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RESEARCH ARTICLE

ASSESSING THE INVENTORY MANAGEMENT PRACTICES, A CASE OF MANUFACTURING FIRMS IN HAWASSA CITY, ETHIOPIA

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ABSTRACT

The purpose of this study was to assess inventory management practices in the case of manufacturing firms in Hawassa City. The study adopted a descriptive research design which allowed the collection of primary and secondary data through structured questionnaires and document review respectively. Purposive sampling approach was employed to identify fifty (50) employees directly involved in inventory management operations. The collected data was analysed with the aid of the Statistical Package for Social Sciences (SPSS) Version 23 and Microsoft Excel 2016 Software. The study revealed that the company under investigation experiences a lot of inventory management procedures to keep their stock always available to meet customer demands. They have a very good inventory management practices. However, it was revealed that, for some of the companies faced with serious long lead time challenges due to bureaucratic procedures in ordering parts leading to the cancellation of purchase orders and losing customers. Finally, it is recommended that the companies have to remove some of the bureaucratic management styles to cope up with the dynamic marketing environment and exist for a long period of serving their customer.

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INTRODUCTION

The term 'inventory' originates from the French word 'Inventaire' and Latin word 'Inventariom", which implies a list of things found. Inventories are the stocks of raw materials, work in process, finished goods and supplies heldby a profit hunting organization to facilitate operations in the manufacturing process (Pandey, 2005).Inventories can either be assets as well as items held in the normal course of business or theycan be goods that will be consumed or used in the production of goods to be sold (Green and James, 2000). Inventory is considered to have originated from the military's need to supply themselves with arms, ammunition, and rations as they moved from their base to a forward position (Cachon, and Fisher, 2000). Inventory is generally made up of three elements such as raw materials, work-in progress (WIP) and finished goods (Cinnamon, Helweg-Larsen, & Cinnamon, 2010). Raw materials are concerned with the goods that have been delivered by the supplier to purchaser's warehouse but have not yet been taken into the production area for conversion process (Cinnamon et al., 2010).

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Work in progress (WIP) concerns are when the product has left the raw material storage area, until it is declared for sale and delivery to customers. In this process the working capital must be considered in terms of reducing the buffer stocks, eliminating the production process, reducing the overall production cycle time. The raw materials and finished goods must be minimised in the production area. WIP must be carefully examined to justify how long it takes for products to be cleared for sale. This stage is normally done by the quality control (QC) procedures (Birt et al., 2011; Cinnamon et al., 2010). According to Peter (2000) Inventory management aims at discovering and maintaining optimal levels of investment in all types of inventories and maximizing the flow of goods, information and other related resources like people and energy from the point of origin to the point of final consumption. In the same vein, Inventory management is a system concerned with integration of information, transportation, acquisition, inspection, material handling, warehousing, packaging and control of supplies and ensuring security of inventory (Silver, et al., 1998). Inventory management involves planning, organizing and controlling the flow of materials from their initial purchase unit through internal operations to the service point through distribution (Smaros, et al., 2003).Inventory plays a decisive role in the growth and survival of an organization in the sense that failure to an effective and

efficient management of inventory was mean that the organization was fail to meet its objectives. According to Goldsby (2003) Customer desire has always been a vital issue in accompany not only to maintain sales but also to survive as a company. Kotler (2002), points that inventory management refers to all the activities and organizations involved in maintaining inventory for their operation so that adequate supplies were available and the costs of over or under stocks were low

Objectives of the Study

General Objectives: The broad objective of this study was to assess the inventory management practices a case of manufacturing firms in Hawassa city.

Literature Reviews

Inventory Management Concept: William Fox points out that Management is the whole process of planning, organizing, and controlling are the organic functions of management. According to him, an organic function is a function which is invariably basic to, and inherent in, managerial activity whenever and wherever it is performed. These functions are performed in each and every situation. However, staffing and directing are also important functions of management (Saleem, 1997). Inventory Management is responsible for planning and controlling inventory from the raw material stage to the customer. Since inventory either results from production or supports it, the two cannot be managed separately and therefore must be coordinated. Inventory must be considered at each of the planning levels and is thus part of production planning, master planning with end items and materials requirements planning with components, parts and raw material (Arnold *et al*., 2008).

