

Inventory Optimization: A Factor Affecting E-Procurement Performance of State Parastatals in Kenya

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Abstract: The objective of the study was to investigate the role of inventory optimization on e-procurement performance of state parastatals in Kenya. The study therefore adopted the Business-Business- interaction model which according to Dooley, (2007) states that, millions of organizations are moving or have already moved their main operations to the Web to take advantage of the potential of more automation, efficient business processes, and global visibility. The study used a cross-sectional survey research design. Both qualitative and quantitative research methodologies were used in the study. The study population of this study comprised of the ICT and Procurement managers at all the 190 state parastatals in Kenya comprising of a total of 380 respondents. Since the population was highly heterogeneous, a cluster sampling was used to select 380 respondents from 190 state parastatals. Primary data was collected using a questionnaire covering the role of E-procurement in state corporation performance. . The questionnaire contained both structured and unstructured questions. Secondary data was gathered from existing credible and recognized source. Quantitative data was analyzed by employing descriptive statistics and inferential analysis using statistical package for social science (SPSS) together with simple graphics analysis, descriptive statistics form the basis of virtually every quantitative analysis to data). Correlation analysis was used to establish the relationship between the independent and dependent variables. The positive (H1) hypothesis testing was done at 5% level of significance and SPSS was used for this purpose. The data was then presented using frequency distribution tables, bar charts and pie charts for easier understanding. Procurement performance in the state parastatals was regressed against the variable of the role of inventory optimization strategy. The study established that, inventory level optimization strategy of the procurement process has positive relationship with procurement performance in State Corporation. The findings also revealed that, the inventory optimization level strategy is always non-negative when unmet demands are lost. The study recommended that, function of inventory optimization strategy should be derived from the need of maintaining the right order fulfillment. Demand conditions are such that it is difficult to meet supply chain expectations as either some supply chain members will be required to expedite shipments (high cost) or hold high levels of inventory.

Keywords: Inventory optimization, Performance

I. Introduction

Background Information: According to (Oke et al, 2006) e-procurement in Kenya is at the early adoption stage. Very few companies and state parastatals have the pre-requisite ICT infrastructure that is necessary for the implementation of e-procurement. This has been attributed to the astronomical costs that are involved in the setting up of the infrastructure as well the skill gap that exists in the labor market. The government of Kenya considers ICT as a key pillar in the success of vision 2030 which aims at transforming the country into an industrialized nation by the year 2030. To this end, a fully fledged ICT board has been set up by the government to spearhead the ICT revolution in the country which is a positive signal for e-procurement (Oke et al, 2006). By April 2008, there were 73 registered ISPs, 16 of which were active approximately 1,500,000 internet users and over 1000 cyber cafes. There were also about 800,000 personal computers in active use.

The high costs of satellite connections, slow speeds and low band width capacity have delayed the adoption of e-procurement though some companies through their massive financial capacity were able to gain a competitive advantage in terms of getting connected early enough. However, this could be a thing of the past. Many companies embraced the technology thanks to the landing of the high speed and high capacity fiber optic cable in the country. The cable is expected to boost the efficiency of internet making e-procurement a reality (Public Procurement Oversight Authority, 2009). The government through the ministry of finance has initiated an e-procurement project that aims at having an e-procurement system running in a few selected ministries before full implementation in all government departments (Republic Of Kenya, 2010).

Statement of the Problem: In today's dynamic and competitive business environment, inventory managers of manufacturing and retail organizations are increasingly under pressure to develop systems that enable them to minimize inventory costs, improve the flow of inventory in the supply chain and meet customer demand in a timely fashion. A properly managed inventory systems can considerably improve the firms performance (Mandrish & Schaffer, 2005) and productivity by reducing the cost of activities related to intra as well as inter firm inventory management. However in Kenya, according to (Oke et al, 2006), e-procurement is at the early adoption stage. Very few companies and state parastatals have the pre-requisite ICT infrastructure that is necessary for the implementation of e-procurement. Thus, the high costs of satellite connections, slow speeds and low band width capacity have delayed the adoption of e-procurement though most companies.

Objective of the Study: Establish the role of inventory optimization on e-procurement performance of state Parastatals in Kenya.

Research Hypothesis: H_{01} : Inventory optimization has no significant influence on e-procurement performance of state parastatals in Kenya..

