Comprehensive study for the inventory control management strategies

Abdelaziz Fathy Abdelaziz [1]
Sayed AbdelGaber AbdelMawgoud [2]
Aya Mohamed Mostafa [3]

Abstract

In any business, the majority of current assets and working capital is made up of the inventory of materials. A tiny inventory reduction will reflect a significant advantage for the company. Stock-out and overstock are the two main inventory-related issues that retail establishments deal with. Consequently, most stores are unable to keep their inventory costs as low as feasible while maintaining product availability. Effective inventory control management strategies can reduce the likelihood of both overstock and stock-out scenarios in retail establishments. This study offers a review of several works in diverse fields of application that discuss inventory control management and its control mechanisms. The methodology used in this study to compile the literature on ABC, XYZ, HML, FSN, SS, ROP and EOQ strategies of inventory control management is used. The main goal of the study is to provide inventory control management guidelines that will allow them to warranty availability of products at the right quantity when needed.

Keywords: Inventory Control management, ABC, XYZ, HML, SS, FSN, EOQ and ROP strategies.

[1]- PhD Degree Researcher in Business Information Systems Department, Faculty of Commerce and Business Administration, Helwan University, Egypt.
[2]- Professor in Information Systems Department, Faculty of Computers and Artificial Intelligence, Helwan University, Egypt.
[3]- Assistant professor in Business Information Systems Department, Faculty of Commerce and Business Administration, Helwan University, Egypt.

دراسة شاملة لاستراتيجيات إدارة مراقبة المخزون

الملخص

في أي عمل تجاري، تتكون غالبية الأصول المتداولة ورأس المال من مخزون المواد. سيعكس التخفيض البسيط في المخزون ميزة كبيرة للشركة. يعد نفاد المخزون وتكديسه من أهم القضايا المتعلقة بالمخزون التي تتعامل معها مؤسسات البيع بالتجزئة. وبالتالي، فإن معظم المتاجر غير قادرة على إبقاء تكاليف مخزونها منخفضة قدر الإمكان مع الحفاظ على توافر المنتج. يمكن لاستراتيجيات إدارة مراقبة المخزون الفعالة أن تقلل من احتمالية سيناريوهات المخزون الزائد ونفاد المخزون في مؤسسات البيع بالتجزئة. تقدم هذه الدراسة مراجعة للعديد من الأعمال في مجالات التطبيق المتنوعة التي تناقش إدارة مراقبة المخزون وآليات الرقابة الخاصة بها. استخدمت المنهجية في هذه الدراسة لتجميع الأدبيات المتعلقة باستراتيجيات ABC، XYZ، HML، FSN، SS، ROP، EOQ لإدارة مراقبة المخزون. الهدف الرئيسي من الدراسة هو توفير إرشادات إدارة مراقبة المخزون التي تسمح لهم بضمان توافر المنتجات بالكمية المناسبة عند الحاجة.

الكلمات المفتاحية: إدارة مراقبة المخزون، ABC، XYZ، HML، SS، FSN، EOQ، ROP.

1. Introduction

Both huge and tiny retail stores are opening up more and more every day. The management of these retail establishments are accustomed to deal with business in conventional methods with limited or extensive knowledge of inventory control systems. In the current unstable economic climate, Corporations are working to find new strategies for retaining an advantage over their competitors by effectively boosting sales and reducing wasteful expenditures. In the current retail landscape, large retailers that do not have a well-defined inventory control management strategy are unlikely to survive. Not only is inventory control management crucial for retail establishments, however it is also significant for other businesses. Any business that deals with tangible products, including manufacturers, distributors, and retailers, all need to keep their inventories in the appropriate amounts. (Lin, Yan, & Hsiao, 2021). Stock-out and overstock are two inventory-related issues that regularly affect retail establishments. Consequently, the stores lack the ability to keep their inventory costs as low as feasible while guaranteeing product availability. Lack of product availability has an adverse consequence on client satisfaction, which is the main driver of any business. To resolve these problems, adequate control of inventory techniques are needed (Haibing, Zhou, Yang, & Shengjun, 2020). Inventory control management is the act of setting and keeping a level of raw materials, ongoing work inventories, and finished goods that guarantees enough supplies are available at the most affordable price. Inventory control management is essential to an organization's effectiveness and efficiency. Businesses must deal with a variety of inventory-related expenses, including ordering, holding, and shortage costs. The lack of an inventory control system will cause each to expand, which will hurt profitability. Thus, with proper inventory control, businesses

