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An Empirical Study of the Influence of Information Technology Infrastructure on Supply Chain Performance of Public Universities in Kenya

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Abstract

Organizations are becoming seemingly productive through the adoption and utilization of integrated information systems by use of enabling technologies. This has become possible through creating seamless supply chains linkages by suppliers to customers in order to eliminate poor performance of suppliers, unpredictable customer demands, and uncertain business environment. The purpose of the study was to empirically ascertain the influence of information technology infrastructure on supply chain performance of public universities in Kenya. Information technology plays a critical role in organizational performance by enabling information flow which enhances supply chain robustness and resilience for efficiency. The study was guided by the Collaborative Network Theory (CNT). Information technology infrastructure was hypothesized to have a significant influence on supply chain performance of public universities in Kenya. The study adopted descriptive census survey. A self-administered questionnaire was distributed to 31 public universities in Kenya targeting 62 heads of procurement and Information Communication Technology departments. The response rate was 81 per cent. Descriptive statistics, correlation and regression techniques were used to analyze the data. The results of the study indicate that information technology infrastructure positively influences supply chain performance in public universities in Kenya. Hence the conclusion that information technology infrastructure influences the supply chain performance of public universities. The study has contributed to the existing body of knowledge on the role of information technology infrastructure on supply chain management of organization. The implementation of the study findings can enhance supply chain operational performance. The study recommends that public universities should invest in information technology infrastructure not only in their institutions but also in partnership with suppliers and other stakeholders so as to streamline end to end operations in the supply chain.

Keywords: information technology infrastructure, supply chain performance, public universities

INTRODUCTION

Globalization and rapid technological change, and the turbulence in market environments have fostered organizations to look for strategies that would enable them establish and sustain a competitive advantage in their markets. Information technology infrastructure capabilities and supply chain management practices are at the apex of the firms' competitive capability. Information technology infrastructure enables firms to develop closer inter-firm relationships within the supply chain as part of sustaining competitive advantage. Evidence indicates that, increasingly, organizations realize the importance of engaging in strategic collaboration in order to survive in the current dynamic business environment. Hence, the huge advancement of Supply Chain Management Practices and logistic research has resulted in the change of nature of competition in business from company-to-company to supply chain-to- supply chain (Samadi and Kassou, 2016).

Supply chain management is a critical determinant of firms' competitiveness and has attracted increasing attention by scholars and practitioners who have tried to link supply chain performance with other firm's capabilities and resources. Information Technology is defined as a critical factor to enhance the supply chain performance, and the huge advances in information technology over the past two decades enabled the emergence of modern supply chain management (Ye and Wang, 2013), with its power to provide timely, accurate, and reliable information (Samadi and Kassou, (2016) to enhance collaboration and integration between partners, and to improve the

agility and flexibility of both the focal firm and the partners in the supply chain. The positive effects of IT on supply chains' performance have been approved by many researchers (Jin and Vonderembse, 2014) while other researchers indicated that there was no real consensus about how that maintenance of competitive advantage was related to IT capabilities, there is a productivity paradox in information technology (Sadraoui, Tarek, and Mchirgui,2014). As the research area of IT productivity in supply chain performance matures and the number of related studies increases, it is important to review and analyze related works to provide an overview of their research issues, and their findings, to systematically identify research challenges and gaps that require more attention from both researchers and practitioners.

Organizations engage in developing inter-firm relationships, especially within the supply chain, to create more effective links with their trading partners. Technology enhances the ability of universities to apply technological knowledge in creating and delivering innovative products that satisfy customers' needs which in turn affect their overall performance (Latip, Salleh, Omar, and Yaakub, 2013).

Purpose of the Study

The purpose of the study was to empirically ascertain the influence of information technology infrastructure on supply chain performance of public universities in Kenya.

Statement of Problem

Kaibara de Almeida, Marins, Salgado, Santos, and Luis da Silva (2015) posit that managing supply chains have become complex due to dynamics in the environment and rapid growth in technology. Modgil & Sharma (2017) established that effective coordination of supply chain management practices is critical in enhancing competitiveness of an organization. Attia (2018) identified five different integration approaches and established that companies with comprehensive supply chain integration- with suppliers and customers exhibited superior performance improvement. Hall, Algiers, & Levitt (2018) proposed that well-integrated supply chains create value for the shareholders by decreasing costs and increasing market share. Integration practices of supply chains help to elevate the linkages within each component of the chain and facilitate better decision making to get all the pieces of the chain to interact in a more efficient way. More seriously, the failure of SCM would incur actual negative impacts on the operational continuity and sometimes even threaten the very survival of the firms involved in the supply chain.

