

that all civil servants are hopelessly bureaucratic agains betrays a naivete such as can survive only among those who refuse to open their eyes.

Japan's experience in this respect has been interesting. In Japan there is now a feeling that public enterprises were perhaps managed better when they were run by the civil servants, known as 'managerial administrators' (i.e., before the Second World War and before many of these undertakings were de-nationalised). Even now when the top civil servants who are allowed to retire early for the purpose of managing the public enterprises the practice is jokingly described as "Amakadura" or "descent from heaven." In Japan it is realised that when the so called bureaucracy has so much to do with the development and control of public enterprises, it is an advantage for their managers and civil servants to collaborate in their running.¹¹

This relationship of collaboration in a common endeavour is likely to grow in India. Nor many of us realise that the most innovative experiments in management are taking place in the public sector rather¹² than in the family owned private sector enterprises. The public sector enterprises which now do occupy 'the commanding heights of the economy', have built up a potential for growth which no one can ignore, not even the so-called 'national dailies' (mostly family owned) — not any more. It is in the public sector in India that Peter Drucker's observation regarding the

emergence of the professional managers in modern 'multi-institutional' societies will come out to be true first — ... "The managers of business have emerged as a group which in origin, education, background and values closely resembles the civil servant. (The only exception to this-changing fast enough — is still Great Britain). At the same time the civil servant (as well as leadership groups in other institutions) are in the process of becoming managers."¹³

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'Inventory Management (Text and Cases)
P. Gopalakrishnan and M. S. Sandilya.
Delhi, Macmillan, 1978, pp. 346. Rs. 34.00.

The book is written in two parts. Part I consists of 17 chapters dealing with a variety of theoretical aspects of Inventory Management. In Part II, 11 Indian cases have been discussed. The publication of such a text has indeed been long overdue and certainly fills up a large gap in the literature of Management Science especially pertaining to the Indian environment. The authors have been largely successful in clearly projecting the situation in regard to Inventory Management as obtains in this country. They have taken particular care to bring the focus on the Indian situation not only in the textual part but also, to a much sharper degree in part II — containing actual cases of Indian origin. This book can be recommended as a useful refer-

11. *Towards a New Managerial Order in Asia*. APDAC. pp. 112-115.

12. A cynic may observe that partly the reason is the politician's and bureaucrats' unwillingness to appear to be ignorant of the claims and skills of modern management. However, their acquiescence does provide an opportunity for such productive (and expensive) experiments to be carried out.

13. *Management : Tasks, Responsibilities, Practices*, Allied Publishers (Indian edition), p. 361.

ence book for Management Institutions imparting management education as a regular course for management graduates who would be the potential manager — executives holding key positions both in the private and public sector organisations, in future. It can also be effectively used for short term executive development programmes, In-company training programmes etc.

In chapter 1, the authors proceed to introduce the subject of Inventory to the uninitiated. In the introduction — the authors have classified the inventory into 5 categories — (1) Raw materials, (2) Consumables, (3) Boughtout components, (4) Working process, (5) Finished goods, (6) Spares.

This classification will be of great help to the inventory manager to “see the tree inspite of the forest”. This would enable him to have fuller grasp of the inventory situation which is the essential prerequisite to effective inventory management and control.

The reason why management should consciously introduce scientific Inventory management in their organisations producing goods or services have been clearly emphasized. They have achieved this essentially by pointing out (a) the interdependence of inventories at successive inventory locations starting from the raw materials inventory through the inventory of semi-finished products at various stages of production to the finished goods inventories and possibly the inventories in transit and those at outlying warehouses which are within the purview of the administration of the organisation itself; (b) that inventory means working capital locked up and therefore less inventory means more

efficient use of the working capital, and higher rate of turnover and so reduction in the operating cycle, (c) that the inventory levels should provide sufficient latitude of planning and scheduling operations at different production phases, consistent with economy of working capital investment in inventory and high degree of service level to the “customers”, reasonably independently of one another.