(Lysons and Farrington, 2006) contributed that inventory management covers a wide variety of activities. These activities will vary from organization to organization. The scope of inventory management will also be influenced according to whether it is primarily concerned with Materials Management (MM) or Physical Distribution Management (PDM) or centralized or decentralized. There is clearly a significant difference in the complexity of managing inventory based at a single location and that where inventory is located at possibly hundreds of distribution centers. Said that globalization is another factor that increases the complexity of inventory management. Irrespective of such considerations, however, inventory management is likely to be comprised of such activities such as: Demand management – ensuring that required operational and maintenance supplies are available in the right quantities and at the right time, forecasting future demand requirements, managing items with difficult supply and demand patterns related to seasonal demand, changes in end user applications or meeting demands for the customization of products, reviewing safety stock levels and controlling minimum and maximum amounts of inventory items of both quantity and value, implementing lean inventory policies, such as just in time (JIT) contracts to minimize investment in inventory. Liaising with purchasing section to ensure that supplies are replenished in accordance with corporate and procurement policies, developing cost-effective systems and procedures relating to the ordering, procurement and budgeting of supplies and controlling the receipt, inspection (where necessary), recording, location and issue of supplies to users. Ensuring the safety and security of supplies and the avoidance of loss a result of deterioration, theft, waste and obsolescence, coordination of inventory to ensure that supplies can be rapidly located, preparation and interpretation of reports on stock levels, stock usage and surplus stock, liaison with auditors regarding all aspects of inventory, disposal of scrap, surplus and obsolete items. According to them, the term supplies means all the materials, goods and services used in the enterprise regardless of whether they are purchased outside, transferred from another branch of the company or manufactured in house. They have provided aims of inventory management which are four mainly known; To provide both internal and external customers with the required service levels in terms of quantity and order rate fill, to ascertain present and future requirements for all types of inventory to avoid over stocking while avoiding 'bottlenecks' in production, to keep costs to a minimum by variety reduction, economical lot sizes and analysis of costs incurred in obtaining and carrying inventories and to provide upstream and downstream inventory visibility in the supply chain.

Inventory Management Techniques/ Tools: As it has been pointed out earlier, the goal of inventory management is framed on cost minimization so as to maximize the shareholder's wealth, which is the main goal of the firm. Here under are the inventory management techniques / tools to be employed for efficiency production and profit maximization.

Economic Order Quantity Model (EOQ): It is the best known approach for explicitly establishing an optimum inventory level. It is a mathematical approach to the ordering of inventories where the combined costs of ordering and carrying inventory are kept at minimum. While the ordering cost are costs associated with the purchases of inventory, the carrying costs are cost incurred from receipt inventories to the sale point.

The optimum order quantity is found where annual holding costs = annual holding costs

as shown in the figure below.

EOQ occurs at an order quantity, in which the ordering cost equal to holding costs Solving mathematically then,

$$EOQ = \sqrt{\frac{2 * D * O}{H}}$$

Where;

- *E = Economic order quantity*
- *D = Annual demand of units*
- *O = Ordering Costs per order*
- *H =Annual holding cost (Carrying cost) of one unit of stock*
- Source: Arnold, et al (2008)

Materials Requirements Planning (MRP): The availability of cost-efficient computer systems has allowed firms to make great progress controlling dependent-demand inventory. A widely used system that controls dependent-demand inventory is the material requirements planning (MRP) system. This system relies on production schedules developed for final part numbers in the master production schedule (MPS) to determine the timing and quantities of materials required for components or subassemblies (Monczka, Trent and Handfield, 2002:585).

Coyle et al. (in Gourdin 2001:74) explains that MRP deals specifically with supplying materials and component parts whose demand depends upon the demand for a specific end product. Essentially, MRP begins by determining how much of the final product customers desire, and when they need it. Then MRP breaks down the timing and need for components (all of which could have different lead times) based upon that scheduled end-product need. A MRP system consists of a set of logically related procedures, decision rules and records designed both to translate a master production schedule into time-phased net inventory requirements and to delineate how those requirements will be satisfied. The program also replans net requirements and coverage as a result of changes in the master production schedule, demand, inventory status, or product composition. Emphasizing on the pertinence of the use of MRP in business organizations, Chandra and Kumar (2001:3) underline that without a MRP model, it is impractical and tedious to plan requirements of component parts and assemblies needed to assemble the final product in the quantities required during future time horizons.