II. Literature Review

Theoretical Framework

Business-to-Business Interaction Model: Business-to-Business (B2B) technologies pre-date the Web (Dooley, 2007). They have existed for at least as long as the Internet. B2B applications were among the first to take advantage of advances in computer networking (Dooley, 2007). The Electronic Data Interchange (EDI) business standard is an illustration of such an early adoption of the advances in computer networking. The ubiquity and the affordability of the Web have made it possible for the masses of businesses to automate their B2B interactions (Dooley, 2007). The growth of the Web is revolutionizing the way businesses interact with their partners and customers (Dooley, 2007). Millions of organizations are moving or have already moved their main operations to the Web to take advantage of the potential of more automation, efficient business processes, and global visibility (Dooley, 2007).

B2B applications include procurement, Customer Relationship Management (CRM), billing, accounting, human resources, supply chain, and manufacturing. B2B E-procurement far exceeds B2C E-procurement both in the volume of transactions and rate of growth (Harink, 2003). Despite the dot-com debacle that shook the US economy, B2B E-procurement is still strong and predictions agree that B2B E-procurement future looks even brighter (Hamner & Qazi, 2009). While B2B E-procurement has been around for at least as long as the Internet, it reached its full potential with the emergence of the Web as a conduit for efficient B2B transacting (Hamner & Qazi, 2009).

Numerous organizations started using the Web as a means to automate relationships with their business partners (Hamner & Qazi, 2009). This has elicited the formation of alliances in which businesses joined their applications, databases, and systems to share costs, skills and resources in offering value-added services (Hamner & Qazi, 2009). The ultimate goal of B2B E-procurement is therefore to have inter- and intra-enterprise applications evolve independently, yet allow them to effectively and conveniently use each other's functionality (Puschmann et al., 2005). An important challenge in B2B E-procurement model is interactive consisting of its interoperation and integration with both internal and external enterprise applications (Freeman, 2006).

Business to business (B2B) E-Procurement solutions is important for many companies as they are expected to deliver many purchasing benefits like leveraged buying, process transparency and purchasing overall cost reductions (Hamner & Qazi, 2009). To gain these benefits a successful implementation of the E-Procurement solutions is required and for this the end user adoption plays an important role, which is captured by many of the success and failure factors of E-Procurement systems found in literature (Angeles et al, 2007). The end user also plays an important role in the success of websites in the online business to consumer (B2C) world. This online B2C world has grown tremendously in the last decade as many consumers have discovered the benefits of online purchasing. Many companies have developed websites which offer many services and features to attract new and attain existing customers (Hung et al, 2006). The large increase of popularity of the online B2C world gave rise to the idea that there are opportunities from the online B2C world to improve the user adoption of B2B E-Procurement solutions within companies (Hung et al., 2006).

To demarcate the scope of the research, this study focused on ease of use as an important success factor of user adoption of E-Procurement solutions and focused on functionalities offered to consumers in the online B2C world. This study assumed that including more user preferred functionalities will increase the ease of use of the E-Procurement solution and thereby increase the user adoption of the E-Procurement solution. The goal of this study was thereby to identify the most promising functionalities offered in the online B2C world for usage

within B2B E-Procurement solutions and to assess a fit for usage of these functionalities within a B2B E-Procurement environment (Hung et al., 2006).

III. Methodology

Research Design: The research design constitutes the blue print for the collection, measurement and analysis of data, (Kothari, 2005). A cross-sectional survey research design was used in this study. Cross-sectional survey is a method that involves the analysis of data collected from a population, or a representative subset, at one specific point in time Orodho (2003). The choice of this design is appropriate for this study since it utilizes a questionnaire as a tool of data collection and helps to establish the behavior of employees towards embracing e-procurement in state parastatals. This is supported by (Mugenda & Mugenda, 2003) who assert that this type of design enables one to obtain information with sufficient precision so that hypothesis can be tested properly. It is also a framework that guides the collection and analysis of data. (Kothari, 2005) observes that a descriptive research design is used when data is collected to describe persons, organizational settings or phenomenon.

