Inventory Management System for Retailers

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Literature Survey

Introduction:

The problem of inventory control is one of the most important in organizational management. As a rule, there is no standard solution – the conditions at each company or firm are unique and include many different features and limitations. An occurring task of mathematical models development and determining the optimal inventory control strategy is related to this problem. Features of inventory management models are that the resulting optimal solutions can be implemented in a fast changing situation where, for example,the conditions are changed daily. there is a need for new and effective methods for modeling systems associated with inventory management, in the face of uncertainty. Uncertainty exists regarding the control object, as the process of obtaining the necessary information about the object is not always possible. e solution of such complex tasks requires the use of systems analysis, development of a systematic approach to the problem of management in general. Inventory models are distinguished by the assumptions made about the key variables: demand, the cost structure, physical characteristics of the system. these assumptions may not suit the real environment. There is a great deal of uncertainty and variability.

Inventory management:

Stocks (reserves) are created to carry out the normal activities of the company. Proper and timely determination of the optimal inventory control strategy allows freeing a significant amount of assets, frozen in the form of stocks, which ultimately increases the efficiency of resource use. Even though there are literally millions of different types of products manufactured in our society, there are only two fundamental decisions that one has to make when controlling inventory:

1. How large should an inventory replenishment order be?
2. When should an inventory replenishment order be placed?
e objectives of inventory management oen reduce the problem if it is more prot-able to do quickly but more expensive or slower but cheaper. Such a strategy will be optimal
inventory control, which minimizes the sum of milestones costs associated with the production, storage and inventory shortage per unit of time or for a specific (including infinite) amount of time.

Management models dier in the nature of the available information on the properties of the simulated system. When the value of the model parameters is well-defined, nature of the corresponding mathematical model is deterministic. If the parameters of the system are random values with a known probability, distribution models are stochastic (probabilistic).

If all of the model parameters do not change over time, it is called static, otherwise – dynamic. Static models are used when receiving a one-time decision about the level of reserves for a certain period, and dynamic – in the case of sequential decision-making about stock levels or to adjust earlier decisions, taking into account the changes taking place. When static patterns of change in system parameters cannot be installed, it is necessary to solve the problem of inventory management in the face of uncertainty.
In models of inventory management, the following characteristics are taken into account:
Single versus multiple items. is dimension considers whether a single item can be used in isolation for calculations, or whether multiple interdependent products should be taken into account, as a result of collective budget or space constraints, coordinated control or substitutability between items.

Time duration. In some inventory management situations, the selling season for products is short, and excess stock at the end of the season cannot be used to satisfy the demand of the next season. In such cases, a single period model is required. When multiple periods need to be considered, a common approach is to use a rolling horizon

implementation approach. Here, decisions consider only a relatively small number of future periods and are made at the start of each period. e decisions are then implemented in the current period, and the problem resolved at the start of the subsequent period. Number of stocking points. Sometimes, it is appropriate to treat a single stocking point in isolation. In many real world cases, inventories of the same item are kept at more than one location. In multi-echelon situations, the orders generated by one location (e.g., a branch warehouse) become part or all of the demand at another location (e.g., a central warehouse).

Development:

The project focuses on building an Inventory Management System for Retailers. It ensures that the retailers carry the right amount of merchandise that the customers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or causing wastage by carrying excess amounts of merchandise.

The primary motive behind retail inventory management is to understand the sales pattern and to lower the cost of maintaining an inventory/warehouse.

Once retailers successfully log in to the application they can update their inventory details, also users will be able to add new stock by submitting essential details related to the stock. They can view details of the current inventory. The System will automatically send an email alert to the retailers if there is no stock found in their accounts. So that they can order new stock.

Conclusion:

In the past years, the efficiency of inventory management has become an area of major concern in business. New inventory models for managing the inventory levels are now available. The paper has presented a literature survey of models of inventory control under uncertainty. Most of the analytical models addressed only one type of uncertainty and assumed a simple structure of the production process. e most common dimensions to be considered as fuzzy variables are demand, the cost of acquisition. Each model, based on some assumptions, has its benefits and disadvantages, but still, many authors continue to design inventory control models using such an approach as fuzzy logic.The existence of such quantity of models shows that fuzzy set theory is one of the appropriate methods, which can suppose a great advance in inventory management. The emphasis in each review was to identify how the fuzzy set theory was used in the formulation of the

inventory model. The classification and review of models are quite general and can be extended.

Literature Review:

Abramovitz and Modigliani (1957)

They highlighted the relationship between capacity utilization and inventory investment. Existing stock of inventories was expected to adjust to the desired levels. Thus the variable, existing stock of inventories, was essential to be negatively related with the desired stock. The result was that there is a positive relation among the ratio of inventory to sales and inventory investment. High ratio of stocks to sales in the past suggests the requirement of high levels of inventories in the past and promising high investment in inventories in the current period also.

