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Effects of IT capability on Performance of Manufacturing Firms in Nairobi City County Kenya

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Abstract. Although manufacturing firms support economic development, wealth creation and poverty alleviation, a dismal performance has been reported. In Kenya, the share of gross domestic product (GDP) from manufacturing sector has remained below 10 per cent while its growth rate remained at about 5 percent in the last 10 years. This has been attributed to low innovation and technology diffusion. This study examined the effects of IT capability on firm performance. The study was anchored on Resource Based View, and Dynamic Capability Theory. Positivism philosophical approach, descriptive and explanatory research design were adopted. Using stratified and random sampling techniques, a sample of 222 manufacturing firms from Nairobi City County, was obtained. A semi-structured questionnaire was prepared and used for data collection. To ascertain reliability, Cronbach's alpha coefficient measure of 0.875 was obtained. Research experts confirmed validity of the study instrument. The data was analysed through descriptive statistics to condense the survey data. To test hypotheses, inferential statistics was used. The results showed a positive significant effect of IT infrastructure capability ($\beta=0.247$, $p=0.005 < 0.05$), IT personnel capability ($\beta=0.226$, $p=0.044 < 0.05$), IT management capability ($\beta=0.187$, $p=0.018 < 0.05$) and IT reconfiguration capability ($\beta=0.291$, $p=0.001 < 0.05$) on performance. The study findings also exhibited a 49.2 per cent explanatory power of IT capability on firm performance. Study findings provide a framework for improving firm performance. Subsequently, firm managers should create interventions on IT capability to enhance and sustain superior firm performance.

Keywords. IT capability, Firm Performance, Manufacturing firms

1. Introduction

The manufacturing sector is globally recognised as the engine of overall economic growth and development. This sector is an important driver for industrialization which in turn distributes the benefits of its development by accelerating growth in other sectors of the economy thereby improving the overall welfare of citizens (Jara & Escaith, 2012). This sector is critical in promoting sustainable economic development, raising capital and creating employment. Manufacturing sector also plays a key role in building competitiveness through exports. Competitive manufacturing firms diffuse the economic growth to other activities making the firms lead in poverty alleviation and prosperity.

Performance enable firms to grow and progress Gavrea, Ilies & Stegorean (2011). The notion of performance is uncertain as scholars agree on its lack of universal definition. While

some scholars agree that performance is a function of time in an organizational context, others presume that performance is a firm's potential in exploiting its resources and subsequently achieving its goals and objectives (Fairoz *et al.*, 2010). According to Čater & Pučko (2010), firm performance is the ability to sustain competitive position amongst competitors as well as creating wealth for its owners. According to Laviolette (2019); Nath *et al.*, (2010), concerns raised over firm performance and its dependence on IT capabilities were acknowledged. In developing economies, the effect of IT capability on performance was found to be unclear as noted by Liang *et al.*, (2010).

IT capability refers to the capacity to mobilize IT-based resources. Chae *et al.*, (2014) opined that firms with high IT capability surpassed their competitors in a study where performance was operationalized as a measure of profit and cost. However, despite the widely held belief that technology plays a key role in firms' performance, considerably less attention appears in the empirical evidence on the interaction between technological capability on firm performance (Bharadwaj & Grover, 2016). Further, Parida (2016) posited that IT capability is necessary for the survival and growth of firms through internal use, collaboration and communication use while Oh, Yang & Kim (2014), were of the opinion that firms need to find a proper fit amid IT capabilities, IT systems and performance. Moreover, Bharadwaj & Grover (2016) opined the inconsistent empirical evidence to demonstrate the influence of the IT capability on performance.

IT infrastructure refers to shared resources consisting of platform technologies such as hardware, operating systems, networks, telecommunication, data and core software applications. IT infrastructure capability enable firms to evolve, spread out and preserve information systems as the business environment and market demands and procedures change. Anand *et al.*, (2013) noted that IT infrastructure capability evolved independently integrating with new technologies to support changes in aligning IT resources to business strategies.