According to Sáenz, Revilla & Acero (2018) the average percentage of global companies are reporting losses of revenue due to failures in supply chains that increased from 28% in 2011 to 42% in 2013. Therefore, supply chain integration practices advocates for integrated behaviors, mutually sharing of information, mutually sharing of risks and rewards, cooperation, the same goals and the same focus on serving customers, integration of processes, and building and maintaining long term relationships with supply chain partners (Tolmay & Badenhorst-Weiss, 2015). Other studies found no sufficient evidence to support a significant positive relationship between SCM and firms' performance, and some researchers even found a negative relationship between SCM and performance (Kumar & Kushwaha, 2018).Therefore from these findings none of these studies have investigated the role of information technology infrastructure on supply chain performance of public universities in Kenya, which the study needs to investigate.

Null Hypothesis of the Study

For the purpose of the study the following null hypothesis was tested; Information technology infrastructure has no significant influence on supply chain performance of public universities in Kenya.

Specific Objective of the Study

The specific objective of the study was to empirically examine the influence of information technology infrastructure on supply chain performance of public universities in Kenya.

Limitation and Opportunities for Further Research

The study adopted a cross-sectional survey research design in which data was collected once at a single point in time. The one-time survey was adopted due to the constraints of cost and time. Although cross-sectional studies are helpful in getting insights into aspects of variables, perceptions vary over time and thus cross-sectional studies have limitations in determining causal relationships. The study was used quantitative analysis. Qualitative data from respondents was ignored as the questionnaire used was closed ended, this could have had a bearing on the narrative.

This study was conducted in public universities in Kenya. Universities fall under service sector and may differ with private universities and to a large extent differ with manufacturing firms in that they are more technological and scale intensive while service firms are more skill intensive. Thus, manufacturing firms are likely to be different from service firms in supply chain management practices. Hence the findings of this study may not be generalizable to manufacturing firms. Further, countries differ in terms of contextual factors such as economic conditions and technological advancements. These contextual differences may affect levels of capabilities and

performance. Hence, because of these contextual differences across countries, the findings of this study conducted in Kenya, may not be generalizable to other countries with different contextual conditions. This study used two respondents in each firm to collect data; and the respondents were mainly heads of procurement and ICT. Single respondent studies are prone to single respondent bias which may affect the validity of the study.

Significance of the Study

The significance of this study was to contribute to the existing body of knowledge in the area of supply chain management with emphasis on the role of information technology infrastructure with a bearing on supply chain performance of public universities. The study will enhance the frontiers of knowledge on how internal and external infrastructure integration of information technology can be positioned to enhance customer service and internal operational dimensions of organizations to spur the growth of supply chain performance. The study was timely in the sense that the Kenya Government has taken drastic measures on mismanagement of supply chain operations in all government functions. The findings of this study can be used to inform formulation and implementation of policies geared towards the creation of robust and agile supply chain management policies, procedures, guidelines and practices to among other things enhance the operations of public university operations in Kenya in particular and other organizations in general.

LITERATURE REVIEW

Theoretical Review: Collaborative Network Theory

The effectiveness of the cooperation between and organization and its stakeholders is a key determinant to firm's performance (Festel, De Nardo and Simmen, 2014). The Collaborative Network Theory (CNT) is used as the foundation of the reciprocal effect in inter-firm relationships. Firms choose more integrative management styles with a focus on collaborations along the supply chain as a whole in order to remain competitive abandoning the antagonistic approach (Aschhoff, 2018). The interaction between the different firms and other players in the tiers of the supply chain is vital due to conflicting members' interests and the interests of the whole supply chain (Von Haartman, and Bengtsson, 2015). An effective relationship among supply chain partners can help facilitate a combination of the resources owned by the firms. Resource combination results in better outcomes than those achieved by a single firm acting alone. CNT argues that the value of the resources can be expanded by its combination with other resources, then building effective inter-firm relationships within the network or supply chain can be more important than resource possessions per se (Festel, De Nardo and Simmen, 2014).

