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Factors Affecting Implementation Of Lean Purchasing As A Measure Of Controlling Inventory Holding Costs; A Survey Study Of Supermarket Retail Services In Kitale Town, Kenya

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Abstract: *Supermarket retail business organizations furnish their inventory needs through an established procedure of purchasing stock. The acquired stock from different suppliers needs to be stored within the retail premises before they are sold to the retail customers; it is during this period when stock is held by the supermarkets that inventory storage costs are incurred. The purpose of this research study is to determine what obstacles Supermarkets and especially those within Kitale town encounter when adopting a method of purchasing stock that aims at reducing the storage duration of the stock held and as a result minimizing inventory holding costs. The objective of this research study is to determine how, when Supermarket retail service firms are looking to reduce costs, they ignore the inventory sitting in their warehouses and the cost of carrying that inventory. It is important for Supermarket businesses to carefully examine all the incremental costs of carrying inventory and determine where they can make changes to reduce that cost. The research design considers the descriptive design as the best suited. Descriptive research designs especially survey research technique, helps to provide answers to the questions of who, what, when, where, and how this is associated with a particular research problem; a descriptive study cannot conclusively ascertain answers to why. Therefore the research study considers the use of empirical research design to provide answers as to why, especially from the secondary data collected. Descriptive research is used to obtain primary data concerning the current status of the phenomena and to describe "what exists" with respect to variables or conditions in a situation. The target population is the Supermarket service firms in Kitale town. The sampling technique used is the simple random sampling, the sample size consists of supermarkets' purchasing and finance departments, while the research instruments considered for collecting primary data are the questionnaire and interviews. Data collection is done mainly from purchasing staff in the retail outlets, while data processing is done by use of factor analysis, with the analysis of findings to be done through statistical analysis.*

Abbreviations.

COV; Coefficient of Variation.
EOQ; Economic order quantity.
ERP; Enterprise resource planning.
IMS; Inventory management system
ICT; Information communication technology.
JIT; Just in time.
JITP; Just in time purchasing.
RFQ; Request for quotation
TQM; Total quality management.
POS; Point of sale.
SaaS; System as a service.
SOA; Service orientation architecture
SCM; Supply Chain Management.
STD; Standard Deviation
Respt; Respondent.
WMS; Warehouse management system.
XML; Extensible markup language.

I. Introduction

Supermarket retail service involves the sale of goods and services from businesses firms through self selection aisles to the end-user. Supermarket retailers are part of an integrated system called the supply chain. A Supermarket purchases inventory products in large quantities from manufacturers directly or through a wholesale supplier, and then sells through shelf self selection in smaller quantities to the consumer for a profit. Supermarket retail businesses are usually classified by type of product inventory which include, food, durable goods and consumables. The actual cost of a Supermarket retailer's inventory held within their premises extends beyond the inventory at the supplier's acquisition cost or the cost of goods sold to the final customer.

The costs of managing, distribution to different regional retail branches, handling, storage and maintaining inventory is a significant expense, but the true cost of inventory, is normally within a number of expense items that ensure inventory retains its quality standards before it's sold to final consumer while still held within the retail store. According to media reports from Nation media, in Kenya a national average amounting to 60% of the cost of Supermarket retailing is attributable to purchased inventory materials. If the purchasing function controls over 60% of the costs in a product, then resources and talent must be focused on this function if the business is to stay profitable. Supermarket retail firm should establish business relationships and arrangements with inventory suppliers as a primary task and buyer satisfaction as a primary measurement. Emphasis on placing inventory purchase orders and on expediting delivery should be minimized. Studies by Ansari and Modarress (1987, 1990) show that companies having implemented JITP estimated a 43 percent increase in product quality and a 21 percent improvement in productivity.

Problem Statement

Pearson and Gritzmacher (1990) suggest that the purchasing department can serve as a profit-generating center rather than cost cutting mechanism. With an increasing concern on product quality in today's highly competitive environment, a business can gain competitive advantage by utilizing the purchasing department's knowledge of supplier networks. Every Supermarket retail service firm has the challenge of matching its inventory supply volume to customer demand. How well the retail firm manages this challenge has a major impact on its profitability. Supermarket retailers attribute the typical cost of carrying inventory is at least 30.0 percent of the inventory value. Also, the amount of inventory held has a major impact on available cash. When working capital is a premium, it's important for Supermarket retailers to keep inventory levels as low possible and to sell inventory as quickly as possible. Studies have shown a 77 per cent correlation between overall Supermarket retailing profitability and inventory turns. The challenge of managing inventory is increased by the "Long Tail" phenomenon which is causing a greater percentage of total sales for many retail firms to come from a large number of products with low sales frequency. At the same time, planning frequencies and time-buckets are moving from monthly/weekly to daily and the number of managed stocking locations from dozens in distribution centers to hundreds or thousands at the points of sale (POS). This leads to a large number of time series with a high level of demand volatility. This explains one of the main challenges in managing modern supply chains, the so-called "bullwhip effect", which so often causes small changes in actual consumer demand to cause a much larger change in perceived inventory demand, which in turn can mislead Supermarket retail traders to make bigger changes in inventory orders purchased than are really necessary. This research is about identifying the factors challenging the implementation lean purchasing within Supermarkets as a measure of minimizing inventory storage costs also known as inventory holding costs, or inventory carrying costs. Although, in theory, JIT purchasing seems to be advantageous for small businesses, there is some evidence of assistance from large buyers to small companies in its implementation (Sadhwani, Sarhan, & Camp 1987).