Krishna Murthy (1964)

Study was aggregative and dealt with inventories in the private sector of Indian economy as a whole for the period 1948-61. This study used sales to represent demand for the product and suggested the importance of accelerators. Short Term rate of interest had also been found to be significant.

R.S. Chadda (1964)

Study had been made on inventory management practices of Indian companies. The analysis suggested application of modern scientific inventory control techniques like operations research. These modern scientific techniques furnish opportunities for the companies. Companies can minimize their investment in inventory but there is continuous flow of production. He argued that industrially advanced countries, like, USA, were engaged in developing highly sophisticated mathematical models and techniques for modernizing and redefining the existing tools of inventory investment.

National Council of Applied Economic Research (NCAER) (1966)

Conducted a study in 1966 regarding working capital management of three industries namely cement, fertilizer and sugar. This study mainly devoted to ratio analysis of composition, utilization and financing of working capital for the period of 1959 to 1963. The study reveals that inventory constituted a major portion of working capital i.e. 74.06 per cent in the sugar industry followed by cement industry (63.1%) and fertilizer industry (59.58%). It was observed that inventory had not been managed properly. So far

as the utilization of working capital was concerned, the cement and fertilizer industry had better implementation of working capital. The sugar industry had huge accumulation of stocks so there was inefficient utilization of working capital heavily.

Krishnamurty and Sastry (1970)

It is the most comprehensive study on manufacturers' inventories. They used the CMI data and the consolidated balance sheet data of public limited companies published by the RBI, in order to analyze each of the major components, like the raw materials, goods-in-process and finished goods, for 21 industries over the period ranging from 1946-62. The study was a time series one although there were some inter-industry cross-section analyses that were carried out in the analysis. The Accelerator represented by change in sales, bank finance and short-term interest rate was found to be an important determinant. The utilization of productive capacity and price anticipations was also found to be relevant in the study.

George (1972)

It was the study on cross section analysis of balance sheet data of 52 public limited companies for the period of 1967- 70. Accelerator, internal and external finance variables were considered in the formulation of equations for raw materials including goods-in-process inventories. However, equations for finished goods inventories conceive only output variable. Deliberation was given on accelerator and external finance variables.

Mishra (1975)

It is the study of six major public sector enterprises. He concluded that (i) inventory constitutes the most important component of working capital of public enterprises (ii) efficiency of working capital funds employed in receivables is terribly low in the selected enterprises and (iii) In all units both the current assets and the quick ratios are greater than their standards. Enterprises need proper control on receivables.

Lambrix and Singhvi (1979)

Adopted working capital cycle approach in working capital management, also suggested that investment in working capital can be optimized and cash flows can be improved by reducing the time frame of physical flow starting from the receipt of raw material to the shipment of finished goods, i.e. inventory management, and by improving the terms and conditions on which firm sells goods as well as receipt of cash.

Lal (1981)

He studied Modi Steels Limited as a case study, his study focused on inventory management. He originated a model which involved price variables in inventory management; earlier price variables in inventory were not considered in that company. The analysis recommended solid policies, which would look after internal and external factors, ultimately it would help in bringing in efficient working capital management.

Farzaneh (1997)

Presented a mathematical model, to assist the companies in their decision to switch from EOQ to JIT purchasing policy. He defines JIT as "to produce and deliver finished goods just in time to be sold, sub-assemblies just in time to be assembled in goods and purchased material just in time to be transformed into fabricated parts". He highlights that the EOQ model focuses on minimizing the inventory costs rather than minimizing the inventory. Under the ideal condition where all the conditions meet, it is economically better off to choose the JIT over the EOQ because it results in purchase price, ordering cost.

Rich Lavely (1998)

Asserts that inventory means "Piles of Money" on the shelf and the profit for the firm. However, he notices that 30% of the inventory of most retail shops is dead. Therefore, he argues that the inventory control facilitates the shop operations by reducing rack time and thus increases profit. He also elaborates the two types of inventory calculations that determine the inventory level required for profitability. The two calculations are "cost to order" and "cost to keep". Finally, he proposes seven steps to inventory control.

Dave Piasecki (2001)

He focused on the inventory model for calculating the optimal order quantity that used the Economic Order Quantity method. He points out that many companies are not using the EOQ model because of poor results resulting from inaccurate data input. He says that EOQ is an accounting formula that determines the point at which the combination of order costs and inventory costs are the least. He highlights that the EOQ method would not conflict with the JIT approach. He further elaborates the EOQ formula that includes the parameters such as annual usage in unit, order cost and carrying cost. Finally, he proposes several steps to follow in implementing the EOQ model. The limitation of this literature is that it does not elaborate further on the relationship between

EOQ and JIT. It does not associate the inventory turns with the EOQ formula and fails to mention the profit gain with the quantity calculated.

