological capacity of the firm by acquiring modern information technology equipment, hiring technical capacity individual in key areas of the firm. The most notable area has been the integration of ICT in the management of firm. The ICT has been integrated in financial management which has hastened procurement process and also reduced fraud which manual system had some deficiency. However, finding the required technical expert in the area has been difficult as some of them demand huge salary which in the long run becomes unsustainable to the company. Further, most of the ICT skills and equipment are affected by technological development. This indicates that firms need to spend a lot of funds to remain abreast.

3.9 Inferential Results for Technological Capabilities

In order to determine whether technological capabilities had any effect on firm performance, the study tested the following null hypothesis:

H₀₃: There is no significant relationship between technological capabilities and firm Performance. The researcher used the correlation (r) and regression (beta, β) to test this hypothesis. The test criteria is set such the study rejects the null hypothesis H₀₃ if $\beta_1 \neq 0$, otherwise the study will have failed to reject H₀₃ if $\beta_1 = 0$. To test the hypothesis, mean of firm performance (P) was correlated with mean of technological capabilities.

Table 4.13: Correlation results of technological capabilities and firm performance

Model	R	R ²	Adj. R ²	B	SE	β	t	df	F	Sig.
Constant				2.037	0.180		11.299			0.000
TC	0.673	0.453	0.450	0.587	0.048	0.673	12.153	1,179	147.688	0.000

Predictors: (Constant), technological capabilities

The correlation results between the mean of technological capabilities and the mean of firm performance (P) had $r=0.673$ at $p=0.00$. The results revealed technological capabilities had a statistically positive and significant effect on firm performance. This

implies that increase in technological capabilities would results to increase in performance. Therefore the third null hypothesis is rejected since $P < 0.05$ and confirm that there is significant relationship between technological capabilities and firm performance.

The results in the Table 4.13 show that 45.3% of the firm performance can be explained by technological capabilities ($r^2 = 0.453$). From the ANOVA results the F test gave a value of $F(1, 179) = 147.688$, $p < .01$, which was large enough to support the goodness of fit of the model in explaining the variation in the dependent variables. It also means a technological capability is a significant predictor of performance. The relationship followed a simple regression model of the nature:

$$Pf = 2.037 + 0.587TC$$

Where Pf is the firm performance, α is the constant intercept of which in our case is 2.037 and beta $\beta_1 = 0.587$ and TC is technological capabilities. This suggests that an increase in technological capabilities by one unit would results to significant increase in firm performance by 0.587. In the hypothesis criteria, we were to reject H_0 if $\beta_1 \neq 0$. However, from this results, the value of beta $\beta_1 = 0.587$ and yet $0.587 \neq 0$. The study therefore rejects the null hypothesis and conclude that there is significant relationship between technological capabilities and firm performance.

The correlation analysis results revealed that increase in technological capability would results to increase in firm performance. There has been mixed outcome in relation to this findings. Latip (2012) indicated that there is an association between technological capability and the inter-firm relationship performance and Oya et al. (2010) revealed that technical capability accounted for 34.9% of change in performance. However, Hartog and Verburg, (2004) findings indicated that technical capabilities taken as innovativeness was not found to be related to firm performance.

4. Summary, Conclusions and Recommendations

The study intended to assess the effect of technological capabilities on the performance of Nzoia Sugar Company Limited. The study targeted the 210 employees of Nzoia Sugar Company. Firm performance was determined using market share, sales & revenue. Data was collected using questionnaires and interview then analyzed by use descriptive (Frequency & percentage) and inferential (Correlation and Regression) with significance level of 0.05 with aid of SPSS (20). The results revealed that the increasing competition through globalization has put sugar firms under considerable pressure through the

rapid spread of information and communication technologies and ever decreasing prices for communication, markets in different parts of the world become more intergrated.

Results illustrated that technological capabilities had a statistically positive and significant effect on firm performance with $r=0.673$. The results show that 45.3% of the firm performance can be explained by role of marketing capabilities ($r^2 = 0.453$). An increase in technological capabilities by one percent will result to significant increase in performance by .372. From our descriptive analysis and findings from other studies there is a positive effect of information technology and firm performance. After interviews the research found out that Information Technology plays an important role in developing other other firm capabilities ie customer service, process management and performance management. This in turn favourably influence customer, financial and human resources and organizational effectiveness measures of firm performance. After interviews the research noted that among key managerial implications senior managers at Nzoia Sugar Company Limited are focussing on creating necessary conditions for developing Information Technology infrastructure to assist meet the challenges.

The study recommended that there was need for organization to develop customer care capability that would enable the staff to interact with customers and other stakeholder at all level. This would ensure, all customer needs are addressed promptly and there is uniformity in customer care services, further the study recommended that there was need to set a substantial budget for technical capability. Majority of the firms fail to be technical capable because the technical field is highly dynamic. By setting sufficient budget, organization would be able to adopt most current technologies which would result to increase in performance. Suggestions for further research was made as highlighted

- i). Study should be replicated to other sugar manufacturing firms to confirm if same results could be obtained
- ii). Moderating effect of organizational factors on the relationship between organizational capabilities and firm performance.

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