

## Assessing the Effectiveness of the Inventory Management System in a Service Organization: A Case Study of Toyota Ghana Company Limited Central Parts Depot at Tema (in Ghana)

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### ABSTRACT

This paper examines the effectiveness of the inventory management system of the subsidiary Toyota Motor Corporation distribution organization hitherto referred to in this paper as Toyota Ghana Company Limited (TGCL). The TGCL was incorporated in Ghana in January 1998 by the investment of Marubeni Corporation, Japan and Marubeni Auto Europe S.A., Belgium and started operations in April 1998. However, this research is limited to inventory management and control practices in the TGCL Central Part Depot (CPD) at Tema. Growth and survival of any distribution company depends on microscopic analysis of operational processes and marketing effectiveness. To achieve this objective, inventory analysis has therefore attained limelight considering the investments involved in maintaining and managing inventories. The researchers used both quantitative and qualitative data from 40 customers and 50 staffs incorporating top managers of inventory management in TGCL. The study identified that cycle counting supported by the use of Automatic Data Processing (ADP) technology are used to ensure and maintain effective inventory records. The study further identified that the management of TGCL uses perpetual inventory control system which incorporates automatic order processing to control inventory in the company. There is a proper layout plan for inventory storage facility in maximizing the effectiveness of production process and meeting customers' needs or desires.

**Key words:** inventory, inventory management, marketing effectiveness, automobile industry

### INTRODUCTION

Automobile industry is a symbol of technical marvel by human kind. The industry could have a strong multiplier effect on economic growth (Dicken, 2003) through efficient management of its inventory systems. Inventory management simply means the methods used to organize, store and replace inventory, to keep an adequate supply of goods while minimizing cost. Assets held in inventory are generally required to ensure service delivery continues as planned without interruption. Like any asset, decisions need to be made whether they should be held, and how much to hold, and they need to be efficiently managed.

Efficient management of inventory concerns most managers of marketing and supply businesses, whether they are retail, wholesale, or service oriented. Successful, well-organized businesses rely heavily on inventory management systems to make certain that adequate inventory levels are available to satisfy their customer demand. The inventory system has diverse decision variables that can be considered as continuous like regular orders, demand on the stock, regular supply et cetera. On the other hand, there are discrete variables like special orders that come in at a particular time, theft or accidents that occur without any warning. Based on these, decision makers need to plan properly for their inventory; as these discrete and continuous variables always play an important role in determining the results.

Management is given some discretion in the valuation of the firm's inventory, as they decide on the timing and quantity of inventory write-downs. Moreover, in addition to purchases and sales of inventory, firms can make adjustments to their inventory figures, and subsequent level of earnings. The extent to which firms choose to utilize their discretion to adjust the level of inventory can have a large impact on the financial standing of the firm. The management of inventory and how it can provide insight into firm performance is a topic of interest to shareholders, investors, business owners, and the general public. Through examination of inventory practices and how they differ over time, it becomes easier to judge the stability of a firm and the likelihood that it will perform well in future periods.

While a great deal of attention has been focused on automobile industries; comparatively little empirical research has been done to ascertain the efficiency of a single automobile service company in managing inventory

in their distribution systems, both at the factory and dealer levels. This study therefore investigates the effectiveness of inventory management system of Toyota Ghana Company Limited at the Central Parts Depot in Tema (located in the Greater Accra Region of Ghana).

## **EMPIRICAL STRATEGY**

A successful research depends on three basic elements: these are; the source of data, the method(s) used in collecting the data, and how the data are finally analyzed, interpreted and presented (Kumekpor, 2002). This study adopted cross-sectional research design considering the special situation of TGCL. This empirical design allowed this study to be carried out in a natural setting and also for statistical inferences and generalizations. The researchers found this approach appropriate as observations and information gathered beyond the use of questionnaire was concerned.

The major method for collecting this data was primarily by questionnaire administrations. The researchers used questionnaires to collect data from staffs, management and customers of TGCL at Tema. Accessible information from the questionnaire administration indicates that greater proportions (8 out of every 10) of the staffs, management and clients of TGCL sampled have known or worked with the company for more than 5 years. The protracted and long period of engagement with TGCL increases the profundity of their knowledge on inventory management of the company in order to paint accurate picture of the effectiveness of the inventory management system.

A further dissection indicates that the least qualification of the management and staffs of TGCL is Higher National Diploma. However, all the staffs holding managerial positions have at least a degree qualification. It is high-handed to indicate that the sample with at least a Higher National Diploma qualification could be considered as sufficiently knowledgeable, mature or experienced to furnish balanced and informative responses.

