MATERIALS MANAGEMENT PRACTICES
IN
MAJOR PUBLIC SECTOR UNDERTAKINGS
IN INDIA.

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K.C.MATHEWS, B.A.Hons., M.B.A.

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D E C L A R A T I O N

I hereby declare that this work entitled, "Materials Management Practices in Major Public Sector Undertakings in India", a study based on actual practice in these undertakings, is original and has been carried out by me under the supervision of Dr. M.V.Pylee, Vice Chancellor, University of Cochin. It has not been submitted for any degree of this or any other University.

Supervisor.

VICE-CHANCELLOR
UNIVERSITY OF COCHIN

K.C.Mathews.

PREFACE

This study was made to examine the Materials Management Practices in Major Public Sector Undertakings in India in relation to the practices prevailing in other sectors of industries in India and abroad with a view to proposing suitable recommendations wherever necessary to gain optimum results.

I owe a deep debt of gratitude to Dr. M.V.Pylee, Vice Chancellor, University of Cochin, who guided and supervised my research activity. My sincere thanks are due to all my collegues in major public and private sector industries for their help in furnishing the entire details including matters of confidential nature pertaining to their establishments.

I must also thank several of my collegues in the Indian Association of Materials Management, who have provided me with valuable information. In particular, I wish to acknowledge the help and encouragement I received from the past National President, Shri. V.Hariharan and the present President, Shri. M.L.Capoor, Director, Materials, Dunlop India Ltd., Calcutta.

Finally, I must thank the authorities of the School of Management and Cochin University for helping me to successfully complete this research work and dissertation.

Senior Controller of Purchase,
HMT LTD., Kalamassery,
30th October, 1978.

K.C.Mathews.

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MATERIALS MANAGEMENT PRACTICES IN MAJOR PUBLIC SECTOR UNDERTAKINGS IN INDIA.

CHAPTER I

I N T R O D U C T O R Y

One of the basic functions of management is to employ capital efficiently so as to provide maximum customer service and earn a profit in the process.[1] It is possible to achieve these objectives in different ways with the given amount of capital, either by maximising the output or by maximising the margin of profit or by a combination of both these methods. This would mean that the management must try to make this capital work as fast as possible, which is often difficult to achieve under the present conditions of the factors of production. It is also not possible to increase extensively the margin of profit due to competition in business and in this process the capital turn over and productivity of capital often becomes totally ineffective.

Several modern techniques have been developed and employed by managers to remedy this situation. Among these, materials

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1. Profit is a reward of capital for the successful acceptance of business risk in rendering an economic service. It is the principal objective of the businessman, but a collateral objective of the business organisation. See Ralph Currier Davis, Industrial Organisation and Management, New York, Harper & Row Publishers, 1957, PP.27-32.

management has become one of the most effective methods to achieve both the above goals. Materials management enables a manager to improve productivity of capital by reducing material costs, preventing blocking up of large working capital for long periods and improving the capital turn over.

This study examines the working of materials management departments in public sector undertakings in India[1] and suggests methods to improve its efficiency. In this chapter, various aspects of materials management, its importance in industries, special problems in India regarding efficient materials management, scope and limitations of this study, organisation of the work and methodology, comparison of data and materials referred in this study are detailed.

Industrial Revolution and Materials.

A significant revolution has been developing since World War II in the way products are made. The entire concept of manufacturing and processing has already changed and is continuing to change equally in large and small companies. Such a revolution was necessary even in countries which have for long prided themselves as being progressive and using modern manufacturing techniques because of the growing realisation that progress whether it is measured in terms of standards of living, an overall improvement in culture or a better life for all, depends on

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1. A list of all Public Sector Undertakings is given in Appendix I.

productivity. The vigour with which research and development was carried out has produced an immensely quickened pace in technology. As a result of this, new products are being developed at a much faster rate and they are being brought to the market in a much shorter time than before to keep a company competitive. This obviously placed a heavy responsibility on manufacturing men to develop revolutionary new techniques, complex materials and methods for shortening the manufacturing time, reducing costs[1] and at the same time maintaining or improving the quality of the product.

The products themselves and the manufacturing techniques employed to make them are becoming increasingly complex. For example, a satellite tracking control unit has over 100,000 parts and this is obviously a product that must operate precisely and reliably. The quality of any product to a great extent depends on the quality of materials used for producing it and manufacture of such products require a variety of materials as complex as the product itself. Complexity of materials requirement

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1. A basic goal of materials management is to minimise costs and maximise savings through effective co-ordination and control. For details see Maynard H.B., Modern Manufacturing Management, New York, McGraw-Hill Book Co. Inc. 1969, P. 765.

is by no means limited to any particular type of equipment. Industrial equipment of all kinds and even products for the home are vitally dependent on high quality material supplies as the major factor of the end product.

One important result of this increasing complexity has been the need for shorter manufacturing cycles, better quality materials at lower costs and the invention of sophisticated machines and processes which have combined to create a manufacturing revolution that has replaced the rather slow but steady evolutionary development that existed before the Second World War.

In earlier days materials supply was in a sense almost an isolated function in many companies. The buyer had to take the designer's prescriptions and get the materials. There were also barriers to communication and co-operation between material supplies, finance and other functions of the company. One of the most striking changes that resulted from the industrial revolution has been the steady disappearance of the traditional barriers. It was realised that under the economic and competitive conditions that have since developed, close team-work among all the functional elements of the company, particularly manufacturing, materials, engineering and marketing, was not only desirable but fast becoming a

necessity. Ideally the team work starts at the policy making level and extends throughout the organisation through its structure[1] and the inter-relationship of its parts. The most obvious areas where this co-operation pays off is in cost reduction and the development of new products where teams from engineering, materials and manufacturing can achieve improvements frequently that none of them could accomplish if they worked separately.

In the midst of all this rapid growth, the need for clear guidelines, policies and objectives for materials management becomes essential. They must be stated in such a way that every member of the organisation understands them clearly and can use them to guide decision-making and operational procedures.

Materials management is an organisational concept stating that the control of material costs is an inter-departmental responsibility. This concept arose from

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1. Structure is a series of relationships between similar functions, factors and personnel to facilitate accomplishment of some mission by promoting co-operation and co-ordination. See Davis R.C., The Fundamentals of Top Management, New York, Harper & Brothers, 1951, PP.84-97.

the idea that there are only four key areas to control in manufacturing ie., men, machines, money and materials.[1] Logically, therefore all the material related functions of planning, procurement, storage and consumption should all report to a single manager. In this way the various natural conflicts between these departments with each trying to maximise its own performance, could be resolved at one point. The optimum solutions thus arrived at would take into account the company wide impact of each decision.

The term materials management describes the grouping of management functions related to the complete cycle of material flow, from the purchase and internal control of production materials to the planning and control of work-in-process, to the warehousing, despatching and distribution of the finished product.

Materials management is a vital concept, which can result in cost reduction and improved performance in a manufacturing organisation, when it is understood and carried out efficiently. It is a concept that must be built into the philosophy of the company and its organisation.

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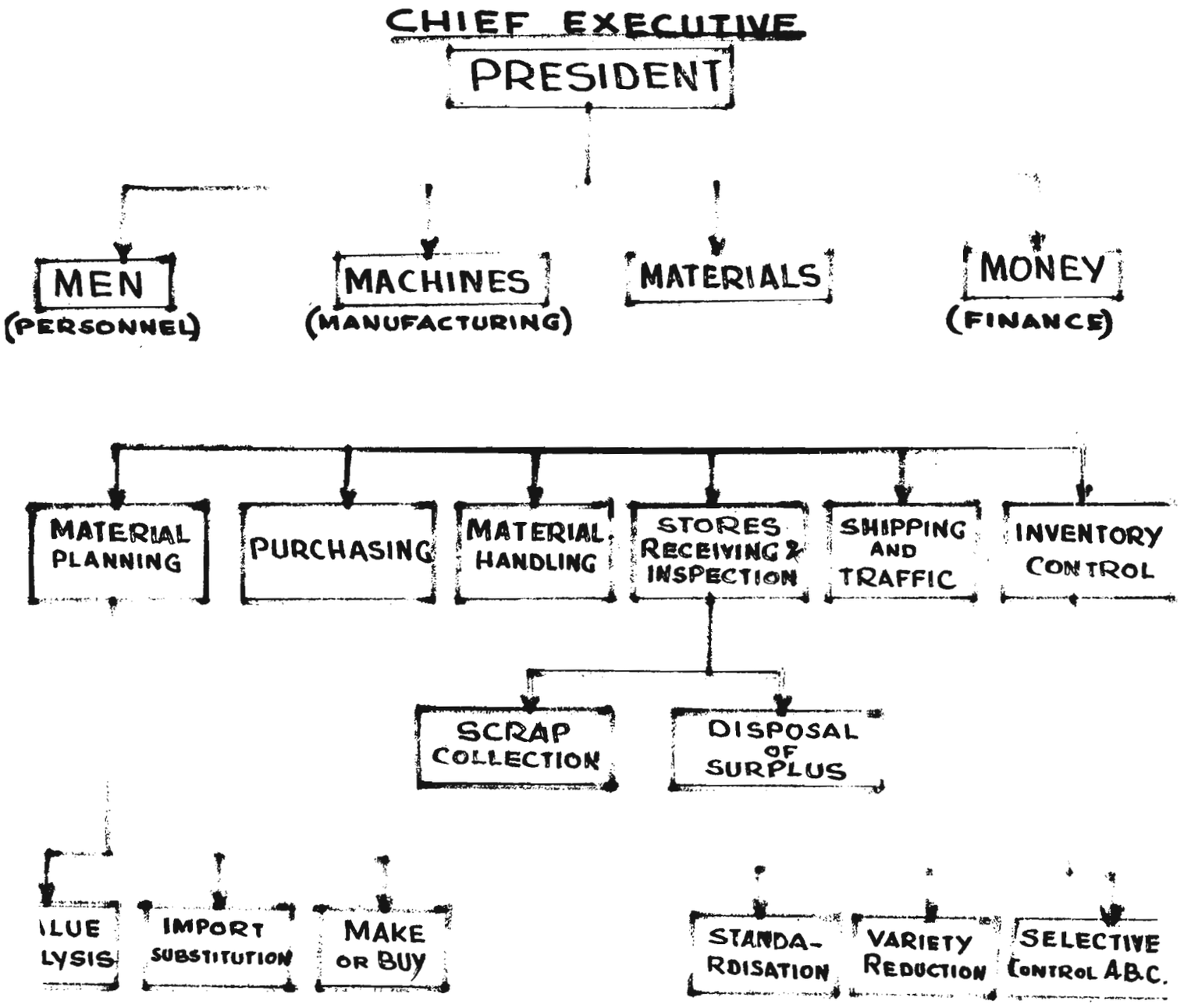
1. Figure 1. shows the organisational set up of key areas of manufacturing under this concept.

FIGURE I

ORGANISATIONAL SETUP UNDER THE MATERIALS MANAGEMENT CONCEPT



Materials management has been practised in various forms since the inception of manufacturing. With the growth of specialised functions in corporate organisation, increases in departmental efficiency have been partially offset by increasing difficulties in communication and dispersion of effort. However it is possible to have the advantage of the higher efficiencies of specialised functions and gain further improvements through integration of allied functions under centralised direction.

Importance of Materials Management in Industries.

Designing a product, manufacturing and marketing it are given the highest priority in any industry. This entire process consists of converting raw materials into forms that have higher utility and value to the customers. The conversion may be accomplished in just one manufacturing step or it may require several distinct stages.[1] The margin between the value of the raw material and the finished product is the value added in the process.

Materials form commonly the largest cost going into finished goods and depending on the product they account

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1. When furniture is made out of wood the conversion is accomplished just in one step and when cotton is converted into cloth it takes several stages of manufacture.

for about 30 to 85 percent of the sale value of the end product.[1] Since a company has to spend on an average over fifty percent of what it sells on materials it is evident that materials are vitally important to any company as no organisation can operate without them. Even small changes in the cost of materials can result in large sums of money saved or lost in procuring and holding large inventories. The main function of the materials division is to provide requisite quality supplies in proper quantities at the proper time and place, at the lowest cost. It therefore has to manage procurement, maintenance and disbursement of inventories in a manner that will serve the company's various operations economically and effectively.

A bad performance of supply function may result in serious losses to any plant, arising out of material shortage and production hold up. Delays in purchase and delivery may result in materials not being on hand at the plant when needed for production. Stocks of materials may get exhausted and rush shipments may mean higher costs. Inventories may be over expanded because of unduly large purchases or too many separate items

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1. Material content varies depending on the product. In a wrist watch, it is about twenty percent while it is over eightyfive percent in the case of a transformer. Table I shows approximate percentage value of material content of some of the important end products.

TABLE I

MATERIAL CONTENT OF SOME SELECTED PRODUCTS

S.No.	Name of the Product.	Percentage Material Content
1.	Automobiles	50
2.	Bricks & Tiles	10
3.	Cloth	20
4.	Cables & Wires	60
5.	Drugs & Medicines	30
6.	Electric Motors	65
7.	Electrodes	70
8.	Fastners - Iron & Steel.	25
9.	Gears Steel.	15
10.	Hoses, Hydraulic & Rubber.	50
11.	Insulators, Electric.	25
12.	Jewellery, Gold and Silver.	90
13.	Knives, Steel.	65
14.	Lamps, Electric.	50
15.	Lenses, Optical.	40
16.	Machinery.	35
17.	Nails, Iron or Steel.	75
18.	Oils, Lubricating.	20
19.	Pumps, Water or Oil.	40
20.	Quenching Oils.	25
21.	Rubber Goods.	70
22.	Sports Goods.	60
23.	Soaps.	50
24.	Tyres, Rubber.	40
25.	Valves.	25
26.	Wines.	15
27.	X-Ray Films.	35
28.	Yeast.	30
29.	Yarn, Cotton or Silk	70
30.	Zinc Anodes.	90

carried in stores. When business declines, the ratio of inventories to sales quickly become abnormal and results in excess inventories which may deteriorate or even become obsolete. Other losses may be caused by variations in the quality of the materials purchased and received at the plant. Such variations may adversely affect the cost of production and customer satisfaction with the product. Failure to salvage waste and scrap materials from the various processes may mean a considerable leakage of profits[1] into the scrap pile. Delay in disposal of surplus and obsolete items[2] will attract carrying costs on such items in addition to the working capital already blocked up.

Companies which do not have a good materials control system usually close their books only annually or semi-annually because of the difficulty of taking a physical inventory of raw materials, parts, work in progress and

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1. The annual realisation from salvage and scrap sales is estimated at five percent of the yearly product sales value in all engineering companies.

2. Surplus and obsolete items are created in inventory holdings continuously due to changes in production, design, specifications and due to introduction of new technology, product or processes.

finished goods. The consequent lack of current information concerning the company's condition may impair the effectiveness of managerial control. There may be many items already deteriorated, damaged and wasted in handling, transportation and storage of materials. The success of the company may be greatly affected by the quality of its materials management methods in these and many other ways.

Many companies install expensive accounting and costing systems and watch expenditures carefully. Safes and vaults are provided for the cash to be kept and it is accounted for to the last paise. On the other hand stocks of materials costing large sums are left about with a minimum of protection and control. It is not unusual for all large companies to have inventories worth millions of rupees, especially where the material content of the product is relatively high. Cash on hand is specially treated because it appears more important and real to some people than far larger amounts that are invested in materials.

The materials procurement and supply division of a company is a staff organisation.[1] Its objective is

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1. Staff functions have been differentiated from the line hierarchy of functions to render some service to the line organisation or to other staff groups. See Spriegel W.R. and Lansburgh R.H., Industrial Management, 5th ed. New York, John Wiley & Sons, Inc., 1955, pp.131-139.

chiefly to aid economically and effectively in the accomplishment of the company's primary task that is to produce goods and services of saleable value for the customer. The materials division contributes directly to the fulfilment of a highly important collateral objective of the business organisation, a profit which of course is one of the principal objectives of any business. The supply division is only secondary in the order of service to the customer.

The status of a staff department for the materials division is determined largely by the nature and importance of its objectives. The following are some of the more important:

a) Supply of adequate quantities of the right kinds of materials and services when and where they are needed;
b) Materials whose qualities suit their intended purposes;
c) Minimum purchase, storage and transportation costs of materials;
d) Minimum loss from deterioration, obsolescense, or theft of materials;
e) Maximum turnover of inventories in transit and in stores and
f) A minimum of interference with operations due to supply failures, material shortage or poor quality supplies.

Some of these values must be achieved in co-operation with other agencies within and outside the organisation. Securing materials and supplies for production and the conduct of the business may be done either by manufacture or by purchase. Inventories of the finished product and the parts of which it is composed are manufactured at the company's works and in some instances certain parts that it cannot produce to advantage are bought from the market.

Items to be purchased from external sources are ordered on the basis of competitive bids or negotiated prices according to the item and the circumstances. This activity is the centre of interest because success or failure in accomplishing purchasing objectives is decided at this point. It is possible to achieve substantial savings in the cost of purchases by adjusting quantities to take advantage of price-breaks, gaining approval on material substitutions and making long term commitments.

This cost reduction programme can be conveniently practised on all high value items. These comparatively small number of items which represent a large majority of annual purchases can prove to be a gold mine. Careful analysis of usage, ordering patterns, forecasts and individual characteristics lays the foundation for negotiations. To earn the same saving effected by a

reduction of five percent in the material cost, production and sales may have to be increased some times to the extent of fifty percent.[1] While it is possible to reduce the material cost considerably by creative purchasing,[2] it is not always easy or feasible to increase production and sales due to the limitations and constraints placed on the factors of production, competition from firms of similar products and Government control on production limits.

Another area of cost reduction is in the timely disposal of surplus and obsolete items. The quantum of slow moving, non-moving and obsolete materials in the organised sector in India is estimated to be Rs. 25,000 million.[3] Even if ten percent of this

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1. Depending on the material content of each product and profit level of the business a small reduction in material cost can amount to the same profit earned from increased production and sales. This is discussed at length in Chapter V. See p. [illegible].

2. Creative purchasing refers to use of modern tools and techniques of cost reduction including negotiation. See Prichard J.W., Modern Inventory Management, New York, John Wiley & Sons Inc., 1964, pp. 185-189.

3. According to the figures available to the Ministry of Industry, Government of India, Subramaniam C., Minister of Industries, Government of India during 1974, gave this figure while inaugurating the Coimbatore branch of the Indian Association of Materials Management to stress the importance of materials management in industries.

quantity could be liquidated and the amount is released, several industries could be financed, especially when our industrial growth is badly affected for want of sufficient financial resources. Modern methods of materials management and inventory control have therefore assumed greater importance for public sector undertakings and for the nation. In advanced countries scientific methods and modern techniques of materials management have been applied with great success in reducing the overall cost and value of material content of the end product.

Special problems in India for efficient Materials Management

In the process of developing and expanding the industrial base in India, it was necessary to set up major basic and key industries[1] like heavy machine building, machine tools, heavy electricals and other heavy engineering projects under the Five Year Plans with foreign collaboration, technical assistance and foreign personnel. Then to reduce import of capital equipment and foreign dependence, several foreign-exchange saving industries were started in the areas of generation and distribution of electrical

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1. Basic and key industries are 'Scheduled Industries' essential for industrial development of the country requiring huge capital investment, which the private sector was unable to invest, as such, these industries were started in the public sector. A list of 'Scheduled Industries' is given in Table II.

TABLE II

LIST OF SCHEDULED INDUSTRIES

SCHEDULE - A.

1. Arms and ammunition and allied items of defence equipment.

2. Atomic energy.

3. Iron and steel.

4. Heavy castings and forgings of iron and steel.

5. Heavy plant and machinery required for iron and steel production, for mining, for machine tool manufacture and for such other basic industries as may be specified by the Central Government.

6. Heavy electrical plant including large hydraulic and steam turbines.

7. Coal and lignite.

8. Mineral oils.

9. Mining of iron ore, manganese ore, chrome ore, gypsum, sulphur, gold and diamond.

10. Mining and processing copper, lead, zinc, tin, molybdenum and wolfram.

11. Minerals specified in the Schedule to the Atomic Energy (Control of Production and Use) Order, 1953.

12. Aircraft.

13. Air transport.

14. Railway transport.

15. Shipbuilding.

16. Telephones and telephone cables, telegraph and wireless apparatus (excluding radio receiving sets).

17. Generation and distribution of electricity.

LIST OF SCHEDULED INDUSTRIES.

SCHEDULE - B.

1. All other minerals except "minor minerals" as defined in Section 3 of the Minerals Concession Rules 1949.

2. Aluminium and other non-ferrous metals not included in Schedule 'A'.

3. Machine tools.

4. Ferro-alloys and tool steels.

5. Basic and intermediate products required by chemical industries such as the manufacture of drugs, dye-stuffs and plastics.

6. Antibiotics and other essential drugs.

7. Fertilisers.

8. Synthetic rubber.

9. Carbonisation of coal.

10. Chemical pulp.

11. Road transport.

12. Sea transport.

energy, communication equipment, defense requirements including arms and ammunition, rolling stock equipments for the railways, ship building, transport vehicles and automobiles, steel plants, minerals, fertiliser complexes, chemicals and pharmaceuticals and electronics.

Non-availability of raw materials to feed these industries was a very serious problem facing these enterprises as most of the items were to be imported with long delivery periods from the foreign suppliers. Equally serious was the position on maintenance spares and standby equipment[1] for these plants. To safeguard the continuous working of these factories at least for some years, all the raw materials, spares and standby equipment were imported along with the original equipment itself without any economic considerations. Most of these factories which were started about fifteen years back, have even now some quantities of spares and standby equipments originally imported with the machinery. Allowing for the manufacturing time of the foreign supplier, inland transport to the sea port and availability of shipping space and clearance delays, these undertakings had to keep stocks of essential raw materials also for very long periods.

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1. Standby equipment refers to spare units of equipments and vital standby machinery stored to ensure continuous working of essential equipments like transformers, generators and prime movers.

In foreign companies, the inventory holdings are normally much less and sufficient to cover requirements of production for one to two weeks only as most of the raw materials of good quality are either readily available or can be obtained at short notice. In fact many assembly plants and automobile factories get their bulk requirements of tyres, tubes and many other such items several times each day, while similar plants in India have to store up materials for several months in the light of shortages of raw materials, unavoidable transportation delays, possible rejections on receipt and inspection and above all, non supply of the items due to labour unrest at the supplier's works.

With the continued emphasis on import substitution,[1] several entrepreneurs have taken up manufacture of items so far imported. However, these manufacturers have again to depend on imports for some of their raw materials. Quality control not being absolutely reliable, supplies often get rejected. The sources of supply are located far away from consumption centres and this results in transportation bottlenecks. Added to these the promised date for delivery of goods cannot be relied upon due to

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1. Import substitution refers to development and local manufacture of imported items to save foreign exchange.

uncertain industrial relations,[1] which makes materials management a most difficult proposition under present Indian conditions.

The balance of payment position has improved[2] recently for India and in the light of this development, import of raw materials and spares have been liberalised by the Government. However, the progress in import substitution is still very slow and a great deal of equipment and spares are even now being imported.

Scope of this study.

Industries in various sectors have grown considerably and consequently the working capital blocked up in inventories has also gone up. With rapid modern development in management, various effective tools and techniques have been evolved for efficient management of materials. Many firms have taken advantage of these new developments and re-structured[3] their materials organisations in line

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1. Industrial relations were very bad prior to the enforcement of emergency during June 1976 and soon after lifting of the emergency during February 1978 the same situation came back and millions of productive manhours have been lost on this account.

2. India's foreign exchange reserves stood at Rs. 46,000 million at the end of March, 1978. See Reserve Bank of India bulletin Jun. 1978.

3. Restructuring of organisations refers to integrated systems for economy. See Buchan J., Scientific Inventory Management, Englewood Cliffs, N.J., Prentice Hall, Inc., 1962, pp. 183-194.

with the modern trend and have obtained benefits of cost reduction. Some firms are in the process of getting their personnel trained while many others have not yet initiated action to tone up their materials divisions and a vast majority of materials personnel are untrained and unaware of modern trends in the field. As a result the inventories in various forms still remain high in these organisations and a major opportunity for cost reduction is being lost.[1]

Soon after the oil crisis, there was an abnormal increase in the cost of every material and as a result the working capital blocked up in inventories increased many times. To control the price level effectively, production of goods and services had to be increased which in turn needed additional working capital. With the present high rate of interest the cost of capital is high and therefore working capital requirements have to be minimised. Ninety percent of working capital is invested in inventories and as such special attention has to be paid to control the inventories by ordering less, stocking less and consuming less.

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1. Opportunity being lost refers to cost reduction gains in purchase and that due to reduction of inventories resulting in a direct addition to the savings.

This problem is faced by companies all over the world but private sector companies are careful to make at least some savings by effecting both internal and external economies, as otherwise their very existence itself will be threatened.

As the materials are readily available to them, foreign firms are not faced with such problems as those faced by the Indian industry but in the public sector due to social obligations and responsibilities, internal economies are not as effective as in the private sector. Most public sector undertakings were making heavy losses until a few years back and even now the return on investment in the public sector is nowhere comparable to that of the private sector.

It is possible to reduce the cost of purchased materials by competitive bidding, negotiation, value analysis and make or buy policies while savings in the cost of holding inventories can arise out of economic ordering, reducing deterioration and obsolescense in storage, expediting disposal of surplus and non-moving stores and thereby releasing the working capital blocked up. These methods have been used with great success in foreign firms and in the private sector companies in India, while in the public sector there is good scope for further improvement. Therefore an attempt has been made to study the basic essentials and standard practices of materials

management and compare them to the practices followed in these industries to arrive at suitable recommendations to increase their efficiency and profitability. This is essentially the scope of this study.

The main limitation of the study is that the data obtained relate to the period 1975-76 and earlier and the current position is not available. However it would not affect the findings substantially since no major change has taken place in regard to the objectives and programmes of materials management in Indian industries during this period but the increasing emphasis on management education in the last decade should have improved the position in the materials field also to some extent.

Another limitation is that uniform norms cannot be applied to evaluate different materials management organisations, as the structure, geographic locations[1] and conditions under which they work are very much different from the rest of the organisations. This is particularly so with the Oil and Natural Gas Commission,

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1. When geographic locations of factories are far apart, there is bound to be difficulties in transportation of materials and delay in communications, making centralised control ineffective.

Holding companies[1] and multi-unit companies having factories all over India.

Organisation of the work and Methodology.

A representative field has been selected from various categories of industries primarily depending on their investments and also considering the type of industry such as steel plants, fertilisers, ship building, machine tools, precision instruments and watches. Twenty such companies each from the public and private sectors have been selected for this study along with twenty foreign firms with similar manufacturing activities as per Appendix II.

The topics of this study have been selected based on the following essential components of materials management, bearing in mind the contributions of each of these activities to the total departmental objectives.[2]

1. Organisational set up for materials management
2. Personnel planning and development

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1. Holding companies have several factories situated far apart, where common materials are consumed for producing similar or different products. In such cases, a combination of centralised and decentralised system of control is useful for materials management.

2. The departmental objectives refer to cost reduction techniques to minimise costs so that the value of the material content of the final product is a minimum and thereby maximise savings. See Prichard J.W., Modern Inventory Management, op. cit., p. 148.

3. Material planning systems
4. Purchasing management
5. Stores management
6. Materials handling and transportation
7. Inventory management
8. Import and export management
9. Performance appraisal and accountability and
10. Monitoring systems and management reporting.

A suitable questionnaire was prepared as shown in Appendix III to elicit detailed information on all the above topics and was forwarded to the selected firms.

Since the questionnaire contained confidential information on the capital structure, wages, production, profitability etc., only a few firms were willing to furnish the required details as all the foreign firms and most of the private and public sector Indian firms wanted to maintain strict secrecy over their operations. However through the good offices of the Indian Association of Materials Management[1] and its national council it was possible to collect the necessary information from Indian firms by personal contact and visits to their offices. Most of the firms were not even willing to give copies of

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1. Indian Association of Materials Management is a subsidiary of the International Federation of Purchasing and Materials Management and has a membership of over 2000.

their balance sheets and annual reports.

In the case of foreign firms some details were collected from foreign representatives who visited India and from Indians who went to foreign firms for training and negotiations. As these details were still insufficient to draw up any definite conclusions, it was necessary to visit as many foreign countries as possible to ascertain details personally. Accordingly, the author made two visits abroad, the first during April 1977 to Europe and the United Kingdom as a delegate to the first world congress of the International Federation of Purchasing and Materials Management[1] held at Venice where the occasion facilitated direct contacts with many materials managers from all over the world and later visited several of their companies. The second visit was organised during March 1978 to Europe, United Kingdom and the United States and during this period it was possible to visit all the foreign firms shown in Appendix II and gather complete data needed for this study. The details collected have been tabulated topic wise and used in this work.

Comparison of Data:-

The findings of the survey and the practice followed in these undertakings have been compared to the basic

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1. International Federation has half a million members, its registered office is in London and has over one hundred subsidiary associations all over the free world.

principles and standard practice in materials management to evolve suitable recommendations, so that optimum economy and efficiency can be obtained in their operations.

References in this study:-

In formulating basic principles and standard practices, various books on materials management, manufacturing and related matters have been consulted. Besides, during the course of this study various documents of the Government of India on the origin and development of planning in India, hand books on the development of industries pertaining to pre and post independance periods, records on various systems of planning in other countries and articles, statistics and reports on industry, industrial policy and industrial development during the five year plans have been made use of. Publications of the Ministry of Industry, the Chief Controller of Imports and Exports, the Iron and Steel Controller, the Directorate General of Technical Development and periodic bulletins of the Reserve Bank of India have also been referred to.

For import-export, publications on import trade control, Rules and Procedures Hand Book, Customs Clearance Manual and Brussels Tariff Nomenclature Classifications have been consulted. A few references have been indicated on the relevant pages of this work and a complete bibliography is given at the end.

APPENDIX I

LIST OF CENTRAL GOVERNMENT PUBLIC ENTERPRISES

1. Air India,
   Air India Building,
   20th Floor, Nariman Point,
   BOMBAY-400001.

2. Air India Charters Ltd.,
   Air India Building,
   Nariman Point,
   BOMBAY-400001.

3. Balmer Lawrie & Co. Ltd.,
   21, Netaji Subhash Road,
   CALCUTTA-700001.

4. Banana & Fruit Dev.Corpn.Ltd.,
   49, Mowbray's Road,
   2-B, Sri Lethic Colony,
   Alwarpet,
   MADRAS-600018.

5. Bharat Coking Coal Ltd.,
   P.O. Sijua-828111.

6. Bharat Aluminium Co. Ltd.,
   F-41, N.D.S.E. Part - I,
   NEW DELHI-110049.

7. Burn & Co. Ltd. and
   Indian Standard Wagon Co.,
   10-C, Hungerford Street,
   CALCUTTA-700017.

8. Bharat Dynamics Ltd.,
   10-3-310, Masab Tank,
   HYDERABAD-500028.

9. Bharat Earth Movers Ltd.,
   P.B.No.7, Unit Building,
   J.C. Road,
   BANGALORE-560002.

10. Bharat Electronics Ltd.,
    P.O. Jalahali,
    BANGALORE-560013.

11. Bharat Gold Mines (P) Ltd.,
    Red Gauntlet
    P.O.Kolar Gold Field-563120.

12. Bharat Heavy Electricals Ltd.,
    Hindustan Times Building,
    16th Floor, Kasturba Gandhi Marg,
    NEW DELHI-110001.

13. Bharat Heavy Plate & Vessels Ltd.,
    VISAKHAPATNAM-530012.

14. Bharat Opthalmic Glass Ltd.,
    DURGAPUR-713210.

15. Bharat Pumps & Compressors Ltd.,
    Naini,
    ALLAHABAD-211010.

16. Bokaro Steel Ltd.,
    Main Administrative Bldg.,
    Bokaro Steel City-827001.

17. Bongaigaon Refinery & Petro-
    Chemicals Ltd.,
    1st Floor, Surya Kiran Bldg.,
    19, Kasturba Gandhi Marg,
    NEW DELHI-110001.

18. Braithwaite & Co. Ltd.,
    5, Hide Road,
    CALCUTTA-700043.

19. Cashew Corpn. of India Ltd.,
    P.B.No. 1261,
    COCHIN-682011.

20. Cement Corpn. of India Ltd.,
    'Herald House',
    5A, Bahadur Shah Zafar Marg,
    P.B.No. 642,
    NEW DELHI-110001.

21. Central Electronics (P) Ltd.,
N.P.L. Campus,
Hillside Road,
NEW DELHI-110012.

22. Central Fisheries Corpn.Ltd.,
14, Watkins Lane,
CALCUTTA-700015.

23. Central Inland Water-
Transport Corpn. Ltd.,
P.B.No.2664,
4, Fairlie Place (2nd Floor)
CALCUTTA-700001.

24. Central Road Transport
Corpn., Ltd.,
3, Fairlie Place (2nd Floor)
CALCUTTA-700001.

25. Central Warehousing Corpn.,
C-90, NDSE Part II,
NEW DELHI-110049.

26. Coal India Ltd.,
10, Netaji Subhash Marg,
CALCUTTA-700001.

27. Cochin Shipyard Ltd.,
COCHIN-682015.

28. Cochin Refineries Ltd.,
Ambalamugal P.O.,
Post Bag No. 1751,
COCHIN-682302.

29. Cotton Corpn. of India Ltd.,
Air India Bldg., 12th Floor,
P.B.No. 1350, Nariman Point,
BOMBAY-400001.

30. Delhi Transport Corpn.,
Indra Prastha Estate,
NEW DELHI-110001.

31. Electronics Corpn.of India Ltd.,
Industrial Dev. Area,
Cherlapalli,
HYDERABAD-500762.

32. Fertilizer Corpn. of India Ltd.,
F-43, South Extension Area Part I,
NEW DELHI-110049.

33. Electronics Trade & Technology
Development Corpn. Ltd.,
15/48, Malcha Marg,
Chanakyapuri,
NEW DELHI-110021.

34. Engineers India Ltd.,
P.B. No. 730, PTI Bldg.,
Parliament Street,
NEW DELHI-110001.

35. Food Corpn. of India,
Barakhamba Lane,
NEW DELHI-110001.

36. Garden Reach Workshops Ltd.,
43/46, Garden Reach Road,
CALCUTTA-700024.

37. Fertiliser & Chemicals Travancore Ltd.
UDYOGMANDAL P.O.-683501.

38. Export Credit & Guarantee Corpn.Ltd.,
10th Floor, Express Towers,
P.B.No. 373, Nariman Point,
BOMBAY-400001.

39. Engineering Projects (I) Ltd.,
"Kailash"
26, Kasturba Gandhi Marg,
NEW DELHI-110001.

40. Goa Shipyard Ltd.,
Vasco-da-Gama,
GOA-403802.

41. Film Finance Corpn. Ltd.,
White House,
91, Walkeshwar Road,
BOMBAY-400006.

42. Gresham & Craven of India Ltd.,
23, Gebra Road,
CALCUTTA-700014.

43. Handicrafts & Handloom Export
Corpn. of India Ltd.,
11 A, Rouse Avenue Lane,
NEW DELHI-110001.

44. Heavy Engineering Corpn. Ltd.,
Plant Plaza Road,
P.O. Dhurwa,
RANCHI-834004.

45. Hindustan Aeronautics Ltd.,
Indian Express Building,
Vidhana Veedhi,
BANGALORE-560001.

46. Hindustan Cables Ltd.,
RUPNARAINPUR-713301.

47. Hindustan Antibiotics Ltd.,
Pimpri,
POONA-411018.

48. Hindustan Copper Ltd.,
"Industry House",
10 Camac Street,
CALCUTTA-700017.

49. Hindustan Housing Factory Ltd.,
Jangpura,
NEW DELHI-110014.

50. Hindustan Insecticides Ltd.,
Hans Bhavan, Wing 1,
Bahadur Shah Zafar Marg,
NEW DELHI-110001.

51. Hindustan Organic Chemicals Ltd.,
P.O. Rasayani,
Distt. KOLABA-410207.

52. Hindustan Machine Tools Ltd.,
36, Cunningham Road,
BANGALORE-560052.

53. Hindustan Latex Ltd.,
Varikat House T.C.,
4/405 Kawdiar,
TRIVANDRUM-695003.

54. Hindustan Paper Corpn.(P) Ltd.,
Vishal Bhavan,
95, Nehru Place,
NEW DELHI-110049.

55. Hindustan Salts Ltd.,
Badnor House,
P.B.No. 146,
JAIPUR-302001.

56. Indian Petro-Chemicals Corpn.Ltd.,
P.O. Jawhar Nagar-391320.

57. Hindustan Steel Ltd.,
P.O. Hinoo,
RANCHI-834002.

58. Hindustan Steel Works Constn.Ltd.,
5/1, Commissariat Road,
Hastings,
CALCUTTA-700022.

59. Hindustan Petroleum Corpn. Ltd.,
17, Jamshedji Tata Road,
BOMBAY-400020.

60. Hindustan Teleprinters Ltd.,
G.S.T. Road,
Guindy,
MADRAS-600032.

61. Hindustan Photo Films Mfg. Co. Ltd.,
'Indu Nagar'
OOTACAMUND-643005.

62. Hindustan Zinc Ltd.,
No. 6 (Sahelion Ki Bari)
New Fathepur Scheme,
UDAIPUR-313001.

63. Hindustan Shipyard Ltd.,
VISHAKAPATNAM-530005.

64. Housing & Urban Dev. Corpn. Ltd.,
Block No. 12-A, Jam Nagar Hutments,
NEW DELHI-110011.

65. India Tourism Dev. Corpn. Ltd.,
Jeevan Vihar,
3, Parliament Street,
NEW DELHI-110001.

66. Hotel Corpn. of India Ltd.,
Air India Building,
Nariman Point,
BOMBAY-400001.

67. Indian Airlines,
Indian Airlines House,
NEW DELHI-110001.

68. Indian Dairy Corporation,
Yash Kamal Building,
7th Floor, Likmanya Tilak Road,
BARODA-390005.

69. Indian Drugs & Pharmaceuticals Ltd.,
No. 12, New Delhi South Extension Part I,
NEW DELHI-110049.

70. India Motion Picture Export Corpn. Ltd.,
Shivnagar Estate, 'D' Block 5th Floor,
Dr. Annie Besant Road, Worli,
BOMBAY-400018.

71. Indian Oil Corpn. Ltd.,
Indian Oil Bhavan,
Janapath,
NEW DELHI-110001.

72. Indian Rare Earths Ltd.,
Pilcourt III,
Maharishi Karve Road,
BOMBAY-400020.

73. Petrofils Co-operatives Ltd.,
P.O.Jawahar Nagar-391320.

74. Indo-Burma Petroleum Corpn. Ltd.,
Allahabad Bank Building,
17, Parliament Street,
NEW DELHI-110001.

75. Instrumentation Ltd.,
Kota-Jhalawar Road,
KOTA-324005.

76. International Airports Authority of India Ltd.,
32, Ferozeshah Road,
NEW DELHI-110001.

77. Jute Corpn. of India Ltd.,
1, Shakespeare Sarani,
CALCUTTA-700016.

78. Lubrizol India Ltd.,
Delstar,
9-A, Hughes Road,
BOMBAY-400026.

79. Mazagon Dock Ltd.,
Dockyard Road,
Mazagon,
BOMBAY-400010.

80. National Building Construction Corpn. Ltd.,
44, Ring Road,
Lajpat Nagar III,
P.B.No. 3004,
NEW DELHI-110024.

81. Indian Telephone Industries Ltd.,
Doorvani Nagar,
BANGALORE-560016.

82. Jessop & Co. Ltd.,
63, Netaji Subhash Road,
CALCUTTA-700001.

83. Life Insurance Corpn. of India,
Yogakshema,
Jeevan Beema Marg,
Post Box No. 252,
BOMBAY-400020.

84. Madras Fertilizers Ltd.,
Manali,
MADRAS-600068.

85. Madras Refineries Ltd.,
Manali,
MADRAS-600068.

86. Metal Scrap Trade Corpn. Ltd.,
P-34, India Exchange Place,
CALCUTTA-700001.

87. Metallurgical Engineering
Consultants (I) Ltd.,
RANCHI-834002.

88. Mineral Exploration Corpn. Ltd.,
Lakshmi Smitri, Behind GPO,
Palm Road, Civil Lines,
NAGPUR-440006.

89. Minerals & Metals Trading Corpn.,
P.B.No. 498, Express Building,
9-10, Bahadur Shah Zafar Marg,
NEW DELHI-110001.

90. Mining & Allied Machinery
Corpn. Ltd.,
DURGAPUR-713210.

91. The Mogul Line Ltd.,
16, Bank Street, Fort,
BOMBAY-400026.

92. National Fertilizers Ltd.,
27, Community Centre,
East of Kailash,
NEW DELHI-110024.

93. National Coal Dev. Corpn. Ltd.,
Darbhanga House,
RANCHI-834002.

94. National Industrial Dev.Corpn.Ltd.,
Chanakyapuri, P.B.No.458,
NEW DELHI-110021.

95. National Instruments Ltd.,
1/1, Raja S.C.Mullick Road,
CALCUTTA-700032.

96. National Newsprint & Paper
Mills Ltd.,
NEPANAGAR-450221.

97. Neyveli Lignite Corpn. Ltd.,
P.B.No.1,
NEYVELI-607801.

98. Mishra Dhatu Nigam Ltd.,
Defence Metallurgical Research,
Laboratory,
HYDERABAD-500258.

99. National Research Dev. Corpn.,
of India Ltd.,
Lajpat Nagar III,
NEW DELHI-110024.

100. National Projects Construction
Corpn. Ltd.,
E-9, Defence Colony,
NEW DELHI-110024.

101. Modern Bakeries (I) Ltd.,
25-B, Block, Paschimi Marg,
Local Shopping Centre,
Vasant Vihar,
NEW DELHI-110057.

102. National Minerals Development Corpn. Ltd.,
Andhra Pradesh Housing Board Building,
Behind Gruh Kalpa Mukarramjahi Road,
HYDERABAD-560001.

103. National Seeds Corpn. Ltd.,
Beej Bhavan, CTO Bldgs.,
Pusa Complex,
NEW DELHI-110012.

104. National Small Industries Corpn. Ltd.,
Near Industrial Estate, Okhla,
NEW DELHI-110020.

105. National Textile Corpn. Ltd.,
Surya Kiran Building,
9th Floor, 19, Kasturba Gandhi Road,
NEW DELHI-110001.

106. Oil and Natural Gas Commission,
Tel Bhavan,
DEHRADUN-248001.

107. Praga Tools Ltd.,
6-6-8/32 Kavadiguda Road,
P.B.No. 1570,
SECUNDERABAD-500003.

108. Projects & Equipment Corpn. of India Ltd.,
'Chandralok', Janapath,
NEW DELHI-110001.

110. Pyrites, Phosphates & Chemicals Ltd.,
Dehri-on-Sone
(Bihar)

111. Rail India Technical & Economic Services Ltd.,
New Delhi House (1st Floor)
27, Barakhamba Road,
NEW DELHI-110001.

112. Rehabilitation Industries Corpn. Ltd.,
25, Free School Street,
P.B.No. 8103,
CALCUTTA-700006.

113. Richardson & Crudas (1972) Ltd.,
P.B.No. 4503,
BOMBAY-400008.

114. The Shipping Corporation of India Ltd.,
"Shipping House"
Madame Cama Road,
BOMBAY-400001.

115. Salem Steel Ltd.,
Railway West Colony,
SALEM-636005.

116. Sambhar Salts Ltd.,
Badnor House, Bhagwan Das Road,
P.B.No. 146,
JAIPUR-302001.

117. State Farms Corpn. of India Ltd.,
Beej Bhavan, CTO Buildings,
Pusa Complex,
NEW DELHI-110012.

109. Bridge and Roof Co. of India Ltd.,
21, Netaji Subash Marg,
CALCUTTA-700001.

118. Scooters India Ltd.,
C-40, 'A' Mahanagar,
LUCKNOW-226006.

119. State Trading Corpn. of India Ltd.,
Chandralok Bldg., Janpath,
NEW DELHI-110001.

120. Steel Authority of India Ltd.,
14th Floor, Hindustan Times Building,
Kasturba Gandhi Marg,
NEW DELHI-110001.

121. Tannery & Footwear Corpn. of India Ltd.,
13/400, Civil Lines,
Hazari Bungalow,
KANPUR-208001.

122. Tea Trading Corpn. of India Ltd.,
225, E, Acharya Jagdish,
Chander Bose Road,
CALCUTTA-700028.

123. Triveni Structurals Ltd.,
Naini,
ALLAHABAD-211010.

124. Tungbhadra Steel Products Ltd.,
Tungabhadra Dam - 583225.

125. Artificial Limbs Mfg. Corpn. Ltd.,
F-Side, Near IIT Campus,
KANPUR-226016.

126. Biecco Lawrie Co.,
21, Netaji Subash Marg,
CALCUTTA-700001.

127. Delhi Small Industries Development Corpn. Ltd.,
3-4 State Emporium Bldgs.,
Kharak Singh Marg,
NEW DELHI-110001.

128. Uranium Corpn. of India Ltd.,
P.O. Jaduguda Mines-832102.

129. Industrial Containers Ltd.,
21, Netaji Subash Road,
CALCUTTA-700001.

130. Mica Trading Corpn. Ltd.,
62-D, Srikrishnapuri,
Boring Road,
PATNA.

131. National Thermal Power Corpn. Ltd.,
"Kailash",
Kasturba Gandhi Marg,
NEW DELHI-110001.

132. State Chemicals & Pharmaceuticals Corpn. of India Ltd.
"Chandralok",
36, Janpath,
NEW DELHI-110001.

133. SAIL International Ltd.,
Hindustan Times Building,
Kasturba Gandhi Marg,
NEW DELHI-110001.

134. Bharat Refractories Ltd.,
Post Bag No. 1,
BOKARO STEEL CITY-827001.

135. Mandya National Paper Mills Ltd.,
MANDYA (Karnataka)

136. Rural Electrification Corpn.Ltd.,
D-5, N.D.S.E., Part II,
NEW DELHI-110049.

137. Steel Containers Ltd.,
21, Netaji Subhash Road,
CALCUTTA-700001.

138. Water & Power Dev. Consultancy Services (P) Ltd.,
5th Floor, "Kailash"
26, Kasturba Gandhi Marg,
NEW DELHI-110001.

139. Nagaland Paper and Pulp Mills Ltd.,
P.O.Tuli,Dist. Mokokchung (Nagaland).

140. Hydro Carbons India (P) Ltd.,
Bank of Baroda Building,
NEW DELHI-110001.

APPENDIX II

LIST OF PUBLIC SECTOR UNDERTAKINGS SURVEYED FOR DATA ON MATERIALS MANAGEMENT.

	NAME OF THE FIRM	PRODUCT
1.	Heavy Electricals, Bhopal.	Electrical Equipment
2.	Bharat Heavy Electricals, Trichinopoly.	Boilers and Pressure Vessels
3.	Heavy Engineering Corporation, Ranchi.	Machinery, Castings and Forgings
4.	Hindustan Steel, Rourkela.	Pig Iron and Steel
5.	Hindustan Machine Tools, Bangalore.	Machine Tools
6.	Hindustan Zinc Ltd., Udaipur.	Zinc Processing
7.	Hindustan Cables, Ramnarainpur.	Cables and Wires
8.	Hindustan Antibiotics, Pimpri.	Medicines
9.	Mazagaon Dock Ltd., Bombay.	Ship Building
10.	Gardenreach Works, Calcutta.	Ship Building
11.	Hindustan Shipyard, Vizagapatnam.	Ship Building
12.	National Coal Development Corporation, Ranchi.	Coal Mining
13.	National Mineral Development Corporation, Delhi.	Minerals
14.	Oil and Natural Gas Commission, Dehradun.	Petroleum Products
15.	Fertiliser Corporation, Sindhri.	Fertilisers
16.	Fertiliser Corporation, Trombay.	Fertilisers
17.	Fertilisers and Chemicals, Alwaye.	Fertilisers
18.	Hindustan Machine Tools, Watch Factory, Bangalore.	Watches
19.	Hindustan Photo Films, Ooty.	Photo Films
20.	Instrumentation Ltd., Kotah.	Precision Instruments

LIST OF PRIVATE SECTOR COMPANIES
SURVEYED FOR DATA ON MATERIALS MANAGEMENT.

	NAME OF THE FIRM	PRODUCT
1.	M/s. Lucas - TVS Ltd., Madras.	Auto Parts
2.	M/s. Dunlop India Ltd., Calcutta.	Rubber Goods
3.	M/s. Century Enka Ltd., Poona.	Textile Machinery
4.	M/s. Escorts Ltd., Faridabad, Hariyana.	Tractors
5.	M/s. Pfizer Ltd., Nariman Point, Bombay.	Medicines
6.	M/s. SLM-Maneklal Industries Ltd., Vatava, Ahmedabad.	Machinery
7.	M/s. International Instruments (P) Ltd., Hosur Road, Bangalore.	Precision Instruments
8.	M/s. Motor Industries Co. Ltd., Bangalore.	Auto Parts
9.	M/s. Smith Kline & French India Ltd., Old Madras Road, Bangalore.	Medicines
10.	M/s. Kirloskar Electric Co. Ltd., Bangalore.	Electrical Equipment
11.	M/s. Jyoti Ltd., Alembic Road, Baroda.	Electrical Control Gear
12.	M/s. Sarabhai Chemicals Ltd., Wadi, Baroda.	Medicines
13.	M/s. ACC-Vickers Babcock Ltd., Bombay.	Boilers
14.	M/s. Kamani Metals & Alloys Ltd., Bombay.	Metals and Cables
15.	M/s. Mukand Iron & Steel Works Ltd., Kurla, Bombay.	Steel and Castings
16.	M/s. South India Viscose Ltd., Race Course, Coimbatore.	Synthetic Fibres
17.	M/s. Brooke Bond India Ltd., Coimbatore.	Tea Processing
18.	M/s. Kelvinator of India Ltd., Faridabad, Hariyana.	Refrigerators
19.	M/s. Ashok Leyland Ltd., Ennore, Madras.	Transport Vehicles
20.	M/s. Mather Greaves Ltd., Chinchwad, Poona.	Electrical Equipment

LIST OF FOREIGN FIRMS SURVEYED
FOR DATA ON MATERIALS MANAGEMENT

	NAME OF THE FIRM	PRODUCT
1.	M/s. La Precision Industrielle, Rueil Malmaison, France.	Machinery & Bearings
2.	M/s. Guildemeister & Co., Bielefeld, West Germany.	Machinery
3.	M/s. VEB-Grobdrohmaschinenbau, East Germany.	Machinery
4.	M/s. Strojimport Foreign Trade Co., Praha, Czechoslovakia.	Machinery
5.	M/s. Burgess Micro Switch Company, Gateshead,England.	Electrical Control Gear
6.	M/s. Aciera, Biel Bienne, Switzerland.	Precision Machines
7.	M/s. Schaublin, Biel, Switzerland.	Machine Tools
8.	M/s. Oerlikon Machine Tools Works, Birchstrasse, Switzerland.	Machine Tools
9.	M/s. Oil Gear International Corporation, Milwaukee, U.S.A.	Machinery
10.	M/s. Mattison Machine Works, Illinois, U.S.A.	Machinery
11.	M/s. Societa Nebiolo, S.P.A., Torino, Italy.	Printing Machines
12.	M/s. Mercedez Benz Car Factory, Stuttgart, W. Germany.	Automobiles
13.	M/s. Frederick Pollard, Birmingham, England.	Press Machines
14.	M/s. Lauffer and Butscher, Stuttgart, West Germany.	Moulding Machines
15.	M/s. Karl Stolser, Cologne, West Germany.	Reciprocating Machines
16.	M/s. Diprofil, Basel, Sweeden.	Polishing Machines
17.	M/s. Cincinnati Machine Tools, Liecester, England.	Power Presses
18.	M/s. Ford Meter Company, Wabash, Fort Wayne, U.S.A.	Meter Test Benches
19.	M/s. Dresser Industries, Indianapolis, U.S.A.	Material Handling Equipment
20.	M/s. Goss and Deleeuw, Hartford, Kensington, U.S.A.	Special Purpose Machines

APPENDIX III

(FOREIGN COMPANIES)

K. C. Mathews, (B. A. (HONS) M. B. A., D. E., A. M. I. E. E. (LOND.)
Controller of Purchase,
HMT Ltd., Kalamassery, Kerala,
INDIA

25th October, 1974

Dear Mr .....

Though we do not know each other personally, I have known you for a long time, since we have been writing to each others Company on supply of materials. But this, I am writing for a personal favour to complete a project I have undertaken from the Cochin University for a study on Materials Management leading to a Doctorate in Management

My plan is to get some details as per questionnaire enclosed on vital aspects of Materials Management, so that we can compare those with our Organisations in India. It might be helpful to improve our affairs, and in the process we may even learn about the modern practice.

I shall therefore, be grateful if you will kindly fill up the enclosed questionnaire based on the practice in your Company and post it to me at your earliest convenience.

Thanking you in anticipation,

Yours sincerely,

(K. C. Mathews)

K. C. Mathews, (B. A. (HONS)
M. B. A., D. E., A. M. I. E. E. (LOND.)
Controller of Purchase,
HMT Ltd., Kalamassery, Kerala,

Ernakulam,
1st September, 1974

Dear Mr......

Though we do not know each other personally, I have known you for a long time, in your official capacity, since we both are in the same profession.

We in Cochin do not have an organisation of Materials Managers, at present, but hope to form soon, a branch of the National Association of Materials Management. Recently, Mr. Hariharan, the national president was here to organise the same and once this is started, we could have a convention held in Cochin, so that we could all meet.

In the meantime, I need your help and co-operation to complete a project I have undertaken in "Materials Management Practices in Major Public Sector Undertakings in India" with the Cochin University for a doctorate in management.

My plan is to get details as per the attached questionnaire, and after study of the same, if necessary, clarifications may have to be got either by mail or by personal visit. I will also need a copy of the annual report for the last 3 years. The modern Practice and latest developments in the field in advanced countries like U S A, U. K. and Europe will also be obtained by mail or personal visit. Then the findings and observations will be communicated to you for comments. In order to complete the project, I need your full support and earnest co-operation.

I shall be grateful if you will kindly fill up the attached questionnaire and send me with a copy each of the annual report for the last 3 years.

With best wishes and kindest regards,

Yours sincerely,

(K. C. Mathews)

Questionnaire on the Materials Management Practices in Major Public Sector Undertakings in India.

A GENERAL

1. Name of the Company:-
2. Year of Establishment:-

3. Total investment:- Rs. Lakhs
   a) Plant and Machinery : .....
   b) Housing and Estate :
   c) Working capital : .....
4. The type of Materials Organisation - Integrated/Stores & Purchase separate/any other.
5. Staff allocation:-

	Purchase	Stores	Total	Total annl. salary Rs. Lakhs	Total Cost of items bought yrly. Rs. Lakhs	% of mtrl cost to salary
Officers	—		.....			
Supervisors	—	.....	.....			
Clerical & others	.....	.....	.....			

6. Officers in the Materials Management are Technical/Non-Technical/ both types/any other.
7. Are they exposed to Materials Management training and in general management: Yes/No
8. Do they attend training courses and refresher courses: Yes/No
9. Do you have performance evaluation of supervisory personnel & above: Yes/No
10. Do you have performance budgetting in force in your Orgn., so that accountability is established: Yes/No

B PRODUCTION

1. **NAME OF MAJOR PRODUCTS:**

	Installed capacity	Yearly output Rs. in Lakhs for the last 3 years						Percentage material content of the product
		1971—72		1972—73		1973—74		
		Qty	Value	Qty	Value	Qty	Value	
a)	.....							
b)	.....							
c)	.....							
d)	.....							

2. Net Profit or Loss: ....
3. What percentage of shortage items can you afford in production : Nil/1%, 2%, 5%/ any other.

C PURCHASE

1. What is the approximate acquisition cost (Rs. per order): Rs. 10, 20, 30, 50, 100, any other
2. Do you follow the economic order quantities in buying: Yes No

If answer is no what are main problems : 1) .....
2) .....
3) .....

3. What are the financial powers of the Controllerand Purchase officers:
Upto Rs .....Up to Rs.....
4. How is finance associated with purchase : Pre Audit/Post audit/any other.
5 Do you consider financial checks too many/reasonable/too little.
6 Purchase budget for the last 3 years :

	1971—72	1972—73	1973—74
Rs. Lakhs	.....	.....	.....

7 Main items purchased & value of yrly. purchase :

a) Standard parts & components			.....	.....	
b) Electrical parts	—	—		.....	
c) Accessories	—	—		.....	
d) Shop Stores	—	—	.....		.....
e) Steel & Castings	—	—	.....		
f) Tools & Instruments	—	—	.....	.....	
g) Any other	—	—	.....	.....	

8 Total No. of orders placed — — ....
9 Total of items covered by these orders
10 Total value of import licences obtained ....
11 Do you operate on DGS & D Contracts as a direct demanding officer : Yes/No
12 Do you finalise your own rate or annual contracts — : Yes/No
13 What is the average time taken for getting supplies against an indent : — 2 months/ 3 months, 4/6 monthsany other
14 Do you adopt PERT or CPM net work techniques in the procurement of long delivery items : Yes/No
15 What is average time taken for inspection of incoming materials : 7 days/15 days/30 days/any other
16 Do you maintain and make up-to-date a list of approved suppliers : Yes/No
17 Do you keep records on vendor performance, rating and black listing of firms : Yes/No

D IMPORT SUBSTITUTION:-

1 What is the approximate import (components, raw materials & spares) per year Rs.....lakhs

2 What is the value of substitution achieved during the last 3 years 1971-72 1972-73 1973-74

....

3 Do you have a Committee/Cell to explore, and effect substitution wherevre possible Yes/No

E VALUE ENGINEERING:

Do you have a regular cell working on value engg : Yes/No

1 What is their achievement during the last 3 years (Rs. lakhs) 71-72- 72-73 73-74

....

2 Do you think there is scope for further savings in import and cost reduction : Yes/No

F STORES

1 What is the approximate inventory carrying cost (%) : 10,% 15%, 20°/₀, any other.

2 Closing inventories for the past 3 years as on 31st March each year : Rs. in lakhs

	1971—72 Qty Value	1972—73 Qty Value	1973—74 Qty Value
3 Appx Total No. of items		.....	.....
a. Slow moving items out of this (nos) and value for 1 year or more		.....	.....
b. Non-moving or obsolete ,, ,,	.....	.....	.....
c. No. of insurance spares ,, ,,	.....	.....	.....
4 Actual value of consumption	.....	.....	.....
5 Work in progress at the end of the year value	.....	.....	.....
6 Finished goods inventory ,, ,,	.....	.....	.....
7 a. Approximate value or °/₀ of safety stock	.....	.....	.....

b. Are safety stocks determined based on variations in consumption, lead time, criticality of items and or any other Yes/No

8 What is your recoupment procedure for items:—Yearly/Half yrly/Quarterly/any other

9 Do you follow ABC analysis in inventory control: Yes/No

10 Do you have any system of standardisation, variety reduction & codification : Yes/No

11 How do you detect & dispose off non-moving and obsolete items : Quarterly/ Half yrly/Yearly

12 Do you have an inventory cell to control and regulate all matters of inventory: YesNo

13 Do you use bar charts for stock control of important items for coverage of time YesNo

14 What other methods of inventory control are in use:

15 What is the inventory turnover ratio : 3/5/7/8

16 What is the°/₀value of inventory spent in materials handling and transport:2°/₀, 5°/₀, 10°/₀, any other

17 Is there data processing or computer aid in stores accounting/ purchase or inventory control : Yes/No

18 Is there a system of reporting to management on receipt/stock/issue & balances of stores : Yes/No

G SALVAGE AND SCRAP

1 What is the method of scrap & salvage collection : Under Special Officer/In special yard/any other

2 Is there a special cell to look after this work yes/No

3 What is the method of disposal : By auction/sale tenders/any other

4 What is the yearly realisation for the last 3 years: 1971-72 1972-73 1973-74

Rs. lakhs ....

CHAPTER II

ORGANISATIONAL SET UP FOR MATERIALS MANAGEMENT

Introduction

Modern man has learned to accommodate himself to a world increasingly organised, mainly due to the pervasive influence of organisations in many forms of human activity.[1] These organisations are social inventions developed by men to accomplish things otherwise not possible and they take a variety of people, knowledge and usually materials of some sort and give them structure and system to become an integrated whole.

A well known company had launched a new manufacturing programme utilising a special purpose machine. Months after this machine was supposed to have been installed, the president of the company on a review found that even contracts were not finalised for its supply. In order to assess the situation, the president called for a meeting of all those connected with its ordering. As the time of the meeting approached, so many people assembled that it was necessary to shift the venue of the meeting place from the originally scheduled board

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1. 'Man is a social animal' and he cannot live in isolation. See Bellows, Roger M., Psychology of Personnel, IInd. ed., N.J. Prentice Hall, Inc., 1954, p. 122.

room to a conference hall and from there finally to the auditorium. When he arrived for the meeting, he found to his surprise that almost a hundred people were awaiting him and wondered why so many people had to get involved in getting one job done. He therefore concluded that there was an organisational problem.

The fact that hundreds or even thousands of people are connected with one job is no indication of an organisational problem, but the essence of the problem is that the job is not getting done and that the co-ordination among people has broken down.

In this chapter different aspects of organisational set up, its importance, structure and objectives, need for co-ordinated set up for materials and its effect on total cost, integrated organisation and other related topics are examined. After comparing these with the existing practice in the organisations studied, conclusions have been drawn.

Importance of Effective Organisational Set up.

All manufacturing and processing companies have been started to make certain end products. When a small group of men start a manufacturing business they may all work in the different departments of the business without any serious problems of overlapping functions. But as the business grows they have to specialise or

secure the help of others to concentrate specifically in the respective areas of manufacturing, sales, accounting, personnel, materials management and finance. This will be necessary as the work load increases, because it will be too much for each person to manage and one cannot possibly be a specialist in all the fields of business activity.[1]

As long as the business is on a small scale it is possible for its management to be well informed on all phases of its activities and if various alternatives are available, the management group can make the best business choices and decisions.[2] As the business grows the number of specialists needed to control and manage different activities also grows. These specialists make decisions which are money savers but at times some decisions which may save costs in their area of responsibility may have negative effects on the costs in another area, virtually none being aware of the reasons for the increased costs.

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1. The fields of business activity refer to planning, organising, directing and control of all the phases of work in an organisation for which an executive is responsible. For details see Wayne L. Mac Naughton, Introduction to Business Enterprise, New York, John Wiley & Sons Inc., 1960, pp. 206-210.

2. Business decisions are made from the alternatives available in line with the organisational objectives so that the operations are economic and effective. See William T.Morris, Management Decisions, Illinoi Richard D. Irwin Inc., 1964, pp. 81-90.

This can be overcome only by an effective organisational set up.[1] A great many functions closely related to each other are infact so dispersed through an organisation especially in large ones that optimal decisions cannot be and are not made. Through co-ordination and control of various departmental activities it is ensured that the available resources are used effectively in the accomplishment of an organisation's objectives.[2] This inter-departmental relationship is established through a sound, flexible and dynamic organisational structure.

Organisational Structure and Objectives.

Every company has its objectives which include supply of goods and services, earning a surplus, being a leader in the field of its activity, ensuring welfare of its employees, etc. The company's policies, programmes, plans and schedules are so set as to

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1. Effective set up is a condition in which the relative development of the functions of an organisation conform as closely as practicable with the importance of their contributions to an accomplishment of the organisation's objectives. See Ernest Dale, The Great Organisers, New York, McGraw Hill Book Co. 1960, pp. 71-79.

2. Objective may be any value for which someone is willing to make the necessary effort or sacrifice to get it and this value may or may not be socially desirable but the objective is the starting point of thinking and planning concerning any organisational activity. See Dan H.Fenn Jr., Management's Mission New York, McGraw Hill Book Co. 1959, pp. 124-131.

achieve these objectives for the organisation as a whole and in turn for each component of the business. Each of them determines the work to be done to achieve these objectives under guided policies and the related work is divided and assigned to simple, logical, understandable and comprehensive sub-groups.

The organisational structure assigns duties and responsibilities clearly and definitely to the various departments. It also determines the requirements and qualifications of personnel most suited to occupy such positions and defines clearly the operating tasks and delineates responsibilities associated with each task. The output will mainly depend on the organisational structure, capabilities of personnel and their motivation. Without functionalisation, co-ordination and control, a good performance will be difficult to achieve.

It is not always easy to define the materials function as clearly as any other company function. Materials administration is one of the two value-adding sections the other being manufacturing, the latter by conversion of materials to higher forms of utility and the former adds value by distribution, place and time utility of materials and finished goods.

Departments like personnel, finance, planning, information processing and public relations are contributive to the value adding function. Production

and distribution are commercial activities and purchasing and marketing are physical activities like transportation and storage. Commercial activities are concerned with the exchange function, the matching of supply and demand while the physical activities are directly concerned with the material-flow. The organisational structure in all these cases has to be in line with the function to be performed and the objectives[1] to be achieved.

The Need for Co-ordinated Set up for Materials.

In the process of converting raw materials into a finished product these materials have to pass through several stages and in order to be economic and effective, co-ordination and control of this flow is very essential.

The various stages of this flow are:-

1. Material Planning
2. Purchasing
3. Transportation
4. Receiving of the materials
5. Inspection

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1. Objectives provide a direct expression of the company's ethical standards, its managerial philosophy and its continuing purposes in a form which make them understandable and acceptable. See Alan Mumford, The Manager, Great Britain, Pitman Publishing House, 1971, pp. 58-76.

6. Storage
7. Inventory control
8. Issues and consumption control
9. Accounting of stores and payment
10. Value engineering and import substitution
11. Disposal of surplus material
12. Make or buy decisions and
13. Development of ancillary industries.

The organisation for materials must therefore ensure co-ordinated control of all these stages effectively to achieve inter alia all the economic advantages.

The materials function becomes more important when the volume of purchase and inventories is considerable. The inventory volume in turn depends on the make or buy policies and the material content of the product which varies for different end products. The make or buy policy is guided by overall economic considerations.[1] If the cost of a product can be reduced, the emphasis is to buy parts rather than make them and this may increase the volume of purchases

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1. Without idling the existing plant capacity, if components or other items of quality can be procured from outside sources at cheaper rates, buying is preferred rather than making them at the shops. See Magee, J.F. and Boodman, D.M., Production Planning & Inventory Control, New York, McGraw Hill Book Co., 1963, pp. 143-148.

to some extent which simultaneously increases the inventory holding. The use of computers requires inter-related systems within the company and unless the whole materials field is covered, it will not be efficiently operative. In automated production[1] also, uninterrupted material flow is essential and this flow cannot be achieved without a streamlined materials administration to cover the inter-related system and the whole area of materials.

In some organisations, purchase and stores are managed under different departments whereby the purchase manager may be tempted to buy material in bulk for the sake of better prices or quantity discounts without due regard for inventory levels or interest charges. Therefore if inventory control is his responsibility he is bound to assess the total impact on the economy. He will also then be in the know of overall stock, the cost of stock outs, the time by which material is required and whether any suitable substitute is available. Based on this knowledge he will be able to take purchase decisions regarding prices, quantities and delivery dates. If inventories, material costs

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1. Automation is that field of knowledge which deals with the automatic handling, processing, gauging and movement of materials between operations on a product or component part dealing with an advanced form of mechanisation. For further details see Tom Burns and Stalker G.M., The Management of Innovation, London, Tavistock Publications, 1961, pp. 77-82.

or any other costs are out of tune, it becomes easy to pin point[1] the weak link in the material chain and remedial action can be taken promptly as there is no dividing line of responsibility.

Effect of Co-ordination on Total Cost.

Efficiency and economy effected in materials operations are a direct reflection of the organisational effectiveness as seen from:

a) The low cost of supplies and services through economical and efficient procurement programmes

b) Maximum inventory turnover[2] by regulated ordering, selective inventory control[3] and a staggered material flow

c) Low carrying and acquisition cost through low inventories and economic quantity ordering

d) Minimum shortage with continuous flow of supplies through proper chasing and follow up

e) Good quality supplies through proper specifications, standardisation and selective inspection of incoming materials and

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1. Table III shows expense distribution in an American firm and Table IV shows that in a Public Sector Undertaking. Figure II shows this distribution graphically.

2. The amount of sales during a period divided by the average inventory of particular items during the same period is the turnover ratio. Also see Prichard, J.W., Modern Inventory Management, op. cit., p. 139.

3. The staff function of constraining, co-ordinating and regulating the work of procuring and disbursing materials in accordance with inventory norms and manufacturing plans is inventory control. For details see Buchan, J., Scientific Inventory Management, op. cit., p. 241.

TABLE III

INCOME AND EXPENDITURE DISTRIBUTION
IN A MANUFACTURING PLANT (FOREIGN)

Sl.No.	Item	Total in Millions	Percent of sales
1.	Receipt by Sale of Products	$ 3250.4	100
2.	Employment Costs	1387.0	42.7
3.	Products and Services bought	1134.3	34.9
4.	Depreciation	261.8	8.0
5.	Taxes	266.7	8.2
6.	Interest Charges	5.2	0.2
7.	Dividends	110.7	3.4
8.	Reinvested in Business	84.7	2.6
9.	Total ..	3250.4	100.0

Financial Results of the United States Steel Company.

