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INFLUENCE OF ADOPTION OF PROCUREMENT TECHNOLOGY ON PERFORMANCE OF AGROCHEMICAL FIRMS IN KENYA

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ABSTRACT

*This study sought to find the influence of procurement technology adoption on performance of agro chemical firms in Kenya. The study adopted a descriptive design to relate the independent variables namely virtual storage, e-MRO, e-transactions, virtual storage, and enterprise resource planning, with organization performance as the dependent variable. The target population of this study comprised of heads of procurement and ICT departments of the 80 agrochemical firms in Kenya. The study collected primary data from the respondents by the use of structured questionnaires that was issued to the lead of ICT and lead of procurement departments. Descriptive statistics was used to analyze data on the matters of procurement technology adoption and organization performance. On the other hand, the connection between procurement technology adoption and organization performance was analyzed through correlation and regression analysis, conducted with the aid of SPSS. The outcomes were presented using tables accompanied by explanations. The study concluded that enterprise resource planning, e-transactions, virtual storage and E-MRO all have an affect performance in agrochemical firms in Kenya. This study recommended adoption of virtual storage by Agro chemical firms in Kenya this would help to allow Agro chemical firms to open new lines of products and diversify revenue streams without making a big investment, **t**he costs of opening an online store were much lower than if compared to cost of opening a local business and that virtual storage would enable Agro chemical firms reach a worldwide market of internet users, not just the local market of a physical store. This study recommended as well adoption of E-MRO system by Agro chemical firms in Kenya.*

Key Words: *Enterprise Resource Planning, E-Transactions, Virtual Storage, E-MRO Procurement, Agro Chemical Firms*

INTRODUCTION

Most of the procurement functions are bombarded with a lot of risky issues that do adversely affect core supply chain operations in organizations. For an organization to efficaciously function and compete in the current risky supply chain environment, it must put into place effective procurement strategies within its internal supply chain (Hugos, 2018). Agreeing with Sabourin (2015), unique tactics presently implemented by corporations in the agro chemical firms is technological implementation. Consequently technological invention has made consumers become more alert and are thus inserting additional demands. Agreeing with Melville (2011), the contemporary economy has a multifaceted arrangement which will absolutely upsurge as a result of market trends. Revolution in technology has supported explosion of information which promotes business in global market place where customers are able to access information about products, make comparisons on quality and prices and support buying decisions.

Procurement of goods, works, and services from end to end by the use of technology, is emerging worldwide with the potential to transform processes, improve market access, and promote integrity in procurement. Kramer, Jenkins, and Katz (2007) reported that the Government of Chile is using ICTs to facilitate the procurement from small businesses using a new business model and this has positively affected on the functioning of the procurement system especially, since the integration of online services in the system. According Olali and Nyamwange (2015) in Kenya, manual systems are a cause of key inefficiencies in regulation and operations of procurement function. Accordingly, adoption of technology ensures proper functioning of the procurement system. This does not only involve computerization of the system but scaling communication technology.

According to Syngenta research department (2016), the world populace is anticipated to rise from approximately seven billion currently to over nine billion by year 2050. Topmost of this populace growth will happen in developing republics, where the inhabitants are anticipated to stretch to eight billion in year 2050, an upsurge of about 40%. However, the population of the countires which are developed is anticipated to rise at a much gentler rate, to approximately 1.3 billion. In equal measure, a larger number of individuals will have improved capital and advanced buying influence, and as a consequence, this will intensify intake of processed diet. A Goldman Sachs study approximated that the global intermediate class of people who earn US$7,000 and US$40,000 per annum – will swell by two billion persons by year 2030.

The first petrochemicals plant in Egypt, an ammonia facility, was established in Suez in the 1940s. As of 2013, the petrochemicals sector accounted for 3% of GDP and 12% of the industrial sector. In 2013/14, the plastics and petrochemicals industry was worth $7.5bn, according to the Egyptian Industrial Development Authority(EIDA). This strong performance is being driven by both high demand for fertilizers from the agricultural sector and a high level of plastics consumption in the country. As of 2012, plastic consumption per capita stood at 25 kg, with demand growing by 6% per year (EIDA ,2012).

In July 2015, Kenya Institute of Supplies management (KISM),under sections 5 and 13 of the Supplies Practitioners Management Act, 2007 flagged of Certified Procurement And Supply Professional Of Kenya (CPSP-K) and Associate In Procurement And Supply Of Kenya (APS-K) professional courses designed to equip learners with knowledge, practical skills and attitudes that will enable them perform supervisory, management and leadership roles as buyers, Supply Chain managers, supervisors, directors, or consultants for organizations so as to

feed the growing need for competence staff in the Supply chain management roles.

Statement of the Problem

Since agriculture is a very important sector in Kenya, contributing to at least 30% of the GDP, the players in the sector need to perform better in terms of supply of quality inputs at the right time at affordable costs. The Ministry of Agriculture (2009) indicated the importance of the agrochemical firms to achieving this fit. Basel (2006) argued that one of the ways of ensuring speed, quality and reduction in procurement costs up to the tune of 40% is adoption of technology; Mranda (2014) on the other hand argues that technology improves performance by up to 48%.

Statistics from the Agrochemicals Association of Kenya (2017) strategic plan reveal that there has been rising procurement costs among the agro chemical firms in Kenya from 8.7 billion in 2015 to 11.5 billion in 2016 (AAK, 2017). Furthermore, the performance of agro chemical firms also faces scrutiny with statistics from the Kenya Flower Council (KFC) report that sought to probe the safety conditions of the horticultural products exported to the European Union indicating that up to Kshs. 1.5 Billion was spent on importation of poor quality pesticides in Kenya in the year 2016.