Research Objectives.

General objectives: Establish the factors affecting the application of lean purchasing when sourcing, ordering, acquiring and replenishment of inventory in Supermarket service firms within Kitale town.

Specific Objectives;

1. Identify the inventory storage costs incurred by supermarket service firms and the effect these costs have on their financial performance.
2. Determine how Supermarket service firms adopt the use of information communication technology applications when replenishing its inventory.
3. Determine how inventory merchandising becomes part of implementing lean purchasing as a method to control inventory holding costs.
4. Determine the role of inventory suppliers' lead time in the implementation of lean purchasing.
5. Determine the factors affecting the implementation lean purchasing in Supermarket service firms.

The Oretical Review

The literature on strategy types (e.g., Hofer & Schendel 1978; Miller & Roth 1994; Porter 1980; Richardson, Taylor, & Gordon 1985) reveals that the purpose of adopting specific strategies is to increase market share and performance by either reducing costs or by differentiating products. Dealing with fewer suppliers for a particular inventory item or items contributes to establishing a long-term, stable and satisfactory relationship between a supplier and buyer (Ansari and Modarress 1990; Schonberger 1982; Schonberger and Gilbert, 1983).

A study by Sohal, A. S., Ramsay, and Samson (1993) shows that the link between JIT and competitive strategy is less common than between JIT and operational tactics. The findings of their study reveal that only

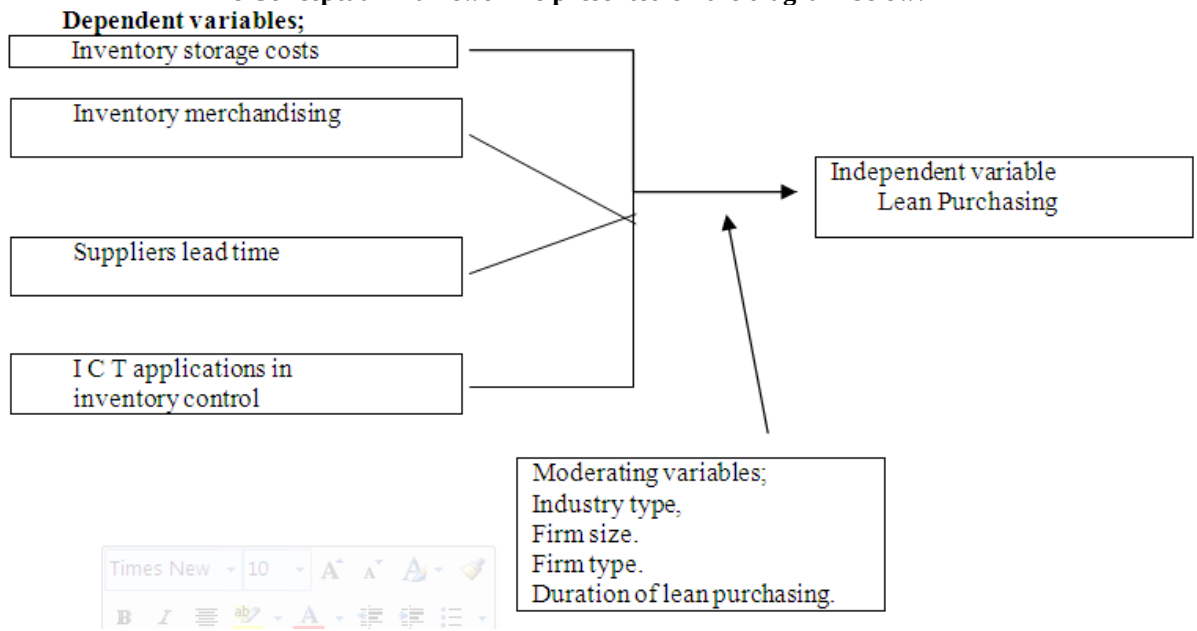
17 percent of firms perceive JIT as a strategic tool to increase competitiveness whereas 44 percent think JIT is utilized to improve operations. Most Supermarket retail businesses today remain competitive by maintaining only a minimum level of inventory; hence their demands are met by observing the "just-in-time" (JIT) technique.

Conceptual Framework

Supermarket retail business organization furnishes its needs through an established system of purchasing inventory and services. Most traditional purchasing procedures are undergoing improvements by integrating computer technologies and applications that enable businesses to adhere to the principles of lean thinking. The costs that are considered so that a supermarket retail firm can decide on the amount of stock to hold can mainly be identified as inventory holding costs. These are the incremental carrying costs associated with keeping inventory over time, and include the following; Warehouse rent for unsold inventory storage over long durations. Depreciation of unsold inventory stored for long durations. Labour such as wages and salaries of the staff involved in inventory management. Warehouse expenses overheads, for example; cleaning, lighting, and security of retail stores. Money tied up in stored inventory due to loss of interest and opportunity cost. Obsolescence costs when inventory is left stored to the end of its useful product life. Stock deterioration when money is lost if product that deteriorates in quality is held in the store instead of being disposed to create room for new inventory. Theft of inventory unsecured in the retail service premises. Insurance costs of retail premises and inventory held within its stores. Adopting use of information technology system applications to monitor and control stock levels, this will require the development of expensive warehouse inventory management software. Inventory items flow, handling and repackaging to facilitate storage.