can save a significant portion of their overall investment in stocks. Accidentally inventory investment is avoided with effective inventory control. The practice of guaranteeing an adequate stock level to promptly satisfy consumer demand is known as inventory control. Therefore, avoiding both excess and deficient inventory levels should be the ultimate objective of inventory management. To overcome a stock-out situation, orders should be submitted at the appropriate time in order to take effective action. Achieving the proper amount at the right price and quality is another benefit of this effort. Depending on (Jacobs & Chase, 2018), Inventory management is a series of regulations and guidelines that keep track of inventory levels as well as determine what levels are suitable to be maintained.

The definition of the retail is "a set of activities that promotes products or services for personal or household use to final consumers." It does this by organizing its availability on a relatively large scale and delivering it to consumers on a relatively small scale" (Bascur, Camila & Rusu, Cristian, 2020), Table (1) shows some examples of a retail store (Bhattacharya, Kunal & Gurjar, Omkar, 2016).

Table (1): Retail store examples.

Type	Description
Mom and pop stores	Local clients' daily requirements are catered to by small, independently owned businesses. They typically provide products that meet a family's need.
Department stores	provides potential clients with a variety of products at one location. Customers can find a vast choice of options in department shops, allowing them to fulfil many demands in one place.
Specialty stores	stores that focus on selling only specific products from a given product, or brands. The goal of these kinds of stores is to have very satisfied customers.
Discount stores	provides customers with a broad range of products at a discounted price. generally, the selection of goods in discount stores is smaller, and the quality could be worse compared to department stores.
Warehouse stores	offers a constrained inventory of goods in bulk at lower prices. The products are generally not presented as neatly as they were in earlier store types, and the store interior is not equally essential to this kind of store.
Supermarkets	Sell domestic goods and food products in general. Products in a supermarket are arranged in sections in order to draw people in and allow them to freely select what they need and want.

It is expected that the results of this study will give managers and decision-makers in the retail sector a broad view of the benefits of a robust inventory control management strategy for modern organizations. Putting the inventory control management strategies (ICMS) together as attempted in this study may provide some starting points towards integrated thinking as a way of dealing with the complexities of modern inventory control.

2. Literature Review

Research on inventory management is being done in a wide range of areas. The ABC, XYZ, HML, EOQ, SS, FSN,

EOQ and ROP analysis of inventory control strategies that are applied in various fields are the main topics of this overview of the literature. (SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed, 2017) deploy a study of several inventory control Strategy for a retail store's effective inventory management system. The study aims to give inventory management recommendations so they may make sure the right number of products is accessible when needed. Only the four stock control methods—ABC analysis, EOQ, safety stock, and HML analysis—are examined in this article. This document's examination of numerous inventory control strategies can lead to encouraging outcomes in preventing stock-outs or overstocks. (Nanaware & Saharkar, 2017) suggested that EOQ and ABC analysis are useful tools for inventory management. The distribution of materials of types A, B, and C is provided by the application of ABC analysis. The way that materials are distributed reveals how important they are economically. The proper number of orders placed at the right time yields outcomes according to EOQ. It also prevents material waste and delays in the procurement of materials. Inventory control systems reduce material waste, which eventually lowers project costs. (Kumar, Yogesh, Sahu, Veneshwar, Sahu, Devprakash, & Dewangan, Komal, 2017) concentrated on XYZ analysis. Based on unit demand fluctuation, the components in the XYZ analysis are categorized into X, Y, and Z classes. The variation of coefficient (CV) is a metric used to quantify the variability of objects. Data is gathered primarily every three months by the shop's general manager and other staff members involved in the inventory control operation of the steel plant. According to the study, this analysis aids in the efficient management of inventory items for both completed goods and raw materials. It will be beneficial to comprehend issues that arise from the expense of purchasing safety stock and inventory materials.