TABLE IV

INCOME AND EXPENDITURE DISTRIBUTION

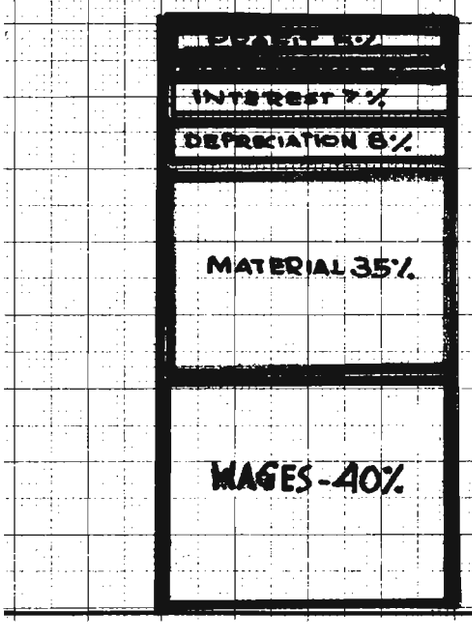
IN A MANUFACTURING PLANT IN INDIA

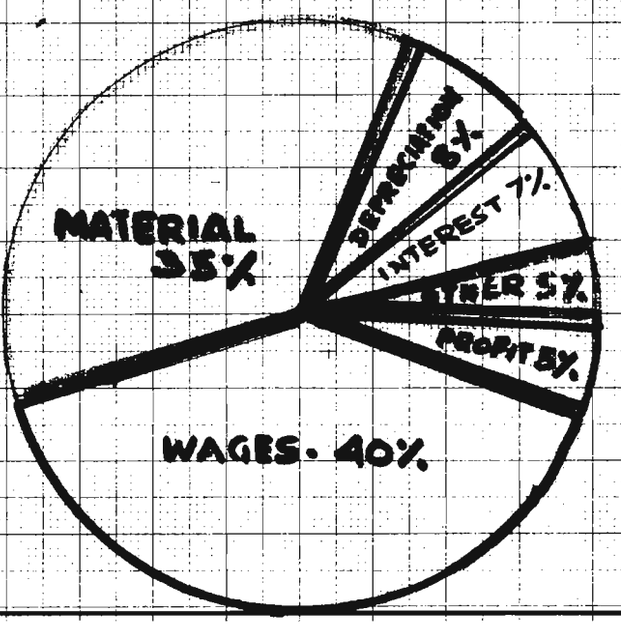
Sl.No.	Item	Total in Millions	Percent of sales
1.	Receipt by Sale of Products	Rs. 80.0	100.0
2.	Employment Costs	32.0	40.0
3.	Products and Services bought	28.00	35.0
4.	Depreciation	6.4	8.0
5.	Interest Charges	5.6	7.0
6.	Taxes and other Expenses	4.0	5.0
7.	Profits	4.0	5.0
8.	Total ..	80.0	100.0

Financial Results of Hindustan Machine Tools Limited.

FIGURE II

EXPENSE DISTRIBUTION IN A TYPICAL MACHINE TOOL PLANT





f) Reliable sources of supply and cordial relations with the suppliers through prompt payments, proper public relations and periodical discussions on product development.

All efforts are centered on the total cost which has to be kept as low as possible but the cost cannot be kept low unless the various components of materials administration are co-ordinated and controlled from one point. If there is no organisation established to co-ordinate the various activities of each department, it is certain that the optimum costs will not be achieved and a very good saving opportunity will be lost.

When the stores organisation is attached to the production department, people in charge of production will be inclined to lay more emphasis on production even at the cost of other activities of the undertaking. They will be pleased 'if all the bins are full all the time' so that there is no hindrance to any production line and they are some times blind to the fact that for the money blocked up in inventories interest is to be paid and not to be earned. Therefore materials management has to be a distinct responsibility and it has to act for the overall economy of the company. When the responsibility for the non-availability of materials is assigned to the materials manager, the production manager will be able to devote his full time attention to production needs instead of spending

part of his time worrying about materials and their availability. This arrangement also enables the chief executive to have efficient control over the materials division.

An increased production at reduced cost can be made only by an intelligent approach to the various functions involved in the acquisition and use of materials. The materials manager will have to be independent of production or any other department to be able to exercise absolute control on all materials activities and to be really effective, he should also have an equal status and delegation of powers as the production or finance manager. Then only can he execute his responsibilities efficiently and command advance information about the requirements of materials in a phased manner, based on priorities and accurate quantities which are essential for advance planning.[1]

Integrated Organisation.

Every organisation must expand as its volume of business increases and the work load must be broken down, separated, analysed and then grouped into assignable work units through functional integration. Though the organisational requirements of each undertaking may vary, depending on their structure and activity, all the component activities of

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1. Advance planning is the work of determining and specifying originally, the factors, forces, effects and relationships in the accomplishment of designated objectives. See Hallock, J.W., Production Planning, New York, The Ronald Press Company, 1959, p. 181.

materials management must be integrated[1] to ensure maximum efficiency and co-ordination. The degree of economy would depend heavily on the soundness of the organisational set up based on functionalisation, control and co-ordination.

Integrated materials management envisages a high degree of co-ordination and control among all materials activities like planning, ordering, receipt, inspection, payment, stores accounting, issues, inventory control and disposal of surplus. All these activities are different stages of a single function and therefore there should be a single line of command running through them. Such a step also enables better relations with the suppliers which is vital for efficient procurement and product development.

With integrated organisation, services improve and costs decrease. Besides effective co-ordination and control will also improve since the entire department is under one executive rather than several. A stable materials department whose manager has equal status with

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1. Integration is grouping and combining of similar functions for achieving economy and efficiency. If the component functions are separately organised there will be duplication of efforts and increase in overall costs. Also see for details Buchan J., Scientific Inventory Management, op. cit., p. 203.

those in engineering and production, offers an intangible benefit of strong influence on indirect materials activities of standards, specifications and value analysis programmes.

As a result of combining different functional areas of materials division the total material cost decreases and inter-departmental participation in these activities increases. From the foregoing facts the essentials of an effective and economic organisational set up for materials can now be summarised as follows:

a) A sound, flexible and dynamic organisational structure incorporating objectives of the organisation, duties and responsibilities of personnel for each department and their inter-relationship.[1]

b) Efficient, experienced and trained personnel, with effective executive leadership and morale, to manage these departments most economically

c) Co-ordination of the various materials activities so as to achieve all the targets and company objectives

d) Control of performance periodically to check on the attainments and to initiate timely remedial measures

e) Functional decentralisation and

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1. a) Inter-relationship is the inter-dependence for achieving end results by mutual co-operation and joint effort. See Robert N.Anthony, Management Control Systems, Illinois, U.S.A., Richard D. Irvin. Inc., - 1965, pp. 84-93 and

   b) Ralph Currier Davis, Industrial Organisation & Management, ~~xxxxxx~~ op. cit., p. 713.

f) Proper delegation of authority and accountability.

From the above requirements it is evident that unless the various functions of materials administration are co-ordinated and controlled under one departmental head, it is difficult to obtain the best economy and efficient performance. Integrated materials management is the most popular set up in all the foreign firms studied and for this system to be really effective, there should be functionalisation, decentralisation and delegation of powers with independent decision-making authority for the concerned personnel.

Materials Administration in Foreign Firms - Europe, United Kingdom and United States.

Unlike in India, all the raw materials are readily available in western countries and can be obtained at short notice. The integrated system of materials management is followed in almost all foreign companies. The chief of the materials division is either a Vice-President or a Director whose status is on an equal footing with the head of the other departments like finance or personnel.
The material flow starts from the supplier to the plant and ends with the delivery of the finished product to the consumer through the channels of planning, procurement and conversion consisting of in-flow, internal flow and out-flow.

There are two distinct material set ups prevalent in European organisations studied viz. internal and external.

The internal set up is under the direct control of the company while the external set up is controlled by the suppliers and customers. In order to have a better control over the total materials flow, the internal materials system strives to include parts of the external system. Such an arrangement is aimed at closer ties with suppliers and customers through systems contracting,[1] stockless buying[2] and blanket ordering.[3]

The term materials management is used in American firms for the group of activities concerned with getting purchased materials and services to the point where they are economically useful.[4] The source and supplier form the external materials system, the processing and consumption within the company form the internal materials system and finally the customers get the finished product through the external materials system. This arrangement gives a systematic integrated approach to materials through and from the company. The flow cuts across the traditional boundaries between departments and an integrated control leads to reducing total costs and improving the level of services. The whole philosophy is based on total cost concept with

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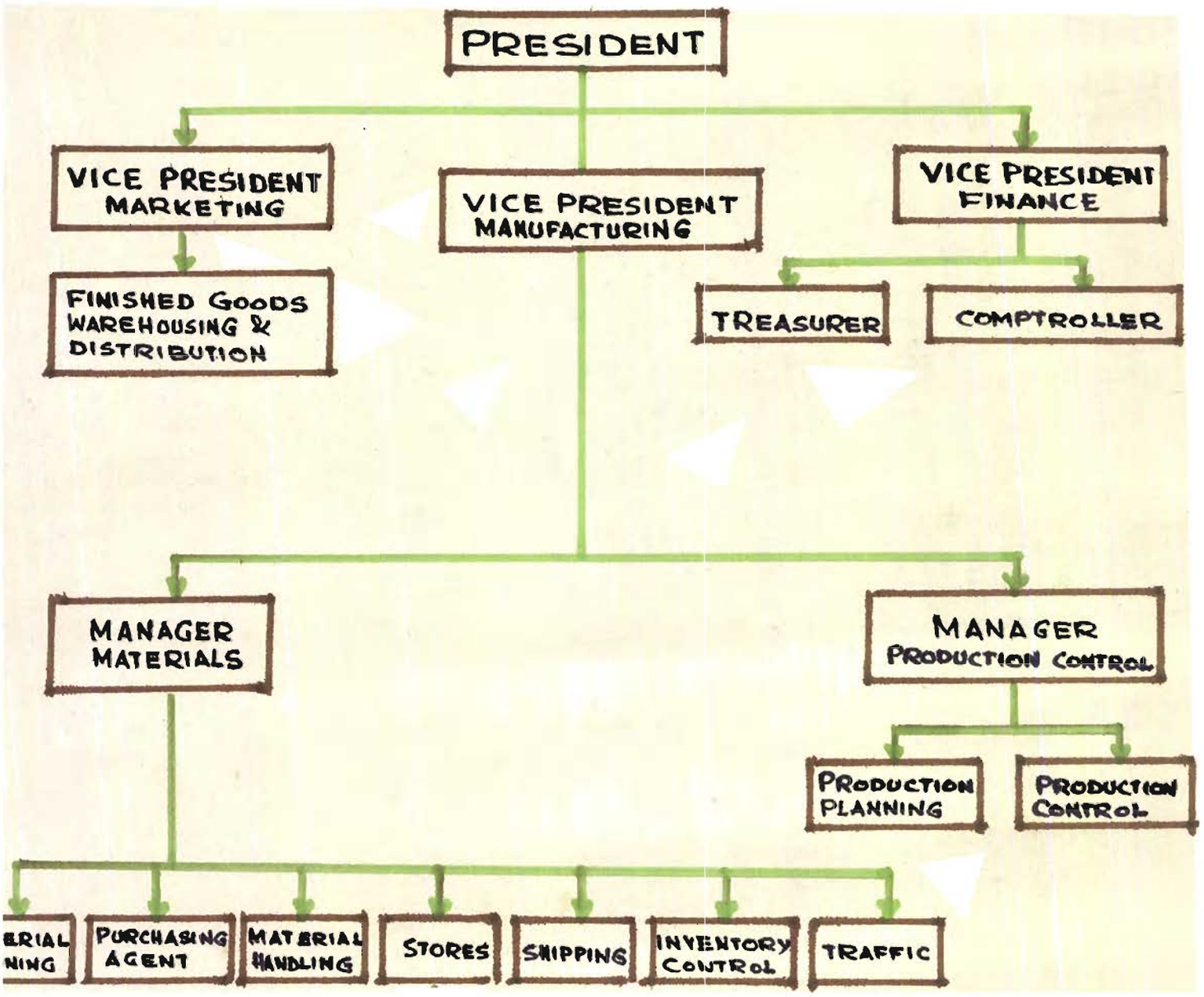
1. Systems contracting refers to reservation of suppliers' capacity for certain periods to get complete group system, supplied by them.
2. Stockless buying refers to the need based procurement and is opposed to the system of stocking and use.
3. Blanket ordering refers to bulk orders without detailed quantities and delivery limitations.
4. Figure III shows Integrated Organisational set up of materials management department generally adopted in American firms and Figure I shows the set up in Indian firms.


PRESIDENT
VICE PRESIDENT MARKETING
VICE PRESIDENT MANUFACTURING
VICE PRESIDENT FINANCE
FINISHED GOODS WAREHOUSING & DISTRIBUTION
TREASURER
COMPTROLLER
MANAGER MATERIALS
MANAGER PRODUCTION CONTROL
PRODUCTION PLANNING
PRODUCTION CONTROL
ERIAL NING
PURCHASING AGENT
MATERIAL HANDLING
STORES
SHIPPING
INVENTORY CONTROL
TRAFFIC

efforts to balance various costs and revenues against each other in order to reach the best trade-off. The materials organisation of companies is similar in Europe, the United Kingdom and the United States and there is not much difference except that sub-contracting is practised on a larger scale by firms in the United States.

Comparison of Organisational Set up:

When the basic essentials of the organisational set up and the practice followed in Europe, the United Kingdom and the United States were compared to those existing in private and public sector industries in India, it was found that out of 20 public sector undertakings surveyed only 10 of them have integrated materials management set ups while the remaining companies have separate purchase and stores organisations. Similarly in the private sector out of 20 companies studied 19 of them have integrated materials management and all the 20 foreign firms surveyed follow integrated system. All other details like the total value of yearly purchase, number of items held in the inventories, the extent of delegation of powers and decentralisation, quality of personnel and their status, performance control, acquisition cost[1] and overall cost[2] of the department, have been

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1. Acquisition cost is the procurement cost of materials and is proportional to the total number of orders placed in a year, cost incurred to place one order and the annual consumption of the item.

2. Overall departmental cost is the cost incurred on account of the materials management department including salary and wages, transportation, printing, stationery and postage which is normally around one percent of the purchase price of materials. Also see Thuesen, H.G., Engineering Economy, Prentice Hall of India, New Delhi, 1965, pp. 99-103.

tabulated in Table V.

Conclusion

The system prevalent and popular all over the world for the organisational set up of materials divisions is integrated management. Though this may vary depending on the size of the organisation, location of its factories, mode of purchase whether centrally or de-centralised and the similarity of the items required by its various units, it is possible to integrate most of the activities to achieve economy in its total operations.

The Parliamentary Committee on Public Sector Undertakings has recommended that the integrated system of materials management be followed in all public sector industries.[1] Accordingly many public sector units have already introduced this system but there are many still to implement these recommendations.[2] In some cases within the same company like Hindustan Machine Tools, some units follow an integrated system while others follow separate organisational set ups

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1. Realising the importance of efficient materials management, a committee of Parliament members was set up by the Government to study the performance in materials functions and working results of certain public sector undertakings every year and to give their recommendations to improve the overall results of these organisations. In most of their reports, materials management and its importance were emphasised with specific mention of the necessity for integrated materials management.

2. The recommendations of the Parliamentary Committee on materials management in public sector undertakings included among other things, inventory levels for imported and indegenous items, recoupment policy, disposal of surplus and non-moving items, conditions of contract for government purchases, etc.

for stores and purchase.[1] In the absence of such an integrated organisational set up, it is not possible to effect any significant savings in cost and improvements in the service level.

As can be seen from table V in respect of other essentials like quality of personnel, their status in the organisation periodic control of performance, functional decentralisation and delegation of powers, public sector organisations are far behind the private sector companies and foreign firms which is one of the factors for their performance not being very encouraging.

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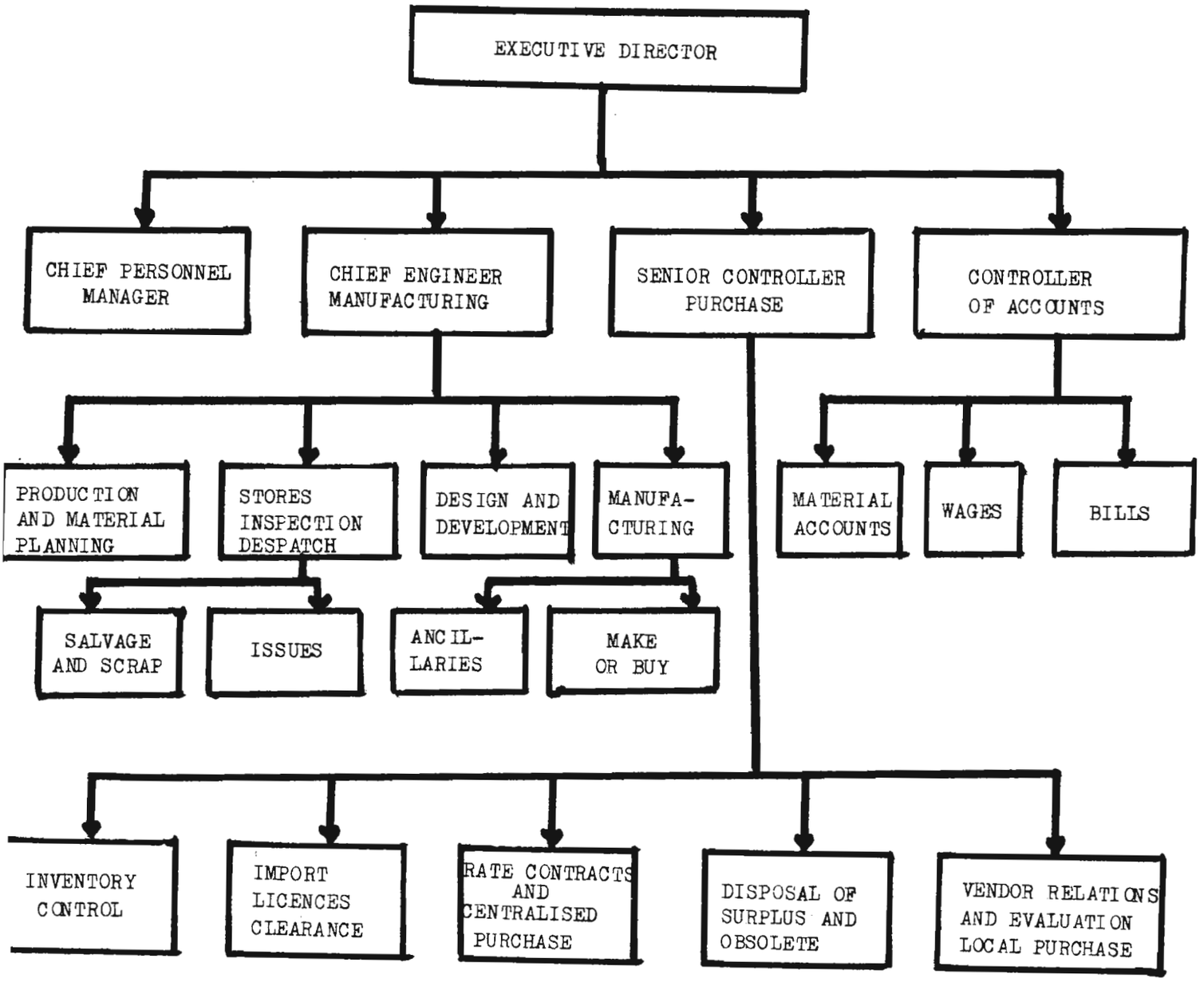
1. Figure IV shows separate organisational set up for purchase and stores departments as practiced in Hindustan Machine Tools Limited, Kalamassery. Half the number of public sector companies surveyed follow this pattern of organisational set up for their materials department.

FIGURE III

ORGANISATIONAL SETUP OF MATERIALS MANAGEMENT IN HINDUSTAN MACHINE TOOLS LTD., KALAMASSERY



CHAPTER III

PERSONNEL PLANNING AND DEVELOPMENT.

Introduction

Organisation planning forms the basis for manpower requirements and activities. The materials manager utilises all of management's basic element of planning, organising, controlling, staffing and motivating. He should therefore be familiar with good organisation principles and concepts so that he can do an efficient job of organisation planning. His task is to organise human effort toward the accomplishment of targets and objectives set for his department. This can best be done with an organisational structure, spelling out the functions, duties, responsibilities and authority of the required people.

Once the basic structure and functions are determined, a quantitative assessment of the needed manpower can be made[1]. The objective of manpower planning for materials department is to ensure that the proper quantity and quality of personnel will be available when needed to man the department. There is special significance where materials personnel are concerned as they spend more than half the revenue of the company on materials and any amount saved here accrues to the profits of the company.

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1. Man power planning is vital, because an organisation can be as good as the people who manage it. See Dale Yoder, Personnel Management and Industrial Relations, New Delhi, Prentice Hall of India, 1975, pp. 169-175.

In this chapter all the essential requirements for the materials personnel to make the department a profit centre are assessed and compared with the quality and capabilities of personnel now present in public sector undertakings. The mode of selection, types of training, orientation, delegation of powers and the goals set for them are also compared with those in foreign firms and in the private sector companies in India and conclusions have been arrived at.

The Objectives and Functions.

Specialised techniques of materials management alone cannot make materials operations successful. A sound organisation, refined policies, procedures and trained competent personnel are essential. The effectiveness of the department will be proportional to the abilities and motivation of the oeople operating it. It is therefore necessary to organise the department spelling out the functions, duties, responsibilities and authority of the personnel.

The annual sales forecast can form the basis for determining the workload in materials division, which can be broken down into individual tasks and the number of people required to meet the daily, weekly and monthly schedules. The quality of the manpower required is determined job analysis[1],

1. Job analysis is any technique for collecting, classifying and analysing information concerning the characteristics and requirements of general work assignments.

job specifications and descriptions[1], based on which selection and recruitment are made. The staffing tasks of management encompass selection, recruitment, training, promotion, development and utilisation of personnel.

Sources of Personnel

Sources can either be from within the organisation or from outside. If selected from the company itself it can generate high morale, stimulate better performance, reduce training costs and replacement can be had at a lower cost[2]. It can also cause a chain of promotions within the department replacing each one and produce an inbreeding, but it possibly prevents the flow of new ideas into the organisation.

External sources are casual applicants, former employees, schools and colleges, employment agencies and applications invited through advertisement. Some concerns solicit recommendations from their present employees, who are allowed to bring in their relatives and friends, who can be relied on better than casual applicants. However there is the danger of cliques developing if too many friends and relatives

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1. Job specification is a summary of job analysis information pertaining to the functions, conditions and requirements of a particular work assignment including the requirement of the person for the job. See Robert C. Sampson, The Staff Role in Management, New York, Harper & Brothers Publishers, 1955, pp. 51-54.

2. Internal recruitment has the advantage of lower cost and company orientation, but may lack special skills required for specific jobs. For details of advantages and disadvantages see Mathew Jackson, Recruiting, Interviewing and Selection, London, Mc Graw Hill Book Co.(U.K) 1972, p.27.

are employed in the same department.

Personal Characteristics for Materials Men.

In professional materials management work a high degree of co-operation with other departments is very important. The materials manager has to be a self-starter, with ability to negotiate at all levels and has to do cause and effect analysis to arrive at sound decisions. Apart from a knowledge of the characteristics of materials handled, he must also be aware of the pre- and post-operations performed on it and the end use.

Secondly business and technical knowhow are essential for all materials men. Business knowhow includes materials management principles, their application and general understanding of the business functions related to materials. Technical knowhow relates to understanding of materials characteristics and manufacturing processes. The proportion in which a materials manager combines these two depends upon the nature of the product and the need for greater technical knowhow increases with the complexity of the product. An aggregation of experience is acquired by a combination of academic training and practical experience and the real value of engineering training to a buyer is two fold that it provides technical orientation and analytical abilities for dealing with quantitative problems.

The International Federation of Purchasing and Materials Management[1] lists the following personal characteristics essential for professional success in the materials field:-

1) Integrity
2) Dependability
3) Initiative
4) Industriousness
5) Unusual ability
6) Unusual tact
7) Ability to learn
8) Ability to work on details
9) Mechanical aptitude
10) Good human relations skills
11) Enquiring mind
12) High sense of value and
13) High ethical standards.

Most of these qualities come under business knowhow and when the products are highly sophisticated viz: electronic, chemical or aerospace, a combination of academic qualification, training and practical experience is essential to attain the desired levels. A basic degree is therefore advantageous subsequent to which practical experience and selected reading in specialised areas when combined can make up the required ability. A good materials manager when properly trained is invaluable while a poor untrained one is a major liability.

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1. IFPMM is the world organisation of Material Managers and IAMM is its Indian Subsidiary. IAMM conducts regular courses on Materials Management and the publications are available from their registered office at Lansdowne Road, Bombay - 5.

A survey conducted on the members of the Indian Association of Materials Management gave the following composition:-

Field of specialisation	Percentage
Business and Industrial Management	30
Engineering	20
Liberal Arts and Science	20
Law and Accountancy	18
All other fields	12

The survey also revealed that about 86 percent of the top level managers are college graduates and 25 percent of them are post-graduates with management qualifications.

Selection of Personnel

Industrial undertakings have come into the public sector either through acquisition or nationalisation of existing industries in the private sector or through the establishment of a new enterprise directly in the public sector. Acquired undertakings having expansion programmes and new industrial undertakings have need for additional manpower. The first step is to determine the job requirements and then proceed to find individuals possessing the characteristics and abilities required by the job or the subsequent jobs to which it can lead. In the long run when people enjoy their work, they perform better and are happy when their abilities and interests are fully utilised and challenged by the requirements of the job.

The selection process mainly focuses attention on abilities, knowledge, training, experience and personal qualities that are necessary to perform the job efficiently, in addition to certain personal characteristics and background experience mentioned earlier for a materials man to grow and achieve stature in the profession.

The normal steps followed for selection are:-

1) Application and employment interview
2) Work history investigation
3) Investigation of references
4) Formal testing
5) Physical examination and
6) Interviews with operating executives.

An interview is a method of obtaining facts from an individual and of accomplishing a meeting of minds concerning a particular problem[1]. Some interviews have to do with getting facts for planning or policy purposes, the administration of disciplinary action, the handling of grievances, the determination of the status of project and others.

During the interview with the operating executives, the skill and experience of the applicant, general attitudes and interests, maturity and adaptability and personality characteristics are appraised.

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1. A technique for obtaining facts from one individual or few individuals by some questioning procedure which will assist in determining suitability of those interviewed. See Bernard Ungerson, Recruitment, IInd.ed. Great Britain, Gower Pres Ltd., 1975, pp. 150-163.

For the interviewers it is an art of listening and the applicant can explode on the details of the job. The interviewer should not be carried away by the Halo effect[1] of weighing everything on the general impressions of the applicant or weighing a few details too heavily. To remedy this, interviewing is done by more than one person and tests conducted on intelligence, aptitude, personality, interest and initiative. The final evaluation is based on whether 1) the qualifications and experience match the job requirements, 2) the motivation and interests shown are enough to handle the job successfully and 3) the personality traits fit the requirements of discretion, initiative, decision making etc.

Orientation, Education and Training.

The career potential of all men currently in the organisation, are pre-determined and training programmes organized to make them more effective. A long range time table for training, promotion and recruitment is then planned depending on future predictions, which is reviewed and modified from time to time to suit the new conditions and changing environment.

General orientation and functional orientation are arranged for new persons. The former deals with details of the Company, its aims and objectives, products, policies, fringe benefits, wage scales, company organisation chart, map of the locality, etc. and is done through the explanation

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1. The Halo effect is the first impression winning over all subsequent details without due consideration of consistency. See Mathew Jackson, Recruiting, Interviewing and Selection op. cit., p. 152.

of departmental operation, work regulations and plant tours. Functional orientation is effected by learning and doing by the sponsor method and functional rotation. The initial experience on the job influences the person's attitude toward permanency and covers ambitions with the firm.

It costs a good lot to acquire a trained professional man and to lose him and it costs even more to retain a disgruntled man. Therefore, proper orientation is extremely important, because a good programme puts the new employee in a frame of mind which is conducive to learning and development and since he represents an investment it must be possible to earn a good return[1].

Education is concerned with acquisition of knowledge, understanding and mental skills that enable one to use this knowledge effectively in problem solving thought. Both effective thinking and an attempt to apply a logic of effective thinking takes place necessarily with respect to those problems that tend to be associated with the particular body of knowledge. It helps people to develop an understanding of the traditions and ideas influencing the society in which they live, learn other cultures and laws of nature, acquire linguistic and other skills basic to communication.

Training is more job specific, the systematic development of an understanding of some organised body of facts,

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1. Considering the cost involved in selection and employment of an additional hand through advertisement, interviews, section, orientation, training and development, every company is making a sizable investment expecting a reasonable return. See Bursk Edward, How to Increase Executive Effectiveness, Harward University Press, 1953, pp. 31-36.

rules, methods, attitudes, knowledge and skill required to perform adequately a particular task or job. Education and training are closely related and they tend to shade into one another.

Management Development.

All those who direct and control the work of others as a large part of their jobs and those who do not manage people but because of the importance of the work carried on by them, enjoy a rank or status as high as those who do, are part of the management[1]. Job enrichment with some responsibility for planning and controlling at least his own work with some involvement in company objectives, makes a person to some extent a manager.

With the growth of large firms and the sophistication of the industrial environment, the number of managerial personnel has multiplied. In Britian, it is about ten percent of all those employed and in Holland The Dutch Shell alone has as many as 10,000 people in management positions.

Management development is a system of developing effective managers at all levels to meet the requirements of the organisation. This will mean present and future needs of the undertaking, the assessment of actual and potential skills and devising means to match available staff to the expected requirements. A good programme evidences the care

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1. Figure V shows the arrangement of managerial and operative functions.

FIGURE V

MANAGERIAL AND OPERATIVE FUNCTIONS.

<table>
<tr><td></td><td>BASIC KINDS AND GRADES OF ORGANISATIONAL SERVICE</td><td></td><td colspan="2">MAJOR ORGANISATIONAL DIVISIONS</td></tr>
<tr><td></td><td></td><td></td><td>LINE</td><td>STAFF</td></tr>
<tr><td rowspan="2">MANAGERIAL SERVICE</td><td>ADMINISTRATIVE MANAGEMENT</td><td rowspan="2">PLANNING, ORGANISING AND CONTROLLING THE WORK OF OTHERS</td><td>DUTIES</td><td>DUTIES</td></tr>
<tr><td>OPERATIVE MANAGEMENT</td><td>DUTIES</td><td>DUTIES</td></tr>
<tr><td rowspan="4">OPERATIVE SERVICE</td><td>PROFESSIONAL</td><td rowspan="4">PLANNING, CONTROLLING AND ORGANISING ONE'S OWN WORK</td><td>DUTIES</td><td>DUTIES</td></tr>
<tr><td>SKILLED</td><td>DUTIES</td><td>DUTIES</td></tr>
<tr><td>SEMISKILLED</td><td>DUTIES</td><td>DUTIES</td></tr>
<tr><td>UNSKILLED</td><td>DUTIES</td><td>DUTIES</td></tr>
</table>

and personal interest taken by managers in training those placed under them, the time and effort put in and the personal responsibilities allotted to them.

Development activity should be tailored to each man. It is not sufficient to introduce programmes in the hope that it will do some good, but the needs of individuals must be ascertained and then adopt the methods or techniques which will be responsive to these needs. Improvement requires action on the part of the individual, he must have experience which contributes toward the development of skills he is expected to have. A person cannot learn to ride a bicycle by reading a book and similarly a manager cannot develop the skills and abilities of a manager without some experience as a manager. Measurements and controls aid development. The environment in which a man works affects his performance and his ability to learn and retain. Training is the function of helping others to acquire and apply knowledge, skills and attitudes which they can use in specific work situations.

Training for Materials Men.

Decision making skills, management perspectives for the whole company, consciousness of political, social and economic influences and added proficiency in the use of management techniques are the areas of development needed for materials men[1]. The points of strength and weaknesses in the

1. Management efficiency is attained through skillful training. See Dale Yoder, Personnel Management and Industrial Relations, op. cit., pp. 329-386.

performance are identified to decide in what direction further training and education are needed. Based on a planned programme, training methods are decided and it is essential to evaluate the performance of each individual to ascertain whether the required standard has been reached.

In company and outside courses are specifically designed for needs which have been found to exist in the departments concerned. Case studies, projects and exercises developed from incidents and problems in the company and confidential company information are employed. New attitudes matter a lot more than new techniques. This is why participative methods like case studies and exercises are more effective in such courses, whereby they are related closely to current problems in the company.

Company courses are organised by the company staff or by engaging outside speakers and specialist consultants in the area to do the job. External courses are arranged by deputing these persons to the management institutions. Some courses are residential and others are evening courses of part time. Professional bodies have now taken up even correspondence courses in various fields of management.

Motivating Materials Men

For getting results through the efforts of other people they must have motivation to do the job, rather than an order to do it. A good manager maximises results through maximum involvement with his people. One who has no concern for his people, is only interested in results and

nothing else and similarly too much concern for the people also would not produce the desired results. Due to personality traits of individual managers concerned, depending on the needs of the situation, company policy, tradition or on the basis of set assumptions about them the management style may differ.[1] Some of the assumptions are that:-

a) The average man dislikes work and wants to avoid it if possible

b) He has to be forced, directed and controlled to work

c) He prefers to be directed and has little ambition and

d) The main thing he wants, is security.

This view of the average man has since changed and the management can get better results by basing its strategy on a different set of assumptions that:-

a) The expenditure of effort in work is natural

b) The external control and threats are not good ways to produce results

c) The average man prefers to have some responsibility under proper conditions and

d) Self direction and self control can be used in managing employees, who will then exercise imagination and initiative which external direction and control tends to repress.

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1. For details on the management style of theory 'x' and 'y' see Douglas McGregor, Human Side of Enterprise, New York, McGraw Hill Book Co. 1961, pp. 76-79.

In a socialistic frame work, where values of society have to be identified with those of institutions, the latter assumptions have greater application in the patterning of organisations.

Participative and Objective Management

The manager has always to make hard decisions, take responsibility for picking one course of action from among many uncertain alternatives, to make mistakes and take the consequences. Good human relations are important but it can never cut out all discord and disappointment. By sharing authority, proper delegation and wilful participation, business risks are reduced and company morale boosted. Participation contributes effectively to unity of thought, action and integration of ideas. Amongst the many human needs in an ascending order of priority are food, clothing, shelter, safety, security, love, affection, self-esteem and self-actualisation.[1] The disappearance of needs as they are satisfied and the emergence of new higher level needs, as the dominating motivator, is not a conscious automatic process.

Some of the factors which make up job satisfaction and morale, are security, status, good pay, work conditions, supervision, inter-personal relationship, company policy, administration, growth, advancement, responsibility,

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1. Figure VI shows the hierarchy of human needs.


SELF
ACTUALISATION
EGO
SOCIAL
SAFETY
PHYSIOLOGICAL

recognition, good work and achievement. A better understanding through participation together with an integration of individual and group interests may result in better morale.

Objective management[1] is a dynamic system which seeks to integrate the company's need to clarify and achieve its profit and growth goals with the individual manager's need to contribute to the corporate objectives and develop himself. It is a technique under which targets are fixed as a basis for achieving greater effectiveness throughout the whole or part of an organisation. The system involves the fixing of agreed and realistic targets for an organisation, in precise quantitative terms like certain increase in output, reduction in the processing time or certain percentage reduction in the rejection rate. The factors which may impede the attainment of these objectives are then identified and action taken to remove them. Delegation and decentralisation of authority is the essence of management by objectives.

The Appraisal Plans

The results against set targets are periodically assessed

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1. Management by objectives sets mutually agreed targets for individual performance and evaluation. For details see Cyril O. Donnell, Principles of Management, New York, McGraw Hill Book Co. 1959, Ch. VII, pp. 214-217. Also see Peter F.Drucker, Managing for Results, New York, Harper & Brothers, 1954, p. 137 and John W.Humble, Improving Business Results, New York, McGraw Hill Book Co., 1968, pp. 82-103.

and after review new targets are set. Individual targets are made clear and realistic to effectively contribute to the aims of the organisation. The targets agreed by the manager and his subordinates are in themselves an incentive and they form a yardstick against which performance can be measured.[1] A management guide is then prepared which sets forth the key tasks and standards of performance for the manager and shows what control data are required to measure performance against the standard.

The manager discusses job improvement plans with his supervisors and one or two key tasks are selected for improvement. Specific objectives are set for each individual in short and clear descriptions about definite results to be achieved in a set period of time. This gives the manager his opportunity to perform and creates the kind of environment in which every member of the department is concerned not only in getting the job done but with actively seeking out opportunities for improvement and innovation. If properly managed this can certainly increase profitability, effectiveness and performance which can then lead to much greater job satisfaction for the manager and his staff.

One of the most important products of management by

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1. Performance appraisal improves individual efficiency. See Joseph J. Famularo, Modern Personnel Administration, New York, McGraw Hill Book Co., 1972, pp. 40-45.

objectives is the discussion by each manager, both up and down the line, which clearly establishes expectations for performance and willingness to undertake the objectives assigned. It is at this point, that a capable leader not only participates in the question of objectives but also communicates an understanding of why the particular objectives are important and how they fit into the other activities and objectives of the organisation.

The Feed Back System

Periodic reviews and reports serve as a feed back on the progress so far made and these should lead to some kind of discussion as setting objectives or altering it. Frequent discussions and reviews help and the success of the objective programme depends on these and how specific the objectives are. However, the setting up of objectives is difficult as well as using it to evaluate performance or getting assistance in the development of people. Even then, in the area of performance evaluation, lies one of the great advantages of managing by result-oriented objectives.

For Materials Management, whether it be regarded as a service centre or a profit centre, is really, a motivational problem.[1] The high costs of supplies and services are to

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1. There is special significance for motivating materials men properly, because it can pay rich dividends. See Alan Mumford, The Manager and Training, op. cit., pp. 45-47.

be regarded as expenses incurred in providing a service or as an outlay made to earn a profit. Both views are tenable and affect the attitudes of those concerned but we have to see which works best in the motivation and appraisal of materials people.

Most manufacturing people working on production, are considered to be on the line management area, the field in which the management proper is in operation. Everything else is seen to some extent as a service, staff or advisory area. Sales provides a service in selling the product, transport in taking it away, design in specifying it, purchasing and stock control in providing parts and materials to make it and production planning and control in working out what to make and when. Operationally, materials supply becomes a service function parallel in importance to manufacturing, marketing, engineering and finance, basically established to assist them in their operations. As such the feed back system of line staff applies to materials men.

These essentials can now be summarised:- Effectiveness of materials operations depends on the abilities and motivation of the people operating it. Based on a long range plan, the personnel needs are assessed and job requirements assigned. Selection from an internal or external source is done objectively. General and functional orientation, education and training in company plant, outside institutions and refresher courses are then provided to them to attain

maximum efficiency in their work. The most popular management style is participative system with definite objectives, targets and feed back. Delegation and decentralisation of authority make decision making quick and effective.

Appraisal and job improvement plans help to strengthen weak links and enables remedial measures to be taken in proper time. Job satisfaction ensures better performance and specialised training for materials men imparts special skills to effect every possible saving in material cost and thereby contributes liberally to the earnings of the company from its investment in men.

Comparison with Existing Practice in Industries.

An organisation can only be as good as the personnel managing it. This being so the choice of personnel must be on qualitative basis rather than on any other external considerations. From the tabulation[1] of personnel details of the undertakings subjected to this study the following characteristics stand out. Normally internal candidates are given preference whenever openings occur in public sector companies irrespective of their basic requirements for the job. The same is not always the case in foreign firms and private sector companies where experienced and qualified outsiders are often selected on the basis of ability and motivation for the job. They also give special

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1. Table VI shows personnel details of firms surveyed together with connected data.

importance to business, technical and process know how of the material and functional decentralisation.

In foreign and private sector firms, weightage is given for previous performance, qualifications, merit and proper training courses undergone which are essential for the job. Even if training is not enough initially, such facilities are easily made available during employment. Performance based rewards are available in the private sector only. Appraisal and job improvement plans are regular features in foreign companies and the private sector firms but the same is not very common amongst public sector companies. This way great importance is attached in the private sector in choosing the correct people and conditioning them to the tasks assigned.

The study shows over staffing in most of the public sector organisations. Lack of enough training facilities for many materials managers in the public sector is another aspect seen from the study. Depending on the targets assigned, cost centre system works better in private sector with feed backs on the progress. This method is practised only in very few public sector organisations. Delegation of powers in the public sector is less compared to that in the private sector and foreign firms, consequently the effectiveness is reduced. The status of materials managers is not the same as that of production or finance managers in the public sector while it is on par in foreign

firms and private sector companies.

Some public sector units like BHEL, HMT etc. have recently started a department of organisational development for conducting training programmes for managerial and other staff. However, in a majority of public sector undertakings, training opportunities are lacking.

Conclusion

In order to fulfil the obligations of this vital service of material supply as a profit centre, the personnel of the materials department have to be correctly chosen, oriented, trained, delegated, appraised and rewarded. Opportunity to grow professionally must also be provided. There is special significance for materials personnel because a few of them spend over fifty percent of the entire revenue of the company on materials and there is considerable scope for savings in the process depending on their capabilities.

From the study, it is seen that in all the stages of grooming the materials people, there is much still to be done especially in the areas of motivation, training, appraisal, feed back and job improvement plans in the public sector. Private sector industries attach extra importance in selection and training of materials people. The remuneration and compensation attached to the materials positions are attractive and naturally they are able to get better calibre of personnel. Due to lack of job satisfaction in the public sector many senior talented

people leave these organisations every year and this sector loses such talent at a very high cost. Besides, due to salary limitations, ceilings on fringe benefits, limited delegation of powers and restricted authority, many persons do not prefer public sector service. Facilities for management development have to be increased in the public sector as such facilities would ultimately increase the profitability of these organisations.

CHAPTER IV

MATERIAL PLANNING SYSTEMS.

Introduction

Manufacturing is a complex activity involving labour, materials, finance and equipment in the production of marketable goods. Successful manufacturing requires the management of resources available for the purpose to produce the desired goods in proper quantities at the appropriate time and at the lowest possible total cost. As with all management, material planning requires short and long range planning of production materials, direction and control of the resources made available for production.[1] The degree of success of manufacture without any hold up for want of materials depends to a large extent on the skill with which material planning is conducted.

Material planning is provisioning of materials of the right quality, in right quantities, at the right price, at the right time and from the right source, to enable production to be carried on most economically. Value analysis, material substitution and make or buy decisions

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1. Material planning is the process of deciding on the resources that the firm will require for its future manufacturing operations and of allocating these resources to produce the desired product. See John F.Magee and David M. Boodman, Production Planning and Inventory Control, op. cit., pp. 181-192.

reduce the overall cost of the material content in the product. These and other essentials of material planning, budgeting, forecasting, procurement planning and capital replacement plans are discussed in this chapter. The actual practice followed in the industrial organisations studied are then compared to these essentials and conclusions have been drawn.

Planning and Management:

Planning is largely a decision making process[1] and a series of advance thinking plans to establish a framework within which future activities are to be conducted. Initially, specific objectives are decided and then operating policies determined to guide all activities toward the attainment of these objectives. Subsequently, the implementation of each policy will involve developing a group of detailed procedures. Finally time schedules and financial budgets are determined to ensure that each group of activity can in fact be carried out and is not out of physical and financial reach. The success of the organisation depends on the success with which the planning function is performed at every organisational level. Executives in the lower echelons contribute chiefly to the development of short

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1. Planning is the work of determining and specifying originally the factors, forces, effects and relationships in the accomplishment of designated objectives. See David W. Ewing, Long Range Planning for Management, New York, Harper & Row Publishers, 1972, pp. 126-134.

range plans,[1] while those in the higher echelons spend most of their time in the development of long range administrative plans, policies and programmes.

The basis of planning function is mental ability which is the sum total of intelligence, knowledge, training and personality. Intelligence is a basic factor in effective thinking and it is the basic mental capacity for problem solving. Any business planning function has two major phases, administrative planning and operative planning. These phases exist even in a one-man organisation. Material planning is essentially in the operative field.

Planning Methods for Procurement.

The process of securing materials and supplies for production and the conduct of business is procurement planning. Three broad methods effectively used for material planning are:-

1) Budgeting;[2]
2) Purchasing Research and Development and
3) Critical Path Scheduling and Analysis.

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1. Short range plans refer to those for periods upto three years and all other plans exceeding in time are long range plans.

2. Budgeting is planning and controlling the expenses that are required in connection with a company's activities and is a tool of management control. See Moore Franklin G., Production Control, New York, McGraw Hill Book Co. Inc., 1951, pp. 141-146.

The work of planning and controlling the expenses that are required for the accomplishment of pre-determined sales and profit objectives is budgeting. This is a managerial tool in planning and control and a device which balances the planned allocation of expenses with the forecasted income during a period of time, which is normally a year. Material budget is prepared on the presumption that production will take place at a pre-determined level, based on sales forecasts.

Budgets raise the quality of creative planning because the basis of action is expressed in objective and statistical terms. They make administrative executives more careful in making plans, because these plans must be expressed in definite form with a financial standard of performance by which to interpret the actual results. The necessity for establishing budgets on the basis of organisational divisions may lead to a study of the structure itself, resulting in its improvement.[1] The operating executives receive plans expressed in financial terms, which fosters a definite division and allocation of responsibility.

The business conditions that actually develop as the accounting year progresses, may substantially differ from those that were forecast before the beginning of

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1. Budgetary controls can help in toning up the structure and activities of an organisation. See Heckert and Wilson, Business Budgeting & Control, II ed., New York, The Ronald Press Company, 1955, p. 219.

the period, resulting in changes in sales, expenses and profits for reasons that are beyond the control of any executive. Credit or discredit for results depends on the factors within control and not beyond the control of the organisation.

The materials budget though prepared for one year, provides allocations for monthly operations of materials as well as the purchasing department's operating expenses. The operating budget controls the departmental expenditures, which are usually constructed by historical adjustment of such expenses for expected future changes in the level of operations. Salaries and wages constitute the largest part of the purchasing department's operating expenses. A large portion of this outlay pays for the routine clerical work done in the department. These facts must compel the materials executive to appraise carefully the efficiency of such activities and to search constantly for ways of reducing clerical costs. The operating cost varies from one company to the other depending on the nature of goods produced. Most of the operating expenses are fixed or semi-fixed and the company size influences the proportion of these expenses.

Material budget[1] is made product-wise and value-wise

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1. Materials budget enables the best use of working capital to achieve business objectives and the end result of this process is a set of projected plans of cash flow, profit or loss etc., over a period of usually a year. See Baily P.J.H., Purchasing and Supply Management, London, Chapman and Hall, 1973, pp. 58-70.

to cover direct production needs as well as the maintenance requirements. The quantity requirement is assessed from the production budgets in terms of material units, which are then converted into values. Separate groups like raw materials, components, castings, consumption stores, electrical parts, tools and accessories are formed and group values are provided in the budget for operating convenience.

Material control together with performance of the materials division can be effected by the materials budget, through the periodic control data, accounting reports and variances in the commitment of budgeted values. Material budget provides maximum lead time for procurement, selection of the most reliable source, negotiating best terms on price and freight without pressure of dead lines for supplies and to obtain best value for the money spent. The budget also helps to spread out evenly the purchasing work load and by synchronising materials supply with production schedules, facilitates intelligent forward buying thereby improving the vendor relationship.

Material Purchasing Research and Development.

Most of the planning actions require certain investigations to choose the right course and the following questions would help in the search:-

a) What is the significance of the need relative to the company's long range plans?

b) Are standard materials easily available to do the job?

c) Should the material be subjected to a formal value analysis?

d) What manufacturing processes are involved in case of non-standard items?

e) How much should the items cost at the most?

f) Who are the suppliers best equipped to do the job?

g) Is one supplier more desirable than any other in the existing conditions and

h) What is the economic outlook for the industry involved?

The purchasing library which contains general sources of information can assist the buyer in answering most of the above questions. If the requirement is purely short term, steps taken for its planning will not be as elaborate as repetitive bulk requirements. Answers to the above questions help the development of standards and plans for greater economy and effectiveness in the field of material supply, through lower cost of purchased materials, technical assistance, lower investment in inventories in relation to sales, better purchasing and supply methods and others.

The research work will be mainly in the fields of procurement cost analysis, market research to determine price and supply trends, the fixation of quality standards, development of inventory plans, determination of economic ordering quantities, better procedures for procurement and supply and co-operation with vendors in price reduction.

Some companies have developed individual purchasing policy designed to maintain fair and friendly reciprocal

relations between buyer and seller. Seller's co-operation in furnishing his cost details for comparison depends on mutual respect and confidence. The factors supporting the cost formation can also be obtained by a detailed cost analysis. Such an analysis is essential for items which have large value and physical volume, items which could be made or sold by vendors at a lower price without sacrificing quality or profit margins and items whose material costs compare favourably with corresponding parts in competing product models of principal competitors.

Forecasting of price and supply trends enables to formulate intelligently policy governing inventory coverage. This may vary for specific classes and items of materials from spot buying to 3 months or more, depending on the market and business conditions. The same applies to sources of supply also. The same way the economical limits of producers and consumers risk in setting tolerences for acceptance can be determined. The planning and research department makes studies on procedures that cause trouble and suggest remedial action. Other duties of a planning nature are also assigned to the same department. The exact duties depend on the size of the company and the various materials activities.

The same department co-operates and co-ordinates with technical and other departments primarily in the field of applied business economics and the personnel consists of

accountants, business economists and engineers. This composition of personnel enables the establishment of performance standards in the operative fields of material substitution, value analysis and in choosing simple manufacturing process instead of precision production processes.

Critical Path Scheduling

This technique is used in planning and controlling complex projects comprising of inter-related and inter-dependent activities. While entering into a contract for supply, sub-contracting, project buying or construction work, this technique is particularly useful.

The scheduling[1] begins with identification of significant activities of the project and the determination of sequential relationship. The network shows time required for each activity and its relation to other activities. It establishes the sequence in which the activities be scheduled for earliest completion of the project. The inter-relationship is the feature that distinguishes this from Gantt and other bar chart planning techniques. Performance is monitored and progress periodically compared with the original plan making it an effective progress control device.

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1. Scheduling is that function of control which determines when or at what rate the principal phases of the plan must be completed to meet the final time objectives of the projects or programme. Scheduling supplies the timing that is necessary for an effective co-ordination of action.

Periodic review of the scheduling forces vendors to do more planning than otherwise. It co-relates the activities of buying with the activities of other departments. The accuracy of the technique depends on the data on which they are based. This type of planning also forces one to do more thorough and precise thinking about future needs and conditions than otherwise be done.

After all the activities are listed and a sequential relationship between them is determined an activity network graph is constructed. The network diagram is a shorthand approach to showing in one picture both the activities of a project and their performance sequences, together with their interdependence.

By indicating project activities on a network diagram, project elapsed time can be calculated by adding up the time along various path or project duration. Materials and machines required can then be planned to arrive as per the schedule taking into consideration the respective supply delay margins.[1]

Some activities can also be paralleled allowing many different jobs to be carried on simultaneously. All other activities have to be planned in series to allow step by step completion of each task. Once the critical path is

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1. Supply delay margin is the time that elapses between the indenting of a material till its receipt, the procurement lead time both internal and external.

determined, the planner can identify precisely the activities that require close control. Some huge projects like steel plants or boiler plants require few years for its completion. Employment of PERT[1] and CPM is very useful for planning of such projects to decide time, quantum of various equipments and raw materials required for different phases of its work.

By scheduling the supplies, equipment and raw materials, inventories can be satisfactorily controlled. The funds available can be diverted to the task which has to be performed first, thereby reducing the inventories and avoiding hold ups in the project completion. This process is also called the Resource Scheduling. Men, money and materials need be called up only when required and at no time need they be idle and waiting to be employed.

For resource analysis, initially a bar chart is drawn showing expected start and completion dates of the project. From this the available floats[2] are determined and the activities requiring resource are estimated. This is supplemented by a resource histogram.[3]

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1. PERT, Programme Evaluation and Review Technique is similar to Critical Path Method and is used for elaborate and complicated projects, while CPM is used for smaller projects. PERT has computer software facility, while CPM has no such facility available. For a detailed discussion on CPM and PERT see Smith K.M., Critical Path Planning, London, British Management Association, II ed., 1971, pp. 5-85.
2. Float is the amount of inventory of a material, part or product that is in stores or in production between two points in its processing.
3. Histogram represents graphical display of resource requirements during each activity.

Each activity will have some float which can be scheduled to start later to that extent revising the shape of the histogram and then a new series of start times can be set for the activities to suit the resources. It will also minimise variations in the requirement of resources. When two or more activities compete for the same resource, the activity which has the least float gets the priority. Even when the float is the same, the duration of the activity and the amount of resource required determines the priority.

Other Planning Techniques:- The Line of Balance:-

This is a managerial tool developed by the United States navy applying the concept of management by exception to ascertain and maintain a balance in the activity level. The line of balance[1] enables all phases of production or any other such activity to be at that point at a time so that the projected completion or delivery targets are accomplished. If any activity is lagging, the line of balance helps to take such action as to bring the same forward to the targetted phase and to review progress periodically.

There are 4 main stages in the balancing:-

a) Set the objective target to be accomplished

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1. The line of balance aims at regular progress for all activities, and special attention to bring forward lagging activities to where they should have been by the application of the rules of exception. See Hallock, J.W., Production Planning, New York, The Ronald Press Company, 1952, pp. 251-254.

b) Detail the plan of operation and stage by stage positions

c) Draw up a progress chart showing current status and

d) Cumulative completion count and line of balance.

All the principal and limiting factors, where they are and where they should have been are compared with the objective and corrective actions taken. This is a very useful method to ascertain whether proper progress at all stages of the proposed target is being maintained as per schedule. Due to some unforeseen factors, if some activity is lagging behind and unless the same is brought forward to be in line with the progress of other stages, the whole objective will be lost as this one stage alone lagging can delay the whole project. As such, it is essential to keep a watch periodically on all stages and to take proper action promptly to improve positions. This technique is particularly useful in accomplishing promised delivery schedules and completion of supply contracts to avoid penalty payments[1] for late delivery and liquidated damages.[2]

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1. All major contracts stipulate penalty for late delivery of materials and supplies at the rate of half percent per week of the delayed value of goods.

2. Liquidated damages refer to claims of buyers against complete failure to supply and the consequent cost incurred by them to procure goods and services from elsewhere. See Davis Ralph C., Purchasing and Storing, New York, Alexander Hamilton Institute, 1951, p. 121.

Bar Charts: Material planning can be systematically done by the aid of bar charts. Material requirement for each product is ascertained and the available quantity for production, maintenance and service requirements are indicated by horizontal bars on the chart. This will show the period covered by the stock in hand and action has to be taken to cover the balance period. In assessing the requirements, a wastage and rejection allowance of about five percent is taken into consideration.

Gantt Charts: It is a display board of work progress as a function of time, viz. planned vs actuals against individual orders or requirements. A horizontal time scale is used where a heavy line indicates planned work and a light or coloured line over the heavy line indicates progress. The position is checked periodically and suitable chasing action taken to comply with targets.

This however does not show inter-dependencies and inter-relationships. Critical concurrency cannot show slippages and changes in plans. It cannot also reflect uncertainty, tolerance and variations in time estimates.

Planning of Capital Replacements.

It is uneconomical to operate machinery and equipment beyond its useful economic life as the benefits of production obtained from them will be lesser than the operating cost. For full use of facilities at minimum cost and safe working conditions for the operators, it is essential to have proper

replacement plans for every capital equipment at the end of their useful life, otherwise there will be frequent break downs and additional investment on standy equipments.[1]

Rising maintenance cost may indicate that it is time to replace the equipment. How to judge this correctly depends on the attained age, maintenance cost, down time, spoilage of work and variances maintained from standard costs. It is possible for some time to avoid buying new equipment by improving existing facilities, by work simplification, motivating people to better output and by consideration of economics of repairing old machines.

The right time for replacement of the equipment can be decided on the basis of performance factors of the present equipment and the expected returns on the new investment. Rate of return, pay back period, discounted cash flow and Mapi method are some of the methods used to ascertain replacement time.[2] Rate of return on each investment is compared and the one which gives the highest return is selected based on the opportunity cost. Pay back period is the time during which the asset will pay back itself

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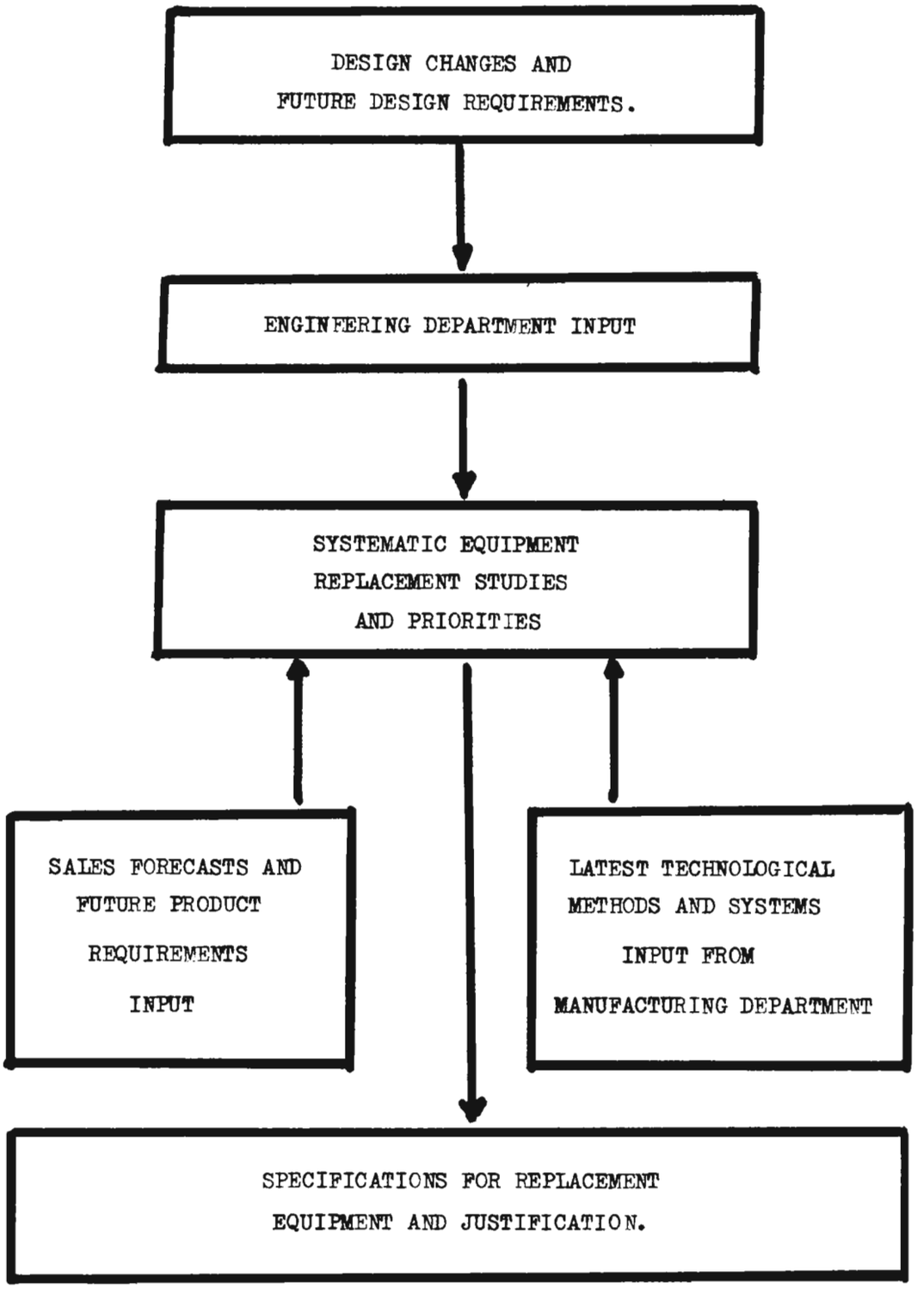
1. Figure VII shows inputs required for systematic equipment replacement studies.

2. Equipment replacement programmes are important to overall corporate planning because rapid technological change is a permanent factor in industrial corporate life. See Grant M.W., Capital Replacement, New York, Machinery and Production Engineering, June, 29, 1966.

FIGURE VII

INPUTS REQUIRED FOR SYSTEMATIC EQUIPMENT REPLACEMENT STUDIES.



through returns the full cost involved and in such a case the shorter the period of pay back, the better is the investment. Normally, if an investment pays back itself from its profits within 5 to 7 years, it is considered good investment compared to the economic life of the asset itself being 10 to 15 years. The discounted cash flow[1] estimates the rate of return during the period of operation at discounted rates of present value[2] after paying fully the initial cost and maintenance cost to ascertain profitability index of alternate proposals.

The Mapi method[3] determines whether the replacement is beneficial and advantageous during the immediate future or whether it can be economically postponed for another year. The factors considered for this calculation are as follows:-

$$R_m = \frac{(R_1 + y)\ (1 - x)\ -\ (z - Tx)}{C}$$

---

1. Future earnings assessed at present value of discounting to compare returns from investments and to choose the best amongst them. For details see Donaldson E.F., Corporate Financial Policy, New York, The Ronald Press Company, 1957 p. 193.

2. Present value of a future earning at ten percent discounting are:- Earning after 1 year, present value 0.909: 2 years, 0.83; 3 years, 0.75; 4 years, 0.68 and 5 years, 0.62.

3. The Mapi Ratio determines the most opportune time for equipment replacement. Higher the ratio, better to replace the equipment and if this ratio which is mainly based on operating advantage of the new machine is far less, it is advisable to postpone the replacement. See Knoeppel C.E., Profit Engineering, New York, McGraw Hill Book Co. Inc., 1963, p. 376.

Where R_1 is the operating advantage of the new machine for the first year

y is the estimated saving in salvage value of the old machine by selling it now or one year later

z is the capital consumption

x is the percentage tax applicable

T is the development rebate portion and

C is the actual cost of equipment less salvage value.

The main factor is the annual operating advantage based on which replacement or postponement can be decided. However as this calculation has built in assumptions, the forecast is not very reliable but all the same a decision arrived at with some figures for guidance is better than that with no figures at all.

Planning of Materials for Production.

The planning system varies depending on the type of industry whether job oriented, production oriented or process oriented. For job oriented industries the production cycle is long and requires longer planning and safety stocks.[1] In production and process oriented industries stock out cost is very high due to continuous nature of production and to avoid any break down, planning has to be very

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1. Safety stocks give short term protection against sales or demand uncertainty. Depending on the lead time consumption, about 4 to 6 weeks requirements are considered enough for the safety stocks. For details on the determination of safety stocks, see Westing J.H., and Fine I.V., Industrial Purchasing II ed., New York, John Wiley & Sons Inc., 1961, pp. 287-293.

accurate to eliminate practically all shortages.

Safety stocks are provided to minimise the production shortages as the quantity planned, based on an average expected consumption may fall short due to increase in actual consumption rate or due to delay of the incoming supplies. In case of recoupment based on review system any abnormal consumption during the review period can also cause shortage.

Normally the safety stock is determined by the square root of the average lead time consumption multiplied by a constant K which varies from 1 to 3 depending on the number of stock outs possible, how often and its cost. If the stock outs are to be reduced, the safety stocks have to increase with increased carrying cost. In an exponential distribution:

K = the average value and in a poisson distribution

$K = \sqrt{\text{average}}$

With the review system and poisson distribution,

the safety stock = $K\sqrt{\bar{a}\ (L+R)}$

where $\bar{a}$ is the average lead time consumption,

L is the lead time and

R is the review period.

A value-wise approach can be made in case of the safety stocks to reduce carrying costs and afford protection against stock outs. If the stock outs are very costly involving

business loss and high risks, a bigger safety stock is advisable but the stock out cost and the carrying costs are the limiting factors.

ABC Classification

The safety stock provision based on the lead time consumption of an estimated group of parts, irrespective of their value is likely to increase the inventory holdings considerably. Therefore all items are so grouped that the control effort and attention is more on high value items depending on their annual usage.

Generally about 70% of the items in stock are of a lower value amounting to about 10 percent of the total cost of the inventory holding and such items are classified as 'C' class items. Even if the inventory of this category of items is little high, the value being small, the carrying costs will not be much affected.

Similarly about 20 percent of the items in stock may account for about 20 to 25% by value of the total holdings and these are classified as 'B' class items.

This leaves about 10 percent of the stock items accounting for about 70 percent of the total value of the inventory. Because of the high value of these items, they are called 'A' class items and the highest consideration as to how much to order, how much to stock and how much to consume is given to these items. This classification

enables selective control on the inventory[1] of high value items by planning and ordering more frequently than others and stock outs prevented for 'B' and 'C' items, by maintaining a higher inventory. It is easier to control lesser number of high value items closely than many low value items which enables reduced investment and control on stock outs.

Planning of Insurance Spares and Standby Equipments.

These are required as an insurance for the continuity of production, avoiding break downs and resulting loss of revenue and customer goodwill, etc. A transformer supplying power to the works may break down any time for some reason or other. In such cases a standby transformer is kept in order to ensure continuous power supply and emergency lighting for the works. Similarly for essential production equipments like air compressor, converters and such other machines, vital spares are kept in stock as an insurance against its continuous working though these spares may not be used for a long time. In planning such items, one cannot go by the economies of carrying costs and investment but ABC classification can be used to minimise the investment in high value items and can be liberal with low value items.

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1. Selective control refers to control on procurement, stocking and consumption of inventory items based on value. Higher the value, controls are more to limit the investment and this system automatically allows least control on 'C' items, based on their annual usage. See James W. Prichard, Modern Inventory Management, op. cit., pp. 237-239.

The quantum is decided by the seriousness of break downs and its cost in relation to the investment involved for the insurance spares.

Make or Buy Decisions.

Material planning has to decide on the merits of buying out the items or making them at the works.[1] The ultimate consideration is the final cost, whether manufacturing cost or purchased cost whichever is less. The technical skills, availability of raw materials, present and future price, availability of spare capacity, man-power, proper equipments, additional machinery required if any and capital resources have also to be considered. The materials manager has to play a key role in deciding the issue as the item may be vital to the company's product and may require high precision and quality, very close tolerance and very high skill to produce the same. As such buying is preferable if it is cheap, difficult to make, not a vital part, easily available, quantities are small, no idle or surplus capacity in the plant to make it and additional investment is required to take up its manufacture.

Making such items at the works is preferable when the number of vendors is limited, raw material not available with the suppliers, the item has a large and stable demand, it can be made within the existing facilities in the factory

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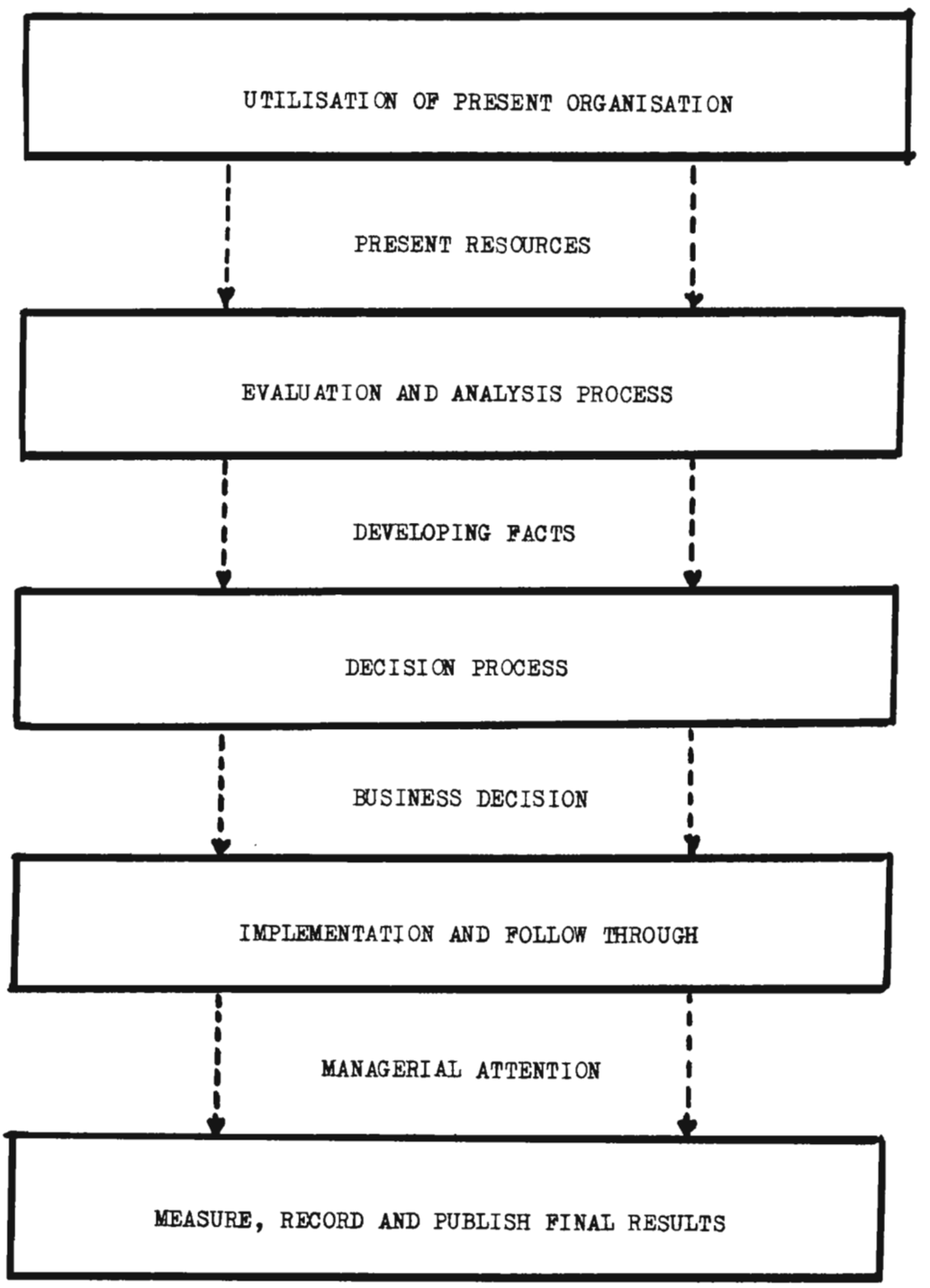
1. Figure VIII shows logical steps to be followed in make or buy decisions.

FIGURE-VIII

STEPS TO A LOGICAL MAKE OR BUY DECISION



and are similar to the other items being made. On the other hand if the existing facilities can be better used for other components, or the investment can be in better profitable facilities, it is better to buy out the items.

Value Analysis.

Another important function of material planning is to exercise value analysis[1] of high value items going into production. It is a cost reduction technique and is the study of the function in relation to design features, cost of any product, material or service with the object of reducing its cost, through modification of design, material specification, manufacture by a more efficient process, changing the source of supply and by possible elimination or incorporation of a related item. This can be applied to raw materials, component parts, tools, plant and machinery, etc.