In the supply chain, merchandising is the practice of making inventory products in Supermarket retail outlets available to consumers, primarily by stocking aisles, shelves and displays. While this used to be done exclusively by the stores' employees, many Supermarket retailers have found substantial savings in requiring it to be done by the inventory supplier, distributor, vendor, or wholesaler that provides the products to the retail store. In supermarkets, products delivered directly to the store from an inventory supplier or wholesaler will be stocked by the supplier's employee who is a full-time merchandiser. Product categories where this is common are Beverage (all types, alcoholic and non-alcoholic), packaged baked goods (bread and pastries), magazines and books, and health and beauty products. For major food manufacturers in the beverage and baked goods industries, their merchandisers are often the single largest employee group within the company. Supplier's lead-time was defined as the time necessary to deliver an inventory order. Hahn et al. (1983) identified four components of lead time of a full inventory supplying process: administrative time to process the inventory order, packaging time, transportation time, and receiving and inspection time.

The Conceptual Framework is presented on the diagram below:



The role of information communication technology (ICT) application in the Supermarket retail services is mainly through the adoption of use of the Enterprise Resource Planning (ERP) which provides the computer system support that can run different software such as WMS, IMS, SaaS and POS which are designed to record inventory flow related information. ERP provides an integrated real-time view of core business processes, using common databases maintained by a database management system. ERP facilitates information flow between all business functions, and manages connections to outside stakeholders. Supermarket retail organizations consider the ERP system a vital organizational tool because it integrates varied departmental systems and facilitates error-free transactions and production. ERP systems were developed to accommodate Retailer front office functions, such as customer relationship management (CRM), dealing directly with customers, as well as supplier relationship management (SRM) which have became integrated after the Internet simplified communicating with external parties. Two-tier ERP software and hardware lets retail firms run the equivalent of two ERP systems at once: one at the retailer corporate level to link with external business partners and the other ERP at the department or subsidiary level to link different internal sections and branches of the retail firm. When, a retail firm uses an ERP system to manage ICT links across its business partners, such as; independent national or regional inventory suppliers, distributors, and service providers who utilize these to support the main retailer's inventory replenishment requirements. Each independent supplier center or subsidiary may have their own ERP model, workflows, and business transaction processes but can be linked through the internet. Inventory merchandise supplies are received for storage by the Supermarket retailers back office system which make use of the warehouse management system to monitor and control inventory level through for example barcode readers which will assist in indicating the physical stock count of inventory within the store. The warehouse management system (WMS) is a key part of the retail services industry and primarily aims to control the movement and storage of inventory materials within a warehouse and process associated transactions, including shipping, receiving, put away, issuing and picking. The systems also direct and optimize stock storage and its related based on real-time information about the status of bin cards utilization. A WMS monitors the progress of stock through the retail warehouse. It involves the physical warehouse infrastructure, tracking systems, and communication between inventory product location stations whether in different premises. This determines which inventory types have reached a trigger point to electronically alert for the need for replenishment by the selected suppliers. Inventory management software (IMS) is a computer-based system for tracking inventory levels. Retail service firms use inventory management software to avoid inventory overstock and shortages. It is a tool for organizing inventory data that before was generally stored in hard-copy form or in spreadsheets.

Once in the Supermarket retail store the inventory merchandise can now be sold to consumers and as this is done while the available stock levels have to monitored to ensure that there are no stock outs of fast moving consumer inventory goods. At the point of sale the flow of inventory out of the Supermarket retail store is recorded by the Saas and POS, while the ERP supports the software the monitors and records inventory flow information as consumers buy. The Supermarket retail store is also linked to the information system of selected suppliers such that this enables real time management of inventory levels to ensure immediate replenishment of declining stocks. The SaaS provider hosts the application and inventory database centrally—deploying patches and upgrades to the application transparently, and delivering access to end users over the Internet through a browser or smart-client application. A variety of security mechanisms can be used to keep sensitive data safe in transmission and storage such as payment of inventory supplied. Traditionally, POS systems are autonomous systems that exchange flat files in batch mode between the front office and with back-office systems for stock management and reporting. In the same offline mode and after a role change, the back-office system exchanges inventory sales and item data with retail systems and inventory suppliers.

II. Research Method

Dillman's (2000) Total Design Method, commonly employed in operations management research was used with slight modifications to administer the survey. The collection of primary data for this research study was done from the purchasing departments of different Supermarket retail service firm's sources within Kitale town through the population sampling technique. Population sampling is the process of taking a subset of subjects that are a representative of the entire population. The research sample unit is to be of sufficient size to warrant statistical analysis of the data to be collected from these sources. The target population considered for this survey study is the purchasing departments of the Supermarket retail service firms within Kitale town. The research study relied on sampling techniques because some objects within the population have a common, binding characteristic or trait. The subjects of the survey are the Supermarket retail purchasing and finance managers because these high-ranking respondents would possess the type of information required for this study.

Before a sample unit is taken, members of the study population, the Supermarket retail service firms, are identified by constructing and including them in a list called a sampling frame. Each member of sampling frame becomes a sampling unit. The sampling fraction or the ratio of sample size to study population size was

decided at 35% of the total population of Supermarket retail outlets in Kitale town. The sampling units consist of the accounts and purchasing staff of the Supermarket retail service firms selected as the sampling units. Determining the sample size to be selected is an important step in this research study.