Population: Population refers to an entire group of persons or elements that have at least one thing in common. Population also refers to the larger group from which a sample is taken (Orodho, 2003). A population can also be defined as including all people or items with the characteristic one wish to understand. The study population of this study comprised of the ICT and Procurement managers at all the 190 state parastatals in Kenya comprising of a total of 380 respondents. Thus E-procurement strategy and its application is relevant at this level prompting the choice of the departments i.e. these group of respondents is directly involved in the implementation of E-procurement policy. A list that contains the number of all managers was sourced from the human resource department of each state corporation and directorate of state parastatals (GOK 2011) this was used as a sampling frame to identify every single element in the target population.

Sampling Frame: A sampling frame is the source material or device from which a sample is drawn. According to Orodho (2003) a sampling frame is a list of all those within population who can be sampled. The sample for this study was 190 state parastatals in Kenya. (Directorate of state parastatals, 2013).

Sample and Sampling Techniques: A sample is a set of observations drawn from a population by a defined procedure. The sample represents a subset of manageable size. Samples are collected and statistics are calculated from the samples so that one can make inferences or extrapolations from the sample to the population. The sample size of this study was 80 respondents. Since the population is highly heterogeneous, a cluster sampling was used to select 380 respondents from 190 state parastatals. Cluster sampling is a sampling technique used when "natural" but relatively homogeneous groupings are evident in a statistical population. In this technique, the total population is divided into groups (or clusters) and a simple random sample of the groups is selected. Then the required information is collected from a simple random sample of the elements within each selected group. This may be done for every element in these groups or a subsample of elements may be selected within each of these groups. A common motivation for cluster sampling is to reduce the total number of interviews and costs given the desired accuracy. Assuming a fixed sample size, the technique gives more accurate results when most of the variation in the population is within the groups, not between them (Orodho, 2003). A simple random sampling plan where every respondent, or object or subject has chance of representation will be used in this study.

Data Collection Methods: A research permit was sought from the National Council for Science and Technology (NCST). On obtaining the research permit, the researcher sought permission from the managers to visit their parastatals. Selected state parastatals were thereafter visited by the researcher after an appointment had been made with the managers. Questionnaires and the interview schedules were administered personally by the researcher to the respondents. Adequate instruction and assurance of confidentiality was provided to all participants. Thereafter, the questionnaires were collected by the researcher after being filled.

Sample size formula

$$n = \frac{N}{1 + N(e)^2}$$

Where n=sample size
N= sample population

e=precision

Therefore the sample size will be 80

Table 1 Sample Frame

| Population | Target population | Sample at 10% precision |
|--------------|-------------------|-------------------------|
| ICT Mangers | 190 | 40 |
| Procurement | 190 | 40 |
| Total | 380 | 80 |

Data Collection Instruments: According to (Mugenda &Mugenda, 2003) data collection is the means by which information is obtained from the selected subject of an investigation. The researcher collected both primary and secondary data during the researcher. Primary data was collected using a questionnaire covering the role of E-procurement in state corporation performance. The questionnaire contained both structured and unstructured questions. The open-ended questions were used to limit the respondents to given variables in which the researcher is interested, while unstructured questions were used in order to give the respondents room to express their views in a more pragmatic manner (Kothari, 2005). Secondary data was gathered from existing credible and recognized source. The data comprised of materials that are desirable, current, accurate, sufficient and relevant collected from library text books, internet and magazines and personnel file in the organization.

Pilot Study: According to Mugenda, (2003) pilot test is necessary and the validity of a study. A pilot test was conducted using questionnaires administered to ICT managers and procurement managers. This constituted 10% of the 38 state parastatals firms that were registered by directorate of state corporation the for ICT managers and for procurement (10% of 38) = 3.8 = 4 were selected using simple random sampling. In each of the ICT and the procurement managers were targeted. This constituted to respondents in each state corporation and therefore the total number of the respondents for the pilot was 4 respondents.

The pilot was undertaken to pretest data collection instrument for validity and reliability. According to (Orodho, 2003) a pilot study is necessary for testing the reliability of data collection instruments. (Cooper & Schindler, 2001) explains reliability of research as determining whether the research truly measures that which it was intended to measure or how truthful the research results are. Pilot study is thus conducted to detect weakness in design and instrumentation and to provide accurate data for selection of a sample (Young, 2009). The validity of the questionnaire was determined using construct validity method. Construct validity is the degree to which a test measures an intended hypothetical construct (Mugenda, 2003). Using a panel of experts familiar with the construct is a way in which this type of validity can be assessed; the experts can examine the items and decide what that specific item is intended to measure (Kothari, 2005).