IT personnel capability is the ability to acquire technical skills to provide effective management of Information systems, their synergy and collaboration with users. Kim (2010) was of the opinion that growing such a knowledgeable forces progress gradually making it difficult for competitors to imitate over a short life span. Bhatt & Grover (2005b) asserted that firms with strong IT human capabilities effectively integrate IT and business planning processes, conceived and developed reliable and cost effective applications which then support business needs, better than their competitors.

IT management capability refers to skills used to align business strategy and IT strategy to enhance performance. According to Peppard (2007), IT management capability involve managing of personnel, administration of IT resources and development of initiatives to provide sustainable performance. Kim *et al.*, (2011) asserted that IT management capability aligned IT resources to business.

IT reconfiguration capability refers to firms' ability to creatively recombine resources and technologies building new products and applications. According to Danneels (2007), technology leveraging examine new technologies to gain an understanding on their potential contribution to new business markets and to satisfy customer needs. Isobe *et al.*, (2008) posited that reconfiguration capability would improve long term strategic performance through setting up new base competences to extract new solutions that can satisfy customer needs.

1.2 Statement of the problem

The performance of manufacturing firms in Kenya in terms of the GDP, has shown a decline from 11.8 per cent in 2011 to 7.7 per cent in 2018 (KNBS 2019). Equally, a slow growth

rate has been noted dropping from 11.8 per cent in 2011 to 7.7 per cent in 2018 (KNBS 2019). In terms Kenya's competitive industrial performance (CIP) index showed a declining trend from 0.0136 in 2009 to 0.0093 in 2017. For these firms to remain relevant in national development, there is need to come up with strategies which will help in building sustainable performance.

Scholars have raised concern over the scanty empirical evidence on the IT capability effect on performance. Bharadwaj & Grover (2016) opined the inconsistent empirical evidence to demonstrate the influence of the IT capability on performance. However, Ashrafi & Mueller (2015) asserted that firms with superior IT capability had improved survival and growth implying that they performed better than their rivals. Rai, Patnayakuni & Seth (2006) observed that IT resources could not create sustainable firm performance on their own. The lack of consensus has led to calls for more empirical studies to identify the mechanisms through which firm's IT capability can develop and sustain superior performance (Chae Koh & Prybutok, 2014).

1.3 Study Objectives

The general objectives of the study was to establish the effect of IT capability on performance of manufacturing firms in Nairobi City County. The specific objectives of the study were to:

1. Explore the effect of IT infrastructure capability on performance of manufacturing firms in Nairobi City County, Kenya.
2. Establish the effect of IT personnel capability on performance of manufacturing firms in Nairobi City County, Kenya.
3. Investigate the effect of IT management capability on performance of manufacturing firms in Nairobi City County, Kenya.
4. Determine the effect of IT reconfiguration capability on performance of manufacturing firms in Nairobi City County, Kenya.

1.4 Study Hypothesis

H₀₁: There is no significant relationship between IT infrastructure capability and performance of manufacturing firms in Nairobi City County, Kenya

H₀₂: There is no significant relation between IT personnel capability and firm performance.

H₀₃: There is no significant relation between IT management capability and performance of manufacturing firms in Nairobi City County, Kenya

H₀₄: There is no significant relation between IT reconfiguration capability and performance of manufacturing firms in Nairobi City County, Kenya

1.5 Significance of the study

The findings provide knowledge to new entrants in the industry on ways of achieving and sustaining high firm performance in business. The study offers academic; policy and practice implications to help researchers and scholars in their quest to increase general knowledge and provide literature for future studies. This study to a great extent assists the managers when making strategic decisions concerning firm performance with respect to technology. Additionally, the study provides a theoretical foundation to support the value of IT. The Chief Executive Officers and IT managers will benefit from the study outcomes as it addresses the role of IT capability in leveraging performance enhancement.