Chapter 2 is entirely devoted to the discussion of the impact of inventory consisting of raw materials, semi and finished goods on the working capital management and the operating cycle. The concepts have been effectively illustrated by numerical examples — which clearly show how better inventory management leads to substantial improvement of the profit picture. Chapter 2 prepares the ground for further discussion on the interaction between inventory management and the structure of financial management as prevalent in India, which is the content of chapter 3. The authors are, however, not correct in saying that any text book on financial management refers to the operating cycle concept. Books well-known in this area like those by Van Horne, Weston and Brigham, Walker etc. have no reference to it at all. It would have been fair if they had acknowledged the work done by some Indians on this specific theme like Chakraborty, Rao, Dua etc.

In chapter 3, they draw attention to inflation and witnessed during 1972-74 and the regulatory measures that Government took to combat the inflation. These measures had a tremendous impact on the inventory management — as the industrial sector of the economy account for more than 50% — 60% of the total credit extended by the banking system

and Indian industries finance their inventories essentially through bank credit. The Tandon Committee was appointed by Reserve Bank of India to develop norms for follow-up and control of Bank credit extended to industries. It has become a statutory obligation on the part of the Industries to satisfy the norms with regard to inventory levels and other associated requirement before Banks can release the necessary credit which is computed in accord with the directives as laid down by the Committee. The up-shot of the whole thing has been—(1) The Industries are forced to consciously plan their working capital carefully and in advance of time. (2) The Industries are forced to consider the scientific techniques of Inventory management and control which provide management with scientific guideline to minimise Inventory levels subject to the constraints of credit squeeze and desired level of customer service.

Chapter 4 follows chapter 3 in logical sequence. In this chapter the authors consider the various factors that influence inventory levels. Understanding of these factors are essential pre-requisites to scientific Inventory management. They have introduced the important concepts of opportunity cost of over stocking and under stocking, service level, obsolete inventory and scrap.

However the authors would have been well-advised to treat the concept of opportunity cost of over stocking and under stocking a little bit more seriously. The concept of service level also has received only a cursory treatment by the authors. They have in fact treated the service level on the basis of probability of stock out during the procurement lead time. Thus if the same service level is estab-

lished in this sense as say 99% for two items — item A having cycle time equal to 1 month and another item, item B having cycle time of 1 year — then the implication would be that item A would go out of stock once every 100 months and item B which may belong to C category will go out of stock once every 1200 months which is inconsistent. Thus the concept of equal service rate could better have been introduced.

In chapter 5 — the authors have done an excellent job of describing the various ways of classification of inventory which would be needed for the purpose of selective control. They have in particular discussed the basis and application of the eight classification systems based on different parameters.

They have discussed situations which demand the use of a number of classification systems in combination to yield the desired degree and scope of inventory management and control, and help management to develop appropriate strategies for procurement, inventory control etc.

In chapter 6, the authors discuss the very important concepts of codification, standardisation and variety reduction, and put forward a very strong case for introducing them to provide the infra-structure on which any scientific inventory management can be based. After devoting a few paragraphs to the methodology of codification, they describe the Kodak and Birsch and British systems. They have discussed the advantages of codification in inter-plant transfer, for each unit with different foreign collaboration, and the desirability of codification for organisations belonging to the same industry group by industry associations.

They have also emphasized the importance of national codification which can be developed by organisation like the FICCI, ASSOCHAM, AIMO, government agencies like the DGTD, DGD & D, CCIE, and ISI.

After explaining the purpose and meaning of standardisation — they give examples from foreign sources how standardisation have led to substantial savings and consequential improvement of the profit picture. The peculiar nature of the problem of standardisation in the Indian scene has been well explained and illustrated. Finally they talk about variety reduction at the input stage, processing stages and output stage. The use of preferred numbers in variety reduction and advantages derived therefrom have been well explained.

