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# Effectiveness of Electronic Inventory Systems on Customer Service Delivery in Selected Supermarkets in Kenya

Eunice W. Wanjohi[1], Robert Mugo[2*], Juma Wagoki[1]
1. Jomo Kenyatta University of Agriculture and Technology, Nakuru Campus
2. School of Business, Kabarak University
* E-mail of the corresponding author: mugorobert@gmail.com

**ABSTRACT**

Effectiveness of electronic inventory system is very vital on customer service delivery. Without effectiveness, the customers will judge businesses harshly. The study evaluated the extent to which electronic inventory systems are used by supermarkets in Kenya. It also sought to determine the level to which lead-time variability resulting from the use of electronic inventory systems affects customer service delivery. The study also aimed at evaluating how the service quality created with electronic inventory systems has on customer service delivery in the selected supermarkets. A descriptive survey research design was adopted for the study with a target population of two thousand five hundred and forty nine respondents (2549) of which forty nine (49) were management staff and two thousand five hundred (2500) were customers of the five major supermarkets in Kenya. A census was conducted among the managers and supervisors while a sample of ninety two (92) was picked from the customers making the total sample size for the study three hundred and eighty one (141). For customers, Stratified-sampling design was used to achieve the desired representation from the total population and the sample size for each stratum was allocated proportionately. Data was collected using questionnaires, which were tested for reliability using Cronbach's Alpha. Data collected was analyzed through Pearson's correlation and the Chi-square test to test the hypothesis. From the analysis the researchers established that majority of the supermarket chains had integrated the use of electronic inventory systems which had enhanced effective customer service delivery. Lead time had also been influenced positively the use of electronic inventory systems as well as the quality of service delivery which in turn led to effective customer service delivery. The researchers recommended continuous improvement on the use of electronic inventory systems to ensure enhanced customer service delivery.

**Key words:** Inventory Holding Cost, Inventory, Lead-time, E-inventory System, Customer Service

## 1 INTRODUCTION

Over the years, the trend has been towards an integrated world economy. Firms have developed or are seeking to develop global strategies on how to avail products in the different countries where they operate. Pressure has been to incur the cost of making the product towards the customer or main inventory available in a timely manner to achieve a competitive advantage. Changes is business environment are happening and keeping pace with them is a challenge. The turbulent global markets have created fragmented demand for goods and services making companies prioritize the demand of their customers. Inventory management is the process of efficiently overseeing the constant flow or units into and out of an existing inventory. It is an attempt to balance inventory needs and requirements with the need to minimize costs resulting from obtaining and holding inventory (Lysons, 2006).

Inventories pervade the business world and maintaining inventories is essential for any company that deals with physical products, including retailers, wholesalers and the manufacturers. The total value of all inventory—including finished goods, partially finished goods, and raw materials—in the United States is more than a *trillion* dollars which is more than $4,000 each for every man, woman, and child in that country. The carrying costs of the inventory are also very huge, perhaps a quarter of the value of the inventory. Therefore, the costs incurred for the storage of inventory in the United States may run into hundreds of billions of dollars annually. Reducing these costs through appropriate inventory management techniques can enhance any organization's competitiveness. Many companies in different parts of the world have been revamping the ways in which they manage their inventories. Most are developing long-term partnerships with suppliers and collaborating with them in inventory control (Chan et al., 2003).

In today's business environment, many smaller businesses have come to rely on computerized inventory management systems. Given such developments, it is little wonder that business experts commonly cite inventory management as a vital element that can spell the difference between success and failure in today's keenly competitive business world. Udo (1993), described telecommunications technology as a critical organizational asset that can help a company realize important competitive gains in the area of inventory management. Udo noted that companies that make good use of this technology are far better equipped to succeed than those who rely on outdated or unwieldy methods of inventory control. According to Kotler and Armstrong (2008), a supermarket is a relatively large, low cost, low margin, high volume self service operation designed to serve the consumers or customers total needs for grocery and household products. The spectacular growth of the market share of supermarkets in retailing is no longer an isolated phenomenon in the developing world. In Latin

 

America for example, where 4 out of 10 people live in poverty, supermarkets increased their market share from 10-20% to 50-60% of national food retail markets from 1990 to 2000 (Reardon and Berdegue 2002). To a smaller degree, similar observations were made in Asia (Reardon and Timmer 2002).

1.1 Statement of the Problem

Inventory management is an important part of a business's operation. The introduction on automated systems like the Enterprise Resource Planning and Barcodes, since the last decade of the twentieth century has led to increased efficiency and thus improved customer service delivery in retail outlets. The electronic inventory systems like vendor managed inventory have been effective in retail supermarkets by improving stock management, cash flows and risk management. Despite the emerging technologies, businesses are still struggling to improve in their performance in inventory control as well as eliminate manual systems. Supermarkets deals with a variety of items to enable them meet the different tastes and preferences of their customer. It is difficult to maintain internal accuracy in the inventory levels and meet customer requirements efficiently if inventory is not properly coordinated and maintained using electronic inventory systems. For efficient supply and purchase of goods and services in and out of the supermarket, there is need to use electronic inventory systems in order to appropriately match demand and supply forces and be competitive in the market at the lowest possible cost. The retail industry in Kenya is faced with high competition due to rapid growth of the towns in the country. This competitive rate in the current business arena has put pressure on more supermarkets to institute electronic inventory systems such as Enterprise Resource Planning, Vendor Managed inventory, Electronic Data Interchange, Electronic Point of Sale and Bar codes in order to improve on their efficiency and effectiveness in fulfilling customers order resulting in satisfactory customer service delivery and consequently profitability. One of the approaches being used by retail outlets is the use of electronic inventory systems. The researchers thus sought to determine the effectiveness of electronic inventory systems on customer service delivery in selected supermarkets in Kenya.

**1.3 Objectives of the Study**

The specific objectives that guided the study were:

(i) To evaluate the extent to which the electronic inventory systems used affect customer service delivery in the selected supermarkets in Kenya.

(ii) To determine the level to which lead time variability resulting from the use of electronic inventory systems affect customer service delivery in selected supermarkets in Kenya.

(iii) To evaluate the influence service quality created by electronic inventory systems has on customer service delivery in the selected supermarkets in Kenya.

