

Influence of Information Communication Technology (ICT) Capabilities on Firm Performance of Manufacturing Entities in Kenya

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Abstract: Information Communication Technology is an integrative subject, which is an important determinant of operational excellence in any manufacturing entity. The purpose of manufacturing is to produce value in form of products and services, through different processes and activities, which are performed by a network of organizations both upstream and downstream. These processes form an integrated supply chain where raw materials are converted into final finished products for the end consumer. It is absolutely essential for manufacturing entities to be thoroughly aware of the information communication technology capabilities and understand the impact that it might exert on the overall performance of the organization. Therefore, the objective of this study was to investigate the influence of Information communication technology capabilities on firm performance of manufacturing entities in Kenya. The population of interest for this study was manufacturing firms within Nairobi and its environs. A sample of 69 manufacturing entities was randomly selected to participate in this study. Data was collected using questionnaire. Descriptive and inferential statistics was used aided by Statistical Packages for Social Sciences version 24 to compute the response. The study recommends that the management of manufacturing entities should exploit Information communication technology capabilities on the day to day operation with the aim of ensuring financial viability and a competitive edge over other market competitors thus attaining superior firm performance.

Keywords: Information communication technology capabilities, firm performance and manufacturing entities.

1. INTRODUCTION

Manufacturing is viewed as the leading edge of modernization and skilled job creation, as well as a fundamental source of various positive spillovers (Tybout, 2000). The purpose of manufacturing is to produce value in form of products and services, through different processes and activities, which are performed by a network of organizations both upstream and downstream. These processes form an integrated supply chain where raw materials are converted into final finished products for the end consumer (Zhu & Sarkis, 2006). Supply chain management (SCM) advocates for the integration and coordination of business processes and strategy alignment throughout the supply chain for purposes of satisfying end-consumers in the supply chain.

The supply chain is an entire network of entities, directly or indirectly interlinked and interdependent in serving the same consumer or customer. In manufacturing and supply chain management it is fundamental to possess and employ certain skill sets, knowledge and competencies with regards to supply chain management. The skills, prowess, knowledge and competencies are what are referred to as supply chain capabilities. Supply chain capabilities are the abilities to perform or achieve certain actions or outcomes through a set of controllable and measurable faculties, features, functions, processes,

or services. The capabilities may entail aspects such as procurement capability, inventory management capabilities, administrative capabilities, logistics capabilities, integrated logistics management services capabilities, distribution and warehousing capabilities and transport capabilities (Morash, 2001).

The manufacturing sector has a great potential on promoting economic growth and competitiveness in Kenya. It is the third leading sectors contributing to GDP in Kenya. The sector has experienced the fluctuations over the years under different financial conditions. It experienced the lowest real GDP growth rates in 2008 to 2009 as 1.7 percent in 2008 and improved to 2.6 percent in 2009 (East African Community Facts and Figures – 2010, March Issue, 2011). The Kenyan manufacturing industry continues to grow from strength to strength despite challenges in the operating environment. Currently the manufacturing industry in Kenya contributes 14% to the country's gross domestic product and employs over two million people (KAM, 2015).

Problem statement:

Manufacturing is extremely important for the modernization of any country. It is the main activity that split the developed world from the developing one. According to an economic survey of 2016 undertaken by the Kenya National Bureau of Statistics (KNBS, 2016), The manufacturing sector's contribution to Gross Domestic Product (GDP) improved marginally to 10.3 per cent in 2015 compared to 10.0 per cent in 2014. The sector grew from 3.2 per cent recorded in 2014 to 3.5 per cent in 2015. The growth was partly attributed to reduced cost of inputs such as petroleum products and electricity. However, this growth is significantly lower in comparison to developing countries that are more conversant with the employment of supply chain competencies to the operations such as China, Japan, Malaysia, Korea and Singapore. According to the United Nations Industrial Development Organization (UNIDO, 2015), China's manufacturing output rose by 6.5 per cent in the fourth quarter of 2015. Among other developing countries, a strong growth of 12.4 per cent was registered by Viet Nam. Industrial production also grew by 5.3 per cent in Bosnia and Herzegovina in the fourth quarter of 2015 on a year-to-year basis.

