Chapter-II

Review of Literature
Inventory, in most of the industries, accounts for the largest proportion of gross working capital. A number of studies, therefore, have been conducted to find the determinants of investment in inventories. The following discussion provides a brief review of studies, dealing with factors influencing investments in inventory in India.

Economic studies to analyze the factors that influence inventory accumulation in India, are based on time series and pooling of cross section of time series data pertaining to manufacturers’ inventories. Krishnamurty’s study (1964) was aggregative and dealt with inventories in the private sector of the Indian economy as a whole for the period 1948-61. This study used sales to represent demand for the product and suggest the importance of accelerator. Short-term rate of interest had also been found to be significant.

Sastry’s study (1996) was a cross-section analysis of total inventories of companies across several heterogenous industries for the period 1955-60 using balance sheet data of public limited companies in the private sector. The study brought out the importance of accelerator represented by change in sales. It also showed negative influence of fixed investment on inventory investment.

Krishnamurty and Sastry’s study in 1970 was perhaps the most comprehensive study on manufacturers’ inventories. They used CMI data and the consolidated balance sheet data of public limited companies published by RBI, to analyze each of the major
components i.e. raw material, goods-in-process and finished goods for 21 industries over the period 1946-62. It was a time series study but some inter-industry cross section analysis had also been done. Accelerator represented by change in sales, bank finance and short-term interest rate were found to be important determinants. Utilization of productive capacity and price anticipations had been found to be of some relevance. Another study conducted by them in 1975 analyzed inventory investment in the context of flexible accelerator with financial variables. Both RBI and Stock Exchange Official Directory, Mumbai data for seven important industries had been taken for the period of 1956-69. Their study of pooled cross section was in current prices whereas time series analysis based on RBI data was a constant price. OLS results showed the important influence of accelerator, internal and external funds flow and fixed investment on inventory investment.

Materials management has been considered as a separate field of management discipline only in the recent past and is accorded the status of a separate functional area. While the concept got wide popularity and recognition in all the advanced countries. In India, it is yet at an infant stage. On account of its latest origin, unfortunately research in the area of materials management both at the micro and macro levels was conspicuously absent. There does not exist adequate indigenous literature on this subject. However, in recent years on account of the growing importance of material management, few research studies were conducted at various universities in our country.
which highlighted some of the problems faced by selected central and state public sector undertakings in the country. Apart from the above research work, a few studies were conducted at Administrative Staff College of India, Hyderabad and some studies were conducted by individual authors which focused to some extent on the existing policies, procedures and problems of industrial organizations in the field of materials management. Besides the above studies, there are a number of reports submitted by governmental committees from time to time. In addition to this, some studies were conducted on Inventory Management in India.

Bansal G.D., in his study on Material Management, A Case Study of Bharat Heavy Electrical Limited, Bhopal unit, (BHEL)’, has evaluated the existing systems of inventory management. He emphasized the need for automatic replenishment system in the undertaking. He also studied the application of ABC analysis and EOQ technique of inventory control. He also pointed out the accumulation of surplus stores and non-moving items in the organization. He recommended that the surplus and obsolete stores, which are no longer required, should be disposed off as early as possible at the best available price. Further, he has suggested the preparation of monthly classwise statements on inventories for effective control over them. And he suggested the introduction of reconciliation of stores’ ledgers with account ledgers to avoid misappropriation of stores. The study also revealed that raw material, components and 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 generally are of the order of two to three years’ requirements and these are considered as excess.