The significant contribution of CNT to the determination of the inter-firm relationships is the role played by supply chain partners who yield to trust through supply chain collaborations such as communication as well as mutual adoption of management systems and culture hence the firms' performance. According to Festel, De Nardo and Simmen,(2014) by establishing information sharing and collaborative communication, firms can build the relationships with their supply partners through the social exchange process to improve their performance In CNT, a network is believed to be in a state of dynamic momentum, rather than a point of optimal equilibrium (Kembro and Naslund, 2014). The collaborations between firms and their supply chain partners aim to govern such dynamics that include exchange process, information, products, and technical, legal. In supply chain management CNT has been applied to map the supply chain in terms of activities, actors and flows of resources. The main focus of CNT is to develop long-term relationships by building mutual trust between supply chain partners (Kaisaris de Almeida et al., 2015). The study adopts CNT collaboration aspects in assessing information technology infrastructure integration capabilities of universities.

Empirical Review

Information Technology Infrastructure

In the recent past, researchers and practitioners have given much attention to the topic of information technology infrastructure. Information technology infrastructure is the extent to which a firm has established information technology capabilities for the consistent and high-velocity transfer and information sharing within and across the supply chain boundaries.

Previous studies posit that information technology infrastructure comprises a group of shared, tangible information technology resources that enable present and future business applications (Turek, 2013). In the current turbulent market environments, a flexible information technology infrastructure can instantaneously deliver rapid results and support sustainable growth (Tiwari, Tiwari, and Samuel, 2015). Information technology infrastructure supports rapid data-driven innovation, knowledge-sharing, and relational coupling with supply chain partners and enables flexible processes often considered a primary goal of information technology application adoption, such as Enterprise Resource Planning (ERP) or Electronic Data Interchange (EDI). ICT impacts both internal process and external integration by increasing the flow of relevant information among process participants by shaping closer supplier and customer relationship. Based on a survey of 127 companies in China Peng, Quan, Zhang, and Dubinsky, (2016) also empirically

confirmed that a firm's capability to manage both internal and external business processes fully mediate the impact of Information Technology on performance.

Information Technology Infrastructure and Supply Chain Performance

According to Tina (2013) Johnson and Johnson Company faced new business pressures when large customers, such as Wal-Mart and K-mart, made new demands on the company basing on cost savings and just-in-time stock replenishment. The company's business and IT managers acted in partnership to develop a new set of information technology infrastructure capabilities that enabled the company to provide the necessary services for its large customers while at the same time reducing costs at Johnson and Johnson Company (Wagner and Bode, 2014). Charles Schwab focused on delivering customized information to its investors in a timely manner by using the company's information technology infrastructure and applications aligned with its business focus that had made Schwab became a full service beverage firm. Due to this, the firm was able to provide information and process transactions in meeting its business objectives.

This made her Customers' to retrieve stock quotes and place orders via Schwab's Web site, which made the corporation to be an industry leader (Wagner and Bode, 2014). Tina, (2013) opines that the capability building processes and actions in firms tie information technology infrastructure capabilities with the development of customer management capability. Better information technology infrastructure capabilities enable firms to position their information technology assets and data and information services to capture information about customers as well as disseminate information to customers through the internet, virtual communities and personalized information channels (Deepak and Saji 2016). The perspective of an integrated information technology infrastructure enables consistent and real-time transfer of information between supply chain management related applications and functions that are distributed across partners. The integrated information technology infrastructures for supply chain management can be blended with inter-organizational processes to develop higher order capabilities for demand sensing, operations, workflow coordination, and global optimization of resources.

The Information Technology infrastructure capability offers the appropriate support for process by providing the reach and connectivity to design and manage processes that connect the firm with its customers. A high level of information technology infrastructure enables firms to design metrics and analytics to provide visibility into the real-time performance of various processes. The integration between the various processes and advance warnings about performance degradation in processes and finally a high level of information technology infrastructure capability enables faster and more responsive redesign and reconfiguration of processes to enable responses to changes in business conditions (Tiwari, Tiwari, and Samuel, 2015). Information technology can be used as a tool for addressing challenges in handling diverse data and information (Tina, 2013). For developing economies like Kenya adoption of ICT can be an efficient way to remove barriers that hinder economic development.