**1.4 Research Hypothesis**

(i) $H_{01}$: There is no significant influence between electronic inventory systems used and customer service delivery in the selected supermarkets.

(ii) $H_{02}$: There is no significant influence between lead-time variability resulting from the use of electronic inventory systems and customer service delivery in the selected supermarkets.

(iii) $H_{03}$: There is no significant influence between service quality created by electronic inventory systems and customer service delivery in the selected supermarkets.

**2.0 LITERATURE REVIEW**

**2.1 Theoretical Review**

Larson and Siibrands (1991), on the quick response (QR) impact on retail inventory levels found that QR involves technology-driven, co-operative retailer/supplier relationships. QR enabling technology includes: point-of-sale systems, uniform product/article codes, and electronic data interchange. Using statistical analysis of Canadian chain store inventory data, and a case study on the largest chain store operation in The Netherlands, there study found that QR brought lower inventory levels to retailers. The implications of their findings were that, merchandisers can use QR techniques to reduce inventory levels – but only up to a point. Since stock stimulates sales, retailers should use item/stock-keeping unit (SKU) level data to study optimal (which may not equal minimum) inventory levels. In a study on Implementing an Effective Inventory Management System it was found out that Inventory control problems often result from record and physical count discrepancies which may ultimately lead to higher than preferred inventory levels. Conversely, accurate inventory records result in lower inventory investment and are the foundation for forecasting, ordering, tracking, vendor evaluation, and dead stock administration programmes (Harrington et al., 1990).

This research is based on the Theory of Inventory Control, which is explained using two models, the deterministic models or stochastic models according to the predictability of the demand involved. In inventory, the demand for a product refers to the number of units that will need to be withdrawn from inventory for some use during some specific time, for example, sales. Deterministic inventory models are used in cases where the demand is known, that is, in cases where future periods can be forecast with considerable precision and where it is assumed that all forecasts will always be completely accurate.

 

Stochastic models on the other hand are used when demand cannot be predicted very well, that is, where the demand in any period is a random variable rather than a known constant. These models can also be classified by the way the inventory is reviewed, either continuously or periodic. In a continuous model, an order is placed as soon as the stock level falls below the prescribed reorder point. In a periodic review, the inventory level is checked at discrete intervals and ordering decisions are made only at these times even if inventory dips below the reorder point between review times (Stevenson 2007).

**2.2 Electronic Inventory Systems**

**2.2.1 Bar Codes**

Bar coding was invented in the 1950's. Barcodes accelerate the flow of products and information throughout an enterprise. The most familiar example of their used is the Electronic Point of Sale (EPOs), which is commonly used in supermarket, whereby sales are recorded by scanning a product's barcode at the checkout tills. The EPOs systems verifies, checks and charges transactions, provides instant sales reports, monitors and changes prices and sends intra- and inter stores messages and data. With the integration of Electronic Data Interchange (EDI) at the electronic point of sale, communication between suppliers and the supermarkets can be more effective. This is by making stock replenishment effective due to interchange of information. Barcodes will usually represent a product identification that a computer will recognize when scanning the code. This will enable the retailer to know how much has come into the store, how much has been left the store as sales and by extension, how much should be left in the shelves. It alerts them on when to reorder and informs them on which items are selling well (Lysons, 2006).

**2.2.2 Radio Frequency Identification (RFID)**

An RFID is a tag that contains a silicon chip that carries an identification number and an antenna that is able to transmit the number to a reading device. This tool results in improved inventory management and replenishment practices. This results in reduction or interrupted or lost sales due to items being out of stock (Lysons, 2006).

**2.2.3 Enterprise Resource Planning (ERP)**

ERP, or enterprise resource planning, is a computer network system that uses a database of information that is company-wide accessible. ERP is designed to replace paper-based systems by analyzing data from all areas of a company's resources. ERP covers all functions of a business such as purchasing, manufacturing, distribution, and inventory management. ERP is designed around a number of modules each of which can stand alone or combined with others that include finance, logistics, manufacturing, supplier management and human resources (Stevenson 2007). By using an ERP management system, a company's inventory is stored on a database that is comprised of physical stock, costs, vendor accounts, and lead-times for re-ordering stock. ERP management systems can improve costs, productivity, reduce time lag, reduce waste, and improve overall efficiency. To fully use an ERP inventory management system, a business needs to understand the relationship of their company compared to the rest of the supply chain. ERP management uses bar codes to keep up with inventory items. This makes tracking stock much easier. As the bar-coded items leave inventory, they get scanned and their product information is entered into the ERP inventory management system. Placing bar code labels on stock helps companies save money because it keeps the list of stock updated. Employees can easily see when certain quantities are low and need to be re-stocked. Customer service also benefits from this because businesses and customers can see what products are immediately available.

**2.2.4 Economic Order Quantity (EOQ)**

According to Burt et al (2010), EOQ is the ordering quantity, which minimizes the balance of cost between inventory holding cost and re-order costs. To be able to calculate a basic EOQ, certain assumptions are necessary. These may include: known, constant, stock holding costs; that there is a known, constant ordering costs; that the rates of demand are known; that there is a known constant price per unit; that replenishment is made instantaneously, that is the whole batch is delivered at once and no stock-outs are allowed.

**2.2.5 Just in time (JIT)**

This is a production scheduling and inventory control technique that is used to provide what the customer needs, when it is needed, and in the quantity needed using the minimum resource of people, materials and machinery. Its objectives include zero defects on products, improved quality, zero inventories, zero setups and zero handling. For it to be successful, it should have material flow system, reliable delivery, good customer-supplier relationship, consistent quality with zero defects, short distance between customer and supplier, standardization of components and methods and uniform master production schedules (Burt et al.,2010).

**2.2.6. Vendor Managed Inventory (VIM)**

Inventory replacement decisions are centralized with upstream manufacturers or distributors in this JIT technique. It enables manufacturers or distributors to eliminate the need for customer to reorder, reduce or exclude inventory and stock outs. Under such an agreement, the vendors obtain warehouse or point-of-sale information from the retailer and use that information to make inventory-restocking decisions. This point of sale could be facilitated by the use of EDI systems at the supermarket at the EPOS (Bailey et al, 2005). In a VMI partnership, the supplier, usually the manufacturer but sometimes a reseller or distributor, makes the main

 

inventory replenishment decisions for the consuming organization. The purchase order acknowledgement from the vendor may be the first indication that a transaction is taking place: an advance shipping notice informs the buyer of materials in transit. The arrangement transfers the burden of asset management from the consuming organization to the vendor, who may be obliged to meet a specific customer service goal (usually some kind of stock target).