Rama Krishna Rao B., in his thesis ‘Materials Management in Heavy Engineering Industry’ a case study of Bharat Heavy Plate & Vessels Limited (BHPV), Visakhapatnam in 1979, he has evaluated the performance of materials management in BHPV and identified some problems pertaining to materials management in BHPV in particular and heavy engineering industry in general. The method of investigation involves documentary evidence and survey of expert opinion. He has evaluated the existing purchase systems and lead-time involved in procurement of materials and suggested that the long lead-time should be reduced. His study pinpointed the excess inventory in terms of number of months cost of production in all the engineering units. He also highlighted some of the problems in the area of materials management such as delay on the part of customers in supplying their own materials, existence and disposal of surplus and non-moving items, excessive lead time and excessive dependence on imports. He also found that the administrative and procurement lead times of the company are on the higher side due to the peculiar nature of the industry. He suggested the liberalized purchase procedures, increasing financial powers to the personnel, opening up of liaison offices in various countries to reduce the lead-time. In comparison with the BPE norms, the inventory levels of various stores items in
Phaniswara Raju B produced a research work entitled ‘Materials Management in Andhra Pradesh State Road Transport Corporation (APSRTC) in the year 1986. In his study, he examined the materials management practices and purchasing systems in APSRTC on the basis of various parameters like material consumption per vehicle, material consumption per kilometer, inventory per vehicle, inventory in terms of number of month’s consumption etc. He highlighted some major problems in the procurement of materials. The study was primarily based on secondary data collected from published annual reports of APSRTC, the records of MIS, the reports on performance of Nationalized Road Transport Undertaking of CIRT, Pune etc., coupled with personal interview with various officials of the corporation. The study revealed the increasing levels of materials consumption in APSRTC as compared to other undertakings. He observed the absence of the use of important analytical techniques like value analysis and network techniques in the purchasing system of APSRTC.

The inventory control system in APSRTC was critically examined in respect of stock out pattern, reordering and review policies, lend time patterns, stock out levels etc. He mainly suggested the reclassification of stores items based on the
criticality, the refixation of reorder level and reorder quantities. The study also showed the wastage caused by maintenance of unnecessary stock records relating to items, which were no longer used.

Hari R. Swami in his research work “Materials Management in Public Undertakings” has evaluated the performance of materials management in the central public undertakings in Rajasthan such as, Instrumentation Limited, Kota unit: HMT, Ajmer unit: Hindustan Zink Limited, Debari unit; Hindustan Copper Limited, Khetri unit and Sambhar Salts Limited. The study covered various aspects of materials management in these enterprises from 1977-78 to 1981-82. The methods of investigation include questionnaire interview, on the spot study and deskwork techniques etc. It has been observed that the cost of materials accounts for more than 50 per cent of the total cost of production in the selected units of the study. Unfortunately, the importance of proper materials management was not fully realized by public undertakings in Rajasthan and very little attention has been paid so far, to the task of controlling investment in inventories through the application of various scientific techniques of materials management. The research opined that, materials management should not cover the inspection function, as it requires an autonomous and independent status in the organization. The study revealed that the lead-time in the selected public enterprises was considerably long and suggested to reduce administrative lead-time by expediting purchase files. The study also revealed
that the inventory of selected public enterprises had been accumulated due to the following reasons: faulty purchases, heavy rejections, high lead time, uncongenial organization, lack of scientific and modern techniques of materials management, defective inventory control and inflationary tendencies in the economy. He suggested that the inventory holdings could be reduced by adopting integrated system of materials management, appointing qualified and trained inventory managers, reducing lead time, setting and regulating consumption and stocking norms of raw materials and other goods, applying modern techniques of materials management and identifying slow and non-moving items. The study tested fully its hypothesis “the public enterprises had suffered losses or earned low level of profits relates to the inefficient management of materials. If the public enterprises followed standard techniques of materials management, they would not only generate resources for their own expansion but would also have contributed towards economic growth.” The very important reason for public enterprises having suffered losses or earned low level of profits relates to the inefficient management of materials. Had public undertaking in Rajasthan managed materials in an efficient and effective manner, they would not only have generated resources for their own expansion but would also have contributed towards economic growth.

In the year 1980, K. Sambasiva Rao conducted a research study entitled “Materials Management in Public Sector Shipbuilding Industry.” He made a review of studies conducted
earlier on materials management in the Indian industries and he threw light on planning and budgeting of materials management in Hindustan Shipyard Limited. He did an in-depth study in the areas of procurement of materials, codification and standardization, vendor analysis, and inventory control in the light of inventory norms fixed by the Bureau of Public Enterprises of the company under study. He conducted the study under certain limitations like absence of proper records, confidential nature of the information, un-disclosure of certain information, reluctance of officials in providing the necessary data pertaining to inventory control.