Literature illustrates that ICT has a major role in public management reform since it enhances the quality of public service and at the same time reduce time and cost of transaction. According to Ali and Sassi, (2016) e-government in public institutions helps in reducing corruption levels and realization of Millennium Development Goals (MDGs). From a purely economic point of view ICT adoption helps improve public productivity and efficiency together with good governance. Ali and Sassi (2016) argue that e-government can enhance service delivery.

Internal integration involves cross functional teams that may bring together a carefully selected array of specialists who share information and make product, process, and manufacturing decisions, jointly and simultaneously (Otchere Annan, and Anin, 2013). Internal integration is defined as a process of inter-functional interaction, collaboration, coordination, communication and cooperation that bring functional areas together into a cohesive organization (Wagner and Bode, 2014). Organizations with a low internal integration strategy will achieve low level of external integration and organizations implementing the full internal integration strategy will have the highest levels of external integration (Otchere Annan, and Anin, 2013).External supply chain integration reveals two major areas of emphasis: Customer Integration (CI) and Supply Integration (SI). Supplier and Customer integration interactions and collaborations ensure an effective flow of products and services to customers. (Wagner and Bode, 2014). CI involves sharing demand information, help the manufacturer to understanding better the customer needs and to forecast better customer demand, as well as collaborative involvement of customers with respect to product design, provision of better quality products at lower cost and more flexibility in responding to customer demand (Tiwari et al., 2015).

Supply Chain Performance of Public Universities in Kenya

The public universities in Kenya are incorporated through an Act of Parliament under the Universities Act, 2012 for governance and accreditation of universities. Universities in Kenya are regulated by

the Commission for University Education (CUE) which is a sole regulatory which is the successor of the Commission of Higher Education that was established in 1986 by an Act of Parliament, University Act, CAP 210B. According to the Commission for University Education (GoK- CUE, 2017), Kenya has 31 accredited public universities. The public universities generate broader economic growth in terms of creation of employment opportunities, creation of innovation and diversification of the income generating paradigms through research. Universities nurture graduates, unlock and harness new knowledge, build cultural and political understanding. Universities being public entities usually get funds from government grants, donations, bursaries, students' fees and tuitions payments hence without an effective supply chain practice would lead to poor financial and operational performance.

Supply chain activities in the public universities continue to evolve both conceptually and organizational in order to enhance their performance (Lufunyo, 2013). According to Fourie and Poggenpoel (2017) performance is a contemporary issue that applies to all organizations both private and public and profit and non-profit organization and in order to be more effective and efficient in an ever-changing environment, the public universities have to reform. Supply chain performance is defined as the ability of the supply chain to deliver the right product to the correct location at the appropriate time at the lowest cost of logistics (Gunasekaran, Subramanian and Rahman 2015).

The qualitative measures are customer satisfaction, flexibility, information and material flow integration, effective risk management, and supplier performance. Most studies agree that this is because of the lack of agreement on its levels and components (Zhang and Huo, 2013). There is emphasis on efficiency, transparency, accountability in university processes and operations in order to enhance organizational flexibility and excellence. There are indications that supply chain integration would add value to the operations hence promoting high organizational performance in public universities (Singh, Sohani, Marmat, 2013).

Conceptual Framework

As shown in Figure 1, supply chain performance of public universities as the dependent variable, information technology infrastructure is variable. This was conceptually hypothesized as Information technology infrastructure has significant influence on supply chain performance of public universities in Kenya