Krajewski and Ritzman (1999:689) note that MRP translates, or explodes, the master production schedule and other sources of demand into the requirements for all subassemblies, components and raw materials needs to produce parent items. This process generates the material requirements plan for each component item. An item's gross requirements are derived from three sources:

- The MPS for immediate parents that are end items,
- The planned ordered releases for parents below the MPS level, and
- Any other requirements not originating in the MPS, such as the demand for replacement parts

The research done by Smaros et al. (2003:1) in Finland on the impact of increasing demand visibility on production and inventory control efficiency reveals that for products with stable demand a partial improvement of demand visibility can improve production and inventory control efficiency, but that the value of visibility greatly depends on the target products' replenishment frequencies and the production planning cycle employed by the manufacturer.

Just In Time (JIT) Philosophy: Harber et al. (in Biggart and Gargeya 2002:1) mention that the just-in-time (JIT) production system (as the Toyota Production System) was introduced by Shigeo Shing and Taichi Ohnoat the Toyota Motor plant in the mid-1970. JIT production is called by many names: zero inventory production system (ZIPS), minimum inventory production system (MIPS), Kanban production, kaizen production, stockless production, pull-through production and quick response (QR) inventory systems. JIT manufacturing, both as a philosophy and a disciplined method of production, has received much attention since its introduction. The JIT production philosophy is founded upon three fundamental principles: elimination of waste, continuous quality improvement and encouragement of worker participations planning and execution. Gourdin (2001:76) adds that this just-in-time manufacturing philosophy requires manufacturers to work in concert with suppliers and transportation providers to get required items to the assembly line at the precise time they are needed for production. JIT is a disciplined approach to improve manufacturing quality, flexibility and productivity through the elimination of waste and the total involvement of people. JIT is not simply reducing inventory; rather its overall objective is increased quality. If properly developed, a number of potential benefits can follow. To realize these benefits, certain conditions must prevail. The goals must include the respect for people and the elimination of waste. Respect for people includes creating a stable environment, motivation and trust, bottom round management, robotics, quality circles and subcontractor networks. The employees, not management, operate JIT. The employees determine problems and solve them. The employees increase product quality. If the employees do not believe in the JIT concepts, the system will fail no matter what management tries to do (Bloomberg, Lemay and Hanna 2002:165-166). Gourdin (2001:76-78) has identified a number of basic tenets, advantages and disadvantages of JIT. These tenets, advantages and disadvantages will be briefly discussed in order to provide basic information on just-in-time inventory management

The ABC Inventory Control Technique: To have better control at a reasonable cost it is helpful to classify the item according to their importance. The ABC principle is based on the observation that a small number of items often dominate the results achieved in any situation. This observation was first made by an Italian law. As applied to inventories, it is usually found that the relationship between the percentage of items and the percentage of annual dollar usage follows a pattern in which three groups can be defined. Group A about 20% of the items account for about 80% of the dollar usage, Group B about 30% of the items account for about 15% of the dollar usage and Group C about 50% of the items account for about 5% of the dollar usage (Arnold *et al*. 2008)

Note: The percentages above are approximately and should not be taken as absolute.

The figure below shows the classification of items.