The function of each item is examined in relation to the price paid. Price of anything depends on manufacturing cost, esteem cost, exchange cost, time and use values. Value analysis is not a substitute for cost reduction but it aims at reducing the cost by modification, incorporation

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1. Value may be any satisfaction of a need or a desire. Value may be legitimate or illegitimate. Value must justify the purpose or function performed or served and value analysis attempts to eliminate excess value than what is absolutely essential. See Baily P.J.H., Purchasing and Supply Management, op.cit., pp. 293-304.

sub-division or substitution without affecting the required level of performance. It tries elimination and if not possible, keep it trying to change with a view to reduce cost.

A common method used in value analysis is called 'Brain Storming'[1] which is to ask questions on the features, essentiality and functions of the item, viz.

a) Does its use contribute to its value or can it be eliminated

b) Is the cost proportional to its usefulness or has it excess capacity than what is required

c) Does it need all its features or design and specifications can be changed to make it cheaper

d) Is there anything better for the intended use

e) Can a usable part be made out at a lower cost by using cheaper material at a lower cost or superior material at the same cost

f) Can a standard product be found instead of specials

g) Considering the quantity required, is it made on proper tooling, can the weight be reduced, whether tolerance specified necessary or commercial quality will do

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1. Brain Storming is creative thinking for generating ideas useful to cost reduction. The spontaneous and positive ideas are recorded and filtered up for feasible ones and the specialists then deal with them further. See Bosticco M., Creative Techniques for Management, London, Business Books Ltd., 1971, pp. 84-91.

h) Is the total cost reasonable considering material, labour and overhead

i) Will another supplier be able to give at a cheaper price

j) Is there any one buying it for less from any source or can it be made cheaper in the shop, etc.

The purpose must be clear cut and specific for each part, so as to ascertain whether the same function can be achieved at a lower cost, by comparing costs for each function part or process. By consulting a specialist, as many alternatives as possible that can do the job cheaply, can be determined. Suppliers also can give new ideas. By using standard parts wherever possible, refining ideas, tactfully removing all resistance to change and by getting full co-operation from all quarters, value analysis can be implemented.

Regardless of how much value analysis activity is carried on, it is still the responsibility of the buyer to seek maximum value while purchasing. He has to challenge wasteful and avoidable cost inherent in the things bought and this way it is inescapable that a large share of value analysis will have to be done by the buyer himself.

These planning essentials can now be summarised:

The success of any company depends on its systematic planning of short and long term objectives. Three broad methods used in procurement planning are budgeting, purchasing research and development and critical path

scheduling and analysis. The research section has to develop standards and plans for greater economy and effectiveness in procurement and supply. The main objectives of procurement planning are to lower cost of purchased materials, developing specifications, standards, variety reductions, make or buy decisions, value analysis and to lower investment in inventories.

Planning controls expenses through the materials budget. Organising the purchasing research and the library, long and short range planning of materials with critical path scheduling wherever required, resource analysis, cost analysis, use of other planning techniques wherever applicable, reviewing economics of capital replacements, provision of insurance spares, classification, treatment and selective control on value basis for all items, are some of the other functions of the materials planning department. How well these functions are carried out will be reflected in the inventory holdings and the value of material content in the end product.

Comparison

Material planning function in most foreign firms is organised through the computer which automatically takes care of the minimum investment in inventories. Budgeting, procurement research and library exist in all the foreign firms. Since all materials are almost readily available, many elaborate planning techniques like CPM, charts and

analysis of kinds normally used to progress and chase supplies are not at all necessary. The use of computer and ready availability of materials have limited the inventory holdings in respect of stock, non-stock materials and essential spares including insurance spares.

In the public sector companies under study, materials budgeting is practised by all of them. All of them have library not separately but combined for all departments of the company but vendor catalogues, technical literature, manufacturers hand books and directories, trade magazines and journals are with the materials division. Critical path scheduling and procurement research are seldom practised. A few public sector undertakings have computers, but most of them use it for production and wage calculation purposes. Except from assessing the periodic inventory holdings and its value, not much work of materials division is done on the computer or data processing equipment.

Value-wise classification is made use of in planning, ordering and stocking of the items in public and private sectors. Similarly the economics of capital equipment replacement and provisioning of insurance spares are made use of in both the sectors. Cost analysis and make or buy economies are seldom used in planning of materials. Some efforts are being made towards value analysis and import substitution by M/s. Bharat Heavy Electricals and M/s. Hindustan Machine Tools Ltd., as can be seen from

the statement but achievements are only moderate.

A pattern generally observed in public sector is that once the annual production plans are finalised, material requirements are passed on to the materials division for provisioning. How much to procure and how soon to get them is a matter left to the purchase department. However, due to variations in the production plans during the year, some materials already procured may become non-moving and obsolete as the same is no longer required in the manufacturing process. Instead, other materials are required to meet the revised schedules.

In all these cases, a cautious approach is most beneficial. In most private sector companies production starts on the basis of firm orders and based on sales forecasts. Very few companies produce specialised equipments for stock, except general engineering goods and consumption goods. Even in these cases a market survey and examination of the market share possibilities are extremely useful. Details of Material Planning Systems existing in firms surveyed are shown in Table VII.

Conclusion

Planning is vital in provisioning as all other successive stages depend on proper scheduling. More emphasis is needed in public sector on procurement research, make or buy economics, value analysis, economics of capital

replacement and provisioning of insurance spares. Scientific planning in due time can save machinery break downs, production hold ups, and scheduled completion of projects. In most cases of failure, late planning is seen as one of the reasons.

Most public sector undertakings plan materials for a nil shortage, which naturally results in high inventories and safety stocks. At the same time, foreign firms and private sector firms tolerate shortage of about one percent which helps in lower stock holdings. The system followed in public sector is to plan materials required for the whole year and to get them through procurement on staggered delivery basis. Very often production plans change depending on the incoming pattern of orders and heavy accumulation of stocks may occur. Periodic reviews of production plans, incoming orders and regulating of supplies can remedy this situation.

CHAPTER V

PURCHASING MANAGEMENT

Introduction

The materials manager faces a variety of problems, such as changes in raw materials and end products, wide fluctuation in consumption and irregularities of supply due to labour trouble and transportation difficulties. He must so organise his operations such that there will be a smooth flow of information and materials extending all the way from the basic source of raw material through the engineering, methods, design and manufacturing operations of the company on to the ultimate consumer.

The need is obvious for personnel of integrity, sound judgement and particularly attentive to details together with a comprehensive knowledge of the origin, processing and use of materials pertinent to the manufacturing operation. The materials manager should have the ability to do cost analysis and negotiate prices to obtain the most favourable rates for the materials bought. At the same time, he must maintain good business relations with vendors so that as and when needed, the organisation

will be able to avail various vendor benefits.[1]

In this chapter, the significance of the purchasing function, its objectives and the essential steps to be followed to obtain the maximum contribution to company savings are examined. These essentials are then compared to the systems and procedures existing in public sector and other industrial organisations and based on the findings conclusions have been drawn.

Purchasing Objectives.

There are two types of purchasing in the business world, one for resale and the other for consumption or conversion. For resale one must buy what is in demand at a price which will permit resale at a profit, while the industrial buyer has to co-relate his activities with market conditions, sales forecasts and production schedules and has to align his actions with those of the other departments like design, production, finance, personnel, marketing, etc. In both types of purchasing it is not an isolated activity but an active process of achieving contribution to the objectives of the business through

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1. Vendor benefits refer to assistance of vendors in regulating material supplies and in product development. Good vendor relations and co-operation helps the buyer to obtain concessions in price, terms of payment and assistance in design and manufacturing facilities. See Ammer, D.S., Purchasing for Profits, Harvard Business Review, June, 1967, p. 31.

the joint operation and efforts of all the departments.[1] The structure of the materials organisation normally provides this facility of interaction.

Most companies are very active where marketing is concerned as this forms the spearhead of profitability but equally profitable is the purchasing field. As such all companies must have two fronts of operation purchasing and marketing with the profit objectives. Within purchasing itself, performance targets can be set not only in the tangible area of purchasing, but also in the intangible area of buyer's performance,[2] as the overall performance of purchasing activity is the sum total of each buyer's results.

Handsome savings can not only be earned from the business strategy but also from regulation of material costs. As the volume of production increases unit labour costs decrease due to the 'learning' process[3] and the relative

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1. The basic objective of purchasing is to obtain materials and supplies at the most economic prices, so that the value of the material content of the end product is a minimum. See Starr M.K. and Miller D.W., Inventory Control, New York, Prentice Hall Inc., 1963, pp. 123-125.
2. Intangible area of a buyer's performance refers to a comparative evaluation of those qualities that are necessary for success in the purchasing field, like initiative, negotiating skill and judgement which cannot be measured objectively.
3. Learning process refers to the time and skill gained in manufacturing or processing of subsequent units of the same product compared to the earlier units showing an improvement in the number of units produced and the man hours required to produce them. See Philip Marvin, Management Goals, Illinois, Dow Jones-Irwin Inc., 1972, pp. 231-234.

percentage of material cost goes up. Depending on the type of industry the material cost varies from around thirty percent to eightyfive percent and the main objective is to reduce this percentage cost by effective purchasing so that any extent of reduction is a direct addition to the profits. Even one percent reduction in material cost can produce as much savings as earned by the company through an additional production and sale of about ten percent. Table VIII shows percentage savings in material cost and the relative percentage of additional production required to make the same savings.

The Purchasing Function.

The main purchasing function is to procure goods and services of proper quantities for delivery at a certain time and place, at the lowest price, consistent with the requisite quality to support company operations with an uninterrupted flow. There are other functions also which are complimentary to the main function, viz:-

a) To develop alternate sources of supplies and good business relationship with vendors

b) To train and develop highly competent personnel and achieve maximum integration with other departments of the company and

c) To buy competitively considering the supply and demand that regulate price and availability and keep inventory investment and inventory losses to a minimum.

Each of the five components of the main function viz. right quality, right price, right quantity, right time and the right source has an important part in supporting company operations. Failure in any area of these components would affect production seriously and the final cost of the product is bound to increase.

The Right Quality:-

Determining the right quality[1] involves verification of all factors to ensure whether the product will serve the function for which it is intended at the lowest overall cost. The total cost takes into account installation and maintenance cost, life expectancy, market availability and operational workability. In assuring right quality steps have to be found to define it, determine it and to control it. The final choice will however be based on technical suitability, economic viability, users assessment and attitudes, free availability, substitutes, vendor suggestions, standardisation and total value considerations.

While inviting bids, quality is fully described so that vendors understand the requirement clearly. This is normally done by market grades, brands, trade names, commercial standards, drawings, chemical and physical compositions, material usage, method of manufacture, samples,

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1. The right quality refers to those characteristics that distinguish one product or service from another when both are offered to the customer in satisfaction of the same or a similar need. They are attributes that give the product or service its utility or need satisfying capability.

national or international specifications, or a combination of some of these. In the search for right quality, good specifications and standardisation can resolve functional conflicts of design, procurement, manufacturing and sales. Design considers function, procurement considers markets, availability and price, manufacturing considers economical production and sales is concerned about consumer acceptance.

Standardisation is corollary to simplification and with standardisation, industries will be able to manage at lower labour costs, can refine and streamline the system of operations and its processes, so as to produce low cost, high quality differentiated products. Standardisation is a pre-requisite of mass production and prosperity and mass production does not imply a uniform standardised product but the manufacture of diverse products assembled from standardised parts which are mass produced. An alert buyer will constantly strive to avoid special materials, as non-standard products introduce problems of availability, higher costs, quality and uniformity.

Quality is assured by proper and complete specification, selection of reliable suppliers with sufficient technical and production capabilities and developing a realistic understanding by suppliers about quality needs.

The Right Price:-

Obtaining a right price[1] irrespective of the business cycles of stability, prosperity or recession is important. Buyers concentrate their efforts in obtaining a lower price primarily in situations involving imperfect competition where in the long run prices tend to follow the law of supply and demand. There are dampers for a fall in prices like built-in costs such as health and retirement plans, long term labour contracts and social security costs, but upward price movements are not so easily controlled.

A buyer can obtain the right price by the use of price lists, competitive bidding, cost analysis or by negotiation, using one or a combination of methods. By analysing cost factors and allowing a reasonable profit the buyer and seller can arrive at an acceptable and reasonable price. In analysing the cost, fixed, variable and semi variable costs are classified into direct, indirect and overhead costs. Some of the important factors affecting costs are capability of management, efficiency of labour, plant capacity, continuity of out-put, composition of overhead costs, prices of materials, the amount of cost data available to the buyer and the extent of business risks involved.

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1. The right price of anything depends on the cost of production plus a reasonable profit. Reasonableness of cost of production can be determined by cost analysis. Prices based on esteem value, exchange value, time value and use values are not the right prices.

Determining a fair and reasonable price and negotiating to get it requires a very high degree of skill and judgement because most prices are determined from estimates and judgements and not from precise facts. No supplier can precisely forecast his sales and production volumes nor can its costs be calculated precisely and hence to maximise profit he relies on his business judgement. The market itself plays a prominant role in pricing. When business booms sales go up and prices increase. During such times it is difficult to get price concessions but when the market weakens the concessions can drop the price all the way down to out of pocket costs.

A competent buyer has a comprehensive knowledge of how cost, production, sales and competitive relationships influence a supplier's pricing in both booms and recessions. He must know negotiating principles, make or buy analysis, techniques of group ordering and selection of the appropriate contract. In most of the industrial purchasing situations while determining the price, not only the vendors but the buyers also cast their votes. For all these and other reasons prices can be influenced as much by the purchasing skill as by the supply and demand forces of the market.

Competition is the mainstay of good pricing as all suppliers do not have the same cost of production. The sale of products must recover all costs plus a little more if

a profit is to be made. However all products do not always sell at a profit. While the sum of all out of pocket costs is the lowest price, the market conditions and company goals determine the highest price. Competition among buyers and sellers regulates the prices between these extremes.

Break even analysis[1] and learning curves are the two pricing techniques often used by buyers to obtain a fair price. The former enables a buyer to further his pricing objectives:-

a) By sharpening his perception of the purchasing role in the company's performance

b) By giving clues on the timing of further price changes and

c) By assisting in determining the reasonableness of a vendor's price.

By constructing and analysing a suppliers break-even chart a buyer can uncover clues to the timing of future price changes and can understand why the supplier priced his products the way he did. The latter depends on the fact that the time required to produce subsequent units

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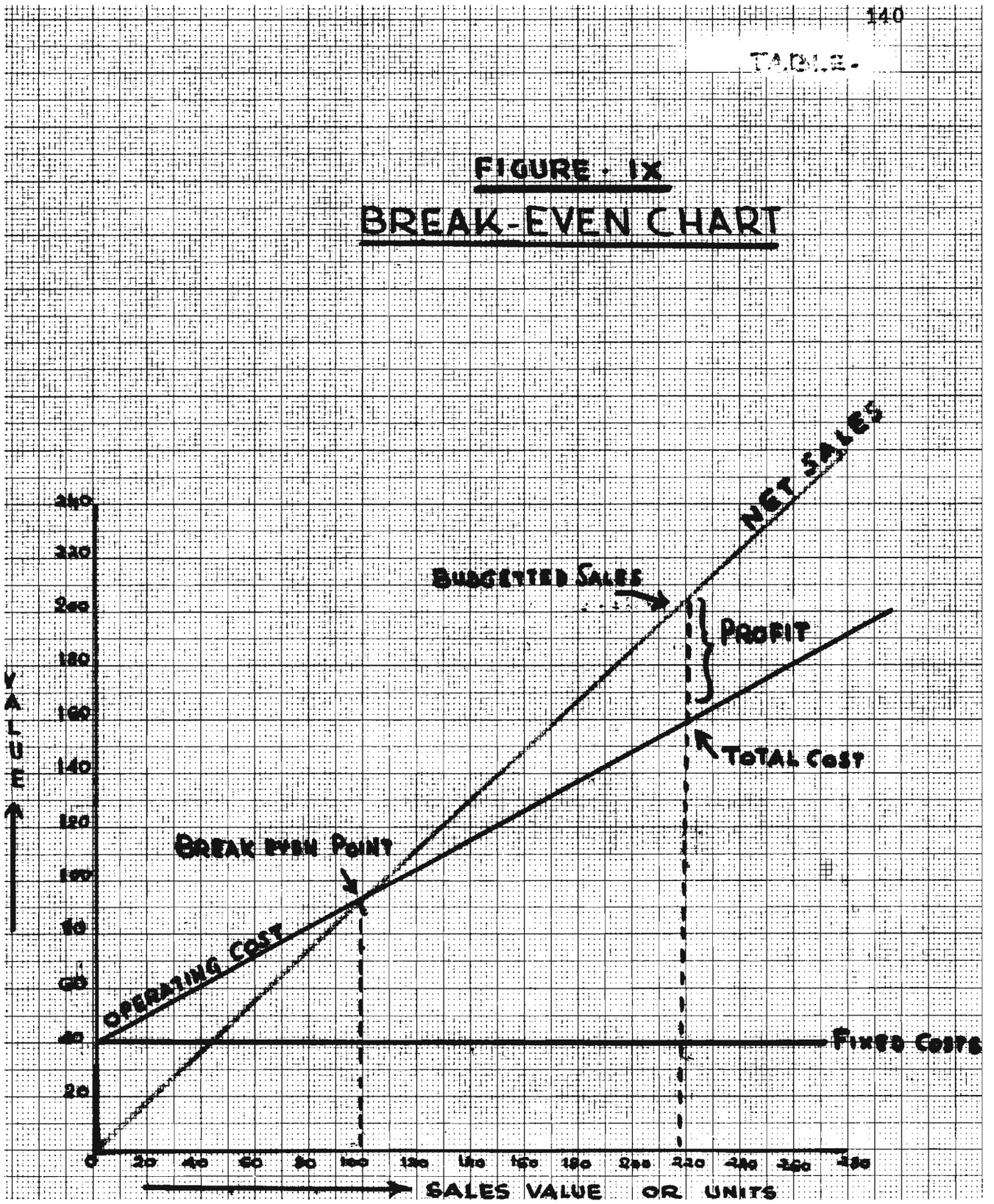
1. Break-even chart is a graphic method for expressing expense factors in a manner that will show their effects on profits with changes in business volume, to arrive at that quantity of production, the value of which will be equal to the fixed and variable expenses and any production beyond can generate a profit.
Figure IX shows graphical determination of the Break Even Point.

TABLE -

FIGURE - IX

BREAK-EVEN CHART



of a product is less than that of earlier units due to learning and it is an improvement curve between the number of units produced and the labour hours required to produce them. Buyers can use this relationship to analyse the effects of production and management 'learning' on a supplier's unit cost of production. No matter what products are manufactured or what type of operation is undertaken, there is always a good possibility of profit from the learning curve.

Pricing decisions are not made purely on economic or business considerations alone but also in accordance with legislation, government control, court decisions, etc. Various types of discounts like trade, quantity, seasonal and cash, are important factors in pricing. Apart from their innate value, cash discounts are frequently an effective negotiating tool for achieving price reductions which are otherwise unattainable.

Many buyers rely heavily on economic theory alone for determining prices but they must also rely on practical aspects of pricing, with a proper blending of purchasing art and science. Since even the usual measurements of past costs, prices and capacities may be arbitrary, prices are determined by buyer's and seller's estimates and judgements concerning all the forseable present and future forces that may influence the market.

As the prices depend on the market forces to a great

extent especially for non-standard and proprietory items, negotiation is a technique used to bargain for a favourable price along with other terms and conditions of a contract.

Negotiation[1] is an art by which a buyer and seller using usually a face to face discussion, resolve the precise terms and conditions of a contract through analysis, discussion, bargaining and common understanding. It helps in the following:-

a) To obtain a fair and reasonable price

b) To get the supplier to perform on time

c) To persuade the supplier to give maximum co-operation to the buyer

d) To control the performance of the contractor and

e) To develop a sound and continuing relationship with competent suppliers.

Negotiation is usually beneficial for non-standard items and services but occasional advantages of using negotiation for standard items cannot be overlooked. The most common situations requiring negotiation are:-

a) When any of the five pre-requisite criteria for competitive bidding is missing

b) When there are many variable factors bearing

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1. Negotiation is a process to obtain more concessions in the terms and conditions including price of a contract. For details in this connection see Lewis Howard T., Procurement Principles and Cases, rev. ed., New York, Richard D. Irwin Inc., 1952, p. 279.

on price, quality and service

c) When the business risk involved cannot be accurately pre-determined

d) When tooling and set up costs represent a large percentage of total costs

e) When a long period of time is required to produce the items purchased

f) When production is interrupted frequently because of numerous changes in orders

g) When a thorough analysis is required to solve difficult make or buy decisions and

h) When the products of a specific supplier are desired to the exclusion of others.

Negotiating the terms and conditions of a contract is an investigation with the supplier of all the elemental cost areas that bear on price viz. price investigation, cost analysis, learning curve analysis and profit analysis. The less tangible areas of analysis are the supplier's capacities, production capabilities and general business reputation. The cost areas include engineering cost, tooling cost, direct material cost, labour hours and rate, sub-contracting, overhead cost, general and administrative expenses, selling expense and other direct cost and profit.

In preparing for negotiation a buyer should appraise his own strengths and weaknesses accurately relative to the seller's strengths and weaknesses. The seller's

strength generally depends on how badly he wants the contract, how certain he feels of getting it and how much time is available to reach an agreement. The buyers bargaining strength normally depends on the extent of competition present among sellers, the adequacy of cost or price analysis and the thoroughness with which he has prepared for negotiation.

All negotiations centre on specific issues and it is better to discuss the issues in the order of their probable ease of solution since an agreement is the essence of negotiation. A competent negotiator never strives to lose the initiative and a buyer who knows his supplier personally has an advantage. The wise use of questions is the most important single technique in negotiation. A competent negotiator uses the composite of his life's experience, his formal and informal education, beliefs, knowledge, skills, judgement and a blend of all these personal factors.

The Right Quantity:-

The most advantageous quantity to be procured every time is determined on the basis of all incremental costs associated with the order quantity, its acquisition and carrying cost. The acquisition cost is the procurement cost which includes wages and operating expenses for purchasing, material planning and control, receiving, inspection, bills payment, cost of stationery and printing, postage and

communications. This cost is proportional to the number of orders released. There are indirect labour and overhead costs generated in various departments in connection with materials, which are also chargeable to the acquisition cost but establishment costs of a fixed nature are excluded and only the incremental costs are considered while assessing the cost per order and this varies from about Rs. 10/- to Rs. 100/-.

Similarly the carrying cost includes the interest on investment, storage cost, deterioration and obsolescense cost,[1] insurance cost, property taxes and opportunity cost varying from about 15 to 30 percent of the inventory value. In determining the right quantity there can be special purchasing considerations of price, lead time, availability or market condition. Allowing these considerations, a regulated quantity to safeguard continuity of production with least acquisition and carrying costs would be ideal. If the quantity ordered is less, the unit cost may go high due to small quantity extras, in addition to cost of production holdups that may occur on account of shortages, but if the quantity ordered is too much, in addition to the prohibitive carrying cost there will be the risk of

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1. Obsolescense cost refers to cost of non-moving and other items which cannot be used in production due to product changes, process and technological revisions. It may be possible to modify and use some of these, but others must be disposed off expeditiously to avoid further carrying cost.

deterioration and obsolesense.

The sum of the acquisition cost and carrying cost will be a minimum when both values are equal. The product of cost per order and the number of orders will give the former and the product of the average inventory value and the percentage inventory holding cost will give the latter.

The inventory carrying cost is directly proportional to the average value of the inventory held, which approximately comes to half the quantity ordered every time, when the usage is regular, prices are stable and lead time is short.

Let the economic quantity ordered every time be = Q,

Then the average inventory will be = $\frac{Q}{2}$

Let the percentage carrying cost be = I,

Then the value of carrying cost will be = $I \times \frac{Q}{2}$

Let the annual consumption of the item be = U,

Then the number of orders placed in a year will be = $\frac{U}{Q}$

Let the acquisition cost per order be = A,

Then the value of acquisition cost will be = $\frac{U}{Q} \times A$

The most economic order quantity[1] is obtained When the sum of these two costs is a minimum and this occurs when they are equal ie.

$$I \times \frac{Q}{2} = \frac{U}{Q} \times A$$

$$IQ^2 = 2UA$$

$$Q^2 = \frac{2UA}{I}$$

$$Q = \sqrt{\frac{2UA}{I}}$$

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1. In actual practice it is not always possible to follow this type of ordering due to manufacturing limitations, batch quantities, rolling and melting capacities of the equipment.

Figure X shows graphical determination of economic order quantity.

It is also simple to transform this formula to give direct solutions in terms of number of months supply to order, number of parts or the optimum frequency of order. This formula is also not very sensitive to small changes in value as the total cost curve is flat around the minimum point. In actual practice the cost factors required to compute A and I are not readily available especially with many items in the inventory, but the ability to determine the right quantity depends mainly on basic managerial planning, organisation, co-ordination and control.[1] ABC approach is also suitable to determine the most suitable quantity to be ordered for high value items. The economic order quantity is also proportional to the square root of the annual consumption of the item, as the two incremental costs are more or less constant.

The Right Time:-

Obtaining supplies at the right time is important for continuity of production and availing a most favourable price depending on the market in a reasonably competitive economy. If the general demand for a product increases,

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1. Figure XI shows graphical determination of Economic Order Quantity, for different values of ordering and carrying costs and how these costs influence the order point.

FIGURE X

DETERMINATION OF ECONOMIC ORDER QUANTITY.

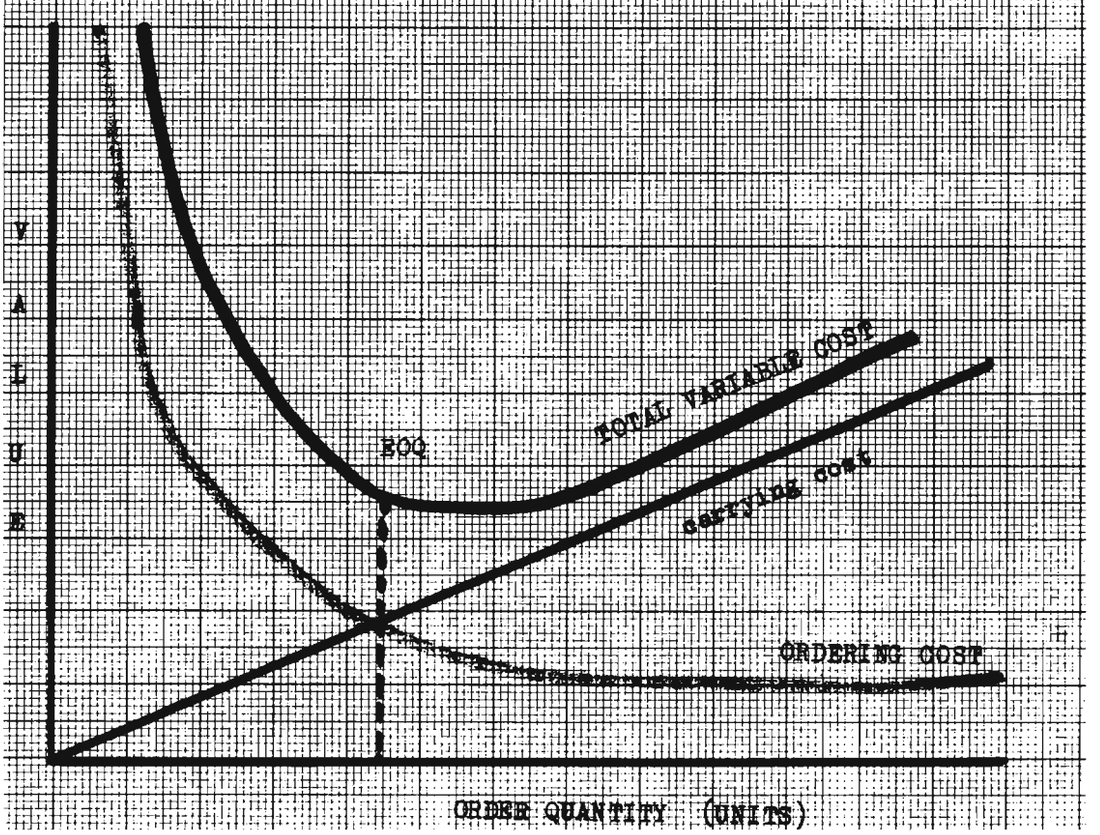
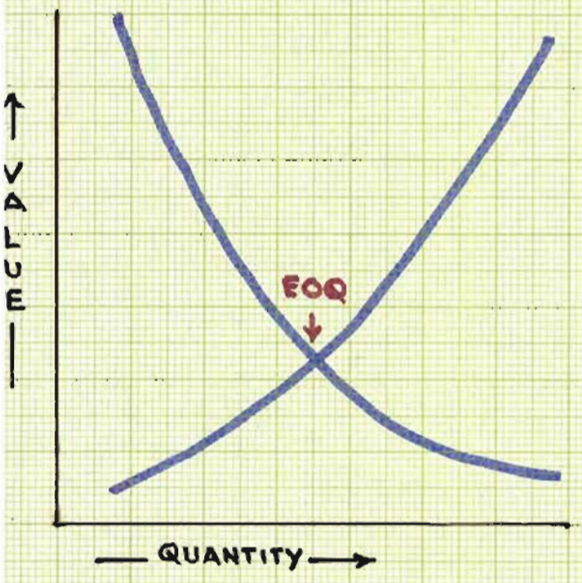
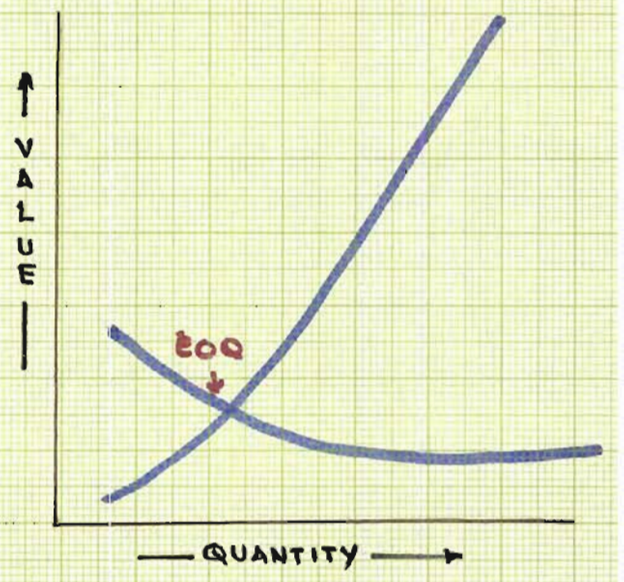


FIGURE- XI

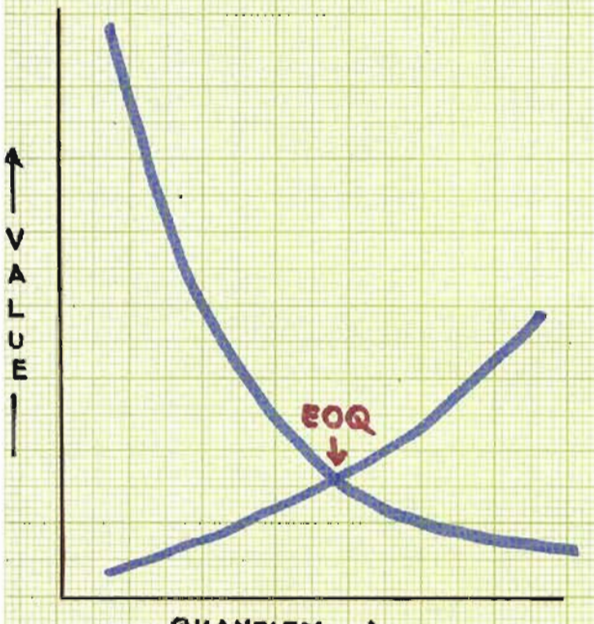
INFLUENCE OF INCREMENTAL COSTS ON ORDER POINT



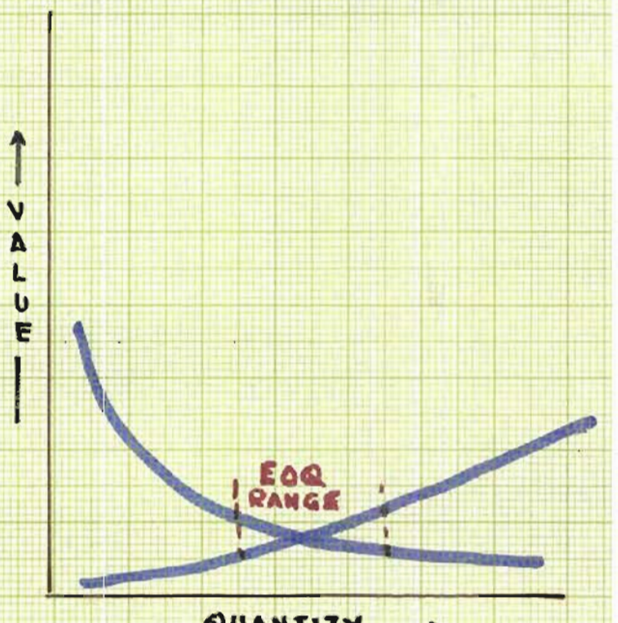
HIGH ORDERING & HOLDING COST



LOW ORDERING & HIGH HOLDING COST



HIGH ORDERING & LOW HOLDING COST



LOW ORDERING & LOW HOLDING COST

a temporary shortage may develop till demand tapers off with increase in production. Timing is also important for unstable markets though the buyer cannot influence the market price, by the proper timing he can control the price he pays.

Some of the other types of purchases effected with timing to obtain favourable prices are speculative buying, forward buying, hand to mouth buying, time budgetting and hedging. In speculative buying materials are bought for resale when price increase is anticipated and sold at a higher price with no added value or any service to the buyer. In case of consumption, materials in excess of forseeable requirements are bought in anticipation of future need expecting a profit by buying at the present time and price and is covered by a limited risk.

Forward buying is done under favourable price situation, a quantity exceeding current requirements in anticipation of price increase due to material shortages, transportation bottlenecks, unreliable deliveries, etc. and is also subject to future price fluctuation risk. In an unstable market hand to mouth buying saves money by timing the purchase when prices ~~and~~ are dropping. By this method inventory losses in case of design change or product change can be reduced and the working capital can be used elsewhere more profitably. Time budgetting method is to buy small quantities of material over equal short operating

periods, so that the price paid will be closer to average market price and can minimise the price fluctuation risk, but the risk of stockouts and high acquisition cost on account of uneconomic quantities cannot be avoided. Hedging is another technique used to minimise risk associated with fluctuating markets in buying materials for which an organised commodity exchange exists and provides protection against market price declines during the processing.

The Right Source:-

There are two primary sources of supplies which are internal and external. The internal source is created by investment in men, machines, materials and management, while those which are not planned internally are bought from external sources. The five rights are significantly independent of each other but the selection of the right source of supply can greatly influence the attainments of all the other rights and therefore it is very essential to choose the really right external source.

When it is decided to obtain supplies from outside sources, the first step is to have an approved list of suppliers. Reputed manufacturers are included in the approved list of suppliers duly classified, depending on their production capacities, financial position, management efficiency, service facilities, annual volume of business, quality of products, type of customers, business standing

and specifications to which products are made. The approved list is periodically updated as new sources are located. Similarly vendor rating is also done based on quality performance, right time delivery, ability to offer competitive prices, promptness in correspondence and supply ethics on a selective basis mainly for high value items. Most of the foreign firms have computer control for vendor performance and those with unsatisfactory performance are either removed from the list or blacklisted.

Suppliers goodwill is a valuable asset because it can help during unforeseen emergencies by expediting supplies, increasing or decreasing supplies as needed and taking them back altogether if not wanted. In addition, vendors can render assistance in price, terms of payment, design and manufacturing, product development and in general co-operation. The purchasing department must maintain cordial relations not only within the company but also outside the firm to gain reputation, integrity and fairplay. A company that fails to get these vendor benefits is losing because of poor purchasing practices.

Having alternate sources of supply for the same material ensures competition and continuity of supplies along with protection against breakdowns and strikes. A single source of supply cannot also be avoided when long co-operation between buyer and seller is needed to develop certain sophisticated items. It is also difficult to

strike a balance between commercial and technical considerations when what is sought to be purchased is not a standard product and when manufacturing capacity and research work over long periods are involved.

A manufacturer may quote lower prices but an agent who may quote slightly higher prices may be able to supply the same at short notice from his stock, while the producer has to manufacture and then supply. In some cases, an agent may quote lesser prices than the manufacturer, as he may be forgoing a portion of his own commission or trying to clear away his stocks for cash. In all these cases the rational course is to investigate the facts which may vary from trade as well as by areas and decide each case to the best advantage.

The principle of reciprocity[1] is a prevalent practice all over the world in buying and selling. Public sector undertakings order their requirements from each other on a reciprocal basis as some of their capacity is under utilised. In many cases this will also save imports and increase the country's self dependence.

Source development is a continuous process for obtaining more economic and technically acceptable products. Development of small scale and ancillary industries is a step in that direction with the advantage of providing addi-

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1. Reciprocity refers to co-operation of buyers and sellers in utilising their capacities and products for mutual benefit. In this process concessions are offered in prices and other terms and conditions of business.

tional employment opportunities. A small scale industry is one having an investment not exceeding Rs. 1 million in fixed assests of plant and machinery and an ancillary has the same scope with investment upto Rs. 1.5 million.[1] They must be engaged in supplying manufactured items or rendering service upto 50 percent of their installed capacity to the parent industry and must not be a subsidiary, owned or controlled by any company.

Ancillaries and small scale industries give a fill up to the local economy, creates employment opportunities, develops skilled manpower and helps to reduce costs. As a matter of policy, major undertakings encourage setting up of ancillary units for mutual help, so that they can concentrate on the manufacture of sophisticated items where value added is high and all other items are off loaded to these units.

A library for the materials division is very useful in obtaining economic information on current business conditions, new products and processes, locating new sources, properties of materials, and above all new concepts and techniques in managing materials most efficiently and economically.

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1. Guide Lines for Industries, Government of India Publication, 1976-77, Chapter VII; p. 19, defines Small Scale and Ancillaries based on limitations of investment and their obligations to parent industries. Appendix IV gives the list of items reserved for the small scale sector.

Alternate Sources of Supply and Vendor Relationship.

Continued study of sources is necessary for high value items eventhough the purchasing department has lists of accredited vendors. Financially strong sources may become weak in a relatively short time. A vendor's products which were formerly strong competitively may have lagged behind in technological progress. Other reasons like unsatisfactory labour relations in the supplier's factory and the fact that the quantity that can be supplied is not enough to meet buyers full requirements, may make it desirable to change or add alternate sources of supply. Selection of local sources assures better services, quicker delivery and greater ease for resolving disputes and misunderstandings. Purchase should normally be direct from manufacturers rather than their distributors or middlemen wherever possible. Business ethics[1] in vendor selection ensures less malpractices, bribery and corruption.

Better relations with the vendors can be established through expediting inspection of incoming materials, effecting payments promptly and advising reasons for rejection if any, immediately after inspection. Suppliers co-

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1. Ethics in business is that field of moral philosophy which deals with questions of 'right' or 'wrong' in the conduct of business activities. See Henry H. Albers, The Management, New York, John Wiley & Sons Inc., 1972, p. 149.

operation is a valuable asset because he knows more about his product and this knowledge combined with broad experience in its applications qualifies him best to give valuable suggestions on product development. While quoting against the buyer's requirements he can either participate in the programme or give suitable alternate offers. By making visits to his plant, gathering ideas and getting suggestions, clues on making the product more economical can also be availed.

Vendor Rating and Performance.

Vendor rating is the technique used in evaluating the performance of each of the suppliers of a business on a comparative basis. A list of high value materials on which the company spends most of its materials budget and the respective suppliers from whom the company buys these items, can help the buyer to discover if he has spread his business for a particular material over too many suppliers or whether he has created monopolistic sources by sticking to one supplier for too long.[1] These vendors can also be rated on their quality performance based on percentage of acceptable lots together with ratings on price and service resulting in an overall performance rating. The final

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1. Selection of good sources and maintaining good buyer-seller relations ensure all other attributes like quality, price, quantity and right time. See Morse P.M., Inventories and Maintenance, New York, John Wiley and Sons, Inc., 1963, p. 98.

index provides a rational basis for the selection of vendors or for dividing the total business among two or more vendors.

When a vendor is compared against his competitors, he may insist that the only fair basis is comparison on a given part or component and not on an overall average performance. This is because some vendors may have more difficult requirements to meet for a particular kind of part not being made by their competitors. This information can be used to strengthen vendor performance because when appraised of a poor quality situation, most of the reputable suppliers will make every effort to improve their standing or reputation.

Vendors can be classified with respect to quality, deliveries, service and price. Each of these factors provides some measure of vendor excellence. Because the interest is generally in the area of quality and delivery as an adjunct to price, these two factors must particularly be evaluated. Vendors whose performance has been outstanding for a prolonged period can be recognised through the presentation of a certificate which he may be able to use for his status and publicity. Those who are consistently bad in performance can be removed from the approved list.

Procurement Process and Invitation of Tenders.

The purchasing action starts with the receipt of an indent duly authorised. This indent may have relevent details of maximum-minimum level, re-order level, monthly usage, present stock and quantity outstanding on orders. The buyer then scrutinises the requirements of material specification, quality limits and dates of delivery required and arranges to obtain offers.

Depending on the value of the purchase, nature of the item and its sources, a single tender, limited tender or an advertised tender is invited. For high value items and equipments tenders are normally invited by public advertisement for obtaining more competitive offers from national and international firms. Every company has some procedure laying down requirements for advertised tenders such as value, name of the paper, display or classified, value of the tender forms and the amount of earnest money to be paid. A security deposit for proper fulfilment of the obligations of the order is also taken against advertised tenders before placing the order.

When the sources are limited and known there is no need to advertise tenders but only tender intimations are sent to the suppliers to buy the tender forms and quote. In case an order is placed with a new firm whose performance is unknown, a second order for a part quantity of the same material is also placed with the last known supplier at a

negotiated price, to ensure regular production untill satisfactory supplies arrive from the new source.

When the item is of a proprietory nature or controlled commodity or when a repeat order is to be placed soon after the earlier order, single tenders are issued. A better buyer-seller relationship can be developed through a limited and single tender system.

Limited tenders are sent to a number of firms selected from the list of approved suppliers. If the firms in the list are numerous they are given a chance to quote in rotation. In the private sector and foreign firms this is the method adopted for purchase. For each group of items a few reliable well established firms are selected whose products are well known quality-wise and the annual requirements are ordered at negotiated prices, on a staggered delivery basis. Since these suppliers are fully conversant with the items, they are able to quote a very realistic price, prompt and definite delivery and orders can be finalised quickly at reasonable prices compared to the last purchase.

All tenders received after the due date are late offers and are normally not considered unless there is lack of competition or when ring prices have been doubted. In exceptional cases late offers are also accepted on merits like attractive price, favourable terms of payment and ready stock delivery.

Acceptance of an offer is to be confirmed within the valid period of offers, otherwise an order placed after the expiry of the offer does not constitute a legal contract. There are standard conditions of contract for each undertaking which are almost similar. Central Government purchase agencies like the DGSD, Railway Board and state purchasing authorities have framed their own conditions of contract[1] after obtaining legal advice but some of them are cumbersome, outmoded and difficult to comply with. Therefore many suppliers do not agree to these conditions and alternately they offer their own terms and conditions of business.

Many organisations stick to their conditions of contract, as it is not prudent to change them after drawing them up with detailed deliberations, unless the price difference is too high or there is no other source of supply. For the contract to be legally binding, there must be total acceptance of the offer. If the tenderer has quoted his own conditions other than those specified, he should be persuaded to withdraw them or his conditions should be accepted and incorporated in the order.

When the need for certain materials is urgent, the inviting of tenders may be omitted and an order may be

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1. Standard conditions of contract for indigenous supplies adopted for Government purchases are as shown in Appendix V.

released at a reasonable price to the last supplier or a vendor who has the item in ready stock. When tenders are issued, most companies use a standard tender/enquiry form, as it ensures uniformity amongst the offers submitted by the various tenderers and it affords greater assurance that the vendor will receive all the necessary information concerning the conditions of purchase which are printed on the tender form. These include conditions of acceptance of the lowest or any other offer, validity of offers, terms of payment and shipping or delivery terms[1] viz. ex-works, F.O.B., F.O.R., buyers site, C.I.F., F.A.S., etc. The ownership of the goods usually changes to the buyer at the point of delivery.

In most companies it is a condition that the tender/enquiry form must be filled and returned as this constitutes an offer to sell. Delivery is one of the most important considerations in purchasing and it is a function of the transportation services used. The description of the material may affect its freight classification, tariff and duties, so the nomenclature has to be correctly chosen. In considering bids, offers must be reduced to a comparable

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1. Delivery terms refer to the vendor's offer to supply goods upto a predetermined point at his risk and cost unless otherwise specified. Exworks means at his factory works, F.O.B. means Free on Board any ship, F.O.R. means Free on Rail head, Buyers site means delivery at buyers works, C.I.F. means cost, insurance and freight paid upto the nearest port of the buyer, F.A.S. means Free alongside ship at the shipping port.

basis as many firms offer trade discounts, quantity discounts, prepaid freight and prompt payment cash discounts.

Each vendor's offer together with prorata transportation charges are listed on a recapitulation sheet and the total unit purchase cost is computed. If the prices received are much higher than the earlier purchase price, a lower price can possibly be obtained by calling for fresh bids, searching for cheaper sources, selecting cheaper substitute materials and arranging a cost analysis for price reduction. If price reduction of the items by this method is not possible, the only alternative left is to increase the price of the finished product.

By reinviting tenders from several firms it may be possible to get cheaper offers and by the process of value engineering, suitable cheaper substitute materials can be located. Increasing the price of the finished product has its own limitations and depends on prices of competitors. This leaves the area of cost analysis only to be pursued. By applying cost analysis techniques selectively and in building up the yard sticks, a buyer is developing his own technical, commercial and managerial skills. It is not a weapon to beat the supplier but is aimed at establishing a reasonable cost and profitability norm.

Pre-production analysis is a form of value analysis conducted on a material or part before it goes into pro-

duction, in the areas of material, tooling and manufacturing methods. Ideally both parties must work together to eliminate unnecessary cost, reduce manufacturing scrap and find substitutes for difficult to obtain materials. A supplier's profit may not be affected as a result of this effort, but the buyer who is interested in getting the item at an economic price from the supplier attains his objective.

Purchase Contracts.

A purchase contract is a statement of obligations created by an agreement between the buyer and seller for the exchange of certain values and the conditions governing the discharge of these obligations. Contracts may be oral or written but in industrial purchasing, these are invariably written. The buyer acts as a legal agent for his company and creates certain legal obligations when entering into a contract for supplies. Purchase contracts are classified as individual or blanket contracts. A purchase order is an individual contract covering a particular supply of material, while a blanket contract provides for the supply of some material over a period of time. Contracts may also differ with regard to their price clauses such as flat price contract, cost plus contract and "the market at the time of shipment" contract.

In a flat price or fixed rate contract, the price agreed on by the buyer and seller applies to all supplies

made under it. Under the cost plus contract, the buyer agrees to purchase the goods at the cost of production of the item, plus an agreed upon percentage of profit subject to his right to inspect the sellers books to verify the cost statements. This type of contracts started during the second World War, when the cost of materials and labour was advancing so rapidly that it was impossible to make cost estimates that could be relied upon for any length of time. On the surface, this arrangement appears to be perfectly fair but it frequently leads to abuses. It gives the seller an incentive to increase rather than decrease costs and this can be done in so many ways without any such intent showing in the cost records that the buyer is likely to suffer unless the seller is unusually honest.

The term cost includes material, labour and services directly applicable to the job, taxes, duties, cost of hand tools, rentals on spare equipments and other overhead charges. Compensation generally includes overhead, general supervision, administrative and general expenses and profit. In all such cases the parties should have a clearly defined understanding of the cost elements and the compensation involved. Such cost plus contracts are to be limited to the minimum because of its demerits.

Contracts based on 'market at time of shipment' or prices ruling on the date of delivery[1] means that shipments

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1. Supply of Alloy Steels by Hindustan Steel and Visveswaraya Iron and Steel is made only on this basis, due to long manufacturing time and variations in prices of imported materials and locally bought items during this period.

as released under the contract are priced at the current price quoted by an agreed upon source like the London Metal Exchange. This arrangement ensures that the plant will have an adequate supply of material when needed and precludes the possibility of a speculative loss because of falling prices, except as a result of competition, where other manufacturers have bought or sold successfully on the market.

In respect of foreign contracts there are certain additional terms and conditions applicable.[1] For payment of imported goods, import licences and foreign exchange are involved. This requires additional documentation such as bill of lading,[2] invoices, shipping specifications, certificate of origin, insurance and freight certificates.

Purchase and Leasing of Capital Equipment:-

In selecting an equipment the buyer has to ensure its operating characteristics, engineering features, total economic analysis based on estimated cost and performance data, suppliers resources, after-sales service, production capacity and warranty terms. The buyer must also be

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1. Terms and conditions of foreign contracts adopted for government purchases are as shown in Appendix VI.

2. Bill of lading is the receipt issued by the shipping company stating description of goods, weight, name of the consignor and consignee, markings of the cases of goods to be transported to the port and name of the country of origin.

aware of the latest developments in major capital equipment fields, assess the economics of the equipment, evaluate the specifications and net costs, conduct qualitative analysis, tabulate bid data and negotiate prices, to ensure the best buy.

Leasing of industrial equipment is a new method to avoid bulk capital investment. It can act as a hedge against inflation and provide protection against equipment obsolescense. There will be a definite financial advantage eventhough leasing ultimately costs more.

In most of the public sector undertakings and in the private sector, computers and data processing equipment are leased by IBM, ICL and such other companies. In such cases an initial lump sum payment plus month-ly rentals are charged by these companies for the installation and maintenance of these equipment. In case it is an out-right purchase, the company has to undertake repairs and maintenance or entrust it to the suppliers. If the company opts to do the maintenance itself it has to recruit and train specialists which will ultimately works out to be more expensive.

Purchase Orders:

From amongst the offers received in response to the tender, the most favourable quotation in view of delivery, quality, service and price is selected and an order is released to the vendor. On his acceptance of

the order it becomes a contract. The purchase order has three principal functions:-

1. It records the terms of the contract
2. It conveys to various sections of the company that they have to carry out their part involved in the order and
3. It serves as a control instrument for the purchase department.

Amongst the terms of contract recorded on the order some most important are: payment terms, conditions of rejection, price variation, security deposit, risk purchase penalty clause and conditions of liquidated damages.

More and more firms stipulate advance payments with the order or against proof of inspection and despatch. This type of payment is considered only to the most reputable firms in exceptional cases. Otherwise in all normal cases payment is made only after receipt and acceptance of the goods. If the payment is made in advance and the goods are rejected, it will become difficult to recover the amounts paid. Some companies pay against a bank guarantee executed by the vendors to the effect that if the goods are not accepted, the advance amount will be refunded or necessary rectification of defects arranged free of cost.

Most contracts are placed subject to the consignee's

ultimate right of rejection despite the fact that the materials may have been inspected by ~~the~~ his representative before despatch. In case of rejection at the site, the supplier has to be intimated within a reasonable time of about thirty days from the date of receipt of the goods.

Goods once accepted cannot be rejected and if the material proves to be defective or inferior in performance during the guarantee period, a claim can be made against the supplier for free rectification or replacement. Reasons for rejection must be precise and intimated in writing to the supplier describing in what way it differs from the ordered quality, specification or drawing. The supplier is also asked for disposal instructions of the rejected material. Where payment either in part or full is already made, rejected materials are not returned until the replacement supply is received. Even freight charges paid on the rejected material are normally recovered from the supplier. The contract provides for such conditions in the terms and conditions of supply.

Some firms quote prices subject to variation due to changes in raw material prices, exchange variation in case of imports, price escalation on account of cost of labour and other allied cost. Such variations are accepted only in respect of commodities controlled by the Government viz. steel, cement, non-ferrous metals, oils and fuels.

Contracts placed subject to security deposits are not valid till the deposit is paid. If they fail to pay, the contract is cancelled on risk purchase terms. Security deposits are accepted in different forms:-

a) By cash deposit

b) By a bank guarantee

c) By a bond or other government securities and

d) By surrender and endorsement of fixed deposit and such other receipts.

The security deposit can be partly or fully adjusted for defaults in supplies, delays, penalties and against liquidated damages.

Penalty for late delivery of goods is normally levied at half percent of the value of the delayed goods per week of delay. The liquidated damages are calculated on the basis of loss or damage suffered by the company in the execution of its projects/programmes due to non-receipt of the ordered material either not supplied or delayed.

Within a reasonable time of cancelling of a contract a fresh purchase is to be made to qualify for claiming from the defaulter the extra amount incurred in the fresh purchase. Reasonable time is considered to be six months and if not made within this period, risk purchase is not tenable. The fresh order placed must be for identical material, quantity and quality and any deviation may nullify risk purchase.

Purchase Follow-up:

The control of purchasing is concerned with regulating and co-ordinating procurement activities in a manner which will assure their effective and economical performance. Follow up is concerned with the proper execution of the contract with regard to delivery and to ensure shipment when and where specified. It must follow the progress of the purchase order from the time it is released and till the supply is received. If materials are not supplied by the due date the supplier is reminded in writing, contacted on the phone, or reminded by telegram. In spite of all these if supplies are not forth-coming a registered notice of risk purchase is given. If the delay is due to reasons beyond the control of the firm and if the organisation can wait without jeopardising any of its projects, extension of delivery time may be granted, otherwise penalties for late delivery as provided in the contract are enforced. If the supplies are urgently required and are not forthcoming in spite of registered notice, risk purchase is effected.

Legal Aspects of Purchasing.

The Purchasing Agent and the Law: The activities of all purchasing executives are subject to the two major areas of the law, the law of agency and the law of contracts. A buyer is an agent for his firm and is covered by the law of agency. When he buys materials and services he enters into a contract. In case of a dispute the matter would be settled

by a court of law or by an arbiter in accordance with the law of contracts. From a business stand point, a high legalistic approach is both unnecessary and unprofitable and as such business considerations should have priority over legal aspects. At the same time a basic knowledge of law is essential to the purchasing executive, because his employer has contracted his services, the law makes the buyer personally liable for any advantages gained for himself or for any aid given by him to competitors. A sales man has no authority to bind his company to a contract or to a warranty, except to solicit orders while the buyer has a delegated and apparent authority.

Essentials of a Contract: There must be four basic elements in a valid contract:

1) An offer and an agreement of acceptance
2) Consideration or obligation
3) Competent parties and
4) A lawful purpose by a valid communication in any manner or medium reasonable to the circumstance.

The contract becomes effective only when the material is supplied, despatched or delivered to the buyer.

Every offer must have a validity period and a time limit for acceptance and no withdrawal is permissible during this period. Consideration must be bilateral, the buyer promises to buy at a stated price and the vendor promises

to deliver under mutuality of obligation. If both are not bound in the eyes of the law neither is bound and no contract exists. Competent parties are persons having contractual capacity. If the buying agent exceeds his delegated authority, the company is not bound by the contract and the agent is personally liable for his actions. A contract made by a minor, a lunatic or an intoxicated person is null and void.

Courts hold an oral contract to be just as binding as a written one. However, the law requires all agreements to be in writing and binding on both parties if no objection is raised within 10 days. Also written or typed statements in a contract take precedence over-printed statements. All matters of the contract should be above the signature of the parties and courts have ruled that data appearing below the signature is informational only and not part of the contract.

The law gives the buyer a reasonable time to inspect the material supplied to him after receipt if he has not inspected it earlier and if he raises no objection within a reasonable time, he is deemed to have accepted it. The purchaser has the right to reject the material if it does not conform with the terms of contract. In case of an excess supply he can reject the whole lot or the excess quantity. When material is wrongly delivered he is required to notify the vendor although he is not bound to

return the material. If he neither notifies nor returns the material within a reasonable time he is bound to pay for it.

The ownership title of the goods passes to the purchaser depending on the terms of contract, who pays the freight and who has to process claims in case of loss or damage. This in turn depends on the delivery terms accepted in the contract.

There are two types of warranties implied and express. Implied of ownership to sell a merchantable quality and fitness for the stated need can be even as per sample. For this reason while buying expensive equipments a performance guarantee is specified. If a buyer acts in good faith and has no knowledge of an implied warranty the law holds the vendor responsible unless otherwise stated in the contract. An express warranty nullifies an implied warranty to the extent it conflicts with the implied warranty.

Breach of Contract: Failure to comply with any one of the terms of the contract is a breach. In addition to cancellation of the order, the purchaser can sue for damages. Damages are limited to the difference in cost of fresh purchase. If the buyer cancels the order and if there is no damage to the vendor, (he can sell the goods to others) no damage is payable but if the goods are not saleable to any one else the buyer has to compensate the vendor. For this purpose the extent of liability is limited to the full

value of the goods or equipment. In some cases bonus is introduced in the contract to gain early delivery of the equipment if the buyer can make better profits by doing so.

Honest mistakes are forgiven and they do not invalidate a contract. If breach of contract happens due to force majaure conditions or by an act of God the contract is null and void.

Patent and Trade Mark: A patent is a grant by the Government to an investor, his heirs or assignees for exclusive right to his invention for a specific period. The patentable matter may be a new useful process, machine, material or composition of matter. The trade mark may be any word or symbol, device or a combination thereof adopted by makers to identify their goods from those of others.

If patented items are bought from a vendor without authorisation from the patent holder, the buyer is guilty of infringement. Clauses to this effect that the seller shall indemnify the buyer against all such infringement shall be included in the contract.

In the United States it is unlawful for any buyer knowingly to induce or receive a discriminatory price but in India there is no legal provision to prevent it. The layman who tries to be his own lawyer has a fool for his client. Therefore buyers should seek sound legal

counsel when problems arise, but real skill lies in avoiding legal controversies by selecting sound, co-operative and reliable vendors.

Business Ethics in Purchasing:

The following ethical requirements have been adopted as basic principles of purchasing and standards of conduct for buyers[1] and their agents by the International Federation of Purchasing and Materials Management and the Indian Association:-

a) To consider first the interest of his company in all transactions and to believe in and to carryout its established policies

b) To be receptive to competent counsel and to be guided without impairing the dignity and responsibility of the office

c) To buy without prejudice seeking to obtain maximum ultimate value for money

d) To strive consistently for knowledge of materials and processes of manufacture and to establish better methods for the conduct of his office

e) To subscribe to and to work honestly in buying and selling and to denounce all forms and manifestations of commercial bribery

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1. The constitutions of International Federation of Purchasing and Materials Management and the Indian Association specify these ethics as basic requirement for Materials Managers.

f) To accord a prompt and courteous reception, so far as conditions will permit to all who call on a legitimate business mission

g) To respect his obligations and require that obligations to himself and to his concern be respected as consistent with good business practice

h) To avoid all sharp, shady and unethical practices

i) To consult and assist fellow purchasing agents in the discharge of their duty whenever ocassion permits and

j) To co-operate with all organisations and individuals engaged in activities designed to enhance the development of purchasing.

Appraisal of Purchasing Performance.

It is difficult to assign objectives and targets for purchasing activities and is even more so to assess the purchasing performance. Any yardsticks based on the number of orders issued, the volume and value of purchases, are appraisals of a clerical function and not one requiring initiative and judgement.

However some areas where performance appraisal can be conducted are:

a) Savings generated by the purchasing function other than cost reductions due to market conditions.

The total cost saved can be expressed as a percentage

of the annual purchase value and this can also be expressed as an improvement in relation to the savings effected during the previous years

b) A reasonable inventory turn over ratio. There would be no inventory if the purchasing did not buy it, but all essential materials and services have to be bought in time to conduct the business. This turn over ratio is the relation between annual sales value to average inventory value during the year. Normally this ratio is in the range of 8 to 10 in case of foreign firms and is much less in case of Indian firms. Too rapid a rate probably would indicate a great deal of last minute changes and expediting and too low a rate would imply additional costs in extra handling, space and monetary investment

c) Acquisition cost. By locating dependable and good quality sources, the rejection rate and the procurement cost can be reduced. An improvement every year in the acquisition cost can reveal good purchasing performance

d) Number of shortage items. Smooth production depends on the availability of all essential items and a monthly review of production hold ups due to non-availability of raw materials, parts, tools and consumption stores can also assess purchasing performance.

These principles can now be summarised:

As the largest cost going into finished goods, materials have great potential in reducing cost and thereby earning a profit. For this, availability of materials as and when required at proper price, quality, quantity and from the right source is important. Proper price can be obtained through competitive bidding, cost analysis and negotiation by a buyer who has a high degree of negotiating skills and judgement. Specifications, standardisation and good sources assure quality. The most economic quantity is decided on the basis of acquisition and carrying costs and it is optimum when these costs are equal. Choosing the right time avoids any production hold ups, reduces the inventory holdings and determines the price.

Although all the five ingredients price, quality, quantity, time and source are independent of each other, the right source can greatly influence the attainments of all the other factors. Because of its importance, an approved list of suppliers and evaluation of their performance periodically is essential. Suppliers' goodwill is a valuable asset as they can assist in product development, material supplies, price, terms of payment, design and manufacturing, timely deliveries, and genral co-operation. A Company that fails to get these vendor benefits is losing money because of poor purchasing practices. Development of alternate sources, ancillaries and small scale industries

ensures competition and continuity of supplies against breakdowns and strikes at any source.

Bids against requirements are obtained through advertised, limited or single tenders depending on the nature of the item, its value and source. When sources are limited and known, advertisement can be avoided. Tender formalities are forgone for urgent items and bought from the readily available source. In case the best prices received against a tender are much higher than the last purchase price, fresh bids, search for cheaper sources, locating substitute materials and cost analysis for price reduction are the alternatives.

Contract is a statement of obligations created by an agreement between the buyer and seller. Mainly these are two types fixed and cost plus contracts. Some contracts based on "Market at the time of shipment" are priced as per rates ruling at the time of despatch of materials. While buying capital equipment, its operating characteristcs and long term economies have to be scrutinised. For leasing capital equipment also ultimate cost is the prime consideration. Terms and conditions of supply of a contract or a purchase order includes payment terms, conditions of rejection, price variation, security deposit, risk purchase, penalty clause and liquidated damages. Above all, business ethics are extremely important for all buyers.

Comparison with the existing practice in industries.

From the survey of purchasing activity in foreign firms it is seen that competitive bidding is done only once a year and a few most reliable sources are selected and prices negotiated. For subsequent requirements of the same material, an order is placed on the same source without any further tender formalities. Since materials are readily available there is no need for stocking items and as a result the acquisition and carrying costs are very little. Material planning and ordering are processed on the computer and therefore the acquisition cost has very little effect on the number of orders.

Vendor evaluation is regularly done on the computer and a very cordial relation is maintained with the vendors by making timely payments. This enables buyers to avail maximum vendor benefits of product development and general co-operation. There is enough authority delegated to the buyers, who have high negotiating skills and judgement in decision making, which enables them to reduce the internal leadtime to a minimum.

In the case of private sector companies in India, cost analysis and price negotiation are practised to a great extent but in the public sector it is much less. Vendor evaluation and vendor relations are better maintained in the private sector than in the public sector. The public sector unfortunately gets the least of invaluable vendor benefits.

Due to limited delegation and financial powers, decision making is slow in the public sector compared to the private sector. As a result, the internal lead time is also greater. Financial controls are too many in the public sector, impeding decision making and delaying actions. Similarly economic order quantities are not as popular with the public sector to the extent to which they are used in the private sector. It is seen from the study that most public sector companies do not practise the technique of negotiation for price reduction for fear of criticism by the audit and others. Due to elaborate procedures followed for inviting bids and the advertisement for tenders, the acquisition cost is higher in the public sector than in companies in the private sector. All these details are tabulated in Table IX.

Conclusion: Practice of cost analysis and fair negotiation of price are essential for cost reduction of materials and this must be greately encouraged in the public sector. The buyers have to be well trained to acquire high negotiating skills and judgement to obtain better results. Internal lead time and the acquisition cost can be improved only by increasing the delegation of powers and reducing the financial checks and counter checks. Everything must be done to improve vendor relations to obtain all the vendor benefits which are invaluable. By maintaining business ethics, misuse arising out of vendor relations, can be minimised.

Most of the public sector companies do not use "economic order quantity" for one reason or the other. They have problems of batch quantity, melting capacity and set up times as limiting factors, but in whatever area it can be practised, it can definitely reduce incremental costs. Delay in decision making may cause price increases and even production hold ups. To avoid this unnecessary cost, decentralisation and delegation are essential. Performance accountability and periodic evaluation of achievements can furnish feed backs on areas where corrective actions are necessary.

APPENDIX IV

List of Industries Reserved Exclusively for Development In The Small Scale Sector.

1. Absorbent Cotton.
2. Automobile Radiators (except for expansion on merits).
3. Barbed Wire.
4. Beam Scale.
5. Bichromates (except for exports).
6. Bolts and Nuts (except for high tensile and other special type).
7. Conduit Pipes - Metallic.
8. Domestic Electrical Appliances and Accessories.
9. Dyes -
   i) Azo Dyes (Directs and Acids) and
   ii) Basic Dyes.
10. a) Electrical Wiring Accessories.
    b) Electrical Light Fittings.
11. Expanded Metal.
12. Fire-works.
13. Formulated Perfumery Compounds.
14. Full P.V.C. Footwear.
15. Glass Holloware by Semi-Automatic Process.
16. Gun Metal Bushes.
17. Hand Numbering Machines.
18. Hand Stapling Machines.
19. Hurricane Lanterns.
20. Hypodermic Needles.
21. Insecticides, Dusters and Sprayers (Manual).
22. Laundry Soap.
23. Leather Footwear.

24. Machine Screws (except for Socket Head and Special Types).
25. Machine Shop Vices.
26. Metal Clad Switches upto 30 Amps.
27. Miniature Bulbs:
    a) Miniature Vaccum Bulbs,
    b) Torch Bulbs,
    c) Radio Panel Bulbs,
    d) Cycle Dynamo Bulbs &
    e) Decoration bulbs.
28. Paints and Varnishes.
29. Palm Rosa Oil.
30. Paper Conversion Products.
31. Pine Oil.
32. Plaster Boards.
33. Plastic Processed Products:
    i) Bottle Caps, Buttons, Lamp-shade etc.
    ii) Plastic Articles.
    iii) Polythelene Films.
    iv) Blow-moulded Containers.
    v) Spectacle Frames.
    vi) Manufacture of Polyster Sheets.
34. Rivets of all types.
35. Rolling Shutters.
36. Roofing, Flooring and Glazed Tiles.
37. Safety Matches.
38. Steel Wool.
39. Students' Microscopes.
40. Surgical Gloves.

41. Telescopic Aerials.
42. Thermometers (upto 150°).
43. Water Meters.
44. Welded Wire Mesh.
45. Wire Brushes and Fibre Brushes.
46. Wire Products.
47. Wood Screws.
48. Cycle Tyres and Tubes.
49. Electric Horns.
50. Hydraulic Jacks below 30 tonnes capacity.
51. Tooth Paste.
52. Pressure Die Castings (upto 4 kgs.).
53. Drums and Barrels (upto 50 lit. capacity).
54. Tin containers.
55. Flash Light Torch Cases (Plastic).
56. Truck Body Building (Wooden Structure).
57. Battery Cell Tester.
58. Pressure Gauges.
59. Low Tension Insulators.
60. A.A. & A.C.S.R. Conductors.
61. Electric Transmission Line Hardware.
62. Grease Nipples and Grease Guns.
63. Exhaust Mufflers.
64. Zinc Oxide.
65. Auto Leaf Springs.
66. Chaff Cutter Blades.
67. PVC & VIR Wires of Domestic Type.
68. Metal Fittings for Garments & Leather Goods.

69. Weights.
70. Sodium Silicate.
71. Domestic Utensils (other than stainless steel).
72. Steel Measuring Tapes.
73. Cashew Shell Oil.
74. Room Coolers (Desert Type)
75. Cotton Measuring Tapes.
76. Rubberised Cloth.
77. Household Knitting Machines.
78. Para-Dichloro Benzene Balls.
79. Potassium Silicate.
80. Calcium Silicate.

AUTOMOBILE ANCILLARIES.

81. Fuel Tank Caps.
82. Fuel Lines.
83. Wiring Harness.
84. Tail Lamp Assembly.
85. Side Lamp Assembly.
86. Stop Lamp Assembly.
87. Horn Buttons.
88. Bulb Horn.
89. Seats for Buses and Trucks.
90. Ornamental Fittings.
91. Rear View Mirrors.
92. Sun Shades.
93. Sun Visor.
94. Luggage Carrier.
95. Tyre Inflators.

96. Ash Trays.
97. Hub Caps.
98. Wind Shield Wipers.
99. Electrical Fuses.
100. Electrical Fuse Boxes.
101. Battery Cables and Fittings.
102. Spokes and Nipples.
103. Steering Wheels.
104. Spot Lamp Assembly.

GARAGE EQUIPMENTS.

105. Armature Tester.
106. Battery Terminal Lifters.
107. Condensors and Resistance Testers.
108. Fender Spoons and Hammers.
109. Feeler Gauges.
110. Flaring Tools.
111. Gear Flushers.
112. Puller of all Types.
113. Screw Extractors.
114. Spark Plug Tester and Cleaners.
115. Toe in Gauges.
116. Stud Removers (Extractors)
117. Tyrevalve Pull Out Tools.
118. Tube Cutters.
119. Flanging Tools.
120. Valve Lifters.
121. Valve Replacing and Resetting Tools.
122. Camber Testing Equipment.

123. Ring Expenders.

124. Ring Compressors.

ADDITIONAL ITEMS RESERVED FOR SMALL SCALE SECTOR.

125. Agricultural Implements:

a) Hand-operated Tools and Implements.

b) Animal Driven Implements.