The study used different groups of experts in the field of procurement and issued them with the questionnaires. The experts were required to assess if the questionnaires helps in establishing the role of e-procurement within state parastatals in Kenya. The coefficient of data gathered from the pilot study was computed with assistance of Statistical package of social Sciences (SPSS) version 21. A coefficient of above 0.5 was obtained and this indicated that the data collection instruments were valid (Klein & Ford, 2003). The recommendations from the procurement experts and the pilot study respondents were used to improve on data collection instruments. Data validity played an important role towards generalization of the gathered data to reflect the true characteristics of the study problem.

The reliability of the questionnaires was determined using test-retest method. A reliable measurement is one that if repeated second time gives the same as it did the first time (Mugenda & Mugenda, 2003). Test-retest reliability is a measure of reliability obtained by administering the same test twice over a period of time to a group of individuals (Mandrish & Schaffer, 2005). The scores from Time 1 and time 2 can then be correlated in order to evaluate the test for stability over time (Mandrish & Schaffer, 2005). Test-re-test reliability is the degree to which scores are consistent over time; it indicates score variation that occurs from testing session as a result of errors of measurement (Shim et al, 2001). The preliminary or first draft of questionnaires was given to a panel of five experts in the field of procurement. These experts were asked to review the instrument and make recommendations for improving its validity. These recommendations were then incorporated into a second draft of the instrument which was then given to a small sample of relevant professionals. This pilot sample was asked to comment on the ease with which they understood and completed the test questions. Where relevant, these comments were incorporated into a third draft of the test instrument. This third draft was constituted to the final test instrument where the open-ended questions on the survey instrument were analyzed qualitatively; that is, they were simply reported for each of the three groups of the respondents.

Reliability: The study conducted factor analysis to select a subset of variables from a larger set based on the original variables with the highest correlations with, the principal component factors. Reliability analysis was conducted using Cronbach’s alpha to determine whether the data gathered on each variable had a significant relationship with the role of e-procurement

Reliability is the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable (Orodho, 2003).

(Cooper & Schindler, 2001) identify three types of reliability referred to in quantitative research, which relates to; the degree to which a measurement, given repeatedly, remains the same as the stability of a measurement over time; and the similarity of measurements within a given time period. (Mugenda, 2003) adheres to the notions that consistency with which questionnaire items are answered or individuals scores remain relatively the same can be determined through the test retest method at two different times. This attribute of the instrument is actually referred to as stability. If we are dealing with a stable measure, then the results should be similar. A high degree of stability indicates high degree of reliability, which means the results are repeatable. (Klein & Ford, 2003) detects a problem with the test-retest method which can make the instrument, to a certain degree, unreliable. She explains that test-retest method may sensitize the respondent to the subject matter, and hence influence the response given. Similarly, (Cooper & Schindler, 2001) note that when respondents answer a set of test items, the scores obtained represent only a limited sample of behavior. As a result, the scores may change due to some characteristic of the respondent, which may lead to errors of measurement. These kinds of errors reduced the accuracy and consistency of the instrument and the test scores. Hence, it is the researchers’ responsibility to assure high consistency and accuracy of the tests and scores (Kothari, 2005). To measure the reliability of the gathered data, Cronbach’s alpha was applied. Cronbach’s alpha is a coefficient of internal consistency.

Table 2 Internal consistency- Cronbach’s alpha

| Cronbach’s alpha | Internal consistency |
|-------------------------|---------------------------------|
| $\alpha \geq 0.9$ | Excellent(high stakes testing) |
| $0.7 \leq \alpha < 0.9$ | Good (low stake testing) |
| $0.6 \leq \alpha < 0.7$ | Acceptable |
| $0.5 \leq \alpha < 0.6$ | Poor |
| $\alpha < 0.5$ | Unacceptable |

However, greater number of items in the test can artificially inflate the value of alpha and a sample with a narrow range can deflate it, so this rule of thumb should be used with caution.