(Indresh Nishad & A Arunkumar, 2018) presented a case study of a Maharashtran company located in Vasai is examined. Because the identity of this company is protected, it is referred to as company XYZ in this study. When there is an overstock or stock out in the warehouse, the management of this company is faced with numerous challenges. An EOQ analysis is chosen for research work in this publication. The overall cost of inventory decreased by about 10% in this research study. The business can use this model to determine the precise quantity of materials to order as well as the best time to make fresh orders for each material. Data collection is not possible due to restrictions, in accordance with corporate policy. It was also quite challenging to gather data from every department that was accessible. Calculating the economic order amount is predicated on certain assumptions. Demand is taken to be constant throughout this time frame. However, in reality, demand varies throughout time. (Priniotakis Georgios & P Argyropoulos, 2018) demonstrated the significance of inventory control. It goes over some fundamental ideas and methods for managing stock levels, reducing stock-outs, classifying inventory, and raising customer satisfaction. In addition, it talks about how important demand forecasting is and how to measure prediction inaccuracy effectively using root mean square error (RMSE), This ultimately developed into a vital component of inventory control The importance of safety stock (SS) and the usage of service level (SL) as a performance metric are emphasized. The reorder point (ROP) is discussed as a helpful indicator for starting production replenishment, and a simple mechanism for prioritizing production orders is given at the end. (C Subratha, Kumar Naveen, D'Souza Bryal, & Mavaji Arun, 2018) used VED and ABC analyses on the tumor pharmacy's drug inventory, as well as computing and evaluate the drug's criticality and yearly drug expense. The drug's viability was

decided upon following discussions and agreement amongst physicians. When analyzing medication classes that need varying degrees of regulatory control and oversight, matrix analysis is utilized. Inventory turnover is also predicted using the inventory index approach. The ABC, VED, and inventory index matrix analysis is useful for efficient hospital inventory management. It gives management access to data that can be use on inventory areas that require oversight and control. (Vivek A Shrouty, 2019) emphasized important of ABC analysis. The unit consumption value is used in ABC analysis to categorize things into A, B, and C groups. Based on this study, It is recommended that suitable and economical material procurement and storage be implemented in order to minimize waste and material delays and successfully satisfy the demand and supply of raw materials. Over a three-month period, general store managers and other staff members involved in inventory control collected most of the data. (Shaikh Sajid & Niyati Raut, 2020) revied the process and computes different raw material/product variables related to inventory control. Twelve high-speed machinery companies make up the sample. The methodology shown above makes it simple to determine the economic order quantity, the annual order volume, and the overall cost. The computation of the stock level (SL) and economic order quantity (EOQ) in relation to the quantity of material is displayed in the data analysis. Based on the analysis section's concluding conclusions compared to historical data, it is evident that material loss has decreased, and material costs have decreased, which has an impact on product output and customer satisfaction. An efficient framework for inventory management is developed by (Jadhav Pragati & Jaybhaye Maheshwar, 2020) using ABC and HML analysis of inventory control strategy. The company has employed a variety of inventory strategies to manage its inventory costs. The main

store supervisor and other staff members involved in inventory control activities gathered data for a year. The analysis revealed that the implementation of this strategy fosters effective inventory supervision within the organization. It will aid in comprehending the problems surrounding the cost of buying safety and material inventories. (Susanto,, 2018) conducted a study aimed at reducing the overall cost of inventory based on production needs. This work was supported by EOQ. The study's findings suggest that inventory levels and the quantity of materials needed for storage are more economically appropriate for meeting production demands and preventing an increase in the cost of storage. (Sneha, Pandey, & Polasi, 2022) provided an analysis of three distinct inventory control methods for a retail store's effective inventory management system. While there are a number of inventory control strategies available for upholding appropriate inventory management, in this instance three distinct strategies are implemented (ABC, FSN, and EOQ Strategy). Businesses that sell goods confront issues like overstock, waste, understock, etc. and rely heavily on experience. The research presented here indicates that stores will reduce their overstock, waste, and understock if they incorporate inventory control procedures into their business model.