Sitanda (2013) sought to determine the strategies that the agrochemical companies in Kenya adopt to deal with the challenges of distribution systems of their products. The findings of the study showed that the agrochemical industries faced challenges from the pressure exerted by the environmental groups. Muyanga and Jayne (2008) focused on the effect of the policies on the operations of the agro produce industries in Kenya. This study intended to bridge existing knowledge gaps by investigating procurement technology adoption in the agrochemical sector and its effect on their performance in Kenya.

Objectives of the Study

The main objective of the study was to determine the influence of Procurement technology adoption on performance of Agro chemical firms in Kenya. The specific objectives were:-

- To determine the influence of enterprise resource planning on performance of Agro chemical firms in Kenya
- To establish the effect of e-transactions on performance of Agro chemical firms in Kenya
- To examine the influence of virtual storage on performance of Agro chemical firms in Kenya
- To determine the influence of e-MRO procurement on performance of Agro chemical firms in Kenya

LITERATURE REVIEW

Theoretical Review

Resource Based Theory

Wernerfelt (1984) developed the Resource Based theory. According to the theory, the intangible assets are the main source to improve firm performance. The theory argues that sustainable competitive advantage and better performance results from resources that are inimitable, not substitutable, tacit in nature, and synergistic (Barney, 2001). Therefore, managers need to be able to identify the key resources and drivers of performance and value in their organizations.

The Resource Based Theory also states that a company's enhanced performance is derived from the company's ability to assemble and exploit an appropriate combination of resources. Such resources can be tangible or intangible, and represent the inputs into a firm's production process; such as capital, equipment, the skills of individual employees, patents, financing, and talented managers (Helfat & Peteraf, 2003). Adoption of technology in operations is one such unique resource which can lead to an improvement in performance of the organization.

Adoption of technology places a company in a better position to perform better than its competitors due to the inherent benefits of technology.

Transaction Cost Economics Theory

Transaction Cost Economics (TCE) theory evolved from the idea that transactions form the basis for economic thinking as was analyzed by John R. Commons in 1931. Later on, Williamson (1979) suggested that there are different kinds of transactions costs: costs of search and information, bargaining costs, policy and enforcement costs and so forth. The search and information costs comprise costs caused by search for the best supplier, partner, customer, price level or availability of goods on the market. He further stressed that, bargaining costs imply costs associated with establishing of the tamper-proof contract meaning the achieving of the appropriable agreement with other party (Williamson & Masten, 1995).

The policy and enforcement costs are the costs of monitoring and enforcing the implementation of the contract. Vernimmen, Verbeke and Van Huylenbroeck (2000) later on argued that the search and information costs comprising of costs caused by search for the best supplier, partner, customer, price level or availability of goods on the market can be managed by using technology. Hence this theory forms a basis for this study. Agro chemical firms undertake a lot of transactions, in all operational fronts. From the supplier section to the buyers, the transactions are numerous which requires the backing of technology for information searching, selection of suppliers and buyers as well as availability of goods (Wiesner, 2017). The theory is therefore relevant to the study in explaining the role of technology in performing procurement activities such as searching for suppliers (sourcing), price level (e-cataloguing), availability of goods in the market as well as inventory keeping, invoicing, payment and marketing. The use of technology makes it easier and reduces transaction costs thus improving procurement performance.

Contingency Theory

The theory was proposed by Lawrence and Lorsch (1967). It holds that circumstances play a critical role in determining the best possible response (Donaldson, 2001). According to the theory, each organization has unique circumstances and management has to tailor decision making to create best fits that address contextual issues. All organizations have to attempt to uniquely respond to their circumstances and create a good fit for the emergent circumstances. when applied to the procurement function, these theories lead to appreciation that the procuring environments are very different and unique. There are no models that are universal and can enable any organization that applies them to achieve procurement outcomes (Donaldson, 2001).

While one approach works in one context or organization, the same approach would lead to failure when applied to other organizations. These are important considerations when it comes to adoption of technology in procurement and actual procurement practices in organizations. Technology adoption in procurement has to be fit in the organizations unique circumstances thus stimulating optimal performance. If the organization does not adopt its operations to circumstances or business environment contingencies, it will not be adequately fitted for operations in a given business environment leading to failures (Tidd, 2001).

Institutional Theory

The proponent of this theory was DiMaggio and Powell in 1991. This theory appreciates that within the framework of formal and informal rules, institutional actors should be present in an environment. The proponents of this theory allude that the actions of an organization are driven and justified by it. Through norms and social procedures,

there should be a rational account for an entity's actions by the very actors who undertake them. Subsequently, entities are built upon three bases; regulative, normative and cultural-cognitive elements.

It is stated in Wei, *et al* (2008) that going by this theory, so as to fully understand how to implement technology in procurement, a number of forces driving institutions may influence the adoption of Information Technology based systems. These forces include normative, mimetic and coercive. Pressures coming from copying what competitors do are what are called mimetic, as firms tend to adopt the successes of other similar one. This reduces a number of costs that an entity is likely to incur when faced with. Furthermore, adoption of technology can also be influenced by market forces as well as the trends (Cox, 2010).