The data collected were then processed by editing to remove undesirable information that was given by sample and to check for completeness, accuracy and uniformity.

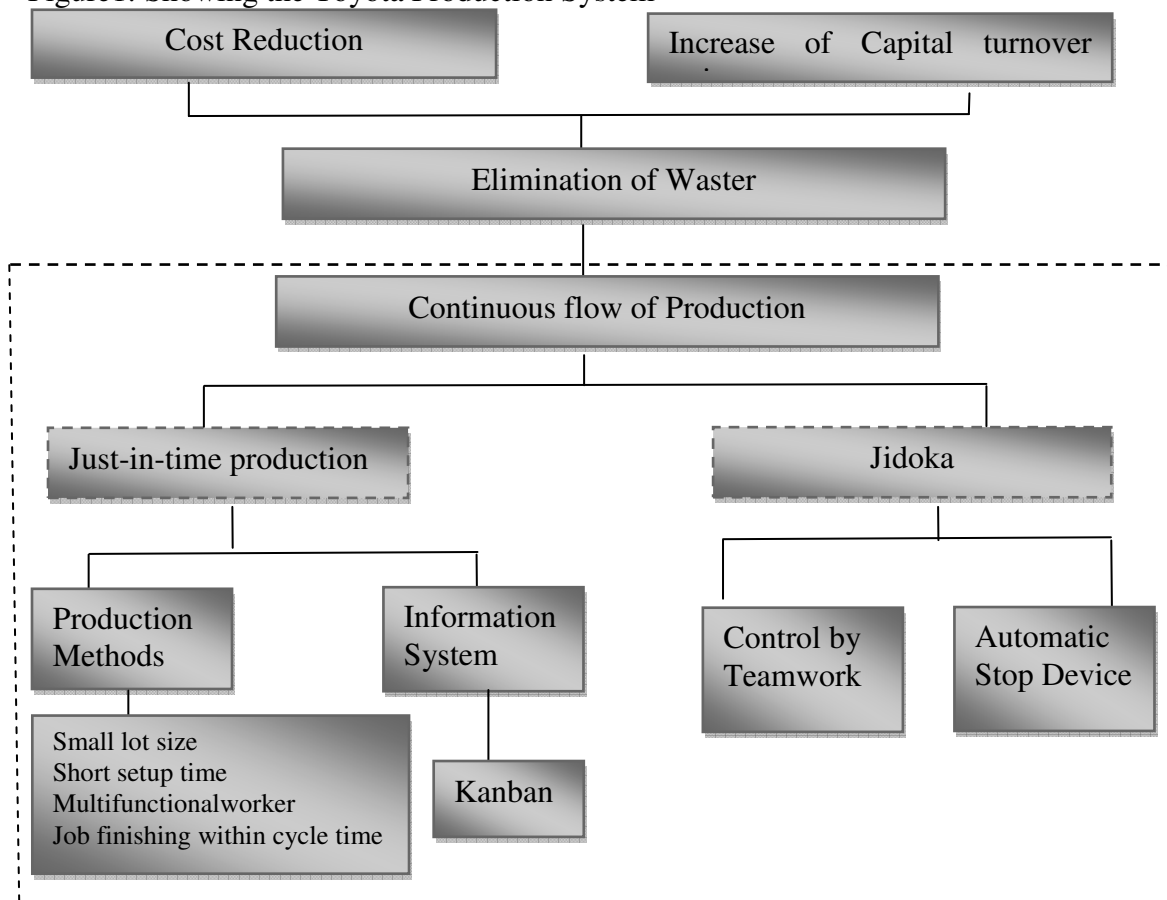
## **TOYOTA PRODUCTION SYSTEM**

The Toyota Production System (TPS) is steeped in the philosophy of "complete elimination of all waste". This philosophy imbues all aspects of production in pursuit of the most efficient methods, tracing back its roots to Sakichi Toyoda's automatic loom. The TPS has evolved through many years of trial and error to improve efficiency based on the Just-in-Time concept developed by Kiichiro Toyoda, the founder (and second president) of Toyota Motor Corporation. Waste can manifest as excess inventory in some cases, extraneous processing steps in other cases, and defective products in yet other cases.

Toyota Motor Corporation's vehicle production system is a way of "making things" that is sometimes referred to as a "lean manufacturing system" or a "Just-in-Time System". This production control system has been established based on many years of continuous improvements, with the objective of "making the vehicles ordered by customers in the quickest and most efficient way, in order to deliver the vehicles as quickly as possible".