In order to succeed as a brand manufacturer, it is important to create and maintain an efficient and effective supply chain all the way to the consumer (Kumar, 2008). Therefore, the performance of a manufacturing entity is influenced by the supply chain capabilities in place. Ganeshkumar and Nambirajan (2013) suggested that supply chain competitiveness strongly influences the organizational performance of the manufacturing firms, while the competitiveness of the manufacturing firms is strongly influenced by supply chain competence and supply chain practices of the manufacturing firms. Information communication technology is a supply chain capability aspect. Therefore, the purpose of this study is to investigate the influence of Information communication technology capabilities on firm performance of manufacturing entities in Kenya.

Objective of the study:

The objective of this study was to determine the influence of Information communication technology capabilities on firm performance of manufacturing entities in Kenya.

Hypothesis:

H₀ There is no significant correlation between Information communication technology capabilities and firm performance of manufacturing entities in Kenya.

2. LITERATURE REVIEW

The study was focused on Dynamic capabilities theory and Resource-Based View Theory.

Dynamic capabilities theory:

The term "dynamic" refers to as "the capacity to renew competences so as to achieve congruence with the changing business environment; this is relevant in situations where time to market is critical and the nature of competition is difficult to determine". Capabilities are referred to as "the key role of strategic management in appropriately adapting, integrating and reconfiguring, internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment". Dynamic capabilities theory was first introduced to explain firm performance in dynamic business environments, focusing on the capabilities that firms employ to reach competitive advantage (Beske, Land, & Seuring, 2014). The function of dynamic Capabilities seemingly work towards the goal of achieving sustainable competitive advantage in dynamic business environments. The manufacturing function operates in

an ever changing environment. Therefore, in an attempt to maintain a competitive advantage over other firm; manufacturing entities should employ information communication technology capabilities that are advance and in conformity with the emerging trends in manufacturing and operations.

The dynamic capabilities theory explains that the way organizations develop firm specific competences to respond to changes in the business environment is ultimately related to the firm's business processes, market positions, and opportunities (Teece, 2014). These three factors form the basis for determining DC's. *Processes* encompass the way things are done in organizations and they have three roles; coordination, learning and reconfiguration. *Positions* define specific endowments of technology, intellectual property, complementary assets, customer base, and its external relations with suppliers and complementors. *Paths* refer to the strategic alternatives available to the firm; these are defined by path dependencies and technological opportunities. The organizational processes that are shaped by a firms asset positions and paths, explain the essence of the firms DC's and its competitive advantage. The competitive advantage that is accompanied by these capabilities can be attributed to the fact that firm specific assets such as values, culture and organizational experience cannot be traded in the market. This implies that distinctive competences and capabilities must be built within the firm (Teece et al., 1997). The fact that DC's cannot be bought suggests that a firm's behavior is unique and hard to replicate. Teece et al. (1997) argue that competitive advantage through competences can only generate rents if they are based on a collection of routines, skills, and complementary assets that are difficult to imitate.

Resource-Based View Theory:

The RBVF is a theoretical perspective that attempts to describe, explain, and predict how firms can achieve a sustainable competitive advantage through acquisition of and control over resources. Resources, according to the RBVF, include both tangible (e.g. equipment) and intangible (e.g. process knowledge) assets (Grant, 1991) that facilitate the production and delivery of goods and services. Firms seek to acquire and exert either permanent or semi-permanent control over resources that can provide a competitive advantage over competitors. Because firms may exert different levels of control over different types of resources, they would differ in terms of the collective whole – commonly referred to as bundle of resources (Barney, 1991) or resource endowment – that would be available to them (Amit & Schoemaker, 1993). These differences, in turn, should lead to different product and/or service attributes that ultimately account for the firms' competitive position (Schulze, 1994).

Barney (1991) and Peteraf (1993) have discussed, in more specific terms, the five explicit characteristics of a resource that would allow firms to attain a sustainable competitive advantage. First, the resource must be valuable in that it improves firm efficiency and/or effectiveness. Second, the resource must be rare so that by exercising control over it, the firm can exploit it to the disadvantage of its competitors. Third, the resource must be imperfectly imitable to prevent competitors from being able to easily develop the resource in-house. Fourth, the resource must be imperfectly mobile to discourage the ex-post competition for the resource that would offset the advantages of maintaining control of the resource. Fifth and last, the resource must not be substitutable; otherwise, competitors would be able to identify different, but strategically equivalent, resources to be used for the same purpose. Information communication technology can be viewed as a resource to the manufacturing entity that possess proficiency in information communication technology. Therefore, manufacturing entities should attempt to incorporate information communication technology capabilities that are valuable to the firm, rare to come by, imperfectly mobile, not imitable by competitors, and not substitutable (or simply VRINN) provide the firm with a sustainable competitive advantage thus enhancing firm performance.