Conceptual Framework

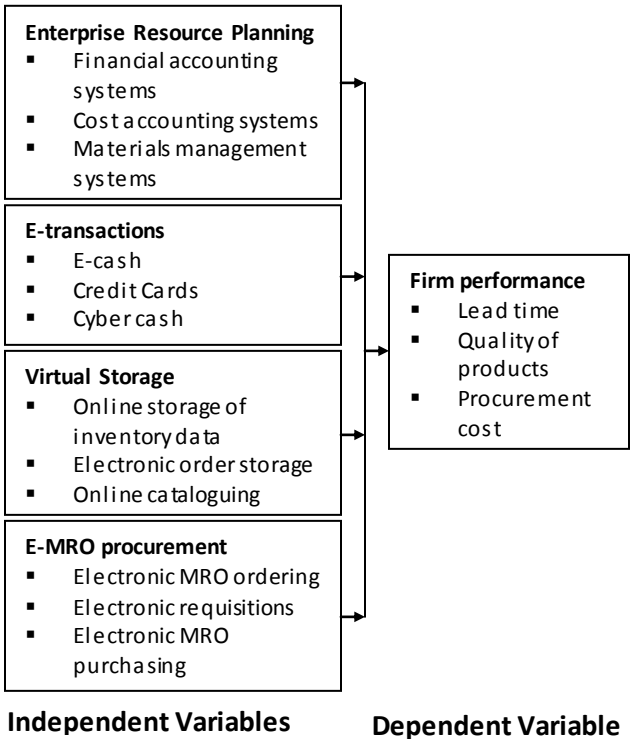

Figure 1: Conceptual Framework

Enterprise Resource Planning

Enterprise Resource Planning (ERP) system is an integrated information system that is used to support business processes and resource management within an organization. These systems integrate between one business unit with other business units. With the implementation of this system in an organization to support the company's operations, it is expected to provide optimum benefit for the company (Boudijilda & Pannetto, 2013). This is especially needed by the various industrial sectors in this era of globalization. So, the company can compete with competitors or even create a competitive advantage. In addition, ERP selection is also done with various strategic reasons both tangible and intangible.

E-transactions

Electronic payment are payments for goods, services, and bills/invoices using paperless cash through gadgets such as mobile device (such as a mobile phone, smart-phone, or Personal Digital Assistant) by taking advantage of wireless and other communication technologies (such as mobile telecommunications networks, or proximity technologies) (Apanasevic, 2013). E-payment service comprises of all technologies that are offered to the user as well as all tasks that the payment service provider(s) perform to commit payment transactions (De Reuver, Verschuur, Nikayin, Cerpa & Bouwman, 2015).

Virtual Storage

Virtual storage or cloud computing began as a way to increase storage capacity for businesses. Making all available storage capacity available to every user is what virtual storage is all about: using and accessing storage that is not limited to an individual computer (Wang, & Feng, 2010). Virtual storage can ease frustration, but it can also save the company money. Instead of the company investing in more storage for each computer individually or paying for more portable storage media, the company can purchase a

separate storage area that all three workers can access. The company saves money in the long run while increasing productivity.

E-MRO Procurement

MRO supplies are a small segment of the company operation and may not be needed for the final product but play an important part in order to have a continuous process of activities. Gelderman, Semeijn and Lek (2008) argue that MRO can be described as indirect and low value items but, it is essential to keep administrative task, machines and factory running. These include a vast array of items that support internal operations ranging from office supplies to spare parts (DHL MRO Indirect Supply Report, 2009). Proper handling of MRO procurement is important in order to avoid problems that may negatively impact the business operation and result to scarcity or excess of the supplies.

Firm Performance

Shale *et al*. (2014) suggested that procurement performance starts from purchasing effectiveness in the procurement function in order to change from being reactive to being proactive to attain set performance levels in an entity. Organizations that do not have performance means in their processes, procedures, and plans experience lower performance and higher customer dissatisfaction and employee turnover.

Measuring the performance of the purchasing function yields benefits to organizations such as cost reduction, enhanced profitability, assumed supplies, quality improvements and competitive advantage as noted by (Basheka & Bisangabasaija, 2010). Although the need for performance in procurement has long been recognized, for a variety of reasons, many organizations fail to measure it adequately. Basheka & Bisangabasaija (2010) argued that measuring long-term impact is notoriously difficult. The literature on e-PP is divided in terms of its impact at the operational or strategic level of the organization.

Empirical Review

Enterprise Resource Planning

Yamin and Mavondo (2015) studied the value of e-procurement as defined by price benefits plus transaction less technology locks in cost. The findings on the study indicated that price benefits result from saving in search, negotiation, and contracting and coordination costs. With technology lock in cost in choosing and using a specific procurement system, including switching cost. They also found out that global sourcing is now an automatic expectation to respond to competition. However, the choice of where to obtain goods and services is not a static decision. Procurement cost reduction strategy is a continual re-evaluation is a continual re-evaluation of the cost of each item bought and procured. This study focused mainly on costs reduction strategies in procurement thereby related to procurement performance.

Boudijilda and Pannetto (2013) reviewed the European Public Procurement Initiative and Standards for Information Exchange. According to the study findings, e-procurement provides necessary training and technology. The efficient functioning of an operation will then depend on how well the suppliers meet up with the expectations of the organization. For this reason, the supply chain principle emphasizes the totality of E-procurement adoption in all facets that includes the suppliers. ERP endorses the total quality approach in creating customer satisfaction. The findings emphasize on the impact of e-procurement as in the current study.

E-transactions

Doherty *et al* (2013) also sought to establish the institutional responses to electronic procurement in the public sector. The study used five in-depth case studies based on extensive interviews, observation and documentation reviews conducted within central and local government governments. The findings of the study revealed that the adoption of e-

procurement technologies such as electronic invoicing to make payments and issuance of receipts have improved lead time in supply chain. The study further showed that majority of the institutions was actively planning to implement: e-tendering; e-award; e-contract and e-catalogue systems, but none had any intention of adopting e-marketplaces or e-auctions.