2. Literature Review

2.1 Theoretical literature

The study was anchored on dynamic capability theory (DCT) which evolved from resource-based theory (RBV) and which emphasizes on IT capability as firm's ability to effectively reconfigure technology-based resources. RBV theory was proposed by (Barney, 1991; Wernerfelt, 2013). It was derived from theory of the growth of firms proposed by Penrose (1996) and theory of expansion of firms proposed by Rubi (1973). RBV rather focuses on organizational resources being rare, valuable and difficult to duplicate and substitute subsequently enabling firms to gain a competitive edge which makes them perform better than their rivals.

Dynamic capability theory draws its tenets from organizational routine, core competences, capabilities and rigidity. Teece, Pisano & Shuen (1997) proposed the Dynamic Capability Theory in support of firm's capacity to deploy, build, renew and reconfigure firm competences and achieve congruence within the business. Anand & Wamba (2013) argued that continuous refreshing of bundles of firm resources produced synergetic effects. Additionally, dynamic capability theory aims at providing a lens to study how firms can achieve sustainable performance through IT-based resources.

2.2 Empirical Review

Tallon & Pinsonneault (2011) that showed IT infrastructure capability impacted positively on firm performance. Cano & Baena, (2015) asserted that building IT capabilities using technological and organizational resources significantly influenced firm performance. However, Fink (2011) opined that IT infrastructure capability effect on firm performance was inconclusive.

Makhloufi, Yaacob & Yasmin (2018) explored the effect of IT personnel capability on competitive position in furniture industries in developing countries and found that IT personnel capability affected performance. Kariuki, Obonyo & Ogutu (2018) conducted a study to explore the effect of human resource capability on competitive advantage in firms listed in Nairobi Securities exchange. A census of 62 firms was carried out and data collected from human resource managers. The data put through multiple regression analysis revealed that human resource capacity created a competitive edge over competitors. The survey used a small number of firms hence the results cannot be generalized.

Arokodare, Asikhia & Makinde (2020) in a study on IT capability and performance of oil and gas marketing companies in Lagos State Nigeria, revealed a significant relationship between IT management and non-financial performance. Arokodare, Asikhia & Makinde (2020) in a study on IT capability and performance of oil and gas marketing companies in Lagos State Nigeria, revealed a significant relationship between IT management and non-financial performance. A survey research design with a target population of 515 retail filling stations owned by 7 firms was deployed. A structured questionnaire was used to collect data from depot/station managers. The study was grounded on resource-based view. Non-financial performance factors were not considered in the study.

Mutsembi (2019) conducted a study examining the effect of reconfiguration capability on performance in the Kenyan manufacturing industry. The study was grounded on dynamic capability view an approach that would establish whether firms influence their performance by integrating, building and reconfiguring their resources and competences. The study adopted a descriptive cross sectional design. Data was collected through a census within 27 listed manufacturing firms in Nairobi securities exchange and a structured questionnaire was used to

collect primary data. Two dimensions of performance were used namely: product effectiveness and process efficiency. Reconfiguration capability reduced performance. A limitation of the study is that a very small sample of manufacturing firms was used in the study hence, the results cannot be generalized.

2.3 Conceptual framework

The study proposed a conceptual plan in which it was hypothesized that IT capability affect the performance of manufacturing firms. The study adopted the conceptual framework shown in Figure 1 as guided by the literature review. In the framework, IT capability was operationalized in terms of IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability guided by the following hypotheses. The indicators of firm performance were sales growth, market focus and customer retention.

Independent variables

Dependent variable

Figure 1: A conceptual model showing the interaction between IT Capability and Performance of Manufacturing firms (Source: Author 2020)

3. Methodology

This study used descriptive, explanatory and cross-sectional research design as recommended by Serakan & Bougie (2009). The descriptive research design is used to obtain whole data which are contextual and detailed for testing hypotheses. An explanatory research design provides the reasons why an interaction between the aspects of a phenomenon exists. It also helps generalize the results obtained from the sample survey. Additionally, cross sectional design requires that questionnaires are administered to a huge number of respondents within a short time. The researcher obtained a sample of manufacturing firms from Nairobi City County, through stratified sampling design within the 13 sub-sectors defined by Kenya Association of Manufacturers (KAM) using the following formula.