Sample and sampling technique: In this study Supermarket firm sample unit was a subset of the whole population of Supermarket service firms within Kitale town. The sample unit refers to a representative of the target population being the Supermarket retail service firms, from which it is drawn and it has a good size to warrant statistical analysis from the primary inventory data to be collected.

Sampling Technique: Any member or object of the defined Supermarket retail service firms could be included in the sample. A theoretical list of Supermarket retail service elements that make up the population is the sampling frame. The sampling procedure that the researches study considered; is the simple random sample which is a form of non probabilistic sampling. In this method, all subject, members or elements had an equal probability of being selected. The research study prefers the simple random sample which is used as a basis of selecting which Supermarket retail service firm would provide the respondents and a source of primary data.

Research Instruments: Numerous techniques have been observed to improve an instrument and its ability to accurately capture the intended data. One such approach suggested is the use of brief and concise questions (Armstrong and Overton, 1977). This reduces the likelihood of any ambiguity being "read into" the question. Along this same line of thinking, Mangione (1995) suggested the use of clearly understood terminology. Schuman and Pressor (1981) raised awareness that the ordering of questions can also play a role in the effectiveness of a questionnaire. In the research study, the definition of an instrument encompassed a set of survey questions. Any research instrument must be tested with a reasonable range of reliability. This research study considered the following two research instruments, interviews and questionnaire; interviews enable face to face discussion with the selected respondents from the Supermarket retail service firms' in Kitale town. When using interviews the researcher decided to take notes, rely on memory and write in the respondents answers. Before going out to interview there is a need to draw up an interview schedule of questions which are either closed or open questions, or a mixture of these. Closed questions tend to be used for asking for and receiving answers about fixed facts such as name, numbers, and so on. They do not require speculation and they tend to produce short answers. With closed questions, interviewees could be given a small selection of possible answers from which to choose. This enables management of data and quantifying the responses. The problem with closed questions was that they limit the response the interviewee can give and do not enable them to think deeply or test their real values. However when open questions are asked such as they could elicit an almost endless number of responses. But it was very difficult to quantify these results. Questionnaires seemed a logical option as a way of collecting information from the finance and purchasing staff of the retail services firm. Developing and using a questionnaire followed these guidelines; identifying the research questions from the research objectives to be included in the questionnaire. Identify those Supermarket retail service firms that would provide respondents to fill the questionnaires as representative samples units from selected retail service firms in Kitale town. Drawing up a list of appropriate questions and try them out. Pilot these potential questions to determine their suitability with the variables of the research topic. Ensure the questions are well presented on the questionnaire and it is clear how to 'score them' (tick, circle), these would be the open and the closed questions.

Data collection procedure: Whilst there are slightly different variations according to the resign design, the methodology is divided into a few sections; identify the instruments of data collection materials such as questionnaires and equipment used for interview with respondents in this research mainly to record primary data. Explaining how the samples units mainly the Supermarket retail service firms in Kitale town were be selected, by the use of randomization techniques useful when selecting sample units of this type. Explaining how the measurements are determined when considering the roles of different types of lean purchasing techniques as a measure of controlling inventory holding costs, in the selected Supermarket retail service firms, and how these measurements are decided, made and what quantitative calculations were performed upon the raw data collected from survey methods of primary data collection.

III. Discussion Of Research Findings

In this research, Lean purchasing consists of four components which are the plan, the source, the inventory and the delivery: First the plan, refers to the over-all strategy of how lean purchasing can be practiced. Second the source refers to those suppliers who'll provide the inventory and services necessary to run the Supermarket retail business. Third the inventory type variety required by the Supermarket retail services sector, whether it can be acquired through lean techniques. Fourth the delivery, which refers to the system for issuing orders to suppliers, developing a network of warehouses and getting the inventory to the Supermarket retail firms. The primary data collected from different questionnaires received were categorized as follow;

Respondent 1, Respondent 2 and Respondent 3 Data collected from the different questionnaires received from respondents formed part of the descriptive research design, this was both qualitative and

quantitative. The qualitative data, such as actual purchasing staff performance, was not computable by arithmetic relations. These are labels that advised in which category or class an individual, object, or process fall. They are called categorical variables. Quantitative data sets consist of measures that take numerical values for which descriptions such as means and standard deviations are meaningful. They can be put into an order and further divided into two groups: discrete data or continuous data. Discrete data are countable data, for example, the number of inventory items ordered from a supplier. Continuous data, when the parameters (variables) are measurable, are expressed on a continuous scale. For example, suppliers lead time. The first activity in statistical data analysis is to measure or count. Measurement/counting theory is concerned with the connection between data and reality. A set of data is a representation that is, a model of the reality based on a numerical and measurable scales. Confidence level refers to a range of values/intervals that act as good estimates of the unknown population parameter. The confidence level contains the parameters values that when tested should not be rejected with the same sample. Data from the questionnaire are called "primary type" data collected from the questionnaire. The research data analysis tables shown below consist of data collected from the returned questionnaire were by the figures shown are provided by the respondents when asked to quantify the activity from a percentage scale of 0% to 100%, according to assessment of the different respondents answers in relation to the questions of the survey study.