In his study, he highlighted the problems faced by the Indian shipbuilding industry in general and specific problems of Hindustan Shipyard Limited. The problems include international parity price on the involvement of the directorate of shipping in fixing the price of the ships constructed. Inadequate use of installed capacity, paucity of funds, paucity of orders, paucity of trained manpower, high cost of material inputs, delays in procurement of material and equipment, due to the undevelopment and underdevelopment of ancillary units, the shipbuilding industry is facing severe hardships in obtaining the necessary inputs by paying scarce foreign exchange reserves. Even if at all there are some indigenous ancillary industries to shipbuilding industry, the prices of the products of ancillaries tend to be high because of the incidence of duties, taxes and high overhead schedules are postponed after receipt of major material
and components due to lack of coordination among the various departments by drawing offices, production planning and control department, purchase department, stores organization and production department.

Finally, his study highlighted the significance of materials management function in shipbuilding industry and suggested that the procurement policies, procedures and systems need to be improved to achieve higher operational efficiency in this critical area.

In the year 1996, (Ms) Prameela Devi did a research work entitled “Materials Management in Public Sector Heavy Engineering Industry. A Case Study of Bharat Heavy Plates and Vessels Limited, Vishakapatnam.” She laid emphasis on the problems faced by materials management department in BHPV Limited. She did a comparative study of inventory management practices of BHPV with the public sector heavy engineering units. She found some weaknesses in the materials management function of BHPV and suggested some measures to turn up the materials management function and for the overall performance of BHPV Limited. She highlighted the difficulties of materials management in jobbing industry like BHPV with that of the industrial units, which are of continuous process industry. The researcher observed that frequent changes taking place in materials management adversely affects the smooth functioning of materials management.
She also observed that the number of items in the inventory is on the increase and she suggested that enforcing strict control on the delegation of powers should curb it. For determination of the appropriate quantity to be procured and minimum capital without any delay in the production is of importance, in satisfying the conflicting interests. For it, she gave some solutions like SIM (selective inventory management) which consists of Pareto analysis (ABC analysis), criticality analysis (VED analysis), movement analysis (FSN analysis) and availability analysis (SED, GOLF, SOS etc.).

She further highlighted the deficiencies of the management and they are as follows. Adoption of inventory control methods like classification, codification, and standardization, variety reduction, value analysis, ABC analysis is not systematically implemented. Economic order quantity was not adopted. Vender rating techniques and value analysis were not followed. Materials management manuals were not even prepared in BHPV. Buying cost or inventory carrying cost of materials was not worked out systematically. Computerization was not extensively done.

So far, a good number of research studies were conducted by different researchers in different institutions in universities and they tried to cover all the aspects of materials management in both public sector and private sector industrial units located throughout the country. But there was not even a single work done in the area of materials management in shipbuilding units managed by defence production department. As such, researcher
found this gap and took up the study of “Materials Management in Indian Shipyards: A Case Study of Goa shipyard Limited.”


In addition to the above mentioned text books, which deal with all the aspects of materials management, thee are some other text books exclusively on inventory management such as Inventory Management in India (Chandda R.S., 1984), Inventories in Indian

In all these books, an attempt had been made by the respective authors to explain the concepts, importance, tools and techniques and problems of inventory management with some case studies. For instance, Krishna Murthy and Sastry have studied inventory behaviour of 21 industries comprising 91 per cent of output and 96 per cent of inventories of the group of the industries covered by the census of manufacturers. The study deals only with inventory holdings of the manufacturers and the analysis is mainly in terms of the prices prevailed during the study period.

Similarly, the IFMR’s survey “Inventory Management” summarizes briefly the findings of four important surveys, it conducted in the area of inventory management practices in Indian industry. A study on control practices in Indian industry conducted by the faculty members of the Jamnalal Bajaj Institute of Management Studies, University of Bombay concluded that most of the companies were still guided by rules of thumb and
intuition in deciding on how much capital to invest in inventory. Out of the 224 companies approached, 36 responded and among them only 13 reported using inventory control techniques. Only six out of the 13 companies took into account inventory costs in controlling inventories.

The faculty members of the Administrative Staff College of India made a survey on spare parts management practices in India in 1977. 200 organizations were covered under this study. The survey findings indicate that a major bottleneck is the painful slow process of import substitution. This is mainly because inability of ancillaries to provide quality goods, scarcity of certain raw materials etc.