To obtain the correct sample size, Bixley & Yamane (1965) formula was applied on the 526 manufacturing firms in Nairobi City County as per KAM directory 2018.

At 96 per cent confidence, the sample size was computed as per the following formula $n = N / 1 + N (e^2)$, Where N represents the total population size, n is the sample size and e is the level of precision. Applying the formula to a population of 526 firms, 222 firms were obtained. $n = 526 / 1 + 526(0.05)^2$. The sample size of 222 manufacturing firms, spread through the defined strata based on their individual percentage strength.

Primary data was collected from the Company's managing director, production managers and chief information officers using a semi-structured questionnaire.

4. Analysis and Findings

4.1 Reliability of the research instrument

Reliability was tested from the pilot survey from a sample of 15 manufacturing firms an overall Cronbach's Alpha coefficient of 0.875 was obtained. This value surpasses the threshold of 0.7 recommended by (Field (2013a). Internal consistency was therefore confirmed. The questionnaire items on all the variables were declared reliable.

4.2 Response Rate Analysis

222 questionnaires were distributed to the respondents and 160 were returned. From this number, 140 were dully filled while 20 were incomplete. This corresponds to a response rate of 63.1 per cent which is acceptable for analysis and reporting as recommended by Babbie (2010).

4.3 Characteristics of the Informants

Table 1 exhibits a summary of the characteristics of the informants.

Table 1. Informants' characteristics

Respondents position	Frequency	Percent
Company Managing Director	17	12.1
Chief information Officer	76	54.3
Production Manager	47	33.6
Total	140	100.0
Age		
18-29	35	25.0
30-39	55	39.3
40-49	38	27.1
50-59	12	8.6
Total	140	100.0
Gender		
Female	17	12.1
Male	123	87.9
Total	140	100.0
Work Experience		
Less than 5 yrs	9	6.4
5-10 yrs	26	18.6
11-15 yrs	38	27.1
Above 15 yrs	67	47.9
Total	140	100.0
Education Level		
Diploma	9	6.4
Degree	113	80.7
Postgraduate	18	12.9
Total	140	100.0

(Source: Survey Data, 2020)

66.4 % of the respondents were aged between 30- 49 years with 87.9 % being males while the remaining 12.1 % were females. Majority (over 70 %) had a work experience of over 10 years while over 80 % had a first degree or a higher level of education.

4.4 Firm demographics

Table 4.2 shows the firm demographics where approximately 90 per cent of the firms were over 10 years old with 23.6 per cent in the range of 11-20 years, 22.1 per cent from 21-30 years, 23.6 per cent from 31-40 years and lastly 26.4 per cent being in existence for over 40 years. The respondent obtained from small, medium and large manufacturing firms with 31.4 per cent from small and medium enterprises, 32.9 per cent from medium sized firms and 35.7 per cent from large sized firms. Firm's annual turnover was 22.1 per cent for less than 100 million, 38.6 per cent in the range 100-500 million and 39.3 per cent with an annual turnover of over 500 million. Further, 6 per cent reported no/minimal automation, 75 per cent semi-automation and 19 percent full automation. 62.86 per cent had installed Enterprise Resource Planning Systems (ERPs) while the remaining 37.14 percent had not. This implies that their internal functions are not integrated leading to inefficient supply chains.

On the other hand, only 19 per cent of the firms reported full automation while 75 per cent reported semi-automation. Lastly, 37.1 per cent didn't have ERPs (Enterprise Resource Planning Systems) implying that their internal functions are not integrated and their supply chain might be inefficient.