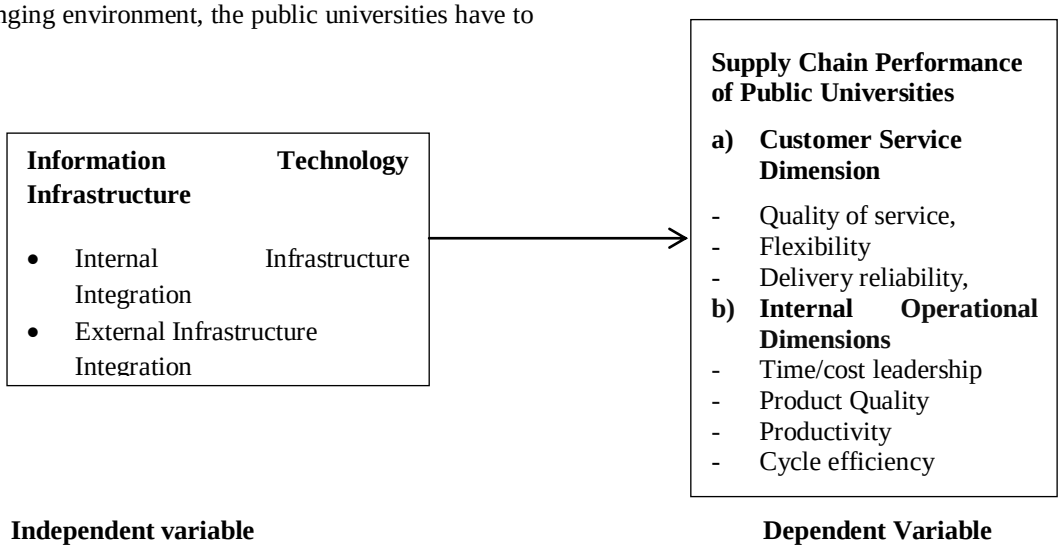

Figure 1: Conceptual Framework

Conceptual Hypothesis of the Study

Based on the objective of the study and the literature reviewed, the conceptual hypothesis formulated for the study was that, information technology infrastructure has a significant influence on supply chain performance of public universities in Kenya.

MATERIALS AND METHODS

Research Design

This study adopted a positivism approach. Positivism involves theory testing and the key argument of positivist orientation is that the world exists externally, and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, replication or instinct (Hyett, Kenny, and Dickson-Swift, 2014). Positivists argue that true knowledge is scientific in character and describes interrelationships between real and observable phenomenon. Positivist orientation is related to the quantitative approach, a research strategy or general orientation to conduct research (Rahman, 2017). The study adopted descriptive survey design and a census of all 31 public universities in Kenya to collect relevant data which

was used to determine the correlation between the variables of the study.

Population of the Study

The target population consisted of heads of procurement and Information Communication Technology departments totaling to 62 respondents form all the public universities in Kenya. The census approach was justified since according to Saunders, Lewis and Thornhill, (2016), data gathered using census contributes towards gathering of unbiased data representing all individuals' opinions in the study population on a study problem.

Instrumentation: Reliability and Validity

A structured questionnaire was self-administered in the process of collecting data. A pilot, validity and reliability study was done. Instrument validation was achieved through validity and reliability measures. A pre-test was done, on the basis of the pre-test response, the instrument was adjusted appropriately. Validity which indicates whether the instrument is testing what it should was done through examination of content to determine whether it covered a representative sample of the measurement items.

Validity can be assessed using expert opinion and informed judgment (Gujarati, Porter and Gunasekar, 2013). The Cronbach Alpha was calculated to test for reliability. The Cronbach's Alpha coefficient was used to measure the internal consistency of measurement scales. This is a scale measurement tool, which is commonly used in social sciences to establish the internal consistency of items or factors within and among variables of study. Saunders, Lewis, and Thornhill, 2016) argues that an alpha coefficient of .700 or above is an acceptable measure. Information technology infrastructure had a Cronbach Alpha coefficient of .941 and supply chain performance of public universities had .934 this indicates that the data collected using the above mentioned instruments was reliable for analysis.Validity tests were also carried out to determine the extent to which the instrument measured what it was designed to. Validity is the ability of the research questionnaire or instrument to measure what is intended to measure in terms of accuracy and meaningfulness (Saunders, Lewis, and Thornhill, 2016).

It is a classic evaluation criterion used in science, referring to the extent to which conclusions drawn in a study provide an accurate description or explanation of what happened. There are a variety of validity tests including face to face validity, content validity, construct validity, criterion (predictive) validity and convergent validity. For this study, construct validity and face to face validity tests were adopted. This is because these tests measure the extent to which the set of questions (scale items) measure the presence of the target constructs (Abdolshah, 2013).

Face to face validity was dealt with by discussing the questionnaire with experts in procurement and ICT who confirmed their understanding of what the questions sought to measure. The researcher used expert judgment from a few lecturers of the Technical University of Kenya and the supervisors and the researcher's cohort in the respective departments. Ambiguous, double edged and sensitive questions were cleaned, sorted or dropped. Construct validity on the other hand, was assessed using a factor analysis in order to observe how well the individual measures reflected their constructs.