126. Diesel Engines upto 15 HP (Slow Speed)

127. Chlorinated Paraffin Wax.

128. Bicycle Tube Valve.

129. Voltage Stabilizers - Domestic Types.

130. Drawing and Mathematical Instruments & Survey Instruments excluding Theodolite.

131. H.D. Polythylene Monofilament Yarn.

132. Weighing Machines Except for Sophisticated Items.

133. Emergency Lamps.

134. Boosters.

135. Asbestos Pipes and Fittings.

136. I.F. Transformers.

137. Air-Trimmers for Professional Use.

138. Assembly of Loud-Speakers.

139. Hearing Aids.

140. Electronic Flashguns.

141. Amplifiers for Entertainment and Public Address System.

142. Low-cost Radio Receivers.

143. Transistor Headers.

144. Dimethyl Sulphate based on Methyl Alcohol.

145. Wire Gauge and Wire Netting Thicker than 100 mes. size.

146. Pyrazone.

147. Centrifugal Pumps upto size 4".

148. Shoe Grindery.

149. Washers.

150. Builders Hardware.

151. Stranded Wire.

152. File Mechanism.

153. G.I. Buckets.

154. Pressure Cookers.

155. Belt Lacing.

156. Belt Fasteners.

157. Hand and Animal Drawn Carriage Fittings.

158. Cutlery.

159. Gate-Hooks.

160. Tin Cutters.

161. Domestic Gas Appliances such as Cooking Ranges.

162. Zip Fasteners (metallic & non-metallic).

163. Oil Stoves.

164. Sanitary Fixtures.

165. Umbrella Ribs and Fittings.

166. Snap Fasteners.

167. Safety Pins and other similar Products.

168. Steel Furniture.

169. Contact Lenses.

170. Reinforced Cement Concrete Pipes upto 100 c.m.

171. Sanitary Napkins.

172. Duplicating Machines.

173. Circlips.

174. Graphite Crucibles.

175. Carbon Brushes.

176. Woodwool Slabs.

177. Black Adhesive Insulating Tape.

APPENDIX .V. . . .

GENERAL TERMS AND CONDITIONS OF CONTRACT

(INDIGENOUS SUPPLIES)

Definitions and Interpretation

1. (a) Parties:

The parties to the contract are the contractor and the Purchaser, named in the Schedule.

(b) Authority of person signing the contract on behalf of the contractor:

A person signing the tender or any other document in respect of the contract on behalf of the contractor without disclosing his authority to do so shall be deemed to warrant that he has authority to bind the contractor. If it is discovered at any time that the person so signing had no authority to do so, the Purchaser may, without prejudice to any other right or remedy of the Purchaser, cancel the contract and make or authorise the making of a purchase of the Stores at the risk and cost of such person and hold such person liable to the purchaser for all costs and damages arising from the cancellation of the contract including any loss which the purchaser may sustain on account of such purchase. The provisions of clauses shall apply to every such purchase as far as applicable.

(c) Address of the contractor and notices and communications on behalf of the purchaser

(i) For all purposes of the contract, including arbitration thereunder, the address of the contractor mentioned in the tender shall be the address to which all communications addressed to the contractor shall be sent, unless the contractor has notified a change and taken written acknowledgement thereof from the purchaser. The contractor shall be solely responsible for the consequence of an ommission to notify a change of address in the manner aforesaid.

(ii) Any communication or notices on behalf of the purchaser in relation to the contract may be issued to the contractor by a Purchase Officer and all such communications and notices may be served on the contractor either by registered post or by hand delivery duly acknowledged at the option of such officer.

Quotations of rates by contractors

2. Contract.

This contract is for the supply of the stores of the descriptions, specification and in the quantities set forth in the Schedule to the order on the date or dates specified therein.

Any variation and amendment of the contract shall not be binding on the Purchaser unless and until the same is endorsed on the Contract or incorporated in a formal instrument or in exchange of letters and accepted by the parties.

3. Security Deposit.

Unless otherwise agreed between the Purchaser and the Contractor, the Contractor shall, within 14 days after written notice of acceptance of the tender has been posted to the Contractor deposit with the Undertaking concerned (in cash or the equivalent in Government Securities or scheduled Banker's Guarantee Bond) a sum equal to 5 per cent of the total value of the stores detailed in the Schedule to the order for which the Tender has been accepted, subject to a maximum of Rs.10,000/- as security for the due fulfilment of the Contract.

No claim shall lie against the Purchaser in respect of interest on cash deposits on Government Securities or depreciation thereof. The Purchaser shall be entitled and it shall be lawful on his part to forefeit the said security deposit as per the Contract, in whole or in part in the event of any default, failure or neglect on the part of the contractor in the fulfilment or performance in all respects of the Contract under reference or any other Contract with the Purchaser or any part thereof to the satisfaction of the Purchaser and the Purchaser shall also be entitled to deduct from the said deposits any loss or damage which the Purchaser may suffer or be put to by reason of or due to any act or other default recoverable by the Purchaser from the Contractor in respect of the contract under reference or any other contract and in either of the events aforesaid to call upon the Contractor to maintain the said security deposit at its original limit by making further deposits, provided further that the Purchaser shall be entitled to recover any such claim from any sum then due or which at any time thereafter may become due to the Contractor under this or any other contract with the Purchaser. In the event of the Contractor failing to make and to maintain, a security deposit in the manner aforesaid he shall be liable to forefeit to the Purchaser any money lodged with the tender by him, and the Purchaser shall be entitled to cancel the acceptance of the tender.

4. Delivery.

The contractor shall, as may be required by the Purchaser, either deliver free or F.O.R. or C.I.F. or F.O.B. at the place or places detailed in the Schedule to the order, the quantities of the stores detailed and specified therein and the stores shall be delivered or despatched not later than the dates notified in the schedule.

Notwithstanding any inspection or approval by the inspector on the Contractor's premises property in the stores shall not pass on to the Purchaser until the stores have been received, inspected and accepted by the consignee, other than an interim consignee specified in the contract.

No stores shall be deliverable to the consignee's depots on Sunday and Gazetted Holidays without the written permission of the consignee.

5.1 Time for and date of delivery, the essence of the contract.

The time for and the date specified in the schedule or as extended for the delivery of the stores shall be deemed to be of the assence of the contract and delivery must be completed not later than the date(s) as specified or extended.

5.2 Facilities to the Inspecting Officer: The contractor shall allow reasonable facilities and free access to his works and records to the Inspecting Officer. Progress Officer or such other officer as may be nominated by the Purchaser for the purpose of ascertaining the progress of the deliveries under the contract.

5.3 Failure and termination.

If the contractor fails to deliver the stores or any instalment thereof within the period fixed for such delivery in the schedule or as extended or at any time repudiates the contract before the expiry of such period, the Purchaser may without prejudice to his other rights:

(a) recover from the contractor as agreed liquidated damages and not by way of penalty a sum equivalent to 2% of the price of any stores including elements of taxes, duties, freights etc. which the contractor has failed to deliver within the period fixed for delivery in the schedule of such stores may be in arrears where delivery thereof is accepted after expiry of the aforesaid period.

(b) cancel the contract or a portion thereof and if so desired purchase or authorise the purchase of the stores not so delivered or others of a similar description (where stores exactly complying with particulars are not in the opinion of the Purchaser, which shall be final, readily procureable) at the risk and cost of the contractor.

Where action is taken under Subclause (b) above, the contractor shall be liable for any loss which the purchaser may sustain on that account provided the purchase, or, if there is an agreement to purchase, such agreement is made in case of failure to deliver the stores within the period fixed for such delivery in the schedule or as extended within six months from the date of such failure in case of repudiation of the contract before the expiry of the aforesaid period of delivery within six months from the date of cancellation of the contract. The contractor shall not be entitled to any gain on such purchase and the manner and method of such purchase shall be in the entire discretion of the Purchaser. It shall not be necessary for the Purchaser to serve a notice of such purchase on the contractor.

Where supplies are not made within the contract delivery period, the officer mentioned in the Schedule may extend the delivery date upto the period of 21 days, on application to him by the supplier in this behalf, unless the schedule specifically provides that this provision will not apply.

6. Extension of time for Delivery

If such failure as aforesaid shall have arisen from any cause which the Purchaser may admit as reasonable ground for extension of time, the Purchaser shall allow such additional time as he considers to be justified by the circumstances of the case and shall forego the whole or such part, as he may consider reasonable, of his claim for such loss or damage as aforesaid. Any failure or delay on the part of Sub-Contractor, though their employment may have been sanctioned under conditions hereof, shall not be admitted as a reasonable ground for any extension of time or for exempting the Contractor from liability for any such loss or damage as aforesaid.

7. Examination of Drawings, Specifications & Patterns

When tenders are called for in accordance with a drawing, specification or sealed pattern the Contractors' tenders to supply in accordance with such drawing, specification or sealed pattern shall be deemed to be an admission on his part that he has fully acquainted himself with the details thereof and in no circumstances will any claim on his part which may arise on account of his insufficient examination of the ssaid drawing, specification or sealed pattern, be considered.

8. Mistakes in Drawing:

The contractor shall be responsible for and shall pay for any alterations for the works due to any discrepancies, errors or ommissions in the drawings or other particulars supplied by him whether such drawings or particulars have been approved by the Purchaser or not provided that such discrepancies, errors or ommissions be not due to inaccurate information or particulars furnished to the Contractor on behalf of the Purchaser. If any dimensions figured upon a drawing or plan differ from those obtained by scaling the drawing or plan, the dimensions as figures upon the original drawings or plan shall be taken as correct.

9. Samples:

(a) Advance Samples: Where an advance sample is required to be approved under the terms of the contract the contractor shall submit the sample free of cost to the Inspecting Officer within the time specified in the Acceptance of Tender. If the contractor is unable to do so, he must apply immediately to the Officer issuing the Acceptance of Tender for extension of time, stating the reasons for delay. If the Purchaser, is satisfied that a reasonable ground for an extension of time exists he may allow such additional time as he considers to be justified (and his decision shall be final) with or without alteration in the delivery period stipulated in the acceptance of tender and on such conditions as he deems fit. In the event of the failure of the contractor to delivery the advance sample by the date specified in the Acceptance of Tender or any other date to which the time may be extended as aforesaid by the purchaser or of the rejection of the sample, the purchaser shall be entitled to cancel the contract and if so desired, purchase or authorise the purchase of the stores at the risk and cost of the contractor in which case the provisions of clauses shall apply as far as applicable.

(b) Unless otherwise provided in the contract samples required for test shall be supplied by the contractor free of cost. Where a sample which is supplied free, is rejected after examination and test, the same whatever remains of the sample after examination and test will be returned to the contractor at his request and cost within three months of the date of such rejection at Public Traffic Rate owners' risk.

(c) Marking: Samples submitted shall be clearly labelled with the contractor's name and address and the acceptance of tender number.

(d) If the contractor submits a sample whether with, before or after the tender, the same shall not govern the standard of supply except when it has been so specifically stated in the Acceptance of Tender.

(e) Where under the contract, the contractor is required to submit an advance sample, any expenses incurred by the contractor on or in connection with the production of stores in bulk, before the sample has been approved unconditionally, shall be borne by the contractor and he shall not claim any compensation in the event of such sample being found unacceptable by the Inspecting Officer.

(f) The rejection of the sample by the Inspecting Authority or Inspecting Officer shall be final and binding on the contractor.

(g) Where the contract does not require any advance sample to be approved, the contractor may before proceeding with bulk manufacture or delivery of the stores, if he so desires submit to the Inspecting Officer for inspection a sample of the stores in which case a quantity not less than 1 per cent of the total quantity to be supplied unless otherwise authorised by Inspecting Officer shall be submitted. The contractor shall not, however, be entitled to be shown any consideration or given any extension of time to be exonerated from completing the delivery within the stipulated period only on the ground of delay in the approval of any such sample.

(h) If under the contract supplies are governed by a sealed pattern, the contractor shall be bound to examine such pattern before preparing a sample or manufacturing the stores in bulk as the case may be.

(i) Loan of Samples: If a certified sample is lent to the contractor, it will bear a label containing INTER ALIA variations known to the Inspecting Officer between the said sample and the stores desired. If the contractor finds any further variation between the certified sample and the particulars of specifications mentioned in the schedule he shall at once refer the matter to the Inspecting Officer and shall also give intimation of such discrepancy to the Purchase Officer. The contractor shall follow the instructions of the Inspecting Officer, as to what sample or particulars should guide the production of stores and the decision of the Inspecting Officer in the matter shall be final and binding on the contractor.

The contractor shall not detach the said label from the certified sample and if for any reason the said label gets detached, the contractor shall at once return the certified sample to the Inspecting Officer for attaching a fresh lable.

10. Risk of loss or damage to Government or Purchaser's Property.

(a) All the property of the Government or purchaser loaned whether with or without deposit on terms and conditions to be separately agreed upon in respect of each particular contract, to the contractor in connection with the contract shall remain the property of the Government or the purchaser, as the same may be. The contractor shall use such property for the purpose of the execution of the contract and for not other purpose whatsoever.

(b) All such prpperty shall be deemed to be in good condition when received by the contractor unless he shall have within twenty-four hours of the receipt thereof notified the purchase officer to the contrary. If the contractor fails to notify any defect in the condition or quality of such property he shall be deemed to have lost the right to do so at any subsequent stage.

(c) The contractor shall return all such property and shall be responsible for the full value thereof as assessed by the Purchaser whose decision shall be final and binding on the contractor. The contractor shall be liable for loss or damage to such property from whatever cause happening while such property is in the possession of or under the control of the contractor, his servants, workman or agents.

(d) Where such property is insured by the contractor against loss or fire at the request of the Government or purchaser such insurance shall be deemed to be effected by way of additional precaution and shall not prejudice the liability of the contractor as aforesaid.

11. Inspection Notice:

When inspection during manufacture or before delivery of despatch is required, notice in writing shall be sent by the contractor to the Inspecting Officer and acknowledgement obtained, when the stores or material to be supplied are ready for inspection and test and no stores shall be delivered or despatched until the Inspecting Officer has certified in writing that such stores have been inspected and approved by him.

Marking of Stores: The Contractor shall if so required at his own expense mark all the approved Stores with a recognised Government or Purchaser's mark. The stores which cannot be so marked shall, if so required by the Inspecting Officer be packed in suitable packages or cases each of which shall be sealed and marked with such mark.

12. Charges for work necessary for completion of the Contract:

The contractor shall pay all charges for handling stamping, painting, marking, protecting or preserving patent rights, drawings, templates, models and guages and for all such measures as the Purchaser or the Inspecting Officer may deem necessary for the proper completion of the contract, though special provision therefore may not be made in the specification or drawings.

13. Responsibility of the Contractor for executing the Contract.

Risk in the stores: The contractor shall perform the contract in all respect in accordance with the terms and conditions thereof. The stores and every constituent part thereof, whether in the possession or control of the contractor, his agent or servants or a carrier, or in the joint possession of the contractor, his agents or servants, shall remain in every respect at the risk of the contractor until their actual delivery to the consignee at the stipulated place or destination or, where so provided in the acceptance of tender, until their delivery to a person specified in the Schedule as interim consignee for the purpose of despatch to the consignee.

The contractor shall be responsible for all loss destruction, damage or deterioration of or to the store from any cause whatsoever while the stores after approval by the Inspecting Officer are awaiting despatch or delivery or are in the course of transit from the contractor to the consignee or, as the case may be, interim consignee. The contractor shall alone be entitled and responsible to make claims against a railway administration or other carrier in respect of non-delivery, short delivery, misdelivery, loss, destruction, damage or deterioration of the goods entrusted to such carrier by the contractor for transmission to the consignee or the interim consignee as the case may be.

13.2 Consignee's right of rejection: Notwithstanding any approval which the Inspecting Officer may have given in respect of workmanship involved in the performance of the contract (Whether with or without any test carried out by the contractor or the Inspecting Officer or under the direction of the Inspecting Officer) and notwithstanding delivery of the stores where so provided to the interim consignee, it shall be lawful for the consignee, on behalf of the Purchaser, to reject the stores or any part, portion of consignment thereof within a reasonable time after actual delivery thereof to him at the place or destination specified in the schedule if such stores or part, portion or consignment thereof is not in all respect in conformity with the terms and conditions of the contract whether on account of any loss, deterioration or damage before despatch or delivery or during transit or otherwise however.

Provided that where, under the terms of the contract the stores are required to be delivered to an interim consignee for the purpose of despatch to the consignee, the stores shall be at the purchaser's risk after their delivery to the interim consignee, but nevertheless it shall be lawful for the consignee on behalf of the purchaser to reject the stores or any part, portion or consignment thereof upon their actual delivery to him at the destination if they are not in all respects in conformity with the terms and conditions of contract except where they have been damaged or have deteriorated in the course of transit or otherwise after their delivery to the interim consignee.

The provisions contained in clauses relating to the removal of stores rejected by the Inspecting Officer, shall, mutatis, mutandis, apply to stores rejected by the consignee as herein provided.

13.3(a) Subletting and assignment:

(i) The contractor shall not, save with the previous consent in writing of the Purchaser, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever.

(ii) In the event of the Contractor's subletting or assigning this contract or any part thereof without such permission, the Purchaser shall be entitled to cancel the Contract, and to purchase the stores elsewhere on the Contractor's account and risk and the Contractor shall be liable for any loss or damage which the Purchaser may sustain in consequence or arising out of such purchase.

13.3(b) Changes in a firm:

(i) Where the contract is a partnership firm, a new partner shall not be introduced in the firm except with the previous consent in writing of the Purchaser, which may be granted only upon execution of a written undertaking by the new partner to perform the contract and accept all liabilities incurred by the firm under the contract prior to the date of such undertaking.

(ii) On the death or retirement of any partner of the contractor firm before complete performance of the contract the purchaser may, at his option cancel the contract and in such case the contractor shall have no claim whatsoever the compensation against the purchaser.

(iii) If the contract is not determined as provided in sub-clause (ii) above notwithstanding the retirement of a partner from the firm he shall continue to be liable under the contract for acts of the firm until a copy of the public notice given by him under section 32 of the Partnership Act has been sent by him to the Purchaser by registered post acknowledgement due.

13.3(c) Consequence of breach: Should a partner in the contractor firm commit a breach - sub-clause (a) above by assigning his share or the Contractor should commit a breach of the conditions 15.3(b)(i) of this sub-clause, it shall be lawful for the purchaser to cancel the contract and purchase or authorise the purchase of the stores at the risk and cost of the contractor and in that event the provisions of clauses shall as far as applicable shall apply.

13.3(d) The decision of the purchaser as to any matter or thing concerning or arising out of this sub-clause or on any question whether the contractor or any partner of the contractor firm has committed a breach of any of the conditions in this sub-clause contained shall be final and binding on the contractor.

13.4 Assistance to the Contractor:

(a) The contractor shall be solely responsible to procure any material or obtain any import or other licence or permit required for fulfilment of the contract and the grant by the Purchaser of any other authority of a quota certificate or permit required under any law for distribution or or acquisition of iron and steel or any other commodity or any other form of assistance in the procurement of the material aforesaid or any attempt to render assistance in the matter aforesaid, shall not be construed as a representation on the part of the purchaser that the material covered by such licence or permit or quota certificate is available or constitute any promise, undertaking or assurance on the part of the purchaser regarding the procurement of the same or effect any variation in the rights and liabilities of the parties under the contract. But,if by any such assistance as aforesaid, the contractor obtains any materials at less than their market price or the cost of production of the stores is lowered, the price of the stores payable under the contract shall be reduced proportionately, and the extent of such reduction shall be determined by the Purchaser whose decision shall be final and binding on the contractor.

(b) Every effort made by the Purchaser to supply, or give assistance in the procurement of materials, whether from the Government stock or by purchase under a permit or release order issued by or on behalf of or under authority from Government or by any officer empowered in that behalf by law or under other arrangements made by the Purchaser shall be deemed to be subject to the condition that it will be performed with due regard to other demands and only if it is found practicable to do so within the stipulated time and the decision of the Purchaser whether it was practicable to supply or given assistance as aforesaid or not shall be final and binding on the contractor.

14. Use of Raw Materials Secured with Govt. Assistance.

14.1 Where any raw material for the execution of the contract is procured with the assistance of the Government by purchase or under arrangement made on permit, licence, quota certificate or release order issued by or on behalf of under authority from the Government or by any officer empowered in that behalf by law, or is issued from Government stock and where advance payments are made to the contractor to enable him to purchase such raw materials for the execution of the contract, the contractor.

(i) Shall hold such material as trustee for the Government - third party risk under insurance at supplier's cost.

(ii) Shall use such material economically and solely for the purpose of the contract.

(iii) Shall not dispose of the same without the previous permission in writing of the purchaser and

(iv) shall render due account of such material and return to the Government at such place as the purchaser may direct all surplus or unserviceable material that may be left after the completion of the contract or its termination for any reason whatsoever.

On returning such material the contractor shall be entitled to such price therefore as the purchaser may fix having regard to the condition of such material.

14.2 Where the contract is terminated due to any defaulton the part of the contractor, the contractor shall pay all transport charges incurred for returning any material upto such destination as may be determined by the Purchaser and the decision of the Purchaser in that behalf shall be final and binding on the contractor.

14.3 If the contractor commits breach of any of the condition in this clause specified, he shall, without prejudice to any other liability, penal or otherwise, be liable to account to the Government for all moneys, advantage or profits accruing from or which in the usual course would have accrued to him by reason of such breach

14.4 Where the stores manufactured on fabricated by the contractor out of the materials arranged or procured by or on behalf of the Government are rejected the contractor shall, without prejudice to any other right or remedy of the Government on demand the cost price or market value of all such materials whichever is greater.

15. Indemnity:

15.1 The contractor shall at all times indemnify the purchaser against all claims which be made in respect of the stores for infringement of any right protected by patent, registration of designs or trade mark. Provided always that in the event of any claim in respect of alleged breach of letters patent, registered designs or trade mark being made against the purchaser, the purchaser shall notify the contractor of the same and the contractor shall at his own expense either settle any such dispute or conduct any litigation that may arise therefrom.

15.2 The Contractor shall not be liable for payment of any royalty, licence fee or other expenses in respect of or for making use of patents or designs with respect to which he is according to the terms of the contract, to be treated as an agent of the Government for the purpose of making use of the patent or trade mark for fulfilment of the contract.

16. Packing:

16.1 The contractor shall pack at his own cost the stores sufficiently and properly for transit by rail/road, air and or sea as provided in the schedule so as to ensure their being free from loss or damage or arrival at their destination.

16.2 Unless otherwise provided in the schedule all containers (including packing case, boxes, tins, drums and wrappings) in which the stores are supplied by the contractor, shall be considered as non-returnable and their cost as having been included in the contract price.

16.3 If the schedule provides that the containers shall be returnable, they must be marked "returnable" and they will be returned to the contractor as per terms of the contract.

16.4 If the schedule provides that returnable containers shall be separately charged, they shall be invoiced by the contractor at the price specified in acceptance of tender, in such cases the contractor shall give full credit for the invoiced amount if the containers are returned to the contractor. Return of containers shall be made within a reasonable time and in the event of any dispute or difference arising as to whether the containers were so returned the decision of the Purchaser thereon shall be final and binding and the Purchaser may in his discretion award such compensations as may in his opinion be proper for any undue delay in returning the containers.

16.5 Each base or package delivered under the contract shall be marked by the contractor at his own expense. Such marking shall be distinct (all previous irrelevant marking being carefully obliterated) and shall clearly indicate the description and quantity of the stores, the name and address of the consignee, the gross weight of the package and the name of the contractor with a distinctive number or mark sufficient for the purpose of identification. All markings shall be carried out with such material as may be found satisfactory by the Inspecting Officer as regards quickness of drying fastness and indelibility.

16.6. The Inspecting Officer may reject the stores if the stores are not packed and/or marked as aforesaid and in case where the packing materials and instructions are separately prescribed, if such materials are not in accordance with the terms of the contract. Such rejection of the stores by the

Inspecting Officer shall be final and binding on the contractor.

16.7 Each bale or package shall contain a packing note specifying the name and address of the contractor, the number and date of acceptance of tender or supply order and the designation of the Purchase Officer or Officer issuing the supply order, the description of the Stores and the quantity contained in such bale or package.

17. Notification of Delivery:

Notification of delivery or despatch in regard to each and every instalment shall be made to the Consignee and to the Indentor immediately on despatch or delivery. The contractor shall further supply to the consignee, or the interim consignee, as the case may be, a packing account quoting number of the acceptance of tender and/or Supply or Repeat Order and date of despatch of the stores. All packages, containers bundles and loose materials part of each and every instalment shall be fully described in the packing account and full details of the contents of the packages and quantity of materials shall be given to enable the consignee to check the stores on arrival at destination. The railway receipt/consignment note or bill of lading if any, shall be forwarded to the consignee by registered post immediately on the despatch of stores. The contractor shall bear and reimburse to the Purchaser demurrage charges, if any, paid by reason of delay on the part of the contractor in forwarding the railway receipt, consignment note of bill of lading.

18. Progress reports:

18.1 The contractor shall from time to time render such reports concerning the progress of the contract and/or supply of the stores in such form as may be required by the Purchaser, who will have the right to depute an expeditor/ engineer for i nspection, at suppliers premises/work.

18.2 The submission, receipt and acceptance of such reports shall not prejudice the rights of the Purchaser under the contract, nor shall operate as an 'estoppel' against the purchaser merely by reason of the fact that he has not taken notice of or subjected to test any information contained in such report.

19. Freight:

The stores shall be despatched at public tariff rates. In the case of f.o.r. station of despatch contract, the stores shall be booked by the most economical route or most economical tariff available at the time of despatch as the case may be. Failure to do so will render the contractor liable for any avoidable expenditure caused to the purchaser. Where alternative routes exists, the Purchaser shall if called upon to do so indicate the most economical route available, or name the authority whose advice in the matter should be taken and acted upon. If any advice of any such authority is sought, his decision or advice in the matter shall be final and binding on the contractor.

20. Removal of Rejected Stores.

Any stores submitted for inspection at a place other than the premises of the contractor and rejected shall be removed by the contractor subject as hereinafter provided within 21* days of the date of issue of intimation of such rejection.

If it is proved that letter containing such intimation is addressed and posted to him at the address mentioned in the purchase order/Acceptance of Tender/Contract it will be deemed to have been served on the contractor at the time when such letter would in the course of ordinary Post reach the contractor. It shall be within his authority for the Purchaser or the Inspector to call upon the contractor to remove what he considers to be dangerous, infective or perishable stores within 48 hours of the receipt of such intimation.

Such rejected stores shall under all circumstances lie at the risk of the contractor from the moment of such rejection and if such stores are not removed by the Contractor within the period aforementioned, the Inspector may either return the same to the contractor at contractor's risk and cost by such mode of transport as the Purchaser or Inspector may select or dispose of such stores at the contractor's risk on his account and return such portion of the proceeds as may be necessary to cover any expense incurred in connection with such disposal. The purchaser shall also be entitled to recover ground rent/demurrage charges on the rejected stores after the expiry of the free time mentioned above.

Stores that have been despatched by rail and rejected after arrival at destination may be taken back by the Contractor either at the station where they were rejected or at the station from which they were sent. If the contract is placed for delivery f.o.r. station of despatch the Contractor shall pay the carriage charges on the rejected consignment at Public Tariff Rates from the station of despatch to the station where they were rejected. If the Contractor elects to take back the goods at the station from which they were despatched, the goods shall, in addition be booked back to him freight to pay at Public Tariff Rates and at Owner's risk. The Contractor shall be liable to reimburse packing and incidental charges incurred in such returns of stores. The goods shall remain the property of the Contractor unless and until accepted by the Purchaser after inspection.

21. In all contracts or in contracts where the Inspecting Officer also acts as the interim consignee or where inspection is carried on by the consignee himself at destination and in all cases of local delivery full payment shall be made on submission of "Final 100% bill" supported by the Inspection Certificate and consignee's receipt as aforesaid to the Accounts Officer concerned.

22. Recovery of sums due:

Whenever any claim for the payment of a sum of money arises out of or under the contract against the contractor, the purchaser shall be entitled to recover such sum by appropriating in whole or in part, the security if any, deposited by the contractor, and for the purpose aforesaid, shall be entitled to sell and/or realise securities forming the whole or part of any such security deposit. In the event of the security being insufficient, the balance and if no security has been taken from the contractor, the entire sum recoverable shall be recovered by appropriating any sum then due or which at any time thereafter may become due to the contractor under the contract or any other contract with the purchaser, if such sum even be not sufficient to cover the full amount recoverable, the contractor shall on demand pay to the purchaser the balance remaining due.

For the purpose of this clause, where the contractor is a partnership firm, the purchaser shall be entitled to recover such amount by appropriating in whole or in part any sum due to any partner of the firm whether in his individual capacity or otherwise.

23. Corrupt Practices:

23.1 The contractor shall not offer or give or agree to give to any person in the employment of the purchaser or working under the orders of the purchaser any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of the contract or any other contract with the purchaser of Government or for showing any favour or for bearing to show disfavour to any person in relation to the contract or any other contract with the purchaser or Government. Any breach of the aforesaid condition by the Contractor, or any one employed by him or acting on his behalf (whether with or without the knowledge of the contractor) or the commission of any offence by the contractor or by any one employed by him or acting on his behalf under chapter IV of the Indian Panel Code, 1860 or the Prevention of Corruption Act 1947 or any other Act enacted for the prevention of corruption by Public Servants shall entitle the Purchaser to cancel the contract and all or any other contracts with the contractor and to recover from the contractor the amount of any loss arising from such cancellation in accordance with the provisions of clauses.

23.2 Any dispute or difference in respect of either the interpretation effect or application of the above condition or of the amount recoverable thereunder by the purchaser from the contractor, shall be decided by the purchaser whose decision thereon shall be final and binding on the contractor.

24. Insolvency and breach of contract.

The Purchaser may at any time, by notice in writing, summarily determine the contract without compensation to the contractor in any of the following events, that is to say:

(i) If the contractor being an individual or if a firm, any partner thereof, shall at any time be adjudged insolvent or shall have a receiving order or order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any conveyance or assignment of his effects or enter into any arrangement or composition with his creditors or suspend payment or if the firm be dissolved under the Partner-ship Act, or

(ii) If the contractor being a company is wound up voluntarily or by the order of a court or a Receiver, Liquidator or Manager on behalf of the Debenture holders is appointed or circumstances shall have arisen which entitle the Court or Debenture-holders to appoint a Receiver, Liquidator or Manager, or

(iii) If the contractor commits any breach of the contract not herein specifically provided for.

Provided always that such determination shall not prejudice any right of action or remedy which shall have accrued or shall accrue thereafter to the purchaser and provided also the contractor shall be liable to pay to the purchaser for any extra expenditure his is thereby put to and the contractor shall under no circumstances be entitled to any gain or re-purchase.

25. Laws Governing the Contract:

25.1 This contract shall be governed by the Law of India for the time being in force.

25.2 Irrespective of the place of delivery, the place of performance or place of payment under the contract, the contract shall be deemed to have been made at the place from which the acceptance of tender has been issued.

25.3 Jurisdiction of Courts: The courts of the place from where the acceptance of tender has been issued shall alone have jurisdiction to decide any dispute arising out of or in respect of the contract.

25.4 Marking of stores: The marking of the stores must comply with the requirements of the Laws relating to Merchandise Marks for the time being in force in India.

26. Headings:

The headings of Conditions hereto shall not affect the construction thereof.

27. Arbitration.

In the event of any question of dispute arising under or out of these conditions or in connection with this or relating to this contract (except as to any matters the decision of which is specially provided for in these conditions) the matter in dispute shall be referred to two arbitrators, one to be nominated by the Purchaser and one to be nominated by the Contractor, or in case of the said arbitrators not agreeing, then to an umpire to be appointed by the arbitrators in writing before proceeding on the reference and decision of the arbitrators or in the event of their not agreeing, of the said umpire shall be final and conclusive and the provisions of the Indian Arbitration Act, 1940 and the rules thereunder and any statutory modification thereof shall be deemed to apply to and be incorporated in this Contract. The arbitrators or the Umpire as the case may be shall be entitled, with the consent of the parties, to enlarge the time for making the award.

28. Powers:-

All powers reserved by the Purchaser under the above conditions shall be exercised by the Material Manager or Chief Administrative Officer of the undertaking concerned.

APPENDIX - VI.

FOREIGN CONTRACT CONDITIONS ADOPTED IN PUBLIC SECTOR UNDERTAKING

EXECUTION: The whole contract is to be executed in the most approved, substantial and workmanlike manner, to the entire satisfaction of the purchaser.

INSPECTION: Inspection will be carried out by the Purchaser or his nominee. The cost of the inspection will be on Purchaser's account subject to other provisions herein contained. At least four weeks notice must be given to the Purchaser on his nominee to enable him to arrange the necessary inspection.

FACILITIES FOR TEST AND EXAMINATION:

The Seller shall provide, without extra charge, all materials, equipment, tools, labour and maintenance of every kind which the Purchaser or his nominee may consider necessary for any tests and examinations which he or his nominee shall require to be made on the Seller's premises, and shall pay all costs attendant thereon.

The Seller shall also provide and deliver free of charge, at such places as the Purchaser or his nominee may nominate, such materials as he or his nominee may require for test by Chemical analysis or independent testing machine. The cost of any such tests will be defrayed by the Purchaser unless it is stated in the specification that it is to be paid by the Seller.

CERTIFICATION OF INSPECTION AND APPROVAL:

No stores will be considered ready for delivery until the Purchaser or the Inspection Officer nominated by him shall have certified in writing that they have been inspected and approved by him. It shall be the responsibility of the sellers to ensure that only such goods as have been duly inspected and approved by the Purchaser or his nominee, are offered for arranging shipment to the Government of India forwarding agents and to furnish to them a certificate as under:

> "Certified that the goods offered for arranging shipment have been duly inspected and approved by the prescribed authority in accordance with the terms of the contract and a copy of the inspection certificate issued in this regard is enclosed"

PROGRESS REPORT: The seller shall render such reports as to the progress of the contract and in such a form as may be called for by the Purchaser or his nominee. The submission and acceptance of thse reports shall not prejudice the rights of the Purchaser in any manner.

SUPPLY OF DRAWING, TRACING & SPECIFICATIONS :

Any drawings, tracings or descriptions specified shall, unless otherwise directed, be furnished by the Seller with the first consignment of the work to which they relate and no payment whatsoever will be made until such drawings, tracings or descriptions have been furnished to the satisfaction of the Purchaser or his nominee.

SELLER'S RESPONSIBILITY: The Seller shall be solely responsible for the execution of the contract in all respects in accordance with the conditions of contract notwithstanding any approval which the Inspecting Officer may have given of materials or other parts of the work involved in the contract or of tests carried out either by the seller or by the Inspecting Officer.

ALTERATIONS:

The Purchaser or his nominee may require such alterations to be made on the work during its progress as he deems necessary. Should these alterations be such that either party to the contract considers an alteration in price justified, such alteration shall not be carried out until amended prices have been submitted by the Seller and accepted by the Purchaser. Should the Seller proceed to manufacture such stores without obtaining the consent in writing of the Purchaser to an amended price, he shall be deemed to have agreed to supply the stores at such price as may be considered reasonable by the Purchaser.

PRICES AND INDEMNITY:

The Seller shall at all times indemnify the Purchaser against all claims which may be made in respect of the said work for infringement of any right protected by patent, registration of design or trade mark provided always that in the event of any claim in respect of an alleged breach of a patent, registered design or trade mark being made against the Purchaser he shall notify the Seller of the same and the Seller shall be at liberty but at his own expenses, to contact negotiations for settlement of any litigation that may arise therefrom.

The Seller is to state in the form of tender his prices for the stores delivered free on board vessels in the nearest ports having facilities to handle the same and the prices stated are to include all cost of stamping, painting, marking protection or preservation of the stores, and any claim whatsoever that may arise from the manufacture, packing, shipment, marking or delivery of stores in accordance with these considerations and include payment by the seller of Dock and Harbour dues, ports rates, export taxes or other fees or charges, if any, levied because of exportation. The prices stated are also to include all rights (if any) of patent, registered design or trade mark and the Seller shall indemnify the Purchaser against all claims in respect of the same.

PLACE OF MANUFACTURE:

The stores shall be made at the place named in the quotations or at such place or places as may be approved by the Purchaser or his nominee.

DELIVERY FOB INVOICES AND FREIGHT:

Shipping arrangements will be made by the Purchaser or his nominee through their forwarding agents to whom adequate notice of not less than six weeks about the readiness of cargo for shipment, should be given from time to time for finalising the shipping arrangements.

Such number of inspection certificates, advice notes, packing lists, invoices etc. as may be required by the Purchaser or his nominees shall be furnished by and at the cost of the Sellers. Negotiable Bills of Lading shall be furnished to the port consignee (s) nominated by the Purchaser, by registered Air Mail sufficiently in advance of the arrival of the vessel at the port of discharge in India.

CUSTOMS DRAWBACK:

If the reasons of customs notifications published after the placing of the contract the stores to be supplied shall become on exportation subject to customs drawback in respect of duties paid on them, the seller shall recover the amount of the drawback and the contract price of the stores shall be reduced by the amount so recovered.

WARRANTY:

The Seller shall warrant that every thing to be furnished shall be free from all defects and faults in material, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for material of the type ordered and in full conformity with the contract specications, drawings or samples, if any, and shall if operable, operate properly.

The warranty shall survive inspection of, payment for, and acceptance of goods, but shall expire 26 months after their delivery in India or 18 months from the date of placing in service at ultimate destination in India, whichever shall be earlier, except in respect of complaints, defects and/or claims notified to the Seller within 2/3 months of such date. Any approval or acceptance by the Purchaser of the stores or of the materials incorporated herein shall not in any way limit the seller's liability.

The seller's liability in respect of any complaints, defects and/or claims shall be limited to the furnishing and installation of replacement parts free of any charge, or the repair of defective parts only to the extent that such replacements or repairs are attributable to or arise from faulty workmanship of material or design in the manufacture of the stores provided defects are brought to the notice of the Seller within 3 months of their being first discovered during the guarantee period and 3 months from the date of expiry of warranty period or at the option of the Purchaser to the payment of the value expenditure and damages as hereafter mentioned.

The Seller shall, if required, replace or repair the goods or such portion thereof as is rejected by the Purchaser free of cost at the ultimate destination or at the option of the purchaser the Seller shall pay to the Purchaser value thereof at the contract price and such other expenditure and damages as may arise by reason of the breach of the condition herein specified.

All replacements and repairs that the Purchaser shall call upon the Seller to deliver or perform under this warranty shall be delivered and performed by the Seller within 6 months (promptly and satisfactorily). If the seller so desires, the replaced parts can be taken over by him or his representative in India for disposal as he deems fit within a period of three months from the date of replacement of goods/parts. At the expiry of this period no claim, whatsoever shall lie on the Purchaser.

The warranty herein contained shall not apply to any material which shall have been repaired or altered by the Purchaser, or on his behalf in any way without the consent of the seller's so as to effect its strength, performance or reliability, or to any defect to any part due to misuse, negligence or accident.

The decision of the Purchaser in regard to Seller's liability and the amount if any, payable under this warranty shall be final and conclusive.

PACKING:

The Seller shall be held responsibile for stores being sufficiently and properly packed so as to ensure their being free from any loss or injury on arrival at their destination.

Where materials are to be supplied in bundles, the weight of each bundle should not exceed 1.5 Metric Tons per bundle for shipment to Calcutta and Bombay Ports and one Metric Ton per bundle for shipment to Madras Port. The Seller shall also be responsible to ensure that only complete and intact bundles are loaded on the ship.

MARKING:

The marking on all goods supplied shall comply with the requirements of the Indian Acts relating to the merchandise or any amendment thereof and of the rules made under such acts and the Seller shall be responsible for the proper and sufficient marking of the goods so as to be in compliance with the requirement of the said Acts.

CORRUPT GIFT AND PAYMENTS OF COMMISSION:

Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the Seller, his Agents, or servants, or any one on his or their behalf to any employee representative or agent of the Purchaser, or any person on his behalf in relation to the execution of this or any other contract with the Purchaser shall, in addition to the criminal liability under the laws in force subject the contract to cancellation of this and all other contracts with the Purchaser, and also to payment of any loss resulting from any such cancellation to the like extent as is provided in case of/under clause "Default" given below and the Purchaser shall be entitled to deduct the amounts so payable from money otherwise due to the Seller under this or any other contract. Any question or disputes as to the commission of any offence under the present clause shall be settled by the Purchaser in such manner and on such evidence or information as may be thought fit and sufficient and his decision shall be final and conclusive in the matter.

LIQUIDATED DAMAGES:

In the event of the Seller's failure to deliver the stores within the time(s) specified for deliveries the Purchaser may withhold any payment until the whole of stores have been supplied and delivered and may deduct or recover from the Seller as Liquidated damages (and not by way of penalty) a sum at the rate of two per cent of the price of any stores which the seller has failed to deliver, as aforesaid for each and every month (part of a month being treated as a full month) during which the stores may not be ready for delivery after the contracted delivery period provided, however, such liquidated damages shall not apply to any period of extension granted by the Purchaser under Force Majeure conditions given under Clause below.

DEFAULT

Should the Seller fail to have the stores ready for delivery by the time or times agreed upon or should the Seller in any manner or/otherwise fail to perform the contract or should it have a receiving order made against it or made or entered into any arrangement or compositions with creditors or suspend payments (or being a company should enter into liquidation either compulsory or voluntary), the Purchaser shall have power to declare the contract as at an end at the risk and cost of the Seller in every way. In such a case, the Seller shall be liable for any liquidated damages for delay provided above and for any expenses, losses or damages which the Purchaser may be put to, incur or sustain by reason of or in connection with the Seller's default.

This clause is subject to the Force Majeure clause below:

RISK PURCHASE:

The cancellation of the contract as stated in the above clause may be either for whole or part of the contract at Purchaser's option. In the event of Purchaser's terminating this contract in whole or part he may procure upon such terms and in such manner as he deems appropriate supplies or services similar to those so terminated and the seller shall be liable to the Purchaser for any excess costs for such similar supplies or services provided that the Seller shall continue the performance of this contract to the extent not terminated under the provisions of this clause.

FORCE MAJEURE

If, at any time during the continuance of this contract, the performance in whole or in part by either party of any obligations under this contract shall be prevented or delayed by reason of any war, hostilities, acts of the public enemy, civil commotion, sabotage, fires, floods,explosion, epidemics, quarantine restrictions, strikes, lock-outs, or acts of God (hereinafter referred to as 'events') then provided notice of the happening of any such event is given by either party to other within 21 days from the date of occurrance thereof neither party shall by reason of such events by entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance and delay in performance and

delivery under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, and the decision of the Purchase Officer as to whether the deliveries have been so resumed or not shall be final and conclusive PROVIDED FURTHER THAT if the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding sixty days either party may at its option terminate the contract PROVIDED ALSO that if the contract is terminated under this clause the Purchaser shall be at liberty to take over from the Seller at price to be fixed by the Purchaser which shall be final all unused, undamaged and acceptable materials bought out components and stores in course of manufacture, in the possession of the seller at the time of such termination or such portion thereof as the Purchaser may deem fit excepting such materials bought out components and stores as the Seller may with the concurrence of the Purchaser, select to retain.

PERFORMANCE GUARANTEE BOND

On acceptance of the offer, the Seller shall furnish a Performance Guarantee Bond in an approved proforma from an approved Bank within 15 days from the receipt of the Letter of Acceptance of the tender by the Seller or the execution of the contract whichever is earlier for an amount equivalent to 2½% of the value of the contract. On the performance and completion of the contract in all respects the P.G. Bond will be returned to the Seller without any interest. The Seller shall undertake to get the Bond duly contersigned by the Reserve Bank or State Bank of India, if so required by the Purchaser. The expenses to be incurred for the counter-signature shall be borne by the Seller. In case furnishing of an acceptable P.G. Bond is delayed by the Seller beyond the period provided above and the Bond is accepted by the Purchaser liquidated damages, as provided in clause liquidated damages for the period of delay in submission of the Bond, shall be levied. Alternatively, the Purchaser may declare the contract as at an end and enforce the clauses of defaults.

The performance guarantee bond shall remain in full force and effect during the period that would be taken for satisfactory performance and fulfilment in all respects of the contract and shall continue to be enforceable for six months after the date of last shipment of the goods contracted to be purchased provided that before the expiry of the date of validity of the Performance Guarantee Bond, the Seller on being called upon by the Purchaser from time to time, obtain from the guarantor Bank extension of time for validity thereof for a period of six months on each occasion. The extension or extensions aforesaid, executed on a nonjudicial stamp paper of appropriate value must reach the Purchaser at least 15 days before the date of expiry of the Performance Guarantee Bond on each occasion.

As and when an amendment is issued to the contract, the seller shall within 15 days of the receipt of such an amendment furnish to the Purchaser an Amendment to the Performance Guarantee Bond rendering the same valid for the contract as amended.

The Performance Guarantee Bond and/or any amendment thereto shall be executed on a stamped paper of requisite money value in accordance with the law of the country in which the same is/are executed by the party competent to do so.

TRANSFER AND SUBLETTING:

The Seller shall not sublet (except as may be customary) in the trade concerned in which case, the Seller shall advise the Purchaser of the same, transfer, assign or otherwise part with the contract or any part thereof either directly or indirectly without the previous written permission of the Purchaser.

The Seller shall be entirely responsible for the work executed by the sub-contractor, if any. For this purpose he shall at his own cost ensure adequate inspection of their works by an inspection organisation acceptable to the Purchaser.

EXPORT LICENCE:

If required, the Seller shall apply to the appropriate Government Authority of the exporting country for the grant of the requisite Export Licence within seven days of the receipt of the contract.

ARBITRATION:

In the event of any dispute or difference arising between the parties hereto as to the construction or execution of the contract or the respective rights and liabilities of the parties such disputes or difference shall except as otherwise expressly provided for herein, be referred to the arbitration of two arbitrators, one to be appointed by each party or in the case of the said arbitrators not agreeing then to an umpire to be appointed by the arbitrators in writing before entering on the reference and provisions of the Indian Arbitration Act 1940 or any statutory modifications or re-enactment thereof and rules framed thereunder from time to time shall apply to such arbitration. If the two arbitrators do not agree on the appointment of the Umpire, the Umpire shall be nominated by the International Chamber of Commerce, Paris.

The decision of the arbitrators or in the event of their not agreeing, the said Umpire shall be binding both on the Seller and on the Purchaser. The venue of the arbitration will be New Delhi (India).

LEGAL INTERPRETATION:

The contract shall be governed by the law of India for the time being in force.

To interpret all the commercial terms and abbreviations used in this Tender which have not been otherwise defined, the rules of 'Inconterms 1953.' shall be applied.

HIGHER PRICE FOR EARLIER DELIVERY:

It would be noted that if a contract is placed on a higher tenderer as a result of this invitation to tender, in preference to the lowest

acceptable offer in consideration of offer of dearlier delivery the contractor will be liable to pay to the purchaser the difference between the contract rate and that of the lowest acceptable tender on the basis of final price F.O.B. destination including all elements of freight, sales tax, local taxes, duties and other incidentals in case of failure of complete supplies in terms of such contract within the date of delivery specified in the tender and incorporated in the contract. This is in addition and without prejudice to other rights under the terms of the contract.

ACCEPTANCE OF OFFERS:

The Purchaser may reject any Tender without assigning any reasons and may or may not accept the lowest or any tender.

CHAPTER VI.

STORES MANAGEMENT.

Introduction

The purchasing department is mainly concerned with securing materials and its responsibilities end with the delivery of materials to the receiving stores, provided these arrive in good condition and meet the specifications. At this point the responsibility for the materials usually passes to the stores department where it remains until these are issued on proper authority. The stores department becomes the physical custodian of all inventories not charged directly to some department or work order. It is also responsible for the safety of materials until these are issued and as the inventory values may run into large sums of money, the importance of the stores management is readily apparent[1].

Stores functions, objectives, organisation, receipt of materials, inspection, systems of material storage, codification, identification, verification, preservation, security of materials, issues from storage, replenishment of stocks, stores accounting, salvage and scrap collection, disposal of scrap and surplus material and evaluation of stores performance are some of the essentials discussed in this chapter and after comparing them with the existing practice

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1. Materials may deteriorate in quality if stored for long periods and some materials like iron and steel rust badly and become obsolete. Apart from perishables most other materials are also affected by weather conditions and moisture, as such issue of materials has to be regulated on 'first come first out basis'. See Stelzer W., Materials Management, Engle wood Cliffs, N.J., Prentice Hall Inc., 1960, pp. 271-274

in the industrial undertakings studied, conclusions have been arrived at.

Stores Functions and Objectives.

The principal phases of the stores functions[1] are receiving materials, arranging inspection, internal transport, storage, issue of materials, replenishment and despatch of finished products[2]. The stores department provides chiefly a technical staff service facilitating the supply of materials. In larger companies each of these phases may be represented by a department. Store keeping is a cost-generating service function which is designed to supply the needed materials expeditiously by eliminating procurement lead time from demand to supply. In manufacturing organisations generally the items stored are raw materials, work in progress, finished goods, tooling, maintenance spares, consumption stores and office supplies. Because the stores function adds nothing to the product value except cost, it is important that the operation be carried out most efficiently to improve the profitability of the business.

In order to reduce inventory costs, deterioration and

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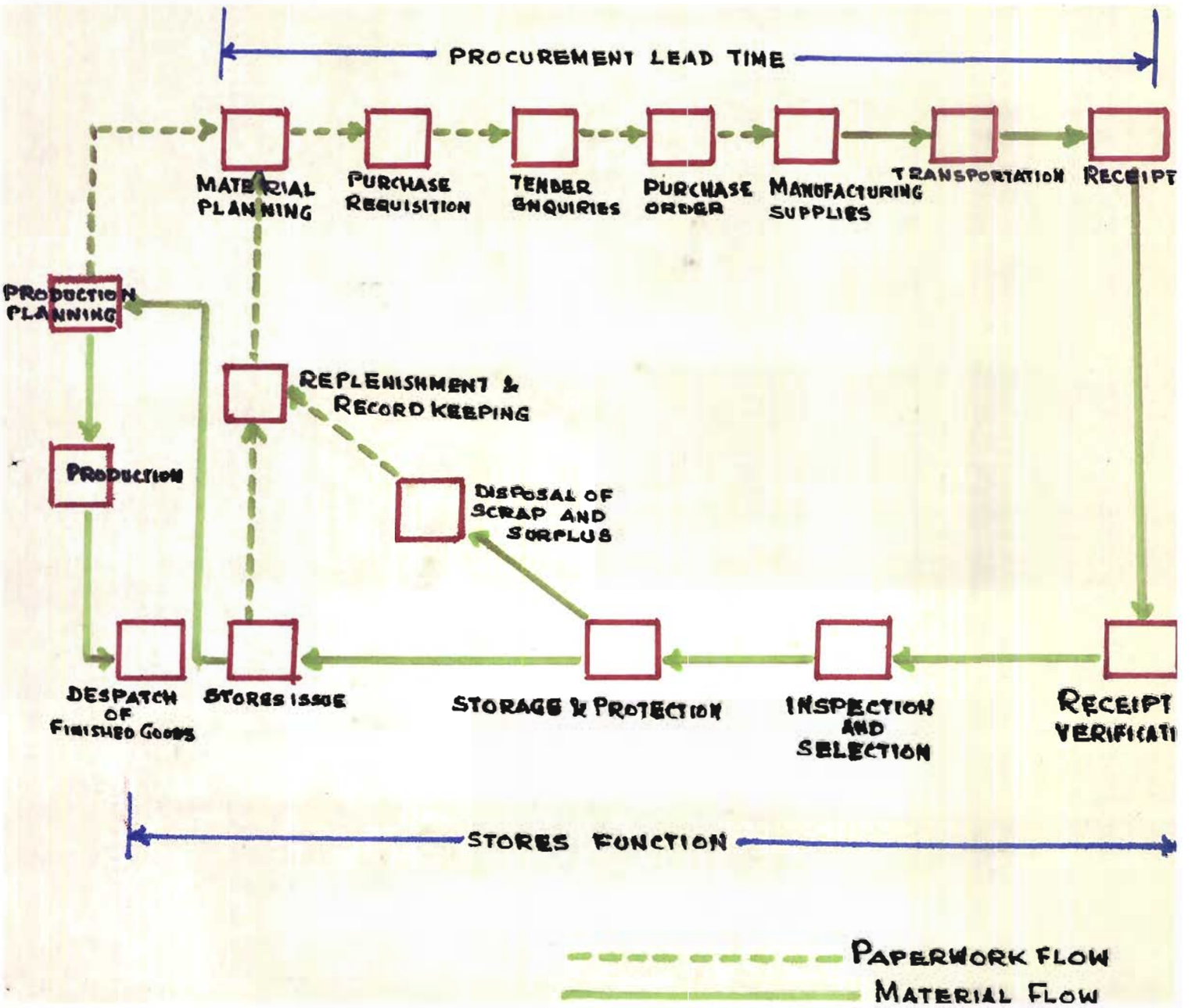
1. Stores function is that part of supply which is responsible for the custody and safe keeping of all inventories of materials or supplies that are not charged directly to some department or order.

2. Figure XII, shows a flow chart of purchase processing sequence, procurement lead time and stores functions.


PROCUREMENT LEAD TIME
MATERIAL PLANNING
PURCHASE REQUISITION
TENDER ENQUIRIES
PURCHASE ORDER
MANUFACTURING SUPPLIES
TRANSPORTATION
RECEIPT
PRODUCTION PLANNING
REPLENISHMENT & RECORD KEEPING
PRODUCTION
DISPOSAL OF SCRAP AND SURPLUS
DESPATCH OF FINISHED GOODS
STORES ISSUE
STORAGE & PROTECTION
INSPECTION AND SELECTION
RECEIPT VERIFICATI
STORES FUNCTION
PAPERWORK FLOW
MATERIAL FLOW

pilferage of materials direct as well as indirect stores labour have to be controlled by the stores department. The carrying cost can also be reduced by arranging periodic checking on in-active items to prevent obsolescence and by the economic usage of storage space. Some other avenues of cost reduction of materials are prevention of pilferage, unauthorised usage and damage or deterioration. If all items are adequately classified, marked and located in a manner to permit easy accessibility and quicker material issue it will provide effective service to production and will reduce the overall cost.

Strategic location[1] of stores can save handling cost and time of workers by reducing waiting time. An efficient work flow that minimises transportation and material handling is important in any manufacturing layout. As such materials must be stored as close as possible to the point of consumptic This decentralised storage reduces manufacturing costs, effect overall economy and better control on manpower, materials, spce and equipment. A combination of both centralisation and decentralisation is most advantageous because by this arrange ment heavy and bulky materials are stored near the place of consumption and other items stored centrally.

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1. Strategic location refers to closeness to consumption centres, which enables least handling, transport and waiting time of workers and ensures smooth workflow. See Shyder R.E., Distribution Age, New York, The Chilton Company 1967, p. 211.

Stores Organisation.

Each store house is under the charge of a stores officer reporting to the materials manager. He is responsible for the maintenance of stores, prompt service, safety, correct physical tally with book balances, prompt postings and proper documentation.

His main duties are;-

a) Verification of receipts
b) Inspection and selection
c) Storage, codification and verification
d) Preservation and security of materials
e) Issues from storage
f) Replenishment of stocks
g) Stores accounting
h) Salvage and scrap collection
i) Disposal of scrap and surplus material and
j) Evaluation of stores performance.

The store depots are divided into wards for stocking different groups of materials. The stores officer is assisted by depot store keepers, assistant depot store keepers and store keepers.

The Receiving Section.

Goods come to the receiving section from local and foreign vendors, by loan or transfer from other companies, organisations or institutions and by manufacture within

the factory or its associates. The receiving section is concerned with proper induction of materials into the plant and hence all such materials pass through it. It also ensures that such goods are inspected by the receiving inspection or the laboratory to determine whether they conform to the specifications in the purchase order. Inspection may not be necessary for all purchases but reports on the condition of each shipment, quality and quantity of materials received against each order is to be made to the purchase and finance departments and to the indentor.

The principal phases of the receiving function are unloading and receiving incoming materials, unpacking and filling them in proper containers, checking and recording quantities, condition of containers and general quality of the material. These reports and records would help in checking freight bills and insurance claims for damages. Heavy and bulky materials are unloaded at the site of construction, storage or installation under the supervision of the receiving section to avoid unnecessary material handling.

The receiving section has to maintain purchase order copy files, make arrival reports of materials, prepare goods received notes, hand over accepted stores to storage keepers, account for and dispose off rejected stores and maintain registers and other connected records. The receiving stores notifies the indentors when materials are received in the receiving section. The manner in which the receiving activities

are conducted directly influences carrying costs and direct labour cost of production.[1] After the receiving section formalities are over, the materials are moved to the incoming inspection department.

The Receiving Inspection

In quality control[2] the incoming inspection plays an important role. All incoming supplies are subjected to random sampling check or complete inspection as necessary for chemical composition, physical properties, specifications, or are compared to approved samples if any, to satisfy the prescribed test for quality, which may be carried out during the manufacture, before or after despatch from the suppliers premises.

When large quantities of materials are received it is expensive and time consuming to inspect all the items individually. For this purpose shorter methods to determine quality has been developed. The statistical sampling is based on

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1. With all the efficiency in purchasing and transport, the production will not have the material if the receiving, inspection and the stores operations are not completed smoothly. Therefore the purchasing should have inherent interest in these services and control operations for production.

2. Quality control is the function of assuring that the quality attributes of a product or some component part of it, conform to certain prescribed standards and that the relationships between these attributes are properly maintained in accordance with specifications. See Kennedy Clifford W., Quality Control Methods, New York, Prentice Hall Inc., 1968, p. 134.

taking samples of predetermined size or quantity, inspecting them and on this basis, accepting or rejecting the entire lot. This method has been proved to be satisfactory as most items in bulk are mass produced and as such variation amongst them cannot happen ordinarily.

Statistical sampling operates on the basis of frequency tables and is more effective than selecting samples arbitrarily. Depending on the lot size and acceptance quality level, sample size is determined. The acceptance level for the entire lot is determined on the basis of the number of pieces in the sample lot found defective on its inspection.

Organisationally the incoming inspection is attached to the materials division and the inspecting officer is in charge of the receiving section in some companies, while in others the same officer also inspects production items and is attached to the production or works inspection department.[1] The inspection wing is responsible for expediting inspection of all materials and deals with all rejections until final acceptance or rejection.[2] They have also to attend to samples received against tenders for approval and correspond with departments of the company and suppliers on matters

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1. Figure XIII shows inter-relationship of quality control inspection with other activities.

2. Table X shows a list of National Laboratories/Institutes where materials are tested and certificates issued. In case of disputes over rejection, a final verdict can be obtained from the relevent testing centres.

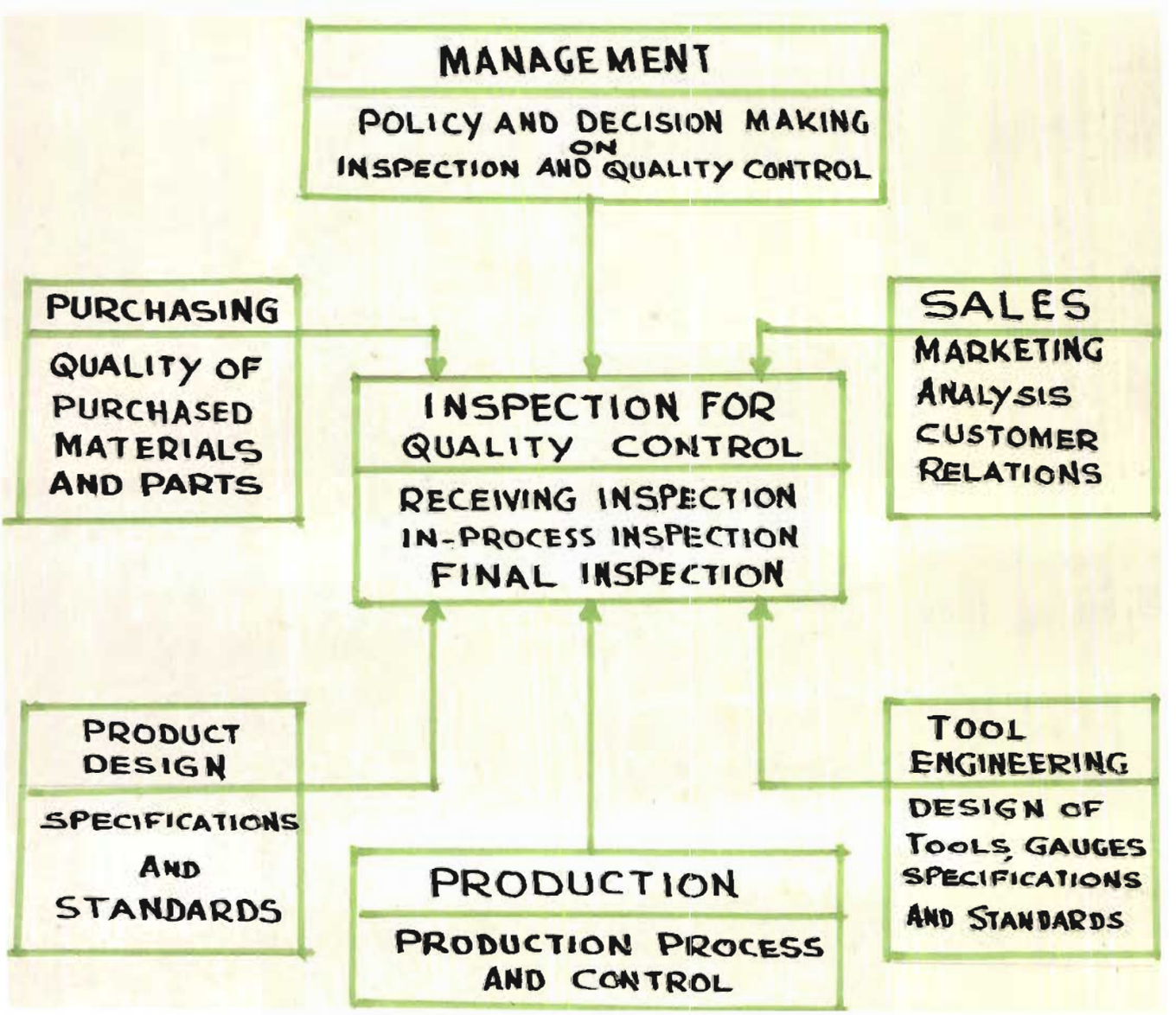
MANAGEMENT
POLICY AND DECISION MAKING ON INSPECTION AND QUALITY CONTROL
PURCHASING
QUALITY OF PURCHASED MATERIALS AND PARTS
SALES
MARKETING ANALYSIS CUSTOMER RELATIONS
INSPECTION FOR QUALITY CONTROL
RECEIVING INSPECTION
IN-PROCESS INSPECTION
FINAL INSPECTION
PRODUCT DESIGN
SPECIFICATIONS AND STANDARDS
TOOL ENGINEERING
DESIGN OF TOOLS, GAUGES SPECIFICATIONS AND STANDARDS
PRODUCTION
PRODUCTION PROCESS AND CONTROL

TABLE - X.

LIST OF NATIONAL LABORATORIES/INSTITUTES, FOR TESTING AND INSPECTION OF MATERIALS.

1. National Chemical Laboratory, Poona - 8

2. National Physical Laboratory, Hillside Road, New Delhi - 12

3. Central Fuel Research Institute, Dhanbad, Bihar.

4. Central Glass & Ceramic Research Institute, Jadavpur University, Calcutta - 32.

5. Central Food Technological Research Institute, Mysore.

6. National Metallurgical Laboratory, Jamshedpur - 7.

7. Central Drug Research Institute, Post Box No.173, Lucknow.

8. Central Road Research Institute, P.O. CRRI, New Delhi - 20.

9. Central Electro-Chemical Research Institute, Karaikudi - 3.

10. Central Leather Research Institute, Adayar, Madras - 20

11. Central Building Research Institute, Roorkee, U.P.

12. National Botanic Gardens Lucknow.

13. Central Electronic Engg. Research Institute, Pilani.

14. Central Salt & Marine Chemicals Research Institute, Bhavnagar.

15. Regional Research Laboratory, Hyderabad - 9.

16. Central Mining Research Station, Dhanbad, Bihar.

17. Indian Institute of Experimental Medicine, Mullick Road, Calcutta-32.

18. Regional Research Laboratory, Canal Road, Jummu-Tawi.

19. Central Mechnical Engg. Research Institute, Durgapur - 9.

20. Central Public Health Engg. Research Institute, Nagpur - 3.

21. Central Scientific Instruments Organisation, Sector - 30, Chandigarh.

22. National Aeronautical Laboratory, Jayamahal Road, Bangalore - 6.

23. Indian Institute of Petroleum, IIP. P.O, Dehra Dun.

24. National Geophysical Research Institute, Osmania University Campus, Hyderabad.

25. Regional Research Laboratory, Jorhat, Assam.

26. Regional Research Laboratory, Sachivalaya Marg, Bhubaneswar - 1.

27. National Institute of Oceanography, Niramar, Panaji, Goa.

28. Industrial Toxicology Research Centre, CDRI Campus, Lucknow.

29. Structural Engg. Research Centre, CBRI Campus, Roorkee.

relating to inspection of materials. In case of rejection an intimation is sent to the supplier showing reasons, with copies to finance and other concerned departments. Rejected items are finally returned to the supplier against replacement or to the insurance company against claims, reverdicted and accepted at a lower cost with or without rework or scrapped and sold or destroyed.

Storage Department

The store is responsible for the safety, care and disbursement of all materials and supplies not in process or in use. Storage of materials, parts and supplies are an integral part of the process by which the materials department maintains a non-stop flow from their points of origin outside the organisation to points of use inside. In selecting the storage place, its lay out and size, the features of material to be stored like quantity and volume of materials, type of material, amount of handling and rehandling, transport involved, security, safety and statutory obligations have to be considered. In most undertakings one item is stored only in one place and if there are many users for the same item, a sub-store is maintained. The sub-store replenishes their items from the main store to avoid excess inventory, deterioration and obsolescense.

Steel, castings, and other non-corrosive materials are not easily affected by weather if stored in tarred or concrete yards on racks or in stacks. It is necessary to store

ferrous and non-ferrous castings in the open yard for seasoning.[1] Similarly for steel bars, aluminium blocks and other such bulky material, it is advantageous to store them in open spaces for easy handling.

It is not advisable to store other materials in the open specially at places where it rains heavily as grass and moss are likely to grow over them in monsoon climate. Inside the buildings, materials are stored in bins and records maintained for all items on bin cards placed in cardex cabinets.

A good store room layout enables easy accessibility, high degree of flexibility in arrangement, effecient utility of space, reduced material handling, minimum deterioration and pilferage and easy physical verification of materials.

The quantity and type of equipment needed will depend on the area of storage, consumption rate of the item, maximum storage quantity at any given time, type of storage facility depending on size, shape, weight etc., transporting and handling needed and the rate of demand and consumption in production. This along with an estimate of future needs will decide the requirement of skids, pallets, open and closed shelves, cabinets, bins, stacking boxes, storage and gravity feed racks and outdoor storage platforms.

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1. Seasoning of castings refers to the process of stress releiving by storing these in the open yard for about three months.

The store rooms must be free from dust and mud, served by a railway siding if possible and provided with equipment for proper storage. During storage the material must get maximum shelf life, safety and minimum deterioration. It should also be possible for forklift trucks, other lifting tackles and battery operated trucks to enter the storage area, move, shift, store and handle materials of incoming and outgoing consignments.

Items must be classified[1] and stored, similar groups being in nearby locations, so that handling will be easy and economical. Codification is essential to avoid duplication of items and to reduce personnel effort in locating and detecting. Proper storage of materials, parts and supplies is an integral part of the process by which the materials department maintain a nonstop flow from their points of origin outside the organisation to points of use inside.

As material handling constitutes a substantial portion of the ultimate cost of an item, store houses are designed suitably. As lorries arrive with loads direct to the receiving end, unloading facility is provided with cranes for easy handling of heavy items. Material trolleys and pallets are also used to move boxes. In some companies there is a separate section dealing only with internal transport. Its

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1. Classification is done value-wise and group-wise, so that materials of the same group are stored nearby, enabling easy location and identification.

work is closely related to the movement of stores. The movement within a shop and between departments and buildings of the factory is handled and routes are established for delivery of the material by this section. It is responsible for proper utilisation of all transportation equipment, arranging prompt and speedy movement of all materials and making continuous and reliable transportation service.

Materials come to storage through receiving section, stores credit and through stock transfers. The store keeper checks up the material with receiving reports for correct part number, description and whether inspected,[1] approved, quantity tallies and whether the materials are without any apparent defect. Then the items are stored and receipt records are entered.

Stores credits consist mainly of depositing manufactured parts in stores, returning surplus materials or repairable and redundant items originally drawn from stores. Stock transfers take place from one store to another.

Special godowns and storage facilities have to be provided for inflammable and explosive materials like

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1. Inspection is a function of quality control that makes a technical comparison between the actual quality of the product and the applicable quality standards to determine whether the quality that has been produced is acceptable. For details on the methods of inspection of engineering goods see Thompson J.E., Inspection, Organisation and Methods, New York, McGraw-Hill Book Co., Inc., 1950, pp. 107-113.

lubricating oils, oxygen, carbon-di-oxide, petrol, diesel oil, rubber and paints as per statutory obligations. Normally all other items are otherwise stored under the same roof, for easy and effective supervision, common use of lifting equipments, cranes, pallets, easy fire protection and to ensure use of common facilities of communication, toilets and drinking water.

Different storage methods are:

(a) Open System:- It is widely used in repetitive mass production types of manufacturing showing a continuous and predictable demand. Materials are stored close to the point of use in bins, racks, shelves or pallets and workers have free access to the items. Stores responsibility ceases as soon as the materials are delivered to the production point and the production in-charge takes over the responsibility beyond this point.

This system is devised to expedite production and places little emphasis on its security. Under ideal conditions materials will be used quickly and will not be subject to high rate of deterioration or obsolescense. This system is usually adopted in automobile assemblies, where materials are used without issue documents and accounted indirectly on standard cost. Better results are obtained for several hundred items, since the value in respect of them is small, the consequence due to them is also insignificant.

(b) Random Acdess Storage:- It is a type of closed storage system having no fixed location and the material goes to the first available bin at random. Similar types and sizes of items are grouped together to reduce multiplicity. While receiving and issuing, punched card system operates through an electronic matching device for location. It is suitable for large operations, with data processing equipment. Physical control is difficult, total stock of any item is difficult to find and is expensive. If a record card is lost, the item itself will not be traceable.

This system utilises the space more efficiently than a fixed location system and provides great flexibility as the same place can accommodate different materials.

(c) Closed Stores System:- In this system all materials are stored in a closed or controlled area by physically locking it. Materials can enter or leave this area only when authorised documents are produced. This system offers maximum security and good accounting control on the materials. Each store keeper posts receipts and withdrawals on bin cards which is the record of activity for each item.

