

THE IMPACT OF EFFECTIVE INVENTORY CONTROL MANAGEMENT IN A MANUFACTURING INDUSTRY.

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Abstract - Inventory Management System is important to ensure quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item. A good Inventory Management System will alert the retailer when it is time to reorder. Inventory Management System is also an important means of automatically tracking large shipments. For example, if a business orders ten pairs of socks for retail resale, but only receives nine pairs, this will be obvious upon inspecting the contents of the package, and error is not likely. On the other hand, say a wholesaler orders 100,000 pairs of socks and 10,000 are missing. Manually counting each pair of socks is likely to result in error. An automated Inventory Management System helps to minimize the risk of error. In retail stores, an Inventory Management System also helps track theft of retail merchandise, providing valuable information about store profits and the need for theft-prevention systems. Automated Inventory Management System work by scanning a barcode either on the item. A barcode scanner is used to read the barcode, and the information encoded by the barcode is read by the machine. This information is then tracked by a central computer system. For example, a purchase order may contain a list of items to be pulled for packing and shipping. The Inventory Management System can serve a variety of functions in this case. It can help a worker locate the items on the order list in the warehouse, it can encode shipping information like tracking numbers and delivery addresses, and it can remove these purchased items from the inventory tally to keep an accurate count of in-stock items. All of this data works in tandem to provide businesses with real-time inventory tracking information. Inventory Management System make it simple to locate and analyze inventory information in real-time with a simple database search.

Keywords– Inventory Control Management System, Quality control

I. INTRODUCTION AND BACKGROUND

In any business or organization, all functions are interlinked and connected to each other and are often overlapping. Some key aspects like supply chain management, logistics and inventory form the backbone of the business delivery function. Therefore these functions are extremely important to marketing managers as well as finance controllers. Inventory management is a very important function that determines the health of the supply

chain as well as the impacts the financial health of the balance sheet. Every organization constantly strives to maintain optimum inventory to be able to meet its requirements and avoid over or under inventory that can impact the financial figures. Inventory is always dynamic. Inventory management requires constant and careful evaluation of external and internal factors and control through planning and review. Most of the organizations have a separate department or job function called inventory planners who continuously monitor, control and review inventory and interface with production, procurement and finance departments.

1.2: Central Planning and Assets Management (CPAM)

Central Planning and Asset Management manages the planning process, which includes customer demand management, strategic inventory management, replenishment/sourcing models and material planning systems. The CPAM team owns processes. It is a central, administrative organization. Products, on the other hand, are owned by the Planning and Asset Management (PAM) teams within the four Product Centres.

CPAM is in the middle of a multi-year effort to design, implement, and orchestrate a Sales, Inventory and Operations Planning (SIOP) process. The objective of SIOP is to align long-term demand forecasting with production capability, with the ultimate goal of improving working capital performance.

1.2.2: Strategic Inventory

Strategic inventory management is the name given to initiatives that focus on the inventory and planning processes at NMPL. Specifically, the word strategic is used to denote that the initiatives are being driven by executive management in a top down fashion. CPAM, who executes strategic inventory initiatives, interfaces with the product center inventory managers. It is at this level in the organizational hierarchy that the internship was targeted. Historically strategic inventory had its own set of initiatives focused on improving working capital. However, with the increased focus on SIOP, strategic inventory is now structured as an initiative under the deployment of SIOP. This re-organization makes sense in that inventory is

a result of the SIOP process. For example, if demand increases within the cumulative manufacturing lead-time, then inventory will increase since safety stock will be required to meet demand. At one level strategic inventory addresses the trade-off between aggregate inventory and service level, which is typically referred to as the inventory - service level trade-off curve .However in order to affect NMPL performance on the curve it is often necessary, as will be discussed, to initiate projects at the product or product family level. In the past, CPAM has focused on multi-echelon inventory optimization projects. But these projects have had limited success, due to a lack of widespread comprehension of the analysis, so the effort of this internship and thus this paper was shifted early on to creating a development path - a journey - that organizations could follow to increase their understanding of inventory causes and effects and to identify and share inventory and planning best practices. Thus was born the need for a so-called maturity model for inventory and planning practices.

1.3 Research Methodology

The exploration technique is a precise answer for the examination issue. Speculation Analysis is gone for research reason at NMPL. For stock examination, we will decide the accompanying discoveries:

- Raw Material Inventory
- Process Inventory Jobs
- Complete Goods Inventory.