The faculty members of the Administrative Staff College of India made another study on inventory management practices with a focus on the Tandon Committee recommendations concerning inventory norms. The study indicated that industries were found to carry by an large more stocks of raw materials including spare parts and imported items than the suggested norms by Tandon Committee. It also revealed that industries except in engineering and textile sectors were managing the work-in-progress inventory within the specified norms.

To highlight the range of problems affecting inventory management and to get an appreciation of the techniques and practices adopted in the Indian context and to tackle these problems, the IFMR has conducted an empirical study on inventory management practices in public sector undertakings
and public limited companies in the private sector in 1979. While it was intended to cover 200 organizations, response was actually received from 48 organizations only. The study revealed that a majority of the respondents gave high priority in inventory management, to the financial objectives of maximizing the return on the investment. It also revealed that there is considerable scope for reducing the spares inventory in the engineering and process industries. There is a general lack of appreciation of the benefits of, and the need for integrated materials management. Most of the respondents viewed that materials management functions as a service centre, and a few conferred on it the status of a profit centre. In most instances, there is a very strong case for the materials management function to be elevated too much higher status with close and continuing association with top management.

In addition to this, there are a number of reports submitted to the government from time to time. For instance, the committee on public undertakings in its 40th report on “Materials Management,” Parliamentary Committee on Public Sector Undertakings, pointed out source of the deficiencies in the realm of materials management of the public sector undertakings in India. The BPE ‘Guidelines for Materials Management in Public Sector Enterprise’, Bureau of Public Enterprises, Ministry of Finance, Government of India, New Delhi, 1979 has issued guidelines on material management to the public sector
undertakings to introduce modern methods and for improving their materials management function.

The administrative reforms commission, Report on Public Sector Undertakings, New Delhi, 1967 made some recommendations for reducing inventory levels. The RBI Study Group, on the follow-up of Bank credit, Bombay, 1975 was appointed to frame guidelines and to lay down norms for bank credit to be made applicable to all classes of industrial borrowers (popularly known as Tandon Committee report). It classified inventories and prescribed inventory norms for 15 industries. The Fifth report of the Committee on Inventory control, Bureau of public enterprises (BPE), Ministry of Finance, Government of India, New Delhi, 1972 appointed by BPE in 1972 examined inventories of the following three public sector undertakings – viz., Hindustan Shipyard Limited, Hindustan Cables Limited, and National Mineral Development Corporation Limited. The committee fixed inventory levels for HSL and made some concrete recommendations to reduce inventory levels in all the three undertakings.

Apart from the research studies conducted at various universities and institutions and textbooks published on the subject, there are a few famous journals on materials management published in India. Though the journals, experts, professional and practitioners in the field of materials management have shared their thoughts in the form of writings. Hereunder, an attempt has
been made to review some of the important articles published in various journals in India.

published in *Lok Udyog*, New Delhi, felt that the key result areas in material function have a direct and important bearing on productivity or purchasing, transportation, materials handling and realizations from disposal of obsolete surplus and waste products in Food Corporation of India (FCI). He also felt that the materials management is a profit center of great importance in industries where 50 to 60 per cent of the cost of production is on materials and where the entire working capital is in the form of inventory. According to Mahadevan, 1982, materials management is vital to corporate management and goals and no wonder it constitutes one of the 5 M’s of the corporate; Marketing Management by sales, Man Management – by personnel, Money management by Finance, Machine Management by workers’ factory, Materials management – by Materials. Gurani V.G. emphasized the need for cost reduction and cost savings in the area of materials management by a combined approach and teamwork of all persons in the organization. Mahalanobis P.C’s, ‘A New Look at Materials Management,’ published in *The Materials Manager*, Indian Institute of Materials Management (IIMM), stressed the need for materials management in improving productivity. He stressed the need for total materials control to achieve better results. Sreenath H.R.’s, ‘Materials Management in a Steel Plant’, viewed the importance of the role of materials management in the productivity of steel plants. He suggested regular interaction between materials management groups, centralized procurements, extensive use of computerization etc., to
improve the productivity of steel plants. Sari, A.R. (1977) in his article ‘Materials Management in the Industrial Economy’, published in *The Indian Buyer* highlights the importance of modern materials management in the present competitive market. The author has discussed in details the silent points to curb and control excess inventory. He also stressed on the purchasing function at large. ‘Materials Management in Process Industries’, an article published in *The Materials Manager* by Chandramouli. K. published by Indian Institute of Materials Management (IIMM), in 1983, differentiated the materials management function between engineering and processing industries. He highlighted the problems of materials management in the process industry. Ramaswamy S., in his article ‘Effective Materials Management-key to Productivity’, in *The Materials Manager*, published by Indian Institute of Materials Management (IIMM), 1983, highlighted the importance of materials management function to contribute effectively to the productivity of the organization. Hans Busch F. viewed materials management as a total concept involving organizational structure unifying a single responsibility, the systematic flow and control of materials. He stressed the need for implementing modern concepts in materials management. Madho Narain stressed the need to develop professional personality and other managerial virtues for the people working in the materials management area in his article ‘Material manager in the managerial hierarchy of the Indian industry’. Kapok M.L.’s article, ‘Productivity in Materials Management’, in *The Materials Manager*
journal published by Indian Institute of Materials Management in 1988, felt that materials management can contribute to the growth and profitability of an organization to achieve better productivity in materials management. He suggested to maintain good relationship with the suppliers and to remove the fear complex of stock outs.