Centralised Inventory Records:-

These are independent of the stock cards. Receipts are posted against suppliers' invoices or receiving reports. Withdrawals are posted from stores requisition or demand notes. The central record provides a running balance. The system of withdrawal is through the engineering bill of

materials. After the design work is completed the production control reproduces the engineering bill of materials instead of material requisitions for release of items.

For low value items like hardware and fastners, the two bin system[1] is used. Accounting is done for purchase order values and the expenditure is allocated equitably among the users, as an elaborate procedure is not commensurate with the value of these 'C' Class items.

Due to human error, the physical balances may not tally with the book balances. Therefore physical verification is done at least once a year and the books are adjusted to match the actual count and absorb shortages into the manufacturing overhead account. Physical verification can be done once a year, during regular periods of the year or at the lowest point of the inventory.

Physical identification of the items is done through one's own stock numbers. It is not possible for any buyer

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1. The two bin system refers to a method of inventory control, where one bin holds material just enough for the lead time consumption, and the second bin contains the balance of the same material. As soon as the material in the second bin is consumed, an order is placed and during the lead time of this supply, the material from the first bin is utilised.
As an alternative, material is kept in one bin only, but a horizontal line is drawn on the bin to indicate the minimum level. As soon as materials in the bin reaches this level, a replenishment order is released. This system of control is followed in Tata Locomotive Works, Jamshedpur.

to have a satisfactory identification system based on suppliers' part numbers and therefore difficult to have any consistent relationship between different kinds of materials and the numbers they carry. Further, there would be no method of determining, what numbers would be added to the system in future. Therefore, there is necessity to have one's own system of numerical identification for materials. The inventory is usually arranged and indexed by the purchaser's own part numbers. It can also include suppliers part number with a brief description. This will provide consistent and unambiguous identification in the critical area of purchasing, inventory control and stores department. This can be further integrated with design, production and cost accounting.

Codification System:-

There are three main systems:-

(a) The arbitrary approach

(b) The symbolic approach and

(c) The use of engineering drawing numbers.

As per the arbitrary system numbers are assigned arbitrarily in sequence as the items are added to the stores but the numbers are not related to specific items or groups of materials.

In the symbolic approach, it is either numerical or mnemonic. Numerical system assigns a six to ten digit code number to each item, in the order of class, sub class and

specific item number. In a mnemonic system, factors are similar to a numerical system but it combines numeric and alphabetic notations in its symbols of identification and is used for smaller number of items. Manufactured items are often identified by drawing numbers. It simplifies inter-departmental communications but has non sequential disadvantages.

Plant Reserve Stores.

A plant reserve is created with serviceable and useful plant left overs from works, instead of selling them off at a threw away price. These are generally air compressors, air receivers, concrete mixing machines, cranes, drilling machines, grantries for girder erection, internal combustion engines and electrical welding sets. Plant reserve is in the custody of stores and they are responsible for the maintenance of the equipment records and their custody. Plant valuation is done depending on the condition at the time of receipt in stores. Issues from these are made on demands duly authorised.

All items of plant reserves are likely to be idle but if there is demand, it is worth while to hire out such items to government agencies or other similar organisations[1].

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1. There is a practice in the public sector undertakings in India to circulate amongst them list of any surplus machinery and equipment any of them may have. If no request is received for these items from any of the undertakings, disposal action will be taken.

Normally road rollers, concrete mixers and such other equipment are always in great demand.

Stores Accounting and Stock Control.

In some undertakings this work is part of the accounts department and in some others part of materials management. They maintain priced ledgers, effect reconciliation of balances with priced ledgers and general books, check value of materials from documents, arrange recovery of cost of stores, make book adjustments, discharge liabilities in connection with receipt of stores, compile stores accounts of receipt, issues and balances, verify stores, periodically and maintain accounts-registers for the assets and liabilities. In most of the undertakings these functions are mechanised and the work is performed on the data processing machines, through the punched card system.

Each month the inventory balance, slow moving and non-moving stores and their values are assessed. After examining these items and the periods for which these were not moving, action is taken to check whether these would be required in the near future for the company's works. If not required, these are put up for sale or sold in auction.

Issues from Storage.

Materials are issued against requisitions and stock transfers, after checking that:

a) The requisition is signed by an authorised person

b) Quantity is correctly mentioned

c) Issues are entered in the requisition and signed and

d) Receipt is acknowledged by the person taking delivery.

The stores officer through his men arranges to verify the stocks of all items once a year in addition to the verification done by the finance department[1]. In case of bulky items like castings and steel, the verification is usually arranged when the stock is lowest to avoid extra labour, expenses and difficulty in assessing the stocks. This verification helps in tallying the ledger and bin balances with the actuals and any descrepancies noticed can be investigated and adjusted. In addition surprise checks are made periodically for items which are likely to be pilfered.

Replenishment of Stocks.

As the bins get empty due to consumption of material it is necessary to fill them up based on the average consumption. Past consumption is a reliable basis for future estimates and provides the yardstick to guide recoupment. This does not apply in cases of new items, items becoming obsolete, items replacing the old, issues against capital works, non-recurring demands and lieu issues which are not taken for computing the past consumption[2].

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1. Independent of the inventory reconciliation and perpectual inventory carried out by the materials management, the finance department also arranges to verify stocks every year from the audit point of view.

2. Past consumption is only a measure of indication but the actual consumption pattern can change depending on the incoming orders for the products, variation in the manufacturing programmes, variants in the products and technological progress in the production process.

After allowing for the above the average consumption for each item can be determined. Then the limits for safety stocks, lead time usage, re-order point and economic order quantity for each item are established. In respect of spares for machinery the two categories for repairs and maintenance and insurance spares are then determined. Maintenance spares are recouped based on actual consumption while insurance spares are recouped on the recommendations of essentiality. The ceiling limit for insurance spares is generally fixed in relation to the capital cost and age of machinery and these details are recorded on the stock cards.

While posting the issues against each items, if it is noticed that the stock level is near the reorder point, recoupment action is taken after verifying the outstanding supplies. If sufficient quantity is outstanding, suppliers are reminded and material expedited.

Where stock control is computerised, or controlled by centralised stock cards, bin cards are maintained in individual stores in the custody of the store keeper. These bin cards show the transactions of receipt, issues etc. Entries in the cards are made immediately after the transactions in some organisations while in some others daily postings are delayed and there are always arrears where this posting work is concerned.

Preservation and Security of Materials

Large quantities of stores deteriorate during storage

due to various causes and become unserviceable[1] and scrap. Therefore preservation is as important as store keeping for materials like clothing, rubber, tyres, tubes, hardware, scientific material, electrical stores, paints, brushes, electrodes, wood and bamboos. Deterioration is mainly due to biological and non-biological causes. Biological causes are while ants, mildew and rats.

Preservation of bamboos is done by immersing them in water or creosote and mustard oil mixture for about twelve hours. DDT dust and naphthalene prevents damage from other insects. Exposure to the sun and fumingation with chemicals are other curative methods. Use of coal tar stops white ants and stores should be kept above floor level without touching the roof or walls. Floors should be cemented and cracks fully repaired.

Rot and mildew take place during wet seasons and to prevent them free ventilation is necessary. Stores must be kept away from moisture, packed completely dry, frequently turned over and periodically inspected. Curative measures are exposure to the sun and insecticide spray. Oils and chemicals also kill insects and are very effective against rot and mildew.

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1. The extent of loss due to ageing and deterioration is difficult to assess but it is estimated that at least one to three percent of the value of stores in respect of non-perishable items is lost annually at any storage place.

Non-biological causes are rusting, caking of paints, hardening of rubber and cracking of timber. Surface protection by paint, oils or grease prevents rust. Boiled linseed oil keeps polished surfaces from rusting. Freshly burned lime can absorb moisture for long periods and keeping such lime in bags around ferrous materials prevent rusting.

Oils, grease and drum packings should have cover, otherwise when exposed to sun and air, the contents expand and contract and in this process a leak may develop. To avoid moisture getting in, the drums are stored horizontally. Rubber and rubber goods are affected by heat and sunlight. Hot air must be avoided and the floor must be kept wet to help humidity. A dusting with french chalk is a helpful preservative.

Theft is a human weakness and the intrinsic value of the item is not the primary consideration to commit it. To avoid theft altogether security precautions must be such as to make it impossible or most difficult. Buildings and boundary walls must be protected including large ventilators and windows. The design of these must aim at the maximum safety. Safety of costly materials[1] must be ensured by storing pilferable items in the most secure and less easily accessible places.

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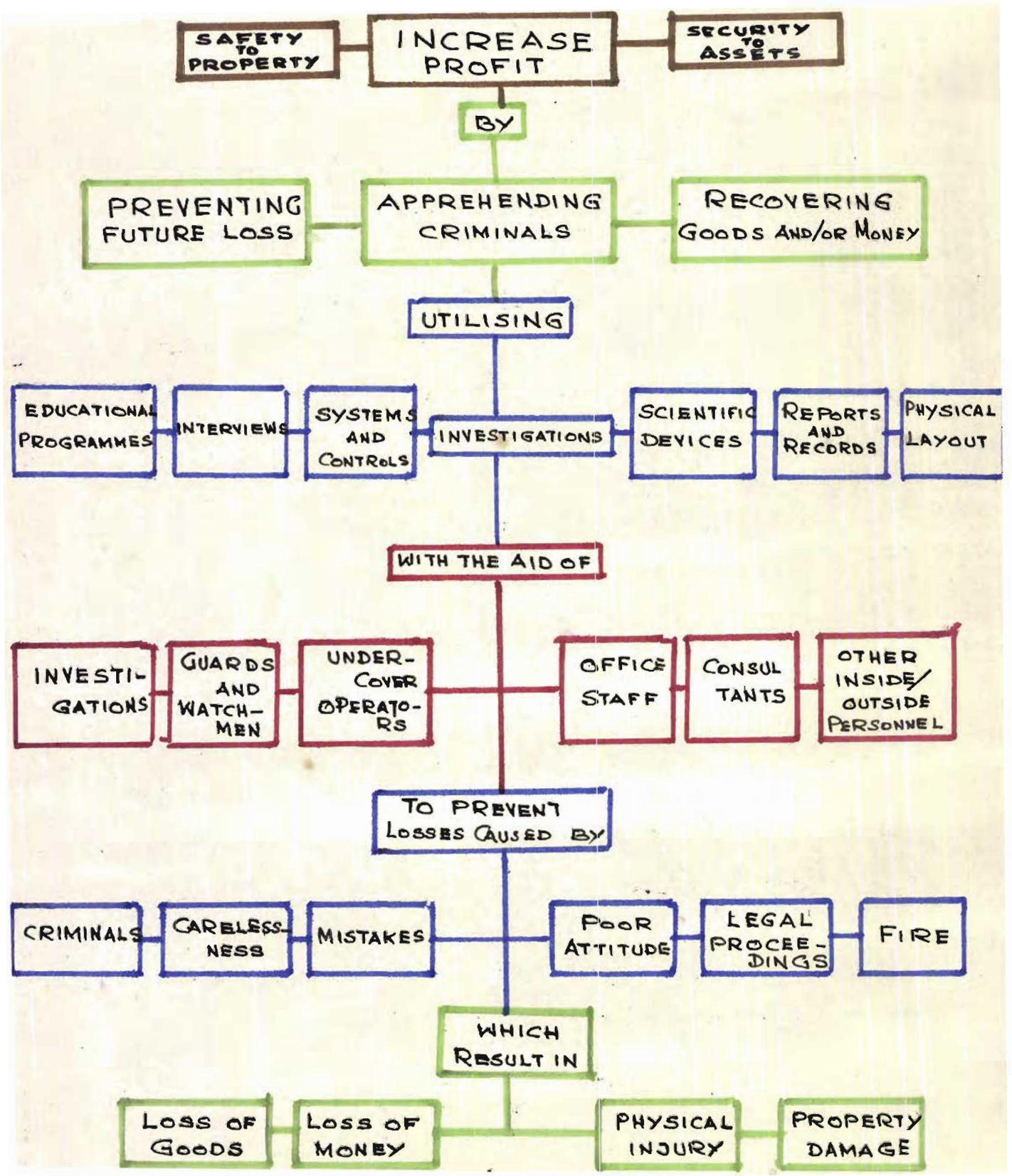
1. Costly materials like diamond tools, wheels and precision instruments are stored in steel cupboards for safe custody and copper, tin, silver and other costly metals are stored in locked rooms. Figure XIV shows how security department can effectively protect property and materials and make considerable savings to the company.


SAFETY TO PROPERTY
INCREASE PROFIT
SECURITY TO ASSETS
BY
PREVENTING FUTURE LOSS
APPREHENDING CRIMINALS
RECOVERING GOODS AND/OR MONEY
UTILISING
EDUCATIONAL PROGRAMMES
INTERVIEWS
SYSTEMS AND CONTROLS
INVESTIGATIONS
SCIENTIFIC DEVICES
REPORTS AND RECORDS
PHYSICAL LAYOUT
WITH THE AID OF
INVESTI-GATIONS
GUARDS AND WATCH-MEN
UNDER-COVER OPERATO-RS
OFFICE STAFF
CONSUL TANTS
OTHER INSIDE/ OUTSIDE PERSONNEL
TO PREVENT LOSSES CAUSED BY
CRIMINALS
CARELESS-NESS
MISTAKES
POOR ATTITUDE
LEGAL PROCEE-DINGS
FIRE
WHICH RESULT IN
LOSS OF GOODS
LOSS OF MONEY
PHYSICAL INJURY
PROPERTY DAMAGE

Yard lighting during the night is essential, including verandahs, corridors and the entire neighbourhood of the boundary walls. Stamping the company name on the materials is a good method to prevent theft. Several items like shoes and uniform cloth issued to the workers of a company are sold to the public by them and stamping the company name on them can prevent such malpractices.

Fire accidents are mostly prevented by installing proper fire fighting accessories and equipments. Electrical short circuit, sparks from steam, cranes and motors must be prevented. Items which are likely to catch fire must be secured and protected. Yards must be cleared of grass and weeds before the approach of dry season.

In summer, oil soaked cotton waste and wood are likely to ignite. These should be stored carefully. Fire fighting appliances like water and sand buckets, chemical extinguisers, fire engines, sumps and hydrants must be provided at the appropriate places. Communication and roads must be provided in the store yard for fire engines to travel. Fire alarms should be provided in the most appropriate places to take quick action in case of an out break of fire.

Surplus and Scrap.

Surpluses accumulate due to different reasons. Some of them are:

a) Lack of materials consumption norms and excess ordering

b) Errors in recoupment

c) Design change of equipment and spare parts

d) Repairs and reclamation and

e) Return of surplus stocks from indentors.

Most undertakings review their surplus materials and scrap half yearly or yearly by collecting them at one place and preparing an up-to-date list showing description, specification and drawing references.

These are then examined in detail whether they:-

a) Can be used as a substitute against standard or other material

b) Can be converted into a standard item

c) Can be offered to government departments, public sector or other sister organisations or

d) Can be disposed off by sales tender/auction as per procedure followed in each undertaking.

Only a portion of the raw material going into the plant comes out as finished product.[1] The balance is completely scrap, consisting of ferrous and non-ferrous waste. Ferrous scrap consists of cast iron industrial scrap, re-rolling scrap, steel and foundry scrap. Turnings and borings, of non-ferrous scrap consists of copper scrap, brass scrap,

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1. In machine tool industry, while processing alloy steels to finished parts for machines, the wastage is about 30 percent. These are cut pieces, turnings and borings. Cut pieces can be forged and re-used while turnings and borings are used for melting in the foundry.

zinc scrap, aluminium scrap, nickel scrap and stainless steel scrap.

Unless these are separately sorted out, their proper value cannot be assessed. Some of these when mixed up cannot be easily sorted out viz. steel scrap and mild steel scrap. There are some methods for sorting these out by magnetic testing, spark testing and chemical spot testing. Where foundries are attached to the works, many undertakings use these scraps in their own foundry for melting.

Scrap to some extent can be reduced by redesigning the product and by using the correct material nearest to the required size. Certain scrap oils, greases, small tools, hand tools and bearings can be salvaged. The same metallic parts can be reused by welding, soldering or electro-plating. It is advantageous to set up a reclamation cell to examine what materials are to be scrapped, what can be repaired, reused or reclaimed economically, the method of reclamation and the economics of salvaging.[1]

Containers can be easily salvaged. These are of two types, returnable and non-returnable drums, tins, reels, gas cylinders, pallets and special packing cases. Returnable

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1. Salvage function is the work of collecting, reclaiming, reworking and disposing of scrap and waste materials. It includes also a staff responsibility for the reduction of the amount of such materials that are produced. Salvage is a staff function of supply in manufacturing establishments. See Baily, P.J.H., Purchasing and Supply Management, op. cit., p. 376.

containers are returned in all cases and deposits if any, are realised in full. When containers are not returnable, they are accumulated in lots and sizes and disposed off periodically by sales tender or by auction. In some undertakings either a fixed price or a rate running contract is made for a year for selling these items.

Sale Tenders

Costly materials and equipment are usually sold by sales tenders after advertisement. There is a risk of buyers forming a ring in case of auction, though this method is an easier and quicker way of disposal. In case of sales tenders conditions of sale are carefully worded and an earnest money deposit of 5 to 10% of estimated value is taken, as otherwise there is a risk of the successful bidder not taking delivery of the material or delaying it. In case of failure to pay and remove the material within a reasonable time, fresh tenders are to be invited and the earnest money of the defaulter is forfeited.

Auction of Materials

Auction can be conducted directly by the company or through an agent. An earnest money deposit is taken in this case also before the auction and full value is collected from the successful bidder after adjusting the earnest money so deposited.

Evaluation of Stores Performance

Some of the yard-sticks against which stores performance can be generally evaluated are:

1) Minimum inventory carrying cost
2) Less deterioration, obsolescence and other inventory losses
3) Minimum cost of running the department, staff-wise and operating expense-wise
4) Good house-keeping[1] and inventory reconciliation
5) Prompt receipt, inspection and storage and
6) Maximum turnover from scrap and salvaging and quick disposal of surpluses.

These principles can now be summarised:

The stores function adds no value to the product, except cost, but if the various functions of receiving, inspection, storage and issue are carried out in the most efficient way, it can improve profitability of the business. With all the efficiency of purchasing and transport, materials may be delivered to stores, but if there is delay in processing through receiving and inspection, these will not be available for production. Good location and proper lay out of store houses can reduce the carrying cost of materials and losses from deterioration, obsolescense, material

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1. Good house-keeping reduces the perils from biological and non-biological causes to inventory. See John F. Magee and David M. Boodman, Production Planning and Inventory Control, op. cit., pp. 247-251.

handling and pilferage. Statistical sampling inspection ensures the quality of materials accepted.

Good house-keeping improves stores efficiency and rotation of stocks reduces deterioration. Codification eliminates duplicate stocking and helps in prompt identification. Since a large amount of money is blocked up in inventories it is essential that items should be verified as to their physical existence and condition so that any discrepancies can be promptly rectified. Scrap collection and salvaging can earn handsome savings. All obsolete and surplus materials must also be disposed off by sales tender or auction. Proper records and documents can control the activities and help to effect a reduction in the overall cost.

Comparison of Principles to the Existing Practice

In respect of foreign firms the processing of materials through the receipt section and inspection takes less than a week, while it is about 10 to 15 days in private sector Indian industries and about a month for the public sector companies as canbe seen from Table XI. The major part of the delay is in inspection and in most cases indentors themselves have to perform the acceptance or rejection which is the reason for the delay. This delay,prolongs every subsequent step in the utilisation of materials, in adjusting advances paid against the purchases and payment to the suppliers. The return of rejected materials is

also unduly delayed in the public sector and this causes delay in replacement and material shortage.

There is great disparity between the number of stock and non-stock items in the public sector, while this is much less in the other sectors. This is reflected in the gap between the number ofreceipts and issues which is also due to non-moving and slow moving items. Periodical reviews can locate such items and those which are useless to the organisation must be promptly disposed off.

There is high inventory of safety stocks in most of the public sector undertakings compared to private sector and foreign firms. Since this is done very carefully in the private sector, these safety stocks amount to about one month's average consumption as against about three months requirement in the public sector companies.

In the private sector and foreign firms, the average yield from salvage and scrap comes to approximately 5 percent while it is only about 3 percent of their production value in the public sector. Non-moving and surplus materials are disposed off twice a year in private sector while in some public sector organisations, it is not effected regularly even once a year. This blocks up working capital unnecessarily. The annual loss due to deterioration, pilferage and material handling is also considerable in the public sector compared to other sectors. These and other costs

due to inventory reconciliation and material holding are tabulated in Table XI.

Conclusion

In order to make better use of the materials already received, settlement of outstanding advances against materials and final payments to the suppliers, it is essential that the processing of materials through receiving and inspection has to be expedited and a maximum time limit of 7 to 10 days would appear reasonable. Prompt return of rejected materials, intimation of specific defects and payment for part quantities if accepted would create good vendor relations which are invaluable for product development.

It is seen from the tabulation that in some public sector undertakings, non-stock items are bought upto about 30 percent of the total value of purchases. As this is likely to create an imbalance in the working capital, more and more common items should be brought under stock items, reducing the present percentage to about half.

Identification of non-moving and surplus materials and their prompt disposal may be given priority as this will not only release the working capital, but payment of interest charges on that amount could be avoided.

By adopting selective control of items, the safety stocks can be brought down to a reasonable limit. It will be a good idea to fix targets for the yield from scrap and salvage. In respect of all engineering industries a five percent yield is not only reasonable but essential. Better house-keeping can reduce inventory losses and can generate overall savings from stores management.

CHAPTER VII

MATERIAL HANDLING AND TRANSPORTATION.

Introduction

Material flow is one of the major factors in determining the size, shape and general arrangement of any manufacturing facility. It determines the location of machines and is almost synonymous with material handling. For every ton of finished product it is necessary to move 50 to 100 tons of materials, depending on the industry and estimates indicate that material handling account for 30 to 50 percent of the manufacturing costs. This clearly emphasises the importance of effective material handling in industries.

This chapter deals with materials handling objectives, organisation, functions, principles and policies, types of equipment used, cost of material handling, cost reduction techniques and an analysis of economies. After comparing these principles to the existing practice in Indian and foreign industries studied, conclusions have been drawn.

Objectives of Material Handling

A product, part or material is of little value unless it is in the right place at the right time. Movement of material must mesh with other operations in as nearly perfect a sequence as possible. Storage of materials, parts and semi-finished and finished products involves material handling,[1] as does the positioning of parts and materials convenient to operators and machines in work areas. Material handling is concerned with the transportation of raw materials and finished products, its warehousing and distribution. Therefore in any manufacturing facility it plays a major role and embraces all the basic operations involved in the movement of any kind of material by any means from the receiving of materials to the shipping and distribution of finished products.

Material handling must produce values that are commensurate with the expenditure of time and money required for its introduction and operation. It must improve the competitive position of the company as a result of better customer service, obtain a higher rate of return as a result of higher capital turn over and lower costs and achieve higher organisational morale. A good material

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1. Material handling is an operative function that is concerned in a manufacturing plant, with the internal movement and positioning of materials and work in-process at a particular location. See James M., Plant Layout and Materials Handling, New York, The Ronald Press Company, 1950, p. 371.

handling system may contribute to improved customer service by making possible a faster movement of raw and processed materials. The result is shorter production lead time and it may be possible in consequence to promise prompt delivery to the customers without the expense of overtime work. An efficient material handling may also reduce the number of customer back orders because it provides a positive and dependable means of moving materials at a scheduled rate. It also contributes to a more effective utilisation of plant and equipment by increasing the speed and reliability of materials delivery.

In the case of store rooms and warehouses also internal transportation helps to reduce congestion and smoothens the material flow. All the above aspects results in a lower processing cost as well as lower handling charges. Appropriate handling equipment[1] will produce substantial reduction in the labour cost because machines can move materials faster than men.

Nature of Functions and Organisation.

In the process of making finished goods from raw materials, there are seven fairly definable material handling functions:

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1. An appropriate system or equipment depends on the selection of equipment or designing of the system for the economical and effective movement of particular materials or work in-process, which is a function of process planning in a manufacturing plant.

1) Transportation of raw materials
2) Receiving
3) Storage
4) In process handling
5) Handling at the work place
6) Warehousing and
7) Distribution.

The handling of materials usually does not shape, form, process or change a material or product in anyway except in cases where products move on a conveyor through an oven, paint booth, test room or freezer where the product is processed during the movement.

Materials, parts and finished products must be moved from one place to another in the most efficient manner so th they reach the work place, service location or customer at the right time. The rate of demand for materials varies among operations in any particular production process and material handling must provide each operation with the exact quantity of the right materials. Storage space is a major element in any facility because it costs money. Space requirements and control of inventory are greatly influenced by the material flow. In an optimum system all these elements of motion, time, quantity and space must be properly integrated so that their combined performance results in smooth, efficient and safe handling of materials.

Planned buying of materials to ensure proper inventory quantity can help in levelling the receiving and storage work loads. Similarly proper planning of production schedules can level the service operation work load. Sales planning, inventory control of finished parts and distribution controls can also level the shipping work load.[1]

Every company is different in its operations and no single formula can determine the levelling media applicable to everyone. The requirement of each company has to be studied to determine where the levelling media are and how they can be controlled to enhance material handling effectiveness and costs. A handling activity must accommodate physical movement of material and there should be a definite and organised plan for the movement. Generally there are three material handling zones:

1) Receiving and into storage
2) Out of storage, into and through production and assembly
3) From production and assembly through shipping.

Receiving and into storage is governed and controlled by the volume of materials received. Out of storage and through production is governed by production schedules.

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1. Advance planning of materials, production, sales, inventory control of finished products and distribution reduces the load on materials handling and transport. See Immer John R., Materials Handling, New York, McGraw Hill Book Co., Inc., 1953, p. 213.

From production and assembly through shipping is governed by the sales schedules. These three zones provide an opportunity to organise the handling system accordingly. In a small operation all the three zones can be governed by a single supervisor. In a medium size operation each of the three zones may be governed by a supervisor and in a large operation more supervisors are needed for each zone depending on the volume of work. In any case they represent separate categories of handling which must be reorganised in any attempt to regulate the overall job. This categorical approach to the improvement of material handling is less costly than new methods and new equipment and should be carefully studied before new methods or equipment are ordered.

Perhaps the single most important factor affecting handling efficiency and cost in any manufacturing facility is physical layout or ground plan. Every time parts or materials move, it costs money. In the ideal plant, raw material enter at one end, go through the various processing steps in exact order and emerge at the other end as finished product ready for shipment. Obviously this is not possible in most plants because the existing plant layout represents a compromise between this ideal and the existing constraints like availability of space, location of departments, manufacturing processes and type of production equipment.

Practically every company can however find opportunities to reduce handling cost by studying layout, processing

sequences and by re-arranging ground plans to achieve minimum total travel for each part or material. In addition it is possible to speed up the flow of materials, reduce accident hazards and eliminate handling bottlenecks. In planning a new layout it is possible to avoid built-in handling costs by considering proper layout long before construction starts. The likelihood of future problems can be minimised by making the new plant layout as flexible as possible from the material handling point of view. The planning has to plan not only for the present processing system but also for possible future changes. If a plant is already built, there is very little that can be done about proper location or layout of equipment but it will pay to keep future needs in mind while planning further changes. Therefore often it is worthwhile to keep the layout flexible to adapt to future changes.

In some cases where space is limited, steps must be taken for the best possible compromise between the ideal layout and the limited space available. The first step is to make a process chart and a flow diagram without reference to the existing layout, listing the operations involved in making each product and the paths to be followed by major components and assemblies. Starting with the receipt of raw material the process chart should trace the material movement through to final shipping.

In addition to noting each operation it should

indicate the approximate amount of material that must be moved per hour, day or week and the frequency of movement. The type of handling equipment to be used should be considered as the equipment affects the layout and the layout affects the type of equipment that is chosen. Another limiting factor is the capability of the floor space to sustain a heavily stacked load, as good utilisation of space calls for high stacking in storage area. Considering all these aspects the best compromise can be effected and a plant layout that does not properly analyse material handling problems is likely to be unsatisfactory. When handling and layout are planned together positive results are realised interms of cost, safety and general efficiency and this contributes to the end result of increased savings.

Almost any material handling problem can be solved if it is clearly stated. Usually it is merely a matter of setting down available facts and means of picturing or representing in flow diagrams[1] materials handling activities clearly so that logical solutions become quite apparent. After all, production is materials in motion and application of motion study and process analysis[2] can solve problems

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1. A flow diagram can be compared to a road map with a line drawn through which the material passes. It not only depicts handling and transportation problems but also the obstacles encountered by materials in transit.

2. A flow process analysis chart is a simple means of collecting and tabulating in direct sequence, data about present material handling operations, including information on storage, temporary delays, transporting distance, time involved and type of equipment used for moving materials.

of materials handling. These give more information than a mere list of operations and equipment needed. They also show the direct relationship between operations and the movement or handling required.

After the present handling chart is completed it can be evaluated by answering four vital questions:

1. Can any step be eliminated?
2. Can it be combined with another?
3. Can it be simplified?
4. Can the sequence be changed to advantage?

This exercise helps in obtaining the best possible solution to the materials handling problem and a reduction in the cost. Organisation for materials handling is similar to that of any other departmental set up to achieve better productivity and profit. In such a set up, authority and responsibility must not be separated because the authority for determining methods and equipment must be accompanied by the responsibility for their successful operation. Authority for arranging handling lay-outs must also be accompanied by responsibility for the resulting flow of materials. Authority for establishing training programmes must be accompanied by the responsibility for their effectiveness. Results achieved from any organisation will be directly proportional to the degree of both authority and responsibility being placed with its personnel.

The overall material handling activities must be divided into functional segments for effectiveness. Adoption of one new method or system does not necessarily lead to a permanent solution to cost reduction and increased productivity[1]. An organisation must be flexible and capable of changing promptly and continuously to maintain maximum efficiency.

In planning materials handling equipment, the analysis starts with the design of the product and follows through to customers packing specifications. The materials handling supervisor acts as a liaison between design, production and sales departments for the various handling activities they require. To maintain an active material handling organisation on a continuing basis, training programmes must be organised. The aim of the programme must be clearly understood, training material must be prepared with both physical and psychological factors in mind and presentation must be vigorous, comprehensive and interesting.

Personnel assigned to various material handling jobs must carry out the plan of operation as developed by the materials handling supervisor. A good performance is directly proportional to the operators' understanding of the job to be done and their knowing how to do it in the most efficient manner.

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1. There may be many methods to do materials handling and transport, but the most effective and economic method or system must be chosen to reduce cost and increase productivity. See Stocker, Harry E., Materials Handling, IInd ed. New York., Prentice Hall, Inc., 1951, p. 173.

This in turn requires knowledge of basic work flow generated by receiving, production and shipping.

Principles and Policies.

The objectives of materials handling in industrial establishments will not be accomplished satisfactorily unless the work is performed economically and effectively using proper equipment. This means that it must be performed in consonance with the requirements of sound principle, policy and practice. These principles and policies govern the selection of equipment and the planning of material handling systems. The following guidelines help in the formulation of such a policy:

1) There should be a minimum movement of materials between departments and operations

2) Materials should be moved continuously at a maximum rate

3) Capacity of the handling equipment should be equal to the volume and rate of movement of materials

4) The size and characteristics of the load determine the size and type of the equipment to be used for economy

5) Production control is facilitated by dependable equipment that will move materials as scheduled

6). The amount of production by men and machines is increased by transferring the physical work of moving and position-

ing the materials to these equipment

7) The re-handling of materials should be reduced to a minimum

8) Overhead movement of work releases floor space for productive work

9) The equipment and method selected for handling a particular material should preserve the quality of the item

10) Standard equipment that has flexibility in particular material handling problem should be used whenever it is economical

11) Control on the use and movement of material handling equipment should be established to ensure its maximum economic use and

12) Material handling equipment should pay for itself within a period of time to ensure against loss through obsolescence.

The plant and equipment represent usually a large proportion of the fixed capital and the inventories with work in process represent a major portion of the current assets. Anything that will increase the rate of production or speed up the movement of inventories will tend to increase the rate of capital turnover which is an important basic factor in profit making. Every management usually has a keen interest in the possible contributions of materials handling equipment to this objective.

The cost of moving materials through the stores operations[1] is relatively an important cost factor in manufacturing and any major reduction in cost is only possible through materials handling equipment. Stores and manufacturing generally compete for the available factory floor space but the area required by the stores can be reduced by storing more materials on less floor space using materials handling equipment. It may be possible to handle more materials with less labour by storing direct materials in the same containers in which they will be moved into production or shipped to the customer.

There can be a separate internal transportation section within the stores organisation for the movement of materials from stores to operative departments as requisitioned so that material can be delivered where and when it is needed. The use of material handling equipment will result frequently in a substantial reduction in the labour cost of materials handling as the work is done faster than men by machines and the machines are not subject to fatigue. This saving in labour cost may be sufficient to pay for the equipment in a short time. The faster handling of materials result in lower interest charges and other handling costs. The machine hour rate may be higher than the wage rate of the man who runs it. A reduction in the amount

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1. It is estimated by the Society of Industrial Packing and Materials Handling Engineers, that most consumer products would cost from 40 to 100 percent more if modern materials handling equipment and methods had not been developed and that material handling costs account for 30 to 50 percent of the manufacturing costs.

of machine down time due to delivery failures or an increase in the amount of operating time of the machine due to a better handling of materials at the machine may make substantial cost savings. All these developments result in lower processing costs as well as lower handling charges.

Selection of the Equipment.

There are many kinds and types of material handling equipment used for different purposes. In some cases different kinds may serve the same purpose but not in the same way or with the same efficiency. The differences between types of equipment are significant to the extent that they condition its ability to move or position materials in a manner that will meet the requirement of a particular handling problem. Therefore the classification of the handling equipment can be helpful in selecting the right equipment for the right purpose. However the final selection is a matter of judgement and depends on what are the dominant functions that should be emphasised in a particular problem.

The following basic considerations are important:

1) Classes of apparatus: Cranes, hoists, conveyors and lift trucks

2) Nature of service performed: Lifting, hauling and transporting

3) Nature of the material handled: loose or bulk, pieces or parts, packages, bundles, boxes or barrels

4) Major fields of industry: mining, manufacturing, transportation and construction

5) Relative mobility of equipment: in a fixed path, travel in a limited area or travel over wide areas.

Some of the classifications of equipment for different purposes are as follows:

a) Hoisting machinery including cranes

b) Package handling equipment

c) Conveyors for loose materials

d) Industrial elevators

e) Trackless transportation and

f) Industrial rail transportation.

Hoisting machinery includes tramways, excavating equipment, hoists and cranes. They are used to lift and handle heavy and bulky materials. These may also be used in conjunction with some other type of handling equipment to transport such materials.

The package handling equipment includes flat roll, gravity roll and live roll, conveyors, the belt, slat and platform conveyors, mono rail chain conveyors, push bar elevators and chutes. Package handling equipment is used commonly in the continuous handling and transporting of specific materials in volume like castings, containers, goods that are packed and transported in barrels, crates, boxes etc. Conveyors for loose materials include skip hoists, screw conveyors, continuous

bucket conveyors, gravity conveyors, belt conveyors and pneumatic conveyors. These are used in industrial power houses for handling coal and raw materials which are in loose bulk form must be conveyed in these type of equipment. When large quantities of liquid materials are used they are usually conveyed by being pumped through pipelines.

Elevators specialise in the vertical movement of passengers and freight. Trackless transportation includes platform trucks, hand trucks, lift trucks, storage battery or gas trucks and tractors truck cranes and trailer cars. Their principal advantages are speed, mobility and flexibility. They can go almost anywhere within the plant and handle almost anything within the limits of their capacity. Devices that operate on tracks or in fixed position are less mobile and flexible. Industrial rail transportation includes locomotives, cable cars and hand propelled cars. They serve in large manufacturing plants, receiving docks and shipping terminals to move loaded cars away from shipping docks, railway sidings and for other similar purposes.

Material Handling Cost

From an average of 30 to 40 percent cost of any manufactured product, the material handling cost can go all the way upto 80 percent. Manufacturing cost comprises of direct and indirect costs, the former includes buying the raw materials, processing them and packing the final product while the latter includes everything else. Invariably a

large proportion of indirect costs can be traced to material handling which can be segregated into four categories:

1) Transporting raw material to the plant and shipping finished products
2) In-plant receiving and storage, movement of materials between processing operations and warehousing
3) Handling of material by machine operators, assemblers and inspectors and
4) Distribution of finished products which includes assembly of unit loads on trucks or other common carriers and delivery to area warehouses or to customers.

Because they are not identified as separate cost centres, they often turn out to accumulate avoidable costs. When cost centres have been identified, improving a handling system depends upon analysing direct and indirect costs.

Some of the important direct costs are:-

a) Cost of equipment and its operating costs
b) Maintenance and depreciation cost of the equipment and
c) Labour costs and the cost of space given for movement, storage and sorting.

Major indirect costs are:-

a) The cost of materials in store between processes
b) The cost of operator and machine down time
c) The cost of damage to goods and materials and

d) The cost of out-put lost through poor plant layout and bad material handling.

In order to reduce the direct and indirect costs, it is important to choose the right system based on reasons, rather than founded by habit. The correct system can be determined by work study methods. The standard procedure is to ask searching questions like what is being done, where is it being done, when is it being done, who is doing it, how is it being done, why is it necessary, what else could be done and what else should be done.

An analysis of materials handling economies requires an investigation of the cost factors that enter into both the present and the proposed methods. The savings to be produced by the new equipment should be at a rate sufficien to cover equipment maintenance, interest, depreciation, obsolescense, taxes and other fixed charges, in addition to a capital contribution to replace the equipment at the end of its economic life. Most companies feel that this kind of equipment must pay for itself within a relatively short time of 3 to 5 years. The time may vary however with the type of equipment and the nature of the installation.

This may appear to be an unreasonably severe test, as this equipment may have to operate under unfavourable conditions and must stand up to very hard use. Its utility is dependent on the characteristics and requirements of current manufacturing functions which are changing

constantly. The fact that manufacturers have always been aggressive in the development of their products increases the danger of obsolescense.

To control costs effectively in a material handling operation, it is necessary to know where to look for waste and inefficiency.[1] Certain activities may be inefficient, or they may affect other production operations in such a way that costs are increased. Therefore to analyse any cost saving step thoroughly, it is usually necessary to investigate the whole production operation. Some of the potential areas to search for cost reduction are:-

a) Idle machine time due to inadequate material flow

b) Production bottle-necks through lack of material flo

c) Rehandling of material several times

d) Large inventories which tie up capital and storage space

e) Poor space utilisation

f) Excessive maintenance

g) Inefficient use of labour and

h) Damage to materials.

Breakage and damage are frequent to materials trans-

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1. Material handling cost analysis will throw light into factors of cost which can be eliminated or reduced. Such analysis if done periodically, can help the materials manager to reduce cost of material content in the product. See Boyce C.W., Materials Handling, New York, McGraw Hill Book Co., Inc., 1951, p. 167.

ported and they form a high cost factor. Proper material handling methods and equipment can minimise this cost. Material handling equipment costs money. When a piece of equipment that costs rupees 50 per hour is used on a job that could be handled by a device costing rupees 10 per hour, the penalty is obvious. Therefore to avoid inefficient use of equipment, it should be selected depending on function and efficiency.

When it is decided that a company needs new handling equipment or a system, so much of information[1] than the initial cost is required to justify its acquisition. How much the new equipment will reduce the production costs, will the equipment pay for itself and add to company profits in the near future, are some of the matters to be considered.

A key factor in evaluating equipment cost is labour ie., how much direct labour is required to do a certain job with the old machine or system compared with the new. As employee wages and fringe benefits increase[2] industrial

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1. Table XII shows an equipment investment analysis in the areas of direct costs, indirect costs, indeterminate costs and other intangible factors. All these factors and information have to be evaluated before an investment decision is made.

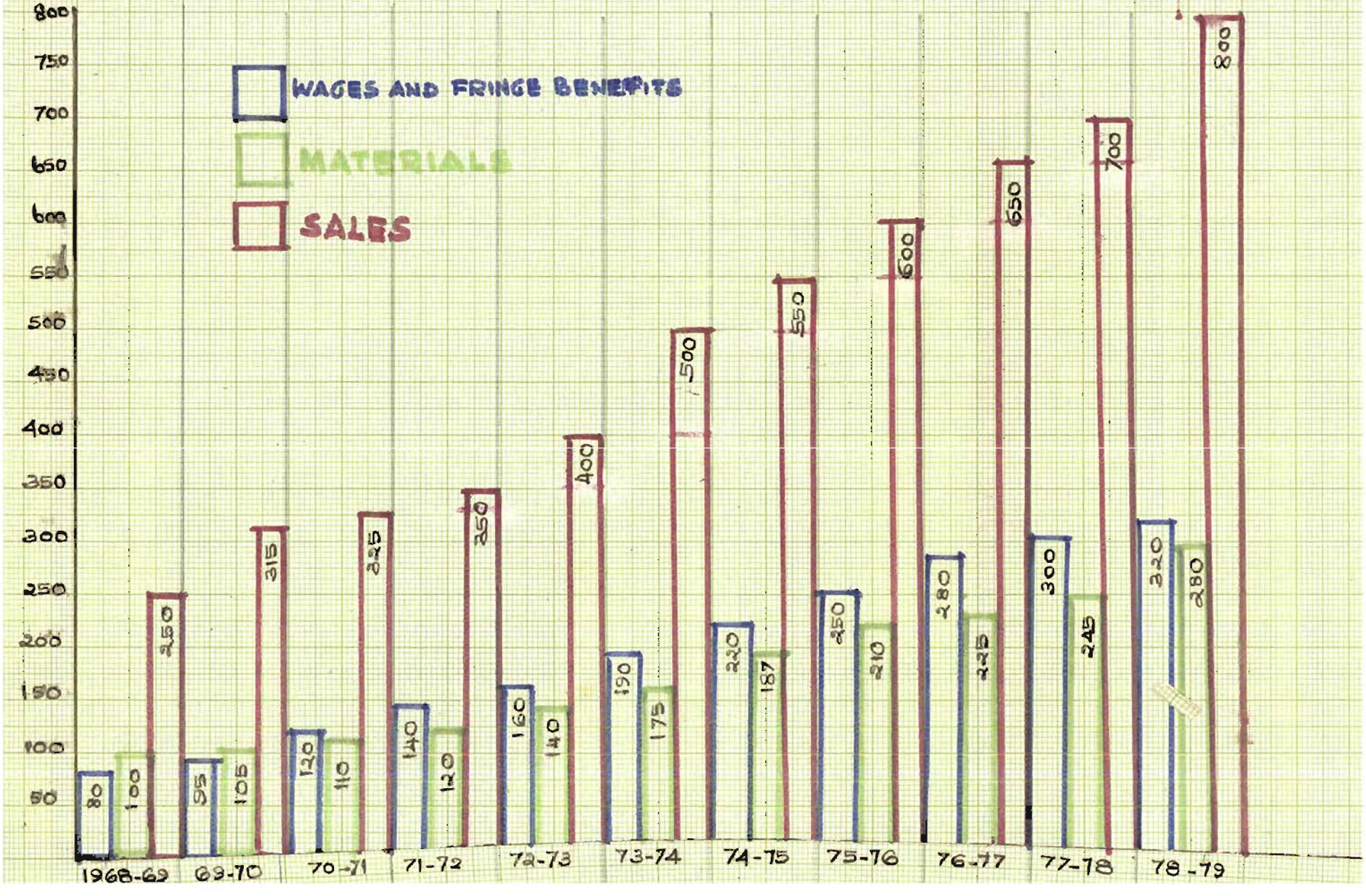
2. Figure XV shows pattern of growth of sales, material cost and employee wages and fringe benefits for the same number of employees during the period 1968-69 to 1978-79 in Hindustan Machine Tools Limited, Kalamassery. It is significant to note that the wages and benefits during the last 10 years have grown five-fold in this company.

EQUIPMENT INVESTMENT ANALYSIS

DIRECT COSTS	INDIRECT COSTS	INDETERMINATE COSTS	INTANGIBLE FACTORS
FIXED	**EQUIPMENT/METHOD**	**EQUIPMENT/METHOD**	**EQUIPMENT**
Depreciation	Space occupied	Space lost or gained	Quality
Interest on investment	Effect on taxes	Changes in overhead	Durability
Taxes	Effect on inventory value	Inventory control savings	Compatibility
Insurance	Value of repair parts	Inventory taking savings	Standardization of equipments and components
Supervisory Personnel	Demurrage costs	Production control savings	Flexibility
Clerical help	Downtime charges	Changes in product or material quality	Adaptability
Maintenance personnel	Changes in production rate	Life of job using equipment	Complexity
Other	**MANAGEMENT**	Reduction in physical effort	Safety
VARIABLE	Travel expenses incurred in investigation	**MANAGEMENT**	Rate of obsolescence
Operating personnel	Cost of follow-up	Lost production due to delay in installation	Manufacturer's reputation
Fuel, power	Re-layout costs	Percent of time equipment will be utilised	Availability
Lubrication	Training of personnel	Additional labour required for increased capacity	Postsale advice/service
Maintenance, parts and supplies	Overtime required to make up for lost production	Turnover of work in process	Availability of service
Maintenance labour.	Volume of work in process	Changes in line balance	Availability of repair parts
	Charges to operation after full depreciation	Trends in business volume	Quality of service.
	Handling returned goods	Trends in equipment costs	**MANAGEMENT**
		Improved work flow	Financial policy
		Ease of supervision	Economic survival goals
		Reduction in paperwork	Effect of future changes
			Plans for expansion
			Labour relations aspect
			Effect on morale
			Increased salability of product
			Improved customer service
			Pride in installation

FIGURE XV

GROWTH OF PLANNED SALES, EXPENSES ON MATERIALS, WAGES AND FRINGE BENEFITS IN HINDUSTAN MACHINE TOOLS LTD. KALAMASSERY. 1968-69 TO 1978-79



managers are willing to spend more and more on capital equipment that saves labour. In addition to labour another important factor, especially to management, is the time value of money. New machinery and equipment require capital and it is important to show that this capital is being used in a most productive manner.

Accumulation of cost data is generally done on an annual basis and is mostly compared to annual returns on the present value method. These costs include interest on investment, depreciation, insurance, taxes, periodic maintenance to the equipment, obsolescence risk and yearly cost of operation.

Evaluation of Materials Handling Performance.

A whole series of measureable goals must be set to provide performance targets for each department that contribute directly or indirectly to the main manufacturing goals. These goals tend to fall into two categories, the first indicating how well the department contributes to the effectiveness of the whole manufacturing organisation, while the second is a measure of how well the department functions within its own confines. It is better to establish enough meaningful targets than to devote much time for the precise identification of the nature of their contribution to plant efficiency.

Some of the areas for measurement of functional goals of materials handling are:-

a) Material handling personnel per 1000 factory employees
b) Percentage of time lost by direct labour in material handling
c) Ratio of total number of moves to total number of operations
d) Ratio of sum of production operation time to total manufacturing cycle time
e) Percentage of usable cubic footage usually occupied
f) Percentage of available time that material handling equipment is used
g) Percentage of floor space used and
h) Material handling costs as percentage of manufacturing expense.

Less number of personnel per 1000 factory employees, without affecting the efficiency of materials handling performance can bring down the percentage handling cost in relation to manufacturing expenses. Similarly all other factors like the time lost by direct labour, percentage of area occupied and the percentage of time the handling equipment is in use are capable of exerting great influence on the materials handling cost. Materials handling equipment tends to integrate men and machines in a productive unity and such an integration promotes co-operation which in turn reduces the operational cost.

The ability to develop good morale depends largely on

the direct relation between the interests of the employees and the service objectives of the organisation, for which leadership is probably the most important factor. All these factors contribute to good performance and reduction of material handling cost as a consequence.

These principles can now be summarised:

Material handling enables every material and part to be in the right place at the right time to help production and in this process, for every ton of finished product, several tons of materials are moved incurring 30 to 50 percent of the manufacturing cost. An efficient handling system can generate enough returns, improve the competitive position of the company, provide better service to the customers, obtain a higher rate of profit and achieve higher organisational morale.

In order to obtain the best results of cost reduction the factors of motion, time, quantity and space must be properly integrated. For efficient material handling, proper plant layout is important. This is done with the aid of material flow diagrams and process charts. From this the required quantity and type of equipment can be assessed to ensure minimum movement and handling of materials with the least damage to the items handled.

Handling equipments are selected based on the volume of materials, nature of service required and the relative

mobility of the equipment. Some of the most common handling equipments are cranes, hoists, excavators, package handling equipment, conveyors, elevators, track and trackless transportation gadgets.

Material handling cost in some industries goes upto 80 percent of the manufacturing cost from the normal range of 30 to 40 percent. These include direct costs of investment on equipment, its maintenance, depreciation and labour costs and indirect costs of machine down time, operator, damage to goods etc. due to failure of material handling. For an effective control of cost factors wastage and inefficiency in the respective areas have to be checked and reduced. Material handling economies can be improved by reducing machine idle time and production bottlenecks due to inadequate material flow, rehandling of materials, poor space utilisation, excessive maintenance, inefficient use of labour and damage to materials.

Comparison with Existing Practice in Industries Studied.

A scientific layout of plant reduces the material handling cost. Compared to foreign firms the plant layouts are not so scientifically done in Indian industries and especially in the public sector there is good scope for improvement of layout based on material flow and production process flow. Probably because of the easy availability, most foreign firms are able to obtain the most modern

handling equipments for their plant and are able to control their handling cost to a minimum. Most of the Indian companies have to import these equipments and those used are not the most appropriate ones for the jobs performed. Because of this reason the operating costs of these equipments are high and as a result the materials handling costs are also high.

Ratio of finished product to the total material movement is high in the public sector undertakings compared to the private sector companies and foreign firms. The loss from breakage and damage during handling is also high in the public sector undertakings as can be seen from Table XIII. Cost reduction techniques are more commonly employed in foreign firms and to some extent in private sector companies, but the effort appears to be totally absent in public sector undertakings. The comparative table gives among other things the system of layout in the organisations surveyed, the type of equipments used for material handling, ratio of total material moved per ton of the finished product, cost of materials handling, the percentage cost of damage and breakage during handling and the practice of cost reduction techniques of material handling followed in these companies.

Conclusion

Cost of materials handling is an important factor in the profitability of any organisation, especially in

view of the fact that it accounts for 50 percent or even more of the manufacturing cost. It is therefore essential to reduce this cost to the bare minimum by the use of modern tools and techniques of layout planning and use of appropriate equipments.

While considering materials handling economies, a scientific layout of the plant is important as the material flow and the cost of handling equipments can be reduced depending on a proper combination of process flow and material flow. Use of modern equipment reduces the operating cost, investment cost, wastage and losses from damage and breakage.

All areas generating and increasing material handling cost, especially the indirect costs have to be identified, checked and controlled in the public sector.

CHAPTER VIII

INVENTORY MANAGEMENT.

Introduction

Indian industry has a big investment in inventories which during 1974 stood at Rs.100,000 million in manufacturing industries and another Rs. 50,000 million in wholesale and retail trade. The effectiveness with which this capital investment is used may be as significant as that of the fixed investment in plant and equipment, although it is generally given much less attention in industrial planning.

Inventory control is the function of constraining, regulating and co-ordinating the procurement and disbursement of materials in accordance with the manufacturing and inventory plans. Inventories are controllable and there are systematic ways of going about the job. The main yardstick to measure the performance of inventory control is the "turnover" which is a measure of output divided by the inventory value at the particular point of time, usually at the end of each financial year.

This chapter deals with the nature of inventory, the most effective organisation for inventory control, aims and objectives, functions, methods of control and evaluation of inventory performance. These essentials have then been compared to the actual practice existing in industrial organisations studied and conclusions have been drawn.

The Need for Inventory.

Industrial machinery is very costly and it is highly uneconomical to allow it to be idle. So is the skilled labour which cannot be hired and fired as one likes it. Along with it modern requirements are urgent and cannot wait and the cost of leaving machines and labour idle is greater than the cost of storing materials. It is therefore economically advantageous to hold inventories to the required extent which enables the company to minimise idle time of factors of production caused by the shortage of materials and spare parts. At the same time, care is to be taken to keep as low as possible the investment in inventories, its carrying cost and obsolescense losses.

Inventory control is one of those functions involving numerous planning and control activities with far reaching effects on company profits. Business on one hand faces a continuing squeese on profits and on the other development of quantitative analytical techniques and electronic data processing permitting analysis of inventory cost problems. These two phenomena combined, form inventory control into a critical function requiring professional and managerial skills. A study of company balance sheets show that 20 to 25% of the invested capital is blocked up in inventories. Added to this, every manufacturer incurs inventory carrying costs from 20 to 25 percent of the average inventory value.

This tremendous investment in inventories[1] at the finished goods level is essentially to provide adequate service to an increasingly complex, demanding and georgraphically dispersed group of potential buyers.

At the production level it is for the most efficient, lowest cost way of operation. There are other reasons for having inventory investment probably as a hedge against anticipated price increases or as the result of past errors in judgement leading to obsolete stocks. The really significant reasons, however, are customer service on the one hand and production efficiency on the other.

An efficient inventory management can substantially reduce costs but the effects of poor management will not be clearly visible in the operating statements of the company as these are indirect costs, dispersed and hidden throughout. No company has access to unlimited capital and with most of them money is scarce. New and replacement facilities, raw materials, finished products, credit to customers and all such other demands on money compete for the available resources. Careful management of inventory is therefore necessary to have adequate stocks of raw material supplies and finished goods, to provide the desired level of customer service.

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1. Investment in manufacturing inventories refers to the value of materials or supplies by individual items or classes of materials that are in stores or in process between any two points in the flow of production.

Inventories are of four types:

1) Production inventories: raw materials and parts
2) Maintenance and repair materials and operating supplies
3) In process inventories and
4) Finished goods inventories.

The inventory includes a safety stock or cushion[1] depending on the pattern of receipts and shipments and the desired level of customer service. In case of production inventory raw materials and components become a part of the product while the maintenance and repairs items are consumed in the process of repairs or manufacture and do not form part of the product like oil, soap, tools and other consumption materials.

The real problem is in determining the inventory level at which money invested produces a higher rate of return than it is invested elsewhere. Various departments have varying reasons for the inventory. The sales manager and the production manager would agree for a higher inventory for different reasons. The former would like it for quick delivery to customers while the latter prefers it for flexibility in production and for reduction of productio

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1. Safety stock is a cushion to meet the unexpected consumption requirements during the procurement lead time or to cover delays in the incoming supplies. Generally this is proportional to the square root of the lead time consumption. In this connection see John F. Magee and David M. Boodman, Production Planning & Inventory Control op. cit., p. 283.

down time costs. Finance is scarce and a low inventory could make the working capital available for other uses and the carrying costs drop proportionately with the fall in inventory level. The procurement will be easier and cheaper for a low inventory as only few orders of larger quantities need be placed.

For all types of inventory, the approach to inventory control is similar to that of value engineering[1] which seeks to identify the minimum cost to perform the essential function and to cut out all the rest.

Organisation for Inventory Control

Modern manufacturing management generally assigns inventory control function as an integral part of materials activity. Like materials management itself, inventory control is functionally inter-related to production control and other allied departments. Sofar as the effectiveness of plant operation is concerned, the determination of ordering policies and inventory levels at all points in the process is inseparable from the more general goal of production which is to see that the scheduling, ordering, despatching, material handling and all other functions of the business combine to produce on time deliveries at the lowest practical total cost.

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1. Value engineering is a cost reduction technique based on critial examination of the function of any part or material with a view to possibly eliminate, modify or substitute and reduce all unnecessary cost. See baily P.J.H. Purchasing and Supply Management, op. Cit., pp. 293 - 304.

Of course there can be many variations on this organisational arrangement depending on the size of the organisation and the type of business.

A form of decentralised inventory control can be used where there is a physical decentralisation of shop operations by production process or product line. In such a case the materials manager co-ordinates the inventory control at least from work-in-process through assembly. In deciding a better form of organisation for inventory control function, the following questions may be asked;

1) Where is the inventory now, by type and physical distribution?

2) Who is responsible for it, does he know to what extent is he responsible, does he know its value and in detail how it is controlled?

3) How is the responsibility for production control and inventory control assigned?

4) Are certain types of inventory such as raw material and finished goods separable?

5) Would better control result from assigning the inventory to a product or process unit, for example, paint to the paint shop or bar stock to the automatic screw machine section?

The best answer or combination of answers is that which will give clearly defined and measurable responsibility to the person most able to do something about the results.

Functions and Responsibilities:

The function of inventory control[1] is "to supervise, directly and through sectional heads, the activities of the department engaged in ensuring that stocks of goods are adequate but not excessive for operating requirements, in accordance with established practice, policy and procedures, to provide a basis for recording inventories and movement of goods in the most economical manner consistant with company's procurement and accounting requirements, to determine the most economical quantities and varities to be carried, to promote rapid turn over and minimise the investment in inventories, to reduce taxes, insurance, storage and handling expenses and minimum losses from obsolescence and physical deterioration ensuring an available supply of materials when needed to facilitate production operations, minimise cost of idle time and render better service to customers."

The following specific responsibilities of inventory control[2] are to be fulfilled through delegation of responsibility

1. Job specifications of a supervisor responsible for inventory control, prepared by Gordon H. Evans, Managerial Job Descriptions in Manufacturing, Research Study No.65, American Management Association, New York, 1964, pp. 304-305.

2. The work of inventory control is a staff function of constraining, co-ordinating and regulating the work of procuring, storing and disbursing of supplies in accordance with inventory and manufacturing plans.

and by initiation and execution of action in keeping with the authority already vested and as per the applicable company policies and procedures:

1) To control the delivery of material requirements as to time and quantity and the purchasing, receiving, storing and handling of material, to store finished parts, ship finished products and provide all records necessary to keep track of these materials, to establish inventories of the raw materials and parts items to be carried in stock to set up order points for various items based on purchasing and manufacturing lead times in accordance with specified practice, to requisition items when available balance falls below order point,

2) To prepare reports on inventory activities

3) To schedule and conduct meeting to review current status of production schedules and work jointly with the departments involved to overcome any problems

4) To provide internal transportation between warehousing and production departments as needed to maintain production schedules

5) To be constantly on the alert for opportunities to improve methods, materials and procedures to effect economy in the operations of the departments and divisions. To prepare and submit recommendations outlining the features and anticipated savings for approval

6) To train, instruct and assign work to employees. To administer the company personnel policies within the department, enforce safety and health regulations and take prompt action on employee complaints to encourage good morale

7) To plan and schedule work and make effective use of employees' time. To keep operating expenses within the budgeted allowance.

In order to perform the above responsibilities, normally the following authority is delegated in keeping with all established policies and procedures:

1) To hire competent personnel and recommend salary rate or employee status changes in the department

2) To penalise or discharge any employee in the department who is guilty of acts against rules and regulations of the company, which calls for such penalty

3) To settle complaints or grievances in the department within the limits of company personnel policy and labour contract terms.

Aims and Objectives.

Inventory has a high cost and involves heavy investment. Therefore a careful assessment of the benifits afforded by it, is necessary before its size and investment is decided.

Inventories make smooth and efficient manufacturing possible. Purchased parts can be planned and procured which in turn gives opportunity for vendors to plan, produce and deliver those on order as per schedule. These will be available to customers from stock at lower direct production costs, lower material handling costs and lower purchasing costs, contributing substantially to the savings.

For maximising the savings, the inventory function has to maintain a close relationship with connected departments like scheduling which supplies the inputs that determine ordering action, purchasing and shop operations which are on the receiving end of those orders, product engineering which controls the bills of material, manufacturing which controls the process planning and with the management which may have much to say about both customer service and inventory levels resulting from the ordering action.

With the growing use of computers for inventory control, this control function is fast becoming less of clerical in nature, which it has largely been in the past and more of a logical analytical activity. It must then be fully cognisant of the manufacturing and distribution activities of the firm, so that its policies can be designed to achieve one of its primary goals; maximum customer service with minimum inventory investment. For this the inter-relationship with other departments must become more efficient and harmonious. The material requirements

must be precise, stock status must be accurate, inventory and customer service goals must be stated and measured rationally. As this happens, the importance of scientific inventory control will more and more be recognised as a key function of the business.

Inventory level is a dependent variable, merely as a result of many other activities, each of which has a logic of its own. Some of these factors are usage pattern, demand and production schedules, changes in manufacturing and product variances and industrial relations. A realistic assessment of optimum level for each item of the inventory is made from the pattern of average past consumption, coupled with the procurement lead time. The controls needed to maintain more or less the optimum inventory levels are budgets, business forecasts and operational controls. Budgets describe in detail the expected operating results for the year through the profit and loss statement and the balance sheet of which inventory is an important item. Expected changes in inventory during the budgeted period must therefore be planned carefully to meet the cash needs accurately. Often the actual output may not match the budget plan but the budgeted inventory turnover should be the controlling factor and deviations from that should be controlled as closely as any other budgeted figures.

Business forecast[1] is another principal control tool for inventories. Many companies make a monthly short range forecast as a supplement to the annual budget. Changes in inventory during the forecasted period must be recognised and the operating plans have to be corrected. The simplest way to relate the inventory forecasts to the operation plans is through the standard device of material, labour and overhead. The variations in each of these factors for the past 3 months are compared to the forecast for the next 3 months. The advantage of this information is that the implications of those changes are immediately evident. If the labour is forecasted to change in a certain way, actions in the plant must be designed to adopt that change and if incoming material is forecasted at a certain rate the consumption pattern may also follow the same. In this way inventory control can be considered as something which interacts with and partly determines other elements of the business not merely as a result.

Operational controls are detailed and operating instructions developed on the basis of analysis or experience and assumed to work in general. If a substantial amount of inventory is involved, it should be verified that the rules are not just customary but have good reasons behind them.

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1. Business forecast refers to prediction of business phenomena during some future time periods. It may be concerned with general economic, industry and company sales and related business conditions. See Landy Thomas M., Production Planning and Control, New York, McGraw Hill Book Co., Inc., 1950, p. 227.

But if they make sense, the controls based on them have the great advantage of being easily understood and acted on. Some examples are:

1) A power plant must have 30 day's usage of coal on hand always
2) Fabricated steel should be made available exactly one week ahead of assembly,
3) Twenty finished machines must always remain in stock.

Once these kinds of rules are established, control reports can be built to monitor them.

Inventory Planning

The operational plan states how much of each class of materials should be carried in inventory during a period, including what should be the quantities at the beginning and ending together with the rate of turnover to be achieved. The plan may be worked out by the procurement planning and research section and execution would be co-ordinated by inventory control. A maximum turnover rate and a minimum absorption of working capital are desirable, with no interference to the operations due to supply failures. Protection against inflation of material costs may be foreseen when inventory needs are planned farther into the future.

The methods of inventory planning vary with the size of the company and the nature and size of the various inventories. The simple use of turnover ratio has a leverage effect on inventories. A policy for inventory planning and

control is merely a rule for the guidance of the supply department to aid in determining the extent to which the demand for or usage of a particular item should be covered by procurement.

Material standardisation[1] is important in inventory control. Closeness and accuracy are a function of the completeness and precision with which standards have been developed. Reasonable economy and effectiveness in manufacturing are impossible without control on the kind, size and type of items used in inventories. Without control there is danger of excessive investment in inventories, low turnover, loss from obsolescence and spoilage and excessive variations in inventory and operations. Adequate standards are as important for the management of materials as for any other phase of management.

The principal objective of every business man may be a profit but the objectives of the business organisation are customer values and service. Every product conveys to the customer the utilities that enable him to satisfy his needs and desires. Material standardisation has its genesis in the product because parts, assemblies or finished products are manufactured or purchased for stock. As a

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1. A standard is that which is established by authority, custom or general consent as a model, criterion or rule of measurement. Material standards are criteria that enable us to proportion and relate functions, physical factors and characteristics to suit mass production and interchangeability.

consequence every organisation has to adopt simplification and standardisation of their products, raw materials and supplies, eliminating excessive variety.[1]

The principal phases of materials standardisation are inventory analysis, development of classification of materials, simplification of inventories and development of material specifications. For inventory analysis, all items carried in stores regularly are listed, checked as to who uses them, for what purpose, how much, where, feasibility of eliminating some and extending use of some for additional purposes are then examined. The classification will include raw or direct materials, indirect materials and supplies, processed materials, component parts, finished goods, salvage stores and unclassified items. This analysis and classification bring to light opportunities for simplifying items, based on their consumption. Low consumption items are eliminated or such requirements are added to the next nearest size or type available in the classification.

Material specification determines the characteristics and attributes it should have for the particular purpose and is useful in designing, engineering and procuring departments. For easy identification of items codification is provided through numerical and mnemonic systems. Inventory standards

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1. Standardisation has great economic advantage for the buyer and seller. See Eidmann F.L., Economic Control of Engineering and Manufacturing, New York, McGraw Hill Book Co., Inc., 1951, p. 317.

will not maintain themselves and may deteriorate if no one is responsible for it. The inventory planning has to take up this responsibility.

Methods of Inventory Control

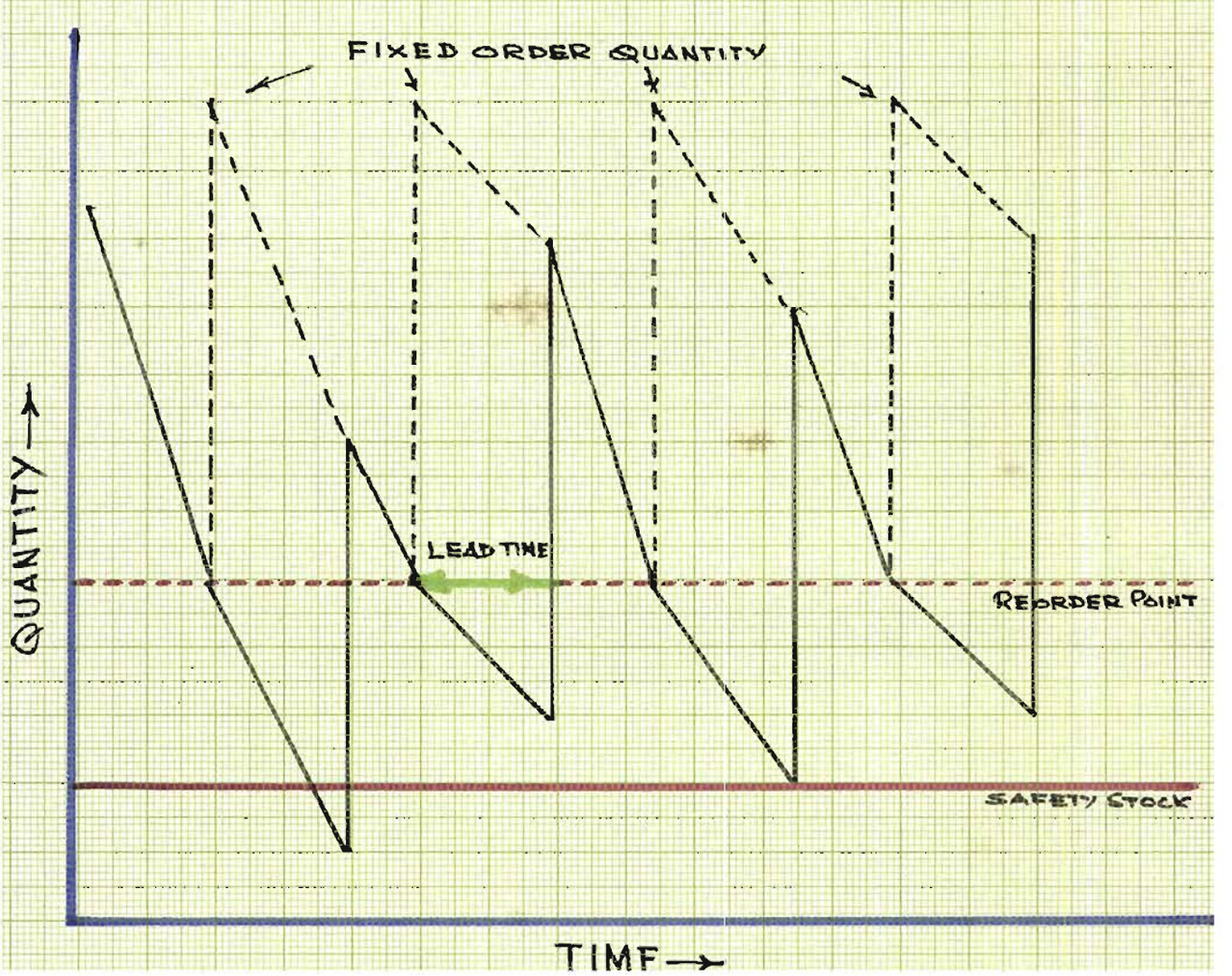
There are many inventory control techniques that may be applied depending on the level of service required, the type of product and the value of annual consumption of the item. In every case however, there are two factors essentially to be considered, when to order and how much to order.

There are two different systems used to determine when to order, the order point system and periodic review system. The ordering action takes place in the former when the stock on hand falls below a pre-determined level, usually called the order point. Replenishment orders may be placed for either fixed or for variable quantities. This system is illustrated in Figure XVI. The reorder point is so computed that the usage during the lead time of the order will cause the stock level to fall to a planned minimum and when the order quantity is received stock level will come to within a planned maximum level.

This system has the advantage of using the economic order quantity, purchased only when it is needed and by planning maximum and minimum level, the total inventory level is kept low. The limitations of the system are that it can function only with stable consumption and definite

FIGURE - XVI

ORDER POINT SYSTEM OF INVENTORY CONTROL



lead time and if posting is in arrears or stock balance is incorrect the system will not work and there will be shortage of materials.

There are three variations of the order point system:

1) Two bin system: One bin contains active stock equal to the difference between maximum level and the order point and the other reserve which is equal to the lead time consumption. When the open stock is over a replenishment order for a pre-determined quantity is placed. This method is most suited for low value hardware items having consistent usage.

2) Mini-max systems: In this system, stock is always brought back to a pre-determined maximum figure when the minimum is reached. Order quantity is not fixed and like two bin system this system is most suited for low cost high volume parts with consistent usage.