3. Inventory control management strategies (ICMS).

For inventory control management, several strategies are available. These strategies are suggested for applications in literature since they are employed for suitable criteria. A collection of some inventory control strategies, along with their application domain and criteria, is presented in Table (2).

Table (2): list of surveyed inventory control strategies.

strategies	Criteria	Application
ABC Strategy (Thakkar Hemant & Pandya Bijal, 2016)	Annual consumption value =Annual demand × Unit price A (High Items) B (Moderate Items) C (Low Items)	For material which go into the production
XYZ Strategy (Devarajan & Jayamohan, 2016)	Sort inventory items according to how frequently they are needed. X- (Steady Demand) Y- (Moderate Demand Variability) Z- (High Demand Variability)	enhance service standards for products whose demand is erratic.
HML (High, Medium, Low) Strategy (SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed, 2017)	Cost per unit H- (Expensive Goods) M- (Items at a Medium Price) L- (Items at Low Prices)	To monitor expensive items.
FSN Strategy (Fast, Slow and Non-Moving) (Devarajan & Jayamohan, 2016)	Store issues provide inspiration. Get rid of stagnant inventory.	Items which move rapidly should be stored at a high level.
SS (Safety Stock) Strategy (SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed, 2017)	Stock for Safety = D * Z * σ_{LT} D = Annual Demand (Units) Z stands for "standard normal value." σ_{LT} = Lead Time Standard Deviation	Carrying too much safety stock raises the holding costs.
ROP (Re-Order Point) Strategy (Priniotakis	ROP= AD*ALT+SS AD=Average Daily Demand ALT= Average lead time	Replenish inventory in a timely manner to

strategies	Criteria	Application
Georgios & P Argyropoulos, 2018)	SS = Safety Stock	avoid high inventory holding costs.
EOQ (Economic Order Quantity) Strategy) (Aro-Gordon & Gupte, 2016)	EOQ = √((2 * D * S) / H) D: Annual demand S: Cost per order H: Holding cost per unit per year	balance between (ordering costs-holding cost)

3.1 ABC classification Strategy

Another name for "specific inventory control" is Better Control on every occasion (ABC) Strategy, this is a widely used inventory classification technique for handling commodities that are kept in storage and require frequent monitoring (Thakkar Hemant & Pandya Bijal, 2016). This Strategy, which divides the components into three classes A, B, and C according to relevance, that depend on the Pareto standard or the 80/20 principle. "A" displays components that are extravagant and need strict control, "B" indicates major and moderately controlled components, and "C" indicates less significant components than "A" and "B."

The following strategy's primary goal is to trigger managers to pay attention to the little, basic number (components A) rather than the unimportant number (components C). Table (3) displays this method's approximate division (SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed, 2017) . The following formula is used to estimate the annual use of different items in the ABC order plot: Unit price × annual demand equals annual consumption.

Table (3): ABC classification strategy

	Class A Items	Class B Items	Class C Items
Percentage of Items	15-20 %	30-40 %	40-50 %
Percentage of Items value	75-80 %	15-20 %	5-10 %
Control	Maximum	Moderate	Minimum

Based on an inventory item's yearly purchases, the ABC Strategy separates inventory items into three groups. The ABC Strategy uses the following three groupings (Nallusamy, Balaji, & Sundar, 2017):

- High-value items (A item): These are the 15–20% of items that make up 75–80% of the overall yearly inventory value.
- medium value items (B items): The 30- 40 % of the items that collectively make up roughly 15-20% of the overall yearly inventory value.
- Low value items (C items): are the 40–50% of things that make up 10–15% of the overall yearly inventory value.

The ABC inventory control management Strategy face the following Challenges:

- ABC categorization Strategy considers just annual consumption value.
- ABC classification Strategy simply takes cost element for classification, more precise classification should be carried out since other characteristics are also significant along with cost.
- The ABC classification Strategy works better with a small group of inventories than with thousands of items.
- One of the main limitations of ABC Strategy is that it does not take into account seasonal demand.