Motivation for Holding Inventory: There are many reasons that motivate companies to have stock. Bloomberg, Lemay and Hanna (2002:136-137) have identified five reasons for holding stock, namely:

- **Economies of scale**. A firm can realize economies of scale in manufacturing, purchasing and transportation by holding inventory. If the business buys large amounts, it gets quantity discounts. In turn, transportation can move larger volumes and get economies of scale through better equipment utilization. Manufacturing can have longer production runs if more material is inventoried, allowing per unit fixed cost reductions
- **Balancing supply and demand**. Some firms must accumulate inventory in advantage of seasonal demand. A toy manufacturer sees some demand year-round, but 60 percent or more of sales will come in the Christmas season. By manufacturing to stock, production can be kept level throughout the year. This reduces idle plant capacity and maintains a stable workforce, keeping costs down. If demand is relatively constant but input materials are seasonal, such as in the production of canned fruits, then finished inventory helps meet demand when the materials are no longer available.
- **Specialization**. Inventory allows firms with subsidiaries to specialize. Instead of manufacturing a variety of products, each plant can manufacture a product and then ship the finished products directly to customers or to a

warehouse for storage. By specializing, each plant can gain economies of scale through long production runs.

- **Protection from uncertainties**. A primary reason to hold inventory ie. to offset uncertainties in demand. If demand increases and raw material stocks run out, the production line shuts down until more material is delivered. Likewise, a shortage of work in process means the product cannot be finished. Finally, if customer orders outstrip finished goods supply, the resulting stock outs could lead to lost customers.
- **Buffer interface**. Inventory can buffer key interfaces, creating time and place utility. Key interfaces include (1) supplier and purchasing, (2) purchasing and production, (3) production and marketing, (4) marketing and distribution, (5) distribution and intermediary, and (6) intermediary and customer. Having inventory at these interfaces helps ensure that demand is met and stock outs are minimized.

Types of Inventory: According to Stock and Lambert (2001:232-235), inventories can be categorized into six distinct forms that are:

- **Cycle stock**. Cycle stock is inventory that results from the replenishment process and is required in order to meet demand under conditions of certainty, that is, when the firm can predict demand and replenishment times (lead times) almost perfectly. For example, if the rate of sales for a constant 20 units per day and the lead time is always 10 days, no inventory beyond the cycle stock would be required. While assumptions of constant demand and lead time remove the complexities involved in inventory management, let's look at such an example to clarify the basic inventory principles.
- **In-transit inventories**. In-transit inventories are items that are en route from one location to another. They may be considered part of cycle stock even though they are not available for sale and /or shipment until after they arrive at the destination. For the calculation of inventory carrying costs, in-transit inventories should be considered as inventory at the place of shipment origin since the items are not available for the buyer, sale, or subsequent reshipment.
- **Safety or buffer stock**. Safety or buffer stock is held in excess of cycle stock because of uncertainty in demand or lead time. The notion is that a portion of average inventory should be devoted to cover short-range variations in demand and lead time. Average inventory at a stock-keeping location that experiences demand or lead time variability is equal to half the order quantity plus the safety stock.
- **Speculation stock**. Speculation stock is inventory held for reasons other than satisfying current demand. For example, materials may be purchased in volumes larger than necessary in order to receive quantity discounts, because of a forecasted price increase or materials shortage, or to protect against the possibility of a strike.
- **Seasonal stock**. Seasonal stock is a form of speculative stock that involves the accumulation of inventory before a season begins in order to maintain a stable labor force and stable production runs or, in the case of agricultural products, inventory accumulated as the result of a growing season that limits availability throughout the year.
- **Dead stock** is inventory that no one wants, at least immediately. The question is why any organization would incur the costs associated with holding these items rather than simply disposing of them. One reason might be that management expects demand to resume at some point in the future. Alternatively, it may cost more to get rid of an item that it does to keep it. But the most compelling reason for maintaining these goods is customer service. Perhaps an important buyer has an occasional need for some of these items, so management keeps them on hand as a goodwill gesture.

METHODOLOGY

Sample Size and Sampling Technique: Non-probability sampling specifically, purposive sampling technique was used for the study. Given the technicalities and relevance of the information required to answer the research questions, fifteen (50) respondents from three departments viz., inventory, cost accounting and top management were sampled. The participants were chosen depending on their position, main responsibilities and experience in inventory management or related activities.