Data Analysis and Presentation: This study is expected to produce both quantitative and qualitative data to explain the role of e-procurement strategy exhaustively. Once the questionnaires were received they were coded and edited for completeness and consistency. Quantitative data was analyzed by employing descriptive statistics and inferential analysis using statistical package for social science (SPSS). This technique gives simple summaries about the sample data and present quantitative descriptions in a manageable form, (Orodho, 2003). Together with simple graphics analysis, descriptive statistics form the basis of virtually every quantitative analysis to data, (Kothari, 2005). Correlation analysis to establish the relationship between the independent and dependent variables was employed. The purpose of doing correlation was to allow the study to make a prediction on how a variable deviates from the normal. The positive (H1) hypothesis testing was done at 5% level of significance and SPSS was used for this purpose. The data was then presented using frequency distribution tables, bar charts and pie charts for easier understanding.

Simple Regression Analysis Model: Procurement performance in the state parastatals was regressed against inventory optimization strategy, The equation will be expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \epsilon$$

Y = e-Procurement performance

β_0 = Constant (Co-efficient of intercept)

X1 = Inventory optimization

ϵ . = Error Term

B1 = Regression co-efficient of Inventory optimization.

IV. Findings And Discussions

4.1: Factors loading for the Construct inventory optimization strategy: On inventory optimization strategy factors, the reliability and factor analysis results were as presented in table 3. This shows Cronbach’s alpha values before and after removal of item with a factor loading value of less than 0.4. It shows that the Cronbach’s

alpha value changed from 0.625 to 0.804 after the removal of item with factor loadings of less than 0.40. These items included; Inventory control, Optimization technique, Demand forecasting, Sequential optimization and Stochastic processes. This concurred with (Mabert et al, 2003), factor loading values that are greater than 0.4. Should be accepted and values below 0.4 should be rejected. The new Cronbach's alpha value of, 0.804 demonstrated that the obtained data on all the inventory optimization strategy item were reliable and this satisfied (Orodho, 2003) that an alpha coefficient higher than 0.60 indicates that the gathered data had relatively high internal consistency and could be generalized to reflect opinions of all respondents in the target population on how inventory optimization strategy determines role of e-procurement strategy on procurement performance in state parastatals in Kenya.

Table 3: Factors loading for the Construct Inventory Optimization strategy

| α before | Items | Factor loadings |
|-----------------|-------------------------|-----------------|
| | Inventory control | .838 |
| | Optimization technique | .742 |
| | Demand forecasting | .689 |
| | Sequential optimization | .639 |
| | Stochastic processes | .628 |

4.2: Descriptive Analysis: The purpose of descriptive statistics is to enable the researcher, to meaningfully describe a distribution of scores or measurements using indices or statistics. The researcher in this study used mean average and percentages of present the study findings of the role of e-procurement strategy in procurement performance in state parastatals in Kenya.

4.2.1: Construct Inventory Optimization strategy: This Inventory optimization strategy offers efficiency in coordinating demand, requests, transformation and inventory management utilization of optimum level and benefits supply chain in keeping inventory toner and ordering more efficient, real time information in regards to inventory levels through the supply chain in assisting to lowering the cost of back orders, lost orders and obsolescence (Zhang et al, 2002).

Inventory optimization strategy assist in coping with the increasing uncertainty both on demand and supply sides, it becomes crucial requirement to making demand and supply by decisions through the cooperation of marketing and operation managers. Traditionally, demand management is the responsibility of marketing managers into estimate demand determinants such as pricing, promotion, and advertising. To anticipate pricing, demand forecasts have become sophisticated, though still flawed due to sheer number of products in a retailer's store. To examine the influence of inventory optimization strategy on procurement performance in state parastatals the study rated key inventory optimization strategy factors in supply chain management. These included inventory control, stochastic processes; optimization techniques demand forecasting and service level sensitivity on procurement performance. Analysis results are presented in table 2 on inventory control on inventory optimization strategy functions. 3.7 percent of the respondents indicated that inventory control practices on procurement performance did not influence the role of e-procurement strategy enhancement on procurement performance in state parastatals in Kenya. 45.7 percent of the respondents indicated that inventory control procurement performance practices influenced the role of e-procurement strategy and its enhancement in procurement performance in state parastatals in Kenya to a small extent whereas 36.5 percent of a moderate extent while 12.3 percent of the respondents indicated that inventory control on e-procurement strategy influenced procurement performance practices in state parastatals to a large extent while 1.8 percent to a very large extent. It was identified that 0.9 percent of the respondents indicated that stochastic processes policy had influence on procurement performance in state parastatals in Kenya to a large extent while 4.3 percent of the respondents indicated that, inventory costs had no influence on procurement performance in state parastatals in Kenya to a very large extent.