**2.2.7 Distribution Resource Planning (DRP)**

This is an inventory control and scheduling that applies the MRP principles to distribution of inventories. It may also be regarded as a method of handling stock replenishment in a multi-echelon environment. An 'echelon' is a stepwise arrangement of troops, ships, planes. DRP serves a control role in coordinating the flow of goods inside the factory with the systems modules that places the goods in the hands of the customers. The emphasis in DRP is on scheduling rather than ordering (Bailey et al, 2005).

**2.2.8 Manufacturing Resource Planning (MRP)**

MRP is a computerized technique that assists in production planning and inventory control. Its aim is to make available, purchased or company manufacturing assemblies just before they are required by the next stage of production or for delivery. It enables orders to be tracked throughout the entire manufacturing or distribution points. It synchronizes ordering and delivery of materials and components with production requirements to achieve planned and controlled inventories and ensures that required items are available at the right time of usage and not much earlier (Stevenson, 2007).

**2.2.9. Electronic Data interchange (EDI)**

This is a technique based on agreed standards, which facilitates business transactions in a standardized electronic form in an automated manner directly from a computer application in one organization to an application in another organization. One of the best examples of EDI is the Electronic Point of Sale (EPOS) at the supermarket where when a product is purchased, the checkout operator scans a barcode on it's label, which automatically registers the price on the cash till. The same signal also triggers a computer process that reorders the item from the manufacturer, sets off a production cycle, and arranges invoicing, payment and transportation of the new order. EDI effectively puts the product back on the self with no paper work and a minimum of human involvement (Lysons, 2006).

**2.3 Effects of Electronic inventory systems on Customer Service Delivery**

Customer service delivery refers to the fulfillment of customer's orders efficiently, effectively and at the minimum cost. It involves meeting customers' expectations with regard to order fulfillment through shorter lead times, consistent and on time delivery, complete orders, quicker response to customer requirements and the ability to meet unique and special requests of the customers (Chopra & Meindl, 2004). Electronic inventory systems affect customer service delivery in some of the following ways: Firstly, in inventory orders whereby electronic-inventory systems help businesses to order inventory by accurately recording consumer sales. Electronic ordering, known as Electronic Data Interchange (EDI), allows companies to maintain the proper amount of stock by not increasing costs through over-ordering of inventory. EDI also ensures that orders are placed immediately, ensuring short amounts of lead-time to receive new inventory.

Secondly, they assist in stock maintenance by allowing companies to properly order and maintain several different types of goods. Thirdly, they assist in determining price levels. Properly managing goods is largely based on the cost of the goods incurred by the business. Purchasing goods by volume also helps companies to lower their cost on inventory, ensuring that low prices are assured to consumers **(**Kotler & Armstrong, 2008).Fourthly, they assist in quick order processing**.** The internet, Just-in-time operating procedures and continuous replenishment of inventories have contributed to customers expecting rapid processing of their requests, quick delivery and a high degree of product availability. A product or service will be of little value if it is not available to customers at the time and place where they need to consume it, thus when an organization makes the product available to the customer in a timely manner, value has been created that was not previously there. Finally, they lead to improved customer satisfaction through quicker and more accurate responses to requests. If the retailer does not have the product on display, customers expect him or her to be able to tell them if you have it in stock or on order. The customers do not want to wait while the retailer or his employee wanders through the back storeroom or phones the warehouse to find out this information. With an electronic inventory control system, it takes only a few keystrokes to answer a customer's inquiry.

**2.4 Lead time**

Lead-time is defined as the time between the order placement and receipt of shipment. (Meredith & Shafer (2003). Waters (2002) gives more details and explains that lead-time is the time taken to prepare an order, send it to a supplier, allows the supplier to make the materials or assemble them and prepare them for shipment, ship the goods to the customer, allow the customer to receive and check on them and put them in stock. Lead-time management is necessary and it refers to the process of ensuring lead times match those given by the customer. Depending on the circumstances, the lead-time can vary between a few minutes to months or even years. Meredith & Shafer (2003), observe that supplier often fix the lead times and they can be quite long. Long

 

lead times reduce flexibility and encourage the keeping of high stocks to cover for uncertainties before another order can arrive.

**2.4.1 Effects of Electronic inventory systems on lead time**

The use of electronic inventory systems like Just-In-Time technique looks for ways of increasing flexibility by moving to smaller, frequent deliveries with shorter lead times. Flexibility reduces lead-time and ensures that specific customer requirements are met (Waters, 2002). Other systems like electronic data interchange allow for exchange of information between the retailer and the supplier in real time thus shortening lead-time and making products available on time to customers (Tachizawa & Ginemez, 2005). Information sharing through use of electronic inventory systems enables the chain partners to compress lead times and know how much they should have in stocks to meet customer demands. These stocks enable chain partners to provide deliveries on time to their customers (Keong et. al., 2005). By implementing electronic inventory systems and information systems like electronic data interchange (EDI), enterprise resource planning systems (ERP), electronic point of sale systems (EPOS) and other electronic inventory systems, the retailer will be able to manage inventories very well among chain partners hence leading to customer satisfaction. These systems will be used to manage inventory levels, reduce inventory costs, lead-time, increase inventory turns and customer service. They will promote flexibility, on time delivery hence leading to customer satisfaction. It also enables the chain partner to compress the lead times, improve faster product to market cycle times and increase flexibility in dealing with supply and demand uncertainties (Mentzer et al., 2000).

**2.4.2 Effects Of Lead Time On Customer Service Delivery**

The use of electronic inventory has led customers to expect products and services to be made available in increasingly shorter lead times. Shorter lead times offer a number of benefits which including decreasing stock holding costs and releasing money to be used for other activities in the organization. It also helps to lower inventory protecting an organization against risk or loss, damage and obsolescence. Lead times affect customer delivery in that if they are long, customer's orders will not be met immediately and this can make a difference between making the sale and watching a competitor sign the contract with the customer. According to Chopra and Meindl (2004), a potential customer still has the chance to change their mind and place an order with a different supermarket known for its speedy delivery times.