The Toyota Production System was established based on two concepts: The first is called "Jidoka" (which can be loosely translated as "automation with a human touch") which means that when a problem occurs, the equipment stops immediately, preventing defective products from being produced; The second is the concept of "Just-in-Time," in which each process produces only what is needed by the next process in a continuous flow. Based on the basic philosophies of Jidoka and Just-in-Time, the TPS can efficiently and quickly produce vehicles of sound quality, one at a time, that fully satisfy customer requirements. The Toyota Production System is illustrated in the figure1.

Figure1: Showing the Toyota Production System



### CUSTOMERS ORIENTED PERSPECTIVE OF INVENTORY MANAGEMENT IN TGCL

A sane inventory management is of great necessity in any business organizations. The future of that business organization depends upon how the top management defines and considers inventory in relationship with service levels. Knowing factors that push purchasing behavior and meeting customer's needs remains a crucial matter for the growth and survival in any competitive market. Inventory analysis has therefore attained limelight considering the investments involved in maintaining and managing inventories.

There was an enquiry into availability of TGCL inventory in satisfaction of its customer's needs. Majority (67.5%) of the customers sampled said the TGCL is able to supply their entire request for products. However, only 57.5 percent of the customers sampled said they are able to get their needs met on time when they make order.

In a sequel to the above, 80 percent of the customers sampled said inventory management system at TGCL does not allow them to check their ordered items while 57.5 percent of the customers sampled demonstrated evidenced of information on requested items while waiting but the overwhelming majority representing 55 percent express dissatisfaction with the time taken before order is received.

All the customers sampled have the view that TGCL product are expensive but of higher quality in lieu to other substitute products in the market. The researchers further try to ascertain pricing of TGCL products from the management in charge of TGCL inventory. The management refers expensive nature of TGCL products to tax components and sundry charges since the product are imported from their parent organization Toyota Motor Cooperation.

In spite of the above expression of dissatisfaction in some of the process in the inventory management of TGCL, the overwhelming majority representing 95 percent of the customers reported that the item supplied meet their expectation whilst 70 percent get complementary product when they make order.

## INVENTORY MANAGEMENT PRACTICES IN TGCL

The success of any business relies on many factors, one of which is a reliable inventory management system. Inventory management system provides information to efficiently manage the flow of materials, effectively utilize people and equipment, coordinate internal activities and communicate with customers. Inventory managers do not make decisions but provide the information to operation managers who make more accurate and timely decisions to manage their operations.

An inquiry was undertaken to ascertain whether inventory management is a core strategic function in TGCL. It is worthwhile to note that 95 percent of the staffs sampled affirmed that inventory management is a core strategic function of TGCL with only 5 percent responding in the negative.

Inventory management consists of everything from accurate record keeping to shipping and receiving of products on time. An inventory management that is properly maintained can keep company's supply chain running smoothly and efficiently. A good inventory management practice requires appropriate paperwork for every type of stock withdrawal. The researchers found out that 76 percent of the staffs sampled agree that a regular warehouse attendant is taken and the others were neutral about this statement. All the TGCL staffs interviewed mentioned that accurate record of any items that arrive at or leave the warehouse is kept and moreover, information on shipment dates communicated are usually accurate. When inventory arrives, this is when breakage or loss on the goods ordered is found. Inventory leaving the warehouse are counted to prevent loss between the warehouse and the point of sale. This study shows that 88 percent of the staffs sampled definitely agree that storekeeper keeps reports on non-delivery, damages, shortages and excess deliveries whilst only 12 percent remain neutral on the evidence of storekeepers keeping reports.

A further enquiry was embarked upon to ascertain validity or otherwise of appropriate records for all stocked items leaving the warehouse; it is imperious that, of the 88 percent of the sample agreeing to the above statement; some strongly agree and others agree. The rest of the sample was not sure about the record keeping process (as captured with the aid of figure below).



**Source: Authors Construct from Field Survey in July, 2012.**

The researchers found out that cycle counting supported by the use of Automatic Data processing (ADP) technology were used to ensure and maintain effective inventory records

As a general principle, all printed picking document were filed at the end of the day. The staffs sampled agreed that receipt of materials and suppliers are recorded accurately and completely on timely basis. The researchers found out that 76 percent of the sample strongly agrees that orders are placed on timely basis with no delay in approval of items to be procured by head of entity. It is high-handed to be underlined that, of the 76 percent of the sample which some strongly agree and others agree to update records as promptly as possible following issue and receipts; 24 percent of the TGCL staffs sampled remains neutral to the above statement.