Gaur, Fisher and Raman (2005)

In their study examined firm-level inventory behavior among retailing companies. They took a sample of 311 public-listed retail firms for the years 1987–2000 to examine the relationship of inventory turnover with gross margin, capital intensity and sales surprise. They observed that inventory turnover for retailing firms was positively related to capital intensity and sales surprise while inversely associated with gross margins. They also suggested models that yield an alternative metric of inventory productivity, adjusted inventory turnover that can be used in study of performance analysis and managerial decision-making.

S. Singh (2006)

Analyzed the inventory control practices of a single fertilizer company named IFFCO. He statistically examined the inventory system with consumption, sales and other variables along with growth of these variables and inventory patterns. He concluded that an increase in components of inventory lead to an increase in the proportion of inventory in current assets. A special focus was made on stores and spares in order to calculate excess purchases resulting in loss of profit. Pradeep singh (2008) In his study made an attempt to examine the inventory and working capital management of Indian Farmers Fertilizer Cooperative Limited (IFFCO) and National Fertilizer Limited (NFL). He concluded that the overall position of the working capital of IFFCO and NFL is satisfactory. But there is a need for improvement in inventory in case of IFFCO. However, inventory was not properly utilized and maintained by IFFCO during the study period. The management of the NFL must try to properly utilize the inventory and try to maintain the inventory as per the requirements. So that liquidity will not interrupt.

Capkun, Hameri and Weiss (2009)

Statistically analyzed the relationship between inventory performance and financial performance in manufacturing companies using the financial information of a large sample of US-based manufacturing firms over a 26-year period, that is, 1980 to 2005. They inferred that a significant relationship existed between inventory performance along with the performance of its components and profitability. Raw material inventory performance was highly correlated to gross profit and operating profit. Work in progress inventory was highly correlated to gross profit measures while finished goods inventory performance was more correlated with operating profit measures.

Gaur and Bhattacharya (2011)

Attempted to study the linkage between the performance of the components of inventory such as raw material, work in progress and finished goods and financial performance of Indian manufacturing firms. The study revealed that finished goods inventory was inversely associated with business performance while raw material inventory and work in progress did not have much effect on the same. They emphasized that instead of focusing on total inventory, an attempt should be made to concentrate on individual components of inventory so as to adequately manage the same. They concluded that managers not paying heed to inventory performance may become weak in combating competitors.

Eneje et al (2012)

Investigated the effects of raw materials inventory management on the profitability of brewery firms in Nigeria using a cross sectional data from 1989 to 2008 which was gathered for the analysis from the annual reports of the sampled brewery firms. Measures of profitability were examined and related to proxies for raw materials inventory management by brewers. The Ordinary Least Squares (OLS) stated in the form of a multiple regression model was applied in the analysis. The study revealed that the local variable raw materials inventory management designed to capture the effect of efficient management of raw material inventory by a company on its profitability is significantly strong and positive and influences the profitability of the brewery firms in Nigeria. They concluded that efficient management of raw material inventory is a major factor to be contained by Nigerian brewers in enhancing or boosting their profitability.

Nyabwanga and Ojera (2012)

They Highlighted the association between inventory management practices and business performance of small scale enterprises (SSEs), in Kisii Municipality, Kisii County, Kenya. They used a cross-sectional survey study based on a small sample size of 79 SSEs. The study inferred that inventory comprised the maximum portion of working capital, and improper management of working capital was one of the major reasons of SSE failures. The empirical results disclosed that a positive significant relationship existed between business performance and inventory management practices with inventory budgeting having the maximum influence on business performance ensued by shelf-space management. The study suggested that by following effective inventory management practices business performance can be enhanced.

Sahari, Tinggi and Kadri (2012)

Empirically analyzed the relationship between inventory management and firm performance along with capital intensity. For the purpose they took a sample of 82 construction firms in Malaysia for the period 2006–2010. Using the regression and correlation analysis methods, they deduced that inventory management is positively correlated with firm performance. In addition, the results indicate that there is a positive link between inventory management and capital intensity.

Soni (2012)

Made an in depth study of practices followed in regard to inventory management in the engineering goods industry in Punjab. The analysis used a sample of 11 companies for a period of five years, that is, 2004–2009 and was done using a panel data set. The adequate and timely flow of inventory determines the success of an industry. She concluded that the size of inventory enhanced marginally over the period as compared to a hike in current assets and net working capital. Inventories constituted half of the working capital which was due to overstocking of inventory as a result of low inventory turnover especially for finished goods and raw materials. Rise in sales and favorable market conditions lead to a rise in inventory levels. It was also inferred that sales increased more as compared to inventory.