**2.5 Service Quality**

Service quality can be a main differentiator in business and help to retain customers. Businesses that are rated highly by their customers for their quality service delivery are usually more profitable and have faster growth. Quick response to the needs of customers' can give many firms a competitive edge. This usually involves bringing a new product or service quickly into the market, delivery of the existing products or services to customers quickly after order placement and handling customer complaints quickly (Stevenson, 2007). According to Cook (2002), the ability to provide an excellent service is a requirement for firms that want to both attract and retain customers. Service quality is a critical component in the perception of customers about the service offered to them. They will perceive services in terms of its quality and how satisfied they are with their overall experiences (Zeithaml, 2000). Service quality is thus defined as the customers' perception of how well a service meets or exceeds their expectations (Czepiel, 1990). In the retail context, the perceptions of service encounters usually accumulate with time and the relationship a customer has with an organization are a continuation of the interactions they have had in the past and the present" (Czepiel, 1990). When customers are evaluating retail service, they will compare the perception they have of the service they will receive with the expectations they had and if the perceived service meets or exceeds their expectations they will be satisfied. If the service falls below their expectations they will be dissatisfied (Levy & Weitz, 2005).

There are models that researcherss have came up with, on service quality measurement. These are SERVQUAL and GAP model by Parasuraman et al. (1988), SERVPERF by Cronin and Taylor (1992), Retail Service Quality Model by Dabholkar et al. (1996).SERVQUAL and Gap Model- In 1980s, Parasuraman et al conducted an investigation in an attempt to define service quality and develop a model of service quality. The results showed that consumers used the same basic criteria in evaluating the quality of service regardless of the type of service. They labeled those 10 criteria "service quality determinants". From then on, service quality was defined through those 10 dimensions: access, communication, competence, courtesy, credibility, reliability, responsiveness, security, tangibles and understanding/knowing the customer. Later on, these 10 dimensions were simplified into five dimensions to include: tangibles, reliability, responsiveness, assurance and empathy.

Servperf - Cronin and Taylor (1992) developed a "performance based" service quality measurement scale called SERVPERF *w*ith the argument that the gap theory of service quality by Parasurman et al, was supported by little empirical or theoretical evidence. The major difference between these two scales is that SERVQUAL operationalises service quality by comparing the perceptions of the service received with expectations, while SERVPERF maintains only the perceptions of service quality. The SERVPERF scale consists of 22 perception items excluding any consideration of expectations. SERVPERF thus became a more superior model over SERVQUAL and this was demonstrated in numerous studies including those by Brady *et al.* (2002). Retail Service Quality Scale (RSQS) - Dabholkar et al. (1996) developed Retail Service Quality Model (RSQS) to fit

 

the context of the retail industry. The model has been used to measure service quality in departmental stores, supermarkets and discount stores.

## 3.0 METHODOLOGY

The study was carried out through descriptive survey design. The target population of this study was all the major supermarkets in Kenya. However, the population of the study was limited to the five supermarkets that had branches in most parts of the Country as they had integrated the use of more than one electronic inventory system. The subjects of the study were all the management staff and all the customers of the selected supermarkets.

The Supermarkets had six sections categorized as: General, Utensils, Electronics, Hardware, Clothing and Food stuffs each with a supervisor who was in charge of electronic inventory control. Each supermarket also had a manager who was in charge of its entire operations. A sample size of 141 respondents was selected. This comprised of 92 customers selected from the all the selected supermarkets and 49 respondents from the management staff. The above sample size for the customers was arrived at by using the formula below by Fisher et al

$$n = \frac{Z^2 pq}{d^2}$$

Where: Z : Normal distribution Z score

P; Estimated proportion of an attribute that is present in the population, p.

q; Proportion of the attribute absent ( 1-p)

$$n = \frac{(1.96)^2(0.5)(1-0.5)}{(0.1)^2}$$

= 96

To adjust for a population less the 10, 0000 the following adjustment formula was used

$$n_f = \frac{n}{1 + \frac{n}{N}}$$

Where $n_f$ = the desired sample size (where the population is less than 10000)

n = the desired sample size (when the population is more than 10,000)

N = the estimate of the population size.

$$n_f = \frac{96}{1 + \frac{96}{2500}} = 92$$

The sample size for each stratum was allocated proportionately under which the sizes of the samples from the different strata were kept proportional to the sizes of the strata. This was arrived at by dividing the total population of the strata with the total target population and multiplying the answer with the total sample size (Kothari 2004). A census was conducted on the management staff while for the customers, stratified random sampling technique was used to produce the respondents in the study. Stratified random sampling technique was preferred for this study because it provides greater precision geared to bring forth a proportionate stratification whereby each stratum has the same sampling fraction (Kothari 2004). The data collection instrument that was used by the researchers was a structured five point Likert scale questionnaires with closed and open ended questions. The Data was analyzed using the Statistical Package for Social Scientists software (SPSS). Pearson Correlation coefficient was used to indicate a one-on-one association between the independent variable and the dependent variable, while holding all other factors constant. Chi square test was used to test the significance between electronic inventory systems and customer service delivery, lead-time variability resulting from EIS use and customer service delivery and the significance between quality service resulting from the use of EIS and customer service delivery.

## 4.0 RESULTS AND DISCUSSIONS

### 4.1 Response Rate

Despite several challenges associated with data collection processes, 71 questionnaires were received against a target 92 customers and 40 responses from the 49 supervisors and managers. This represents 77% and 80% response rate respectively adequate for effective representation and a basis for deriving inferences for the study.

### 4.2 General characteristics of customers

The findings indicated that majority of the respondents (47%) had know the supermarkets existence for more than three years while a substantial proportion (31%) had known the supermarkets for between 1-2 years. Twenty one percent (21%) had known the entity for less than one year. Majority of the customers indicated that they had shopped for more than three years while 35% and 20.8% had shopped for between 1-2 years and less than 1 year respectively. This was clearly supported by length of time they had known the supermarket.