3) Perpetual inventory system: Inventory status records are maintained so that closer control may be exercised over the ordering of material. All transactions are posted to the inventory record so that judgement may be used in determining when ordering action is to take place and what quantity is to be ordered. The perpetual inventory system allows review of all disbursements and requirements to screen out unusual

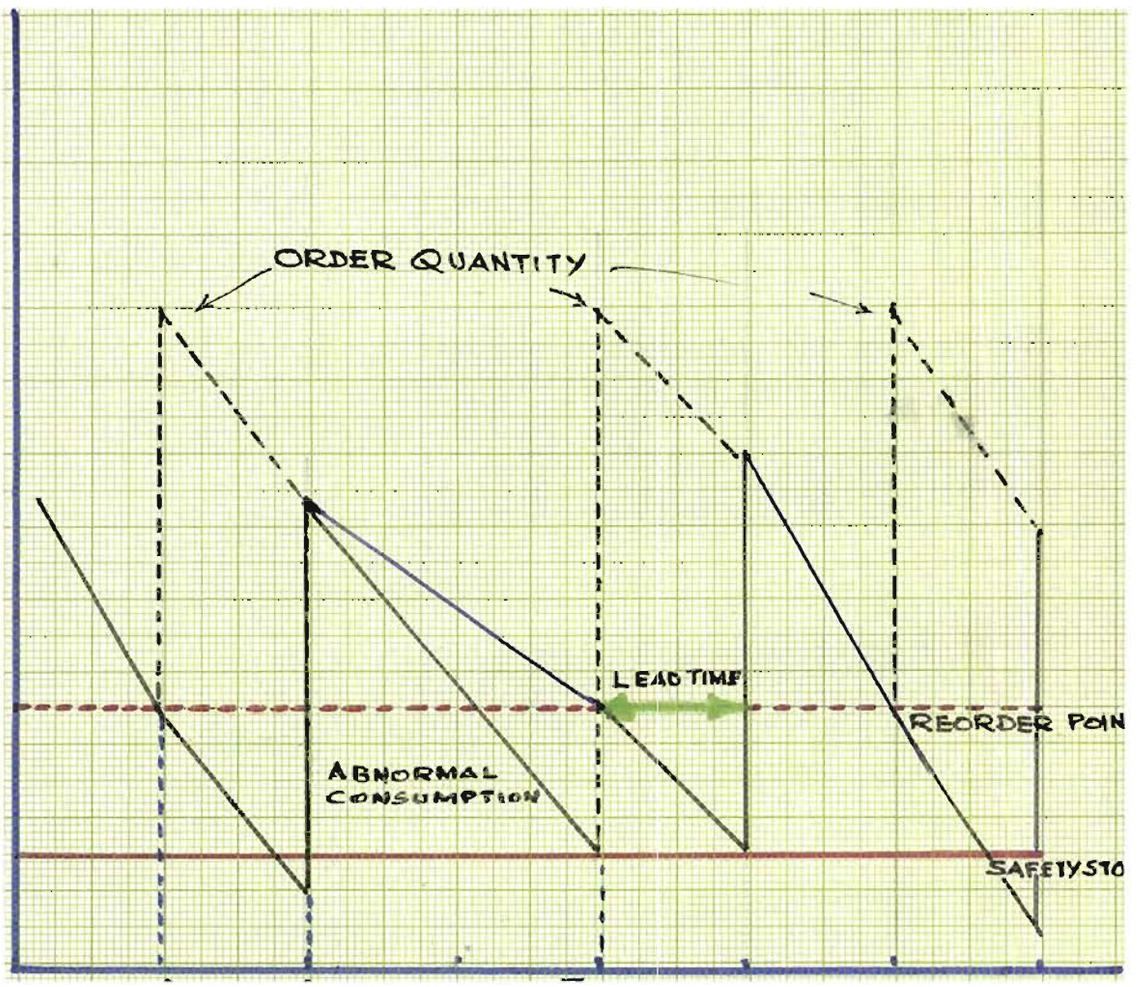
requirements and provide information for close control of inventory. However for such a system to be effective, it is necessary to process a large number of requirements quickly and accurately. As all transactions must be posted promptly, this system is more expensive to operate than the two bin system.

In periodic review system the inventory is reviewed at a fixed time interval of fortnightly or monthly rather than when the material reaches a specific level as in the order point system. A graphic representation of this system is shown in Figure XVII. When the stock level is not enough to sustain the production until the next scheduled review, an order is placed to replenish the supply. The frequency of review varies between ABC items, specific production schedules and also depends on market conditions.

Similarly order quantities also vary for different materials usually chosen for pre-determined coverage of periods. Stock levels are monitored by physical inspection, review of inventory cards or by automatic computer surveillance. For verifying actual balances from bin cards they have to be posted uptodate. This method is more suited where the items have a long delivery period.

The disadvantages of this system are:

1) It compells periodic review of all items, where some items may not have been used or used more before the next review or even exhausted, so that


ORDER QUANTITY
LEAD TIME
REORDER POIN
ABNORMAL
CONSUMPTION
SAFETYSTO

a minimum balance will have to be kept.

2) The system calls for inflexible order quantities, i.e., no optimum economic order quantity for each item, based on cost, usage or internal costs and hence frequently there will be an increase in the total inventory costs.

3) This system tends to peak the work load around review dates, and the review dates have to be regulated to smoothen the work load.

Generally the cycle time is one year and this works ll for production materials and components, specially be imported or having long lead time.

Three types of review systems are as follows:

1) Min-max system: In this system the level of materials in all bins is reviewed periodically and orders placed to bring the stock level back to the maximum predetermined level. This system is again applicable to low cost high volume items that have consistent usage.

2) Fixed order quantity system: In this type, all ite are reviewed periodically and in contrast to the min-max system, a fixed quantity is ordered each time. Often the quantity to be ordered is calculated based on economic order formula.

3) Materials planning and control system: The basic

difference between this and the perpetual inventory type mentioned earlier is that where in the previous system all requirements are grouped or summarised as received, while in the material planning system requirements and orders are handled on a time phased basis, as shown below:

Time-Phased Handling of Requirements

Time period	1	2	3	4	5	6	Total
Requirements.	100	50	50	0	200	150	550
On order.	200	..	..	200	200	200	800
Net available.	+100	-50	-50	+200	0	+ 50	+250

In this system the requirements are shown as needed in the time period in which they are due to be despatched or withdrawn from stock, orders are shown in the time period in which they are to be delivered to stock. The net requirement is calculated for each time period. The requirement for each time period may be either actual or forecast requirement or a combination of both.

This system is of particular advantage where changes in productmix can be predicted in advance. It is also advantageous where short delivery requirements are coupled with a very restricted inventory. With accurate forecasting, it is possible to schedule into stock the quantity

that will be needed in each time period rather than drawing from a larger order quantity over a period of time. This system differs from the perpetual inventory system because in the latter requirements and orders are shown in a summarised fashion and not netted in each time period.

In the materials planning system, requirements are processed to show the exact quantities due in each time period or requirements and orders may be accumulated for some period of time such as one year. This system of accumulation is as follows:

Accumulation System for Requirements and Orders.

Time Period	1	2	3	4	5	6
Requirements.	100	150	200	200	400	550
On order.	200	200	200	400	600	800
Net available.	+100	+50	0	+200	+200	+250

The accumulative system is advantageous in situations where there are a large number of transactions to be processed and where delay in processing is likely. As all production and shipments are on an accumulative basis, the need for a sharp cut off in handling data is reduced. Instead of being concerned about clearing the records for a specific lot of material and the attendant danger of duplicating production if the records are not cleared,

production may be based on completion of an accumulative quantity by the end of each time period.

The accumulation of inventory is related to the order quantity and therefore it is essential to plan most economical quantities for ordering. Fixed and variable quantities are ordered depending on the system followed. In fixed order quantity system the order quantity is determined on the basis of judgement or desired monthly coverage or one of a number of formulas may be used. These formulas are the economic lot size ELS or economic order quantity EOQ which determines the order quantity that results in the least total cost. In its evaluation, the annual usage, set up or ordering cost and inventory carrying cost percentage per year are taken into consideration. Fixed order quantities are most commonly used in conjunction with the bin reserve and perpetual inventory systems.

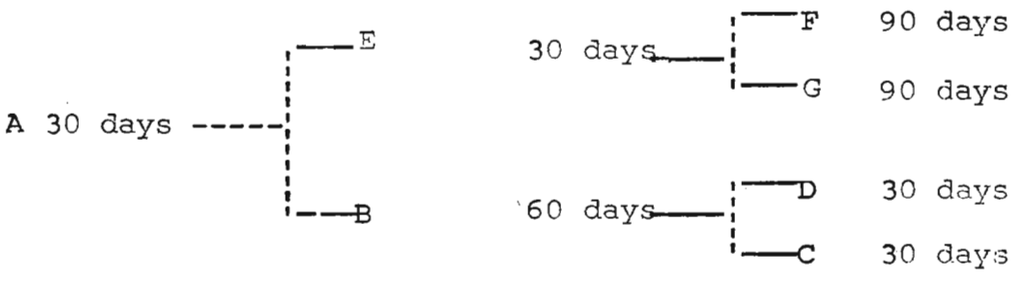
The lead time estimate used for EOQ and order point calculation is often based on an estimate of sampling of given group of parts. From this sample, a statistical analysis can be made to determine the variation in lead times that can be expected and must therefore be taken into consideration to prevent more stock outs than anticipated.

In addition to the lead time, the value of the parts to be controlled should be taken into consideration. It is not reasonable to spend as much time on a hardware item

as on a high value item. Inventory items are accordingly grouped so that the control effort and special attention may be applied to high value items. A typical distribution of items is as shown in Figure XVIII. This value-wise distribution is known as the ABC analysis, which allows concentration of control effort on those items that are the most significant. This analysis is made on the basis of annual usage and value of each item and then ranking them in a descending order.

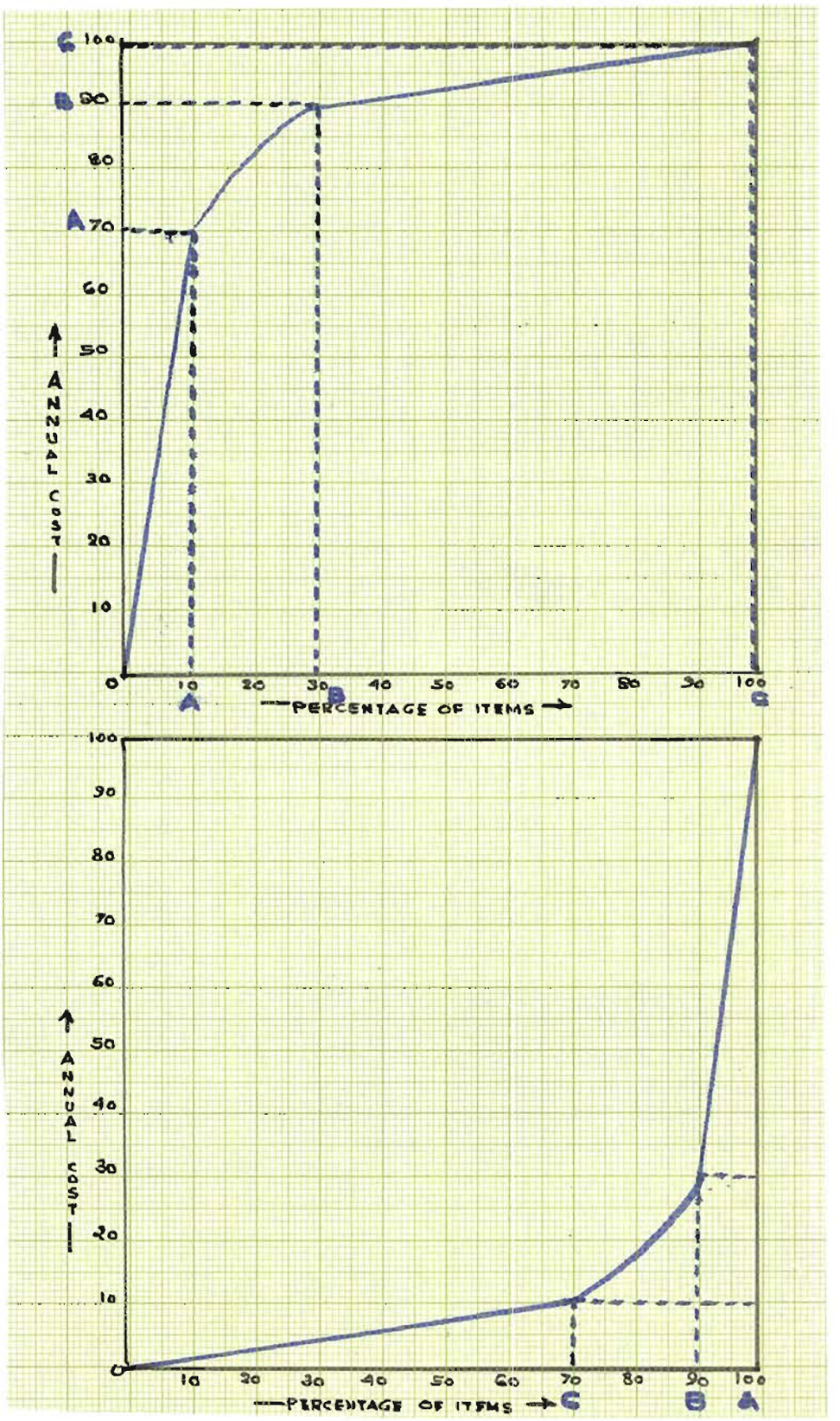
After the lead time has been established, the product and part lead times must be reviewed to determine the level and type of inventory to be controlled. Lead time analysis of a three level product consisting of parts, sub-assemblies and assembly is as shown below:

Lead Time Analysis of a Three Level Product.



Product A is represented by chain A + E + F = 150 days.

The following table indicates the different levels of inventory that are required to satisfy different customer delivery times.


C
B
A
100
90
80
70
60
50
40
30
20
10
0
ANNUAL COST
10
20
30
40
50
60
70
80
90
100
A
B
C
PERCENTAGE OF ITEMS
100
90
80
70
60
50
40
30
20
10
0
ANNUAL COST
10
20
30
40
50
60
70
80
90
100
PERCENTAGE OF ITEMS
C
B
A

Desired customer lead time	Stocking level	Inventory examples
Off the shelf		Finished goods stocked
Less than 30 days Less than 60 days	A E, B.	Major sub-assemblies stocked to allow final assembly of products.
Less than 90 days	F, G, B.	Detail parts.
Less than 120 days	F, G, D, C.	Raw material and purchased parts
More than 150 days	No inventory required	All items ordered as required.

In developing the estimated manufacturing lead time, the elapsed time at each point in the process must be considered.

Variable order quantity systems are of two types: The first is part of the min-max type of system in which the order quantity although variable, is determined by the pre-determined maximum to which the stock level is to be raised.

The second type of variable order quantity is found generally as part of the material planning type of system. Items are planned as and when orders are received, that is on 'one for one' basis or grouped over a period of time. Each customer's order is scheduled and ordered independently

of all others, except in the case of a job shop where several repeat orders are avoided by consolidating them.

If items are grouped over a period of time for ordering, requirements are summarised at some control level and combined for scheduling and ordering purposes. If orders are combined this way, it is possible to control the loading of the shop more carefully and to vary the size of the order depending on the value of the item, expected or forecast orders and the like.

To determine the most appropriate control technique, the methods and calculations by which materials are to be ordered and scheduled, the purpose that the inventory is to serve must be defined. The need for better customer service must be balanced against the cost of carrying the necessary inventory. In determining the type of control to be used however, specific attention must be given to the lead time and the value of the item to be controlled.

In most manufacturing operations, there are three types of lead times: (1) The desired time for delivery of goods to the customer, which must generally be defined by marketing or sales in the light of competition (2) The total manufacturing lead time, which is the sum of all the individual cycle times, plus waiting times for all operations or parts that must be produced after an order is received and (3) The individual piece part lead time which is the estimated time to produce a given part.

The selection of some of the inventory control techniques based on the lead time requirements and the value of the item to be controlled is as shown below:

Appropriate Inventory Control Techniques
Based on Lead Time and Item Value.

Value of item	Delivery	
	Off the shelf	Lead time allowed
High (A and B)	Perpetual inventory	Materials planning
Low (C)	Bin reserve or min - max.	

As shown, for high value items some form of accurate record keeping for inventory control is required. For high value items which need not be delivered from stock and for which lead time is allowed, the material planning technique is usually used, because it allows greater flexibility and control in ordering and scheduling material than does the perpetual inventory system.

For low value items, regardless of the delivery requirements, it is usually more economical to order and control material without counting each receipt and disbursement, to use bin reserve or min-max systems. In the application of inventory control techniques, prediction of future usage is a key area to be correctly assessed. A fair prediction of this usage can be generated in two different ways.

1) Extrapolation of actual past usage by moving average or exponential smoothing techniques.
2) Forecasting future demands based on known customer demands, specific jobs and judgement.

In practice, both techniques are usually combined in the determination of the usage which is the basis for EOQ and ROP calculations, if material is to be delivered off the shelf.

In situations where the materials planning concept is used for high value items, the specific time phased requirements scheduled in the future may be the basis for forecasting usage for low value items. In this way the forecast of future usage has a base of actual requirements and should tend to be more accurate.

In situations where the delivery lead time conditions require delivery off the shelf, the inventory control point for an item must be the completed item, so that it may be despatched immediately as orders are received. However in situations where some lead time can be allowed, where the material planning type of system is used, inventory can often be controlled at some lower level. Thus depending on the lead time requirements, material may be held as sub-assemblies ready for final assembly, held as parts ready to go into sub-assemblies, or held in the form of bar stock and purchased materials. Generally, the further down in the line of requirement of materials, control point is

established, the greater will be the flexibility in the use of inventory and the less will be the overall inventory requirement.

In fact, in all operations where it is possible to provide many variations in the finished product, the establishment of the control point is one of the basic manufacturing decisions to be made in putting an item into production. After the control point has been established, customer orders are exploded down to the control point. Parts requirements are then summarised at the control point for periodic order action. In materials planning systems, orders will be compared with forecasts at this point and schedules adjusted accordingly.

After the specific order quantities have been established purchase or production orders are released. In an order point system the order is released immediately showing the required completion date. In materials planning systems, orders are held until the required starting date which is the completion date less lead time.

Fundamental to the problem of inventory control is the identification and classification system.[1] In many

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1. Codification of items enables easy identification and eliminates duplication. This together with value-wise classification helps inventory control to a great extent. See Holt Charles, Planning Production and Inventories, Englewood Cliffs, N.J., Prentice Hall, Inc., 1960, pp. 167-171.

cases, items are identified in numerical sequence with little logic in the assignment of numbers. This tends to aggravate many inventory problems. The ideal system should allow identification of similar manufactured items, basic materials and finished items that use the same basic assemblies. In the numbering system, where the piece number which indicates the product and the basic component used in the assembly allows flexibility in the use of materials and inventory control.

Use of computers is ideally suited for much of the work in the inventory control area especially:

1. Maintaining perpetual inventory records
2. Calculation of order quantities and order points
3. Calculation of average usage, including use of exponential smoothing techniques for forecasting requirements and
4. Simulation of the effect on inventory of specific actions.

Calculation of inventory investment is based on forecast of production and sales. The computer can be used to store and manipulate the information needed to create a viable inventory information system. Some of the information that can be put on a computer oriented inventory system are inventory status, lead time, unit cost, annual usage, order point, orders outstanding, due date, completed orders, slow moving items and actual balances on hand.

In the computer oriented system there are several benefits available. One of the most important is the use of exception reports to pinpoint areas where action is needed. Typical of these reports are:

1. Order point reached reports
2. Date of delivery or material overdue from vendors and
3. Date of last usage report, in case of slow moving items.

In the installation of computer oriented system, great care must be paid to the accuracy of the data used and to the accuracy of the transactions that take place to update the records. If the accuracy of records is not kept up the improvements in efficiency gained through the high speed computer may be lost.

Evaluation of Inventory Performance

The following are the main areas where evaluation of performance can be made for the inventory control function.

1. Ratio of inventory control employees to total plant employment
2. Inventory turnover rate
3. Average inventory value
4. Surplus inventory
5. Obsolete inventory
6. Cost of holding inventories
7. Estimated material cost versus actual
8. Percentage of items for which no receipts or

distribution record was made

9. Percentage of stock outs
10. Scheduled versus actual levels of inventory for raw materials work in-process and finished goods and
11. Levels of safety stock.

Improvements in all other areas of performance will help the inventory turnover to improve which is the most important factor of inventory control.

These basic principles and essentials can now be summarised:

The need for inventory arises from the fact that the cost of keeping factors of production idle is more than the cost of keeping adequate stocks. Therefore the essence of inventory control is to assess how much to order, stock and consume, without increasing costs unduly. To perform these responsibilities satisfactorily, the organisation of inventory control must be provided with the freedom of action and accountability for the results.

In planning inventories, standardisation, simplification and specifications are important. The two main methods of inventory control are order point and review system to ascertain when to order and the economic quantity helps in finding how much to order. Different lead times play an important role in the inventory control function. The main areas where effective control is required are in the number of persons employed for inventory control, average

inventory value, surplus and obsolete items, carrying cost, levels of safety stocks, number of stock outs and the rate of inventory turnover.

Comparison with the Practice Followed in Industries Surveyed

Out of all the companies studied, the organisational authority for inventory control is vested with the materials management department in case of all foreign firms and most of the private sector Indian companies. Out of twenty public sector undertakings studied, ten of them have similar arrangement while in others this function is attached to the production planning or production control department of the manufacturing division. The necessary freedom of action and accountability of the personnel is clearly present in foreign firms and in the private sector while it is not so in the public sector as can be seen from the Table XIV. This table also contains details of average inventory value, inventory turnover rate, surplus and obsolete inventory, carrying cost and safety stock levels. Average inventory, surplus and obsolete stocks and safety stocks are much more in proportion in the public sector, compared to foreign and private sector companies.

The carrying cost of inventory is comparatively greater in public sector companies in spite of lower borrowing rates from banks than is allowed to the private sector companies. One reason for the high inventory is the slow disposal of non-moving and obsolete stocks. Due to the same reason

the turnover rate is much less in public sector organisations compared to other industries surveyed.

Conclusion

For efficient management of the inventory, its organisation must be brought under the materials management department with integrated functions. Again, for achieving a better turnover of inventory, reducing the stock outs and controlling the average value of inventory, the personnel in-charge of inventory control must have sufficient delegation of powers together with accountability for achieving targets set for them. In foreign firms and in private sector companies the turnover is on the average 5 and above and the targets in public sector also must be set accordingly.

Along with the same, norms must be established on the level of safety stocks and method of disposal of surplus and obsolete items. By disposing promptly all unwanted items and reducing the safety stocks, the carrying costs can be brought down. Another factor in case of public sector is the number of non-stock items bought and used without entering the inventory. The value of such items is about 25 percent of the total annual purchase. This must be reduced to about ten percent as otherwise it will have adverse effect on the profits of the company.

The safety stock levels are greater in public sector. This consists of spare parts for maintenance and repairs,

insurance spares and imported equipment and materials, which require longer delivery periods. Since the private sector companies in India also function under the same conditions, there is no special reason for the public sector undertakings to have excessive stocks. These excessive stocks not only increase the investment in inventories, but also incur additional cost to carry them, which at present is about twentyfive percent due to high borrowing rates from the banks. This is the most compelling reason for prompt disposal of all surplus materials not needed in the recent future, even at a lower cost than the book value of such items.

Besides, it is also possible that these materials may deteriorate further in quality if stored for longer periods and even the resale value may fall. Iron and steel materials may rust, corrode and deteriorate, chemicals may absorb moisture and lose their effectiveness and other materials may become weak and unsuitable for fabrication due to ageing. It is therefore essential that the inventory cell must concentrate on these aspects and considerable savings can be effected by prompt action in this area of the public sector.

CHAPTER IX

IMPORT AND EXPORT MANAGEMENT.

Introduction

During the five year plans a large industrial investment was necessary which needed foreign assistance and substantial imports of capital equipment and raw materials. Most countries which gave aid stipulated that the required equipment and materials should be bought from their countries. This involved payment of higher prices and created a deficit balance of payment for India.

Even after the completion of several plans it was not possible to balance the Indian imports with relative exports. Fortunately however by controlling smuggling activities and other illegal foreign exchange transactions along with ever increasing exports to oil rich countries, India has now not only wiped out the deficit in balance of payment but has been able to earn a handsome surplus to the extent of Rs. 10,000 million in recent years.[1]

This chapter deals with the effect of import export

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1. Source: Monthly Statistics of the Foreign Trade of India, Vol. I & II, published by the Director General of Commercial Intelligence and Statistics, Calcutta.

control on materials management, origin and development of industrial licensing, industrial policy and regulation, import and export policy, canalised imports and exports, exemptions from import and export licensing, open general licence and measures introduced for control and regulation of import and export of materials and capital equipment. After comparing and analysing these principles and the practice followed in the industrial organisations studied, in respect of their requirement of imported raw materials and spares and the measures taken for regulating and substituting imports, conclusions have been reached.

Origin and Development of Industrial Licensing

The Imports and Exports Control Act 1947[1] empowers the Central Government to prohibit, restrict or otherwise control imports. In exercise of the powers conferred by this Act, the Imports Control Order, 1955, has been issued showing a list of articles restricted for import. The import of such items is prohibited except;

1) Under and in accordance with a licence or a customs clearance permit issued under the said order, or
2) If it is covered by an Open General Licence,

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1. Appendix VII gives the text of the Imports and Exports Control Act, 1947, as amended upto April, 1978.

subject to such conditions as may be stipulated, or

3) If they are covered by the savings mentioned in the import control order

4) The import of gold, silver, currency notes, bank notes and coins is controlled by the Reserve Bank of India, under the Foreign Exchange Regulation Act.

Export control covers only the items listed in the Exports Control Order, 1977. Export of goods can be made without any licence:

1) If the items are not specified in the list or

2) Falls within the purview of the export control order or

3) These are covered by an Open General Licence included in the export policy, 1978-79.

The provisions of the act apply to all industrial undertakings including those manufacturing any of the items included in the list of'Scheduled Industries'[1] and managed by any person or authority including the Government. For the purposes of the Act, a factory means any premises including the precincts thereof in which a manufacturing process is carried on

1) With the aid of power provided 50 or more workers

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1. Table II gives the list of Scheduled Industries. See p. 17.

are working or were working there on any day of the preceding 12 months, or

2) Without the aid of power provided that 100 or more workers are working and provided further that in no part of such premises any manufacturing process is being carried on with the aid of power.

A licence is a written permission from the Government to an industrial undertaking to manufacture specific articles. It includes particulars of the industrial undertaking, its location, the articles to be manufactured, their capacity on the basis of maximum utilisation of plant and machinery and other appropriate conditions which are enforceable under the act. It is also subject to a validity period within which the licensed capacity should be established.

Under the provisions of the Industrial Development and Regulation Act, a licence is necessary for:

1) Establishing a new industrial undertaking
2) Taking up the manufacture of a new article[1] in

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1. New article means any item of manufacture in a scheduled industry other than those specified in the registration certificate or licence issued to the undertaking. It also includes any article which bears a mark as defined in the Trade Marks Act, or which is the subject of a patent if at the date of registration or issue of the licence or permission, as the case may be, the industrial undertaking was not manufacturing or producing such article bearing that mark or which is the subject of that patent.

an existing industrial undertaking

3) Substantially expanding the capacity of an industrial undertaking in an existing line of manufacture

4) Carrying on the business of an existing industrial undertaking to which licensing provisions of the act did not originally apply on account of an exemption order issued by the Government and became applicable thereafter as a result of cancellation of the exemption order and under certain other circumstances as provided in the act. Such licences are referred to as COB licences[1] and

5) Changing the location of an existing industrial undertaking.

In accordance with Government's announcement made in October, 1966, industrial undertakings can increase the production of articles for which they are licenced or registered upto 25 percent of the capacity so licensed or registered without obtaining a substantial expansion licence, provided that certain conditions are fulfilled.

These conditions restrict additional plant and equipment, additional foreign exchange expenditure and any extra demand for already scarce raw materials.

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1. COB (Carrying on Business) licences are issued to industrial undertakings mentioned at (4) above.

Industrial Policy and Regulation

The basic frame-work for the Government's industrial policy is provided by the industrial policy resolution[1] dated 30th April, 1956. The resolution emphasises that the industrial policy like any other policies must be governed by the Directive Principles of State Policy enunciated in the Constitution and the more precise direction given to them by Parliament through its acceptance of the socialistic pattern of society as the objective of socio economic policy.

In order to realise this objective, it is essential to accelerate the rate of economic growth and to speed up industrialisation in both the public sector and co-operative sector. The resolution also underlines the need for prevention of private monopolies and concentration of economic power. At the same time it encourages the role of cottage, village, small scale and ancillary industries in the development of national economy.

In order to regulate the industrial growth, industries have been licensed and the growth in public, private, joint and co-operative sectors has been specified. Exemptions from licensing have been granted to certain categories of industries on the basis of investments involved, nature of

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1. The text of the Industrial Policy Resolution 1956, is given as Appendix VIII.

industry and the foreign exchange requirements. The exemption limit of Rs. 2.5 million fixed during 1964, was raised to Rs. 10 million during 1970 and in view of the favourable position of balance of payment this limit has now been raised to Rs. 30 million.[1]

As part of different measures to ensure balanced regional development, the Government of India has announced certain financial incentives for industries established in selected backward districts and areas.[2] These are in addition to the facilities and incentives that are offered by individual State Governments.

These include:

1) A subsidy of 10 percent of the fixed capital investment or Rs. 0.5 million whichever is lower, free of income tax
2) Concessional finance at low interest from financial institutions
3) Transport subsidy of 50 percent for all industrial units in the hill districts
4) Special tax rebate
5) Concessions for supply of machinery on hire purchase by National Small Industries Corporation and

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1. This enhancement has been published in the Guidelines for Industries 1976-77, by the Department of Industrial Development, Ministry of Industry and Civil Supplies, New Delhi.

2. The list of industrially backward areas covered under the incentive scheme is given in Appendix IX.

6) Import facilities for units set up in specified backward areas.

Import Policy and Procedures for Raw Materials and Equipment

The Import Trade Control was first introduced in India as a war time measure in the early stages of the Second World War by a notification issued by the Government on 20th May, 1940. The primary objective of this measure was to conserve foreign exchange resources for war and to make the best possible use of shipping space available.

To begin with, 68 commodities of consumer goods were subjected to control. Subsequently with increasing exchange difficulties the control order was extended to other items like steel and machine tools. On August 23, 1941, most other items were also controlled and finally during July 1943 a consolidated notification was issued for all the controlled items.

After the end of war, import trade control was kept alive by an ordinance issued in 1946. On March 25th, 1947, this was replaced by imports and exports control order. This order was amended from time to time and extended indefinitely, still continues to be in force.

The main objectives of the import policy are the promotion of export oriented industrial growth in a manner that is consistent with the overall balance of payments, controlling inflation and increasing industrial production and exports.

Actual users are those industrial units, who require raw materials, components, accessories and spare parts, for their own production and maintenance.[1] For licensing purposes they are classified as those registered with Director General of Technical Development, small scale units registered with state Directors of Industries and others such as non DGTD and non SSI units.

Machinery and equipment essential for production which are not indigenously available are allowed to be imported. The procedure and permissibility of such items are published every year in the import trade control book which gives details of procedure to be followed for importing machinery and equipment and also the list of restricted and banned items.

When capital machinery and equipment for more than rupees one million are required to be imported, it is necessary to first obtain clearance from the indigenous angle by publishing the requirement in the Indian Trade Journal. This process of advertisement is not required for orders which are less than rupees one million. Such an advertisement gives an opportunity to the stockists and manufacturers in India to try and offer any of the items or the nearest substitute they may have.

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1. List of items permitted for import under the Open General Licence by Actual Users is given in Appendix X.

After the offers are received and if there are no suitable local offers for the equipment, an application for import is made through the sponsoring authority.[1] Normally the sponsoring authority for public sector undertakings is the ministry under which the industry is organised. If the ministry is satisfied about the requirement, then the application is recommended and forwarded to the Director General of Technical Development and then to the Chief Controller of Imports and Exports.

Licences are issued by the Chief Controller of Imports and Exports in duplicate.[2] On the strength of the exchange control copy, the bankers open letters of credit in favour of the foreign suppliers against each order and the other copy is used for customs clearance purposes. Two signed copies of the list of goods will also be attached with the licence to assist in opening credit and inspection by the customs in clearing the goods on arrival.

Import of Materials and Indigenous Clearance.

The Director General of Technical Development approves phased manufacturing programme of industries and based on

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1. List of sponsoring authorities for various industries is shown in Appendix XI. These authorities recommend grant of licences, fixation of quotas, issue of essentiality certificates and raw materials.
2. List of Central and Regional licensing authorities is given in Appendix XII.

this programme, import of essential components and raw materials are allowed to these industries. However with the industrial growth, more and more items are locally made and more varieties of steel and other raw materials became available locally and as a result imports are being reduced. Therefore, every year list of items to be imported are to be cleared by the licensing authorities. Licences are generally issued on the basis of actual consumption of the materials during the past 12 months or on the basis of licences obtained during the same period whichever is lower. To limit the expenditure of free foreign exchange, licences are generally issued against any available credits from friendly countries and general currency area licences are given only if suitable credits are not available.

A vital item of import for most of the undertakings is spare parts for machinery and equipment installed at the factory. Various provisions for import of permissible spares[1] as well as non-permissible spares by actual users have been made in the current import policy. All permissible

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1. Permissible spares are those spares which are not banned for import. Spare is a part for substitution ready to replace an identical part if it becomes faulty or worn out. It is to be understood that banned items are indigenously produced.

spares can be imported under Open General Licence.[1] These spares include items for maintenance and repairs of capital goods, accessories, ancillary equipment, control and laboratory equipment and safety appliances installed or in use at the factory. A separate licence will have to be obtained for non-permissible spares. Import of a single banned item of spare is limited to Rs. 50,000/-. Servicing spares are allowed to be imported at 0.1 percent of the production value of goods sold.

Credits have been offered by many friendly nations to meet the foreign exchange requirements of India's imports mainly from the United States, the United Kingdom, Japan, France, West Germany, Switzerland, Russia, Czechoslovakia, Poland and Hungary. Each of them while offering the credit, stipulates certain terms and conditions some of which are as follows:

a) The goods must be imported from the donor country and must have originated or produced there
b) Payment to the suppliers must normally be full against shipment
c) The target dates by which the contracts and payments must be completed
d) Items which are eligible for purchase under the credit

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1. Open General Licence means import is generally open without the normal conditions of licensing.

e) The shipment must be through the vessels of that country or jointly with the buying country

f) In case of East European countries payment must be effected in non-convertible Indian rupees, so that those Governments can buy Indian goods with the same money.

Western nations have created a fund through their contribution, known as the International Development Association fund from which developing countries are given foreign exchange credits[1] from time to time for import of capital items, components, raw materials and spares. Items permissible for import are notified from time to time under this loan. The names of industries eligible for IDA loans are published in the Import Trade Control book. Each credit is for a period of about 3 years, by the end of which the import as well as payment for the same is to be completed. There is no restriction on ships of any member countries being used to carry the goods, except that these should not belong to shipping lines banned by IDA.

Payments are made by the importer in the currency of the country from which the import is made and the amount so

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1. A list of industries eligible for IDA Credit is given in Table XV. The conditions of credit offered by IDA are much simpler in nature compared to credits offered by other nations. Except East European countries most other nations contribute to this fund including India and the loans received from IDA every year for India's plans were the largest.

TABLE XV.

LIST OF I.D.A. INDUSTRIES.

1. Agricultural tractors.
2. Power tillers.
3. Agricultural discs.
4. Fertilizers.
5. Pesticides.
6. Electric Motors (Above 1 H.P.)
7. Power and distribution transformers, switchgears, Control gears and related components.
8. Electrical steel stampings and laminations.
9. Cables and wires.
10. Power generating equipment.
11. Boilers.
12. Commercial vehicles, that is.,
    - i) Trucks and buses.
    - ii) Jeeps.
    - iii) Three wheelers.
13. Automotive Ancillaries, viz.
    - i) Engines for commercial vehicles.
    - ii) Automobile tyres and tubes.
    - iii) Storage batteries.
    - iv) Synthetic rubber.
    - v) H.T. Bolts, nuts and machine screws.
    - vi) Auto leaf springs and coil springs, and
    - vii) Other automobile ancillaries.
14. Machine tools.
15. Small tools and cutting tools including grinding wheels and abrasives.
16. Ball and roller bearings.
17. Ferrous castings and forgings, that is.,
    - i) Cast iron and spun pipes.
    - ii) Steel castings.
    - iii) Malleable castings.
    - iv) S.G. Iron castings.
    - v) C.I. castings.
    - vi) Steel forgings.
18. Textile machinery.

paid is reimbursed by IDA against presentation of documentary evidence to show the details of import.

Licensing Procedure for Materials.

An Automatic Licensing system has been introduced by the Government for the last 3 years and actual users are given licenses on the basis of their consumption of imported materials during the past 12 months or the value of licenses received by them during that period whichever is less.

For this purpose a consumption certificate showing the value of the imported raw materials and components consumed by the company during the corresponding earlier period duly certified by a practicing chartered accountant must be sent with the application. In case of small scale industries, this certificate can be signed by the sponsoring authority. Iron and steel items released from canalising agencies and imported materials locally procured are not to be included in this statement of consumption.

Import of raw materials and components under automatic licences based on the value of consumption or the value of licences received will be made available to all actual users within a short period after their application.

Apart from automatic licences, 'select industries'[1]

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1. Select industries are a group of priority industries specially to be developed for achieving self sufficiency in imports of such items. These include scheduled industries as given in Table II. See p. 17.

will be eligible to apply for supplementary licences, through the sponsoring authorities and licences will be issued based on the production programme, inventory position, importance of the industry, availability of foreign exchange and other relevent considerations.

For small scale industries also, automatic licences will be given. If specifically applied for, they will be given an additional 20% value of the licence along with the original licence itself and no supplementary licences will be issued.

Import of Emergency Requirements.

The import of emergency spares is allowed, to deal with any emergency breakdown of production. Spares upto Rs.50,000/- in case of large scale units and upto Rs. 20,000/- for small scale sector will be issued with the names of spares to be imported.[1] DGTD units should apply direct to the licensing authority without any sponsoring and small scale units must apply to the Regional Licensing authorities, indicating such licences already received by them earlier and the list of items proposed to be imported.

As a way of flexibility, licences of raw materials and components can be utilised for import of permissible spare parts including consumable spares required for the plant,

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1. Import Policy April 1978 - March 1979, Government of India, Department of Commerce, New Delhi, Chapter IX, pp. 8-9.

machinery and equipment installed or used in the licence holders factory, including spare parts of ancillary equipment, control and laboratory equipment and safety appliances.

Import of non-permissible spare parts detailed in the policy book, are such items as are locally produced and available. Import of such items will also be allowed upto 20% of the face value of licences for spare parts subject to the condition that the value of a single item of spare must not exceed Rs. 50,000/-.

Select industries which export 20% or more of their production are eligible for preferred sources of financing for import. Other industries outside the select list will also be given such a facility based on merits. Even restricted items will be allowed to be imported by such firms for double the value which is normally permissible within the overall entitlement.

Import of Materials by Institutions and for Research and Development.

Import requirements of universities, educational institutions, research organisations, technical institutions and hospitals will be allowed, when such items are cleared by DGTD. Import licences will be issued in such cases for the value of foreign exchange released on each application by the University Grants Commission or the administrative ministry concerned. Where such provision does not exist, applications for licences will be considered by the licensing

authority from whatever foreign exchange available at their disposal.

Technical samples supplied free of charge not exceeding Rs. 2,000/- in CIF value, in one consignment except vegetable seeds and new drugs, will be allowed under open general licence, without an import licence. Issue of licences for values between Rs. 2,000/- to Rs. 5,000/- will be considered by the regional licensing authorities.

Import of prototypes and other materials as samples may be considered by the licensing authority on the recommendations of the sponsoring authorities.

Special facilities as shown below are given to industrial firms, research foundations and private individuals, setting up research and development activities:

1. Proposals for import should be recommended by the Secretary, Department of Science and Technology
2. The programme for which equipment is required should be well defined and the essentiality of the equipment for the programme should be established
3. Costly equipments will be allowed only when such research and development facilities do not exist in India and
4. Prototypes to a maximum value of Rs. 0.1 million will only be allowed.

Import of a few selected consumer goods like medicines,

text and technical books, hearing aid, batteries and artist's brushes will be allowed through the National Co-operative Consumers Federation, New Delhi, within the given ceiling for distribution through consumer co-operative stores.

Special Facilities for Setting up Industries and Importing Materials and Equipment.

Certain special facilities are also given for Indians returning from abroad.[1] Import licences for machinery, equipment, control and testing instruments and raw materials for industrial units to be set up by Indian nationals residing/returning from abroad will be given on liberal basis:

1. Machinery upto Rs. 2.5 million can be imported within the applicants own foreign exchange earnings as approved by the Reserve Bank of India
2. The individual should have not less than 51% financial interest in the concern
3. Imported machinery cannot be sold for 5 years
4. Raw materials for one year may be purchased subject to a maximum value of Rs. 0.5 million from own foreign exchange resources
5. Neither the capital and materials nor the profits from the industry can be repatriated
6. Details of business or any change thereof, should

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1. Hand Book of Import Export Procedures, 1978-79, Government of India, Department of Commerce, New Delhi, Ch. VIII., (XV), pp. 20-21.

be communicated to the exchange control department of the Reserve Bank of India and

7. The procedure for maintaining accounts and audit thereof, would be on the same basis as applicable to limited companies.

Foreign investment is accepted on a selective basis, considering priority of industry and the nature of technology involved. The ceiling in all such cases is 40 percent, with preference for export oriented industries. The foreign capital should be by-way of cash and not in kind of machinery, equipment, knowhow, trade marks, or brand names.

Technical knowhow is considered on the basis of annual royalty payments linked to production and should not exceed 5% of the ex.factory selling price, minus landed cost of imported items. Royalty payment is subject to Indian taxes. Preference is given to fixed amounts per unit of production, for over a period of 5 years.

For import of drawings, documentation and knowhow, lumpsum payment is allowed. These payments are considered in relation to production value and are subject to Indian taxes.

Foreign Collaboration

For setting up an industry with foreign collaboration, a letter of intent has to be obtained from the Industrial Licensing Department of the Government if the item belongs to the list allotted to the scheduled industry and if the under-

taking is not exempted from licensing. Where the investment is exempted from licensing, approval for foreign collaboration can be applied straight away without getting a letter of intent.[1]

Foreign collaboration is permitted only in high priority areas and items where foreign technology is essential. Import of technology is considered on merits, if substantial exports are guaranteed over a period of 5 to 10 years. A list of industries where foreign collaboration and/or investment is permitted and also those in which neither collaboration nor investment is permissible, is being published by the Government every year.

Export Policy and Procedures

The fifth five year plan envisaged exports at the compound rate of 7.6 percent per annum. This can be achieved only if export earnings from industrial products increased at a compound growth rate of 16 to 22 percent per annum. Therefore government has recognised the need for adequate orientation in the licensing policy to step up the export effort,[2] as follows:

1. Foreign collaboration will be more freely permitted for export oriented units

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1. For details on terms and conditions of foreign collaboration, see Guidelines for Industries 1976-77, Government of India, Department of Industrial Development, Ministry of Industry and Civil Supplies, New Delhi, Ch.III,pp.13-15.

2. For details on Export Policy and Procedures, see Import Export April 1978-March 1979, Government of India, Department of Commerce, New Delhi, Ch. XIX, pp. 21-24.

2. Use of REP (replenishment of export percentage) entitlements for import of capital goods
3. Supplementary licences for capital goods
4. Special procedure for import of capital goods against export obligations
5. Preferred treatment in the allocation of imported inputs
6. Preferred sources of supply and financing for licences and purchases and
7. Higher import replenishment for exporting units adequate to meet the competitive strength.

A comprehensive programme of quality control and pre-shipment inspection has been put into effect under the export Act 1963. In process and progressive quality control during manufacturing has been introduced in production and packaging.

A trade development authority has been set up to promote selective and intensive export development of products with growth potential by technically competent and commercially viable units to the developed countries. The Government of India have approved a package plan for servicing the requirements of TDA's clientele. TDA has been recognised as a sponsoring authority for licences.

Registered exporters are those who hold valid registration certificates issued by the registering

authorities like the Export Promotion Authorities, at the ports.

Members of the export promotion council having past export experience and good record, are eligible for registration. If the authority is satisfied that the general commercial background of the applicant and his industrial experience of export performance are good, applicants with no previous experience will also be considered.

Replenishment Entitlement.

Export replenishment entitlement is available for most of the countries.[1] However exports to Sikkim, Bhutan, Nepal and Afghanistan will not qualify for import replenishments unless payment is received in free foreign exchange. Similarly export under Barter deals and trade promotion agreements, between India and importers in other countries will not qualify for replenishment unless there is specific provision for replenishment.

The replenishment quota varies from 2% in case of electrical insulating material and cleaned hemp, to about 80% in case of non-ferrous semis and extrusions. The detailed percentages admissible for each category of material and items permitted for import against these entitlements

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1. For details on the system of export entitlement, see Export Control Policy, Vol. II, April 1977 - March 1978, Government of India, Ministry of Commerce, New Delhi, Part B, pp. 6-7.

are classified in the import and export control policy book published every year.

With all these measures taken by the Government of India, for export promotion, Indian exports have been increasing only very slowly. Added to this due to the oil crisis, India had to spend Rs. 400 million in additional foreign exchange for import of crude oil. At the same time, Indian exports, contracts for construction works and supply of capital equipment to oil rich countries have altogether earned enough foreign exchange surplus now, that the imports are well balanced and there is a huge surplus in the trade balance.

Exemptions from Licensing:

Industrial undertakings other than those coming under Monopoly and Restrictive Trade Practices[1] and the Foreign Exchange Regulation Act[2] which take up manufacture of items developed by National Laboratories established by the Council of Scientific and Industrial Research will be exempted from licensing subject to the condition that the item is not reserved for public sector or

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1. In line with the industrial policy of the Government, to avoid concentration of economic power, the Monopolies and Restrictive Trade Practices Act was passed in 1969, which controls and restricts further growth of such monopoly houses. Further licensing of industries to these groups will have to be approved by the Project Approval Board and the Secretariat for Industrial Approvals

2. Foreign Exchange Regulation Act 1973, provides over all supervision of the Reserve Bank of India in all matters relating to foreign exchange.

for small scale sector.

Exemptions have also been given based on investments, nature of industry, foreign exchange requirements etc. The present exemption limit of Rs. 30 million includes land, buildings and machinery but excludes equipment like trucks, delivery vans and office equipment. The item involved should not be reserved for public sector or for small scale and the foreign exchange should not exceed 5% or Rs. 0.5 million whichever is less in relation to the investment.

No licence is also required for proposals from entrepreneaurs who do not fall under MRTP and FERA, based on indigenous equipment and local raw materials, for their new ventures or for expansion of capacity and for manufacture of new articles, provided no foreign collaboration is required and the item is not reserved for small scale sector.

Industries which are exempted from licensing have to register with the Director General of Technical Development. This includes those in non-scheduled industries and those employing less than 50/100 workers with and without power.

Canalisation of Imports and Exports

The import of certain items[1] are canalised only through public sector agencies. The canalising agency

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1. Table XVI shows the list of items canalised for import through public sector agencies.

TABLE XVI.

LIST OF ITEMS, IMPORT OF WHICH IS CANALISED THROUGH PUBLIC SECTOR AGENCIES

AGENCY	PRODUCT
Balmer Lawrie & Company	1. Paraffin wax.
Cashew Corporation of India	2. Raw Cashewnuts.
Central Silk Board	3. Raw Silk. 4. Silk Worm (Cocoons)
Cotton Corporation of India	5. Raw Cotton.
Electronics Trade & Technology Development Corporation	6. Calculator chips. 7. T.V.Picture tubes.
Film Finance Corporation	8. Cinematograph films,not exposed, all types and sizes, excluding black and white positive and sound negative film.
Food Corporation of India	9. Cereals.
Jute Corporation of India	10. Raw Manila Hemp (Fibre). 11.Raw Sisal Fibre.
Minerals & Metals Trading Corporation of India	12. Antimony metal. 13. Antimony ore. 14. Asbestos raw. 15. Copper unwrought. 16. Fluorspar (acid grade) 17. High grade molybdenum ore/molybdic oxide/ molybdenum oxide. 18. Lead. 19. Mercury. 20. Nickel virgin/nickel scrap. 21. Non-processed elemental/non-refined recovered sulphur. 22. Platinum. 23. Palladium. 24. Stainless/heat resisting steel plates/sheets/ coils/strips-excluding cold rolled strips of width 22.38 to 22.40 mm and thickness 0.10 to 0.13 mm. 25. Tin. 26. Zinc (or Spelter) unwrought.

AGENCY	PRODUCT
State Chemicals & Pharmaceuticals Corporation of India	27. Alkyl Benzene/Dodecyl Benzene. 28. All Synthetic non-cellulose fibres excluding polyester fibre/tow, polynosic fibre, acrylic fibre acrylic tow. 29. Calcium borate. 30. Caprolactum. 31. Cryolite. 32. D.M.T. 33. Iodine. 34. Sodium Cyanide. 35. Methyl methacrylate monomer (Virgin). 36. Monoethylene glycol. 37. Sodium borate. 38. Polyester filament yarn. 39. Titanium dioxide (rutile grade). 40. Vinyl acetate monomer. 41. Vinyl acetate.
State Trading Corporation of India	42. Arms and ammunition. 43. Coconut oil. 44. Photographic colour papers. 45. Copra- For use in Vanaspati industry and other industrial purposes. 46. Explosives. 47. Mutton tallow. 48. Beverages, spirits and liquors. 49. Newsprint. 50. Nylon yarn and thread, (other than base flat nylon filament yarn (1st quality) and industrial nylon yarn of 210 denier and above). 51. Palm oil, all types, excluding palm oleine For all requirement including edible purposes. 52. Photographic films (colour and black & white). 53. Soyabean oil - For use in Vanaspati industry and other industrial pruposes. 54. Woollen rags/Shoddy wood.
Metal Scrap Trade Corporation	55. Ferrous melting scrap. 56. Rerollable scrap in the form of old ships, vessels, etc. for breaking.
Sail International	Carbon Steel items of all grades, (other than cladded/composite Steel) the following: 57. Ingot/blooms/billets/squares/rounds/rods/ hexagons/octagons/flats/joists/beams/ channels/angles/'T' sections/Special 'Z' sections/sheets/piling sections, excluding the following: i) Rolled blooms above 330 mm; ii) Forged blooms/rounds above 520 mm;

AGENCY	PRODUCT

iii) Rolled rounds above 240 mm; and
iv) Flats above 350 mm width or below 6 mm thickness.

58. Plates excluding chequered plates.

59. Sheets/strips/coils, hot rolled/cold rolled, excluding the following:

i) Defective/secondary grade of sheets/strips/coils/cuttings/seconds.
ii) Cold rolled high carbon (0.6% carbon and above) steel strips of maximum 12.75 mm width.
iii) Cold rolled steel strips with width upto 20 mm and thickness upto 1.5 mm
iv) Cold rolled high carbon (carbon 0.6% and higher)/alloy steel strips of width 22.38 to 22.40 mm and 0.10 to 0.13 mm thickness.
v) Cold rolled high carbon steel strips (0.6% carbon and above) unhardened and untempered).

60. Galvanised sheets plain/corrugated (including coils).

61. Electrical steel sheets/strips/coils excluding cold rolled non-grain oriented category.

62. Tinplate.

All grades of Alloy Steel (other than cladded/composite steel), the following:-

63. Stainless/heat resisting steel ingots/blooms/billets/squares/rods/rounds/flats/hexagons/octagons/structurals.

64. Alloy steel plates/sheets in boiler/pressure vessel quality/specifications.

65. Wire rods in stainless/heat resisting steel of 10 mm dia and above.

will apply for bulk allocation of foreign exchange and import material and distribute it to the actual users. The allotment is done directly by canalising agencies, through release orders issued by the licensing authority, or the sponsoring authority.

The sale price for distribution of canalised items to actual users will be determined by the pricing committee consisting of Chief Controller of Imports and Exports, Economic Advisor, Development Commissioner for small scale industries, Director General of Technical Development and representatives of public sector agencies.

Export of certain items[1] are also canalised only through public sector agencies. This will enable public sector agencies to play an expanding role in developing exports and building up the export capabilities of manufacturers and exporters.[2]

Apart from canalised items, public sector agencies are allowed to import in bulk other raw materials and steel and distribute these to actual users. For this purpose, the State Trading Corporation has set up an Industrial Raw

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1. Table XVII shows the list of items canalised for export through public sector agencies.

2. For details on canalisation see Hand Book of Import-Export Procedures, 1978-79, Government of India, Department of Commerce, New Delhi, Ch. XII, pp. 41-42.

TABLE XVII

LIST OF ITEMS CANALISED FOR EXPORT

S.No.	Item	ETC Classification	Canalising Agency
1.	Dried Fish other than Prawns, Sharkfins, Fishmaws, Beach-De-Mere and Bombay Ducks	B.4	State Trading Corpn.
2.	All Categories of semi-processed hides and skins including E.I.tanned and Wet Blue hides and skins and crust leather	B.7(b)	State Trading Corpn.
3.	Iron and Steel other than cast iron pipes and fittings:-	B.9(ii)	
	(a) 1. Pig Iron 2. Ingots & Slabs 3. Billets and bars 4. Structurals 5. HR coils/plates/sheets 6. CR coils 7. GP/SGC sheets 8. Electrical sheets 9. Railway materials 10. MS wires (coated & uncoated/ medium/HC wires excluding spring steel wires 11. Alloy steels.		SAIL International Ltd.
	(b) Ferrous scrap: 1. Mill scale scrap 2. CI skullscrap 3. Rejected CI ingot mould/bottom plate scrap 4. Rejected discarded CI chilled roll scrap 5. Tool & Alloy steel scrap (other than stainless steel scrap) 6. Steel skull scrap 7. CI borings (not exceeding 30,000 M.T.) 8. Detinned bundles 9. Rejected steel ingots 10. Pig iron chips/scrap		Metal Scrap Trading Corporation.
4.	Silver bullion, silver sheets and plates which have not undergone any process of manufacture subsequent to rolling.	B.12(a)	State Trading Corpn.

Sl. No.	Item	ETC Clfcn.	Canalising Agency
5.	(i) Iron Ores (other than Goa origin)	B.14(ii)	Minerals & Metals Trading Corporation.
	(ii)Bi-metal ore (black iron ore) with manganese contents from 3% upto 10% of Goa origin.		Minerals & Metals Trading Corporation.
6.	Manganese Ores	B.14(iii)	Minerals & Metals Trading Corporation.
7.	Sillimanite	B.14(iv)	
8.	Barytes	B.14(xv)	
9.	Mica including Mica Splittings of all grades and varieties of mica excepting manufactured and fabricated mica (including die-out condenser films, spacers, bridges,washers etc.) micanite reconstituted mica, mica powder and mica paper.	B.16	Mica Trading Corporation of India Pvt., Ltd.
10.	Coal and Coke (except Carbonised lignite briquetters Loco)	B.17	Minerals & Metals Trading Corporation
11.	Ferro Manganese (other than ferro manganese containing less than 0.05% Carbon) ferro Manganese slag/Silico manganese.	B.18(i)	SAIL International Ltd.
12.	Ferro Chrome (other than ferro chrome containing less than 0.03% carbon and nitrogen bearing)/Silico chrome.	B.18(ii)	SAIL International Ltd.
13.	Ferro Silicon	B.18(iii)	SAIL International Ltd.
14.	Basmati Rice	B.25	State Trading Corporation
15.	H.P.S.Groundnuts	B.26(i)	Indian Oil & Produces Exporters Association
16.	De-oiled Groundnut Cake (Extractions)	B.28	Groundnut Extractions Export Development Association.
17.	Castor Oil	B.30(ix)	State Trading Corporation.
18.	Lemongrass Oil	B.31	State Trading Corporation.
19.	Onion	B.35(i)	NAFED

S.No.	Item	ETC Clsfcn.	Canalising Agency
20.	Potatoes -	B.35(iii)	NAFED
21.	Kuth -	B.44	State Trading Corporation
22.	Shellac, seedlac, buttonlac, garnellac and all other forms of lac except those mentioned against item 24 in Part A.	B.45	State Trading Corpn.
23.	Raw Jute, Mesta and Jute cutting excluding caddies	B.46(ii)	Jute Corporation of India.
24.	Salt, all sorts -	B.48	State Trading Corpn.
25.	Footwear, all types -	B.50	State Trading Corpn.
26.	Exposed Cinematographic films (feature films)	B.51	Indian Motion Picture Export Corporation.
27.	Cement -	B.57 i) ii)	State Trading Corpn. Engg. Projects (India) Ltd., Only for use in construction projects undertaken by them in foreign countries.
28.	Knitwear (Woollen and mixed)	B.58 a) b)	Handicrafts and Handlooms Exports Corpn. of India Ltd. State Trading Corpn. for export of Knitwear olive green.
29.	Cardamoms (large) -	B.72	NAFED
30.	Deoiled Rice Bran -	B.78	Solvent Extractors Association of India.
31.	Railway Wagons -	B.107	Project & Equipment Corpn. of India Ltd., New Delhi.
32.	Natural Rubber -	B.116	State Trading Corpn.
33.	Benzene and Toluene -	B.121	State Trading Corpn. subsidiary - The State Chemicals and Pharmaceuticals Corporation of India (CPC)

Sl. No.	Item	ETC Clsfcn.	Canalising Agency
34.	Sugar -	B.129	State Trading Corporation.
35.	Goat Hair Patties -	B.131	Handicrafts and Handloom Exports Corporation of India Ltd.
36.	Solvent Extracted cotton seed cakes (de-corticated and undecorticated)	B.132(a)	All India Cottonseed Crushers Association, Bombay.
37.	Cottonseed Expeller cakes (de-corticated and un-decorticated)	B.132(b)	

Materials Assistance Centre for arranging shelf delivery of materials to actual users and exporters against their licences.

Import Substitution Effort

In spite of all the efforts for indigenisation, India's imports are still high at Rs. 50,000 million a year. These are mainly capital equipment, raw materials and spares. Table XVIII shows value of the total import, export and balance of payment position for the periods shown against each.

The licensing authorities have restricted imports of capital machinery and equipment locally available and indigenously produced. Preference is also given for imports of such equipment from Rupee Currency Area[1] so that payment can be effected in Indian rupees, instead of in foreign exchange. Some of these countries have trade representatives in India, who are able to deliver such equipment from their stocks in India to prospective buyers. These countries have also given extensive credits to India for buying their equipment for several industrial establishments. In addition most of these countries have supplied equipment for setting up complete industrial plants like

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1. Rupee currency area refers to East European countries with whom India has bilateral trade agreements under which the rupee value of the Indian imports will be utilised by the respective countries to buy Indian products and export them to their countries.

TABLE XVIII.

VALUE OF IMPORT, EXPORT & BALANCE OF TRADE 1960-61 TO 1976-'77

Rupees in Million

Sl.No.	Year	Import	Export	Balance of Payments
1.	1960 - 61	11210	6420	- 4790
2.	1965 - 66	14080	8050	- 6030
3.	1969 - 70	15820	14130	- 1690
4.	1970 - 71	16340	15350	- 990
5.	1971 - 72	18250	16080	- 2170
6.	1972 - 73	18670	19710	+ 1040
7.	1973 - 74	29210	24830	- 4380
8.	1974 - 75	45180	33280	-11900
9.	1975 - 76	52650	40420	-12230
10.	1976 - 77	49080	49800	+ 720
11.	March 1976	4750	5910	+ 1160
12.	October 1976	3330	4210	+ 880
13.	November 1976	4270	3200	- 1070
14.	December 1976	4440	3800	- 640
15.	January 1977	4050	3760	- 290
16.	February 1977	3580	3930	+ 350
17.	March 1977	3770	5210	+ 1440

SOURCE:- Monthly Statistics of Foreign Trade of India Vol. II (Imports) published by the Director General of Commercial Intelligence & Statistics, Calcutta.

steel plants, heavy machine building plant and foundry and forge plant. However it was found that these plants and equipment are not as productive or efficient as those supplied by the western nations. It is also difficult to get necessary spares for such equipment from rupee area countries.

The majority of supplies come from Russia, Czechoslovakia, Poland and Hungary. Some items like alloy steel and engineering goods made in Czechoslovakia are comparable in quality with those made in the western nations, while some items like bearings made in these countries are not as superior in quality as those produced in Austria, France, United Kingdom and the United States.

Several industries have been set up in India for import substitution, including small scale and ancillary industries. Major undertakings have a programme to exhibit imported items, so that prospective entrepreneurs can examine the possibility of manufacturing such items locally.

These principles and essentials can now be summarised:

Import control has been introduced to conserve foreign exchange resources and to promote export oriented industrial growth. Indian imports mainly consist of capital equipment, raw materials and spares. Though several industries have been started to manufacture equipment which has so far been imported,

there are many items still not covered by the indigenisation programmes. The same applies to raw materials and spares also. There are several raw materials like non-ferrous metals, chemicals and engineering materials which are still not available locally. Though some quantity of crude oil has been obtained locally a major share is still being imported paying Rs.6000. million annually.

As regards spare parts and insurance spares for imported equipment and machinery locally made but containing imported items like electrical circuit control items may still have to be imported. In order to develop these items indigenously several major undertakings are encouraging small scale and ancillary units to take up import substitution work, by providing them with materials, tools, knowhow, inspection and production assistance. Most of these companies exhibit samples of imported items for entrepreneurs to choose, depending on their manufacturing facilities.

Materials management has to ensure reduction of imports to save foreign exchange or at least match the imports with exports. A constant effort has to be made for continuous development of imported items indigenously. For this purpose the development of ancillaries has been accepted in principle as a way out by all major undertakings, so that the overall cost can be reduced. As for the spares for imported machines, all possible items are being locally fabricated and only unavoidable items are imported.

Comparison with Practices Followed in Indian Industries.

Foreign firms have no problem where import of raw materials, parts or equipment is concerned as most of them have all the materials almost readily available and they hardly import any of their industrial inputs. In case of Europeans industries, there is a system of reciprocity. For instance each European country buying Mercedez Benz cars from Germany has reciprocal arrangements for supplying some components or sub-assemblies to them in return. Except for this reciprocal arrangement, there is no import of materials as such.

Most of these countries solely depend on export of their products as the internal consumption is limited compared to the large output capacity they have. Messers Benz produce 22000 Standard Cars daily in addition to special models, out of which sixty percent is allotted for internal consumption in Germany and the balance is exported.

As far as Indian industries are concerned, both the private and public sector companies are trying to minimise their imports by tapping all available indigenous sources. With the imposition of higher import duties and surcharge on such duties, it is the policy of the Government of India to make imported items costlier than quality goods indigenously produced. Many engineering and other goods now produced in India, under strict supervision and quality control

of agencies like the export promotion council and export inspection authority, are equal in quality to foreign made goods, if not superior in performance.

Most of the private sector companies have balanced their imports with exports, while public sector companies are far behind in their export obligations, as can be seen from the comparative data shown in Table XIX. An import substitution effort is more evident in the private sector companies than in the public sector organisations probably because it is easier for the latter to obtain import licences as and when they need it. In developing imported spares indigenously, the private sector companies make special efforts while the public sector companies rely more on imports of such spares.

Conclusion

In the case of public sector undertakings there is need for more vigorous efforts to reduce imports of capital equipment, raw materials, maintenance spares and standby units as the quantum of imports at present is very high. By establishing more ancillary industries, indigenisation of many items can be expedited. By vendor selection and strict quality contol, dependability of the indigenous products can be ensured.

In balancing imports with exports, private sector companies have achieved their targets and exceeded them in many cases, while the public sector undertakings have to go a long way at least to balance these even if they cannot exceed the targets.

Import substitution is the area where public sector companies should concerntrate more attention. Their present achievements are negligible compared to the efforts put in by the private sector organisations. If a long range plan is formulated and a special cell is created to implement complete indigenisation of all imported items, these targets can easily be achieved. Additional custom duties have been imposed by the Government of India by way of surcharges on almost all items to discourage imports. As such imported items are costlier and they increase the cost of material content in the product. Therefore with a view to limit the material content of every product, public sector undertakings should limit their imports and encourage more and more indigenous development of their import requirements.

APPENDIX VII.

IMPORTS AND EXPORTS (CONTROL) ACT.

Imports and Exports (Control) Act, 1947 as amended upto 3rd, April, 1978.

An Act to prohibit or control imports and exports.

Whereas it is expedient to prohibit, restrict or otherwise control imports and exports.

It is hereby enacted as follows:-

1. Short title, extent, commencement and duration:-

(1) This Act may be called the Imports and Exports (Control) Act. 1947.

(2) It extends to the whole of India.

(3) It shall come into force on the 25th day of March, 1947.

2. Definitions:- In this Act, unless the context otherwise requires,-

(a) "adjudicating authority" means the authority specified in, or under, section 4K;

(b) "Appellate authority" means the authority referred to in section 4M;

(c) "Chief Controller" means the Chief Controller of Imports and Exports;

(d) "control order" means a control order made, or deemed to have been made, under this Act;

(e) "customs station" has the meaning assigned to it in the Customs Act, 1962;

(f) "Deputy Chief Controller" means a Deputy Chief Controller of Imports and Exports;

(g) "import" and "export" means, respectively, bringing into, and taking out of, India by sea, land or air;

(h) "letter of authority" means a letter authorising the licensee to permit another person, named in the said letter, to import goods against the licence granted to the licensee;

(i) "licence" means a licence granted, and includes a customs clearance permit issued, under any control order;

(j) "prescribed" means prescribed by rules made under this Act;

(k) "recognised agency" means an agency to which the functions of distribution of imported goods have been assigned by the Chief Controller.

3. Powers to prohibit or restrict imports and exports:-

(1) The Central Government may, by order published in the Official Gazette, make provisions for prohibiting, restricting or otherwise controlling in all cases or in specified classes of cases and subject to such exceptions, if any, as may be made by or under the order:-

(a) the import, export carriage coastwise or shipment as ships stores of goods of any specified description;

(b) the bringing into any port or place in India of goods of any specified description intended to be taken out of India without being removed from the ship or conveyance in which they are being carried.

(2) All goods to which any order under sub-section (1) applies shall be deemed to be goods of which the import or export has been prohibited under section 11 of the Customs Act. 1962 (52 of 1962), all the provisions of that Act shall have effect accordingly.

(3) Notwithstanding anything contained in the aforesaid Act, the Central Government may, by order published in the Official Gazette, prohibit, restrict or impose conditions on the clearance, whether for home consumption or for shipment abroad of any goods or class of goods imported into India.

(4) Continuance of existing orders:- All orders made under rule 84 of the Defence of India Rules or that rule as continued in force by the Emergency Provisions (Continuance) Ordinance, 1946 (Continuance of Existing Orders, XX of 1946), and in force immediately before the commencement of this Act shall so far as they are not inconsistent with the provisions of this Act, continue in force and be deemed to have been made under this Act.

4 A. Fees for applications for, and issue or renewal of, licences:- The Central Government may by order levy, subject to such exceptions, if any, in respect of any persons or class of persons as may be specified in the order, any fee in respect of any application or in respect of any licence granted or renewed under any order made or deemed to have been made under this Act.

4 B. Power to enter and inspect:- Any person authorised in writing in this behalf by the Chief Controller or any officer serving under him, not being an officer below the rank of a Deputy Chief

Controller (hereafter in this Act called the "authorised person"), may enter, at any reasonable time any premises in which -

i) any imported goods or materials which are liable to confiscation under this Act, or

ii) any books of account or other documents or things which in his opinion, will be useful for, or relevant to, any proceeding under this Act,

are suspected to have been kept or concealed and inspect such imported goods, materials, books of account, other documents or things and may take such notes or extracts from such books of account or other documents as he may think fit.

4 C. Power to search:- If the authorised person has any reason to believe that -

i) any imported goods or materials liable to confiscation under this Act, or

ii) any books of account or other documents or things which, in his opinion will be useful for, or relevant to, any proceeding under this Act,

are secreted in any place, he may enter into and search such place or premises for such imported goods, materials, books of account, other documents or things.

4 D. Power to seize imported goods or materials:-

(1) If the authorised person has any reason to believe that any imported goods or materials are liable to confiscation under this Act, he may seize such goods or materials together with the package, covering or receptacle, if any, in which such goods or materials are found and where such goods or materials are found to have been mixed with any other goods or materials, he may seize such goods or materials together with the goods or materials with which they are so mixed:

Provided that where it is not practicable to seize any such goods or materials, the authorised person may serve on the owner of the goods or materials an order that he shall not remove, part with or otherwise deal with, the goods or materials except with the previous permission of such authorised person.

(2) Where any goods or materials are seized under sub-section (1) and no notice in respect thereof is given under section 4L within six months of the seizure of the goods or materials the goods or materials shall be returned to the person from whose possession they were seized:

Provided that the aforesaid period of six months may, on sufficient cause being shown, be extended by the Chief Controller by a further period not exceeding six months.

(3) The authorised person may seize any documents or things which, in his opinion, will be useful for, or relevant to, any proceeding under this Act.

(4) The person from whose custody any documents are seized under sub-section (3) shall be entitled to make copies thereof or take extracts therefrom in the presence of the authorised person.

(5) If any person legally entitled to the documents or other things seized under sub-section (3) objects, for any reason, to the retention by the authorised person of the documents or things, he may make an application to the Central Government stating therein the reasons for such objection and requesting for the return of the documents or things.

(6) On receipt of an application under sub-section (5), the Central Government may, after giving the applicant an opportunity of being heard, pass such order as it may think fit.

(7) Where any document:-

(a) is produced or furnished by any person or has been seized from the custody or control of any person under this Act or any other law for the time being in force, or

(b) has been received from any place outside India (duly authenticated by such authority or person and in such manner as may be prescribed) in the course of the investigation of any offence alleged to have been committed by any person against this Act.

and such document is tendered in evidence against the person by whom it is produced or from whom it was seized or against such person and any other person who is jointly tried, or proceeded against, with him, the court, or as the case may be, the adjudicating authority shall notwithstanding anything to the contrary contained in any other law for the time being in force, -

(i) presume, unless the contrary is proved, that the signature and every other part of such document which purports to be in the handwriting of any particular person or which the court or the adjudicating authority may reasonably assume to have been signed by, or to be in the handwriting of, any particular person, is under that person's handwriting, and, in the case of a document executed or attested, it was executed or attested by the person by whom it purports to have been so executed or attested;

(ii) admit the document in evidence notwithstanding that it is not duly stamped, if such document is otherwise admissible in evidence.