3.2 XYZ classification Strategy:

The method that is most frequently applied in an organization is the XYZ Strategy. Based on demand swings, the components in the XYZ Strategy have been divided into X, Y, and Z classes (Kumar, Yogesh, Sahu, Veneshwar, Sahu, Devprakash, & Dewangan, Komal, 2017). Variability is measured using the coefficient of variation (C.V.), and the cutoff line is established by the organization. A statistical metric called the coefficient of variation (C.V.) is frequently employed in the XYZ analysis to evaluate the variability of demand for various products.

The C.V. is calculated by dividing the standard deviation of demand by the average demand and multiplying it by 100 to express it as a percentage. The XYZ Strategy uses the following three Classes (Devarajan & Jayamohan, 2016):

- X-Class: Materials in this class have a fixed need size and are characterized by minor periodic changes. This allows for good forecasting accuracy, and their daily demand variability is roughly minimal ($CV \leq 0.3$).
- Y-Class: materials exhibit modest swings in demand, enabling forecasting accuracy of Average (D). The daily demand variability is typically intermediate, with $0.3< CV \leq 0.56$.
- Z-Class: materials have erratic demand requirements, which makes daily demand and forecasting less accurate.

The XYZ inventory control management Strategy face the following Challenges:

- The XYZ classification Strategy works better with a small group of inventories than with thousands of items.
- The most important drawback of XYZ Strategy is categorization of new products. They are most often

classified as "Z" class items because their demand patterns are not established.

- XYZ Strategy can also overlook seasonal items.

3.3 HML classification Strategy

HML classification Strategy, also known as High-Medium-Low analysis, is a method for organizing objects in an inventory according to their worth or significance. This analysis helps organizations prioritize their attention and allocate resources effectively to different inventory items. The HML Strategy is comparable to the ABC Strategy; however, instead of using the annual consumption value as in the ABC categorization, the HML Strategy uses the cost per unit criterion. (SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed, 2017). According to their unit prices, the products in this classification scheme are placed in descending order. The management makes all the decisions about the products' classification according to unit price. It supports managers in making decisions about purchasing policies, such as the recommendation that H&M products not be ordered in excess of what is necessary. This technique also starts the practice of regularly checking stocks. The majority of precious items need regular stock checks (Sirisha & Kalyan, 2022).

The HML inventory control management Strategy face the following Challenges:

- The HML classification Strategy works better with a small group of inventories than with thousands of items.
- HML classification Strategy only takes cost factor for classification.

3.4 FSN classification Strategy

This classification is based on movement analysis, which is based on patterns of material usage. Here, the items are divided into three categories: fast moving, slow moving, and non-moving, depending on how frequently they are traded. Whether they are components or raw materials, obsolete goods can be combated with the help of FSN Strategy. It facilitates the distribution and handling of stocks as well as how they are arranged in stores. Reducing inventory obsolescence is the primary goal of this investigation. Technology is changing quickly; therefore this classification will need to be revised more frequently. The inventory turnover ratio is the basis for FSN Strategy inventory turnover ratio is calculated by dividing the average inventory of a material by its annually use (Devarajan & Jayamohan, 2016).

Three types of inventories are presented in Table(4)when different inventory turnover ratios (ITR) at different times.

Table (4): FSN classification strategy

Inventory Type	Description
Fast moving inventory	There is a high demand for these stocks, and any shortfall could seriously impede the organization's ability to operate.
Slow moving inventory	Their ITR is really low. To maintain such stockpiles at the lowest possible levels, the manager must take all required actions.
Non-moving inventory	There is no market for these stocks, and it's likely that there never was. They've gone out of style. A firm choice must be made regarding whether to keep them or eliminate them.

The FSN inventory control management Strategy face the following Challenges:

- FSN classification Strategy considers only on their sales velocities.
- The FSN classification Strategy works better with a small group of inventories than with thousands of items.
- Handling new products or limited historical data: FSN Strategy may encounter difficulties when dealing with new products or items with limited historical sales data.
- Time sensitivity: FSN Strategy requires regular monitoring and updating of item movement classifications. Items' sales velocities can change over time due to various factors such as seasonality, market trends, or promotional activities.