On optimization technique function 0.7 percent of the respondents indicated that optimization technique does not have an influence on procurement performance in state parastatals in Kenya, 3.6 percent of the respondents indicated that optimization technique function influences procurement performance in state corporation in Kenya to a small extent, 13.7 percent of the respondents indicated that optimization technique functions influences procurement function in state parastatals to a moderate extent, 76.2 percent of the respondents indicated that optimization technique function influences procurement performance in state parastatals to a large extent, and 5.8 percent of the respondents indicated that inventory optimization strategy function influences procurement performance in state parastatals in Kenya to a very large extent.

On the rate of demand for casting, 0.9 percent of the respondents indicated that the level of demand forecasting did not influence procurement performance in state parastatals, 6.4 percent of the respondent indicated that the level of demand forecasting influenced procurement performance to a small extent in state parastatals in Kenya, 72.6 percent of the respondents indicated that the level of demand, forecasting influenced

procurement performance to a moderate extent in state parastatals in Kenya, 8.2 percent of the respondents indicated that, the level of demand forecasting influenced procurement performance to a large extent in state parastatals in Kenya while 11.9 percent of the respondent indicated that the level of demand forecasting influenced procurement performance to a very large extent in state parastatals in Kenya.

Further on sequential optimization on inventory optimization strategy practices, 1.4 percent of the respondents indicated that sequential optimization on inventory optimization strategy practices did not influence procurement performance in state parastatals, 56.8 percent of the respondents indicated that sequential optimization on inventory optimization strategy, influenced procurement performance practices to a small extent in state parastatals in Kenya, 36.8 percent of the respondent indicated that sequential optimization on inventory optimization strategy, influenced procurement performance practices to moderate extent in state parastatals in Kenya, 4.8 percent of the respondents indicated that sequential optimization on inventory optimization strategy, influenced procurement performance practices to a large extent in state parastatals, while 2.4 percent of the respondents indicated that sequential optimization on inventory optimization strategy, influenced procurement performance practices to a large extent in state parastatals in Kenya, while 0.2 percent of the respondents indicated that sequential optimization on inventory optimization strategy, influenced procurement performance practices to a very large extent in state parastatals in Kenya.

Analysis results are presented in table 2 on stochastic process on inventory optimization strategy functions. 2.5 percent of the respondents indicated that stochastic process practices on inventory optimization strategy did not influence procurement performance in state parastatals in Kenya. 5.3 percent of the respondents indicated that inventory control procurement performance practices influenced the role of e-procurement strategy and its enhancement in procurement performance in state parastatals in Kenya to a small extent whereas 6.7 percent of a moderate extent while 48.7 percent of the respondents indicated that stochastic process on inventory optimization strategy on e-procurement strategy influenced procurement performance practices in state parastatals to a large extent while 36.8 percent to a very large extent.

These findings concurred with (Brousseau, 2000) who indicated that the complexity and uncertainty exists in supply chain and thus makes the concepts of accurate and effective forecasting an elusive target. On the other hand (Cagliano et al., 2003) to have a visible decision making system is becoming a crucial issues for organizations in a constantly fluctuating environment where the economic uncertainty needs mathematical models, forecasting the expected demand for a certain period of time with one or more product is one of the most relevant targets with an enterprise despite the need for accurate forecasting to enhance competitive advantage through proper inventory optimization strategy approach (Evenett and Hoekman (2004). The study deduced that the major factors affecting procurement performance in many state parastatals include lack of training on information technology skills, corruption, lack of transparency, nepotism and in efficient procurement procedures and by not following public procurement act and the regulations envisaged by procurement policies and guidelines and hence poor procurement performance practices.