 

The key driver to shop at the specific supermarket was also investigated. From the analysis the researcherss established that service quality (90%), variety of products offered (91%) and quality of products offered (91%), and fair pricing (53%) were the key factors considered by most of the respondents as being the major motivators for shopping at the supermarket. However other factors such as family influence (36%), closeness to the bus terminals (28%), parking space (39.8%) and prestige (36.7%) were motivators for choosing the supermarket. The respondents were also requested to indicate if they were aware of the level of services they expected from the supermarkets and from their responses an overwhelming majority (98.8%) indicated that they were aware of the level of service they expected and demanded from their shopping outlet. Respondents rating of the quality of services offered by the supermarket of their choice was also analyzed. From the response, 36.7% rated the quality of services to be very good. Fifty four percent (54.2%), 8.4% and 0.3% rated the service quality receives as good, average poor and very poor respectively. This was a clear indication that majority of the respondents were satisfied with quality of services received from their supermarket.

**4.3 General Characteristic of Management staff**

From the findings, most of the respondents (63.3%) had attained college level education while 26.5% and 10.2% had attained secondary and university level education respectively. Experience of management staff working in supermarkets was evaluated and from the results, over 40.8% had worked for more than 6 years while 38.8% and 20.4% had worked for the supermarket for between 2-5 years and less than 1 year respectively**.** Forty questionnaires for section supervisors and managers selected for the study were received, five questionnaires (12.5%) were received from food stuff, hardware and utensil sections while 15% were received from the electronic, utensils and general merchandize. All the managers responded in the study representing 17.5%. The response was adequately representative of all sections giving it a wider view of a shopping experience and perspective for the study.

**4.4 Use of Electronic Inventory Systems**

The direct involvement in the use of electronic inventory management systems by management staff involved in the study was analyzed. From the analysis it was evident that majority (65.3%) of them used electronic inventory management systems within the section they supervised. However, those who did not have a direct use of EIS were 34.7%. This is a clear indication of EIS integration not covering all areas of the supermarkets.

**4.4.1 Type of EIS used by Management Staff**

On the use of EOQ, majority (89.8%) indicated that they used it all the time while 6.1% used it often, 2% use it sometimes and rarely while none had never used it. As for materials requirement planning, 94% acknowledged that they have never while 2.0% and 4.1% used it most of the time and all the time respectively. Enterprise resource planning was among the most widely used systems with a response rate of 26.6% and 59.2% using it always and regularly, while a few 6.1% and 8.2% used it sometimes and rarely respectively. Vendor managed inventory system had been used by all with 95.5% and 4.1 % respectively indicating all the time and often. The just in time system was less applied in with responses of 83.7%, 2%, 8.2%, 2.0% and 4.1 % having never used, rarely used , sometimes used often used and used all the time respectively. Distribution requirements planning was also among the rarely used systems with 83.7%, indicating they never used it, 0% rarely used, 2.0% used it sometimes, 8.2% used it often and 6.1 % used it all the time. Bar coding was indicated as the widely used electronic inventory system with a distribution of 32.7% using it all the time,55.1% using it often, 6.1% using it sometimes, 6.1 0% rarely using it. The last system to be evaluated was the electronic data interchange with most responds having used 77.6% often while 8.2%, 2.0%, and 4.1 % having all the time, rarely used, sometimes, often and never used. This findings show an integration of majority of the electronic inventory systems in the supermarkets.

**4.4.2 Effects of EIS on Customer Service Delivery**

The management staff of the supermarkets were also requested to indicate if there felt there was a relationship between the electronic inventory system they used and the service delivery levels provided to their customers. From there responses, 98% of the respondent indicated that there is a positive link between the Electronic Inventory System used and customer service delivery. Only 2% did not perceive the beneficial relationship to exist.

**4.4.3 Extent to which Electronic Inventory Systems affects Customer Service delivery**

From their response it was found out that 34.7% perceived that there was a large extent and some extent to a relationship between EIS use and customer service delivery. Thirty percent (30.6%) recognized that ESI use and customer service delivery were related to a very large extent while none responded on the less and none options respectively.

**4.4.4 Effects of EIS on Service Delivery**

The results indicated that (95.9%) agreed that use of EIS resulted in faster processing of customer orders while 2.1% were undecided and strongly agreed of the influence. On its effect on accurate record keeping, 46.9% agreed while 51.0% strongly agreed. In relation to better stock monitoring, all of the respondent were positive and responded in agreement with 87.8% agreeing and 12.2% strongly agreed. Reduction of queues

 

because of using EIS received 83.7%, 8.2% and 8.2% who agreed, strongly agreed and undecided. The contribution of EIS on faster product introduction, 51% strongly agreed, 46.9% agreed and 2% were undecided. As to whether it results in cost savings 8.2% were undecided and equally agreed, while 83.7% strongly agreed. On better service delivery, majority (69.4%) strongly agreed while 6.1%,14.3% and 10.2% disagreed ,agreed and undecided respectively.EIS contribution to ensuring high product availability received 4.1% ,46.9% and 49.0% as disagree, undecided and agree respectively. 93.9% of the respondents acknowledged that EIS translated into provision of a wider variety of goods maintained by the supermarket while 4.1% strongly agreed and 2.0% were undecided. The same trend was also identified with reduction in stock out costs where 4.1% were undecided, 59.2% agreed and 36.7% strongly agreed. Reduction in demand uncertainty as a result of using EIS received response of 2.0% for disagreement, 6.1% for undecided, 34.7% for agree and 57.1% for strongly agree As for accurate ordering the respondents were mainly in agreement where 2.0% were undecided while 83.7% agreed and 14.3% strongly agreed. The overall effect EIS in improving stock management the same trend was evident where 2.0% were undecided, 46.9% agreed and 51.0% strongly agreed.

### 4.4.5 Hypothesis One Testing

A chi square test of independence was performed to test the relationship between supervisors and managers responses on the use of EIS and their rating on its influence on the level of effectiveness of customer service delivered and the results are as presented in Table 4.1 below:-

**Table 4.1: Chi square test between of EIS use and Effectiveness of CSD**

| | Value | df | Level of Significance. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 7.199[a] | 2 | .027 |
| Likelihood Ratio | 7.769 | 2 | .021 |
| Linear-by-Linear Association | 6.955 | 1 | .008 |
| N of Valid Cases | 40 | | |

a. 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.8.