3.5 Safety Stock (SS) Strategy

The inventory that a company holds on hand over and beyond what is required for the lead time is known as safety stock. Businesses maintain safety stock on hand to avoid stock outs. Demand is erratic, thus safety stock (SS) is necessary to meet demand in the event that it exceeds projections. The holding costs of a supply chain increase when an excessive amount of safety stock is carried. The secret to any supply chain's success is to balance customer satisfaction with safety stock. Taking into account the constant requirement (SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed, 2017), safety stock is calculated using the following formula:

$$SS = Z \times D \times \sigma_{LT} \quad \text{…….. (1)}$$

where:

D = Demand per year (units).

Z = Standard Normal Value.

σ_{LT} = Standard deviation of Lead Time.

The safety stock inventory control management Strategy face the following Challenges:

- The safety stock Strategy works better with a small group of inventories than with thousands of items.
- Demand variability and forecasting accuracy: Estimating demand variability accurately is a significant challenge in safety stock Strategy.
- Lead time variability: Safety stock Strategy must account for lead time variability, which refers to the time it takes for replenishment orders to arrive after placing them.
- Seasonality and demand patterns: Safety stock Strategy becomes more challenging when dealing with seasonal demand patterns.

3.6 ROP Strategy

A fundamental concept in inventory management is the inventory reorder point, which establishes the ideal interval for restocking inventory levels. It indicates the point in the inventory cycle at which a fresh order needs to be placed in order to guarantee that there is enough inventory on hand to satisfy consumer demand without running out (Priniotakis Georgios & P Argyropoulos, 2018). The ordering point is determined by taking into account a number of parameters. The lead time—the amount of time it takes for a new order to be delivered after it has been placed—is the main determining factor. This is the average demand throughout that period. By analyzing historical sales data and considering lead time variability, businesses can estimate the average demand during this period. Safety stock is another consideration when calculating the reorder point.

Inventory replenishment is triggered by the Re-Order Point (ROP) mechanism, which takes inventory level into account. As shown in the following equation, the replenishment time demand plus a safety stock is used to determine the level at which the ROP is set:

$$ROP = AD * ALT + SS \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where:
AD=Average Daily Demand.
ALT= Average lead time.
SS = Safety Stock.

The ROP inventory control management Strategy face the following Challenges:

- The re-order point Strategy works better with a small group of inventories than with thousands of items.
- Demand variability and forecasting accuracy: One of the primary challenges in re-order point Strategy is accurately forecasting demand variability.
- Lead time variability: Re-order point Strategy must consider lead time variability, which refers to the time it takes for replenishment orders to arrive after placing them.
- Seasonality and promotional activities: Seasonal demand variations and promotional activities can significantly impact the re-order point Strategy.

3.7 EOQ Strategy

The Economic Order Quantity (EOQ) (Aro-Gordon & Gupte, 2016) (Riza, Purba, & Mukhlisin, 2018) method is a popular inventory management strategy that seeks to identify the best order quantity to reduce overall inventory expenses. It assists businesses in striking a balance between the expenses associated with carrying inventory and the costs associated with acquiring new or renewing existing inventory.

- The following expenses must be taken into account when calculating an EOQ: - Holding Cost, sometimes called Carrying Cost. It includes expenses for inventory tracking, storage, depreciation of stored goods, and other related expenses.
- Ordering costs: These storage costs are the administrative costs of processing production or purchase orders and tracking them.

The formula for calculating the EOQ is derived from balancing the holding costs and ordering costs (Riza, Purba, & Mukhlisin, 2018):

$$EOQ = \sqrt{((2 * D * S) / H)} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where:

- EOQ means The Economic Order Quantity.
-D is the product's yearly demand.
-S is the cost per order.
- H is the annual holding cost per unit.

The EOQ inventory control management Strategy face the following Challenges:

- Demand Variability: One of the major challenges is dealing with demand variability, The EOQ Strategy assumes a constant demand rate, but demand for products can fluctuate due to factors such as seasonality or market trends.
- The EOQ Strategy relies on certain assumptions, such as constant demand, fixed ordering costs, and holding costs.