Groznik and Manfreda (2015) sought to determine the impact of e-invoicing and e-government on business processes in Slovenia. The study used census surveys on all registered businesses in Slovenia. The findings of the study revealed that the adoption electronic invoicing in both government and business enterprises leads to cost cutting due to less operating expenses as a result of lack of paperwork or postal services. This is due to the fact that higher returns were realized as a result of the incorporation of e-invoicing in ordering of commodities.

Virtual Storage

Wu, Chen and Li, (2015) studied trusted-based Cloud Computing Virtual Storage System and Key Technologies. In order to protect confidentiality and integrity of user data in Cloud Computing, the research firstly studied the relevant research works in fields of trusted computing and Cloud Computing data protection and secondly introduced the concept of trusted into Cloud Computing data protection, presents the concept of Trusted Virtual Block Storage Device (TVBSD) and designs the Trusted Cloud Computing Virtual Storage System (TCCVSS). The study findings of experiments revealed that the system and the related technologies can not only effectively ensure the security of user data, but also control the consequent performance overhead in a proper range.

A study conducted by Wang *et al.* (2009) presented a method to solve the security of data storage in virtualization platform. The study results revealed that data encapsulation method based on the properties of component can be achieved by using the Trusted Platform Module (TPM). Yang *et al.* (2011) design architecture of cloud storage system based on TPM. This architecture used the symmetric key to encrypt data, and then used the asymmetric key to encrypt symmetric key, and finally used TPM to protect the asymmetric key. The study findings revealed that this way can we manage the process of key storage, backup and share effectively

E-MRO Procurement

Balano and Nachev, (2014) study to examine how e-procurement improves the old ways of procuring MRO deliveries within the small-sized firms in Holland. The research was a qualitative form of research by means of an abductive method and several case studies as a tactic. Purposive selection was used in sampling the firms to be studied. The research findings resolved that e-procurement improves the old procurement methods of MRO within small-sized firms in the Holland by means of the computerized implementation of the process precisely in the seller assortment, order settlement and compensation phase. This was as a result of decrease in manual based procurement of works, removal of monotonous operation and clerical costs plus enhancements with contacting the supplier and their selection, while additionally having efficient way of work which shows how eProcurement improves old procurement paper based method.

Gelderman, Semeijn and Lek (2008) carried a research to analyze of E-commercial Traits: Evaluating the NATO Logistics Stock Exchange. E-commercial platform can be valuable when utilized while procuring repairs, maintenance and operating (MRO). The research found out the efficiency and effectiveness traits of e-commercial for purchasing. The researched collected data from users of the NATO logistics stock exchange (NLSE) to get awareness scores of the status and presentation by the NLSE on each of these traits. The research

outcome was that the cataloguing of e-marketplace traits both shows which traits are extremely esteemed by users, as well as shows on which traits a firm for example the NLSE should put its machinery on for better user fulfilment. Efficiency-related traits appeared to be of utmost significance by these users.

METHODOLOGY

The research design provides the structure of the research and links all of the elements of the research together. The study adopted a descriptive research design to determine the influence of Procurement technology adoption on performance of Agro chemical firms in Kenya. The target population in the study was 80 agrochemical firms in Kenya. The respondents in management positions were targeted because they were the people who approved and authorized various processes and operations in the agrochemical firms. The study used quantitative primary data collected using a closed ended questionnaire. The questionnaires were administered in two stages; the pilot study and the main study. Quantitative data collected was analyzed by the use of descriptive statistics using statistical package for social sciences (SPSS, V.21.0). The following multiple regression model was adopted:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where:

Y = Performance

β_0 = Constant

X_1 = Enterprise Resource Planning

X_2 = E-transactions

X_3 = Virtual storage

X_4 = E-MRO

e= Error term

β_1, β_2, β_3 and β_4 = coefficient of the independent variables

FINDINGS

Enterprise Resource Planning

The study sought to determine the extent to which respondents agreed or disagreed with the following statements regarding enterprise resource planning.

Table 1: Statements Regarding Enterprise Resource Planning

Statements	N	Mean	Std Dev
Agrochemical firms require ERP systems that are designed to maintain a cutting edge and support cross functional teams. Such as in Finance, warehouse and management.	143	4.01	0.46
I am skilled to operate the ERP system in place for procuring agrochemicals according to my role	143	4.13	0.58
ERP system use is easier and faster than manual procurement process of procuring agrochemicals.	143	4.27	0.71
I understand fully cost accounting system for capturing agrochemical costs and savings	143	1.92	0.31
A system is in place at my workplace for refresher course on the use of ERP systems after every system upgrade	143	1.98	0.13

Source: Research Data, 2018

Results presented in table 1 showed that majority of the respondents agreed that ERP system was easier to use and more faster than manual procurement process of procuring agrochemicals (M= 4.27 SD =0.71), majority of the employees were skilled to operate the ERP system in place for procuring agrochemicals according to their roles (M= 4.13 SD =0.58) and that Agrochemical firms required ERP systems that were designed to maintain a cutting edge and support cross functional teams. Such as in finance, warehouse and management (M= 4.01SD =0.46), these findings were in line with the study results by Yamin and Mavondo (2015) ERP systems helped to consolidate procurement reporting functions of in an organization thus allowing staff to review each department using centralized reports. Further this study noted that having a unified ERP system can greatly lower IT-related expenses, including management/administration staff, support, infrastructure needs.