Descriptive statistics is used to describe the basic features of the data in a study; they provide summaries about the population sample and its measures mainly of distribution, central tendency and dispersion. Descriptive statistics is about what is or what the collected primary data shows especially after it's has been reduced into a summary. Measures of distribution show a summary of the frequency of individual values for a variable, this lists every value of a variable and the number of respondents who had each value. The measures of central tendency show the center of a distribution of values for example; mean median and mode. Measures of dispersion shows the spread of the value around the central tendency examples are; the standard deviation (STD) and the range. The coefficient of variation (COV) is the ratio of the standard deviation and the mean, it is a relative measure and suitable for comparing any two series which differ largely in respect of their means. All the more, a series of values having lesser coefficient of variation as compared to the other is more consistent. The tables shown below are the descriptive statistical analysis of the primary data collected through the research questionnaire.

Table of the factors affecting the application of lean purchasing

Respondents	1.	2.	3.	MEAN	STD	COV
Failure to use ICT links with suppliers	100	100	95	98	2.4	0.024
Lack of supplier cooperation	99	90	30	73	30	0.42
Irregular inventory demand	35	10	20	21	12.1	0.575
Increased inventory ordering costs	20	0	70	30	29.4	0.98
Absence of lean purchasing	20	100	0	40	43.2	1.08

The table above of the factors affecting the application of lean purchasing indicates that for all the respondents their main challenge was establishing Information Communication Technology (ICT) links with inventory suppliers that assist in the process of sharing inventory flow data between the supermarket and their inventory supplier to enable implementation lean purchasing when monitoring stock levels, this was mainly due to lack of capacity and the preferred confidentiality of supermarkets stock levels and variety held, from access by external competitors and business partners. This is indicated by the coefficient of variation showing least value of 0.024 as compared to other coefficients. Also lack of supplier cooperation was the second major challenge because the aim of suppliers was to deliver inventory in bulk quantities to the Supermarket but not smaller units for the purpose of lean purchasing, this is indicated by a coefficient of variation of 0.42. However the least of challenges was lack of information about lean purchasing because this was not the case as most respondents were aware of lean purchasing as indicated by coefficient of variation of 1.08, and practiced lean purchasing especially for perishable fast moving goods like; fresh milk, vegetables and bread.

Table of the Supplier assistance when implementing lean purchasing

Respondents	1.	2.	3.	Mean	STD	COV
Reduced supplier lead time	80	90	50	73	17	0.23
Inventory merchandising	50	60	98	69	20.7	0.29
Supply of fixed quantity of inventory	100	10	95	68	41	0.61
Use of ICT links with suppliers	0	0	5	1.67	2.36	1.41

The table of supplier assistance when implementing lean purchasing shows that reduced supplier lead time was the main form of assistance because supply deliveries were done promptly to ensure better inventory supplier service as a competitive advantage, hence the least coefficient of variation of 0.23 as compared to the other coefficients. Meanwhile inventory merchandising was also yet another main assistance as shown by

coefficient of variation of 0.29, because the suppliers sought to have their inventory arranged by their staff on the supermarket shelves for faster sales and not transferred to the warehouse for storage where they could not be reached for buying by supermarket customer. However lack of Information Communication Technology (ICT) links between the supermarket and their inventory suppliers was least form of assistance as shown by the coefficient of variation of 1.41, this was mainly due to the lack of capabilities to develop these links to facilitate supplier support and the unwillingness of supermarket management to reveal its stock levels to external suppliers.

Table of the benefits of the application of lean purchasing to Supermarket services.

Respondents	1.	2.	3.	Mean	STD	COV
Minimum supplier lead time	90	90	95	92	2.38	0.025
Better purchasing staff performance	100	85	90	91	6.27	0.068
Decrease in inventory storage duration	99	80	80	86	8.9	0.104
Reduction of inventory storage costs	70	90	60	73	12.5	0.171
Improved profitability		95	80	58	41.7	0.718
Better supplier relationships		80	90	56	40.3	0.719
Use of ICT in inventory replenishment		95	60	51	39.2	0.769
Improved inventory merchandising		10	50	20	21.6	1.080

The table of the benefits of the application of lean purchasing to Supermarket services as arranged according to descending order of merit, indicating that the main gain was minimum supplier lead time to delivery of inventory with coefficient of variation 0.025 because most suppliers considered this as an opportunity to sale their stock, the other gain was better purchasing staff performance with coefficient of variation 0.068 because they were able to monitor stock levels more regularly and make inventory purchase order immediately the need arose. The least gain was inventory merchandising with coefficient of correlation of 1.080 because most supermarkets preferred their staff to arrange the aisles shelves with inventory for the purpose of order and pricing of stock. Most supermarkets considered the use of Information technology communication (ICT) an internal matter and did not wish to involve external inventory suppliers hence a coefficient of variation of 0.769.

Implementing lean purchasing as a measure to control inventory storage costs by Supermarkets.