2. STOCKS AND INVENTORIES

A ‘bought-out’ part is a part used in a machine or equipment that is not manufactured in-house by the manufacturer of the machine or equipment. These can be Standard off-the-shelf parts from another manufacturer, for example, a power supply cable or a rechargeable battery. The part appears in the Bill of Materials of the equipment with the Part / Model Number of the original manufacturer. Or a part that is custom-designed by the equipment manufacturer, but manufactured by a specialist manufacturer against design and material specified. In this case, the Bill of Materials contains the internal Part reference of the equipment manufacturer Audit of BOPs make sense only for parts of the second variety. Audit would require the comparison of what was specified to be built, versus what was built and supplied. The reference is the design document of the part being audited. The term work-in-progress (WIP) is a production and supply-chain management term describing partially finished goods awaiting completion. WIP refers to the raw materials, labor, and overhead costs incurred for products that are at various stages of the production process. WIP is a component of the inventory asset account on the balance sheet. These costs are subsequently transferred to the finished goods account and eventually to the cost of sales.WIPs are one of the components of a company's balance sheet. The WIP figure reflects only the value of those products in some intermediate production stages.

This excludes the value of raw materials not yet incorporated into an item for sale. The WIP figure also excludes the value of finished products being held as inventory in anticipation of future sales. Finished goods inventory is the third and final classification of inventory that is used for accounting purposes by manufacturing companies, the items that are sold to the customer. Manufactured products begin as raw materials and then move into the work-in-progress (WIP) stage as they are being produced. End products ready for distribution and sales constitute the finished goods inventory. Accounting for inventory follows that production workflow. Inventory value moves from raw materials to WIP and, ultimately, to finished goods through entries in the business’s different general ledger accounts. The process of moving inventory values from one account to the next allows the manufacturer to see how much inventory it has at any of the three stages. Some businesses, such as retailers that buy completed products from wholesalers to sell directly to consumers, might skip the first two classifications and only carry finished goods inventory. It’s important to note that, as an element of business accounting, finished goods inventory is expressed in terms of the dollar value of the inventory, not the number of items. Finished goods are considered a short-term asset because they are expected to sell within 12 months; finished goods therefore appears as a current asset on a company’s balance sheet. Inventory in transit also called transit, transportation, or pipeline inventory is a shipping term that refers to the finished goods that have been shipped by a seller, but have yet to reach the buyer. As the name suggests, inventory items are in ‘transit’ to their destination as well as their respective recipient. Many times, the goods are moving from a wholesaler to an ecommerce retailer (who then becomes a reseller).



3. METHODS FOR ARRANGEMENT

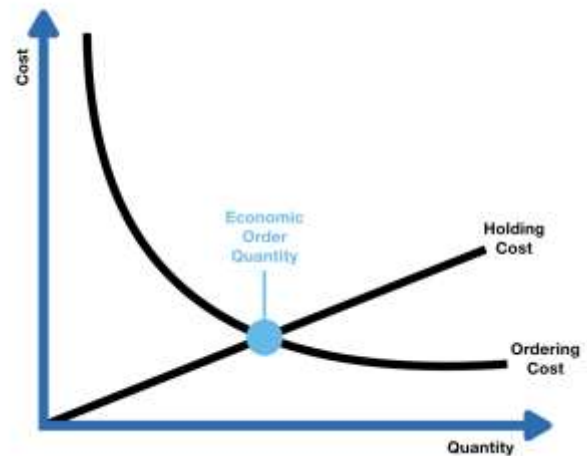
There are five pillars in 5S in a continuous improvement program, which stand for: Sort, Set in Order, Shine, Standardize, and Sustain.

- Sort:** Start by removing all items from your work area. Inspect the equipment and identify those items that are critical to the success of the function performed at the workstation. Eliminate any duplicates, unnecessary equipment, infrequently used items, and trash. Identify the non-essential items as either waste or “valuable but not critical.” Store the non-critical items outside of the workstation area. This saves time, space, and labor costs, while enhancing productivity.
- Set in Order:** Whatever equipment is deemed critical to the operation must now be organized. Assign positions for all equipment, work in progress, and raw materials, keeping ease of reach, identification, and proximity to work surface in mind as you do. The goal is to maximize the efficiency of the workstation layout. On a smaller scale, it’s the same concept as warehouse layout. The most frequently used tools should be the most convenient to grab. This eliminates wasted time from excess motion and searching.
- Shine:** Keep everything clean, every day. Doing this keeps things ready to be used when needed. A clean workspace is a productive workspace, and Seiso literally means “to clean or shine.” Clean the floors, the walls and the equipment, and ensure all items are restored to their designated place. Make sure the workstation is well lit. This should be a part of your daily tasks and should not be postponed until idle time is available.
- Standardize:** Ensure conditions of work area do not return to the original, disorganized state. Make the previous three S’s part of your standard procedures each day. Implement them with the help of signs, banners, shadow boards, tool holders, etc. Make sure all workers understand their responsibilities and are empowered to perform all of the tasks.
- Sustain:** Make a habit of properly maintaining correct procedures to avoid backsliding. Implementing these steps is a continuous process. It is important to ensure that they are done each day to prevent slipping into old habits. Commit to performing these steps every shift and make sure that any changes to your product or process are compensated for at your workstation and

problems are alleviated as quickly as they are created.



