

AN INFORMATIVE LITERATURE REVIEW ON INVENTORY CONTROL SYSTEM

Rashmi Mishra, Puneet Shukla

Department of Applied Science & Humanities (Mathematics)
G.L. Bajaj Institute of Technology & Management, Greater Noida

ABSTRACT – In supply chain management inventory control is a challenging problem. To fulfill customer demand, companies require to have sufficient inventories in stock meanwhile these inventories have holding costs and this is frozen fund that can be lost and burdens the company's account. Therefore, the task of inventory management is to find the quantity of inventories that will fulfill the demand, avoiding overstocks. In the present paper, an attempt is made to provide an up-to-date and complete review of existing literature, concentrating on descriptions of the characteristics and types of inventory control models that have been developed by Indian as well as Foreign authors.

KEY WORDS-Inventory Management, Survival, Working Capital, Liquidity and Profitability, models under uncertainty, EOQ, EPQ.

INTRODUCTION

The word inventory refers to the goods or resources used by a firm for the purpose of production and sale. Inventories include the matter, which are used as helpful materials to ease production. Every management problem is a decision problem. For any organization Decision is important task which they have to make in the interest of their organization. A very common issue to all organizations is the allocation of resource. For the achievement of their business's objectives organizations have to acquire, allocate and control the factors of their production. A major preoccupation for any company's survival and growth, Inventory control is one of the key activities of business logistics. To hold inventories at the least possible cost, given the objectives to ensure uninterrupted supplies for ongoing operations is the main purpose of inventory control. Management has to find a suitable compromise between the different cost components like the costs of supplying inventory, inventory holding costs and costs resulting from insufficient inventories, while making decisions on inventory. Inventory control consists of so many factors simultaneously for example storage, handling of seasonal products and variation in lead time in reference to date of expiration and application of preservation technology for the economy of the system. In the manufacturing process, supply of goods and service delivery the material management is one of the important stages. In the present paper we have reviewed the work of different researchers in the field of inventory control consisting of essential findings, theoretical as well as methodological contributions.

Here, we take a look on some symptoms of poor inventory control

Symptoms of poor inventory control

There are certain number of symptoms which are helpful in discovering poor inventory control. Following elements are mentioned by Lambart and Stock (2001:254-255) in order to diagnose poor inventory control.

- An increase in number of back orders
- Increasing investment in inventory while back orders remaining constant
- High turn over rate of customer.
- An increase in number of cancelled order.
- Periodic dearth of adequate storage space
- Wide inconsistency in turn over of inventory circulation centres and among foremost inventory items.
- Abating relationships with arbitrators as typified by supplier cancellations and declaring orders.
- Enormous quantities of obsolescent items.

In many occasions, inventory levels can be compressed by one or more of the following steps:

- (i) Multi-echelon inventory forecasting. ABC analysis is an example of such forecasting
- (ii) Lead time analysis.
- (iii) Delivery time analysis. This may lead to an amendment in carriers or intervention with existing carriers.
- (iv) Exclusion of turnover and / or obsolescent items.
- (v) Analysis of pack size and concession structure.
- (vi) Investigation of returned goods system.
- (vii) Reinforcement / automation of product substitution.
- (ix) Setting up of formal re-order review system.
- (x) Depth of fill rates by stock-keeping unit (SKU).
- (xi) Analysis of consumer demand individualities

Now we review work of some researchers on inventory management control system.

Abramovitz and Modigliani (1957)

They highlighted association connecting capacity utilization and inventory investment. Existing level inventories was expected for adjust with required levels. Thus variable, existing stock of inventories, was essential to be negatively related with

the required stock. The result was may be positive relation among the ratio of inventory to sales and inventory expenditure. Highratio of stocks to sales in the past suggests requirement of high levels of inventories in the past and promising high expenditure involves in inventories in the current period also.

Krishna Murthy (1964)

Investigation was aggregative and dealt with inventories in the private sector of Indian financial system aggregative during period 1948-61. This investigation used sales to represent requirement of product and suggested the importance of accelerator. Shortterm rate of interest had also been found to be significant.

R.S. Chadda (1964)

Investigation 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 expenditure in inventory however there is continuous running production.He argued that industrially advanced countries, like, USA, were engaged in developing highly sophisticated mathematical models as well as techniques for modernizing and redefining the existing tools on inventory expenditure.