The factors were rotated using the Varimax Rotation Method while Principal Component Analysis method was employed to extract the factors. All the variables in the study were found to be un-dimensional and valid indicators of the constructs they were to measure. ANOVA and confirmatory factor analysis using statistical packages was used. Correlation and multiple regression and hierarchical regression analysis was done to establish statistical significance and relationships between variables.

Data Collection Procedures

The researchers obtained permission to collect data from the National Commission for Science, Technology and Innovation (NACOSTI). After obtaining permission from the respective university, the drop and pick method was used, where the questionnaire was left with the responded and picked after it had been filled.

Data Analysis and Presentation

The simple linear regression model used was; $\mathbf{Y= \beta_0 +\beta_1 X_1+ \varepsilon}$, where, **Y**= supply chain performance of public universities (Dependent Variable); $\boldsymbol{\beta_0}$ = Intercept; $\boldsymbol{\beta_1}$= Coefficient; $\mathbf{X_1}$ = information technology infrastructure (Independent Variable); and, $\boldsymbol{\varepsilon}$ = Error term.

Ethical Considerations

The researchers obtained a research permit from the National Commission for Science, Technology and Innovation (NACOSTI) to undertake the study. Authority was also sought from and granted from the Technical University of Kenya. The researchers also sought consent from the respondents before data was collected and guaranteed the respondents of confidentiality of information provided.

FINDINGS AND DISCUSSION

The study used both descriptive and inferential statics for data analysis. Regression analysis was used to establish the relationship between the variables and to test the hypothesized relationship. The value of coefficient of determination R^2 shows the degree or

amount of variation in the dependent variable attributed to the predictor variable. The Beta values show the amount of change in the dependent variable attributable to the amount of change in the predictor variable, and the F ratio measures the model fit, or simply it is a measure of how well the equation line developed fits with observed data. The statistical significance of each hypothesized relationship was interpreted based on R^2, F, t, β and p values.

Table 1 Regression Results of Information Technology Infrastructure and Supply Chain Performance

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Information technology infrastructure	.657[a]	.431	.419	.42170

b) ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
Information technology infrastructure	Regression	6.474	1	6.474	36.406	.000[b]
	Residual	8.536	48	.178		
	Total	15.010	49			

c) Combined coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.479	.392		3.771	.000
Information technology infrastructure	.608	.101	.657	6.034	.000

a. Dependent Variable: Supply chain performance
b. Predictors: (Constant), Information technology infrastructure

The objective of the study sought to establish the influence of information technology infrastructure on supply chain performance of public universities in Kenya. The composite index was computed for both the variables attributes and the hypothesis tested through simple linear regression analysis. It was hypothesized that information technology infrastructure has significant influence on supply chain performance of Public universities in Kenya. The regression results in Table 1 indicate that the relationship between information technology infrastructure and supply chain performance of public universities was significant (R Square = 0.431, F = 36.406, P < 0.05). The results show that 43% of the changes in supply chain performance are attributed to information technology infrastructure. The F Ratio shows that the regression of information technology infrastructure on supply chain performance is statistically significant a p < 0.05, which is evidence of the goodness of fit of the regression model.

The beta was significant (β = 0.656, t = 6.034, p < 0.05) the beta value suggests that for one unit increase in the use of information technology infrastructure, supply chain performance increase by 0.656 or 66 per cent. Based on the regression results, the relationship between information technology infrastructure and supply chain performance is positive and statistically significant.

The results are consistent with Tina (2013) who argued that capability building processes and actions in firms tie information technology infrastructure capabilities with the development of customer management capability. Another study by Deepak and Saji (2016) also argues that better IT infrastructure capabilities enable firms to position their IT assets and data and information services to capture information about customers as well as disseminate information to customers through the internet, virtual communities and personalized information channels. Han, Wang, and Naim (2017) argues further that IT infrastructure capability offers the appropriate support for process by providing the reach and connectivity to design and manage processes that connect the firm with its customers' suppliers; another significant business partners and that a high level of IT infrastructure enables firms to design metrics and analytics to provide visibility into the real-time performance of various processes, the integration between the various processes and advance warnings about performance degradation in processes. It is therefore expected that such integrated Information Technology infrastructures for SCM can be blended with inter-organizational processes to develop higher-order capabilities for demand sensing, operations and workflow coordination, and global optimization of resources

CONCLUSION AND RECOMMENDATION

The study sought to empirically examine the influence of information technology infrastructure on supply chain performance of public universities in Kenya. The findings of the study have empirically established that information technology infrastructure significantly influence the supply chain performance of public universities in Kenya. The hypothesis of the study that information technology infrastructure has a significant influence on the supply chain performance

of public universities in Kenya was therefore supported.