However respondents disagreed that the firm had a system in place that facilitate refresher course on the use of ERP systems after every system upgrade(M= 1.98 SD =0.13) and that employees understood fully cost accounting system for capturing agrochemical costs and savings(M= 1.93 SD =0.31) These findings concurred with the study results by Boudijilda and Pannetto (2013) configuring the ERP for new divisions or departments is costly due to various system requirements such as software needs, training requirement periodic updates maintenance cost and much more.

E-Transactions

Respondents were required to indicate the extent to which they agreed or disagreed with the following statements relating to E-transactions.

Table 2: Statements Regarding E-transactions

Statements	N	Mean	Std Dev
It is important to have an experienced employee in procurement to handle e-transactions such as E-cash; Electronic funds Transfer, Credit cards and Cyber cash.	143	3.85	0.14
Professional qualification in procurement is critical for e-transactions	143	3.95	0.20
Procurement heads, Demand planners, ICT supporter ,Supply chain practitioners departmental heads and all related stakeholders needs training on e-transactions	143	4.16	0.74
It is important to have a stringent security feature for e-transactions to protect agrochemical companies from threats like credit card fraud during procurement process	143	3.79	0.12
Most of the procurement related processes are done through the system from order placement to payments in the organization	143	4.08	0.33

Source: Research Data, 2018

Results presented in table 2, showed that majority of the respondents agreed that Procurement heads, demand planners, ICT supporter, supply chain practitioners departmental heads and all related stakeholders needed training on e-transactions (M= 4.16 SD =0.74) and that most of the procurement

related processes were done through the system from order placement to payments in the organization (M= 4.08 SD =0.33). These findings concurred with the study results by Groznik and Manfreda (2015) that E-procurement saved clients and organisation money by preventing duplicate spending, leveraging volume buying, and saving costs associated with paper-based systems.

This study also revealed that it was important to have an experienced employee in procurement to handle e-transactions such as E-cash, electronic funds transfer, credit cards and cyber cash (M=3.85 SD =0.14), professional qualification in procurement was critical for e-transactions (M=3.95 SD = 0.20) and that it was important to have a stringent security feature for e-transactions to protect agrochemical companies from threats like credit card fraud during procurement process (M= 3.79 SD =0.12). These findings were in line with the study results by Fui-Hoonnah and Delgado (2006) electronically conducting procurement makes it easier to write and analyze reports on procurement systems, meaning that organisations can ensure that procurement procedures conform to the organizational policies

Virtual Storage

Survey participants were required to indicate the extent to which they agreed or disagreed with the following statements related to virtual storage.

Table 3: Statements regarding Virtual storage

Statements	N	Mean	Std Dev
Making all available storage capacity available to procurement and ICT heads is a critical factor in ensuring effective and efficient e-procurement process.	143	4.05	0.25
To have virtual space dedicated to key procurement documents such as service level agreements and procurement policies management is key for shortening time required in consultations in a procurement process.	143	4.14	0.41
It is cheaper to have a virtual storage space than to have a company investing in more storage for each computer individually or paying for more portable storage media,	143	3.96	0.75
It takes lesser time to locate a procurement related document on virtual storage area than from a manual file in a storage cabinet.	143	3.71	0.12
There is quick and reliable internet connectivity for storing procurement documents on a hard drive	143	4.25	0.36

Source: Research Data, 2018

Results presented in table 3, showed that majority of the respondents agreed that there was quick and reliable internet connectivity for storing procurement documents on a hard drive (M= 4.25 SD =0.36) to have virtual space dedicated to key procurement documents such as service level agreements and procurement policies management is key for shortening time required in consultations in a procurement process (M=4.14 SD =0.41) and that making all available storage capacity available to procurement and ICT heads was a critical factor in ensuring effective and efficient e-procurement process (M= 4.05 SD =0.25). These findings concurred with the study results by Wang *et al.* (2009) Storage virtualization provided a way to combine all those

drives into one centrally manageable resource, which can benefit your customers via time and money savings, adding that storage virtualization allows organizations to more easily manage heterogeneous storage environments.

Further, the study revealed that it was cheaper to have a virtual storage space than to have a company investing in more storage for each computer individually or paying for more portable storage media (M= 3.96 SD =0.75) and that it took lesser time to locate a procurement related document on virtual storage area than from a manual file in a storage cabinet. (M=3.71 SD =0.12). These findings were in line with the study results by Wu, Chen and Li, (2015) virtualization providers automatically update their hardware and software that will be utilized in that instead of sending people to do these updates locally, they are installed by the third-party provider.

E – MRO Procurement

Respondents were required to indicate the extent to which they agreed or disagreed with the following statements regarding E-MRO (Maintenance, Repair and Operations)

Table 4: Statements regarding E-MRO

Statement	N	Mean	Std Dev
Managers need to re-think strategies for accurately utilizing e-MRO in its business opportunities, in order to mitigate impact on the Agrochemical company's operations and which could result to scarcity or excess of the supplies.	143	4.15	0.19
Using traditional procurement of MRO supplies can be difficult to manage with personal interactions and consists of a complex undertaking	143	3.92	0.17
Agrochemical firms in Kenya are automating their MRO activity using Information Technology.	143	4.00	0.58
Lodging a Maintenance& Repair request online is the norm in my organization. No more Manual requests are done.	143	3.83	0.77
It is easier to track MRO requests progress status and close out issues online that manually on a physical request card.	143	4.22	0.10