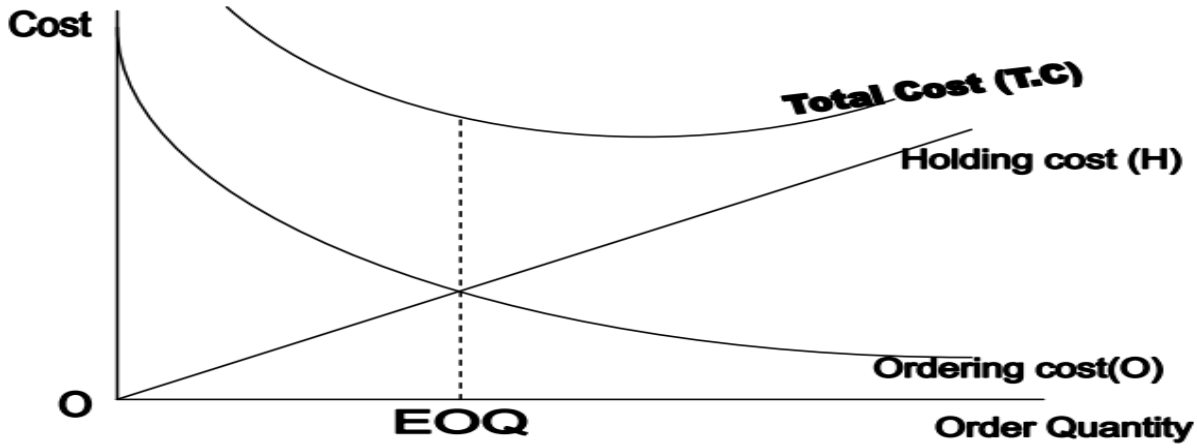
Source of Data: In this research, the researchers used both primary and secondary data. The source of primary data includes feedback gained from respondents by using structured questionnaires distributed to selected personnel from the sampled respondents. While the secondary data were collected by using documents review from sources like journals, books, and thesis and unpublished manuscripts like office annual reports, minuets and other materials related to the study.

Tools and Method of Data Collection: Self-administered questionnaire was used to gather pertinent data from the sample respondents. Two types of questionnaire were prepared (English and Amharic (native language) Version). The Amharic Version of the questionnaires were basically prepared to help those respondents who can't read and respond in English. The questionnaire has four parts. The first section dealt with socio-demographic characteristics of the respondents. The second section concerned with inventory cost management practices in the study area. Accounting practices in recording and reporting inventories mainly described in third section. In the fourth section, an inventory valuation technique has been presented.

Data Analysis: Data were sorted, checked for the error and coded before the data analysis were undertaken. SPSS version 23 and MS-Excel 2016 was used as a tools to analyse data. To summarize data, simple descriptive statistics like: percentage, frequency, mean and standards deviation were used.