Information Communication Technology capabilities:

Information Communication Technology can be defined as a family of technologies used to process, store and disseminate information, facilitating the performance of information-related human activities, provided by, and serving both the public at-large as well as the institutional and business sectors (Salomon & Cohen, 1999). The role of Information Communication Technology (ICT) is viewed as critical within the economic challenges faced by government and businesses, whether small or large. ICT's importance is often conflated with viable and competitive businesses (Levy & Powell, 2003). The same applies to the field of manufacturing and the entire supply chain, Information communication technology is highly fundamental to the competitiveness and overall success of a manufacturing entity. The effective use of ICT provides companies with competitive advantage. In SCM, ICT is highly regarded as a major enabler in achieving effective SCM. As a supply chain spans many organizations in delivering products to customers both upstream and downstream and many functional areas within a company, the implementation of IT allows companies to increase

communication and coordination of various value adding activities with their partners and between functions within their own operations (Simchi-Levi et al., 2003).

It is more than obvious that the introduction of new technologies in Information and Communication has changed the way business is conducted has changed through the introduction and widespread use of ICT. It is indisputable that information and communication technology has an enormous effect on contemporary business (Zhang 2011). On the one hand, applications of ICT have resulted in many new business models often put under the umbrella of “new economy” or more skeptically the dotcom boom. Some of these have resulted in stable companies, like Amazon. ICT has resulted in a plethora of new tools that might support operations management and supply chains. Virtually no large business exists without having some type of ERP system or using EDI; email and internet are common for almost every company; while new technologies such as RFID emerge. The influence of ICT has been as an inspiration for new business and as an enabler of a fast flow of information to support operations and supply chain management.

In addition, advance development of the Internet technology offers significant opportunities for cost reduction, increasing flexibility, increasing response time, and improving customer services (Lancioni et al., 2000; Lee & Whang, 2001). Sanders and Premus (2002) empirically found that ICT provides significant contribution to organizations’ performance and competitive advantage when it is well linked with firms’ competitive priorities. Through case study research, Chae et al. (2005) found that the impact of ICT in supply chain collaboration depends on the existing nature of relationship between partners. ICT will improve collaboration and coordination between supply chain members in the environment where trust and long-term commitment between partners exist. Therefore, information communication technologies has an enabling effect on the day to day operates of a manufacturing entity. It leads to a high degree of collaboration, communication and coordination which are crucial to the performance of an entity.

Firm performance:

There are various definitions of performance such as: the ongoing monitoring and reporting of program accomplishments, particularly progress towards target goals which is conducted by program or agency management (Nadkarni & Narayanan 2007). Malina and Selto (2004) defined performance as a set of tools that are developed for making better decisions within an organization. Firm performance refers to how well an organization achieves its market-oriented goals as well as its financial goals. Two other aspects must be considered when attempting to define performance: its time frame and its reference point. It is possible to differentiate between past and future performance; past superior performance does not guarantee that it will remain superior in the future (Carneiro, 2005). Another issue related to time is the duration of the interval (short, medium or long term) considered.

Firm performance has a direct influence on the stakeholders since they possess ownership and control of the entity; therefore, it is prudent to consider the stakeholders approach in defining and understanding firm performance. The stakeholder theory offers a social perspective to the objectives of the firm and, to an extent, conflicts with the economic view of value maximization. The use of stakeholders’ satisfaction as firm performance was also adopted by a large number of different authors: (Richard et al., 2009). Besides offering a way to decide what performance is in a comprehensive way, the use of this theory allows one to resolve the issue of differentiating between performance antecedents and outcomes. Performance measures assess the satisfaction of at least one group of stakeholders. This conceptualization of firm performance is applicable across different companies, as remarked by Carneiro, Silva, Rocha, & Dib (2007), allowing one to differentiate between high and low performers in the eyes of each stakeholder.