A lean purchasing process is actually a modification of the traditional system of acquiring Supermarket retail organizational needs. The objective of the modifications is to improve the system of inventory purchasing regarding issues about: Long lead time before an inventory is received, inasmuch as long lead times equate to non-value-added costs before a particular transaction or retail activity can be performed. Maintaining the inventory at an optimized level to ensure that all stocks or materials stored or kept on hand are those that meet the immediate needs of the Supermarket retail service organization and are ready for distribution to customers at a moment's notice. The incremental inventory holding costs can thus be minimized be reducing the duration that stock stored in the retail premises by the use of JITP inventory replenishment and lean purchasing. The different business approaches considered for adoption in lean purchasing in the Supermarket retail service firms included; JIT purchasing; agreements define delivery dates or times according to the Supermarket retail service buyer's schedule, as opposed to shipping dates and times based on the supplier's schedule. JIT purchasing emphasizes supplier evaluation based on product quality, delivery performance and price. Under JIT purchasing, achieving product quality through a long-term contract at a fair price receives the highest priority. Furthermore, most importantly, inventory items must be delivered in exact quantities, neither more nor less.

Vendor managed inventory (VMI); employs the same principles as those of JIT inventory, however, the responsibilities of managing inventory is placed with the supplier or vendor in a vendor/customer relationship. Whether it's a manufacturer managing inventory for a distributor, or a distributor managing inventory for their customers, the management role goes to the vendor. An advantage of this business model is that the vendor may have industry experience and expertise that lets them better anticipates demand and inventory needs. The inventory planning and controlling is facilitated by applications that allow vendors access to their customer's inventory data. Another advantage to the customer is that inventory cost usually remains on the vendor's books until used by the customer, even if parts or materials are on the customer's site.

Economic order quantity (EOQ); the framework used to determine this order quantity is also known as Wilson EOQ Model or Wilson Formula. The model was developed by Ford W. Harris in 1913 but R. H. Wilson, a consultant who applied it extensively, is given credit for his in-depth analysis. Were by; suppose annual inventory requirement quantity (D). Cost per order (K). Cost per unit (c). Carrying cost percentage (h/c) (percentage of c). Annual carrying cost per unit (h).

$$\text{Economic order quantity} = \sqrt{\frac{2D * K}{h}}$$

Electronic purchasing (e-purchasing); this involved the automation of the inventory purchasing process and extends to the manual buying and selling processes, from the creation of the inventory requisition through to payment of the suppliers. The term e-purchasing encompassed back-office ordering systems that lean purchasing may adopt through the use of e-marketplaces and inventory supplier websites. In the emerging digital era, Supermarket retail businesses increasingly used electronic systems for more efficient, predictable, transparent and secure management of their inventory management needs. E-purchasing systems provided up-to-date information on the status of the retailers' inventory needs. They allowed the establishment of an agreement with a supplier to automatically ship inventory materials when a retailer's stock reached a low point. This also applied to the solicitation phase where retailers could track incoming offers prior to supplier selection. Electronic purchasing provided predictability as suppliers knew what to expect and could review an order's progress, often in real time. Also, the status of the goods could be followed in real time. An inventory product would show as having been delivered, accepted and processed for payment without the supplier having to call and request information from accounting staff. Transparency and accuracy was facilitated, with inventory data exchanged and stored electronically instead of through paper-based documents. E-purchasing systems require various Supermarket retailer and supplier systems to have the electronic capability to exchange information and electronic documents. This entailed common standards. XML (eXtensible Markup Language) is emerging as the basis of such standards. The XML standard defined the content in communication and in the selection of general trade data format. Development of an e-purchasing system in a retail business environment would enable it to be linked to other partner business systems for interoperability and this simplified its upgrading for the purpose creating information network coordination between for example the retailer and supplier. Because of the legal nature of inventory order and payments, the system must have mechanisms for identifying and authenticating the user who places the order (e-signatures). Lean purchasing therefore can be implemented through Supermarket retail firms that have considered adopting e- purchasing when restocking their inventory requirements.

E-sourcing; this was when an inventory supplier decision support web tool was implemented group wide with the retailer information communication technology networks that are linked to those of selected major inventory suppliers. The aim was to structure and enlarge the supplier inventory data base and to provide it to the Supermarket retail buyers, electronic request tools for inventory information (e-RfI) and for quotation (e-RfQ), as well as e-auction procedures are useful when determining how inventory was moved from the supplier to the retailer and this had to be done through a Just in time (JIT) sourcing and retailer inventory replenishment strategy which was applicable to lean purchasing. These improved the adaptation of lean purchasing for the Supermarket retailer inventory purchasing requirements and were possible real time inventory control and management was adopted with the assistance of the supplier inventory management database that monitored remotely the retailer stock levels which required replenishment and notified the purchasing staff about this observation which was then done immediately.

Total-system approach; in this approach the interrelationships of the basic inventory information requirements between the supplier and retailer are defined prior to implementation. Inventory flow data collection, storage and information processing are designed and done within the framework of the total retail system. This approach can be successfully implemented in Supermarket retail organizations which are developing. Lean purchasing with the retail system approach makes use of the purchasing department inventory management database. A large and detailed inventory database is amassed, stored and maintained. The database approach is accepted for two main reasons: first, because of inventory data independence it allowed for easier system development, even without attempting a complete MIS; and, second, it provided Supermarket retail management with immediate access to inventory information requirement which could be relayed to the inventory supplier database which then prepared to replenish the Supermarket stock which was about run out according to consumer demand and within the JITP inventory replenishment framework and were possible through a real time communication link that maintained the function of lean purchasing.