Rama Krishna Rao B., in his article ‘Some Problems of Materials Management’, reviewed the inventory position in central public sector heavy engineering units and highlighted the problems faced by engineering units in particular and all central public sector undertakings in general. Roy Chowdhury Bipul K.’s ‘Materials Management Availability Research’ article outlined some of the salient points necessary for the development and disposal of availability research in the area of materials management. Some methods are also discussed and these can be used for setting certain types of research work. Rao and Rama Rao, in their article ‘Information and Material Management,’ published by the Economic Times in 1977, have emphasized the need for constructive information system to the materials management sphere to achieve good results.

Adisesh Iyer, discussed the methods of valuing inventories in his article ‘Inventory Control’, published by The Chartered Accountant journal. He is of the opinion that the work-in-progress inventories have to be valued as per the cost account ledgers instead of attempting physical valuation. Kulkarni, P.V., (1977) discussed ABC analysis techniques at a length in his article ‘ABC
analysis: A Technique of Inventory Management’. Pillai and Ashok Agarwal discussed the inventory management in Indian Air Transport Industry and found its weaknesses and suggested remedial measures for efficient inventory management. Rao K.V’s, article ‘Techniques of Inventory Management’ in *The Economic Times* considered four costs viz., replenishment cost, inventory carrying cost, under-stocking cost and overstocking cost in developing an inventory system. Gopalkrishnan P., in his article published in *The Hindu* entitled ‘Importance of Inventory control’, stressed the need for inventory control in view of the Tandon Committee norms and suggested some methods to control inventories. Gangahara Rao M. and Rama Kishan Rao B. analyzed the trends in inventory levels besides bringing into focus the causes for inventory accumulation in all central public sector undertakings during the period from 1970-71 to 1978-79. Ganesh Kulkarni highlighted the problems of valuation of work-in-progress in the context of identification of materials and valuation in his article (1983) ‘Work-in-progress’. Ramakishna Rao B. in his thesis ‘Inventory control in public sector units’ highlighted the problems of inventory control in public sector units and he classified the costs for inventory accumulation as internal and external. According to him, unrealistic government policies with regard to import licences and erratic delivery schedules and long lead times are responsible for inventory accumulation in public sector units. Rao and Gupta viewed that the effective management
of inventory reduces the cost of production and consequently increases the profitability of the enterprises.

All the above research studies conducted at various universities in India and other published research studies and surveys in this area and text books brought out and research papers published in journals, newspapers etc., revealed that the various facets of materials management have not been fully developed and are not satisfactory. There is no common opinion on what functions have to be covered under the preview of materials management. Even the method, techniques, procedures and systems suggested by various authors to control the inventories varied widely. However, the materials management has been identified as the most potential area of prime importance to increase the productivity and efficiency of an organization. Even then, serious attempts of research have not been made in this area. The present study has been to some extent able to highlight the importance of the materials management as one of the important functional areas in an industry like shipbuilding.