Practical Implication

The implication of the study is that universities that have superior information technology infrastructure both internally and externally with their customers and suppliers reap higher benefits in their supply chain activities in form of operational efficiency and effectiveness and hence customer satisfaction. The study also provides useful information on the current status of information technology infrastructure capabilities in public universities Kenya. This information can assist managements of universities, and policy makers to understand, judge and undertake reviews to build robust and agile end to end supply chain systems to attain a competitive advantage in their operations.

REFERENCES

Abdolshah M. (2013). A Review of Quality Criteria Supporting Supplier Selection. *Journal of Quality and Reliability Engineering Volume 2013* (2013), Article ID 621073, 9.

Ali B M & Sassi S (2017). The role of ICT Adoption in Curbing corruption in developing countries. *Springler International Publishing* AG 2017. Available at www. http://DOI 10.1007/978-3-319-56523-1_4

Aschhoff Nils. (2018) Citizens Differ from Organizations: Modeling a Specific Citizen-Centered Collaborative Capacity. *International Journal of Public Administration* 41(4), 284-296.

Attia Ahmed (2018). Supply logistics integration in the Saudi food industry", Business Process Management Journal, Vol. 24 Issue: 4, pp.1007-1022, https://doi.org/10.1108/BPMJ-01-2017-0016

Deepak DahiyaandSaji K. Mathew. (2016). IT assets, IT infrastructure performance and IT capability: a framework for e-government", Transforming Government: People, Process and Policy, *Emerald Group Publishing Limited, 10* (3), 411-433.

Festel Gunter, De Nardo Mikko., and Simmen Timo (2014).Outsourcing of pharmaceutical Manufacturing– a Strategic Partner Selection Process", October 201*4, International Journal of Operations and Production Management, 35*(9).

Fourie David and Poggenpoel Wayne. (2017). Public sector inefficiencies: Are we addressing the root causes? *South African Journal of Accounting Research, 31*:3, 169-180.

GoK Commission for University Education (CUE). (2017). Status of Universities in Kenya. Available at: http://www.cue.or.ke/services/accreditation/status-of-universities.

GoK University Act, CAP 210B Revised Edition 2012 [1986] Published by the National Council for Law Reporting with the Authority of the Attorney-General www.kenyalaw.org

Gujarati Damodar, Porter Dawn, and Gunasekar Sangeetha. (2013).*Basic Econometrics*, 5th ed, New Delhi, Tata McGrawHill Education. Pvt Ltd

Gunasekaran Angappa, Subramanian Nachiappan., and Rahman Shams (2015). Supply chain resilience: role of complexities and strategies. *International Journal of Production Research, 53*, (22), 6809-6819.

Hall Daniel M., Algiers Afroz, & Levitt Raymond E. (2018) Identifying the Role of Supply Chain Integration Practices in the Adoption of Systemic Innovations. *Journal of Management in Engineering*34:6, pages 04018030

Han Jong Hugh, Wang Jingle and Maim Mohamed. (2017). Reconceptualization of information technology flexibility for supply chain management: An empirical study, *International Journal of Production Economics, 187*, 196-215

Hyett, N., Kenny, A., and Dickson-Swift, V. (2014). Methodology or method? A critical review of qualitative case study reports. *International Journal of Qualitative Studies on Health and Well-Being*, *9*, 10.3402/how. v9.23606.

Jin, Y., & Vonderembse, M. (2014). Exploring relationships among IT-enabled sharing capability, supply chain flexibility, and competitive performance. International Journal of Production Economics.

Kaibara de Almeida Marly Mizue, Marins Fernando Augusto Silva, Salgado Andréia Maria Pedro, Santos Fernando César Almada, and Luis da Silva Sérgio (2015). Mitigation of the bullwhip effect considering trust and collaboration in supply chain management: a literature review, *The International Journal of Advanced Manufacturing Technology*, *77*(1-4), 495-513.

Kembro, J., Selviaridis, K., and Näslund, D. (2014). Theoretical Perspectives on Information sharing in supply chains: A systematic literature review and conceptual framework. *Supply Chain Management: An International Journal*. 19 (5/6), 609-625.