E-ordering; this was where business to business (B2B) integration for direct inventory materials management increased efficiency of the daily Supermarket business transaction processes, by reducing inventory replacement cycle times, improving purchasing process transparency and stability, early identifying possible process interruptions and optimizing workflow on both sides. The business to business integration (B2B) took the form of Supermarket retailer and supplier cooperation. In addition it was installed with a consignment and supplier managed inventory process (SMI). This tool was implemented by the retailer with selected suppliers to facilitate lean purchasing through real time inventory physical count controls which then result to immediate inventory sourcing, acquisitions and replenishment were inventory orders, invoicing and subsequent payments are done electronically but according to the lean purchasing concept of JIT strategic inventory sourcing, ordering, delivery and payment.

IV. Conclusion

Supermarket retailers, have inventory as the largest asset on their balance sheet. In many ways, inventory defines who the retailer is, and their strategic position in the consumer marketplace. It defines the retailers' customer's needs and their expectations, the cost of inventory is the single largest expense item on most every Supermarket retail service firm's income statement. Most Supermarket retail firms evaluate the profitability of their inventories through such yardsticks as inventory turn, gross margin return on investment, gross margin return on square foot and the like. These are all valuable tools in assessing inventory profitability, but they are all limited by the fact that they use inventory at supplier cost as the cost basis in their analysis. Currently purchasing of Supermarket inventory is now seen as a strategic tool and the actual placing of an order is a result derived from the overall business strategy. Under JIT purchasing, agreements define delivery dates or times according to the buyer's schedule, as opposed to shipping dates and times based on the supplier's schedule under traditional purchasing (Ansari & Modarress 1990; Schonberger 1982; Schonberger & Gilbert 1983). Furthermore, JIT purchasing involves both inbound and outbound freight, stressing on-time delivery, whereas traditional purchasing emphasizes outbound freight, stressing low freight cost (Ansari & Modarress 1990). O'Neal (1987) suggests that JIT purchasing requires faster, more responsive modes of transportation than traditional purchasing because of frequent deliveries in small lot sizes.

A study by A. S. Sohal, Ramsay, and Samson (1993) shows that the link between JIT and competitive strategy is less common than between JIT and operational tactics. The findings of their study reveal that only 17 percent of firms perceive JIT as a strategic tool to increase competitiveness whereas 44 percent think JIT is utilized to improve operations. Most Supermarket retail businesses today remain competitive by maintaining only a minimum level of inventory; hence their demands are met by observing the "just-in-time" (JIT) technique. Suppliers or wholesale distributors therefore are selected based on their ability to deliver the organization's needs within the shortest time possible, which could either be within an hour or within the day. The prevalence of the JIT method prods most retailers to embrace the leanest method of purchasing. Doing so can lessen the lead time of a inventory distribution cycle and the non-value added costs involved in procuring and storing goods and services via traditional procedures. Today's advancements in technology make it easier for business organizations to adopt the lean purchasing process by simply selecting those suppliers capable of handling their purchase orders through real-time order-fulfillment applications. Studies by Ansari and Modarress (1987, 1990) show that companies having implemented JITP estimated a 43 percent increase in product quality and a 21 percent improvement in productivity. The traditional system of acquiring goods and services still observes the budgeting system as well as the procurement approval and selection controls. Supermarkets now consider using a single electronically produced document for all related internal transaction as request are processed from point of requisition to issuance. This allows for more accuracy in monitoring inventory levels, less paperwork and real-time recording and monitoring of inventory movements to determine stock that requires immediate replenishments. Some internal critical factors are required in the implementation of JIT purchasing, as well as in the implementation of JIT production (Ahmed, Tunc, & Montagno 1991; Ansari 1986; Ansari & Modarress 1986, 1990; Hay 1989, 1990a, 1990b, 1990c; Im & Lee 1989; Lee & Ebrahimpour 1984). These three essential elements include the following:

First, Senior Retail Management commitment; top management should make JIT purchasing a priority for the whole organization and clearly communicate this commitment to the employees. The necessary resources for the implementation of JIT purchasing should be provided by leaders. Moreover, upper management should demonstrate leadership in order to provide positive involvement of other functions (Ahmed et al. 1991; Ansari & Modarress 1986; Hay 1990a; Im & Lee 1989; Lee & Ebrahimpour 1984). In their survey, Fawcett & Birou (1993) find that companies which successfully implement JIT purchasing activities provide support at different levels of management.

Secondly, Training; most importantly, purchasing people must be trained in the JIT philosophy. Also, purchasing people should be trained in the necessary statistical tools, such as statistical process control (SPC), in order to understand the variation in incoming materials. Furthermore, training support in JIT purchasing and quality management should be provided to suppliers (Ahmed et al. 1991; Ansari 1986; Ansari & Modarress 1986; Im & Lee 1989; Lee & Ebrahimpour 1984). Utilizing teamwork from both parties in reducing the common causes of variability in materials and parts can improve quality (Harrison & Voss 1990). In one study, respondents report that the lack of training and education of suppliers has been a major impediment in the implementation of JIT purchasing (Freeland 1991).

Thirdly, Teamwork; inventory acquisition teams should be established, which may include purchasing, material control, process/design engineering and production representation. This interaction provides the conditions necessary to solve supplier quality problems and facilitates communication within the entire organization (Giunipero & Keiser 1987; Hall 1983). These teams can be utilized in the selection of new suppliers (Burt 1989).