4. The concluded challenges for surveyed inventory control management strategies (ICMS).

The challenges facing the studied inventory control management strategies (ICMS) can be summarized in the following points:

- ABC categorization Strategy considers just annual consumption value.
- ABC classification Strategy simply takes cost element for classification, more precise classification should be carried out since other characteristics are also significant along with cost.
- The ABC classification Strategy works better with a small group of inventories than with thousands of items.
- One of the main limitations of ABC Strategy is that it does not take into account seasonal demand.
- The XYZ classification Strategy works better with a small group of inventories than with thousands of items.
- The most important drawback of XYZ Strategy is categorization of new products. They are most often classified as "Z" class items because their demand patterns are not established.
- XYZ Strategy can also overlook seasonal items.
- The HML classification Strategy works better with a small group of inventories than with thousands of items.
- HML classification Strategy only takes cost factor for classification.
- FSN classification Strategy considers only their sales velocities.
- The FSN classification Strategy works better with a small group of inventories than with thousands of items.
- Handling new products or limited historical data: FSN Strategy may encounter difficulties when dealing with new products or items with limited historical sales data.

- Time sensitivity: FSN Strategy requires regular monitoring and updating of item movement classifications. Items' sales velocities can change over time due to various factors such as seasonality, market trends, or promotional activities.
- The safety stock Strategy works better with a small group of inventories than with thousands of items.
- Demand variability and forecasting accuracy: Estimating demand variability accurately is a significant challenge in safety stock Strategy.
- Lead time variability: Safety stock Strategy must account for lead time variability, which refers to the time it takes for replenishment orders to arrive after placing them.
- Seasonality and demand patterns: Safety stock Strategy becomes more challenging when dealing with seasonal demand patterns.
- The re-order point Strategy works better with a small group of inventories than with thousands of items.
- Demand variability and forecasting accuracy: One of the primary challenges in re-order point Strategy is accurately forecasting demand variability.
- Lead time variability: Point of reordering Lead time variability, or the amount of time it takes for replenishment orders to arrive after they are placed, needs to be taken into account in strategy.
- Seasonality and promotional activities: Seasonal demand variations and promotional activities can significantly impact the re-order point Strategy.
- Demand Variability: One of the major challenges is dealing with demand variability. The EOQ Strategy assumes a constant demand rate, but demand for

products can fluctuate due to factors such as seasonality or market trends.

- The EOQ Strategy relies on certain assumptions, such as constant demand, fixed ordering costs, and holding costs.

5. Conclusion

Based on the previous studies and the present of distinct inventory control management strategies we concluded that effectively supervising and managing a retailer's inventory is known as retail inventory management. To reduce holding costs and guarantee that products are accessible to satisfy consumer demand, effective inventory management is crucial. Accurate ABC, XYZ, HML, SS, FSN, EOQ and ROP strategies of inventory control management are the best practices for managing retail inventories. Maintaining a balance between minimizing excess inventory costs and keeping enough stock to meet consumer demand is essential for effective retail inventory management. By implementing these best practices and leveraging technology and data-driven insights, retailers can optimize their inventory levels, improve customer satisfaction, and drive profitability. The present study has successfully documented seven comprehensive and workable inventory control management strategies that can address common issues in the day-to-day operations of retail warehouses and stores. The size of the company will determine which (ICMS) is best, with space availability and cost effectiveness being the two main factors. The difficulties that any inventory control strategy faces must be considered while implementing it.

6. Future work

To face the challenges of inventory control management strategies:

- A multi-dimensional approach to inventory control management strategy can be used more effectively.
- A combined approach to inventory strategy can provide better results in inventory management.
- Smart techniques offer significant potential for overcoming inventory control management challenges. By leveraging advanced data analysis, speed of running with huge data, predicting capabilities, and real-time insights, it can provide better results in inventory management.