Kumar Anil & Kushwaha G.S. (2018) supply chain management practices and operational performance of fair price shops in India: an empirical study .log forum scientific journal of logistics http://www.logforum.net P-ISSN 1895-2038 2018, 14 (1), 85-99 http://dx.doi.org/10.17270/j.log.2018.237 E-ISSN 1734-459x original paper

Latip, N MI Salleh, B Omar, KB Yaakub (2013). A Resource-based Perspective on Technological Competencies and Relationship Performance: An Empirical Analysis South East Asia Journal of Contemporary Business, Economics and Law 3 (2), 18-22.

Lufunyo, H. (2013). Impact of public sector reforms on service delivery in Tanzania. *Journal of Public Administration and Policy Research*, *5*(2), 26–49.

Modgil Sachin & Sharma Sanjay. (2017). Information Systems, Supply Chain Management and Operational Performance: Tri-linkage—An Exploratory Study on Pharmaceutical Industry of India, *Global Business Review, sage journals, Vol 18,* Issue 3, 2017

Otchere, A.F., Annan, J. and Anin, E.K. (2013). Achieving Competitive Advantage through supply chain integration in the cocoa industry: A case study of Olam /Ghana Limited and Produce Buying Company Limited. *International Journal of Business and Social Research (IJBSR).3(2), pp.131-145*.

Peng, J., Quan, J., Zhang, G., and Dubinsky, A.J. (2016). Mediation effect of business process and supply chain management capabilities on the impact of IT on firm performance: evidence from Chinese firms. *International Journal of Management*, 36 (1), 89–96.

Rahman Md Shidur (2017) The Advantages and Disadvantages of Using Qualitative and Quantitative Approaches and Methods in Language "Testing and Assessment" Research: A Literature ReviewJournal of Education and Learning; Vol. 6, No. 1

Sadraoui, Tarek, and Nejib Mchirgui.(2014).Supply Chain Management Optimization within Information System Development." *International Journal of Econometrics and Financial Management* 2.2 (2014): 59-71

Sáenz, María Jesús & Revilla, Elena & Acero, Beatriz, (2018). "Aligning supply chain design for boosting resilience," Business Horizons, Elsevier, vol. 61(3), pages 443-452.

Samadi, E. and Kassou, I. (2016) The Relationship between IT and Supply Chain Performance: A Systematic Review and Future Research. *American Journal of Industrial and Business Management*, **6**, 480-495. http://dx.doi.org/10.4236/ajibm.2016.64044

Saunders, M., Lewis, P., and Thornhill, A. (2016). Research methods for business Student: (7thed), L.E.G.O. S.p.A., Italy.

Singh Ram Janm, Sohani Nagendra, Marmat Hemant. (2013). Supply Chain Integration and Performance: A Literature Review. *Journal of Supply Chain Management Systems 2* (1) January 2013.

Tina Bjørnevik Aune. (2013). Managing Suppliers in Business Networks: Exploring Innovation, Capability Development, and Network Pictures, October 2013

Tiwari, A.K. Tiwari, A., and Samuel, C., (2015). Supply chain flexibility: a comprehensive review. Manag. Res. Rev. 38 (7), 767–792.

Tolmay Aletta, S. & Badenhorst-Weiss Johanna A (2015). Supply chain relationships between irst and second tier suppliers in South African Automotive supply chains: A focus on trust, Journal of transport and supply chain management Vol.9.1.

Turek, B., (2013). Information systems in supply chain integration and management. Retrieved from http://www.ehow.com/ info_8337099_ information-supply-chain-integration-management.html

Von Haartman Robin and Bengtsson Lars, (2015). The impact of global purchasing and supplier integration on product innovation. *International Journal of Operations and Production Management, 35 (*9), 1295-1311.

Wagner Stephan M. and Bode Christoph. (2014) Supplier relationship-specific investments and the role of safeguards for supplier innovation sharing. *Journal of Operations Management **3***2:3, 65-78

Ye, F., & Wang, Z. (2013). Effects of information technology alignment and information sharing on supply chain operational performance. Computers & Industrial Engineering.

Zhang, M., and Huo, B. (2013). The impact of dependence and trust on supply chain integration: *International Journal of Physical Distribution and Logistics Management*, 43(7), 544-563.