Chi-square test for independence yielded, $\chi^2$ (2, n = 40) = 7.199 against the Expected Value of $\chi^2$ ( 2, 0.995) = 0.01 with all chi square requirements having been met. The output p value, (0.027) was less than the required significant level of 0.05 set for the test and hence the null hypothesis indicating that there is no significant relationship between electronic inventory systems used and customer service delivery in the selected supermarkets was rejected.

### 4.4.6 Pearson's correlation tests

As guide to the interpretation of the strength of the relationship, Cohen (1988) suggested guidelines where: r =0.10 to 0.29, is categorized as weak correlation, r = 0.30 to 0.49 considered a medium and r = 0.50 to 1.0 as a strong correlation were used. The outcomes of the tests are as presented in Table 4.2 below:-

**Table 4.2: Pearson Correlation between of EIS use and Effectiveness CSD**

| | | Use of E-Inventory System | Extent to which EIS affects customer service delivery |
|---|---|---|---|
| Use of E Inventory System | Pearson Correlation | 1 | 0.481** |
| | Sig. (2-tailed) | | 0.007 |
| | N | 40 | 40 |
| Extent to Which EIS affects Service Delivery | Pearson Correlation | 0.481** | 1 |
| | Sig. (2-tailed) | 0.007 | |
| | N | 40 | 40 |

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

The Pearson correlation coefficient for the relationship between use of electronic inventory system and the extent to which EIS affects customer Service Delivery was found to be r = 0.481, ( N = 40) and p value = 0.007 indicating a significant positive correlation of medium strength.

### 4.5 Lead Time Variability Resulting From EIS Use And Customer Service Delivery

The second objective of the study was centered on determining the level to which lead-time variability resulting from the use of electronic inventory systems affects customer service delivery in selected supermarkets in Kenya**.**

 

**4.5.1 Effects of lead-time on order placement and service delivery**

A question was posed to the respondents on what they considered to be the perceived influence of lead time variability on customer service delivery. From their responses forty one percent (40.8%) found it to be very influential,32.7% found it influential while 26.5% were undecided, None of the respondents found it to be un influential and very un influential.

**4.5.2 Effectiveness of lead time management**

Further the respondents were asked to rate the level of influence lead time variability resulting from the use of EIS had on customer service delivery and from their response fifty seven percent (57.1%) found it to be very influential, 42.9% found it influential while none of the respondents found it to be un influential and very un influential or indifferent. To report on the respondents views on the effects of lead-time variability the respondents were requested to respond on a number of statements with regard to lead-time variability and its effects on customer service delivery. The effects of lead-time on customer service delivery received a response of 4.1%, 10.2%, 20.4% and 65.3% for Disagreement, undecided, agreement and strong agreement respectively. On the statement as to whether the use of EIS has affected lead-time variability 93.9% and 6.1% responded in agreement and strong agreement respectively. As to whether it EIS results in shorter lead times, 85.7%agreed while 14.3% strongly agreed. On whether it short lead-time results in faster fulfillment of orders, the response was 2.0% for undecided, 73.5% for agreement and 24.5% for strong agreement. EIS use leading to lead time compression received a response of 26.5% for agreement and 73.5% for strong agreement while influencing supplier flexibility received a response of 2.0% for undecided, 77.6% for agreement and 20.4% for strong agreement. As to whether short lead-time reduces stock holding costs, the response was 2.0% for undecided, 26.5% for those in agreement and 71.4% for those with a strong agreement. On speeding up response to customer needs the response was 30.6% for those who were in agreement and 69.4% for those with a strong agreement respectively.

**4.5.3 Hypothesis Two Testing**

A chi square test of independence was used to test the relationship between lead time variability resulting from use of electronic inventory systems and their computed mean response on the level of customer service delivered and the results are as presented in Table 4.3.

**Table 4.3: Chi square test between of EIS lead time variability and CSD**

| | Value | df | Level of Significance. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 6.302[a] | 2 | .043 |
| Likelihood Ratio | 6.453 | 2 | .040 |
| Linear-by-Linear Association | 6.125 | 1 | .013 |
| N of Valid Cases | 40 | | |

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.57.

A Chi-square test for independence gave $\chi^2$ (2, n, 40) = 6.302 against the Expected Value of $\chi^2$ ( 2, 0.995) = 0.01 with all chi square requirements having been met. A p value of 0.043. was less than the required significant level of 0.05 set for the test and hence the null hypothesis indicating that there is no significant relationship between lead time variability resulting from the use of electronic inventory systems and customer service delivery in the selected supermarkets was rejected.

**4.5.4 Pearson's Correlation**

**Table 4.4: Pearson Correlation between of EIS Lead Time Variability and Customer Service Delivery**

| | | Lead Time Effects On CSD | Effectiveness Of LT Management |
|---|---|---|---|
| Lead Time Effects On CSD | Pearson Correlation | 1 | 0.357* |
| | Sig. (2-tailed) | | 0.012 |
| | N | 40 | 40 |
| Effectiveness Of LT Management | Pearson Correlation | 0.357* | 1 |
| | Sig. (2-tailed) | 0.012 | |
| | N | 40 | 40 |

*. Correlation is significant at the 0.05 level (2-tailed).

The Pearson correlation coefficient for the relationship between lead time variability effects on customer service delivery and effectiveness of Lead time management was found to be r = 0.357, ( N = 40) and p value = 0.012 also indicating a significant positive correlation of medium strength.

 

**4.6 Service Quality received by Customers**

The third objective of the study focused on evaluating the influence service quality created through the use of EIS had on the customer service provided by the supermarkets. This was evaluated from the customers' point of view and the results were as presented in the following four sub sections.