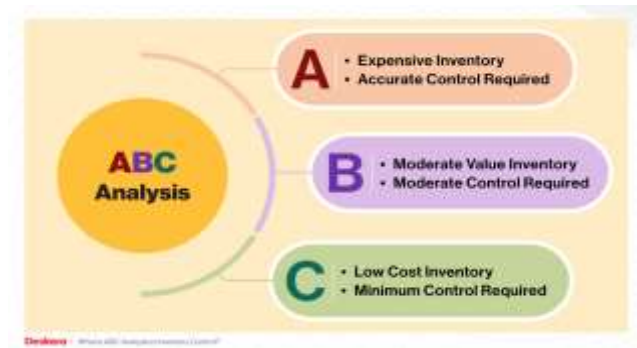
The Economic Order Quantity (EOQ) refers to the ideal order quantity a company should purchase in order to minimize its inventory costs, such as holding costs, shortage costs, and order costs. EOQ is necessarily used in inventory management, which is the oversight of the ordering, storing, and use of a company's inventory. Inventory management is tasked with calculating the number of units a company should add to its inventory with each batch order to reduce the total costs of its inventory. The EOQ model seeks to ensure that the right amount of inventory is ordered per batch so a company does not have to make orders too frequently and there is not an excess of inventory sitting on hand. It assumes that there is a trade-off between inventory holding costs and inventory setup costs, and total inventory costs are minimized when both setup costs and holding costs are minimized.



Inventory control assists businesses to maintain ideal stock levels. It tops the priority list of many industries such as the E-commerce industry, manufacturing, logistics, retail, and

other businesses that deal with inventories. There are various methods of inventory control, and ABC analysis is one such method.

ABC analysis also referred to as ABC Classification, is a vital part of Inventory Management. It allows business owners to distinguish the products in their stock and focus on managing them based on their worth. The main objective of ABC analysis is to make maximum out of minimum investment without wasting any resources or inventory.



Just in time, or JIT, is an inventory management method in which goods are received from suppliers only as they are needed. The main objective of this method is to reduce inventory-holding costs and increase inventory turnover.

4. INVENTORY VALUATION METHODS

There are five ways in which a business can choose to calculate the cost or value of inventory:

Specific identification: Specific identification inventory valuation attaches cost to specific items in inventory. This is done using serial numbers or some other unique identifier.

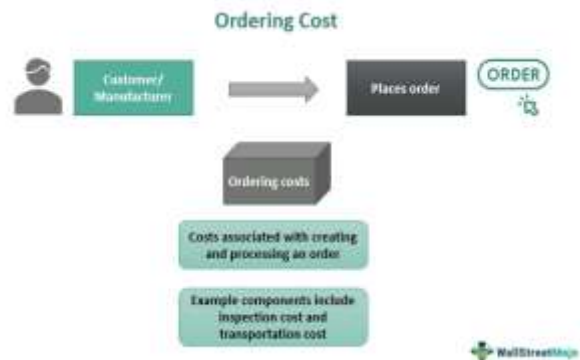
Weighted average: The weighted-average method of inventory valuation is often used when inventory is not perishable but stock can still easily be rotated or intermingled.

Retail method: Instead of valuing inventory based on the cost to acquire the inventory, the retail method values inventory based on the retail price of the inventory, reduced by the markup percentage. This is the least specific inventory valuation method.

First in, first out (FIFO): The FIFO method of inventory valuation assumes the first items entered into your inventory are the first items you sell. FIFO inventory valuation assumes any inventory left on hand at the end of the accounting period should be valued at the most recent purchase price. Anything purchased at an older price would have been discarded due to spoilage or other loss of value.

4. INVENTORY COSTS

Ordering costs, also known as setup costs are those expenses generated whenever creating or processing an order to the supplier. They include administrative costs of placing the order, transportation cost and inspection's costs. The salary of the persons responsible for managing orders is included in the calculation of the cost of ordering, which makes determining these costs very difficult. Most employees perform several tasks than just keeping inventories and their perceived salary covers their whole workload. A solution to this problem consists of determining keys of distribution of the time necessary for the passing of command to each collaborator. These percentages of time are then multiplied by the hourly charge of each employee. These costs are automatically generated and are in the majority of cases independent of the quantity requested, but rather of the ordering frequency. Therefore, to minimize these ordering costs, it is in the company's interest to place a single large order instead of several small orders spread over a while the cost of ordering is also dependent on the number of suppliers solicited. Placing an order with a single supplier who manages several items is in this case economically more profitable than placing several orders with several different suppliers.