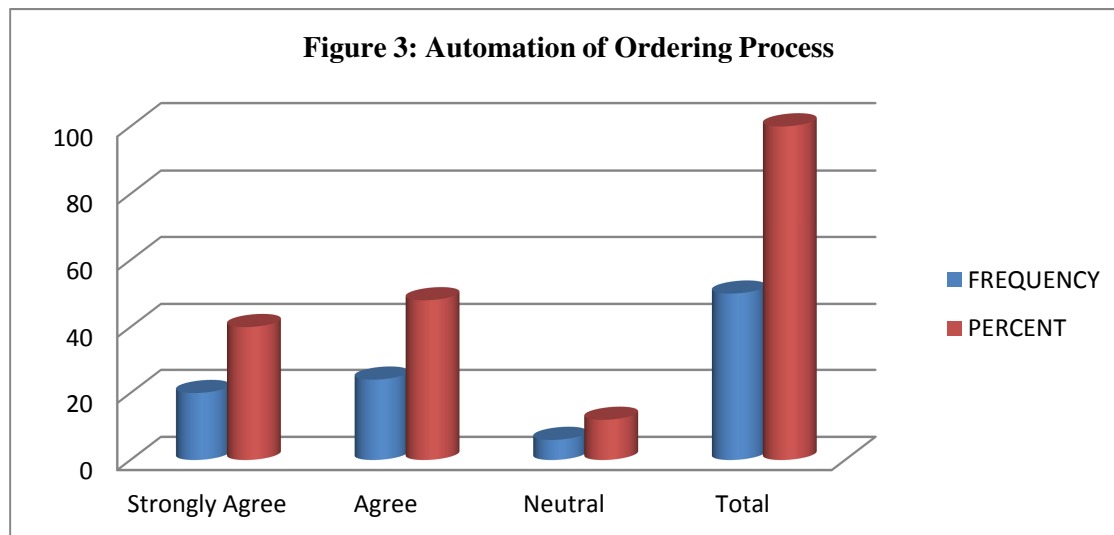
Again 54 percent of the TGCL staffs sampled strongly agree and 34 percent also agree that all purchase transactions are completely prepared and recorded on timely basis. It is better-quality to note that only 12 percent of the sampled staffs remain neutral that all purchase transactions are prepared and recorded on timely basis.

The researchers further ascertained the perceptions of TGCL staffs on whether all paper work in terms of stock receipts are issued in a timely manner. Records from the interview conducted in TGCL indicated that the overwhelming majority (64%) of the TGCL staffs sampled strongly agree to the above statement. It is indispensable to note that 12 percent of the TGCL staffs sampled affirmed neutrality to the assertion that all paper work in terms of stock receipts are issued in a timely manner.

In any business with a lot of inventory such as the case of TGCL, there is the need for regular ordering and purchasing at all times. To do this effectively requires management which can spend time analyzing sales, monitoring inventory levels, and make orders as needed to keep items in stock for customers. The researchers found out that all the TGCL staffs sampled agrees that urgent orders are treated accordingly and overall, special attention is given to special orders by customers.

It is axiomatic that the specific needs of any business vary widely; it is likely that management of inventory can be dramatically improved with computer-assisted ordering. Overall, the key to this is the ability to take advantage of an integrated system that makes it possible to streamline purchasing by automating it. This prevents errors and the potential overlooking needs since it automatically generates orders based on the actual inventory levels. Integrated inventory management system can make all problems go away and give competitive advantage by streamlining ordering process.

As far as response to questionnaires are concerns, 64 percent of the TGCL staff sampled agree that store activities have been automated in the company whilst 24 percent affirmed that activities are automated sometimes and 12 percent remains neutral. There are systems where purchase order, sales and inventory are integrated and work together to systems that have the ability to set up minimum and maximum quantities for them. When those items run low the system can then automatically generate an order based on the number and current inventory levels. While there may always be a need for careful ordering and review, an option to automate the ordering is beneficial. It focuses attention on the areas in inventory and purchasing that requires greater attention. From the research conducted in TGCL, it is crystal clear that the ordering process is automated as evident in result captured below;