Table 4: Inventory optimization strategy

| Inventory optimization strategy | Not at all | Small extent | Moderate extent | Large extent | Very large | Total |
|---------------------------------|------------|--------------|-----------------|--------------|-------------|------------|
| Inventory control | 3.7 | 45.7 | 36.5 | 12.3 | 1.8 | 100 |
| Optimization technique | 0.7 | 3.6 | 13.7 | 76.2 | 5.8 | 100 |
| Demand forecasting | 0.9 | 6.4 | 8.2 | 72.6 | 11.9 | 100 |
| Sequential optimization | 1.4 | 56.8 | 36.8 | 4.8 | 0.2 | 100 |
| Stochastic processes | 2.5 | 5.3 | 6.7 | 48.7 | 36.8 | 100 |
| Average | 1.8 | 23.56 | 20.38 | 42.92 | 11.3 | 100 |

4.2.2: Inventory optimization strategy: To investigate the differences between the ways in which inventory optimization strategy is described in the literature and actual inventory optimization strategy implementations, five case studies have been conducted. The goal of these case studies was to investigate whether statements about inventory optimization strategy outcomes, enablers for success, and the design of inventory optimization strategy itself as found in the literature, also held in practice. The case studies focused on issues like control, information, the buyer-supplier relationship, IT systems, and results. The five cases were selected to cover smaller and larger organizations in a variety of industries. Our key informants were purchasing managers at buying companies and supply chain specialists at supplier companies, and all interviews were complemented with document analysis. The data were analyzed using cross-case synthesis, a method that compares the case study findings in a conceptually clustered matrix to identify differences (Crenshaw & Robison, 2006)).

The case studies showed that inventory optimization strategy can be implemented for a diverse range of products and demand patterns. Different situations lead to different inventory optimization strategy designs. On the other hand, in those cases where inventory optimization was implemented for commodity products, buyer involvement was lower and the supplier was expected to take full control of the entire chain.

In all cases suppliers mentioned that inventory optimization strategy helped to secure their sales. However, to realize improvements in capacity planning, it appeared that it is important that inventory optimization strategy is implemented with a large number of customers. Not all suppliers had accomplished this yet. All buyers were enthusiastic about the improved service levels. There were less emergency orders and a reduction in incorrect orders. Both buyers and suppliers mentioned the advantage of the increased supply chain control. In three out of five cases an increase in the sales margin for the supplier could be noticed. With respect to costs, many differences appeared; some had the advantage of reduced transportation costs while others benefited more from reduced inventory costs. Only one buyer mentioned a reduction in administration costs. These five case studies are limited in number, and they do not represent more than a qualitative exploration, yet, the findings provided further support for the importance of the enablers as they were identified from literature, and they presented additional insights into the expected benefits of inventory optimization strategy.

4.3: Inferential Analysis

4.3.1: Correlation Analysis: Correlation is a term that refers to the strength of a relationship between two variables. A strong or high correlation means that two or more variables have a strong relationship with each other while a weak or low, correlation means that the variables are hardly related. Correlation coefficient can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while a value of +1.00 represents a perfect positive correlation. A value of 0.00 means that there is no relationship between variables being tested (Orodho, 2003). The most widely used types of correlation coefficient are the Pearson R which is also referred to as linear or product-moment correlation. This analysis assumes that the two variables being analyzed are measured on at least interval scales. The coefficient is calculated by taking the covariance of the two variables and dividing it by the product of their standard deviations. A value of +1.00 implies that the relationship between two variables X and Y is perfectly linear, with all data points lying on a line for which Y increases and X increases. Conversely a negative value implies that all data points lie on a line for which Y decreases as X increases (Orodho, 2003). In this study pearson correlation is carried out to determine how the research variables related to each other. Pearson’s correlation reflects the degree of linear relationships between two variables. It ranges from +1 to -1. A correlation of +1 means there is a perfect positive linear relationship between variables (Young, 2009).

Table 5: correlation analysis for construct inventory optimization strategy

| | | procurement performance | Inventory Optimization strategy |
|---------------------------------|---------------------|-------------------------|---------------------------------|
| e-procurement performance | Pearson Correlation | 1 | 3.199 |
| | Sig. (2-tailed) | 0.0002 | |
| | N | 63 | 63 |
| Inventory optimization strategy | Pearson Correlation | 3.199 | |
| | Sig. (2-tailed) | 0.0002 | |
| | N | 63 | 63 |

Correlation is significant at the 0.01 level (2-tailed)