Holding Cost also known as carrying cost, it gathers all the costs linked to the storage of material before its use or sale. It encloses the storage space costs, whether it is owned by the company or leased. Added to that facility maintenance such as lighting and ventilation. The cost of physical handling of goods is also included in the holding cost as well as insurance, security, and IT software and hardware. An important part of the carrying cost is the inventory risk costs like theft, shipping errors or damages. Unlike the ordering cost, holding cost is mainly directly related to the quantity of material rather than the number of arrivals. This cost increases when the quantity to manage is important. From an economic perspective, businesses have an interest in keeping product quantities low if they want to minimize the holding cost. It should be noted that this cost is also directly linked to the value of the stored products. The greater the value of the material, the higher the cost of ownership. In this perspective, if the company wants to minimize the cost of ownership it must control the value of

its stock by minimizing the number of high-value items in its inventories.

Shortage Cost Sometimes called Stock-out cost, it occurs when companies happen to be out of stock for whatever reason (Viale and Carrigan, 1996). The main part of this cost is generated by the disruption of production. A shortage of material means that the business will have to pay charges even without producing anything. This is even more important for the car industry as it operates in continuous production lines, a shortage will mean that the whole production process will be affected and come to stop eventually if the shortage last in time. On the other hand, a stockout means paying extra costs to get a shipment on time, or what is called emergency shipments. This shows that even a shortage of the smallest component (in value) have big consequences on the shortfall. 10 More implicitly, shortages mean longer production and delivery time, which can impact customer loyalty and the company's reputation.

5. NEED OF SUPPLY CHAIN MANAGEMENT

Materials processing is defined as the series of steps or “unit operations” used in the manufacture of raw materials into finished goods. The operations involve a succession of industrial processes with various mechanical or chemical procedures, usually produced in large quantities or batches. Logistics describes the process of coordinating and moving resources—people, materials, inventory, and equipment—from one location to storage at the desired destination. The term logistics originated in the military, referring to the movement of equipment and supplies to troops in the field. Smooth Flow is a process where all the information that is relevant to a manufacturing job is delivered consistently and smoothly through every step of the process – from sales, to planning and design, all the way through to manufacturing engineering and then production. Cost reduction is the process of decreasing a company's expenses to maximize profits. It involves identifying and removing expenditures that do not provide added value to customers while also optimizing processes to improve efficiency. Cost reduction typically focuses on generating short-term savings. 'Mutual Success' is about establishing a shared understanding of what success means for you and your buyers. 'Success Plan' is the shared path that you and your buyer need to take in order to reach the mutually desired outcomes

6. TOOLS AND TECHNOLOGY USED

Flow Charts are the most popular tool for quality control. We can use this tool in order to visualize the series of steps in a process, system, workflow, event, etc. Besides displaying the process as a complete, the flowchart additionally features the association among phases and the process boundaries. **The histogram** is another quality control tool. It is a kind of bar chart that can visualize the distribution of numerical data. In histogram, numbers are

grouped into ranges, and the bar's height shows how many falls into each range. The histogram is an excellent quality planning and control tool, which supports us to comprehend protective and appropriate actions. Failures are prioritized according to how serious their consequences are, how frequently they occur, and how easily they can be detected. The purpose of the **FMEA** is to take actions to eliminate or reduce failures, starting with the highest-priority ones. Failure modes and effects analysis also documents current knowledge and actions about the risks of failures, for use in continuous improvement. FMEA is used during design to prevent failures. Later it's used for control, before and during ongoing operation of the process. Ideally, FMEA begins during the earliest conceptual stages of design and continues throughout the life of the product or service. **Kaizen** is an approach to creating continuous improvement based on the idea that small, ongoing positive changes can reap significant improvements. Typically, it is based on cooperation, commitment, and stands in contrast to approaches that use radical or top-down changes to achieve transformation.

7. CONCLUSION

This study aimed to explore the key factors influencing the cost of inventory management in the automotive industry. This to clarify what can be called effective inventory management in this sector. Through this literature study, it emerged that effective inventory management in the automotive industry should take into consideration three big aspects. Those aspects are

- (1) Physical management,
- (2) Data management, and
- (3) Manufacturer-supplier relationship.

Cost control tools were identified and the dependencies between these tools were discussed.

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