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

Conducted a study in 1966 regarding working financial management on three production organization namely cement, fertilizer and sugar. This study mainly devoted to ratio analysis on composition, utilization and financing about working fund during 1959 to 1963. The study reveals that inventory constituted a major portion of working fund i.e. 74.06 per cent in the sugar company followed on cement company (63.1%) and fertilizer company (59.58%). It was observed that inventory had not managed properly. So far as the utilization about working fund was concerned, cement and fertilizer company had better implementation about working fund. The sugar company had huge accumulation of stocks so there was inefficient utilization of working fund heavily.

The administrative reforms commission(1967) has made some recommendations for reducing inventory levels. **The RBI study group(25)** appointed to frame guidelines and to lay down norms for bank credit applicable to all classes of industrial borrowers (popularly known as Tandon Committee Report), has classified inventories prescribing inventory norms for fifteen industries. **The committee on inventory control(26)** appointed by Bureau of Public Enterprises (BPE) in 1972 examined inventories of the three public sector undertakings viz, Hindustan Shipyard Limited (HSL), Hindustan Cables Limited (HCL), National Mineral Development Corporation Limited (NMDCL). The committee fixed inventory levels for HSL and made some concrete recommendations to reduce inventory levels in all the three undertakings

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 analyse each of the major components, like the raw materials, products-in-process and finished products, for 21 industries during 1946-62. That study was 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 as well as short-term rate of interest was found to be an important determinant. Also utilisation of manufacturing efficiency with price anticipations was also found to be relevant on study.

George (1972)

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

Mishra (1975)

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

Bansal(1976) in his study on Materials Management: A case Study of Bharat Heavy Electricals Limited, Bhopal Unit, (BHEL), has evaluated the existing systems of inventory management. He emphasises. The need for automatic replenishment system in the undertaking offer studying the application of ABC analysis and EOQ technique of inventory control. He also points out the accumulation of surplus stores and non-moving items in the organization and recommends that the surplus and absolute stores which are no longer required should be disposed off as early as possible at the best available price. Further, he suggests the preparation of monthly class wise statements on inventories for effective control over them and the introduction of reconciliation system of stores ledgers with account ledgers to avoid misappropriation of stores, and spares for production and operation are above their actual consumption level. The inventories in general are found to be above their routine requirements. The holdings of stores and spares corresponding to two to three years requirements should be considered excess.

Lambrix and Singhvi (1979)

Adopted working fund cycle approach in working fund management, also suggested that investment in working fund 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 involve price variable in inventory management;earlier price variable in inventory was 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 mathematical model, to assist industries on 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 economic order quantity model describes how can minimizing expenditure on inventory rather than minimizing stock inventory. In ideal condition where all the conditions meet, it is economically better off to choose the JIT over the EOQ because it results on purchase price, request price.

Rich Lavelly (1998)

He claims the stock inventory means “Piles of Money” on the shelf and the profit for the firm. However, he notices that 30% stock of maximum retail shops being dead. Thus, he argues the stock control is facilitate shop operations by minimizing rack time and thus increases business margin. He also elaborates two types on stock calculations which determine stock level required for business margin. There are two calculations such as “ordering cost” and “keeping cost”. Finally, he proposes seven steps for controlling of inventory.

Dave Piasecki (2001)

He focused on various model of inventory to calculating optimum purchase quantity which used the EOQ method. He points out that many companies are not using EOQ model because of poor results resulted from inaccurate data input. He says that EOQ is an accounting formula which determines point at which combination of ordering costs and stock inventory costs are the least. He highlights that EOQ method would not conflict with the JIT approach. He further elaborates the EOQ model formula that includes parameters like yearly usage on unit, order

cost and carrying cost. Finally, he proposes several steps to follow in implementing the EOQ model. Now this literature limitation is as it does not elaborate further association among EOQ and JIT. It does not associate stock turns with EOQ so fails for mention profit gain with associated stock is calculated.

Sambasiva Rao. K(2002) According his investigation on Materials Managing in Public Sector Ship Building Industry evaluates. Output of materials managing and identifies some problems faced by materials managing in the heavy engineering industry. This investigation method involves the 68 documentary evidence and survey of expert opinion. He evaluates the existing purchase systems and lead time involved on procurement of stock item and advised the long lead time shall be reduced. His research points at additional stock in terms on months production cost in all the engineering units. He also highlights some of the problems in the area on materials managing such as delay in customer part on supplying own stock item, existence and disposal of surplus and non-moving items, excessive lead times and excessive dependence on imports. He claims that administrative and procurement lead times for organization are on the higher side according to peculiar nature of industry. He suggests liberalized purchase procedures, increased capital powers to the personnel, Opening up of liaison offices in various countries to reduce the lead time.