In chapter 7 the authors have given a concise but effective treatment of the basic concepts of statistics and some forecasting techniques, which are essential tools for any manner of scientific inventory control.

In chapter 8, the authors demonstrate the interaction between production planning and inventory. Inventory managers should do well to take such factors also into account so that they can discharge their responsibilities in a manner which would earn their credibility with the production personnel who are their principal customers.

In chapter 9 the authors have described the process of materials planning which is derived from production planning. After the materials needs have been planned for the up-coming planning period which is usually a year, the inventory manager may schedule his own operations to procure the materials

in accordance with scientific principles to minimise the total cost of materials inputs. Finally they discuss the formulation of the materials budget derived from planned production and profit plans. The materials budget is a powerful tool for periodic review and control of progress regarding the attainment of the targets as set up in the budget, so far as inventory management is concerned.

In chapter 10 the topic of Economic Order Quantity is discussed. The static and dynamic inventory situations are separately explained. The discussion of the static case is rather weak and misleading. To illustrate, they take an example for which the failure rate is poisson — distributed with mean 0.2. Actually this failure rate should have been associated with the total economic life time of the original equipment. This has not been stated clearly and therefore may create confusion and misconception in the mind of the reader.

Secondly they find the ratio $\frac{K_u}{K_o + K_u}$ in this case is 91%. However while computing the optimal number of spares they do it by the usual tabulation method to arrive at the optimum number of spares for which the expected cost will be minimum. Thus the fact that $\frac{K_u}{K_o + K_u} = 0.91$ is not utilised in this case. This is a second source which would thoroughly confuse the reader. The second example also suffers from the lack of indication of the connection between the formula $F(x) = \frac{K_u}{K_o + K_u}$ and the actual method used to find the most economic number of spares to be purchased. Besides, the above formula is valid in the continuous case. In the discrete case — the relationship between service level and $\frac{K_u}{K_o + K_u}$

is governed by certain inequalities rather than by equality. The treatment of the static case is therefore in error, hazy and unclear.

In chapter 11, the authors proceed to discuss practical inventory systems to take effective decisions as to when to order and how much to order. To determine the Reorder point = ROP they have defined (1) buffer stock (2) reserve stock and (3) safety stock. The meaning of safety stock as explained in the text is not the same however while computing the safety stock in the example that they have considered to illustrate the point. The treatment is hazy and unclear. The relevant portion in the text therefore needs to be revised and properly edited for the next edition.

Besides the fixed order quantity system, they have also considered the two other important models namely the fixed period system and the optional replenishment system. However the confusion regarding safety stock persists throughout. The invocation of the service level in terms of opportunity costs of understocking and overstocking on page 131 is uncalled for, since this is not used anywhere in the logical sequence. The reader naturally will wonder as to the intention behind mentioning service level $= \frac{K_u}{K_o + K_u}$ at this place and he will spend probably considerable time and energy to appreciate the link — but it will be only an exercise in futility.

In chapter 12, the authors tackle certain special types of inventory situation which can not be handled by the usual models as described in the foregoing chapters. They have considered the situation when the cost and or availability of materials varies because of their

seasonal nature or other factors. They have invoked the dynamic programming methodology to contain such situations. Besides they have also introduced the concept of simulation and shown as to how this technique can be utilised to study the performance of various decision rules as to how much to order and when to order offline and hit upon some satisfying rather than the optimal solution of an inventory problem, which can then be put into practice.

While explaining the advantages of holding the inventory centrally and there are n warehouses involved, they have shown that the safety stock will reduce by \sqrt{n} . This could have been explained independently of the fact, that in P and Q systems the standard deviation increases as the square root of the number of periods. The treatment has become blurred because of the so-called analogy. The authors would have been well advised to explain their point independently by applying the principle that if $\psi = a_1x_1 + a_2x_2 + \dots + a_nx_n$ when $a_1 \dots a_n$ are co-efficient and X_1, X_2, \dots, X_n are independent random variables — then

$$\text{Var}(\psi) = a_1^2 \text{Var}(X) + \dots + a_n^2 \text{Var}(X_n)$$

Further their statement is true only where the standard deviation of demand in all the n warehouses is the same.