Lwiki et al (2013)

A survey conducted on all the eight (8) sugar manufacturing firms in Kenya established that there is generally positive correlation between each of inventory management practices. Specific performance indicators were proved to depend on the level of inventory management practices. They established that Return on Equity had a strong correlation with lean inventory system and strategic supplier partnerships. As such, they concluded that the performance of sugar firms could therefore be stated as being a function of their inventory management practices.

Panigrahi (2013)

Undertook an in-depth study of inventory management practices followed by Indian cement companies and its effect on working capital efficiency. The study also investigated the relationship between profitability and inventory conversion days. The study, using a sample of the top five cement companies of India over a period of 10 years from 2001 to 2010, concluded that a considerable inverse linear relationship existed between inventory conversion period and profitability.

Madishetti and Kibona (2013)

Found that a well designed and executed inventory management contributes positively to a small or medium-sized enterprises (SMEs) profitability. They studied the association between inventory conversion period and profitability and the impact of inventory management on SMEs profitability. They took a sample of 26 Tanzanian SMEs, and used the data from financial statements for the period 2006–2011. Regression analysis was adopted to determine the impact of inventory conversion period over gross operating profit. The results cleared out that a significant negative linear relationship occurred between inventory conversion period and profitability.

Srinivas Rao Kasisomayajula(2014)

An analytical study was conducted on" Inventory Management in Commercial Vehicle Industry In India". A sample of five companies' was selected for study. The study concluded that all the units in the commercial vehicle industry have a significant relationship between Inventory and Sales. Proper management of inventory is important to maintain and improve the health of an organization. Efficient management of inventories will improve the profitability of the organization.

Edwin Sitienei and Florence Memba(2015)

Conducted a study on Effect of Inventory Management on profitability of Cement Manufacturing Companies in Kenya. The study concluded that Gross profit margin is negatively correlated with the inventory conversion period, Increase in sales, which denotes the firm size enriches the firm's inventory levels, which pushes profits upwards due to optimal inventory levels. It is also noted that firms inventory systems must maintain appropriate inventory levels to enhance profitability and reduce the inventory costs associated with holding excessive stock in warehouses.

References:

1. A Study of Inventory Management System Case Study. Source: ResearchGate. Authors: Tariq Sheakh & Nazar Sohail.

   Website:
   https://www.researchgate.net/publication/327793184_A_Study_of_Inventory_Management_System_Case_Study

1. A Study of Inventory Management System of Linamar India Pvt. Ltd, Pune. Source: Amity University. Authors: Anajali Mishra & Harshal Anil Salunkhe.

   Website: https://amity.edu/userfiles/admaa/da2a0paper%204.pdf

2. Study and Analysis of Inventory Management Practices in Small Scale Industry. Source: Journal of Emerging Technologies and Innovative Research. Author: Dr. Nagendra Sohani & Ajay Pagare.

   Website: https://www.jetir.org/view?paper=JETIR1401001

3. Performance Improvement of Inventory Management System Processes by an Automated Warehouse Management System. Source: ScienceDirect. Authors: Anas M.Atieh, HazemKaylani, Yousef Al-abdallat, Abeer Qaderi, Luma Ghoul, Lina Jaradat, & Iman Hdairis.

   Website: https://www.sciencedirect.com/science/article/pii/S2212827115012019

4. A Study of Inventory Management System of Linamar India Pvt. Ltd, Pune. Source: Grin. Authors: Yetayew Alemu.

   Website: https://www.grin.com/document/381182

5. On Models of Inventory Management Under Uncertainty. Source: ReadCube. Authors: Serhii Ziukov.

   Website: https://www.readcube.com/articles/10.13165/vse-15-5-1-03

6. An Informative Literature Review On Inventory Control System. Source: Journal of Emerging Technologies and Innovative Research. Authors: Rashmi Mishra & Puneet Shukla.

   Website: https://www.jetir.org/view?paper=JETIRA006108

7. A Study on Inventory Control and Management Techniques. Source: IJSTM. Authors: Manthan Pagare, Santosh Kumar Yadav, Rupesh Mahale, Mahendra Pawar, Pankaj Patil, Dinesh Bhadane.

   Website: http://www.ijstm.com/images/short_pdf/1454563174_284.pdf

8. Literature Review on Inventory and Material Management in Construction Industries. Source: IJRTI. Authors: Prajwal G. Pagare & Aditi R. Sonawane.

   Website: https://ijrti.org/papers/IJRTI2205106.pdf

9. A Study on Inventory Management and Control. Source: ReadCube. Authors: Pratap Chandrakumar. R & Gomathi Shankar.

   Website:http://ijariie.com/AdminUploadPdf/A_study_on_Inventory_Management _and_control_ijariie6498.pdf

10. A Review of Inventory Management System. Source: IJARCCE. Authors: Varalakshmi G S & Asst Prof. Shivaleela S.

Website:
https://ijarcce.com/wp-content/uploads/2021/07/IJARCCE.2021.10689.pdf