Source: Research Data, 2018

Results presented in table 4, showed that majority of the respondents agreed that it was easier to track MRO requests progress status and close out issues online than manually on a physical request card (M = 4.02 SD = 0.10). These findings concurred with the study results by Balano and Nachev, (2014) electronic data interchange provide support for supply chain management that can bring cost and time savings and improve communications at each of step in the MRO acquisitions process

Further, the study revealed that agrochemical firms in Kenya are automating their MRO activity using information technology (m= 4.00 SD = 0.58), using traditional procurement of MRO supplies can be difficult to manage with personal interactions and consists of a complex undertaking (M= 3.92 SD = 0.17) and that lodging a maintenance& repair request online is the norm in the organization, no more manual requests are done (M= 3.83 SD =0.77). These findings were in line with the study results by Gelderman, Semeijn and Lek (2008) EDI allows the

computer-to- computer exchange of standard transaction documents, such as invoices, bills of lading, and purchase orders invoices reducing transaction costs, and yielding time and cost savings, faster communications with supply partners, and better control and reduction of inventories.

Firm's Performance

This section presents statistical evidence on firms performance basically measures through firms ability to handle orders placements, trends on client complains and trend on operational cost incurred.

Respondents were required to indicate the number of order fulfilment met in the last five years in the organization.

Table 5: Efficiency in order fulfilment

Number	2013	2014	2015	2016	2017
<50	55,369	67,589	78,475	88,715	108,125
50 to 100	48,785	49,185	54,758	66,951	76,147
>100	40,478	51,687	69,482	81,342	97,180

Source: Research Data, 2018

Evidence from five year statistical average computations on firms' ability to meet or fulfil orders placed showed a positive trend whereby order ranked under class <50 increased from 55,369 in the year 2013 to 108,125 in the years 2017, orders rated 50 to 100 also increased from 48,785 in the year 2013 to 76,147 in the years 2017 and lastly orders ranked over 100 also increased from 40,478 in the year 2013 to 97,180 in the years 2017. Drawing from these findings, it was evident that changes adopted had significant positive improvement on efficiencies in firm's procurement process.

The study sought to determine number of complaints on defects registered in the last five years.

Table 5: Number of Defects complaints

Number of Defects complaints	2013	2014	2015	2016	2017
<50	363	151	20	13	9
50 to 100	290	116	63	41	15
>100	231	159	50	23	7

Source: Research Data, 2018

Evidence from five year statistical average computations on number of complains on defects registered showed a tremendous decrease trend whereby complains on orders ranked under class <50 decreased from 363in the year 2013 to 9 in the years 2017, complains emanating on orders ranked 50 to 100 also decreased from 290 in the year 2013 to 15 in the years 2017 and lastly complains on orders ranked over 100 also decreased from 231 in the year 2013 to 7 in the year 2017. Drawing from these findings, it was evident that changes adopted brought about service improvement on firm's efficiency thus decreasing complains

Respondents were requested to indicate the amount of reduction of cost in the last five years in the organization.

Table 6: Operational Cost

Amount(Ksh, Millions)	2013	2014	2015	2016	2017
<50	9.6	6.5	4.6	3.3	1.9
50 to 100	11.6	11.3	9.3	4.1	2.5
>100	14.8	9.9	8.8	7.3	3.6

Source: Research Data, 2018

Five year statistical average computations on operation cost incurred show a tremendous decrease trend whereby operation cost incurred on orders ranked under class <50 decreased from 9.6 M in the year 2013 to 1.9 M in the years 2017, operation cost incurred on orders ranked 50 to 100 also decreased from 11.9 M in the year 2013 to 2.5M in the years 2017 and lastly operation cost incurred on orders ranked over 100 also decreased from 14.8 M in the year 2013 to 3.6 M in the years 2017. Drawing from these findings, it was evident that changes adopted brought improvement on firm's efficiency thus decreasing operation cost incurred.

Regression Analysis

In addition, the researcher conducted a multiple regression analysis so as to test relationship among variables (independent) on the performance in Agrochemical firms in Kenya. The model summary provides information about the regression line's ability to account for the total variation in the dependent variable (performance in Agrochemical firms in Kenya). The table below demonstrated how observed y-values were highly dispersed around the regression line.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.911	0.830	0.773	0.6273

Source: Research Data, 2018

The findings showed that the independent variables significantly influenced the dependent variable as shown by an R = 0.911. The output indicated that the strength of association between the variables was very high (R= 0.911). The four independent variables (enterprise resource planning, e-transactions, virtual storage and E-MRO) collectively explained only 77.3% changes on performance in Agrochemical firms in Kenya as represented by the adjusted R^2. This therefore means that other factors not studied in this research contributed 22.7% on performance in Agrochemical firms in Kenya.

Table 8: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.385	4.000	.846	4.285	.007[a]
	Residual	27.255	138.000	.198		
	Total	30.640	142.000			

Source: Research Data, 2018

In view of the results in above table the significance value was 0.007 (which was less that 0.05) indicated that the overall model was statistically significance in predicting how enterprise resource planning, e-transactions, virtual storage and E-MRO affect performance in agrochemical firms in Kenya. The F critical at 5% level of significance was 3.23 from the Standard F-tables. Since F calculated (value = 4.285) is greater than the F critical, this showed that the overall model was a good fit.