Gaur, Fisher and Raman (2005)

In their study examined firm-level inventory behavior among retailing companies. They took a sample on 311 public-listed retail firms for years 1987–2000 for investigate relationship on stock turnover about gross margin, capital intensity, sales surprise. All observed that stock aggregate turnover for retailing company was positively related to capital intensity with sales surprise while inversely related gross margins.

S. Singh (2006)

Analysed stock control exercises on single fertilizer company named IFFCO. He statistically examined stock level according consumption, sales as well as other variables along growth on these variables with inventory patterns. He concluded increments in components of stocks lead to increment in the proportion on stock in current assets. The special attention was made in stores with spares for calculate excess purchases resulting

Pradeep singh (2008)

In his study made an attempt to investigate stock with working capital managing Indian Farmers Fertilizer Cooperative Limited (IFFCO) / National Fertilizer Limited (NFL).

He concluded that overall position of the working fund of IFFCO / NFL is satisfactory. But there arises need for improvement in stocking as situation of IFFCO. Although stock were not properly utilized as well as maintained bay IFFCO during investigation period. Also managing organization of NFL surely try to properly utilize stock with try to care stock according to requirements. So that liquidity will not interrupt.

Capkun, Hameri and Weiss (2009)

Statistically analysed the association among stock levels with fund situation in manufacturing companies using capital information on large sample on US-based production units over a 26-year period, during, 1980 to 2005. According to them a significant relationship existed between inventory performance along with the performance of its components and profitability.

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 as inversely associated

with business performance while raw material inventory and work in progress did not have much effect on same. They emphasised 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)

He researched the changes of raw stock inventory management system with margin of beer company in Nigeria during data from 1989 to 2008 which had gathered for 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. Research analysed that local variable raw stock inventory managing system design such a way to capturing changes of efficient management of raw stock inventory on behalf of company in terms of their margin 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 with by Nigerian brewers in enhancing or boosting their profitability.

Nyabwanga and Ojera (2012)

Their research concentrate relationship among inventory management with business performance of smallscale 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. n loss of profit.

Sahari, Tinggi and Kadri (2012)

They focused on association among the inventory management system and company performance corresponding to fund capability. Therefore according to that reason they looked 82 sample construction company in Malaysia during period of 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

five years, that is, 2004–2009 and was done using panel data set. The adequate and timely flow of inventory determines the success of an industry. She concluded that 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 favourable 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)

According to his analysis inventory management practices used by Indian cement firms and their effects must be on working fund 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 there must be exist inverse relationship among conversion period of inventory and profit margin.

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 significant negative linear relationship occurred between inventory conversion period and profitability.

Srinivas Rao Kasisomayajula (2014)

His research title based on the "Inventory Management in Commercial Vehicle Industry In India". There were five sample firms had preferred for study. The study concluded that all the units in the commercial vehicle industry have 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 an appropriate inventory levels to enhance profitability and reduce the inventory costs associated with holding excessive stock in warehouses.

CONCLUSION

Research in the area of materials management both at the Macro and the Micro levels remains conspicuously absent in India as adequate indigenous literature is not available on this subject. However, of late, on account of its growing importance, few research studies have been conducted at various universities in our country which highlight some of the problems faced by the selected central and the state public sector undertakings.

In any business, make it big or small, we must understand that taking good care of our inventory is very important. If we as managers do not understand the concept of good inventory management, we must learn to be familiar with it and its applications. For failure of any business only inventory management is responsible. Now to fight for failure there are various ways so we could begin from there. Hence using various latest technology we could maintain and minimize our inventory. Thus by learning, implementing and evaluating we could do our business with managed inventory.

References:

- [1] Abramovitz & Modigliani, Franco (1957), "Business Reasons for Holding Inventories and Their Macro Economic Implications", Problems of Capital Formation, Studies in Income and Wealth, Vol. 19, NBER, pp. 495-511
- [2] Chadda, R.S (1964), "Inventory Management in India", Allied Publishers, Bombay, 1964
- [3] Krishnamurthy K., "Private Investment Behaviour in India: A Macro Time Series Study", Arthaniti, January 1964.
- [4] NCAER, Structure of Working Capital, New Delhi, 1966. Administrative Reforms Commission, Report on Public Sector Undertakings, New Delhi, 1967
- [5] Krishnamurthy S. & Sastry D.U., inventories in Indian Manufacturing, Institute of Economic Growth..., Books Ltd., Mumbai, 1970;
- [6] George, P. V (1972), "Inventory Behaviour and Efficacy of Credit Control", Anvesak, No.2, Vol.II, 1972, pp. 168-175.
- [7] Investment and Financing in Corporate Sector in India, Tata McHill publishing Company, New Delhi, 1975.
- [8] Mishra (1975), "Problems of Working Capital with special reference to selected Public Sector Undertakings in India", Somiya Publications Private Limited, 1975.
- [9] Bansal G.D., 1976, 'Materials Management: A Case Study of Materials Management in Bharat Heavy Electricals Limited (BHEL)', Bhopal Unit', Ph.D., thesis submitted to Jiwaji University, Gwalior
- [10] Lambrix, R.J and Singhvi, S.S (1979), "Managing the Working Capital Cycle", Financial Executive, June 1979, pp. 32-41.
- [11] Lal, A.B (1981), "Inventory Models and Problems of Price Fluctuation", Shree Publishing House, New Delhi, 1981.
- [12] Lieberman, M.B. & Demeester, L. (1999). Inventory reduction and productivity growth: Linkages in the Japanese automotive industry. Management Science, vol.45, iss.4, pp.466-476.
- [13] Sambasiva Rao K., Singh, Sukhdev. (2006). Inventory control practices in IFFCO. The Management Accountant, vol.41, iss.7, pp.577-582.
- [14] Pradeep Singh (2008), "Inventory and Working Capital Management- An Empirical Analysis", The ICAI Journal of Accounting and Research, Vol.VII, NO.2, pp.53-73
- [15] Capkun, Vedran, Hameri, Ari-Pekka & Weiss, Lawrence A. (2009). On the relationship between inventory and financial performance in manufacturing. International Journal of Operations & Production Management, vol.29, iss.8, pp.789-806.
- [16] Gaur, Jigyasu & Bhattacharya, Sourabh. (2011). The relationship of financial and inventory performance of manufacturing firms in Indian context. California Journal of Operations Management, vol. 9, iss.2, pp.70-77.
- [17] Krishnankutty, Raveesh. (2011). Panel data analysis on retail inventory productivity. The Economic Research Guardian 1(1), pp.16-23.
- [18] Eneje, B. C., Nweze, A .U. & Udeh, A. (2012). Effect of Efficient Inventory Management on Profitability: Evidence from Selected Brewery Firms in Nigeria. International Journal of Current Research, vol.4, iss.11, pp.350-354
- [19] Nyabwanga, Robert Nyamao & Ojera, Patrick. (2012). Inventory management practices and business performance for small scale enterprises in Kenya. KCA Journal of Business Management, vol.4, iss.1, pp.11-28.
- [20] Madishetti, Srinivas & Kibona, Deogratias. (2013). Impact of inventory management on the profitability of SMEs in Tanzania. International Commerce & Management, vol.4, iss.2, pp.1-6.
- [21] Anichebe, N. A. & Agu, O. A. (2013). Effect of Inventory Management on Organizational Effectiveness. Information and Knowledge Management, vol.3, iss.8, pp. 92 - 100.
- [22] Panigrahi, Ashok K. (2013). Relationship between inventory management and profitability: An empirical analysis of Indian cement companies. Asia Pacific Journal of Marketing & Management Review, vol.2, iss.7, pp.107-120
- [23] Srinivasa Rao Kasisomayajula (2014) "An Analytical Study on Inventory Management in Commercial Vehicle Industry in India", International Journal of Engineering Research, Vol.3, Iss.6, pp.378-383.
- [24] Sanjiv Mittal, R.K. Mittal, Gagandeep Singh, Sunil Gupta (2014). "Inventory Management in Fertiliser Industry of India: An Empirical Analysis" Asia-Pacific Journal of Management Research and Innovation, vol.10, iss.4, pp. 291-303.
- [25] Viplesh Shardeo (2015), "Impact of Inventory Management on the Financial Performance of the firm" IOSR Journal of Business and Management (IOSRJBM). Vol. 17, Iss. 4, pp. 01-12.
- [26] Edwin Sitienei, Florence Memba (2015-16) "The Effect of Inventory Management on Profitability of Cement Manufacturing Companies in Kenya: A Case Study of Listed Cement Manufacturing Companies in Kenya" International Journal of Management and Commerce Innovations Vol. 3, Iss. 2, pp. 111-119.
- [27] Soni, Anita. (2012). Inventory management of engineering goods industry in Volume : 5 | Issue : 8 | August 2016 ISSN - 2250-1991 | IF : 5.215 | IC Value : 77.65 216 | PARIPEX - INDIAN JOURNAL OF RESEARCH Punjab: An empirical analysis. International Journal of Multidisciplinary Research, vol.2, iss.2, pp.247-261.