**Source: Authors Construct from Field Survey in July, 2012.**

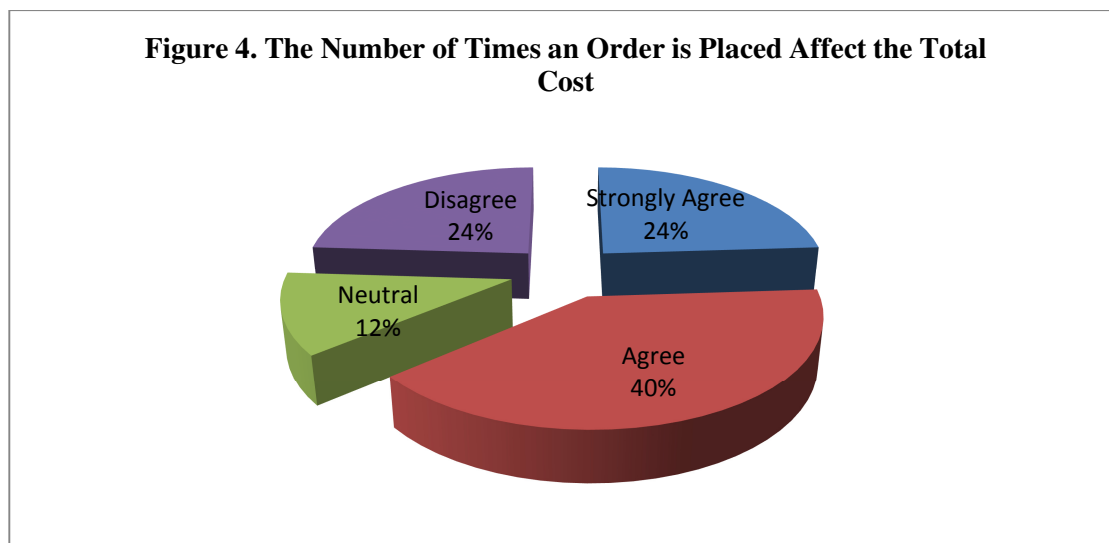
In responding to the question of automation of ordering process, it is imperious to be underlined that; of the 88 percent of the TGCL staffs, 40 percent strongly agree and 48 percent agree to evidence of automation of ordering process. The findings show that 12 percent of the staffs and mangers in TGCL remain neutral to automation of ordering process.

Many companies take an inventory of their supplies on a regular basis in order to avoid running out of popular items. Others take an inventory to ensure the number of items ordered, matches the actual number of items

counted physically. However, 46 percent of the TGCL staffs sampled mentioned that new orders are delivered in full when the inventory reaches zero, whilst 42 percent remain neutral and 12 percent totally disagree to the above statement. Shortages or overages after an inventory can indicate a problem with inaccurate accounting practices.

As far as response from management of TGCL inventory is concern, the frequency of ordering is determined by monitoring stock movement through ADP and sometimes through physical inventory check. The researchers' further makes inquisition to ascertain the mode of requisition adopted in the company. It was found out from management that, it is done through emails from the point of views of inter-branches whilst internally; it is done through requisition books from workshop.

A profound analysis was undertaken into the effect of number of times an order is placed on the total cost of the company. The staffs in TGCL sampled held the assertion that purchase orders are properly authorized and 64 percent of staffs sampled mentioned that the number of times an order is placed impacted the total cost of the company. The views of the staffs and management of TGCL concerning the above statement is illustrated in figure 4.



**Source: Authors Construct from Field Survey in July, 2012.**

It is subsequently indispensable to add that 36 percent of the staffs sampled agrees that no inventory is ordered until there is a demand for the final product, whilst the overwhelming preponderance (64%) established a negative correlation co-efficient with 12 percent proofing neutral to 40 percent totally disagreeing and 12 percent attesting 'do not know' responses.

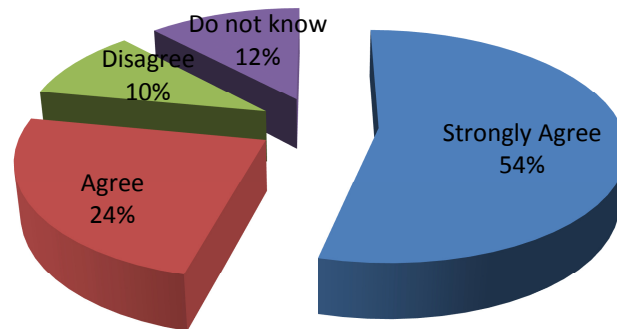
The inventory level of each product is tracked. When the inventory falls below a certain level, the items and quantity on hand is added to a demand purchase list. After being checked by the stocked controller, the list is routed to the computer room, where the "expected" (as per records) inventory levels together with a recommended order quantity, is added on to the list. 64 percent of the TGCL staffs sampled mentioned that high levels of safety stock are required by the company whilst 36 percent established neutrality to the above statement.

A further probing was undertaken by the researchers to ascertain whether orders received are in enough quantities to reach a fixed target inventory points. It is high-handed to note that, the overwhelming majority representing 54 percent of the TGCL staffs sampled affirms positively to the assertion that orders are delivered in enough quantities to reach a fixed target inventory points.