4 E. Power to stop and seize conveyances:- Any authorised person may, if he has any reason to suspect that any conveyance or animal is being, or is about to be, used for the transportation of any imported

goods or materials which are liable to confiscation under this Act and that by such transportation any provision of this Act has been, is being, or is about to be, contravened, at any time stop such conveyance or animal or, in the case of an aircraft, compel it to land, and

(a) rummage and search the conveyance or any part thereof,

(b) examine and search any goods or materials in the conveyance or on the animal,

(c) if it becomes necessary to stop any conveyance or animal, he may use all lawful means for stopping it and where such means fail, the conveyance or animal may be fired upon,

and where he is satisfied that it is necessary so to do to prevent the contravention of any provision of this Act or of any control order or condition of any licence or letter of authority, he may seize such conveyance or animal.

Explanation - Any reference in this section to a conveyance shall, unless the context otherwise requires, be construed as including a reference to an aircraft, vehicle or vessel.

4 F. Search and seizure to be made in accordance with the Code of Criminal Procedure, 1973 - The provisions of the Code of Criminal Procedure, 1973, relating to searches and seizures, shall, so far as may be, apply to every search or seizure made under this Act.

4 G. Confiscation:- Any imported goods or materials in respect of which -

(a) any condition of the licence or letter of authority, under which they were imported, relating to the utilisation or distribution of such goods or materials, or

(b) any condition relating to the utilisation or distribution of such goods or materials subject to which they were received from, or through, a recognised agency, or

(c) any direction given under a control order with regard to the sale of such goods or materials,

has been, is being, or is attempted to be, contravened, shall, together with any package, covering or receptacle in which such goods are found, be liable to confiscation, and, where such goods or materials are so mixed with any other goods or materials that they cannot be readily separated such other goods or materials shall also be liable to confiscation.

Provided that where it is established to the satisfaction of the adjudicating authority that any goods or materials, which are liable to confiscation under this Act, had been imported for personal use, and not for any trade or industry, and that they belong to a person other than the person who has, by any act or omission, rendered

them liable to confiscation, and such act or omission was without the knowledge or connivance of the person to whom they belong, such goods or materials shall not be ordered to be confiscated; but such other action as is authorised by this Act may be taken against the person who has, by such act or omission, rendered such goods or materials liable to confiscation.

4 H. Confiscation of conveyance:- Any conveyance or animal which has been is being, or is attempted to be, used for the transport of any imported goods or materials which are liable to confiscation under this Act, shall be liable to confiscation unless the owner of the conveyance or animal proves that it was, is being, or is about to be, so used without the knowledge or connivance of the owner himself, his agent, if any, and the person in charge of the conveyance or animal and that each of them had taken all reasonable precautions against such use:

Provided that in the case of a conveyance or animal used for the transport of goods or passengers for hire, the owner of the conveyance or animal shall be given an option to pay, in lieu of confiscation of the conveyance or animal, a fine not exceeding the value of the imported goods or materials which have been are being, or attempted to be, transported by such conveyance.

4-I.(1) Liability to penalty:- Any person who, -

(a) in relation to any goods or materials which have been imported under any licence or letter of authority, uses or utilises such goods or materials otherwise than in accordance with the conditions of such licence or letter of authority; or

(b) being a person to whom any imported goods or materials have been delivered by recognised agency, uses or utilises such goods or materials or causes them to be used or utilised, for any purpose other than the purpose for which they were delivered to him; or

(c) having made a declaration for the purpose of obtaining -

(i) a licence or letter of authority to import any goods or materials, or

(ii) any amendment of such licence or letter of authority, or

(iii) allotment of any imported goods or materials, is found to have made in such declaration, any statement which is incorrect or false in material particulars; or

(d) acquires, sells or otherwise parts with, or agrees to acquire, sell or otherwise part with, any imported goods or materials in contravention of the conditions of any licence or letter of authority in pursuance of which such goods or materials had been imported; or

(e) acquires, sells or otherwise parts with, or agrees to acquire, sell or otherwise part with, any imported goods or materials in

contravention of the terms of any allotment made by any recognised agency; or

(f) contravenes any direction given under a control order with regard to the sale of goods or materials which have been imported under any licence or letter of authority or which have been received from or through, a recognised agency.

shall be liable to a penalty not exceeding five times the value of the goods or materials, or one thousand rupees, whichever is more, whether or not such goods or materials have been confiscated or are available for confiscation.

Explanation:- For the purposes of this section, "value" has the meaning assigned to it in sub-section (1) of section 14 of the Customs Act, 1962.

(2) If any person abets the commission of any act or omission, which act or omission would render any person liable to a penalty under sub-section (1), or attempts to commit any act aforesaid, the person so abetting or attempting should be liable to a penalty not exceeding five times the value of the goods or materials in respect of which such abetment or attempt has been made, or one thousand rupees, whichever is more whether or not such goods have been confiscated or are available for confiscation.

(3) A penalty imposed under sub-section (1) or sub-section, (2) may, if it is not paid, be recovered as an arrear of land revenue:

Provided that the adjudicating authority may, by order, attach any money belonging to, or owed to, the person on whom any penalty has been imposed under sub-section (1) or sub-section (2), and such attachment shall be made in the same manner in which an attachment is made by a civil court.

4 J. Confiscation or penalty not to interfere with other punishments:- No confiscation made or penalty imposed under this Act shall prevent the infliction of any other punishment to which the person affected thereby is liable under the provisions of this Act or under any other law for the time being in force.

4K. Adjudication:- Any confiscation may be adjudged or penalty may be imposed under this Act, -

(a) by the Chief Controller, or, where he so directs, by a general or special order, by the Additional Chief Controller;

(b) subject to such limits as may be specified in this behalf, by such other officer not below the rank of a Deputy Chief Controller, as the Central Government may, by notification in the Official Gazette authorise in this behalf.

4L. Giving of opportunity to the owner of goods, etc. - No order of adjudication of confiscation or imposing a penalty shall be made unless the owner of the goods, materials, conveyance or animal, or other person concerned, is given a notice in writing -

(i) informing him of the grounds on which it is proposed to confiscate such goods, materials, conveyance or animal or to impose a penalty;

(ii) giving him a reasonable opportunity of making a representation in writing within such reasonable time as may be specified in the notice against the confiscation or imposition of penalty mentioned therein, and, if he so desires, of being heard in the matter.

4M. Appeal:- (1) Any person aggrieved by any decision or order made under this Act may prefer an appeal, -

(a) where the decision or order has been made by the Chief Controller or Additional Chief Controller, to the Central Government;

(b) where the decision or order has been made by any officer below the rank of the Additional Chief Controller, to the Chief Controller or where he so directs, to the Additional Chief Controller.

within a period of forty-five days from the date on which the order is served on such person:

Provided that the Appellate authority may, if it is satisfied that the appellant was prevented by sufficient cause from preferring the appeal within the aforesaid period of forty-five days, allow such appeal to be preferred within a further period of forty-five days:

Provided further that in the case of an appeal against an order imposing a penalty no such appeal shall be entertained unless the amount of the penalty has been deposited by the appellant:

Provided also that, where the Appellate authority is of opinion that the deposit to be made will cause undue hardship to the appellant, it may, at its discretion, dispense with such deposit either unconditionally or subject to such conditions as it may impose.

(2) The Appellate authority may, after giving to the appellant a reasonable opportunity of being, heard if he so desires, and after making such further inquiries, if any, as it may consider necessary, pass such orders as it thinks fit, confirming, modifying or reversing the decision or order appealed against, or may send back the case with such directions as it may think fit, for a fresh adjudication or decision, as the case may be, after taking additional evidence, if necessary:

Provided that an order enhancing or imposing a penalty or confiscating goods or materials of a greater value shall not be made under this section unless the appellant has had an opportunity of making a representation, and, if he so desires, of being heard in his defence.

4N. Powers of revision of the Chief Controller:- The Chief Controller may on his own motion or otherwise, call for and examine the records of any proceeding in which an order or adjudication or confiscation or imposing

any penalty has been made by any officer subordinate to him and against which no appeal has been preferred, for the purpose of satisfying himself as to the correctness, legality or propriety of such order or decision and pass such orders thereon as he may think fit:

Provided that no decision or order shall be varied under this section so as to prejudicially affect any person unless such person -

(a) has, within a period of two years from the date of such decision or order, received a notice to show cause why such decision or order shall not be varied, and

(b) has been given a reasonable opportunity of making representation and, if he so desires, of being heard, in his defence.

4.0. Power of adjudicating and other authorities:- (1) Every authority making any adjudication or hearing any appeal or exercising any powers of revision under this Act shall have all the powers of a civil court under the Code of Civil Procedure 1908, while trying a suit, in respect of the following matters, namely:-

(a) summoning and enforcing the attendance of witnesses;

(b) requiring the discovery and production of any document;

(c) requisitioning any public record or copy thereof from any court or office;

(d) receiving evidence on affidavits; and

(e) issuing commissions for the examination of witnesses or documents.

(2) Every authority making any adjudication or hearing any appeal or exercising any powers of revision under this Act shall be deemed to be a civil court for the purposes of sections 345 and 346 of the Code of Criminal Procedure, 1973.

(3) Every authority making any adjudication or hearing any appeal or exercising any powers of revision under this Act shall have the power to make such orders of an interim nature as it may think fit and may also, for sufficient cause, order the stay of operation of any decision or order.

4 P. Continuance of proceedings in the event of death or insolvency:-
(1) Where a penalty has been imposed by the adjudicating authority and-

(a) no appeal against the order imposing such penalty has been preferred to the Appellate authority and the person entitled to file such appeal dies or is adjudicated an insolvent before the expiry of the period within which the appeal can be preferred, or

(b) an appeal has been preferred to the Appellate authority against the order imposing such penalty but the appellant dies or is adjudicated an insolvent during the pendency of the appeal,

then, it shall be lawful, for the legal representatives of such person or the Official Assignee or the Official Receiver, as the case may be, to prefer an appeal to the Appellate authority, or, as the case may be to continue the appeal before the Appellate authority, in place of such person and the provisions of section 4M shall, so far as may be, apply or continue to apply to such appeal.

(2) The powers of the Official Assignee or the Official Receiver under sub-section (1) shall be exercised by him subject to the provisions of the Presidency Towns Insolvency Act, 1909, or the Provincial Insolvency Act, 1920 as the case may be.

5. Penalty:- If any person contravenes or attempts to contravene, or abets a contravention of, any order made or deemed to have been made under this Act or any condition of a licence granted under any such order, or any authority under which imported goods were received from or through a recognised agency, he shall without prejudice to any confiscation or penalty to which he may be liable under the provisions of the Customs Act, 1962 (52 of 1962) be punishable. -

(a) where the value of the goods, in relation to which such contravention or attempted contravention or abetment of contravention has been made, exceeds ten lakh rupees, with imprisonment for a term which may extend to seven years and also with fine, and

(b) in any other case, with the imprisonment for a term which may extend to three years and also with fine.

Provided that in the absence of special and adequate reasons to the contrary to be recorded in the judgement of the Court such imprisonment shall not be for less than six months.

5 A. Penalty for contravention of order made by adjudicating authority and Appellate authority: - If any person fails to pay the penalty imposed by the adjudicating or the Appellate authority or fails to comply with any direction or order made, or deemed to have been made, under this Act, he shall, upon conviction by a court, be punishable with imprisonment for a term which may extend to two years or with fine or with both.

5 B. Correction of clerical or arithmetical mistakes:- Clerical or arthmetical mistakes in any decision or order or errors arising therein from any accidental slip or omission may, at any time, be corrected by the authority by which the decision or order was made either on its own motion or on the application of the aggrieved person:

Provided that where any correction proposed to be made under this section will have the effect of prejudicially affecting any person, no such correction shall be made except after giving to that person a reasonable opportunity of making a representation in the matter and no such correction shall be made after the expiry of a period of two

years from the date on which such decision or order was made.

6. Cognizance of offences:- No Court shall take cognizance of any offence punishable under section 5 except upon complaint in writing made by an officer authorised in this behalf by the Central Government by general or special order, and no Court inferior to that of a Presidency Magistrate or a Magistrate of the First Class shall try any such offence.

7. No order made or deemed to have made under this Act shall be called in question in any Court, and no suit, prosecution or other legal proceeding shall lie against any person for anything on good faith done or intended to be done under this Act or any order made or deemed to have been made thereunder.

8. Power to make rules:- (1) The Central Government may, by notification in the Official Gazette, make rules for carrying out the provisions of this Act.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:-

(a) the person by whom, and the manner in which, any document received from a place outside India shall be authenticated,

(b) any other matter which is required to be, or may be, prescribed.

(3) Every rule made by the Central Government under this Act shall be laid, as soon as may be after it is made, before each House of Parliament while it is in session for a total period of thirty days which may be comprised in one session or in two more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the rule or both Houses agree that the rule should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule.

APPENDIX -VIII

INDUSTRIAL POLICY RESOLUTION.

The Government of India set out in their Resolution dated 6 April 1948 the policy which they proposed to pursue in the industrial field. The Resolution emphasised the importance to the economy of securing a continuous increase in production and its equitable distribution, and pointed out that the State must play a progressively active role in the development of industries. It laid down that besides arms and ammunition, atomic energy and railway transport, which would be the monopoly of the Central Government, the State would be exclusively responsible for the establishment of new undertakings in six basic industries - except where, in the national interest, the State itself found it necessary to secure the co-operation of private enterprise. The rest of the industrial field was left open to private enterprise though it was made clear that the State would also progressively participate in this field.

2. Eight years have passed since this declaration on industrial policy. These eight years have witnessed many important changes and developments in India. The Constitution of India has been enacted, guaranteeing certain Fundamental Rights and enunciating Directive Principles of State Policy. Planning has proceeded on an organised basis, and the first Five Year Plan has recently been completed. Parliament has accepted the socialist pattern of society as the objective of social and economic policy. These important developments necessitate a fresh statement of industrial policy, more particularly as the Second Five Year Plan will soon be placed before the country. This policy must be governed by the principles laid down in the Constitution, the objective of socialism, and the experience gained during these years.

3. The Constitution of India, in its preamble, has declared that it aims at securing for all its citizens -

> "JUSTICE, Social, economic and political;
> LIBERTY of thought, expression, belief, faith and worship;
> EQUALITY of status and of opportunity; and to promote among them all;
> FRATERNITY assuring the dignity of the individual and the unity of the Nation."

In its Directive Principles of State Policy, it is stated that-

"The State shall strive to promote the welfare of the people by securing and protecting as effectively as it may a social order in which justice, social, economic and political, shall inform all the institutions of the national life."

Further that -

"The State shall, in particular, direct its policy towards securing-

(a) that the citizens, men and women equally, have the right to an adequate means of livelihood;
(b) that the ownership and control of the material resources of the community are so distributed as best to subserve the common good;
(c) that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment;
(d) that there is equal pay for equal work for both men and women;
(e) that the health and strength of workers, men and women, and the tender age of children are not abused and that citizens are not forced by economic necessity to enter a vocations unsuited to their age or strength;
(f) that childhood and youth are protected against exploitation and against moral and material abandonment."

4. These basic and general principles were given a more precise direction when Parliament accepted in December 1954, the socialist pattern of society as the objective of social and economic policy. Industrial policy, as other policies, must therefore, be governed by these principles and directions.

5. In order to realise this objective, it is essential to accelerate the rate of economic growth and to speed up industrialisation and, in particular, to develop heavy industries and machine making industries, to expand the public sector, and to build up a large and growing co-operative sector. These provide the economic foundations for increasing opportunities for gainful employment and improving living standards and working conditions for the mass of the people. Equally, it is urgent, to reduce disparities in income and wealth which exist today, to prevent private monopolies and the concentration of economic power in different fields in the hands of small numbers of individuals. Accordingly, the State will progressively assume a predominant and direct responsibility for setting up new industrial undertakings and for developing transport facilities. It will also undertake State trading on an increasing scale. At the same time, as an agency for planned national development, in the context of the country's expanding economy, the private sector will have the opportunity to develop and expand. The principle of cooperation should be applied wherever possible and a steadily increasing portion of the activities of the private sector developed along cooperative lines.

6. The adoption of the socialist pattern of society as the national objective, as well as the need for planned and rapid development, require that all industries of basic and strategic importance, or in the nature of public utility services, should be in the public sector. Other industries which are essential and require investment on a scale which only the State, in present circumstances, could provide, have also to be in the public sector. The State has, therefore, to assume direct responsibility for

the future development of industries over a wider area. Nevertheless, there are limiting factors which make it necessary at this stage for the State to define the field in which it will undertake sole responsibility for further development, and to make a selection of industries in the development of which it will play a dominant role. After considering all aspects of the problem, in consultation with the Planning Commission, the Government of India have decided to classify industries into three categories, having regard to the part which the State would play in each of them. These categories will inevitably overlap to some extent and too great a rigidity might defeat the purpose in view. But the basic principles and objectives have always to be kept in view and the general directions hereafter referred to be followed. It should also be remembered that it is always open to the State to undertake any type of industrial production.

7. In the first category will be industries the future development of which will be the exclusive responsibility of the State. The second category will consist of industries, which will be progressively State-owned and in which the State will, therefore, generally take the initiative in establishing new undertakings, but in which private enterprise will also be expected to supplement the effort of the State. The third category will include all the remaining industries, and their future development will, in general, be left to the initiative and enterprise of the private sector.

8. Industries in the first category have been listed in Schedule A of this Resolution. All new units in these industries, save where establishment in the private sector has already been approved, will be set up only by the State. This does not preclude the expansion of the existing privately owned units, or the possibility of the State securing the cooperation of private enterprise in the establishment of new unis when the national interests so require. Railways and air transport, arms and ammunition and atomic energy will, however, be developed as Central Government monopolies. Whenever cooperation with private enterprise is necessary, the State will ensure, either through majority participation in the capital or otherwise, that it has the requisite powers to guide the policy and control the operations of the undertaking.

9. Industries in the second category will be those listed in Schedule B. With a view to accelerating their future development, the State will increasingly establish new undertakings in these industries. At the same time, private enterprise will also have the opportunity to develop in this field, either on its own or with State participation.

10. All the remaining industries will fall in the third category, and it is expected that their development will be undertaken ordinarily through the initiative and enterprise of the private sector, though it will be open to the State to start any industry even in this category. It will be the policy of the State to facilitate and encourage the development

of these industries in the private sector, in accordance with the programmes formulated in successive Five Year Plans, by ensuring the development of transport, power and other services, and by appropriate fiscal and other measures. The State will continue to foster institutions to provide financial aid to these industries, and special assistance will be given to enterprises organised on cooperative lines for industrial and agricultural purposes. In suitable cases, the State may also grant financial assistance to the private sector. Such assistance, especially when the amount involved is substantial, will preferably be in the form of participation in equity capital, though it may also be in part, in the form of debenture capital.

11. Industrial undertakings in the private sector have necessarily to fit into the framework of the social and economic policy of the State and will be subject to control and regulation in terms of the Industries (Development and Regulation) Act and other relevant legislation. The Government of India, however, recognise that it would, in general, be desirable to allow such undertakings to develop with as much freedom as possible, consistent with the targets and objectives of the national plan. When there exist in the same industry both privately and publicly owned units, it would continue to be the policy of the State to give fair and non-discriminatory treatment to both of them.

12. The division of industries into separate categories does not imply that they are being placed in water-tight compartments. Inevitably, there will not only be an area of overlapping but also a great deal of dove-tailing between industries in the private and the public sectors. It will be open to the State to start any industry not included in Schedule A and Schedule B when the needs of planning so require or there are other important reasons for it. In appropriate cases, privately owned units may be permitted to produce an item falling within Schedule A for meeting their own requirements or as by-products. There will be ordinarily no bar to small privately owned units undertaking production, such as the making of launches and other light-craft, generation for power for local needs and small-scale mining. Further, heavy industries in the public sector may obtain some of their requirements of lighter components from the private sector, while the private sector in turn would rely for many of its needs on the public sector. The same principle would apply with even greater force to the relationship between large-scale and small industries.

13. The Government of India would, in this context, stress the role of cottage and village and small-scale industries in the development of the national economy. In relation to some of the problems that need urgent solutions, they offer some distinct advantages. They provide immediate large-scale employment; they offer a method of ensuring a more equitable distribution of the national income and they facilitate an effective mobilisation of resources of capital and skill which might otherwise remain unutilised. Some of the problems that unplanned

urbanisation tends to create will be avoided by the establishment of small centres of industrial production all over the country.

14. The State has been following a policy of supporting cottage and village and small-scale industries by restricting the volume of production in the large-scale sector, by differential taxation, or by direct subsidies. While such measures will continue to be taken, whenever necessary, the aim of the State policy will be to ensure that the decentralised sector acquires sufficient vitality to be self-supporting and its development is integrated with that of large-scale industry. The State will, therefore, concentrate on measures designed to improve the competitive strength of the small-scale producer. For this it is essential that the technique of production should be constantly improved and modernised, the pace of transformation being regulated so as to avoid, as far as possible, technological unemployment. Lack of technical and financial assistance, of suitable working accommodation and inadequacy of facilities for repair and maintenance are among the serious handicaps of small-scale producers. A start has been made with the establishment of industrial estates and rural community workshops to make good these deficiencies. The extension of rural electrification and the availability of power at prices which the workers can afford will also be of considerable help. Many of the activities relating to small-scale production will be greatly helped by the organisation of industrial cooperatives. Such cooperatives should be encouraged in every way and the State should give constant attention to the development of cottage and village and small-scale industry.

15. In order that industrialisation may benefit the economy of the country as a whole, it is important that disparities in levels of development between different regions should be progressively reduced. The lack of industries in different parts of the country is very often determined by factors such as the availability of the necessary raw materials or other natural resources. A concentration of industries in certain areas has also been due to the ready availability of power, water supply and transport facilities which have been developed there. It is one of the aims of national planning to ensure that these facilities are steadily made available to areas which are at present lagging behind industrially or where there is greater need for providing opportunities for employment, provided the location is otherwise suitable. Only by securing a balanced and co-ordinated development of the industrial and the agricultural economy in each region, can the entire country attain higher standards of living.

16. This programme of industrial development will make large demands on the country's resources of technical and managerial personnel. To meet these rapidly growing needs for the expansion of the public sector and for the development of village and small-scale industries, proper managerial and technical cadres in the public services are being established. Steps are also being taken to meet shortages at supervisory levels, to organise apprenticeship schemes of training on a large-scale both in public and in

private enterprises, and to extend training facilities in business management in universities and other institutions.

17. It is necessary that proper amenities and incentives should be provided for all those engaged in industry. The living and working conditions of workers should be improved and their standards of efficiency raised. The maintenance of industrial peace is one of the prime requisites of industrial progress. In a socialist democracy labour is a partner in the common task of development and should participate in it with enthusiasm. Some laws governing industrial relations have been enacted and a broad common approach has developed with the growing recognition of the obligations of both management and labour. There should be joint consultation and workers and technicians should, wherever possible, be associated progressively in management. Enterprises in the public sector have to set an example in this respect.

18. With the growing participation of the State in industry and trade, the manner in which these activities should be conducted and managed assumes considerable importance. Speedy decisions and a willingness to assume responsibility are essential if these enterprises are to succeed. For this, wherever possible, there should be decentralisation of authority and their management should be along business lines. It is to be expected that public enterprises will augment the revenues of the State and provide resources for further development in fresh fields. But such enterprises may sometimes incur losses. Public enterprises have to be judged by their total results and in their working they should have the largest possible measure of freedom.

19. The Industrial Policy Resolution of 1948 dealt with a number of other subjects which have since been covered by suitable legislation or by authoritative statements of policy. The division of responsibility between the Central Government and the State Governments in regard to industries has been set out in the Industries (Development and Regulation) Act. The Primer Minister, in his statement in Parliament on 6 April 1949, has enunciated the policy of the State in regard to foreign capital. It is, therefore, not necessary to deal with these subjects in this resolution.

20. The Government of India trust that this restatement of their Industrial Policy will receive the support of all sections of the people and promote the rapid industrialisation of the country.

APPENDIX-IX

LIST OF INDUSTRIALLY BACKWARD AREAS.

1. Andhra Pradesh

Srikakulam District and 5 'Areas': Two 'areas' from Rayalaseema region comprising 22 blocks

Area I, comprising 13 blocks viz., Chittoor, Bangarupalam, Pulicherla, Pattur, Chandragiri and Kalahasthi (from Chittoor Distric) and Kodur, Rajampet, Sidhout, Cuddapah, Kamalapuram, Praddatur and Pulivendla (from Cuddapah district).

Area II, Comprising 9 blocks viz., Tadpatri, Singanamala, Gooty, Kudair (from Anantapur district) and Dhone, Kurnool, Banganapalli, Nandyal and Giddalur (from Kurnool district).

Three 'areas' from Telangana region comprising 43 blocks:

Area I, comprising 14 blocks viz., Mahabubnagar, Jedchela, Shadnagar, Kalwakurthy and Amangal (from Mahaboobnagar district) and Nalgonda, Mungadi, Nakrekal, Suryape Kodad, Kuzurnagar, Mirgalaguda, Peddavora and Devarakonda (from Nalgaonda district).

Area II, comprising 14 blocks viz., Khammam, Thirumalaipalem, Kallur, Yellandu, Kothagudem, Aswaraopeta, Buragampad and Bhadrachalam (from Kammam district) and Mahabudabad, Narsampet, Hanamkonda, Ghanapur, Jangaon and Mulug (from Warangal district).

Area III, comprising 15 blocks viz., Zaheerabad, Patancheruvu, Narsapur, Medak, and Siddipet (from Medak district), Yedapalli, Nizamabad, Kamareddy and Domakonda (from Nizamabad district), and Sircilla, Karimnagar, Sultanabad, Peddapalli, Manthani and Huzurabad (from Karimnagar district).

2. Assam.

Goalpara, Mikir Hills, Kamrup, Nowgong, Cachar and New Lakhimpur districts.

3. Bihar

Bhagalpur, Darbhanga, Champaran, Palamau, Saharasa and Santhal Parganas districts.

4. Gujarat

Panchmahals, Broach and Surendranagar districts.

5. Haryana

Reorganised Mohindergarh district (comprising Mohindergarh and Rewari sub-divisions), Bhiwani district (comprising Bhiwani and Dadri sub-divisions) and one 'area' comprising 8 blocks viz., Hissar Block No. I and Barwala Block (of Hissar Tehsil), Hansi Block No.1 (from Hansi Tehsil), Bahuna Block from Fatehabad Tehsil), Tohana Block/Tehsil from (Tohana Tehsil) - from district of Hissar - Jind Block and Julana Block (from Jind Tehsil), Uchana Block (Narwana Tehsil) from the district of Jind.

6. Himachal Pradesh

Kangra, Chamba, Kulu, Sirmur and Solan districts.

7. Jammu & Kashmir

Jammu, Srinagar, Anantnag, Doda, Baramulla and Poonch districts.

8. Karnataka.

Raichur, Mysore and Dharwar districts.

9. Kerala.

Alleppey, Cannanore and Malapuram districts.

10. Madhya Pradesh

Six 'Areas':

Area - I (from Eastern Region) comprising 12 blocks viz., Korba, Baloda, Champa, Kota, Masturi and Bhilha (Bilaspur) Block (from Bilaspur district), Bhatapara, Simga Tilda, Dharsiwa (Raipur) Abhanpur and Rajim Blocks (from Raipur district).

Area - II (from Western Region) comprising 10 Blocks viz., Dewas and Tonk Khurad block (from Dewas district), Gulana, Shujalpur and Shajapur blocks (from Shajapur district), Panchor (Sarangpur) and Biaora block (from Rajgarh district) and Chachaura, Raghogarh and Guna blocks (from Guna district).

Area - III (from Northern Region) comprising 9 blocks viz., Shivpur and Karera (from Shivpuri district), Datia and Seondha (from Datia district), Bhind, Mahgaon and Gohad (from Bhind district) and Morena & Jaura (from Morena district).

Area - IV. (from Central Region) comprising 11 blocks viz., Bina - Itawa, Khuri and Banda (Binaika), Rahatgarh, Sagar, Shahgarh (Amarmau) (from Sagar district), Tikamgarh & Baldeogarh (from Tikamgarh district), Vidisha and Gyaraspur (from Vidisha district) and Chhatarput (from Chhatarpur district).

Area - V (from Western Region - II) comprising 12 blocks viz., Potlawad & Meghnafar (from Jhabua district), Badnawar, Dhar and Nalchal (from Dhar district), Maheshwar and Barwaha from Khargone district), Mandsaur, Malhazgarh & Nemuch (from Mandsaur district).

Area - VI. (from North - Eastern Region) comprising 11 Blocks viz., Rewa & Raipur (garh) (from Rewa district), Majhauli, Sidhi, Doosar & Waidhan (from Sidhi district), Sonhat, Kaikunthpur, Manendargarh, Surajipur & Amikapur (from Sarguja district).

11. Manipur

All the districts.

12. Meghalaya

Garo Hills and United Khasi & Jaintia Hills.

13. Maharashtra

Ratnagiri, Aurangabad and Chandrapur district.

14. Nagaland

Kohima, Mekokchung, Tuensang districts.

15. Orissa

Kalahandi, Mayurbhanj, Bolangir, Dhenkanal, Keonjhar and Korapur districts.

16. Punjab

Hoshiarpur, Sangrur and Bhatinda districts.

17. Rajasthan

Alwar, Jodhpur Bhilwara, Chruru, Nagaur and Udaipur Districts.

18. Sikkim

Gangtok, Mangan, Gyalshing and Namchi districts.

19. Tamilnadu

Three 'Areas'/Tracks comprising 33 Taluks:

Area - I Comprising 12 Taluks (including sub-taluks) viz., Ramanathapuram, Mudhukulathur, Sivaganga, Parmakudi, Thiruvadani, Thirupathur Taluks Kairaikudi (from Ramanathapuram district), Melur Taluks from Madura district), Pudukkotai, Thirumayam, Alamgudi and Kulathur Taluks (from Pudukkotai district).

Area - II comprising 11 Taluks, viz., Dharampuri, Palacode Hosur, Denkuikottah Krishnagiri, Uthangaria Harur (from Dharmpuri district), Thirupattur, Vaniyambadi, Vellore and Walajapet (from North Arcot district).

Area - III comprising 10 Taluks viz., Arupukkotai, Sattur, Virudhunagar, Sriviliputtur, Rajpalayam (from West Ramanathapuram of Ramanathapuram district), Tirumanagarlam, Usilamapatti, Nilakothai, Dindigul and Vedasndur (from Maudrai district).

20. Tripura

All the 3 districts.

21. Uttar Pradesh

Ballia, Jhansi, Almora, Basti, Faizabad and Rae Bareli districts.

22. West Bengal

Purulia, Midnapur and Nadia districts.

UNION TERRITORIES:

1. Andaman & Nickobar Islands

Entire Territory

2. Arunachal Pradesh

Entire Territory.

3. Dadra & Nagar Haveli

Entire Territory.

(4) Goa, Daman & Diu

Entire Territory excluding the area within the municipal limits of Territory's Capital.

(5) Lakshadeep.

Entire Territory.

(6) Mizoram

Entire Territory.

(7) Pondicherry.

Entire Territory excluding the area within the municipal limits of Territory's capital.

APPENDIX X

ITEMS PERMITTED FOR IMPORT UNDER THE OPEN GENERAL LICENCE

	Items	Categories of Eligible Importers
1.	Raw materials and components, non-iron and steel, other than those banned and restricted.	Actual Users (Industrial)
2.	Iron and Steel items other than those banned and restricted.	Actual Users (Industrial)
3.	Capital goods of permissible machine tools, presses, testing machines, plant and machinery for oil exploration, machinery for garment and hosiery industry leather processing and finishing dental equipment, studio equipment and machinery for tea industry.	Actual Users (Industrial and non-industrial)
4.	Permissible spare parts. (Details of banned, restricted and permissible items are given in the import control policy book)	Actual Users (Industrial and non-industrial)
5.	Raw Materials, components and consumables, equipment, instruments, accessories and spares	Research and Development units scientific or research laboratories, institutions of higher education and hospitals recognised by the Central or a State Government.
6.	Instruments and equipment required by the blind, including Braille typewriters.	By all persons.
7.	Teaching Aids, the following: i) Microfilms and Microfiches of educational nature; ii) Records for learning of languages; and iii) Pre-recorded cassettes of educational nature, with or without film strips.	Recognised educational, scientific, technical and research institutions, libraries of such institutions, Centre or State Government departments, Industrial units engaged in Research and Development work, registered medical institutions, hospitals, consultants, recognised Chambers of Commerce, Productive Councils, management associations and professional bodies.

Items	Categories of Eligible Importers
8. Edible oils/seeds, the following: i) Ground-nut oil/seeds. ii) Sunflower oil/seeds. iii) Soyabean oil/seeds. iv) Rapeseed oil/seeds. v) Palm Oleine/Palm seeds. vi) Safflower oil/Safflower(Kardi) seeds. vii) Copra.	By all persons.
9. Educational, scientific and technical books and journals, news-magazines and newspapers.	By all persons.
10. Wattle extract/Bark for tanning including wattle bark.	By all persons.
11. Pickled hides, skins, pelts, splits and parts thereof.	By all persons.
12. Hides and skins, raw or salted where the value of hides and skins is more than that of wool/hair thereon.	By all persons.
13. Quebracho extract, chestnut extract and modified eucalyptus extract (Myrtan).	By all persons.
14. Life saving equipment and other drug preparations.	By all persons.
15. Family welfare equipment/instruments, appliances, namely the following:- i) (a) Laproscope; (b) Culdscope; (c) Hysteroscope; (d) Vaccum Suction apparatus; (e) as well as their accessories and spares; and ii) Rubber contraceptives (diaphragms only).	By all persons.
16. Anti-Cancer drugs	By all persons.
17. Homoeopathic medicines in finished form or Homoeopathic drugs (single) in basic form and/or of any potency, including "Sugar of Milk" in bulk and bio-chemic medicines.	By all persons.

Items	Categories of Eligible Importers
18. Crude drugs required for making Ayurvedic and Unani medicines (Import of jade, pearls, and corals will be allowed only in powder form and of non-jewellery quality only).	By all persons.
19. Hearing Aids batteries excluding type UM-3/IR-6.	By all persons.
20. Pulses	By all persons.
21. Spices, the following:- i) Cinnamon/Cassia. ii) Nutmeg/mace. iii) Clove.	By all persons.
22. Dry fruits excluding cashewnuts.	By all persons.
23. Dates.	By all persons.

APPENDIX XI

LIST OF SPONSORING AUTHORITIES FOR IMPORT LICENCES.

	Industry	Sponsoring Authority
1.	Scheduled industries borne on the registers of DGTD	D.G.T.D.
2.	All SSI units	Director of Industries of the concerned State.
3.	Cinematographic/Studio equipment	Films Division, Bombay.
4.	Coffee Industry/Plantations	Chairman, Coffee Board, Bangalore.
5.	Collieries	Coal Controller, Calcutta.
6.	Coir Industry (including rubberised coir products)	Chairman, Coir Board, Ernakulam.
7.	Cold Storages (for Horticultural products)	Agricultural Marketing Adviser, Govt. of India, Faridabad.
8.	Cardamom plantations	Cardamom Board, Ernakulam.
9.	Computer systems (including their spares)	Department of Electronics, New Delhi.
10.	Explosives	Chief Inspector of Explosives, Nagpur.
11.	Fishery industry (including cold storage facilities for other than seagoing vessels)	State Director of Fisheries.
12.	Fishing trawlers	D.G.T.D.
13.	Fruits and vegetable preservation industry	Executive Director (Department of Food and Nutrition Board), New Delhi.
14.	Handlooms	State Director of Handlooms.
15.	Handicrafts	All India Handicrafts Board.
16.	Irrigation Projects	Central Water Commission, New Delhi.
17.	Jute industry, Rope industry using sisal or manila fibres, jute-textile engineering industry and wooden accessory industry for jute mills.	Jute Commissioner, Calcutta.

Industry	Sponsoring Authority
18. Mines (other than collieries)	Controller, Indian Bureau of Mines, Nagpur.
19. Newspaper establishments	Registrar of Newspapers for India, New Delhi.
20. Petroleum Industry	Ministry of Petroleum, Chemicals & Fertilisers, New Delhi.
21. Pharmaceutical industry and cosmetics (including tooth powder) industry :	State Drugs Controller (or other such authority of the State Government).
22. Power supply and distribution undertakings:	Central Electricity Authority, New Delhi.
23. (a) All Integrated Steel Plants & Alloy Steel Plants under Steel Authority of India Ltd.	Steel Authority of India Ltd., New Delhi.
(b) Integrated Steel Plants other than those mentioned in (a) above	Iron and Steel Controller, Calcutta.
(c) All other producers of Iron & Steel, rolling mills, re-rolling mills, wire drawing units, ferro alloy producers excluding units registered with the (State) Directors of Industries or borne on the list of the DGTD.	
24. Printing establishments, publishers, cinema houses, construction agencies, film studios, advertising agencies, service stations and other maintenance workshops.	State Director of Industries (who may, if necessary, consult other technical experts of the State Government).
25. Rubber plantations	Chairman, Rubber Board, Kottayam.
26. Sugar Industry	Chief Director of Sugar, Deptt. of Food, New Delhi.
27. Silk Industry/Sericulture	Central Silk Board, Bombay.
28. Shipping Industry/Shipping Companies	
(a) Sea-going vessels	Director General of Shipping, Bombay.
(b) Inland steam and motor vessels	Principal Officer, Mercantile Marine Department of the area concerned.

Industry	Sponsoring Authority
29. Salt Industry	Salt Commissioner, Government of India, Jaipur.
30. (a) Textile Industry other than jute, hemp and silk. (b) Textile engineering industry (c) Powerlooms (d) Readymade garments (other than hosiery).	Textile Commissioner, Bombay.
31. Tea industry/Plantations	Chairman, Tea Board, Calcutta.
32. Vanaspati	Department of Civil Supplies and Co-operation, New Delhi.
33. Units including cottage industry and A.U. (Non-industrial) - service/ maintenance/jobbing units, for which no sponsoring authority has been specifically mentioned above.	State Director of Industries or any other concerned Department of State or Central Government.

APPENDIX XII

LIST OF REGIONAL LICENSING AUTHORITIES.

S.No.	Licensing authorities	Jurisdiction
1.	The Joint Chief Controller of Imports and Exports, 4, Esplanade East, Calcutta.	West Gengal, Sikkim and Union Territory of Andaman & Nicobar
2.	The Joint Chief Controller of Imports and Exports, New Central Govt. Offices Bldg., S.E. Wing, New Marine Lines, Churchgate, Bombay-400001.	: Maharashtra.
3.	The Joint Chief Controller of Imports and Exports, Customs House, Madras.	Tamil Nadu and Union Territory of Pondicherry, Karikal, Mahe and Yaman.
4.	The Joint Chief Controller of Imports and Exports, Central Licensing Area, Indraprastha Bhavan, 'A' Wing, New Delhi.	Delhi, Haryana and five district of Uttar Pradesh, namely, Meerut Ghaziabad, Bulandshahr, Muzaffarnagar and Saharanpur.
5.	The Joint Chief Controller of Imports and Exports, 7/194, Swaroop Nagar, Kanpur-2.	Uttar Pradesh except those areas which are under the jurisdictior of the Joint Chief Controller of Imports & Exports, C.L.A., New Delhi.
6.	The Joint Chief Controller of Imports and Exports, Premises No. 11-6-860, Red Hills, Hyderabad.	Andhra Pradesh.
7.	The Joint Chief Controller of Imports and Exports, Syndicate Bank Building, P.B.No. 9688, Gandhi Nagar, Bangalore-9.	Karnataka.
8.	The Joint Chief Controller of Imports and Exports, Multi-storyed Offices Building, Near Lal Darwaja, Ahmedabad.	Gujarat State excluding distri of old Bombay State which were formerly known as Kutch and a now included in Gujarat State (including new Kandla Free Trade Zone)
9.	The Deputy Chief Controller of Imports and Exports, T.D.Road, Ernakulam, Cochin.	Kerala State and Union Territ of Lakshadweep.
10.	The Deputy Chief Controller of Imports and Exports, IIIrd Floor, Guru Teg Bahadur Complex, New Market, Bhopal.	Madhya Pradesh.

S.No.	Licensing authorities	Jurisdiction
11.	The Deputy Chief Controller of Imports and Exports, CBR Building, Mall Road, Amritsar.	i) Seven districts of Punjab, namely, Amritsar, Ferozepur, Gurdaspur, Jullundur, Ludhiana, Kapurthala and Hoshiarpur ii) Issue of licences to registered importers, who have opted to obtain their licences from him for imports from Afghanistan.
12.	The Deputy Chief Controller of Imports and Exports, Jaipur (Rajasthan).	Rajasthan.
13.	The Deputy Chief Controller of Imports and Exports, Gauhati	Assam, Arunachal Pradesh, Negaland, and Manipur.
14.	The Controller of Imports and Exports, Morele Building, Shillong.	Meghalaya.
15.	The Controller of Imports & Exports, Ashirwad Building, Panjim (Goa).	Goa, Daman and Diu and Dadra and Nagar Haveli.
16.	The Controller of Imports and Exports, Srinagar.	Jammu & Kashmir, (Note-During winter, a camp office will function at Jammu (Exhibition Grounds), for seven days in each month as per announcement to be made from time to time by Controller of Imports & Exports, Srinagar).
17.	The Controller of Imports & Exports, Agartala.	Tripura and Mizoram.
18.	The Controller of Imports & Exports, Administrative Bldg., Kandla Free Trade Zone, Gandidham (Kutch).	Districts of old Bombay State which were formerly known as Kutch and are now included in Gujarat State (including new Kandla Free Trade Zone)
19.	The Controller of Imports & Exports, Patna.	Bihar.
20.	The Controller of Imports & Exports, Chandigarh.	Union Territory of Chandar, Himachal Pradesh and five dists. of Punjab, namely, Sangrur, Patiala Rupar, Faridkot and Bhatin-da.
21.	The Controller of Imports & Exports, Cuttack.	Orissa.
22.	The Deputy Development Commissioner, (Imports & Exports), Electronics Exports Processing Zone, Santa Cruz, Bombay.	In respect of units situated in the Electronics Export Processing Zone, Santa Cruz, Bombay (SEEPZ).

CHAPTER X

PERFORMANCE APPRAISAL AND ACCOUNTABILITY.

Introduction

The performance of any organisation will be determined for the most part by the skill with which its activities are managed. A capable managerial staff is obviously very important to the success of the organisation. For this reason the selection, training and appraising are usually considered to be very critical functions. But selecting and grooming good managers is not as easy as it sounds, for most managers are made, not born.[1] Thus even more important than selection to the success of the organisation is the development of improved skills in persons who hold leadership positions in the organisation.

In this chapter different aspects of appraisal and control methods to improve job performance in the materials management area, the feed back appraisal of how well the department is doing, evaluation of activities, buying

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1. Managers acquire their ability and leadership qualities generally from their general, technical and commercial education and training in management. In exceptional cases, some managers are born with these virtues and qualities. In this connection see Koontz, Harold and O'donnell Cyril, Principles of Management, New York, McGraw Hill Book Co., Inc. 1955. p. 319.

proficiency, efficiency of personnel, composite audit, performance factors and other areas are discussed and after comparing these to the practice followed in the organisations studied, conclusions have been reached.

Need for Performance Appraisal

A review of past performance can predict the line of future performance. Besides a feed back[1] of the past performance is necessary to knowhow well each individual, department or organisation is doing. It enables proper guidance to correct the situation wherever needed. Regular progress reports on the activities lead to some kind of discussion as and when the objectives are set and reviewed. When there is need for modifying the objective, reasons given must be sound and convincing. In any case discussions between individual employees and their superiors must occur quite often and reviews should take place at least every quarter.

Every manager should know whether his department is performing well on the lines of set objectives and targets and how he has to act in case it is not doing well. One of the ways he can effectively adopt is through appraisal

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1. 'Feedback' is the communication of information concerning the status of performance of an individual or programme that must take corrective action. See Barnes, Ralph M., Motion and Time Study - 3rd ed. New York, John Wiley and Sons, Inc., 1949, p. 127.

and control which is the progressive management process. The manager may delegate and sub-delegate responsibility and authority but he is still responsible for seeing that the job is done properly. To fulfil this responsibility a system of control is necessary. He should appraise each of his subordinates so that their performance can be controlled and rectified before it causes any serious damage. This will also help in self control and better overall performance, since he is aware of the level of performance expected. When each individual willingly and consciously exercises control over his performance, the total operation becomes relatively easy.

However, the performance appraisal programme is hard to practice. It certainly makes good sense to expect that if a man is going to improve his present performance, he must have information about his past performance. Moreover it stands to reason that most people would like to perform as well as they can. Therefore if a person is not performing upto expectation, he could well use some advice and counsel on how he might improve.

Unfortunately in practice most performance appraisal programmes do not work out as well as it seems they should. Performance discussions are likely to be awkward and strained, especially if attempts are made to correct some faults seen in the performance. A way of avoiding such discussions is to impose controls to ensure performance because

even highly trained specialists find attempts to change a person's behaviour through counselling an extremely delicate and difficult task.

Although appraisal and counselling are difficult, the subordinates on the other hand at any level in the organisation have some needs in the work assignment[1] area which coaching or counselling would seem to fulfil. Mainly the needs are of four kinds:

1. What is expected of me? A general framework of expectations is provided through job description and position guide of the post. Normally this is not enough because the employee needs to know on what specific goals he should focus his energies, what kinds of priorities he should give to various tasks and which deadlines must be met. It is therefore found that often employees say in a survey that they really do not have a clear idea of just what is expected of them.
2. How am I doing? Almost everyone likes to know whether he is performing upto expectations. One would of course like to hear that he is

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1. Work assignment area refers to the specification of the general functions and duties to be performed by an individual in doing certain kinds of work on certain kinds of operations and projects that are normally assigned to him. See Maier, Norman R.F., The Appraisal and Interview, New York, John Wiley & Sons, Inc., 1958, p. 98.

doing well in every case but if he is not, he wants to know why not. Very often he would like information about his present performance in order to define performance expectations more clearly. In fact if expectations are defined clearly enough, the individual can get his own feedback and no one else need tell him whether or not he is meeting his commitments.

3. What does management think of me? Most employees would like to have some general appraisal information over and above the feed back about present job performance. They want to know how they are regarded generally in the organisation, not just by their immediate superior but by the chief executive. They would like to know whether they have any chance to higher management positions or as good, steady and dependable performers or as outstanding specialists or perhaps as over the hill.

4. Where can I go from here? Most managers and other senior personnel would like to know what the future holds, what are the various possibilities for advancement, what are the odds in getting one of the better jobs and how to

maximise chances of being given greater power and responsibility.

There is no ready-made formula or programme that managers can use to acquire all the information needed regarding a subordinates performance and potential. No single programme can serve all needs and an approach that serves one of the needs best is often not well suited to any other needs. However, it will be helpful if the appraisal discussions are focussed on the work to be done and not on the individuals. Besides a participative approach as an effective two way process on equal man to man exchange will also be beneficial. In this programme, the individual formulates his own goals, reviews them with his manager and makes changes that they agree upon and then the two working together review and recycle these from time to time.

Most managers spend a good deal of their time in planning activities. Instead of the routine work planning approach, a more systematic and highly programmed approach which calls for agreements on specific work plans and goals with result measurements agreed upon in advance and set deadlines is desirable, in serving the first two needs mentioned above.[1]

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1. Performance evaluation ensures job satisfaction to some extent. See Kellogg Marion J., Closing the Performance Gap, American Management Association, New York, 1967, p. 17.

A good work planning programme starts with the overall objectives of the business and gets translated into specific plans for the organisation as a whole for a specific time period, usually formulated annually in connection with budgeting. The overall business plans next get translated into plans for specific components, organisations or work groups. Component plans then get translated into specific work plans and goals for individuals in the work groups. The job description for each manager should play an important part in determining what aspects of the component plan he will assume responsibility for. Individual capabilities will also play an important part in defining individual responsibilities. Figure XIX illustrates this planning cycle.

A sample of work plans and goals for the inventory control manager is shown in Figure XX. Here the manager has done more than just describe some projects that he will work on and set definite targets for himself in terms of percentage improvements which he intends to realise in each area by target dates.

Methods of Performance Control

Budgetary controls are one of the most effective methods to control performance. Annual material budgets are prepared assigning targets and objectives in every company based on actual requirements of materials to meet the production targets. This budget is adjusted subsequently according to the actual targets achieved. Every

FIGURE ~~XIX~~

MANAGEMENT INFORMATION SYSTEM

BUSINESS PLANNING PROCEDURE

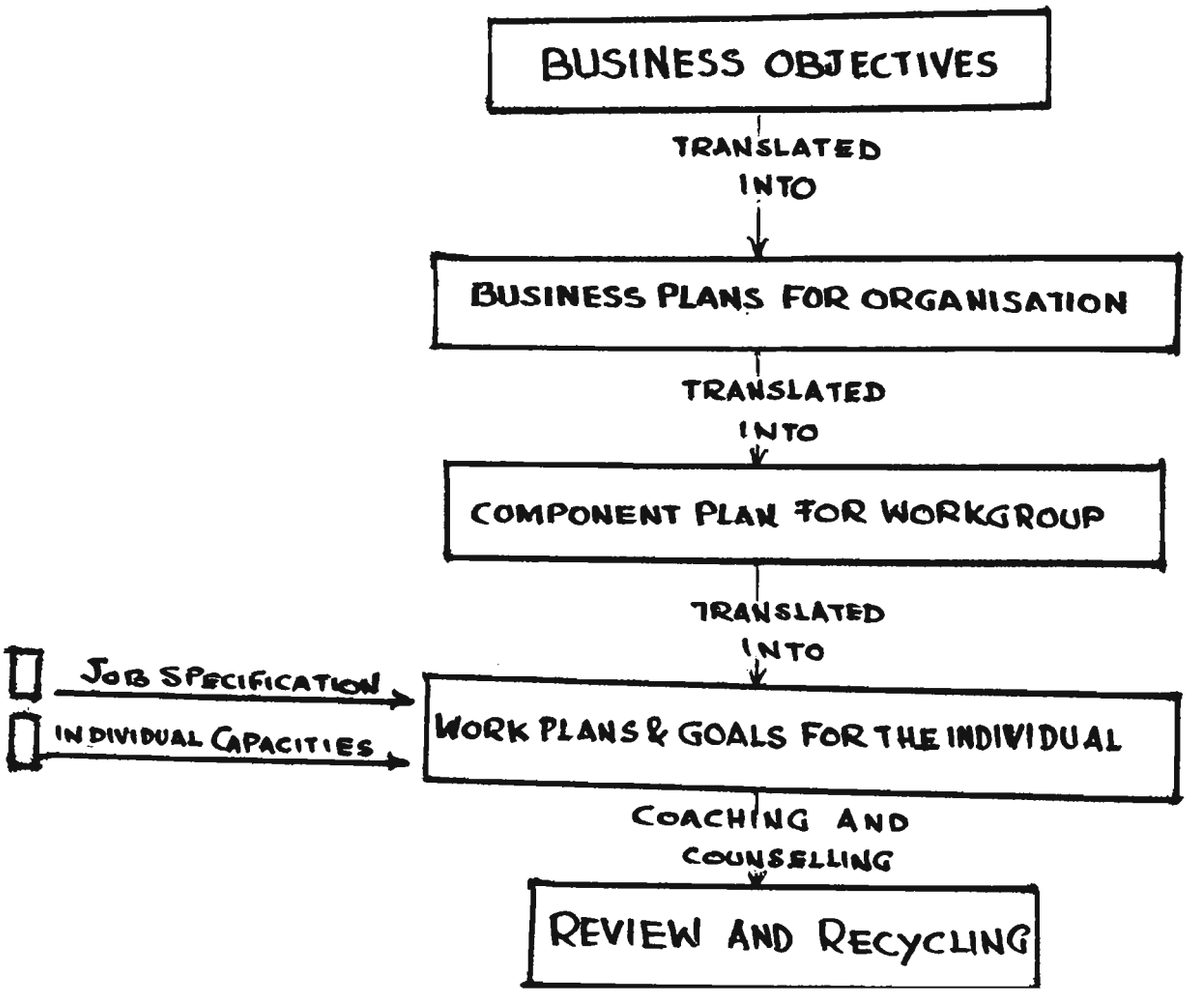

FIGURE XX.

SAMPLE WORK PLANS AND GOALS

FOR

MANAGER INVENTORY CONTROL

1. GOAL: Improve System for identifying parts stock.

   Measurement: Complete re-design of system and pilot test of Procedures by 16 - 1.
   Make it completely operational by 18 - 1.

2. GOAL: Re-arrange parts areas to economise on space and expedite orders.

   Measurement: Make available 25% of presently used space.
   Complete re-arrangements by:
   J. Series items by 26 - 1.
   Electricals by 28 - 1.
   Tool items by 31 - 1.
   All other areas by 5 - 2.

3. GOAL: Improve parts inventory Control.

   Measurement: Reduce back orders by 40%.
   Bring back order list down from 50 to 30.
   Reduce interim orders by 50% (From 4 per month to 2.)
   Remove overstock (Inventory should come down by 12%)

   Complete project. by 28 - 2.

effort is made by these organisations to achieve the original targets, but always some uncontrollable factors interfere and obstruct performance as scheduled. Some of these factors are industrial unrest, scarcity of raw materials, shortage of foreign exchange, failure on the part of suppliers and strikes and lockouts at the suppliers works.

The budget balances the planned allocation of expenses with forecasted income, during a specified period of time. The materials manager prepares a budget for every sphere of his activity to meet the requirement of manpower, equipment, raw materials, components, consumables, accessories, construction materials and spares for production and maintenance. Requirement of salary, wages and estimated expenses for postage, stationery, travelling and other incidentals covered by the operating expenses are also incorporated into the total company budget.

The materials budget will be based on sales forecasts and the same is broken down into a monthly requirement of working capital. Each month the actual expenditure is compared with the budget and if there is any variance, it can be checked up and adjusted. The variance may be due to material usage or material price. The materials manager evaluates the performance of his departments and sections for the purpose of determining whether his organisation is moving towards the objectives, according to

the pre-determined plans. This evaluation helps perform the function of control. Without evaluation of performance drifts could occur which may seriously affect the economy of the organisation.

Evaluation can be done by someone from inside or outside the organisation or by systems experts who have experience in this type of evaluation of performance. Each individual is accountable for his performance and promotions and other elevations in the organisation are given purely on the basis of such gradation.

Pre-action and Post-action Controls

Pre-control can be through proper supervision, pre-checks and procedures while post action control is through appraisal, feedback and comparison with the targets and achievements. An effective control system permits the rule of management by exception,[1] which concentrates on those situations requiring corrective or commendatory action, from the diagnosis of the cause of deviation from the desired performance. The most important phase of managerial control is the diagnosis of the cause of deviation and the ease with which corrective action is

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1. Management by exception technique high lights the relatively few areas requiring further investigation where deviations from the set targets have occurred, instead of searching through the entire operations. See Argyris Chris, Executive Leadership; An Appraisal of a Manager in Action, New York, Harper and Brothers, 1953. p. 143.

effected. This depends upon how precisely, responsibility for the problem can be traced to a specific work group or a particular individual, which in turn depends on the organisational structure and the operating procedures developed.

Every materials manager should develop a carefully structured and continuing programme for appraising the performance of his personnel and his department. Haphazard and in-consistent evaluation is more disastrous to the morale of the department and therefore this must properly be conducted at least once a year so that such a programme will help to provide information:

1) To evaluate selection and training programmes
2) To determine the most deserving for promotions
3) To develop a fair salary structure and
4) To help in the development of all employees.

The evaluation data would also give the strengths and weaknesses of each employee and based on it, a realistic professional improvement programme can be developed.

Appraisal Concepts for Personnel.

The main factors usually selected are as follows:

1) The quality and quantity of work
2) Job knowledge and performance:
   a) Proficiency in the job b) Attendance
   c) Punctuality d) Safety habits and
   e) Good housekeeping.

3) Individual characteristics:

a) Co-operativeness
b) Dependability
c) Initiative
d) Intelligence
e) Accuracy
f) Industriousness
g) Adaptability
h) Attitude
i) Personality
j) Judgement
k) Application
l) Leadership
m) Conduct
n) Resourcefulness
o) Health
p) Neatness
q) Appearence
r) Enthusiasm and
s) Potential.

These factors which are related to the specific job responsibilities[1] are only chosen for appraisal. From the list of items, the most essential group factors can then be selected and developed.[2]

In addition to the immediate supervisor, a second supervisor also evaluates the same candidate. In some cases evaluation is done by a committee. Though it is time consuming, it will have the advantage of rating from members outside the employee's department with whom he has contact.

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1. A specimen Merit and Ability Evaluation form is shown in Table XX.

2. For details on the effects of Performance Appraisal on personnel development see McGregor Douglas, An Uneasy Look at Performance Appraisal, Harward Business Review, May-June, 1957, p. 31.

TABLE XX.

PERSONNEL RATING FORM

MERIT AND ABILITY EVALUATION

Name: .....

Department:.....

Date employed:.....

	Circle the Appropriate Number Refer to Merit Evaluation Guide for Complete Instructions before rating.									
	Low	Bel. Av.			Average				Above Av.	High
1. Accuracy of work	1	2	3	4	5	6	7	8	9	10
2. Use of working time	1	2	3	4	5	6	7	8	9	10
3. Ability to learn	1	2	3	4	5	6	7	8	9	10
4. Ability to work with others.	1	2	3	4	5	6	7	8	9	10
5. Quantity of work	1	2	3	4	5	6	7	8	9	10
6. Initiative	1	2	3	4	5	6	7	8	9	10
7. Dependability and acceptance of responsibility.	1	2	3	4	5	6	7	8	9	10
8. Conduct on the job	1	2	3	4	5	6	7	8	9	10
9. Punctuality and attendance.	1	2	3	4	5	6	7	8	9	10
10. Orderliness	1	2	3	4	5	6	7	8	9	10

Comment:

Rated by: .....Date:.....

(Courtesy National Cash Register Company, U.S.A.)

Besides the consensus of a group is better than that of an individual. For the rating to be meaningful, the raters must be fully qualified, must be familiar with the work of the employee and must be trained in the appraisal work.

In some cases the employee is consulted, so that they know where they stand and get a feed-back. This will also add up the feeling of security and confidence of the employee in his work. The most beneficial thing arising out of an appraisal programme, is the development of a professional improvement plan for each person, which can hardly be realised unless the weak points are dealt with and courses of action are suggested for improvement.

Appraisal of the Departmental Performance.

The main areas of enquiry are:

1) How important is purchase in the eyes of the management? What is the organisational structure of the department and to what extent does it participate in make or buy and other cost reduction programmes?
2) Evaluation of materials people: Are they qualified, do they understand economic and business intricacies of the company and industry, are they management trained, have they knowledge of material processes and are they aware of sources of supplies and markets?

3) Organisational structure of the department: Are all purchasing centralised, lines of authority and responsibility defined, is the delegation fair enough, are the activities logically grouped for smooth operation, is co-ordination and control adequate, has the department adequate job description for fixing qualifications for individuals and is there adequate planning to meet future needs?

4) Personnel: Do qualifications match job requirements before recruitment, what is the selection criteria, what job training and professional development training is given, what personnel planning is done, are compensation levels adequate to retain good personnel and is the employee turnover ratio reasonable?

5) Policies and procedures: Is there a written purchase policy, is there a research cell for economic research, commodity and the systems research, is there ABC consideration, is there a budget, is there forward and speculative buying, is there vendor rating, use of price-cost negotiation and use of multiple sources, are all forms designed to be simple and effective, is purchase co-ordinated with users, are material departments integrated, are procedures adequate to expedite receiving activity and settling claims for loss and damages,

are there stores procedures for inspection, storing and issuing?

6) Capital purchases: Are equipment purchases evaluated, is inventory control, economic order quantity, safety stock and probability concepts practised?

7) Are there proper reports and records: For control purposes, what reports are made to management, how often are they made and is there control by exception?

Buying proficiency control: This depends on the following:

1) Percentage of overdue orders
2) Stock outs by late deliveries, number of production stoppages due to late supplies
3) Stockouts and stoppage of production due to buying of small quantities
4) Chart to show inventory targets, actuals and imbalances
5) Dead stock report (obsolete and non-moving) and
6) A list of materials stocked by vendors to reduce inventory levels.

Controlling of material prices can be done by maintaining standard or target prices and limiting material cost by budget prices. Average price and cost of material content is a measure. Cost saving can also come from negotiation, value analysis, material changes, vendor suggestion, packaging improvements, transportation cost reductions and

gains from forward buying activities. A list of orders issued without firm prices, must also be examined as a basis of cost control.

Quality control measures must be checked from percentage rejections either part or complete rejections. Material defects and labour defects are possible indicators of vendor performance.

Control on source reliability can be achieved through the assessment of:

1. Percentage of rejections and number of late deliveries
2. Percentage of incorrect material supplies, incorrect quantities and split supplies and
3. Quality of transportation, transit delays and damages.

Control on vendor relations: A mail questionnaire survey of vendors may be done to ascertain whether their salesmen could promptly meet materials officials, whether they were cordially received and dealt with and whether were they fair and reasonable in their dealings and discussions.

Control on co-ordination: Whether there is joint development of material standards, joint value analysis and investigation and determination of quantities with production control. Buyers should know about materials that they buy and process, visit departments and give lead time details to them, ensure that purchased materials come in time, investigate causes of delay and the number of shortages.

Composite audit of buying performance: A sample audit of a few completed cases may be done to check on the correct method of purchase, selection of good vendors and how to obtain best price, quality and quantity. Such an audit helps to improve performance. Inter company comparisons are useful in most cases, but due to different operating policies, some comparisons can be meaningless.

Control on procurement efficiency: Too much emphasis on efficiency can really decrease the buying proficiency. An optimum level of operating efficiency may help proficient buying, incidence of purchase order value, purchasing time, operating cost of the department and the acquisition cost.

Efficiency of Personnel: Areas to be assessed are:

1) Performance standards for purchase, receiving, storage and inventory control
2) Time utilisation for non-competitive jobs and work sampling study
3) Cost per order and acquisition cost and
4) Number of employees and their turnover ratio.

Other areas of performance assessment are:

1) A qualitative assessment of a number of broad managerial responsibilities like capabilities of personnel, soundness of organisational structure, purchasing plans, policies and procedures which

are useful as indirect indicators of performance.

2) Buying proficiency compared with target prices and actual prices paid and targets of cost savings through negotiation and from value analysis with actual savings effected. Similarly such other relative performances are compared in relation to other basic objectives.

3) Purchasing efficiency dealing with evaluation of work loads, personnel utilisation, operating costs, processing time relating to operating efficiency and buying proficiency, offers opportunity for cost saving activities.

4) Receiving and storage efficiency of materials: The areas covered are: Average number of daily receipts, time taken to process, number of items stored, stores loss, obsolescence, damage and deterioration, frequency of inspection of stores, safety procedures and general housekeeping.

Reports to management: Reports on the market conditions, price increase or decrease and trends, lead time requirements and availability or shortage of materials can inform the management about the conditions in the materials area, potentially and seriously affecting the company's various operations. These reports can be used for controlling company operations and planning future activities and can show materials department's contribution to the entire

company operations.

Other reports relate to matters dealing primarily with purchasing performance, as to how well purchasing has performed during the period with a brief statistics useful to management (number of orders, value, etc.) a brief discussion about status and problems of the department and if there are problems, action taken to remove them. There may be future plans which management can co-ordinate with other plans. These must be matters of definite value, key departmental facts in concise form, so that they can be easily and quickly understood.

Responsibility, Authority and Accountability.

The term responsibility usually refers to the obligation that an individual assumes when he accepts a general work assignment or job.[1] It is the obligation of the individual to perform to the best of his ability the functions and duties that have been assigned to him, in accordance with the directions of the executive to whom he is accountable. It includes obviously the obligation to perform properly any specific work assignments that may be given to him. Responsibility is an obligation that is created by the con-

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1. Responsibility and accountability should go hand in hand and for assessing accountability there must be clearly defined and understood systems of measurement. See Maynard H.B., Modern Manufacturing Management, op. cit., p. 126.

tractual process of employment.

There is an express or implied acceptance of this obligation when one accepts any position, whether executive or operative with any business organisation. It is evident that business responsibilities are derivatives of business functions and the operative functions are derivatives of business objectives. Responsibility is of an individual rather than a group phenomenon. Individual responsibilities lose their identity when they are fused with other individual responsibilities in a group activity. It is also difficult to determine who is accountable if the group fails to accomplish its mission. It is difficult to take prompt action either positive or negative when it is required urgently. The morale of the group and its effectiveness will probably deteriorate as a result. Other undesirable developments may also take place.

Therefore this is one of the reasons why only advisory rights of decision are delegated to committees in most cases. Executives and operatives are the two classes of employees in any business organisation and accordingly they have managerial and operative responsibilities. Managerial responsibility involves leadership, while operative responsibility does not involve any significant or formal responsibility for the direction, supervision and control of others. The operative responsibility is merely to perform properly the assigned operative functions and duties.

Since responsibility is an obligation of the individual to perform assigned duties to the best of his ability, authority is the corresponding right that enables the individual to discharge the particular obligation and is a derivative of responsibility. Just like managerial and operative responsibility, authority can also be classified on the same basis. Managerial authority is the right to exercise executive leadership, to plan, organise and control the activities of the organisation, decision making and command. Operative authority is the right to perform duties without rights of decision or command with respect to the work of others.

Accountability is a requirement or condition under which each member of the organisation renders a report on the discharge of his responsibilities and is judged fairly on the basis of his record of accomplishments. The objectives of the group and those of the individual together with his duties, responsibilities and authorities should be specified by organisational and operational directives. They establish the basis for accountability. The maintenance of accountability is an objective of control. It is the control function of the management that determines the degree of agreement between actual and planned performance.

Accountability, like responsibility, is of an individual rather than a group problem, because individual accountability for results to a single superior executive,

contributes greatly to the successful accomplishment of organisational objectives.[1] In his role whatever it is, the individual is required to carryout certain activities or in other words to do work. This work that the organisation through its managers requires or expects the individual to do may be called his accountability. To do the work however, the use of certain resources is necessary. At any level in the executive system, including the operating force, access to resources is required as an element of the role. This access to resources may be called authority and it is observed that authority needs to be commensurate with accountability in terms of work relationship.

Accountability is not the only link between the individual and his work. There is something more which has to do with the individual's personal commitment to his work. This is his sense of responsibility which is very much affected by factors outside the work itself as well as intrinsic factors. It must reinforce rather than conflict with the required accountability of the individual if an effective result is to be achieved.

Similarly authority is not the only link between

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1. Responsibility assigns adequate, clear-cut specifications of work for the various executives and operatives composing the organisation. It is the obligation of the employee for the proper performance of the work assignments that constitute his job. See Davis R.C., Industrial Organisation and Management, op. cit., p.69.

individual and resources. In addition to authority of access to resources, the individual needs the knowledge, skill and willingness which comprise the capacity or power to use them effectively if he is to do work.[1] Thus resources must be deployed and authority established if there is to be an adequate organisational opportunity to do work, to achieve results, to produce and to operate. But this alone will not suffice, because along with the operating force to operate satisfactorily the individuals in it must be capable of an motivated toward using those resources effectively, reinforcing the organisational authority with individual power.

Individual power, ability and motivation are also affected by factors outside the work situation as well as by those inherent in it. If a manager is to achieve an effective operating force, he must understand the way in which both sense of responsibility and power are affected by factors internal and external to the work situation and the way in which these factors may reinforce or conflict with the organisational features of accountability and authority. The degree of performance therefore depends

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1. An individual's personal commitment to work is a link to his accountability and is proportional to his sense of responsibility. See Newman A.D., Manufacturing Management, New York, McGraw Hill Book Company, 1970, p. 144.

to a great extent on the skills, responsibility and authority assigned to the personnel. Further, the delegation and decentralisation of authority are important managerial processes and the success of individual performance depends solely on the authority with which they are invested, enabling them to achieve the targets of the company. In this way performance appraisal leads to performance accountability.

These essential principles can now be summarised:

Organisational performance mainly depends up on the skill with which its activities are managed. Carefully selected and trained managerial personnel can achieve better performances the degree of which can be assessed through appraisal plans. Feedback on past performance can give clues on likely future achievements and periodic reviews can help corrective action when and where necessary.

Every manager should know how his department is procedding towards the set objectives and targets of the company and he has to act before it is too late should the need arise. This is done through appraisal and control of the subordinates which automatically helps in self control also. Performance discussions are likely to be awkward and strained when attempts are made to correct faults. Control is imposed to ensure good performance and to avoid to some extent strained attempts to correct faults. Counselling is a way of fulfilling the needs in the work assignment area.

The subordinate always needs to know what is expected of him, how he is doing, what the management thinks of him and where he can rise from the present position.

A participative approach to meet these needs as an effective two way process on an equal person to person level will be more beneficial, in this the individual formulates his own goals, reviews them with his manager, makes changes that they mutually agree and they together review and recycle these from time to time. Specific work plans and goals with results measurements agreed upon in advance and set dead lines would serve the first two needs.

Budgetary controls, supervision, pre-checks and procedures are some of the pre-action controls, while post action control is through appraisal, feedback and comparison of targets and actual achievements. A carefully structured and continuing appraisal programme enables evaluation of requirements of training, promotion, salary restructuring and personnel development of all employees.

The main factors usually chosen for appraisal are quality and quantity of work, job knowledge and performance and individual characteristics related to specific job responsibilities. Evaluation can be done by one or more persons or by a committee.

Appraisal of materials management areas should cover organisational structure, evaluation of materials personnel,

policies and procedures, buying proficiency, records and reports, capital purchases, quality control, source reliability, vendor relations and contribution of the department to overall company profits.