Superior financial performance is a way to satisfy investors and can be represented by profitability, growth and market value (Cho & Pucik, 2005). These three aspects complement each other. Profitability measures a firm’s past ability to generate returns (Glick et al., 2005). Growth demonstrates a firm’s past ability to increase its size. Increasing size, even at the same profitability level, will increase its absolute profit and cash generation. Larger size also can bring economies of scale and market power, leading to enhanced future profitability. Market value represents the external assessment and expectation of firms’ future performance. It should have a correlation with historical profitability and growth levels, but also incorporate future expectations of market changes and competitive moves.

Customer and employee satisfaction are two further aspects to consider. Customers want companies to provide them with goods and services that match their expectations (Fornell, Johnson, Anderson, Cha, & Bryant, 1996). To do that, companies must understand their needs, avoid defects and improve the perceived quality and value added by their offerings. Customer satisfaction increases the willingness-to-pay and thus the value created by a company (Barney & Clark, 2007). Employees’ satisfaction is related to investments in human resources practices. This group tends to value

clearly defined job descriptions, investment in training, career plans and good bonus policies (Harter, Schmidt, & Hayes, 2002). The satisfaction of these stakeholders, translates itself into a firm’s ability to attract and retain employees and lower turnover rates.

According to Ganeshkumar and Nambirajan (2013) firm performance can be measured by the following factors: Market share, Sales growth, Profit margin, Overall product quality, Overall competitive position, Average selling price, Return on investment and the Return on sales. The approach in measuring firm performance can be divided into two categories which are financial measures and non-financial measures. Alternative, firm performance can be measured by financial measures and strategic measures. Non-financial measures include aspects such as customer satisfaction, employee satisfaction, environmental performance, social performance, efficiency, effectiveness and relevance. In line with the above literature, financial measures and non-financial measures will be adopted to measure organizational performance in this study.

3. RESEARCH METHODOLOGY

The study was a descriptive survey as it was concerned with describing the characteristics of manufacturing entities with regards to supply chain capabilities. The population of interest for this study was 680 manufacturing firms within Nairobi and its environs. A sample of 69 manufacturing entities was randomly selected to participate in this study. Both primary and secondary data was used for the study. Primary data was collected using questionnaires covering on the influence of procurement capabilities on firm performance while Secondary data consisted of publications and literature related to procurement and supply chain management.

4. RESEARCH FINDINGS AND DISCUSSION

Response Rate:

Orodho,(2003) defines response rate as the extent to which the final data sets includes all sample members and is calculated as the number of respondents with whom interviews are completed and divided by the total number of respondents in the entire sample including non-respondents. The researcher distributed a total of 69 questionnaires. Out of the 69 questionnaires, 59 were filled and returned, representing a 86% return rate as shown in table 4.1 which was a good representation and sufficient to make generalizations. This response rate confirms to Mugenda (2008) stipulation that a response rate of 50% is adequate for analysis; a rate of 60% is good and a response rate of 70% and over is excellent.

Information communication technology capabilities:

Respondents were asked different questions with an aim to establish the influence of Information communication technology capabilities on firm performance of a manufacturing entity in Kenya. Their responses were rated on a 5 points likert-scale in which they either stated Not at all, small extent, moderate extent, large extent and very large extent. Thus, in this study the scale of not all and small extent meant disagree while large and very large extent meant agreed. The results were, expressed as percentages, as shown in the table below.

Measurement of ICT capabilities:

Information Communication Technology Capabilities	NAT (%)	SE (%)	ME (%)	LE (%)	VLE (%)	Mean	Std. Deviation
E-trading	9	12	35	32	12	3.26	1.11
Enhanced communication	0	5	39	30	26	3.77	0.91
Efficient and effectiveness of operations management	0	7	26	33	33	3.93	0.94
Computerization and Automation of process	4	11	28	26	32	3.72	1.13

Key: NAT-Not at all; SE-Small Extent; ME- Moderate Extent; LE-large Extent; VLE- Very Large Extent

On E-trading the 35% of the responded indicated that it influences firm’s performance to a moderate extent, 32% of the respondents suggest that E-trading influences a firm’s performance to a large extent while 12% indicate that E-trading influences a firm’s performance to a very large extent. When probe on the influence of enhanced communication on the firm performance of manufacturing entities, 56% agreed that enhanced communication influences firm’s performance,

39% suggested that enhanced communication influences firm's performance to a moderate extent and 5% of the respondents indicated that enhanced communication does not influence firm performance.