Table 9: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	1.172	.925		1.267	.017
Enterprise Resource Planning	.692	.184	.152	3.761	.012
E-transactions	.673	.163	.054	4.127	.023
Virtual storage	.574	.161	.116	3.566	.012
E-MRO	.638	.117	.307	5.453	.050

Source: Research Data, 2018

Table 9 above presented results of the beta coefficients as well as the p-values for each independent variable. The regression function extracted using the unstandardized betas are as follows ($\mathbf{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$):

$Y= 1.172 + 0.692X_1 + 0.673X_2 + 0.574X_3 + 0.638X_4$

According to the regression function, holding all factors constant at zero (enterprise resource planning, e-transactions, virtual storage and E-MRO), the coefficient for performance in agrochemical firms in Kenya will be 1.172.The findings further indicated that taking all other independent variables at zero, a unit increase in enterprise resource planning leads to a 0.692 increase in performance in agrochemical firms; a unit increase in e-transactions will leads to a 0.673 increase in performance in agrochemical firms in Kenya. All other factors held constant; a unit increase in virtual storage leads to a 0.574 increase on performance in agrochemical firm all other factors held constant whereas a unit increase in E-MRO will lead to a 0.638 increase on performance in Agrochemical firm when all other factors held constant.

Discussion of the findings

Statistical findings obtained showed that ERP system can greatly reduce IT-related expenses, including management/administration staff, support, infrastructure needs, test regression results predict that a unit increase in enterprise resource planning will positively transform the performance in agrochemical firms by a factor of 6.92%. These findings are in line with the study results by Jonsson, *et.al,* (2014), ERP systems facilitate the flow of real-time information across departments and ecosystems, so businesses can make data-driven decisions and manage performance.

Further the study revealed that ERP system is easier to use and more faster than manual procurement process of procuring agrochemicals (M= 4.27), majority of the employees were skilled to operate the ERP system in place for procuring agrochemicals according to their roles (M= 4.13) and that Agrochemical firms require ERP systems that are designed to maintain a cutting edge and support cross functional teams. Such as in Finance, warehouse and management (M= 4.01), these findings are in line with the study results by Yamin and Mavondo (2015) ERP systems helped to consolidate procurement reporting functions in an organization thus allowing staff to review each department using centralized reports.

However respondents disagreed that the firm has a system in place that facilitate refresher course on the use of ERP systems after every system upgrade (M= 1.98) and that employees understand fully cost accounting system for capturing agrochemical costs and savings(M= 1.93). These findings concur with the

study results by Boudijilda and Pannetto (2013) configuring the ERP for new divisions or departments is costly due to various system requirements such as software needs, training requirement periodic update maintenance cost and much more.

In line with the second objective, this study revealed that unit increase in e-transactions will leads to a 0.673 increase in performance in agrochemical firms in Kenya, adoption of e-transactions system facilitated tacking of procurement heads, demand planners, ICT supporter, supply chain practitioners departmental heads and all related stakeholders needs training (M= 4.16) and that most of the procurement related processes are done through the system from order placement to payments in the organization (M= 4.08). These findings concur with the study results by Groznik and Manfreda (2015) that E-procurement saves clients and organisation money by preventing duplicate spending, leveraging volume buying, and saving costs associated with paper-based systems.

This study further revealed that is important to have an experienced employee in procurement to handle e-transactions such as E-cash, electronic funds transfer, credit cards and cyber cash (M=0.85), professional qualification in procurement is critical for e-transactions (M=3.95) and that it is important to have a stringent security feature for e-transactions to protect agrochemical companies from threats like credit card fraud during procurement process (M= 3.79). These findings are in line with the study results by Fui-Hoonnah and Delgado (2006) that electronically conducting procurement makes it easier to write and analyze reports on procurement systems, meaning that organizations can ensure that procurement procedures conform to the organizational policies.

Descriptive results presented that agrochemical firms in Kenya had quick and reliable internet connectivity for storing procurement documents on a hard drive (M= 4.25) to have virtual space dedicated to key procurement documents such as service level agreements and procurement policies management is key for shortening time required in consultations in a procurement process (M=4.14) test regression results show that a unit increase in virtual storage leads to a 0.574 increase on performance in agrochemical firm and that making all available storage capacity available to procurement and ICT heads is a critical factor in ensuring effective and efficient e-procurement process (M= 4.05). These findings concur with the study results by Wang *et al.* (2009) Storage virtualization provides a way to combine all those drives into one centrally manageable resource, which can benefit your customers via time and money savings.

Further, the study revealed that that storage virtualization allows organizations to easily manage heterogeneous storage environments, it is cheaper to have a virtual storage space than to have a company investing in more storage for each computer individually or paying for more portable storage media (M= 3.96) and that it takes lesser time to locate a procurement related document on virtual storage area than from a manual file in a storage cabinet. (M=3.71). These findings are in line with the study results by Wu, Chen and Li, (2015) virtualization providers automatically update their hardware and software that will be utilized in that instead of sending people to do these updates locally, they are installed by the third-party provider.

In line with the fourth objective, this study revealed that unit increase in E-MRO will lead to a 0.638 increase on performance in Agrochemical firm, with E-MRO it is easier to track MRO requests progress status and close out issues online than manually on a physical request card (M = 4.02) and that it is easier to track MRO requests progress status and close out issues online than manually on a physical request card (M = 4.15) These findings concur with the study results by Balano and Nachev, (2014) electronic data

interchange provide support for supply chain management that can bring cost and time savings and improve communications at each of step in the MRO acquisitions process.

Further, the study revealed that agrochemical firms in Kenya are automating their MRO activity using information technology (M= 4.00), using traditional procurement of MRO supplies can be difficult to manage with personal interactions and consists of a complex undertaking and that lodging a maintenance& repair request online is the norm in several organization, no more manual requests are done (M= 3.83). These findings are in line with the study results by Gelderman, Semeijn and Lek (2008) that EDI allows the computer-to- computer exchange of standard transaction documents, such as invoices, bills of lading, and purchase orders invoices reducing transaction costs, and yielding time and cost savings, faster communications with supply partners, and better control and reduction of inventories.