The proceedings of the interview with TGCL management staffs revealed that management review and follow up reports of inventory turnover, ageing and inventory adjustments to strengthen inventory management. Management takes between 3 to 4 days to check inventory twice every year through stock taking and also when the needs arise. The twice yearly checked is often considered sufficient for keeping the managements informed regarding inventory and sales. The figure 5 illustrates experiences from management and staffs regarding checking of inventory at fixed times.



**Figure 5: Checking of Inventories at Fixed Times**

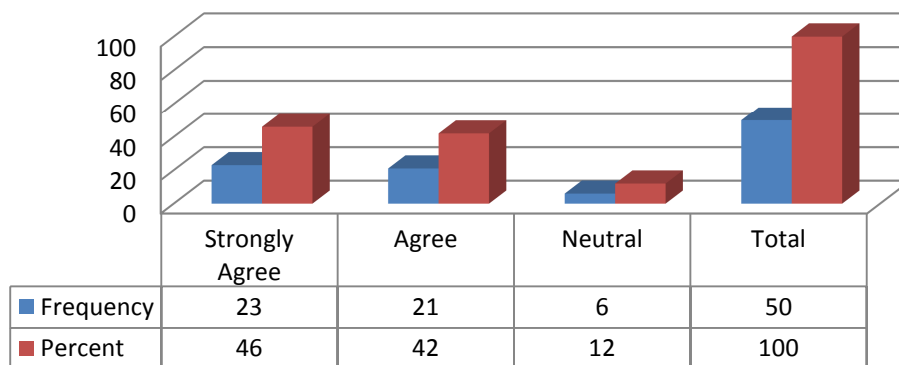


**Source: Authors Construct from Field Survey in July, 2012.**

It can be inferred from the figure 5 that 78 percent of the TGCL staffs and managements sampled affirmed that inventory is checked twice a year. However, 10 percent shows incongruity to the above assertion whilst 12 percent recounts do not know response.

A further probing was done to ascertain the outcome of the inventory checking in the company. It is imperious to note in recap that all the staffs and management sampled mentioned that all items procured are verified before they are moved to the warehouse and their observation of replacement quantities from one order to another is epitomize with the aid of figure below.

**Figure 6: Showing Change in replacement Quantity from one Order to another**



**Source: Authors Construct from Field Survey in July, 2012.**

The researchers found out that cycle counting supported by the use of Automatic Data processing (ADP) technology are used to ensure and maintain effective inventory records. It is clear to conclude that, 88 percent of the TGCL staffs and management agree to change in replacement quantity from one order to another within the company whilst the rest of the staffs and management had a neutral opinion regarding this statement. However, there was unilateral agreement that demand for spare part change over a year period.

It is indispensable to note that both sales and purchases are documented through the Automated Data Processing (ADP) and also through filling. The researchers found out that the inventory process in TGCL start with a stock sheet being printed out with all items, quantities and their locations. This is given out to selected people who do physical counts and match it up with the quantities as indicated on the stock sheet. Discrepancies are investigated and resolved based on the outcome of the stock taking exercise or when it is found out that there are discrepancies.

Inventory control simply provides information on how much inventory the company has. The management of TGCL uses perpetual inventory control system which incorporates automatic order processing to control inventory in the company. Cash receipt and sales record which are generated from the ADP and also through filling provide management of TGCL with vital information for updating the inventory database. There is a proper layout plan for inventory storage facility since it is important component of the business overall operations both in terms of maximizing the effectiveness of production process and meeting employees needs or desires.

Approval procedures are arranged around several factors with the minimum and maximum quantities which customer can order without prior approval set. This ensures that TGCL maximizes any volume discounts available through vendors and preventing over-ordering of stock. When item has average in stock, thus an item classified as strategy “Z” category is used to perform write-offs for non-moving items. The management of TGCL inventory interviewed mentioned that computer generated reports regarding sales, inventory, and profit calculations help them in making correct decisions.

An inquisition into what merchandise to stock decisions are control in TGCL review that; the company policy does not allow stocks of items or parts not authorized by the mother company thus Toyota Motor Corporation. Such items or parts can only be ordered not for stocked but for a particular customer guided by rules and regulations.

The researchers further established relationship concerning how much to stock those items. The company policy encourages minimal stocks especially for non-servicing parts, this form the basis for the establishments of the Central Parts Depot (CPD). As far as responses to questionnaires are concern, the overwhelming majority representing 64 percent of the TGCL staffs and management interviewed are of the same opinion that inventories are reduced by smaller lot sizes in the company.