Table 2: Firm Demographics

Firm age	Frequency	Percent
Up to 10 yrs	6	4.3
11-20 yrs	33	23.6
21-30 yrs	31	22.1
31-40 yrs	33	23.6
over 40 yrs	37	26.4
Total	140	100.0
Number of Permanent Employees	Frequency	Percent
1-49	44	31.4
50-99	46	32.9
over 100	50	35.7
Total	140	100.0
Annual Turnover	Frequency	Percent
Less than 100 million	31	22.1
100-500 million	54	38.6
Over 500 million	55	39.3
Total	140	100.0
Level of Automation	Frequency	Percent
Low/Manual	8	6
Semi-automation	105	75
Full Automation	27	19
Total	140	100.0
Installed ERPs		
Yes	88	62.86
No	52	37.14

Total 140 100.0

(Source: Survey Data, 2020)

4.5 Diagnostics test

To confirm the normality of the sample population for the study, histogram and normal probability plots (P-P) of residuals were used. The histogram showed the residual distribution was approximately normal with the P-P plots falling approximately on a straight diagonal line. These results confirmed normality as recommended by Huizingh (2012). The correlation coefficients for variables were in the range 0.441-0.687. This range is within the recommended acceptable range of between 0.3 and 0.9. Regression results can therefore be accepted as recommended by Hubbard (2009). Kaiser-Meyer-Olkin test (KMO) was used to determine the sampling adequacy. The p values obtained from the test were greater than 0.5 as recommended by (Malhotra & Dash, 2013) implying that the proportion of variance in the variables arose from the underlying factors. Multicollinearity was ruled out because the tolerance values for all variables were above 0.1 and the VIF values were below 10 as recommended by Creswell & Poth (2017). The test for heteroscedascity using Breusch-Pagan test yielded p values which were above 0.05 for all the explanatory variables and therefore met the homoscedastic state recommended by Garson (2012).

4.6 Hypothesis test results

The hypothesis tested stated that IT capability has no significant effect on firm performance.

Table 3 Regressing IT Capability on Firm Performance

Model Summary						
Model	R	R ²	Adjusted R ²	Std error of estimate	R ² change	Sig.
1	0.704 ^a	0.495	0.492	0.06667	0.495	0.000

a. Dependent Variable: Firm Performance

b. Predictors: (Constant), IT capability (IT infrastructure, IT personnel capability, IT management capability, IT reconfiguration capability)

(Source: Survey Data 2020)

As reflected in Table 3, the adjusted R square was 0.492, indicating that IT capability explained 49.2 per cent of performance variation. However, a low explanatory power of IT capability on firm performance which was 49.2 per cent was reported indicating that there were other factors which contribute to the variation of firm performance which were not part of this study.

Analysis of variance results are reflected in Table 4.

Table 4. ANOVA

Model		Sum of squares	df	Mean squares	F	Sig
1	Regression	0.489	1	0.489	135.475	0.000 ^b
	Residual	0.498	138	0.004		
	Total	0.987	139			

(Source: Survey Data 2020)

The results in Table 4 showed an F change of $F(1, 138) = 135.475$, $p = 0.000 < 0.05$ which was deemed significant at 95 per cent confidence level implying a statistically significant effect of IT capability on firm performance.

Table 5 shows the findings for model regression coefficients.

Table 5. Regression Coefficients

Model	Unstandardized coefficient		Standardized coefficient		t	Sig.	Collinearity statistics	
	B	Std. error	β				Tolerance	VIF
(Constant)	.075	.067			1.118	.266		
IT infrastructure capability	.247	.085	.231	2.885	.005		.581	1.721
IT personnel capability	.226	.111	.165	2.038	.044		.564	1.773
IT management capability	.187	.078	.183	2.404	.018		.643	1.556
ITreconfigurationcapability	.291	.086	.288	3.374	.001		.510	1.960

(Source: Survey Data 2020)

Performance of manufacturing firms = $0.075 + 0.247$ (IT infrastructure capability) + 0.226 (IT personnel capability) + 0.187 (IT management capability) + 0.291 (IT reconfiguration capability) + ϵ