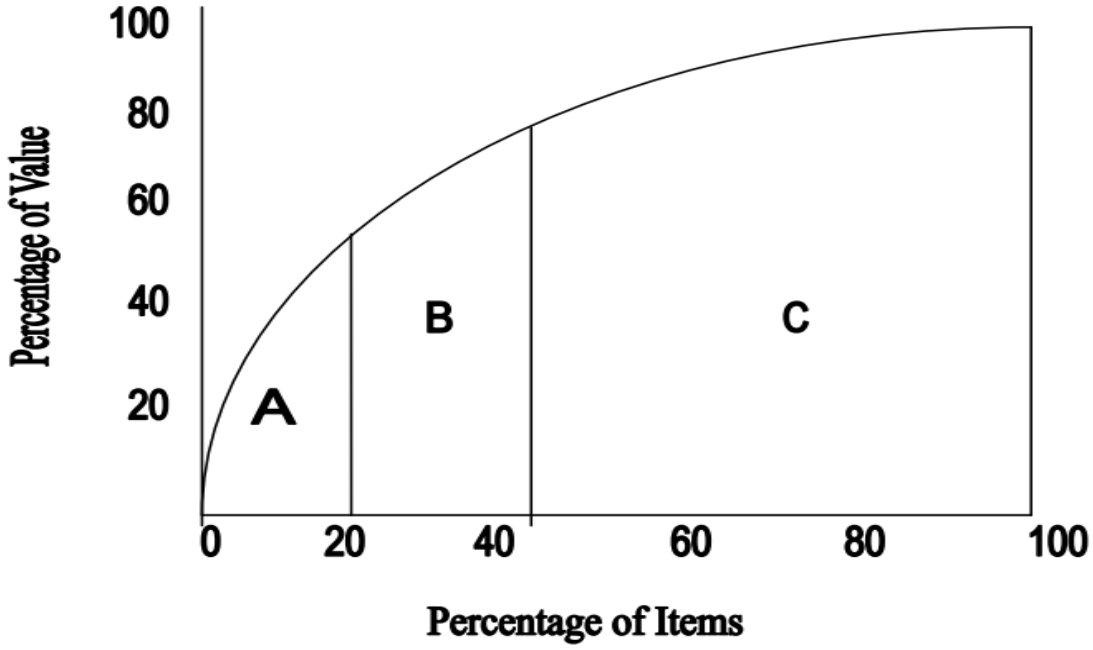
Findings

Operation of Materials Requirements Planning system (MRP): Material Requisition Planning (MRP) is a computer-based inventory management system designed to assist production managers in scheduling and placing orders for dependent demand items. Dependent demand items are components of finished goods—such as raw materials, component parts, and subassemblies—for which the amount of inventory needed depends on the level of production of the final product. Results in Table 1indicated that the operation of materials requirements planning system are used by the selected companies to a large extent (which is about 54% and



Source: Arnold, et al (2008)

Fig 1.1. Economic Order Quantity (EOQ)



Source: Arnold, et al (2008)

Fig 1.2. ABC Curve showing Percentage of Value versus Percentage of Items

Table 1. Operation of Materials Requirements Planning system (MRP)

		Frequency	Percent
Valid	Strongly Disagree	2	4
	Disagree	10	20
	Neutral	8	16
	Agree	27	54
	Strongly Agree	3	6
	Total	50	100.0

Source: (Own survey data, 2019)

Table 2. Economic order quantity (EOQ) model used your company.

		Frequency	Percent
Economic order quantity (EOQ) model used your company.	Strongly Disagree	2	4
	Disagree	3	6
	Neutral	6	12
	Agree	28	56
	Strongly Agree	11	22
	Total	50	100.0

Source: (Own survey data,2019)

Table 3. ABC Model Used Your Company

		Frequency	Percent
ABC Model Used Your Company	Strongly Disagree	6	12
	Disagree	2	4
	Neutral	6	12
	Agree	30	60
	Strongly Agree	6	12
	Total	50	100.0

Source: (Own survey data, 2019)

Table 4. The company has computerized all inventory management systems

		Frequency	Percent
My company has computerized all inventory management systems	Strongly Disagree	7	14
	Disagree	8	16
	Agree	20	40
	Strongly Agree	15	30
	Total	50	100.0

Source: (Own survey data, 2019)

Table 5. The company uses Electronic Data Interchange Technology (EDI)

		Frequency	Percent
The company uses Electronic Data Interchange Technology (EDI).	Strongly Disagree	7	14
	Disagree	6	12
	Neutral	2	4
	Agree	25	50
	Strongly Agree	10	20
	Total	50	100.0

Source: Own survey data, 2019

6% respondent responded for the forwarded question by saying they agreed and agreed on the issue) while 16% undecided. However, 20% and 4% responded disagree and strongly disagree. This implies that manufacturing companies which operates in Hawassa city reap the fruits of having and using MRP which includes: on-time availability of the right materials required for production. timely delivery of manufactured goods to your customers, optimal use of manufacturing resources, decrease in capital cost due to decreased inventory levels and optimal use of production resources, collecting business data for analysis and better planning.

Economic order quantity (EOQ) model used your company: Economic Order Quantity is one of the inventory management practices used in big manufacturing companies in Hawassa, Ethiopia in an effort to increase on productivity by determining the optimal ordering quantity for an item of stock that minimizes cost.