It is imperious to add that all the staffs and management sampled affirmed with 66 percent strongly well-disposed that elimination of idle time reduces inventory cost in the company. The researchers further probed into the inventory control measures concerning when to stock in the company. This study illustrates that for seasonal parts like blades and some suspension parts like shock absorbers, rack ends, ball joint and lower arms whose demand rises during the raining seasons, making it imperative to stock more of these parts at these times. The company has an all year round stock of items in minimal quantities.

The management of the company inventory affirmed existence of strong policy on where to stock since proper storage is an important aspect of effective storage practices. This is done on well labeled racks according to Toyota Motor Corporation standards.

## **TGCL INVENTORY MANAGEMENT METHODS**

Each location where goods are kept requires different methods of inventory management. Keeping an inventory, or stock of goods, is a necessity in a distribution company like TGCL. Customers often prefer to physically touch what they are considering purchasing, and also prefer to have it now, rather than wait for something to be ordered from a manufacturer.

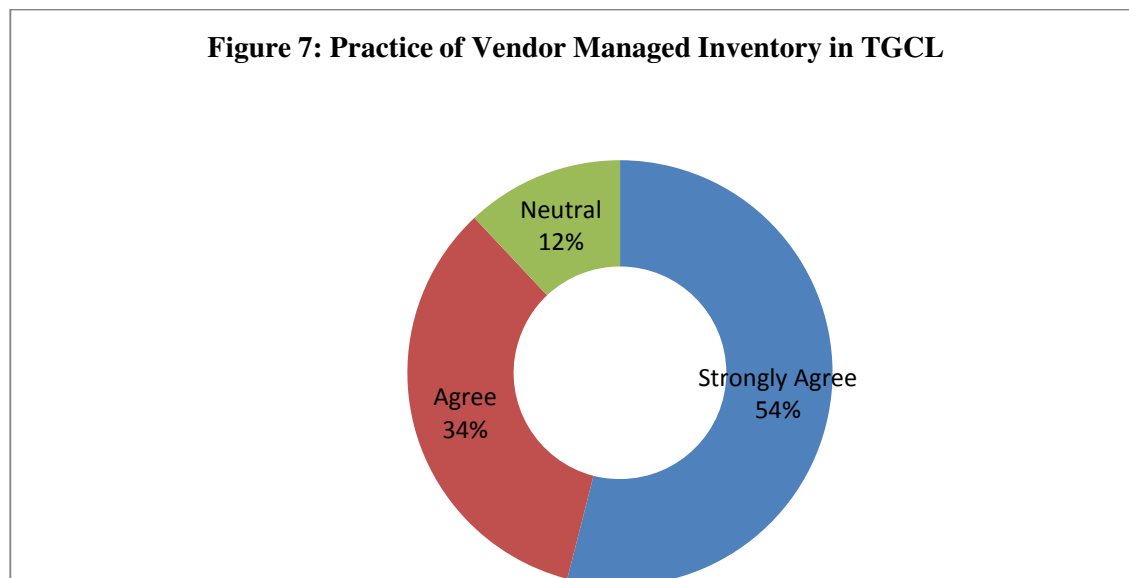
For the purpose of this study inventory management techniques such as Economic Order Quantity (EOQ) , Vendors Managed Inventory, Just in Time (JIT) Inventory, ABC and the used of software were considered.

The findings of this study add weight to the argument that inventory management helps firms achieve better utilization of resources and hence achieve increase in performance. A postmortem was imbibed into the existence of an inventory management system or software in the company to keeps and tracks all inventory records. The researchers found out that 90 percent of the TGCL staffs sampled affirms positively with some strongly agree to the above assertion whilst 10 percent remain neutral to the existence of an inventory management system or software in the company to keeps and tracks all inventory records.

The overwhelming majority (70%) of TGCL staffs sampled mentioned that Economic Order Quantity (EOQ) as inventory management practices is currently been practiced by the company. However, 30 percent of the same sampled remains neutral when the above inquiry was embarked upon. It can be reiterated that EOQ is not the dominant inventory management techniques currently being practice in TGCL.



An inquisition in a similar vein was undertaken to ascertain evidence of practices of Vendor Managed Inventory (VMI) as inventory management practice in TGCL. The figure 7 magnifies the above inquest.



**Source: Authors Construct from Field Survey in July, 2012.**

A further retrospective analysis was embarked upon by the researchers to ascertain the TGCL staffs perceptions of practices of Just in Time inventory management techniques in the company. It is high-handed to note that 82 percent of the staffs sampled with some strongly agreeing that inventory management practices such as the Just In Time is currently been practiced by the company. This is augmented by a piece of information that the entire sampled interview in TGCL shows a positive correlation to the fact that the company eliminates waste by providing a situation to make simpler process.