Efficient and effectiveness of operations management influences the firm performance of a manufacturing entity. Majority (66%) of the respondents indicated that efficient and effectiveness of operations management influences firm performance to a large extent and a very large extent, 26% of the respondents indicated that efficient and effectiveness of operations influences firm performance moderately. In addition, majority of the respondents 58% agreed that computerization and automation influences firm performance. More specifically, 32% of the respondents indicated that computerization and automation of process influences firm's performance to a very large extent while 26% indicated that the computerization and automation of processes influences a firm's performance to a large extent. A moderate number of the respondents indicated that computerization and automation influences firm performance to a moderate extent and 11% of the respondents indicated that it influences firm performance to a small extent.

The study revealed that Information Communication Technology (ICT) capabilities influence the firm performance of a manufacturing entity. This was evident in the computation of the overall mean response which was relatively high (73.4%), with an overall mean response of 3.67. This finding is supported by Sanders and Premus (2002) who found out that ICT provides significant contribution to organizations' performance and competitive advantage when it is well linked with firms' competitive priorities.

Test of hypothesis:

The researcher conducted regression analysis so as to establish the influence of Information Communication Technology capabilities on firm performance of manufacturing entities in Kenya. The hypothesis tested was:

H₀ There is no significant correlation between Information Communication Technology capabilities and firm performance of manufacturing entities in Kenya.

The linear regression model shows $R^2 = 0.397$ which means that 39.7 percent change of performance of the manufacturing entities in Kenya can be explained by a unit change of information communication technology capabilities. The result is shown in the table below.

Model Summary of information communication technology capabilities:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639 ^a	.408	.397	.73150
a. Predictors: (Constant), Information Technology				

Out of the results there is an indication that one unit change in information communication technology capabilities translates to 39.7 percent change in performance of manufacturing entities in Kenya therefore, information communication technology capabilities has an influence on how manufacturing entities perform.

Further test on ANOVA shows that the significance of the F-statistic 0.00 is less than 0.05 as indicated in the table below. This implies that there is a positive significant relationship between information communication technology capabilities and firm performance.

ANOVA of Information communication technology:

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.997	1	20.997	39.240	.000 ^b
	Residual	30.501	57	.535		
	Total	51.498	58			
a. Dependent Variable: Firm performance						
b. Predictors: (Constant), Information Technology						

Further test on the beta coefficients of the resulting model, the constant $\alpha = 0.238$, if the independent variable of information communication technology capabilities is held constant then there will be a positive performance of the manufacturing entity in Kenya by 0.238. The regression coefficient for information communication technology capabilities was positive and significant ($\beta = 0.597$) with a t-value=6.264 (p-value<0.001) as shown in the table below. These findings concur with Flynn et al. (2010) who found out that performance improvement in that theoretical

perspective stems from the interaction between ICT and SCM. In other words, SCM is modeled as a moderator of the relationship ICT and SC performance.

Coefficients of information communication technology:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.238	.095		2.505	.015
	Information Technology	.597	.095	.639	6.264	.000
a. Dependent Variable: Firm performance						

This implies that for every 1 unit increase in information communication technology capabilities, performance of the manufacturing entities in Kenya is predicted to increase by 0.597 units and therefore H₀ is accepted. This result revealed that information communication technology capabilities contributed positively towards the performance of organizations.

5. CONCLUSION AND RECOMMENDATIONS

Based on the results of the study, it could be concluded that information communication technology capabilities had a positive significant linear relationship with the firm performance of manufacturing entities Kenya. This relationship was established using Pearson correlation coefficient. The study inferred that there was a strong positive relationship between information communication technology capabilities and the firm performance of manufacturing entities in Kenya. Therefore, if information communication technology capabilities were implemented throughout the entire supply chain it could result in enhance firm performance of a manufacturing entity. Also, the study concludes that manufacturing firms in Kenya continuously strive to ensure that e-trading is implemented, communication enhanced, efficient and effectiveness of operations management and computerization and automation of processes. In addition, the study found out that information communication technology capability was the most crucial factor to the success of the manufacturing function. Thus, the study concluded that information communication technology capabilities can enhance the firm performance of manufacturing entities.

The study recommends that it would be appropriate for the management of manufacturing entities to exploit that information communication technology capabilities on the day to day operation with the aim of ensuring a competitive advantage over other market competitors thus attaining superior firm performance. Mastering the supply information communication technology s can lead to other operational benefits such as efficiency and effectiveness in other support function such as human resource, finance, auditing and marketing.

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