4.3.2: Correlation analysis for Inventory optimization strategy: A correlation analysis for the construct inventory optimization strategy was conducted to find out how inventory optimization strategy correlated with procurement performance. Table 5 shows that the Pearson correlation coefficient was 3.199374. This is a clear indication that inventory optimization strategy has a positive correlation with e-procurement performance (p-values >0.05). The significance of inventory optimization strategy verses e- procurement enhancement and performance as indicated in the figure, all the plots are on the first quadrant in the line of best fit. These findings indicate that there is a strong linear relationship between inventory optimization strategy and e-procurement strategy. Demand conditions are such that it is difficult to meet supply chain expectations as either some supply chain members will be required to expedite shipments (high cost) or hold high levels of inventory (Carabello, 2007). High levels of stock adversely affect profitability (Croom, 2000).

4.3.3: Regression Analysis for Construct Inventory Optimization strategy: Table 4 presents the regression model the regression model of inventory optimization strategy with a coefficient of determination of R² = 0.272 and R= 0.522 at 0.05 significance level. The coefficient of determination indicates that 52.2 % of the variation on e-procurement performance is influenced by inventory optimization strategy. This shows that there exists a positive relationship between inventory optimization strategies on e-procurement performance. The test of beta coefficient shows that there is a significant relationship between inventory optimization strategy and e-procurement performance as positive. The coefficient significance of inventory optimization strategy effect as .191 and is significantly greater than zero since the significance of t-statistics 0.00 is less than 0.05. This

demonstrates that the high level of inventory optimization strategy as having a positive effect on e-procurement performance. These corroborated findings by (George, 2002) that inventory optimization strategy factor such as high levels of stock adversely affect profitability, coordination of demand requests, transportation and inventory management utilize the benefit of strategic supply chain tools such as information technology in lowering and ordering more efficient and effective stock utilization and hence e-procurement performance.

Table 4 Model Summary

| Model Summary | | | | |
|---------------|------|----------|-------------------|---------------------------|
| Model | R | R Square | Adjusted R Square | Std Error of the Estimate |
| | .442 | .195 | .190 | .8244 |
| | | | | |
| | | | | |

Predictors: (constant) Inventory optimization strategy

4.3.4: ANOVA Test

Table 5 ANOVA for construct inventory optimization strategy

| Model | Sum of Squares | Df | Mean of Square | F | Sig |
|------------|----------------|-----|----------------|------|-------|
| Regression | 32.614 | 1 | 32.614 | 9.61 | .0002 |
| Residual | 465.213 | 135 | 3.446 | | |
| Total | 497.827 | 136 | | | |

Predictors: (constant) Inventory optimization strategy

4.3.4.1: ANOVA for construct Inventory optimization strategy: As can be observed in table 5 of the Analysis of variance (ANOVA) for regression coefficients, the results demonstrate that the significance of F statistics is 0.00 which is less than 0.05. Therefore it implies that there is a significant relationship between inventory optimization strategy and e-procurement performance. Demand conditions are such that it is difficult to meet supply chain expectations as either some supply chain members will be required to expedite shipments (high cost) or hold high levels of inventory (Maleyeff, 2003). High levels of stock adversely affect profitability (McCrudden, 2004).

To coordinate demand requests, transportation and inventory management utilize the benefit of strategic supply chain tools such as information technology to lower and make ordering more efficient (Andersen & Christensen, 2005)

V. Conclusions And Recommendations

The findings indicated that, inventory level optimization strategy of the procurement process has positive relationship with procurement performance in State Corporation. The findings emphasize that continuous inventory replenishment policy takes a regular order. The finding also indicated that, the inventory optimization level strategy is always non-negative when unmet demands are lost. The researcher recommends that intensifying competition and modern management philosophies drive companies to find ways to reduce working capital tied to business operations, including maintenance material inventories. The study recommends that the function of inventory optimization strategy should be derived from the need of maintaining the right order fulfillment. Demand conditions are such that it is difficult to meet supply chain expectations as either some supply chain members will be required to expedite shipments (high cost) or hold high levels of inventory. High levels of stock adversely affect profitability and as such stocks should be replenished continuously from upstream. To coordinate demand requests inventory management should utilize the benefit of strategic supply chain tools such as information technology to lower and make ordering more efficient and effective. This real – time information in regard to inventory levels throughout the supply chain assists in lowering the costs of back orders, lost orders and obsolescence.

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