The regression coefficient results in Table 5 indicated the regression model coefficients for each indicator of IT capability namely: IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability. The findings showed that the beta coefficient of IT infrastructure capability was 0.247 and was significant at $p = 0.001$. Hence, one unit change in IT infrastructure capability produced a 0.247 variation in performance. This relationship was significant at $p < 0.05$ indicating that IT infrastructure capability significantly predicts firm performance. The outcome concurs with earlier empirical studies by Ahearne (2014); Barney (2015); Bharadwaj (2000) who posited that firms invested heavily in IT resources to influence performance.

The findings implied that the beta coefficient of IT personnel capability was 0.226 and was significant at $p = 0.044$. Hence, one unit change in IT personnel capability produced a 0.226 variation in performance. This relationship was significant at $p < 0.05$ stipulating that IT personnel capability significantly predicts firm performance. The results are consistent with those of Jared, Oloko, Orwa (2015); Byrd *et al.*, (2004) who asserted that IT personnel need to be knowledgeable about the key success factors in their institutions so that they can cope up with changing business demands. Makhoulfi, Esmail, Al-Erjal (2017) asserted that IT personnel capability was critical in utilizing IT resources for the purpose of enhancing firm competencies, growth, survival and sustainable competitive advantage in Malaysian SMEs furniture Industry.

The findings alludes that the beta coefficient of IT management capability was 0.187 and was significant at $p = 0.018$. Hence, one unit change in IT management capability produced a 0.187 variation in performance. This relationship was significant at $p < 0.05$ implying that IT management capability positively and significantly predicts firm performance. The findings correlate with studies conducted by Jared, Oloko & Orwa (2015); Hines (2006) who concluded that IT management capability offered effective business support to top management enabling them to align business with IT strategies. Mckeen & Smith (2008); Fieldman & Pentland (2003)

concluded that IT management capability would help oversee the deployment of IT resources to provide more elaborate business value.

The findings exhibited that the beta coefficient of IT reconfiguration capability was 0.291 and was significant at $p = 0.001$. Hence, one unit change in IT reconfiguration capability produced a 0.291 variation in performance. This relationship was significant at $p < 0.05$ meaning that IT reconfiguration capability positively and significantly predicts firm performance. The results obtained from regression model resonate with Jared *et al.*, (2015) who opined that IT reconfiguration capability supports firms in coping up with changing business environment by aggravating its impact on firm's IT systems to support development of new products, services and business processes.

5. Conclusions and policy implications

The study established that the four indicators of IT capability correlated significantly and positively to firm performance. IT capability increases the performance of manufacturing firms significantly. The positive effect of the indicators of IT capability namely IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability increase the performance measure through sales growth, market focus and customer retention. Manufacturing firms should therefore invest in enhancing the four IT capabilities for sustenance of superior performance. From dynamic capability theory perspective, firms that can configure their resources faster than their rivals have greater market opportunities and can achieve superior performance. Corporate managers/owners of manufacturing firms should focus on leadership in designing technology and production innovations policies in order to improve their firms' performance. Firm owners and managers of manufacturing firms should lay more emphasis on IT capability when formulating their firm's IT strategies. IS and business practitioners should acknowledge that IT investment should be spear-headed by acquisition of IT infrastructure capability, skilled personnel and management but also IT reconfiguration capability.

5.1 Areas for further research

The study showed that IT infrastructure capability, IT personnel capability, IT management capability and IT reconfiguration capability explains 49.2 per cent of variation in performance of manufacturing firms in Nairobi City County. The study therefore recommends that further study should focus on the other factors accounting for the remaining 50.8 per cent of the variation in performance of manufacturing firms. Secondly the study proposes that future study should focus on the performance of organizations within the service sector in Kenya. Thirdly, future studies should focus on other organizational strategies that can enhance performance of manufacturing firms. A future survey can focus on a longitudinal study to be able to generalize the results.

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