Statistical evidence from five year statistical average computations on firms' ability to meet or fulfil orders placed show a positive trend whereby order ranked under class < 50 increased from 55,369 in the year 2013 to 108,125 in the years 2017, orders rated 50 to 100 also increased from 48,785 in the year 2013 to 76,147 in the years 2017 and lastly orders ranked over 100 also increased from 40,478 in the year 2013 to 97,180 in the years 2017. Drawing from these findings, it's evident that changes adopted had significant positive improvement on efficiencies in firm's procurement process.

Evidence from five year statistical average computations on number of complains on defects registered show a tremendous decrease trend whereby complains on orders ranked under class <50 decreased from 363in the year 2013 to 9 in the years 2017, complains emanating on orders ranked 50 to 100 also decreased from 290 in the year 2013 to 15 in the years 2017 and lastly complains on orders ranked over 100 also decreased from 231 in the year 2013 to 7 in the years 2017. Drawing from these findings, it's evident that changes adopted brought about service improvement on firm's efficiency thus decreasing complains.

Five year statistical average computations on operation cost incurred show a tremendous decrease trend whereby operation cost incurred on orders ranked under class <50 decreased from 9.6 M in the year 2013 to 1.9 M in the years 2017, operation cost incurred on orders ranked 50 to 100 also decreased from 11.9 M in the year 2013 to 2.5M in the years 2017 and lastly operation cost incurred on orders ranked over 100 also decreased from 14.8 M in the year 2013 to 3.6 M in the years 2017. Drawing from these findings, it's evident that changes adopted brought improvement on firm's efficiency thus decreasing operation cost incurred.

CONCLUSION

Drawing from study results discussions, this study concluded that ERP systems helped to consolidate procurement reporting functions of in an organization thus allowing staff to review each department using centralized reports, ERP systems helped to provide intelligence, visibility, analytics, and efficiency across every aspect of a business and that ERP systems facilitate the flow of real-time information across departments and ecosystems, so businesses can make data-driven decisions and manage performance.

This study concluded that e-procurement is less time-consuming than traditional procurement, E-procurement enabled records stored electronically thus making it easier to submit reusable tenders. In the meantime, use of templates means paperwork can be filled out more quickly. E-Procurement systems can be easily and economically implemented.

The study concluded that selling through online offers much Insulation to local agrochemical firms against regional economic downturns; it is cheaper and simpler to put forth a great image in a virtual business just by investing in a sharp website design, packaging, and marketing materials. The cost of installing a virtual store is relatively low compared to physical store, advertising and promotion via virtual store is very accountable online. And that virtual store is safer than physical store since physical store has much greater chance of being robbed/broken into.

The study concluded that hat enacting a successful MRO strategy relies on all stakeholders involved in indirect procurement working together which includes engineering, operations and finance functions and that through the integration, the supply chain of MRO can be achieved lowest cost, highest efficiency, to improve the competitiveness of the supply chain purposes.

RECOMMENDATIONS

It would be appropriate for Agro chemical firms to train the employees and suppliers on the importance of adopting e-procurement application systems by the organization such as increase speed of the accessibility and dissemination of information, increase in productivity and other benefits as outlined by the research findings of this study.

It is important that the Agro chemical firms makes sure that the system is understood by the senior management, procurement staff and other users of e-procurement suppliers to the organization should be connected to the company's supply chain through the adopted e-procurement application systems especially the market place e-procurement systems. This should be done mainly through the tendering process. Agro chemical firms should capitalize on e-procurement application systems that are easy access and compliant with less complex technological gadgets. These systems should be simplified where necessary so that it is affordable for both the company and its clients.

This study recommended for continued adoption and maintenance of ERP system by agrochemical firms in Kenya as this will help to eliminate information mismatch between departments and give the personnel a single source of truth (quality information). Again adoption ERP system will help to automate core business processes and help to ensure regulatory compliance, reduce risk, fast-track and reporting.

This study recommended for adoption of E-Procurement system by Agro chemical firms in Kenya this will help to reduce material and service costs for MRO goods and services 5%-10% by reducing maverick purchasing, defining the use of preferred suppliers, and providing better leverage for contract negotiations adoption of E-Procurement y Agro chemical firms in Kenya will also enable companies to have better control of enterprise spending.

This study recommended for adoption of virtual storage by Agro chemical firms in Kenya as this will help to allow Agro chemical firms to open new lines of products and diversify revenue streams without making a big investment, **t**he costs of opening an online store are much lower than if compared to cost of opening a local business and that virtual storage will enable Agro chemical firms reach a worldwide market of internet users, not just the local market of a physical store finally this study recommends for adoption of E-MRO system by Agro chemical firms in Kenya Getting MRO right makes it possible to achieve long-term, sustainable efficiency savings.

Areas for Further Research

This study sought to determine the influence of Procurement technology adoption on performance of Agro chemical firms in Kenya. Future studies should attempt to look into efficiency of E-procurement on procurement processes with a specific case of Agro chemical firms. The study recommended that a

similar study needs to be done on effects of competitive bidding on procurement process at the of Agro chemical firms, there is also need to assess on effect of budgeting on procurement process at the of Agro chemical firms and finally there is need to assess on effects of procurement ethics on procurement process at the of Agro chemical firms.

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