**4.6.1 Accuracy of service delivery**

One of the key attributes of service quality evaluated from customers was the level of accuracy they got from being served with EIS. The first statement was on their perceived confidence that all transactions were error free and it attracted a response of 2.4% for those who strongly disagree, 3.6% for those who disagreed 9.9% for those who were undecided 69.3% for those who agreed and 14.8% for those who strongly agreed. This was followed by a questionnaire regarding whether EIS enables the right information to be provided to the customers. The response indicated 0.3% for those who strongly disagree, 1.8% for those who disagreed 32.2%for those who were undecided 47.0% for those who agreed and 18.4% for those who strongly agreed. On whether the EIS indicates product availability and reduces customer disappointments, 0.6% strongly disagree, 1.2% disagreed 21.1% were undecided, 70.2% agreed and 6.6% strongly agreed. With regard to whether use of EIS reduced the chances of a teller making errors while serving the customer, 0.6% indicated that they strongly disagree while 2.7%, 4.2%, 67.2% and 25.3% indicated a disagreement, undecided, agree and strongly agree respectively. As to whether the system enables accurate coding of products translating into better accuracy, their response 1.2% indicated for disagreement 27.4% undecided 59.6% in agreement and 11.7% for a strong agreement. The last statement focused on whether the system enabled the provision of the right product to each customer where 0.6% strongly disagreed, 3.0% disagreed 27.4% were undecided, 63.0% agreed and 5.7% strongly agreed. This findings show majority support that use of EIS leads to accuracy in operations hence quality service delivery to customers

**4.6.2 Responsiveness of service delivery**

The findings established that 0.6% of the respondents strongly disagreed, 3.0% disagreed, 6.3% were undecided, 81.3% agreed and 8.4% strongly disagreed. As to whether it facilitates provision of a variety of products, 0.6% of the respondents strongly disagreed, 1.5% disagreed, 9.0% were undecided, 82.5% agreed and 6.3% strongly disagreed. Provision of high quality merchandize because of EIS use received a response 0.9% for respondents who strongly disagreed, 2.1% who disagreed, 46.7% who were undecided, 39.8% who agreed and 10.5% for those who strongly disagreed. Pertaining to the ability of the teller to reverse wrong entries immediately, the responses were 2.4% for disagreed, 10.2% for those who were undecided, 49.1% for those who agreed and 38.3% for those who strongly agreed. The questionnaire on whether the customers appreciated that EIS had facilitated replacement of defective products once identified after a transaction, their response indicated 0.3% for those who strongly disagreed, 9.0% disagreed, 56.9% were undecided, 29.5% agreed and 4.2% strongly disagreed. The last statement under responsiveness was whether the system allowed for inter branch transfer of products and a response of 0.6% for strongly disagreed, 1.5% for disagreed, 29.2% for those who were undecided, 56.0% for those who agreed and 12.7% for those who strongly agreed was received. These findings show that the use of electronic inventory systems enables the supermarkets to be responsive to the needs of their customers.

**4.6.3. Reliability of service delivery**

The outcome of the analysis on whether the use of EIS can be associated with the supermarkets keeping their promise established that 1.8% of the respondents strongly disagreed, 0.6% disagreed, 4.8% were undecided, 63.0% agreed and 29.8% strongly disagreed. As per their response on whether it facilities the supermarket to provide the right service at the right time, 1.2% of the respondents strongly disagreed, 1.5% disagreed, 6.3% were undecided, 75.9% agreed and 14.5% strongly agreed. Availability of the right merchandize as and when required received a response of 0.9% for strong disagreement, 6.6% for disagreement, 16.3% for those who were undecided, 62.3% for those who agreed and 13.9% for those who strongly agreed. On whether the entity delivered the product requested 0.3% indicated a strong disagreement, 1.5%for disagreed, 29.2% for those who were undecided, 56.0% for those who agreed and 12.7% for those who strongly agreed. These findings indicate strongly that through use of electronic inventory systems supermarkets are able to provide reliable service to customers.

**4.6.4 Problem solving**

In regard to whether the system facilitates return or exchange of goods, 0.3% indicated a strong disagreement, 3.6% disagreed, 8.1% were undecided, 58.4% were in agreement and 29.5% strongly agreed. In reference to the personnel using the EIS having the required skills to solve customer problems, 0.3% indicated a strong disagreement, 0.6% disagreed, 5.4 % were undecided, 51.5 % were in agreement and 42.2 % strongly agreed. The ability to solve customer complaints directly and immediately while using the electronic system received a response of 0.3% for strong disagreement, 3.6% for disagreed, 10.5% were undecided, 49.4%for agreement and 36.1% for strongly agreed. This findings show that through use of electronic inventory systems supermarkets were able to solve their customers problems.

 

### 4.6.5 Hypothesis Three Testing

A Chi-square test for independence gave a $\chi 2$ (4, n = 71) = 13.770 against Expected values of 0.207 and p value = 0.008. The resulting p value was less than the required significant level of 0.05 set for the test and hence the null hypothesis indicating that there is no significant relationship between electronic inventory systems service quality and customer service delivery in the selected supermarkets was rejected.

**Table 4.5: Chi square test between Quality of Service by using EIS and CSD**

| Test Statistic | Value | df | Level of Significance. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 13.770[a] | 4 | 0.008 |
| Likelihood Ratio | 15.149 | 4 | 0.004 |
| Linear-by-Linear Association | 0.563 | 1 | 0.453 |
| N of Valid Cases | 71 | | |

a. 1 cells (11.1%) have expected count less than 5. The minimum expected count is 1.24.

### 4.6.6 Pearson correlation tests

**Table 4.6: Pearson correlation between Quality of Service by using EIS Use and Customer service delivery**

| | | Quality Of Service offered | Customer Service |
|---|---|---|---|
| Quality Of Service offered | Pearson Correlation | 1 | 0.537** |
| | Sig. (2-tailed) | | 0.000 |
| | N | 71 | 71 |
| Customer Service | Pearson Correlation | 0.537** | 1 |
| | Sig. (2-tailed) | 0.000 | |
| | N | 71 | 71 |

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

The results of the relationship between quality of services offered as a result of using EIS and customer service delivery yielded r = 0.357, ( N = 71) and p value = 0.000 indicating a strong positive correlation.

## 5 Summary

It was established that service quality (90%), variety of products offered (91%) and quality of products offered (91%), and fair pricing (53%) were the key factors considered by most of the respondents as being the major motivators for shopping at the supermarket. However, other factors such as family influence (36%), closeness to the bus terminals (28%), parking space (39.8%) and prestige (36.7%) were motivators for choosing the supermarket.