The indicators of performance that shows changes in inventory holding cost of those Supermarket retail firms that adopts the use of lean purchasing in the retail services sector required the involvement of; logistics, information communication technology (ICT), inventory distribution was a shift from inventory-based logistics (push) to replenishment-based logistics (pull). Demand, particularly in the retailing sector, was very difficult to anticipate accurately. A closer integration between inventory supply and demand enabled a more efficient inventory management system with fewer wastes in terms of unsold inventory.

Lean purchasing aimed to reduce waste, inventory sourcing inefficiencies and improve quality, bringing a whole range of benefits to retail businesses of any size, as well as retailers with complex supply chains. These benefits included: First, reduced storage costs; lean purchasing minimized inventory storage costs. Many retail businesses found that purchasing only the inventory they need for their current jobs, improved cash flow and minimized the amount of money tied up in stock. In retail business, getting the suppliers signed up to deliver just in time could reduce the need for costly storage space. Second, higher procurement productivity; it may seem a daunting prospect, but reorganizing procurement to make Lean purchasing work was excellent discipline for any business. It enabled the firm to consider how every part operation process works and to look for ways of streamlining working practices. Third, Retailer Competitive advantage; lean purchasing helped create a more flexible retail business that has better communication with customers and suppliers, and can react more quickly to market demands. Many Supermarket businesses find greater customer loyalty is a welcome by-product of adopting this new way of working. Implementing JIT working will help the Supermarket business move towards industry best practice and keep up with competitors. Fourth, improved Supermarket purchasing personnel job satisfaction; lean purchasing demands active participation in the Supermarket operation process from employees. It increased their skills, gave them greater responsibility and fosters an interest in the performance of the whole Supermarket retail organization, rather than just their department or team.

The factors affecting the implementation of lean purchasing by Supermarkets that were identified in this research study are as follows: Lack of cooperation from inventory suppliers; the suppliers saw little incentive in adopting the JITP approach when the primary benefits of the program go to the retailer. Because the requirements from the supplier were: A long-term supplier business purchasing agreement or contract with the retailer. A fair return on supplier investment especially on Information Technology system that support JIT purchasing. Adequate time for planning on the procedures for cooperation between retailer and suppliers. Accurate retailers' customer inventory demand functions. Correct inventory, pricing and quality specifications when sourcing for stock. Electronic inventory RFPs from retailer designed to match supplier's process capability. Smoothly timed inventory order releases. A fair profit margin from inventory sale to the retailers. Fair dealings with regard to transaction costs that involve JITP inventory sourcing. A minimum number of change orders and fewer errors on inventory orders. Prompt payment of suppliers' inventory invoices issued to the retailer.

Lack of top Supermarket management support; Implementation of the JITP philosophy required a cultural change in the retail organization, such a concept cannot be implemented successfully without total support from top Supermarket retail management when adopting a lean purchasing policy. Lack of employee readiness and support; many Supermarket retail firms were observed to have a lack of support from their employees as being one of the major problems encountered in the implementation of JIT (Lean) purchasing. Very often, such resistance was encountered because the employees were required to change their long-standing work habits, or because they interpreted the new system as being a threat to their jobs. Also, the JITP system required most employees to assume more problem-solving responsibilities on the job, which may lead to additional frustration.

Lack of support from software design engineering personnel; Software design engineering was responsible for making technical specifications for the information technology needs a retail firm requires. Quite often, the purchasing function in a Supermarket retail organization does not receive adequate support from information technology (IT) department and, as a result, purchasing is often unable to advise suppliers on inventory requirements online and with real time. Low product quality and quantity; if suppliers failed to provide retail inventory of adequate quality and quantity on a regular basis, lean purchasing would cause slow-downs and stock outs will occur regularly.

Lack of support from logistics; carrier and inventory transporting companies; few Supermarket retail firms worked closely with carriers to develop long-term relationships that provided for highly structured inventory delivery schedules that lower costs for the retail firm. Buyers have traditionally accepted terms offered to them by the carriers with regard to their inbound inventory freight. Lack of communication; effective development and implementation of the just-in-time system required integration of important functional areas such as purchasing, logistics, accounts, stores, and transportation. Lack of proper communication among these areas poses a major obstacle to the implementation of JITP. While there was no easy solution to this problem,

the purchasing function in an organization assumed the responsibility of calling on top Supermarket management regularly for leadership and support.

Firm performance in the JIT purchasing literature was often measured by quality, cost, productivity such as inventory turnover, and lead-time. JIT purchasing practices potentially affected Supermarket retail service quality on multiple aspects: First, the use of a small number of inventory suppliers and the maintenance of a long-term relationship with Supermarket retailers increased supplier loyalty, which lead to suppliers' willingness to invest time and resources to not only guarantee but also improve quality. Second, the readiness to assist suppliers on various fronts provided suppliers with incentives to pursue continuous inventory and purchasing service quality improvement. Third, quality inspection at the source and small shipments allow fast detection and correction of defects (Schonberger & Gilbert, 1983). Fourth, intense exchange of information on quality assured that both suppliers and Supermarket retailers are informed of occurring problems and may even organize a joint effort to solve them. Fifth, maintaining low perishable inventories meant less part deterioration or obsolescence. Finally, supplier - Supermarket retailer cooperation ensured that suppliers are fully aware of buyers' inventory quality requirements and the Supermarket retailers are familiar with suppliers' capabilities to meet these requirements in advance (Ansari & Modarress, 1988).

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