Similarly, where they show the advantage of centrally ordering — the reduction in total cost is applicable when all the n items are ordered simultaneously. But then the problems as to when to order a group of products simultaneously and how to disaggregate the total order quantity into the component products remain to be clarified. Thus the assumptions under which the formulae are derived

are in no way obvious and should have been clearly stated. There is scope for creating mis-conception in the minds of the uninitiated reader, which might be difficult to unlearn later.

The authors devote the chapter 13 entirely to the very important and burning issue of to-day, namely, management of Project Inventory. They first explain the concept of C.P.M and PERT, and show how to identify the critical and non-critical activities. They then demonstrate as to how the information about the progress of a project can be checked against the PERT and proper co-ordination in terms of scheduling, resource allocation, and supply schedule can be achieved. The special considerations that need be given for proper inventory management in relation to a one time big project have been clearly focussed.

In chapter 14, the authors deal with another vital aspect of scientific Inventory management, namely, "Information System for Inventory." For effective inventory management relevant input data with respect to various factors affecting inventory decisions are needed. These data are then processed to generate decisions as output which are then passed on to lower echelons of management for implementation. They have also discussed briefly but effectively how computers can come to the aid of inventory management in recording, processing and retrieval of data to generate relevant information for taking inventory decisions.

Chapter 15 is devoted to the subject matter of Inventory Valuation and Stores Audit. These are critical functions of inventory management as one of the principal components of the

cost of product of the final product is the cost of materials input.

Different methods of stock valuation will influence the profit picture differently. In view of the above, to safeguard public interest the government has made it statutory obligation that the declared system of evaluation must be followed for a duration of at least 3 years, and any deviation must be approved by the board. Any change in between may be permitted by the concerned authorities only if there are over-riding reasons for such permission. Furthermore any deliberate increase or decrease of valuation will not be tolerated by the tax authorities and Company law department. These are clearly explained by means of an example showing how different systems of valuation give different figures for the profit, for the same operations. They remark however that under existing tax laws only FIFO and weighted average method of valuation are accepted.

The authors then proceed to explain the function of auditing. They draw sharp distinctions between auditing as practised by organisations in the private sector and that as is required to be performed for Company's and organisations belonging to the public sector. They rightly point out that many disagreeable situations can be corrected only if the role of audit is changed slightly so that it not only investigates but also educates.

In chapter 16, the authors proceed to discuss organisation and evaluation of Inventory Management. After elaborating on the context of scientific Inventory management and its theoretical aspects — they emphasize the fact that there should be a proper organisa-

tional structure to facilitate the "delivery of goods" and proper procedures of evaluation should also be built into the system for improvement of control and efficiency. They have clearly explained the various aspects and factors to be considered in the man power planning for inventory management. Besides the well-known techniques of O & M can be utilised to a great advantage in this matter. They have emphasized that the personnel involved in inventory management should be subjected to on-the-job training so that they are well acquainted with the nature of the organisation, the nature of the technology used, the nature of the product and market, the strengths, weaknesses, opportunities and threats of the organisation. They have devoted a number of paragraphs critically discussing the methods of evaluation, rate of inventory turnover as a measure of performance, setting of norms and reporting systems, with special reference to the Indian scene and the nature

of the industry.

In chapter 17, the authors have assembled a number of questions which the reader might choose to ask himself and try to answer. This will not only serve to check but also improve his comprehension of the various facts, aspects, contents and dimensions involved in effective and efficient Inventory management. The interested reader should not miss the opportunity provided by the authors in this final chapter of the text. Finally the publication of this book will surely be welcomed by management educationists, practitioners and students especially because of its unique feature of being geared to the management scene obtaining in the Indian environment.

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