By the same retrospective analysis, result obtained from the survey concluded that 90 percent of the sampled agree that ABC Analysis (Pareto analysis) as an inventory management techniques is also been practiced by the company.

## **INVENTORY MANAGEMENT CHALLENGES**

The success of any business relies on many factors, one of which is a reliable inventory management system. However, there are many common inventory management problems that can occur. Inventory management problems can interfere with a company's profits and customer service. They can cost a business more money and can lead to an excess of inventory overstock that is difficult to move. 90 percent of the staffs interviewed mentioned that TGCL spend more money in storing a unit of items.

The researchers in retrospect to the above make a postmortem to determine some of the impact of the common problems with inventory systems in TGCL. Most of these problems identified are usually due to poor inventory processes and out-of-date systems. It is noteworthy that 74 percent of the TGCL staffs sampled mentioned outdated support systems as a common problem in lieu to inventory management, out of which 22 percent recounts that it is manageable problem in the company.

Risk of upsetting customers with stock outs because of the implementation of Just-in-Time inventory management techniques; by nature of what it is, companies using JIT intend to walk a fine line between having too much and too little inventory. However, because of seasonal demand as mentioned by 88 percent of the TGCL staffs sampled as problem in the company. In eventualities where the company fails to adjust quickly to increase demand the company risks upsetting customers with stock outs.

A major concurrent problems identified in retrospect to inventory management at the Central Part Depot of TGCL is high transportation cost. It is out of the ordinary to note that, 88 percent of the TGCL staffs sampled mentioned it as a problem, of which 76 percent sees it as a major problem in the company.

Excessive inventory in stock and unable to move it quickly enough was identified as a problem at some of the branches; Cash-flow comes from moving inventory. If a company buys an amount of product for their inventory and they do not move it, the company ends up losing money. 76 percent of the TGCL staffs sampled mentioned that excess stock investment is a major problem in the company.

Inaccuracy of stocks records; 76 percent of the store staffs sampled recounts that it is more frustrating when the records says it has a product but it turns out that they do not. The quantities are off and the actual items are not available. Inaccurate inventory records can easily result in loss of money and strained customer service. However 42 percent of the sampled mentioned it to be occasional problems which can be managed.

Misplacement of stock at the warehouse and occasional cases of employee's pilferage; This lead to decrease in profits due to lost sales and higher inventory costs because the item must be re-ordered. The company many a time waste a lot of productive time for employees to track down the misplaced item. 86 of the staffs sampled see it as a problem. However, 34 percent recounts thus it is manageable in the company.

It is imperious to note by way of recap that, the implementation of JIT inventory management techniques had put effective utilization of storage space into use in recognition of the fact that ready access to all materials and goods in the store is essential in order to provide a maximum service and hence much problem was not identified by the researchers in retrospect to inventory management in the company.

### **RECOMMENDATIONS TO IMPROVE INVENTORY MANAGEMENT**

It is highly recommended that Toyota Ghana Company Limited continues with the tight inventory policy in trying to reduce high inventory levels since it was effective.

It is recommended that procedures be put in place for tasks performed on a regular basis in the warehouse. The responsibility lies with materials management and should not be neglected.

From a research point of view in the discipline of inventory management and control, continuous study is recommended to be carried out on the effectiveness of some Mathematical Models like the Economic Order Quantity (EOQ) and Just in Time (JIT) Models in the management of Inventory

It is recommended that TGCL continues with the cyclical counting of inventory to avoid the need for shutting down operations while stock is counted. This means that a particular section of the warehouse or plant is counted at particular times, rather than counting all inventory at once. While this method may be less accurate than counting the whole, it is much more cost effective. Counting is also important because it is the only way you will know if there is a problem with theft occurring at some point in the supply chain.

The development and maintenance of an effective information system is of the utmost importance. The store provides a service to all user departments of the business. Inventory managers must, therefore, be aware of the different types of materials that are required by these departments. In a services and distribution company like TGCL, the inventory and purchasing information system must accurately report on its activities in terms of history and current data.

It is finally recommended that warehouse employees should be educated on the costs of improper inventory management to understand that the lower the profit margin, the more sales must be generated to make up for the lost goods.

### **CONCLUSION**

In the light of the foregoing following recommendation put forth for improving the effectiveness of inventory management system of TGCL at the Central Part Depot. The recommendations if strictly adhere to will help make the inventory management system of TGCL more effective.

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