In order to find out the extent to which electronic inventory systems affect customer service delivery an analysis was conduct and it established that majority of the supermarkets had integrated the use of some electronic inventory systems as was evidenced by 94.5% response rate. The analysis further sought to establish the electronic inventory systems that were being used by the supermarkets and from the response it was evident that majority had integrated the use of bar codes with 55.1 % using them all the time and 32.75% using them often. Other systems that were largely being used were Vendor managed inventories with 95.5% and Economic Order Quantities with 89.9%. EDI and ERP systems were also used often with 77.6% and 59.2% using them often. MRP, DRP and JIT systems were not fully integrated as from the responses, 93.9% and 83.7% had never used the systems. Majority of the respondents agreed that the use of electronic inventory systems in the supermarkets resulted in faster processing of customers orders, accurate record keeping, better stock management, reduced queuing time by customers, faster introduction of new products, high product availability, maintenance of product varieties, reduced stock out cost, reduced demand uncertainty, automatic and accurate ordering. These played a part in improving customer service delivery. These findings were in line with those of Harrington et al., (1990).

A chi square test of independence was performed to test the relationship between supervisors and managers responses on the use of EIS and it positively established that there was a relationship between the two. Chi-square test for independence yielded, $\chi^2$ (2, n = 40) = 7.199 against the Expected Value of $\chi^2$ ( 2, 0.995) = 0.01 The output p value (0.027) was less than the required significant level of 0.05 set for the test and hence the null hypothesis was rejected.The Pearson correlation coefficient between electronic inventory system and customer service delivery was found to be r = 0.481, (N = 40) and p value = 0.007 indicating a significant positive correlation of medium strength. This implies that use of better inventory management systems can lead to high levels of customer satisfaction. These findings were supported by Eckert (2007) who asserts that better inventory management leads to high levels of customer satisfaction. It established that majority of the supermarkets felt that lead time variability greatly influence order placement and customer service delivery.

 

They also agreed that use of EIS shortened lead times, led to lead time compression, supplier flexibility, reduced stock holding costs thus low prices on goods and faster order fulfillment for customers.

The chi square test of independence also established a relationship to exist between the two. The Chi-square test for independence gave $\chi^2$ (2, n, 40) = 6.302 against the Expected Value of $\chi^2$ ( 2, 0.995) = 0.01 with all chi square requirements having been met. A p value of 0.043 was less than the required significant level of 0.05 set for the test and hence the null hypothesis indicating that there is no significant relationship between lead-time variability resulting from the use of electronic inventory systems and customer service delivery in the selected supermarkets was rejected. The Pearson correlation coefficient was found to be r = 0.357, ( N = 40) and p value = 0.012 also indicating the existence of a significant positive relationship of medium strength between lead time variability and customer service delivery.

Finally, the researchers sought to evaluate the influence service quality created with EIS on the customer service provided by the supermarkets. The analysis was based on four major attributes of accuracy, responsiveness, reliability and problem solving and majority of the respondents agreed that through use of EIS the supermarkets had provide quality resulting in customer service delivery. On each of the four attributes, various aspects were measured. On accuracy, majority agreed that use of EIS results in accurate transactions. On responsiveness, the researchers studied on whether it allowed for replacement of defective products, majority of the respondents were not sure with 56.9% indicate undecided. On reliability, majority of the respondents agreed that supermarkets were able to keep their promises, provide the right kind of service at the right time, provide the needed merchandise and deliver the requested product. The chi square test of independence also established a relationship to exist between the two. The Chi-square test for independence gave a $\chi 2$ (4, n = 71) = 13.770 against Expected values of 0.207 and p value = 0.008. The resulting p value was less than the required significant level of 0.05 set for the test and hence the null hypothesis indicating that there is no significant relationship between electronic inventory systems service quality and customer service delivery in the selected supermarkets was rejected. The Pearson correlation coefficient yielded r = 0.357, ( N = 71) and p value = 0.000 indicating a strong positive correlation between the quality of services offered as a result of using ESI and customer service delivery.

## 6. Conclusion

From the findings, the researchers can conclude that the use of electronic inventory systems in the supermarkets has been effective in customer service delivery thus making the shopping experience more satisfactory for the customer. EIS systems like the ERP, EDI, bar coding; EOQ and VMI have greatly been used. By these systems, the supermarkets have been able to offer better service to their customers such as quick order processing, better stock monitoring, accurate and automatic ordering, improved stock management, wide product variety, faster product introductions and reduced queues at the electronic point of sale. The study also concludes that aspects such as lead-time have been influenced by the use of EIS systems, which have contributed to shortened lead-time, supplier flexibility and thus faster provision of products to consumers increasing service delivery. Training all staff on the use of electronic inventory systems as well as better service delivery, listening to customers complaints, suggestions keenly, organize refresher courses for managers, and supervisors are necessary to increase the effectiveness of service delivery. Quality of service has also been impacted by the use of EIS. The EIS systems have led to accuracy of service delivery, increase responsiveness to consumers' needs, increased reliability and greater problem solving, improving on the quality of service delivery thus better customer service delivery.

## 7 Policy Recommendations

Supermarkets should continuously improve on their use of electronic inventory systems like EDI, EOQ, VMI, ERP systems and POS among others to provide information that will then be used to manage inventories leading to customer satisfaction. These systems will be used to manage inventory levels, reduce inventory costs, lead-time, increase inventory turns and customer service. They will promote flexibility, on time delivery hence leading to effective customer service delivery as was found out in the research. Greater collaboration should be enhanced between suppliers and the supermarkets to be able to effectively manage lead-time. This can be done with electronic inventory systems, which the supermarkets should ensure that their suppliers have implemented. This is important as lead-time determines whether customer's orders will be met satisfactorily or not. If lead-time is short customer service delivery is better. Finally the research recommends that the supermarkets be keen on the quality aspects that customers look for in the products and service offered and find out how they can improve of quality service delivery through the use of electronic inventory systems. This is because EIS use can improve on quality, which in turn results in effective customer service delivery. It is prudent for further research to be done on the challenges faced in the use of electronic inventory systems in the supermarkets and how this may affect service delivery. Further research can also be conducted on the use of systems like JIT, DRP and MRP in the supermarkets and zero in on how successful they have been in inventory management and meeting customer satisfaction.

 

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