The degree of performance depends also on the skills, responsibility, and authority assigned to the personnel. Responsibility is the obligation of the individual to perform properly by the contractual process of employment. Authority is the corresponding right that enables the individual to discharge this particular obligation which is a derivative of responsibility. Accountability is a requirement or condition under which each person renders a report on the discharge of his responsibilities and is judged fairly on the basis of his accomplishments.

Comparison with the Existing Practice in Industries Studied

Appraisal programmes are popular in all foreign firms and private sector companies studied but except in a few, majority of public sector undertakings do not practise evaluation of their personnel except through budgeting. However departmental performance is assessed to some extent. Most of the undertakings have not worked out accurately the acquisition and carrying costs because the factors involved in their evaluation are complex. Material consumption norms are available but only very few undertakings practise the same as can be seen from Table XXI.

Inventory turnover ratio is low in the public sector

compared to the foreign firms and the private sector companies in India. Effective inventory is some-times only a portion of the total physical inventory due to presence of surplus and obsolete stocks which have to be disposed off to increase the turnover.

The overall departmental cost is high in the public sector undertakings due to lack of proper delegation of authority, responsibility and accountability. These factors contribute to a greater degree of success in the private sector undertakings and foreign firms in reducing the over-all cost.

Value engineering and import substitution efforts are more in the private sector companies in India, compared to public sector undertakings. Also compared to all other firms, the inventory losses are more in the public sector. Deterioration in storage, breakage and damage during handl-ing are also more. Scrappings during final assembly are greater, salvage and scrap collection and the realisation from the same is low comparatively in the public sector.

Proper delegation of authority with accountability is lacking in the public sector compared to private sector and foreign firms and as a result even without proper perfor-mance, there is more job security in the public sector organisations.

Conclusion

Proper appraisal of personnel and the departmental performance are vitally important for the success of the organisation. The most effective appraisal and counselling must be related to the work of the person through the work planning and goal setting programmes. A qualitative assessment of the capabilities of personnel, soundness of organisational structure, purchasing plans, policies and procedures are indirect indications of good performance.

Purchasing efficiency dealing with evaluation of work loads, personnel utilisation, operating costs, processing time and buying efficiency contributes to cost saving opportunities. Stores performance in expediting receiving and inspection, minimising deterioration and losses in storage, adequate safety and good housekeeping are direct indications of good performance.

Appraisal is one of the most effective control measures and along with counselling it can produce good results. Public sector companies can greatly benefit from this process if properly introduced and carried out in the materials management area as well as in all other spheres of activity.

CHAPTER XI

MONITORING SYSTEMS AND MANAGEMENT REPORTING

Introduction

Nothing happens by itself unless the manager acts directly or indirectly to make things happen. He works through people and this same administrative philosophy applies to the acquisition and processing of ideas that applies to the acquisition and processing of materials.[1]

The information system which exists externally in the company and which contains the new knowledge, can help the company to improve its performance. Similarly the information which exists internally under the direct control of the manager must also be collected and appraised for new ideas, as from outside the company. Both the external and internal sources of information must provide means for exchanging ideas within the company and contribute to the improved overall performance of the company.

In this chapter, the need for monitoring information, types of information systems and its processing, operating systems, main line information system, formulation of infor-

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1. External and internal information systems are vital factors affecting the overall performance of the company. See Heany Donald F., Development of Information Systems, New York, The Ronald Press Company, 1968, p. 121.

mation system, training in the use of systems, application in the materials field, reports and returns and their importance in materials management are some of the areas discussed and after comparing these to the existing practice followed in the industrial organisations surveyed, conclusions have been reached.

Need for Monitoring and Information Systems.

More than any other technology functioning in a business environment, the information system is the one most enmeshed with the vital processes of business management. However, beyond their own personal information needs and those of their immediate organisational environment, most managers possess little knowledge of monitoring systems, how they are developed, how they are operated and how to use them in effective decision making and control. Management has a vital stake in information systems and an active role to play in their development. The following are some of the reasons for the same:

1. Information is the common denominator underlying the managerial functions of planning, organising, directing, and controlling.[1]

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1. Supervision and corrective action are sub-functions of control and span of control refers to the concept of an executive unit of supervision. See Ralph Currier Davis, Industrial Organisation and Management, New York, Harper & Row Publishers, 1957, p. 72.

2. To be effective, information systems must be closely linked with the basic business objectives, policies and strategies established by management. In other words, management sets the specifications for the information system by first structuring the business system.

3. By being forced to think through their information requirements, managers will gain valuable insight into the parameters most significant to the planning and control of their operations. Very often, gaps in goal setting, policy determination, organisational planning and the like will also become apparent.

4. Information systems have a major impact on the utilisation of physical, human and monetary resources particularly in factory operations.

5. Information systems technology must be properly managed. As with any technology an understanding of its capabilities and limitations will enable management to better direct and measure its contributions to business objectives.

6. An appreciation of the information system will make it easier to distinguish between information-oriented problems and those which have other underlying causes. For example, are inventories too high because of poor stocking strategies or because

of confusion and chaos in the inventory control information system?

There are many ways of defining an information system. Heany[1] states that an information system is a set of well defined rules, practices and procedures by which men, equipment or both are to operate on given input so as to generate information satisfying specifications derived from the needs of given individuals in a given business situation. Others view information systems essentially as communication systems consisting of all the means, formal and informal, manual and mechanised, by which information flows through an organisation. Still others consider the decision and control processes of a business to be its information system.

The information system will always contain the following elements:

1. Input data: These are the raw data which in the process of passing through the system be transformed into useful information to satisfy the needs of an individual or group. Data can enter the system in a variety of forms and through a multiplicity of channels - paper forms, punched cards, telephone, telegraph, mail and even face to face communication.

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1. For details of the different information systems and its working principles, see Donald F. Heany, Development of Information Systems, op. cit., p. 17.

2. A File Structure: This is the means by which data are stored and indexed within the system. In manual systems, data files are usually maintained on file cards or in note books. In mechanised systems, the file structure can grow to quite complex proportions, requiring elaborate design and sophisticated computer hardware.

3. Procedural Logic: This is a definable course of action consisting of one or more pre-determined steps for accomplishing a task. In an information system procedures are the steps which are followed in gathering information, feeding it to the system, sorting it, manipulating it, analysing it, making decisions, reporting results and acting upon the system's output. Obviously, there can be a wide range in the complexity of system procedures. In mechanical systems much of the procedural logic is written into computer programmes. However even in such systems, there is always a need for manual procedures to complement those that are computer executed.

4. Paper work: This consists of the various types of documents that are needed to transmit, record and report information. Documents can be handwritten, computer prepared or both.

5. Information Processing Equipment: These, just as machines processing materials, process the infor-

mation much faster. The most obvious example is the computer, but equally important in their own fashion are desk calculators, tabulating machines, telephones, typewriters, display terminals and an entire array of other electromechanical equipment. The proper combination of equipment chosen for a particular information system will depend on the economies of the data processing involved.

6. Output: An information system needs some means of communicating results to its external environment. It does this through a variety of media, the most common of which is printed hard copy. However systems can also have output punched cards, magnetic tape, punched paper tape, cathode-ray tube displays and even spoken messages.

Unfortunately, a universal information system applicable to any type of manufacturing business does not exist and probably never will. The information and control requirements of materials management can hardly be expected to be the same as those of a flow shop producing standard designs to forecast. Furthermore even when comparing businesses that are physically similar, widely differing managerial philosophies are apt to be found.[1] Because the information

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1. Managerial philosophies refer to the system of thought that relates to business objectives, principles, functions and factors in a manner facilitating problem solving, effective thinking and successful action. See Roscoe Edwin S., Organisation for Production, New York, Richard D. Irwin Inc., 1955, p. 161.

system must ultimately be keyed to business objectives, policies and operating strategies, it is bound to reflect the individual styles, backgrounds and personal information needs of the management team.

Notwithstanding this, it is possible to identify certain system elements which are common to virtually every manufacturing business. An understanding of these elements and how they inter-relate will provide a framework for formulating the required information system. A typical system as shown in figure XXI depicts how it can be layered in a fashion similar to an organisation hierarchy. At the top level are the executive control elements concerned with basic policy formulation, long range planning and overall measurement of the health of the enterprise. The next lower level consists of the information elements serving that area, often referred to as the middle management. Here in this level, decisions are made as to the policy of procurement, inventory levels, market strategy and the rules by which physical resources will be allocated.

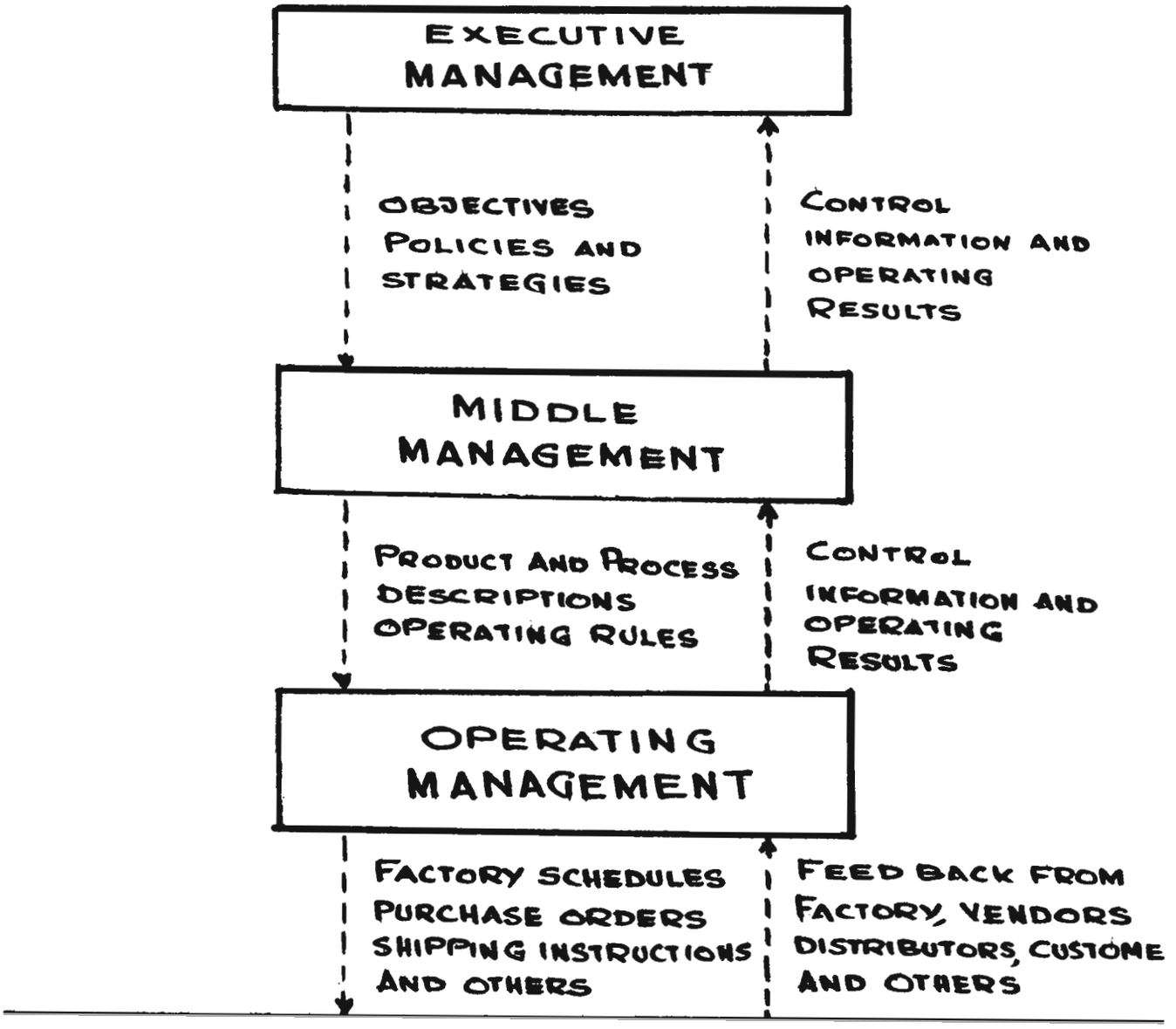
Finally the level of operating systems involving the day to day work is reached. As might be expected, this is where most information systems work has historically been done and will continue to be done. The bulk of the materials management administrative expense and cost of goods and materials occurs at this level.

Certain operating systems, each consisting of a set

FIGURE - XXI

MANAGEMENT INFORMATION SYSTEM

BUSINESS PROCEDURE AT MULTIPLE LEVELS OF DECISION MAKING & CONTROL



of logically related work elements can readily be identified in a typical manufacturing business. These systems do not in all cases bear functional component names, such as engineering or inventory control, because they often cross the functional lines.

Pre-sale - The major work elements involved are: Market intelligence, proposal preparation, sales statistics analysis, advertising, long range forecasting, short range forecasting and analysis of lost business. Essentially the work of this system is geared to market planning and to capturing the orders of potential customers.

Order Processing - The major work elements involved are: Order entry, editing and acknowledgement, pricing, credit checking, maintenance of open order backlog, finished goods allocation, factory requisitioning, billing and collection. This system is the primary inter-face with the customer. Its main function is to accept orders and to interpret them into a form which is compatible with internal product design structures and practices.

Design and Documentation - The major work elements involved are: Technical information storage and retrieval, product documentation (preparation of bills of material, where-used lists and the like), engineering/scientific computations, design automation and reproduction work. In built-to-forecast business this system translates product

plans into standard designs which state to the manufacturing department how the product is to be built and tested. In built-to-order business, it translates customer specifications into unique designs which will satisfy those specifications.

Procurement - The major work elements involved are: Preparation of material indents, preparation of material specifications and drawings, make or buy decisions, value analysis, import substitution, selection of vendors, circulation of enquiries, opening offers and comparing prices and terms, selection of offers, obtaining executive sanction for purchase, placing of the order, despatch and transport of materials to the receiving stores, vendor rating and material cost analysis.

Storage - The major work elements involved are: Receipt of stores, preliminary checking of quantity and quality, process of inspection - comparing with order, specifications/drawings, acceptance/rejection, passing on accepted materials to stores, returning rejected items to suppliers, taking into stock accepted items, intimating concerned departments and arranging payment to suppliers, safety and protection of stores, salvage and scrap collection, disposal of surplus stores, replenishment of stocks and maintaining records and making reports.

Inventory Control - The major work elements involved are: Classification of items in stock on selective basis,

standardisation, variety reduction, simplification, regulation of inventory levels and investment in inventories, reducing carrying cost and other inventory losses due to deterioration, damage and breakage during handling in storage and obsolescense, location and weeding out non-moving, obsolete and other surplus materials and arranging their disposal.

Production - The major work elements involved are: Production planning and scheduling, raw and in-process inventory control, material requirement planning, operations planning, work measurement, detailed scheduling and loading, despatching, shop paper preparation, production feedback reporting and plant engineering and maintenance. These activities constitute the bulk of day to day manufacturing information processing. The production system is essentially a logistics system whose primary function is to plan and control material flow in response to customer demands. More than any other, it will determine how effectively the human, physical and capital resources of the business are utilised.

Quality Control - The major work elements involved are: Quality operations planning, process capability analysis, reliability prediction and reporting, post-sale quality analysis, vendor quality analysis and factory quality data collection and reduction. This system is a part of the production system but it is distinctive and separate because of

the important role that quality plays in achieving and maintaining market position, not to mention its impact on manufacturing cost.

Distribution and Service - The major work elements involved are: Traffic planning, finished goods inventory control, warehousing, packing and shipping, installation and testing and field service. This system begins where the production system leaves off. It sees that the manufactured product is shipped to the customer in accordance with his instructions and is properly installed and serviced as needed.

Personnel - The major work elements involved are: Labour measurement, labour distribution pay roll, employee skills inventory and candidate selection. This system is concerned with the hiring, training and development of employees and with the proper distribution of labour costs for control purposes.

Financial - The major work elements involved are: Cost accounting, general and tax accounting, budgets and measurements, evaluation of alternate business plans and product cost structuring. Historically most systems work has occurred in this area, primarily because of the clerical savings to be gained and because much of the work was already well structured. Not surprisingly, the financial functions are usually the first to be mechanised in computer based information systems.

The materials system operates to satisfy the demands of the production system for vendor materials and is sometimes considered a part of that system.[1] However, because of the high material content of most manufactured products, special emphasis is given to this system which plays more than a routine, role in holding down the cost of goods sold.

The Main Line Information System

So far, the static state of operating level information system has been discussed. To make them active, the flow of information through the various elements must be depicted to illuminate the relationships which exist. The best way to do this is to follow the course of events that current demands (customer orders) and estimates of future demand forecasts. By so doing, the elements which are in the so called main line of day to day information processing will necessarily be emphasised. This should by no means imply that elements not in the main line are unimportant or can be dispensed with. No one would argue against pay roll processing, sales statistics analysis or keeping plant maintenance records, eventhough these functions are not demands regularly arising in the business.

The main line system is the one closest to the physical

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1. Materials management is a closed, inter-related and interdependent system with manufacturing and marketing. See Orlicky Joseph A., "Designing a System for Production and Inventory Control," Automation, February, 1967, pp.74-78.

resources of the business, it deals most intimately with the planning and control of material flow from vendor to customer and concurrently with the allocation of manpower, factory equipment, storage space and transportation equipment essential to this flow. Conceptually, this relationship is shown in figure XXII. This system plans and controls the flow of material and the allocation of resources to satisfy customer needs.

A series of information loops exist between the information system and the physical system. One half of each loop consists of a demand function (purchase order, shipping instruction, factory schedule) while the other half consists of the feedback or control function. These demand feedback loops are characteristic of all information systems controlling physical processes. There also exists a network of information flow paths within the main-line system. This network can grow to quite complex proportions.[1] To successfully systematise and mechanise it, constitutes the two outstanding challenges in business.

Application in the Materials Field

The material ordering phase of the system calculates economic order quantities for both make and buy items.

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1. When the information flow paths are extensive and complex, computer based processing is necessary. For details on computer based information systems, see Rosove, Perry E., Developing Computer-based Information Systems, New York, John Wiley & Sons, Inc., 1967, p. 217.

The ordering logic revolves around the basic questions of when to order and how much to order, considering the net requirements pattern, on hand inventories, open orders, shrinkage allowances, shelf life, maximum allowable inventories, the cost of carrying inventory and a host of other factors. The decisions made at this point in the system will have a major impact on the magnitude of raw and in-process inventories. The output of the ordering function will be a materials schedule, which is routed to purchasing and manufacturing schedule, then enters the detailed scheduling phase of the system.

In purchasing, requests for bought out items will first be recorded. Where an established source of supply already exists, the purchase order can be placed immediately, otherwise, requests for quotations must be issued, followed in some cases by negotiation. The purchasing routine takes into account price breaks, special buys of material, vendor quality and delivery performance, the cost of incoming transportation and the like. After orders are placed, it is the responsibility of the purchasing department to control them, to expedite them and to adhere to production schedules.

When material arrives at the plant and has been cleared through incoming inspection, the receiving section will report back to purchasing, so that open orders can be deleted. The receiving report also goes to the accounting section which will match it against invoices when they arrive.

Approved invoices constitute authorisation to issue payments and to make the proper accounting distribution of costs. Orders for shop made items are then routed through each shop operation using start and completion dates. In calculating the operation cycle times, consideration is given to set up time, move times, queuing, processing and other miscellaneous delays.

Upto this point, the main-line system has been involved only with the planning work. Production does not actually begin until work is released from the system by the dispatching function. However, before the work is released the system checks whether resources and materials are available to complete the job.

Because events on the factory floor seldom occur exactly as planned, the system requires a feed back element for control purposes. Feedback is also required to up-date the system's files as work is done. Completions must be posted to inventory, resource loads have to be relieved, order progress must be maintained and new work must be made available for release. The frequency of feedback reporting depends on a number of factors including the rate of material flow through the shop, the performance of the shop in meeting its schedule commitments, the accuracy with which the above mentioned main-line planning functions are performed and the reliability of shop processes. Because factory feedback involves extremely large quantities of data and is an error-

prone process, feedback reporting should be kept to the minimum commensurate with adequate control. Electro-mechanical feedback equipment though initially expensive can relieve the feedback burden.

Designing an Information System

The process of developing and implementing an information system can be divided into twelve distinct steps:

1. Establish the need for systems work
2. Conduct a feasibility study
3. Obtain management approval
4. Train the users of the system
5. Develop the overall design concept
6. Design the system in detail
7. Test the system
8. Construct the data files
9. Document the system
10. Implement the system
11. Evaluate the system and
12. Maintain the system.

Though these steps are listed sequentially, some of the steps of training users and building data files may proceed simultaneously with others and there can be considerable recycling because of changing business conditions, fresh design insights and human error.

In many cases systems work may result from the need

to respond to sudden changes in business conditions like a competitor advertising a cut in delivery times. Immediately all other firms will be forced to re-evaluate the whole philosophy of doing business and have to examine whether the factory equipment is outmoded, should there be sub-assemblies or are the information systems adequate and if not, how can they be redesigned to achieve shorter cycles.

Common symptoms of the need for systems work are:

1) A high ratio of indirect to direct costs
2) Poor delivery performance relative to promises made
3) Frequent stock outs at all levels of inventory
4) No statistical techniques used in sales or inventory forecasting
5) Excessive raw and in-process inventories
6) Too much of paper work
7) Long response time to inquiries, on order and inventory status or poor quality of status information
8) Excessive stock obsolescence resulting from engineering changes
9) Poor labour standards
10) Excessive overtime and
11) Low inventory turnover.

Once the need for a system and its objectives have been established, it is necessary to determine the technical and economic feasibility of the proposed systems work.

On the technical side the feasibility study will consider the status of the existing system, the types and volume of data to be handled and stored, the response requirements of the system, outputs and the opportunities to employ data processing equipment. The study will include human factors, strength and weaknesses of people who will use and maintain the system, the basic health of the organisation, willingness of the people to accept the new system and their desire to make it succeed.

On the economic side, an estimate of cost reduction and other anticipated benefits to be obtained must be made, together with an estimate of systems design, implementation, operating and maintenance costs. In the area of savings, the system will reduce clerical costs, much volume of paper handling and boost performance of operating work. In the materials area it reduces the inventory, number of stock outs, manufacturing cycle time and delivery delays. These are tangible benefits which can be translated into economic terms and in value, these will be considerable.

Some organisational considerations have to be decided before any system is chosen. Some of them are:

1) Will organisational changes required by the new system unduly disrupt operations and employee morale?
2) Considering the financial demands of other projects, can the expenditure of the new system be met?

3) What are the elements of risk affecting the success of the project?
4) Are product designs or the process technology likely to change sufficiently with the introduction of the system? and
5) Do sufficient systems design and implementation skills exist in the company to complete the project successfully?

It is also necessary to condition the people for the changes due to the system, to arrest their fears and to create awareness in them of the expected benefits together with anticipated changes in their work loads.

With the introduction of automation in industries, the significance of materials has increased manyfold. The plant needs them in exacting types and sizes with rigid specifications to ensure high quality with specific deliveries, so that material supplies may not affect production. These and other factors compel strict control on sources of supplies, specifications of quality and delivery scheduling. With such rigid control on various factors of material supply for bulk production, it is often difficult to manually control the numerous operations and to ensure achievement of targets.

Systems approach and computerisation can solve these problems. Most of the materials activities can be automated

with considerable advantage through integrated systems, some of which are:

1) Preparation of material indents
2) Calculation of economic order quantity
3) Preparation of orders
4) Automatic chaser forms
5) Distribution of accounting charges
6) Posting of delivery and quality records
7) Posting of bin cards
8) Preparation of management reports and
9) Auditing of invoices and preparation of cheques.

Almost all the materials work can be done on a computer, but it is expensive. All the same there are several benefits. Ready availability of reports on un-executed orders, parts short and out of stock, quality problems and vendors performance help to reduce cost. Most of the clerical work can be eliminated and buyers can concentrate on other methods of reducing cost.

Management Reporting

A report is a statement of fact, opinion or both, that is rendered to an authority and it gives an account of certain factors, conditions and activities. Its purpose in business is to provide the responsible authority with whatever information may be required for carrying on managerial functions. The characteristics of reports are

peculiar to some extent, to their purposes and the conditions of their use. There are certain characteristics that are common to all good reports. Some of these are:

1. The information conveyed should be accurate, adequate and pertinent to the purpose of the report
2. Most reports must be timely to be most useful
3. Reports should be as brief and concise as is consistent with reasonable completeness
4. Routine periodic reports should be well designed to speed up the work of processing them, facilitate the mechanisation of office work and reduce costs
5. Excessive writing and transcription of copies of reports should be avoided to minimise expense
6. The information should be arranged to save the receipient's time and facilitate his use of the information and
7. The exception principle should be applied in executive reports.

The kinds of reports that are necessary depend largely on the kind of management functions that they serve.[1] It is frequently helpful to classify reports on the following basis for this reason:

a) Reports for the purposes of creative planning

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1. Reports give feedback on the progress of projects and its outputs. See Miles E.S. Price, Output and Inventory Policy, New York, John Wiley and Sons, Inc., 1962, p. 217.

b) Operative reports and returns and

c) Executive reports and reports for administrative control.

When special reports are developed as a result of investigation of some general problem, such reports convey information concerning the principles, factors, forces and effects in the problem. These reports may or may not suggest the basis of a soluction for it. Such information is the final objective of such projects. This information adds definitely to the company's stock of knowledge concerning the problem. The report conveys this information to those staff executives who must make technical decisions concerning its practical application.

The information enters then into design or other planning of projects. If the information is the result of product research and is usable, it will enter into product design obviously. It enables such executives to understand better why certain effects develop, what improvements in the product's ability to give customer satisfaction are possible and how the design of the product can be improved. Reports of plans may or may not be based on information from investigations. In many cases plans are formulated on the basis of knowledge and experience of executives, information from outside sources, records of previous performance, etc. They may be originated by line or staff executives or both.

Operative Reports

These are statements of fact regarding the results achieved in the completion of a specific phase of an activity. These results may be stated in terms of the quantity and quality of the values produced, relative to time and expense.[1] Operative reports may give information concerning any interference with performance. Such reports are the returns that relate performance to control and are important factors in the comparison function.

Operative control reports are executive reports which usually summarise the results of any causes of interference in any area of activity of the company. Based on feedback information to the operating executives incharge of such operations, these reports enable the chief executive to decide upon the course of corrective action at any organisation level. Administrative control reports summarise operative control reports by organisational elements rather than by specific projects.

Administrative Reports: These show the quantity, quality and the expense involved of the results that have been achieved by each department or division during a particular period of time. Such reports frequently lead to further

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1. Operative reports can show a line of balance in the progress and constraints in the process for which remedial action is necessary. See Finlay R.E. and H.R.Ziobro, The Manufacturing Man and His Job, New York, American Management Association, 1966, p. 14.

creative planning and organising and assist in administrative control of the organisation's activities.[1] A budget report is an example of a report for administrative control purposes. It shows the totals of various items of expense incurred by each department and division during a given period and compares them with the adjusted budget standards for these items.

The following are some of the reports submitted to management to justify proper employment of working capital:

a) Statement of Stores Transactions:

This will show the details of items obtained during each month for production purposes, maintenance and operational spares, consumables, emergency stores, construction materials and other stores obtained for special works, surplus stores and the total transactions in each with opening balance of the month, receipts during the month, issues during the month and the closing balance for each category of items together with value.

b) Monthly statement showing balance of 'A' category items:

This statement shows the group and code number of items, the opening balance and its value, issues and receipts during the month and its value, closing balance at the end

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1. Administrative reports mainly deal with long range planning, policies and strategies for every company. See Schleh Edward C., Management by Results, New York, McGraw Hill Book Company, 1961, p. 317.

of the month and its value. From this statement the total investment in high value items can be assessed and if there is variation in the quantities compared to past consumption, action can be taken to regulate and adjust stocks accordingly.

c) Monthly statement showing items out of stock:

This is to determine the percentage of stock outs possible and to assess their ultimate effect on production. This statement shows total items stocked, surplus items, net useful items after deducting surplus items, number of items out of stock during the month and the percentage of shortage. In some cases the manhours lost due to material shortage is also assessed to arrive at the cost of stock outs.

Based on this statement, a review is usually made to ascertain how these items became short, the probable reason being delays in planning, delivery or increased consumption. Based on the real reason, further action can be taken to avoid such lapses in future.

d) Monthly statement of finished goods:

This statement shows the value of finished goods in stock at the beginning of the month, added during the month, despatched during the month and the total accumulated quantity and value as at the end of the month.

If the stock of finished goods are increasing, more sales effort will be required to obtain orders and to despatch them, to avoid blocking up of working capital, storage space,

packing and preservation and payment of interest to the bank.

With a view to limit the money blocked up in inventories and to control credits from banks on this account, the Reserve Bank of India wanted to fix guidelines and limitations for the values of raw material stocks, work in process and finished goods in terms of the company's annual targets of production. The Tandon Committee[1] was appointed for this purpose and their recommendations were to limit the raw material inventories to about 2 to 3 months requirements, work in process to two months and finished goods to about one month's production, depending on the type of industry.

e) Monthly statement of receipts:

This statement shows the values of items received and accepted during the month. The details include the number of items awaiting inspection at the beginning of the month, items received during the month, items for which inspection is completed and the number of consignments outstanding for inspection for various periods of less than 7 days, 7/15 days, 15/30 days and above 30 days, at the close of the month.

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1. The Tandon Committee was appointed to fix limits of bank borrowings against various inventories, with a view to limit hoarding of materials and finished goods. Any extra finance required by companies over and above the limits specified by the Committee, has to be generated either from their own resources or from financial institutions at higher interest rates.

This statement enlightens on the rate of incoming supplies, the speed with which the receiving and inspection formalities are completed and the effective staggering of supplies so as to regulate the work-load in the stores organisation.

A uniform flow of materials through receiving and inspection is important, as otherwise quicker accounting of materials, their availability for production or maintenance purposes and payments to suppliers are all likely to be delayed, in addition to causing uneven workload to receiving and inspection staff and bottlenecks at all the subsequent stages of the material flow.

f) Quarterly statement of demands ordered and outstanding:

This statement is prepared with a view to reduce the procurement lead time. The details shown on this statement include indents not covered by orders, outstanding at the beginning of the period, indents received during the period, indents which are already covered by orders and not covered by orders during the period and indents outstanding at the end of the period covered by orders and not covered by orders. From a review of the reasons for undue delays in procurement, suitable action can be initiated to reduce the lead time.

Normally after the indents are received, they are scrutinised for their completeness in respect of the stock numbers, description, quantity, specifications, packing,

date of delivery required, present stock, orders outstanding, annual consumption, last purchase details and maximum and minimum level. If the items are to be procured as per sample or as per specifications or drawing, their availability must be ascertained. If after the receipt of indents, prints and drawings are to be obtained there will be considerable delay in the procurement. Therefore the indenting authority makes available proper detailed specifications, the required number of copies of prints, drawings and approved samples wherever required.

Internal and External Lead Time:

Internal lead time is the order processing time required for the purchasing department from the date of receipt of the indent. In some cases, tenders are advertised, enquiries sent out, offers received are opened, a comparative statement is made, recommendations obtained from the indentor, proper executive sanction is obtained and an order is typed out and despatched. This internal lead time is generally about one to three months in most of the undertakings. In case of imported items and capital equipment, due to the time required to obtain foreign exchange release and import licence the delay is bound to be more.

From the date of despatch of the order to the date of supply is the external lead time. It includes time required for manufacturing or fabricating, periodic and final inspection, packing, forwarding and transport to the buyers premises.

For local items this is about 2 to 3 months and for imported raw material items and capital equipment it varies depending on the type of equipment, components or raw materials, from 3 months to one year.

By proper advance planning, the internal and external lead times can be reduced. One method generally used to reduce external lead time for long delivery items is to issue a letter of indent in advance before an order is released, so that the supplier can take up production. Internal lead time can be reduced by repeat orders and rate contracts for repetitive items.

g) Receipt of stores and supply performance:

This statement is prepared quarterly to check the suppliers' performance as well as to ensure that supplies are received against the purchase orders as planned and as required by the indentor.

If the supplies do not arrive as per schedule, there is a likelihood of shortages and if supplies come too early the inventory will increase and storage problems may arise. Therefore a quarterly review is essential as to how the incoming flow is maintained.

This statement contains the number of consignments delivered during the quarter, number of consignments delivered within the stipulated delivery period, number of consignments delivered beyond the stipulated delivery period and the per-

centage of defaults. This figure can be compared for each quarter. If the deviation is more, further analysis will be necessary, to see who are the suppliers often defaulting and whether the delay is due to reasons beyond their control. It is also seen whether the undertaking has suffered any loss or damage in production due to delayed arrival of supplies whether stock outs have occurred and whether it is possible and provided for imposing penalty or liquidated damages on the supplier and to recover the production loss incurred if any.

In case the bad performance continues such firms can be removed from the approved list of suppliers after giving due notice and obtaining their explanation and justification for delays.

h) Annual statement of non-moving and surplus stores:

Apart from the fact that these items are not useful to the organisation, they cost money to the company to maintain them by way of storage and carrying cost. If they are disposed off, the value they can fetch, can be profitably re-employed in the working capital. Therefore it is essential to weed out and dispose off, surplus items as and when they occur.

This statement shows details of accumulation at the beginning of the period, during the period, the period for which they have not moved, quantities disposed during the year and the closing quantity and value. If the quantities are abnormal,

the matter is investigated as to how the accumulation happened and remedial measures have to be taken to reduce such obsolescence in future.

While disposing such items it is not possible always to obtain the book value. A lesser value may be accepted, but the extent to which it can be less depends on the carrying cost, the need for money, the amount of money it can bring and the profitability of its reinvestment in business. There is a guideline in public sector undertakings, issued by the government to dispose off such items, upto 15 percent less than the book value and write off the loss in such cases. However it is seen that while disposing surplus materials, often they fetch a higher value than the book value or even their original purchased cost, due to the price increase that has happened since its purchase.

The progress of disposal of surplus material can be seen from this statement and where initiative is lacking, matters can be chased to identify and dispose off such materials in a most expenditious way.

j) Annual statement of stores transactions:

This is a summary of the monthly statements to assess the overall performance. It shows the extent of surplus stores, maintenance and operation stores, emergency stores, spares and construction stores, as against the value of production materials obtained. This will also show the money

saved by way of scrap collection and disposal.

On an average basis, at least 5 to 8% of the production value can be realised from the prompt collection and disposal of scrap. This realisation is a net saving and if proper care is not taken, this amount will go unnoticed and will be wasted.

From the total issues of production material, the material content of the product can be assessed. The objective is to bring down this material content per rupee value of production. Value analysis, import substitution, make or buy decisions and an economical purchase,help to bring down the material content. Every year, the achievement in these fields have to be assessed against set targets and wherever it is lacking, special efforts have to be made to meet the targets. A special cell has to be created for effecting more economy in each area wherever necessary.

Some of the undertakings use computer or data processing equipment for materials work in their organisations. The work is processed by the computer very fast, but the results depend on the quality of the data fed into the computer. If the data is fed in time, the results can be had quickly, but if the data itself is not ready and delayed the computer print outs will be further delayed and these delayed reports cannot help in the rectification of any situation.

These essentials and basic principles can now be summarised:

The acquisition and processing of ideas have the same administrative philosophy as is applicable to the acquisition and processing of materials. Both the internal and external information system can help the company to improve its performance. The information system is enmeshed with the process of managerial functions of planning, organising, directing and controlling.

The information system is a set of rules, practices and procedures by which men and equipment operate on given input and generate information satisfying specifications derived from the needs of individuals or given business situation. The system contains input data, file structure, procedural logic, paper work, information processing equipment and output. There is no system universally applicable to all manufacturing business, since the requirements of each business are quite different. However certain system elements are common to all manufacturing business and an understanding of these elements and their inter-relation will provide a framework in formulating the required system. An information system can be layered in a fashion similar to an organisation hierarchy starting with executive control elements, followed by the middle management area and finally the operating systems.

The main line information system plans and controls

the flow of materials and the allocation of resources to satisfy customer needs. A series of information loops exist between the information system and the physical system. One half of the loop consists of the demand function and the other half consists of the feedback. There also exists a network of information flow paths within the main line system.

Technical, economic and organisational considerations have to be decided upon before any system is chosen. In addition it is necessary to train people who will ultimately use the system, condition them for the changes due to the system, arrest their fears and create an awareness in them of the expected benefits together with anticipated changes in their work loads.

With the introduction of automation in industries, the plant needs materials in exacting type, quality and with specific deliveries. These and other factors compel strict control on material supply for bulk production and it has become difficult to manually control the numerous operations to ensure achievement of targets. Systems approach and computerisation can only solve these problems satisfactorily. Most of the materials activities can be automated with considerable advantage through integrated systems but it is expensive.

Management reporting renders to an authority an account of certain factors, conditions and activities, helpful for

carrying on managerial functions. The essential characteristics of reports include accuracy, proper time, brevity, simplicity and adequacy, using principle of exception. Mainly, reports are of two types - operative control reports and administrative control reports. Operative reports are statement of facts regarding the results achieved in the completion of a specific phase of an activity which enables the chief executive to decide upon the course of corrective action.

Administrative reports summarise operative control reports which often leads to further creative planning and control of organisation's activities. A budget report is an example. Several reports are made from the materials department to justify proper employment of working capital, some of which are monthly statement of stores transactions, balance of 'A' items, finished goods, receipts and issues, items out of stock, quarterly statements of outstanding demands, supply performance, annual statement of surplus materials and stores transactions.

Comparison with the Practice Followed in Industries Surveyed

Internal and external information systems help to a great extent in improving the company performance. This technique is fully made use of by foreign firms and some of the major private sector companies in India, but its use is limited in the public sector. Similarly the systems approach in operations is not popularly favoured in the public sector

and the use of computer or data processing equipment for materials activities of planning, ordering, chasing, documentation and accounting is also limited.

Operational reports and administrative control reports in materials management help to control inventory levels, stock of 'A' class items and the number of items out of stock. Though not in the form of reports or statements, foreign firms get this information periodically through their computer print-outs. This same system is followed more or less in major private sector companies also while the number of reports made to management in the public sector undertakings are less.

In the public sector, a monthly materials analysis statement is prepared and submitted to the management. This statement shows details of the opening stock, receipts during the period, issues of materials during the period and the values of remaining stock of materials. These details are shown on the statement for all materials arranged in groups. A specimen of the materials analysis statement used in the public sector is as shown in Table XXII. A monthly budget commitment statement is also used which enables procurement and consumption of materials as per budgeted targets and planned payments to vendors with an evenly distributed flow. A specimen of the monthly commitment of materials budget used in the public sector organisations is as shown in Table XXIII.

Various other reports on monthly, quarterly and annual basis are made to justify proper employment of working capital in the private sector industries in India. Since the inventory values are small in foreign firms, they do not resort to multiple reports on inventory positions, except the obsolete and surplus stocks and value of 'A' class items in stock. However the public sector undertakings do not make so many reports except quarterly inventory position and list of surplus and non-moving as can be seen from Table XXIV.

Conclusion

In order to have proper control and judicious use of working capital, it is necessary to regulate the inventory and materials management performance through proper systems, statements and reports. They help to maintain reasonable inventory levels with selective control on high value items, regulate procurement, storage and consumption of materials, increase efficiency of stores transactions and reduce surplus and obsolete materials.

Regular use of external and internal information system can be made through the Public Relations or any other department to improve the company performance. Similarly systems approach and use of computer or data processing equipment for materials management activities can considerably improve the efficiency and performance of the department. Though the use of this equipment is

expensive, the ultimate decision to use or not use them must be based on technical, economic and organisational considerations.

The need for systems work will be evident when the following symptoms appear in the materials performance:

High ratio of indirect to direct cost, poor delivery performance and stockouts, no statistical techniques used in inventory forecasting, excessive raw and in-process inventories, much obvious paper work, long delays internally and externally for procurement, excessive obsolescence and low inventory turnover.

Various reports on stores transactions together with position of non-moving and surplus materials help effective regulation of inventory levels and ensure proper utilisation of the working capital.

CHAPTER XII.

CONCLUSIONS AND RECOMMENDATIONS.

Introduction

Public sector undertakings have achieved a big break-through in their performance during the last few years. There are over 140 such undertakings established by the Union Government including those recently started. The total investment in these undertakings comes to about Rs. 85,000 million. Their output during 1977 was Rs. 120,000 million, with a return of 8.5 percent on the capital employed. These undertakings provide employment for about 1.6 million persons and the total inventory of materials held by them comes to Rs. 50,000 million.

Potential for considerable savings in the materials management area exists in most of these undertakings and therefore the functions concerned with materials have to be toned up to achieve increased profitability. The materials personnel in these organisations have also to be specially trained in modern tools and techniques to increase their skills in creative buying and decision-making. Their status, remuneration and delegation of powers must be adequate to carry out negotiations and effect most economic buying to bring down the value of the material content in the end product.

In this chapter, conclusions already arrived at in respedt of different topics dealt with earlier in this study have been consolidated and final recommendations formulated. Suggestions for further study have also been indicated. All references to the foreign firms and private sector companies in this study generally relate to only those firms whose performance in the materials field has been studied and do not represent the performance of each and every company in these spheres.

1. ORGANISATIONAL SET UP FOR MATERIALS MANAGEMENT

a) An integrated organisational set up for the materials department enables reduction in the overall cost of materials for the following reasons:

a.1. In the process of converting raw materials into a finished product they pass through several stages of material planning, purchasing, transportation, receiving, inspection, storage, issue and consumption, all of which are different stages of a single function. For this function to be efficient and economic, effective co-ordination and control of this flow is essential and a single line of command is necessary.

a.2. Integration enables low carrying and acquisition cost, minimum stock outs, maximum inventory turnover, better vendor relations and better co-ordination which in turn reduces the overall departmental cost and value of material content as control is exercised from one point instead of several.

a.3. With integration, services improve, costs fall and inter-departmental participation in materials activities increases.

a.4. Integration avoids overlapping of functions and thereby reduces the number of personnel required for the department.

a.5. Integration establishes a sound, flexible and dynamic organisational structure which increases co-ordination between different activities and inter-departmental relationship. It also avoids such conflicts as savings effected in one area results in increase of costs in another area of the same department.

a.6. Integrated organisational structure enables functionalisation, co-ordination and control and these improve the capabilities and motivation of personnel, resulting in better efficiency and output.

a.7. Materials add value by distribution, place and time utility. Integrated organisation for materials enables these functions to be performed and the objectives to be achieved efficiently.

a.8. If inventories or material costs are out of tune, with the integrated system, it is easy to detect the weak link and take remedial action in time.

a.9. In automated production uninterrupted material flow is essential. This flow cannot be achieved without a streamlined integrated materials structure.

a.10. If the purchase function is separately organised, the purchase manager may be inclined to buy materials

in bulk for the sake of better prices and quantity discounts without due regard for inventory level or interest to be paid on the value of inventories. If inventory control is his responsibility, he is bound to assess the total impact of economy, overall stock levels, cost of stock outs, time by which materials are required and whether any suitable substitute is available. Based on this knowledge he will be able to take decisions on prices, quantities and delivery dates.

a.11. When the stores functions are separately organised, the stores manager would like all the material bins to be full all the time, so that there is no hindrance to production, without any consideration of interest to be paid. Materials availability should be the responsibility of the materials manager, so that he will be careful to obtain them in time.

b) The materials manager has to be independent to exercise exclusive control on all materials activities and take decisions at the appropriate time, without interference from other departments. For this purpose he must report and be accountable only to the chief executive.

c) The materials manager should have equal status, authority and delegation of powers to other heads of departments like production or finance as otherwise by their interference, his efficiency may be put down. If he has the same status he could exercise strong influence on indirect materials activities of standards, specifications and value analysis

programmes.

d) The integrated system of organisation for materials is practised only in half the number of public sector organisations studied, while this system is invariably used in most of the private sector companies and all the foreign firms surveyed.

In some of these public sector undertakings it appears that the top management is not fully aware of the advantages and economy of integrating the materials department. They merely continue with the existing organisation and are reluctant to have any re-organisation or re-arrangement of sections now held under various departmental heads. Even the departmental heads themselves are not willing to part with these sections, lest they lose their importance or the very existence.

While discussing this matter with one of the chief executives in the public sector, it was stated that he was reluctant to integrate all the material functions for the fear that if all the activities are entrusted to one person, there could be every chance for malpractice. This fear would appear to be only an illusion, because any person inclined to do malpractice, can do enough and more of it even if the stores and purchase sections are organised separately. However with the system of checks, counter checks and audit existing in the public sector, most materials managers cannot manipulate things without the collusion of others.

e) Integrated organisational set up for materials management is becoming more and more popular and is prevalent all over the world because of its obvious advantages. Therefore, in order to have any meaningful economy and administrative efficiency in the materials department, an integrated approach is essential.

II. PERSONNEL PLANNING AND DEVELOPMENT FOR MATERIALS DEPARTMENT

a) Materials operations cannot become successful by the use of techniques alone, but also need a sound organisation, refined policies, procedures and above all competent personnel to achieve the targets and objectives, as an organisation can be only as good as the people managing it.

b) There is special significance for materials personnel, because they spend more than fifty percent of the revenue of the company in buying, storing and controlling consumption of materials. Their effort makes the materials department a profit centre for the company.

c) These personnel have to be carefully selected, oriented, trained, delegated, appraised and rewarded suitably together with opportunity to grow professionally.

They must also be made accountable for their performance.

d) To ensure good performance they must have academic qualifications, professional experience, full knowledge of materials handled, the processes to which they are subjected to and professional training in decision making, negotiations and proficiency in buying operations.

e) Special significance is attached to the selection, training, orientation, fixation of remuneration and professional development of materials people in the private sector, but this emphasis is lacking in the public sector.

f) Much still remains to be done in the public sector, in the areas of training, appraisal, motivation, feedback, job improvement plans and rewards to materials men to attract better talented people who at present opts for the private sector.

g) There is a ceiling on salary and fringe benefits in the public sector. Due to limited delegation, restricted authority and lack of job satisfaction, many talented people leave the public sector every year, which is a great loss to these organisations.

h) Personnel policies, methods of compensation and rewards have to be revised in the public sector to attract high calibre personnel to man-material departments and management development facilities have to be increased, as only such facilities could ultimately increase the profitability of the organisation.

i) It is also essential to have among other things a cadre of highly experienced and motivated managers. At present in some of the public sector companies, persons incharge of the materials department, lack the above qualities and as a result, the ultimate cost of the product and wastage increase. There is need for short and suitably organised

induction and training programmes for all levels of materials managers and others chosen for the public sector industries. It is desirable to have facilities created for this purpose including a national academy for training in materials management. This way, we can lay the foundation for a sound organisational and personnel set up for the public sector materials departments in the near future.

III MATERIAL PLANNING SYSTEMS

a) Planning is vital to provisioning and the success of all subsequent steps depends on proper scheduling. Correct forecasts of production requirements reduces redundant stocks and affords an opportunity to scrutinise the requirement with a view to implementing value analysis, make or buy and substitution decisions.

b) Advance planning of materials helps in selective classification of items, simplification, standardisation and variety reduction.

c) When a realistic forecast is arrived at, it helps to formulate a materials budget and arrive at the ratio of material content to the product. If this ratio is high, further investigations can be carried out for reducing the same to within reasonable limits.

d) The large surplus stores in the public sector indicates insufficient planning. There are several non-stock items and miscellaneous materials bought during each year but not issued for long periods which shows incorrect fore-

casting and planning.

e) Scientific planning and forecasting can avoid machinery breakdowns, production holdups and scheduled completion of projects. In most cases of failure, late planning or no planning at all is seen to be one of the reasons.

f) Public sector undertakings plan materials for a nil shortage, for which high inventories and safety stocks are required. Use of ABC classification in ordering safety stock and spares items would reduce these stocks to a minimum.

g) Production plans change very often in the public sector undertakings depending on the pattern of incoming orders. Quick action to modify material requirements depending on the change, can save heavy accumulation of obsolete stocks. Periodic reviews of production plans, incoming orders and regulating of supplies can remedy this situation.

h) Due importance is not given to value engineering, import substitution and make or buy decisions in the public sector undertakings. Effectiveness is partly lost in these undertakings where the stores and purchase departments are separately organised resulting in duplication of efforts.

i) For this purpose the materials planning must be an integral part of materials department and its personnel should exercise all the above controls in correctly planning and assessing materials to enable them to indent proper quality material in proper quantities, at the proper time.

I V PURCHASING MANAGEMENT

a) Any saving effected in purchasing is a direct saving to the company and therefore purchasing is a very important function in reducing the value of the material content in the product and in increasing profits.

b) The buying procedure in public sector undertakings is lengthy, time consuming and involves too many financial checks and counter-checks. Because of this, decision making is invariably delayed which affects efficiency and increases costs.

c) As a result of the lengthy procedure, internal and external lead times of procurement are increased. When sources are definite and known, advertised tenders can be avoided and offers can be invited from known sources to expedite matters. In case of monopoly items alternate materials and sources must be developed to reduce cost and lead times.

d) Vendor relations are not as good in the public sector as in the private sector companies. There is considerable delay in processing and inspection of materials and effecting payments. As a result, the public sector is not able to obtain any of the vendor benefits by way of co-operation and assistance in product development.

e) Vendor rating is not seriously practised in the public sector as in the private sector companies. For controlling quality and cost, it is essential to evaluate each supplier, eliminate bad sources and add new good sources of supply.

f) Cost price analysis and negotiations are not popular in the public sector companies. These are essential for cost reduction of materials. For high value items, where price increase is noticed the cost analysis can be a guide to the reasonableness of the price. In all such cases where prices are high, negotiation is practised in foreign and private sector companies. Where there is scope for considerable saving, fair negotiation would not affect the sanctity of tenders.

g) The buyers need specialised training and management development to acquire high negotiating skills and judgement to obtain better results. Training and development opportunities are less in public sector companies and these facilities have to be augmented.

h) Economic order quantities are not popularly used in the public sector companies due to various reasons. However the effect of EOQ on the incremental costs cannot be ignored. As such wherever possible EOQ must be used to reduce acquisition and carrying costs.

i) Delegation of powers and decentralisation of authority have to be increased in the public sector companies. Materials managers will not be able to take quick decisions and contribute their best in cost reduction, if each and every time they have to await sanction from someone else. Delay in decision making may cause price increase and even production hold ups in addition to increasing the procurement lead time. To avoid this unnecessary cost, decentralisation and delegation are essential.

j) Performance budgeting and performance accountability can generate better results in the materials management of public sector undertakings. Periodic evaluation of performance of personnel and the department can give feedback on the overall performance of the department. This method is not practised in many public sector companies while it is popularly used in most private sector companies in India and in all foreign firms.

k) The system of setting targets for materials managers is not practised in the public sector, while it is prevalent in other sectors. These targets aim at cost reduction of bought out materials, less stock outs and greater turnover of inventories. This is an assured way to improve materials management performance.

V STORES MANAGEMENT

a) Processing of incoming materials through the receiving section and the incoming inspection, is much delayed in the public sector undertakings compared to the private sector companies and foreign firms. This delays utilisation of some urgently required items, accounting of advances already paid in some cases and payment to suppliers in the remaining cases. A target of 7 days would be reasonable for completing receiving and inspection formalities.

b) Organisationally the incoming inspection of materials should be with the materials management department otherwise the materials manager is not able to expedite matters in

the inspection section. In case of disputes over acceptability or otherwise, he will be able to arrive at a decision after consultation with the indentors if necessary.

c) Return of rejected material is delayed inordinately in the public sector. This delays receipt of replacement supplies and spoils vendor relations. In order to ensure acceptable quality for the replacement supplies, precise reasons with suggestions for improvement must be given to the suppliers. A maximum time limit of 7 days to return the rejected materials, giving proper reasons of rejection will be helpful.

d) Non-stock items are procured to about 30 percent of the total requirements in some of the public sector undertakings. This is too much compared to the private sector companies and foreign firms. As this can lead to malpractice and an imbalance in the working capital, more and more common items must be brought under stock items thereby reducing the percentage to about half of the present level.

e) Selective control of safety stocks is necessary to bring down excess stock of such items in the public sector undertakings. If high value items are classified and ordered frequently, the stock levels can be controlled. Further a periodic review may also be done to determine maximum stock levels of such items under the changed conditions if any.

f) The rate of realisation from salvage and scrap is low in the public sector undertakings. In engineering industries

at least 5 percent of the production value could be recovered from salvage and scrap. If the yield is less there is some slackness in the stores functions and creation of a cell for this work is worthwhile, where the realisable value is considerable. Besides, a target must be set for the stores manager for realisation from salvage and scrap depending on the type of industry.

g) Identification and disposal of surplus, obsolete and non-moving stocks is not done periodically in the public sector undertakings.Guidelines issued by the Government to the public sector undertakings in this matter indicate that such goods could be disposed off upto 15 percent lesser than their book value to avoid further carrying costs. This task could be entrusted to the same cell looking after salvage and scrap and should be included in the responsibilities of the stores manager.

h) Verification of inventory and of specially high value items at least once a year is not regularly done in most of the public sector undertakings. Such verification can reduce damage, deterioration and pilferage of stores. Surprise checks are also to be arranged for all high value items to avoid any possible malpractice. This must be assigned as the responsibility of the stores manager.

i) Losses due to damage, breakage, pilferage and deterioration during storage are comparatively more in the public sector

undertakings and can be brought down only by good house-keeping. This should not exceed one percent of the value of materials stored and it will be a good idea to assign this as a performance target for the stores manager.

j) There is a considerable delay in payment to suppliers, especially to the small scale industries, from the public sector undertakings, due to various delays in processing and accounting of materials. Guidelines have been issued by the Government to pay the small scale suppliers as early as possible and even to pay advances to them in deserving cases to ease their financial difficulties. In this case also payments can be expedited only if accountability of the stores manager is fixed with a time limit for processing and accounting of materials.

VI. MATERIAL HANDLING AND TRANSPORTATION SYSTEMS.

a) Material handling costs account for about 50 percent or more of the manufacturing or processing cost depending on the type of industry. It is therefore an important factor in the profitability of any organisation.

b) Material handling involves direct and indirect costs and it is necessary to identify, check and control the components of these costs to have an effective control on the total handling cost. At present very little is being done in the public sector undertakings to reduce this cost.

c) To control the direct cost, it is necessary to consider the levelled prices for supply of materials to the factory, the ultimate cost of the equipment including initial cost, operating cost, rate of return, pay back period, useful life of the equipment and the wages of the operating staff.

d) Control of the indirect costs like breakage, wastage, losses and damage while handling, can be done through adequate packing and safety instructions specifying mode of despatch, handling and transporting instructions and insurance coverage Such precautions can be taken based on ABC classification affording better protection for high value items. Avoidance of wharfage and demurrage to goods in transit will also reduce indirect costs. Similarly finalisation of all insurance surveys and claims against damage are to be realised within the shortest period. If proper targets are set, with account ability of the persons responsible, it can yield results, but such responsibilities are not assigned in the public sector though it is practised in the private sector companies

e) A scientific layout of the plant based on the process flow is important to reduce handling cost. The extent of material handling and the types of equipments required depend on a combination of the process flow and the plant layout.

f) Selection of the right equipment is important to suit the particular type and need of material handling. While several types of equipment can do the same job, only one type of

equipment can do it most efficiently. Therefore selection of the correct type of equipment is an important aspect. Many public sector undertakings imported their material handling equipment against credits from East European countries and these are not working satisfactorily for want of spares .

g) Where certain heavy equipment like mobile cranes, road rollers concrete mixers and earth moving equipment are concerned it is not essential for each undertaking to buy these as these will not be in regular use all the time. In such cases, it is advisable to get these on hire from neighbouring companies or on lease for the period they are required. Similarly those undertakings who have such equipment must arrange to hire them out or lease them to needy undertakings to avoid idling of these items.

h) In making transportation arrangements, quantitative methods and linear programming can help to minimise costs through assignments. This method is most beneficial while transporting goods to a place of demand from different destinations where store houses are located. It assigns quantities to each store house so that the total transporting cost from different stores to the place of demand is a minimum. Similarly simulation method is used to minimise costs when goods are to be delivered to various customers from one central store house with least delay. Use of these and other similar techniques of cost reduction can be profitably

employed in the public sector undertakings. Foreign firms and private sector companies make use of these techniques for transportation of their finished goods to the consumption centres and for their distribution network.

VII. INVENTORY MANAGEMENT.

a) Inventory is working capital in which not only money is blocked up and additional funds are also needed to maintain it. Inventories in public sector undertakings are comparatively high and special efforts are required to bring them to optimum levels.

b) For efficient management of inventories, their organisation must be brought under the materials management with integrated functions. At present in some of the public undertakings, inventory control is attached to the production or manufacturing department. As this arrangement will not have the overall economy effect and inventory being an integral function of the materials management, it should be assigned as one of the responsibilities of the materials manager.

c) For achieving the targets of minimum investment, minimum stock outs and maximum turnover of inventories, the personnel incharge of inventory control must have sufficient training, delegation of powers and performance accountability for achieving targets set for them. At present these are lacking in the public sector. In the case of private sector companies and foreign firms they are very particular about the

inventory levels, the turn over and the over all performance and these are much better than in the public sector companies.

d) The materials manager should plan inventories, without affecting production or sevice facilities, in such a way that he can order less, stock less and consume less, by controlling safety stocks, regulating surplus and obsolete items and aiming to attain a maximum turn over ratio of at least 4 to 5. If the same inventory is turned over several times in a year the working capital required will be less and efficiency will be more. In foreign firms the average inventory turn over ratio is above 8 to 9 while it is 5 to 6 in the private sector companies.

e) In order to increase the effective utilisation of inventories and to increase their turnover, there are special inventory cells created in the private sector companies to examine, review and lay down norms for maintenance spares, safety stocks and insurance spares. This system is prevalent in some of the public sector undertakings also, but it is not working effectively. By examining the movement of high value items during the last few years, an average pattern of consumption can be set and control measures can be enforced.

f) Modern methods of inventory control have to be introduced and followed up in public sector undertakings to essentially consider two factors i.e. when to order and how much to order. The fixed order quantity system and review system can be used to determine when to order and the economic quantity must be the guide as to how much to order. These are not being

practised at present in the public sector companies but the use of these techniques is bound to improve the inventory position.

g) By developing methods to assess realistic internal and external lead times, the maximum and minimum levels of inventory can be regulated. By carefully examining different stages of lead time, improvements can also be made, especially in the internal lead time. By maintaining good vendor relations, external lead time can be shortened. Generally the third type of lead time for delivery of goods to the customer which must be defined by marketing in the light of competition, is also important to retain the market share. Careful scrutiny of these aspects can improve the performance of inventories in the public sector undertakings.

h) In the application of inventory control techniques, prediction of future usage of goods, extrapolation of past usage through moving averages and exponential smoothing and forecasting future demands, known customer preferences and judgements, are the areas to be correctly assessed.

VIII. IMPORT AND EXPORT MANAGEMENT.

a) The present level of imports into India amounts to Rs.50,000 million annually by way of equipment, raw materials, components and spares. As the corresponding exports are much lower, vigorous efforts have to be made to reduce these imports to the minimum extent possible..

b) For the present, the balance of payment position is favourable to India because of the trade with oil rich countries and this can be considered only as a temporary phenomenon. For a permanent solution of foreign exchange requirements and repayment of various foreign exchange loans India has accepted from friendly countries and financial institutions, India's export earnings have to be increased on a permanent basis.

c) A favourable balance of trade is possible only through reducing imports and increasing exports. To reduce imports more and more such items must be produced locally by way of import substitution efforts by large scale, small scale and ancillary industries. Several concessions including price preferences have been allowed by the government for items developed by industries as import substitution.

d) To encourage export trade, several items have been canalised through public sector agencies and similarly many items have been canalised for import also, through such agencies so that the consumers can get these commodities at reasonable prices.

e) For increasing the import substitution effort, private sector companies have set up special cells to indigenise all possible imported items through value analysis and substituti Wherever some of the items can be made locally, this is done even at slightly higher cost to save expenditure in foreign exchange. Dependability of such locally made items, is increased by strict quality control, selection of reliable sources and assisting suppliers by supplying materials,

tools and knowhow. There is need for such action to be earnestly followed up in the public sector undertakings.

f) Most of the private sector companies have balanced their imports with exports, but this stage of performance has not yet been reached by the public sector. One reason appears to be that foreign exchange for import is freely available to them and some imports are also allowed under open general licence.

g) Efforts are being made by the public sector undertakings to set up more and more ancillary industries to develop quality supplies including imported items, by aiding them with raw materials, tools and manufacturing assistance, but compared to the efforts put up by the private sector industries in import substitution, the efforts of public sector companies are much less.

h) Materials managers have a major role to play in reducing imports and saving valuable foreign exchange. They are the best judges in deciding which items can be indigenously developed out of all the items imported, depending on the nature and complexity of the manufacturing process involved. They can assess from the approved list of suppliers those who will be able to undertake such manufacture and who have the ability to maintain the quality standard required.

i) Goal setting and targets for the materials manager can help in progressive development of more and more imported items indigenously. The price of some items of spares imported

is exhorbitant due to the special type of spare parts pricing adopted by foreign firms. In such cases a cost analysis will show the possibility of indigenous manufacturing even with imported raw materials and the margin of profits provided in the cost by the foreign supplier.

j) Setting up of foreign offices at strategic places can help in exports and these offices can be jointly organised by public sector undertakings. These offices can also help in importing essential items at reasonable cost.

IX PERFORMANCE APPRAISAL AND ACCOUNTABILITY

a) Proper appraisal of personnel performance is necessary to assess how far they are successful in meeting the targets set for them. The sum total of their performance will be the achievement of the department towards the organisational objectives and goals. Periodic appraisal gives the necessary feedback on the progress or otherwise of the activities of the organisation so that where corrective action is needed it can be taken in due time.

b) Where personnel performance falls short of the targets set, counselling can help the person to attain his expected level of performance, through work planning and goal setting programmes.

c) Appraisal programmes are not popular in the public sector undertakings while they are very popular in the private sector Indian companies and foreign firms. Performance appraisal helps in assessing individual needs in the areas

of training and personnel development. A capable managerial staff is obviously very important to the success of the organisation.

d) Assessment of purchasing efficiency dealing with evaluation of work loads, personnel utilisation, operating costs, processing time and the buying efficiency contributes to cost saving opportunities.

e) A qualitative assessment of the capabilities of personnel, soundness of the organisational structure, purchasing plans, policies and procedures are indirect indications of good performance.

f) Stores performance in expediting receiving and inspection, minimising deterioration and losses in storage, adequate safety and good house-keeping are direct indications of good performance.

g) Efficient performance is directly proportional to the skills, delegation of powers, responsibility and authority assigned to the personnel and their appraisal periodically guides and leads them to better efficiency.

X MONITORING SYSTEMS AND MANAGEMENT REPORTING

a) External and internal information systems help to improve the organisational performance. Monitoring systems give feedback on this information and a judicious use of working capital is achieved through them.

b) These systems help to maintain reasonable inventory levels

with selective control on high value items, regulate procurement, storage and consumption of materials, increase efficiency of stores transactions and reduce surplus and obsolete materials.

c) Monitoring and information systems are not popularly used in public sector undertakings to control materials performance, although these are used extensively in the private sector Indian companies and foreign firms. In some cases internal information in respect of budgeting, inventory details and inter-company performances are compared to assess materials operations in the public sector companies.

d) The systems approach and use of computer or data processing equipment for materials management activities can considerably improve the efficiency and performance of the department. At present only a few inventory activities are put on the computer by public sector undertakings and even these are not serving any useful purpose as the reports are brought out very late due to various reasons.

e) Reports to management serve to assess the performance of personnel and the department periodically. They help to regulate procurement, storage, inventory control and consumption and increase operating efficiency.

f) The need for a systems approach will be evident when poor delivery performance, severe stock outs, excessive inventories, long delays, too much of paper work and low inventory turnover or a combination of these symptoms are noticed.

g) Since the statement of total stock, details of surplus stocks and obsolete materials are obtained late, corrective actions cannot be taken in due time. Therefore public sector organisations must obtain computer print outs or data processing statements in sufficient time by collecting and feeding the data promptly. Proper follow up and expediting of this matter can be entrusted to the inventory cell.

h) The delay in feeding the data is generally found to be due to the delay in posting issues, finalising job cards, closing work orders and assessing total material issues. When the stores department is separately organised, the delay is bound to be greater. The inventory cell can be made responsible for expediting these details by setting target dates. There is no reason why the public sector undertakings with much better facilities at their disposal cannot do this in time, when the private sector companies in India are able to do so.

i) Evenafter receipt of reports, it is seen that the follow up action is considerably delayed in the public sector undertakings. In order to remedy this situation, the materials manager must assume responsibility for corrective actions and follow up of matters needing such attention.

j) In the processing of external and internal information systems to improve the company performance, the assistance of the Public Relations department can be made use of in the public sector organisations. At present several

departments collect separate information and it is not fully consolidated. Mostly the information is generated on the shop floor, manufacturing divisions, material planning, storage and accounts. If a single agency can co-ordinate and process all this by specified dates, the desired results can be achieved.

SUMMARY OF RECOMMENDATIONS

1. In order to obtain any meaningful economy, efficiency and savings from the materials organisation in the public sector undertakings, the total activity of the materials department must be integrated under one senior manager with the same status as other departmental heads. This is not so in about half the number of organisations studied.

2. An organisation and its performance can only be as good as the people who manage and control it. A few persons who are responsible for spending over half the revenue of the company on materials must be carefully selected, oriented, trained and developed. They must have basic academic qualifications enabling them to know about the materials bought and the process through which they are put. They must have training and experience to make them good at decision making, conducting negotiations and be proficient in buying. They must be given sufficient powers to act, authority to command and be accountable

for efficient performance.

Materials managers in most public sector undertakings lack some of these requirements and therefore special attention is required in training, development and delegation.

3. Material planning is vital to production and it is essential to plan for proper quality materials in economic quantities at the proper time to avoid stock outs and additional cost. Material planning should initiate value analysis, import substitution and make or buy decisions at the planning stage. For this purpose, organisationally materials planning should be incorporated in the materials management department. It is not so at present with most of the public sector undertakings and unless this section is reorganised the effectiveness will be considerably less.

4. Internal and external lead time must be improved through proper delegation, responsibility, authority and accountability of the materials personnel. There is further scope for savings in procurement in the public sector undertakings through cost analysis and negotiations which are not generally practised at present. The purchasing profits can be further increased by the use of economic order quantity, developing additional sources, maintaining better vendor relations and introducing performance

budgeting.

5. Receiving and inspection time must be reduced to about a week and the materials inspection department should be under the administrative control of the materials manager. There is scope for additional savings from sale of scrap, obsolete and surplus materials and reduction of safety stocks, standby spares and deterioration and associated material losses.

6. Introduction of rate contracts for all regular transportation of materials will reduce direct cost as well as losses and damage resulting from the material handling. There is further scope in the public sector undertakings for reduction of payment of demurrage, wharfage, handling and rehandling costs for materials.

7. Inventory levels can be brought down further by the use of modern techniques of selective control on value basis, economic order quantity, various ordering systems, standardisation, variety reduction and simplification. Enough attention is not being paid to these aspects at present. The turnover ratio can also be increased if the inventory level is brought down as above and prompt disposal action is taken where surplus and obsolete stocks are concerned.

8. Import substitution efforts through the development of ancillaries and small scale industries must be stepped up.

Each organisation must at least balance its imports with its own exports. Public sector industries have to catch up with private sector companies in this respect. Materials managers must take up a leading role in indigenising imported items as quickly as possible to save foreign exchange and thereby evolving a favourable balance of trade.

9. Performance appraisal and accountability are essential part of feedback information system on the individual adherence to company objectives and targets. It enables them to have greater initiative, freedom of action, job satisfaction and to give their best to the organisation. The system of performance budgeting and accountability must be introduced in the materials department of all public sector undertakings to improve their efficiency and performance.

10. Monitoring and management reporting give a picture of the organisational well being, with an opportunity to review and take action to correct the situation where necessary. These reports must include monthly position of 'A' class high value items, slow-moving and non-moving items, obsolete and surplus materials, scrap collection, items out of stock and the extent of production man-hours lost due to shortage of materials. Such reports and the action taken on them can definitely contribute to the increased efficiency of the department.

Other reports must include inventory values, monthly receipts and consumption, realisation from disposal of scrap and

surplus materials, material demands pending for supply for more than 6 months and bills of suppliers pending for payment for more than 3 months. These reports and the action taken on them can pay rich dividends in operating efficiency and vendor relations.

The following annual savings are fairly assured if the suggested recommendations are implemented in the materials management departments of the public sector undertakings:

S.No.	Details	Extent of saving as percentage of inventory value
1.	Economy through functional integration and savings in personnel effort	2
2.	Economy through improved efficiency of personnel by proper orientation, training, development, delegation and authority	1
3.	Savings through the efforts of material planning by way of value analysis and make or buy decisions	2
4.	Savings in the value of purchases mainly through cost analysis and price negotiation	3
5.	Savings through stores efforts of increased scrap collection and disposal and reduction of stores losses and deterioration	1
6.	Savings from cost reduction of material handling and rehandling	1
7.	Savings from inventory management through better turnover, selective control of high value items and reducing stock levels	2
8.	Savings from import substitution and development of items through ancillaries and small scale industries	1

Sl. No.	Details	Extent of saving as percentage of inventory value
9.	Savings through performance budgeting, setting targets and objectives and fixing accountability	1
10.	Savings from improvements through prompt follow up action on reports and returns and by improved management performance.	1
	Total ::	15
	Less expenses towards setting up of special cells for specific action, personnel efforts and other incidentals.	5
	Net saving assessed ::	10 percent of the inventory value.

When we consider an inventory of Rs. 50,000 million in the public sector, a saving of 10 percent of this value annually, is obviously worthwhile and most desirable and is in the best interests of the national economy.

Suggestions for Further Study

The Parliamentary Committee appointed by the Government of India to examine the performance of the public sector undertakings has been scrutinising the different aspects of materials management and issuing recommendations, directives and guidelines to some of these undertakings from time to time.

A further study would be necessary to assess the impact of these instructions and the improvements effected by these organisations in their working, as a result of the above.

New methods systems and techniques are being developed continuously for improvement in every area of management including materials management. These new developments in the area of inventory control assume greater significance because of the huge values of working capital invested in inventories. The development of 'Numerical Control' machines and their introduction to industry can reduce the cycle time of manufacturing to almost half, thereby reducing the inventory levels considerably. This aspect is also worthy of being examined.

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