The above table 2 indicates that, 56% and 22 % of the respondents had agreed or strongly agree respectively to the given statement and 12% of them were neutral, 6% of the respondents had disagree and the remaining 4% of the respondents had strongly disagree to the asked question. The respondents agreed to a very larger extent that the firm uses Economic Order Quantity. Using EOQ ensure that inventory comes in and goes out immediately, the firm maintains that level of inventory that minimizes the total of inventory holding costs and ordering cost, and that the firm orders the optimal ordering quantity for an item of stock that minimizes cost. Further, respondents agreed to a great extent the firm uses Economic Order Quantity practice to ensure that supply of inventory does not hit a stock out, Economic Order Quantity practice helps the firm in deciding when to order an item of stock, the firm uses Economic Order Quantity practice to estimate how much of an item to order, the firm uses Economic Order Quantity practice to determine what items fit into the Just-in-time model, and that the firm minimizes storage costs within the warehouse by using Economic Order Quantity

ABC Model Used Your Company: Activity Based Costing is an inventory management practice used in large manufacturing firms in Hawassa, Ethiopia to allocate time and money in inventory management in an effort to improve on productivity. Respondents were asked to indicate their likely response on whether the manufacturing companies whether they used ABC models of Inventory management or not. The responses were as follows:

According to the table3,60 % of the respondents agreed, 6.8% Strongly agree, 20.3% were neutral, 6.8% disagree, while 15.3% strongly disagree with regards to implementing ABC models of inventory management respectively. Accordingly, majority of the respondents agreed that companies are using ABC. Activity Based Costing to assess the status of items in inventory and that Activity Based Costing enables the firm to deal with multiple product lines and multitude of stock keeping units. Further, the respondents agreed to a great extent that the firm uses Activity Based Costing as an inventory classification system to allocate time and money in inventory management.

Computerized Inventory Management Systems: A Computerized Inventory Control System is the integration of sub-functions involved in the management of inventory into a single cohesive system. It is software installed on the computer systems that enables a firm to keep a check on the inventory levels by performing the automatic counting of inventories, recording withdrawals and revising the stock balance Table 4 shows the respondents responses towards whether

manufacturing companies has computerized inventory management system or not. Above average 40.0% and 30% of the respondents strongly agreed and agreed the availability of computerized inventory management system. Nonetheless, 16% and 14% of the respondents disagreed and strongly disagree. Accordingly, the manufacturing companies under study have befitted from implementing automated (computerized) inventory management system in the following ways: quick and accurate counting, reducing shrinkage and missing inventory, better receiving and shipping, and real time inventory management information

The company uses Electronic Data Interchange Technology (EDI): Electronic data interchange (EDI) is the use of computer and telecommunication technology to move data between or within organizations in a structured, computer retrievable data format that permits information to be transferred from a computer program in one location to a computer program in another location, without manual intervention. An example is the transmission of an electronic invoice from a supplier's invoicing software to a customer's accounts receivable software. This definition includes the direct transmission of data between locations, transmission using an intermediary such as a communication network, and the exchange of digital storage devices such as magnetic tapes, diskettes, and CD-ROMs.

The above table 5, indicates that, 50% and 20% of the respondents had agreed or strongly agree to the given statement, while 4% of them were neutral, and the remaining 12% of the respondents had disagree and 14% of the respondents had strongly disagree to the given closed ended question. From reaction of respondents, the researcher opined that the company used electronic data interchange technology (EDI) and this in turn was developed to solve the problems inherent in paper-based transaction (which includes time delays, labour costs, errors, uncertainty high inventories, and information access) processing and in other forms of electronic communication. In solving these problems, EDI is a tool that enables organizations to reengineer information flows and business processes.

Conclusion

Effective and efficient inventory management practices will always provide a competitive advantage to business, regardless of its nature. The study can be concluded that manufacturing firms found in Hawassa are good at managing their inventory since they appropriately use the various inventory management tools, JIT, ABC, MRP to list few. This was predicted in their higher means of efficiency levels in inventory management and their widely application of theories of inventory management in their operations. The study revealed that manufacturing organization heavily depend on computerized and automated methods of inventory management, recording and costing techniques.

Further Research

The study was conducted on the ceramic, beverages, plastic industries, steel roof shit producer, and flour factory. Similar studies could be replicated in other industries to assess inventory management practices in manufacturing company's setup. Similar studies can also be carried out to determine the impact of effective inventory management on organization's profitability, opportunities and challenges in inventory management. Most importantly, Future studies should attempt to achieve a larger sample to determine whether the results can be generalized

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