References

- *Aro-Gordon, & Gupte. (2016). Overview of the classic economic order quantity approach to inventory management. The Business Age, 1(2), 1-16.*

- *Bascur, Camila, & Rusu, Cristian. (2020). Customer experience in retail: A systematic literature review. Applied Sciences, 10(21), 18.*

- *Bhattacharya, Kunal, & Gurjar, Omkar. (2016). Organized retail sector in India. International Journal of Recent Research Aspects, 3(2), 46-49.*

- *C Subratha, Kumar Naveen, D'Souza Bryal, & Mavaji Arun. (2018). Inventory management using matrix analysis and inventory index in an oncology pharmacy of a tertiary care teaching hospital. Journal of Young Pharmacists, 10(1), 78-91.*

- *Devarajan, & Jayamohan. (2016). Stock control in a chemical firm: combined FSN and XYZ analysis. Procedia Technology, 24, 562-567.*

- *Haibing, Zhou, Yang, & Shengjun. (2020). Analysis and optimization of perishable inventory with stocks-sensitive stochastic demand and two-stage pricing: A discrete event simulation study. Journal of Simulation, 1-12.*

- *Indresh Nishad, & A Arunkumar. (2018). Analysis of Inventory Management by Using Economic Order Quantity Model - A Case Study. International Journal for Research in Applied Science & Engineering Technology (IJRASET), 6(VI), 309-315.*

- *Jacobs, & Chase. (2018). Operations and supply chain management (15th ed.). New York: The McGraw-Hill / Irwin.*

- *Jadhav Pragati, & Jaybhaye Maheshwar. (2020). A Manufacturing Industry Case Study: ABC and HML Analysis for Inventory Management. International Journal of Research in Engineering, Science and Management, 3(9), 146-149.*

- *Kumar, Yogesh, Sahu, Veneshwar, Sahu, Devprakash, & Dewangan, Komal. (2017). XYZ Analysis for Inventory Management – Case Study of Steel Plant. International Journal for Research in Applied Science & Engineering Technology, 5(2), 46-52.*

- *Lin, C.-K., Yan, S., & Hsiao, F.-Y. (2021). Optimal Inventory Level Control and Replenishment. Networks and Spatial Economics, 21, 57-83.*

- *Nallusamy, Balaji, & Sundar. (2017). Proposed model for inventory review policy through ABC analysis in an automotive manufacturing industry. International Journal of Engineering Research in Africa, 29, 165-174.*

- *Nanaware, & Saharkar. (2017). Inventory management technique in construction. International Journal of Engineering Sciences & Research, 6(9), 225-230.*

- *Priniotakis Georgios, & P Argyropoulos. (2018). Inventory management concepts and techniques. Aegean International Textile and Advanced Engineering Conference. IOP Publishing.*

- *Riza, Purba, & Mukhlisin. (2018). The implementation of economic order quantity for reducing inventory cost. Research in Logistics & Production, 8(3), 207-216.*

- *Shaikh Sajid, & Niyati Raut. (2020). STUDY ON VED ANALYSIS, STOCKREVIEW & EOQ TECHNIQUES OF INVENTORY MANAGEMENT. International Journal of Engineering Applied Sciences and Technology, 4(11), 218-223.*

- *Sirisha, & Kalyan. (2022). Inventory management pattern of manufacturing sector in India. Available at SSRN 4165201, 13.*

- *SK Biswas, CL Karmaker, Ariful Islam, Nazmul Hossain, & Shamim Ahmed. (2017). Analysis of Different Inventory Control Techniques: A Case Study in a Retail Shop. Journal of Supply Chain Management Systems, 6(3), 35-45.*

- *Sneha, Pandey, & Polasi. (2022). A STUDY OF INVENTORY CONTROL TECHNIQUES TO OPTIMISE REVENUE IN SMALL RETAIL STORES. Journal of Pharmaceutical Negative Results, 1763-1771.*

- *Susanto,. (2018). Raw material inventory control analysis with economic order quantity method. IOP Conference Series: Materials Science and Engineering. IOP Publishing.*

- *Thakkar Hemant, & Pandya Bijal. (2016). A review on inventory management control techniques: ABC-XYZ analysis. REST Journal on Emerging trends in Modelling and Manufacturing, 2(3), 82-62.*

- *Vivek A Shrouty. (2019). The Study of various Tools and Techniques of Inventory Management and Experiment with use of ABC Analysis. International Research Journal of Engineering and Technology (IRJET), 6(4), 350-356.*