
UNIT 10 MANAGING INFORMATION FOR PRODUCTION SYSTEM

Objectives

After going through this unit you should be able to:

- know the development of computer & communication technology and its application in operations management;
- learn the concept and need of system in operations management;
- appreciate that operations system does not exist in isolation;
- have a sprit idea of objective(s) and methods of appraisal system in operations management; and
- understand the impact of quality in information system.

Structure

- 10.1 Introduction
- 10.2 The Information-Oriented Costly and Corporate Activities
- 10.3 Need of the Systems
- 10.4 Cross Functions Systems and Operational Planning
- 10.5 Needs of Production Management and Work Organisation
- 10.6 Information Needs the Business Appraisal
 - 10.6.1 Objectives of the Appraisal
- 10.7 Potential Benefits in Improving Management Information System
- 10.8 Information
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- 10.11 Development of Production - Material Information System
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10.1 INTRODUCTION

Knowledge is the key resource with which Management operates. Information and intelligence are two essential ingredients of such knowledge. Utilization of information from data source to decision-making is the index of management efficiency. Management is responsible for important components of information, such as, recognition of need, planning, implementing and operating the system. Attempt has been made to make an understanding of corporate activities and the need of the information flow among different departments. It has been explained how the interdependence of functions shows the need for resource balance. Other issues like information needs of business appraisal, objective of appraisal, methods of appraisal are discussed. Information need of production content operational planning, product information and the common database required for the production system etc, arc highlighted at the end.

10.2 THE INFORMATION-ORIENTED SOCIETY AND CORPORATE ACTIVITIES

Today the development of computer and communication technology (the combination of which is referred to as IT. information Technology) has dramatically reduced the



cost, and increased the speed, reliability and global reach of information production and distribution. This development has ushered in a new age which is basically characterized by the production, distribution and utilization of large volumes of information unfettered by the constraints of physical distances, and an accompanying increase in-IT employment. For the purpose of this paper, we will focus only of electronic information that is transmitted between individuals or organizations regarding events and ideas via computer and communication equipment.

The concept of production management emerges with the development of the factory system. As the factory system becomes more complicated, dedicated and integrated, the tasks and functions involved in production management have been expanding. The basic problem associated with traditional manufacturing systems is improper information flow among various departments which results in problems such as excessive inventories, large work in process, long manufacturing lead times, confusion and congestion on the shop floor and poor utilisation of resources. Industries with significant investments on capital equipment understand the importance of proactive planning systems to manage and maintain. Industries that maintain their investments at an optimum level of functionality and availability are able to realise the improvement in profits along with effective capacity utilisations and revenues increase. Liberalisation, privatisation and globalisation have forced Indian industry to strive for productivity and quality to face competition from multinational companies (MNCs). Integrated approach to factory management has clearly demonstrated its impact in many developed nations. In this, the role of computer aided integrated information system is not only of vital importance but essential.

Activity A

Give three functions of a manufacturing firm (e.g. marketing, production, finance) and show how MIS could help integrate these functions. Do the same for a bank. A retail store.

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10.3 NEED OF THE SYSTEMS

The major problems faced by manufacturing industries today can be identified as:

- a) Plant capacity problems
- b) Sub optimal production scheduling
- c) Large work in progress inventory
- d) Long manufacturing lead times
- e) Poor utilisation of resources
- f) Confusion and congestion in the shop floor
- g) Errors in engineering and manufacturing records.

The above mentioned problems can be attributed to poor management of information flow. There is a need for substantial change in outlook regards management of factories affairs. In the past, computerisation, if done, was also limited to a few planning and management functions and that too in isolation. These problems thus call for better systems to plan and control production operations. The need is for an integrated information systems, streamlining the information handling in the factory.

It is confusing that the word 'system' has acquired two meanings. Its most common use covers paperwork system-production planning, machine scheduling, inventory control and management accounting. In a broader context it can be defined as being organisational - 'the complex grouping of human beings and machines, joined together to achieve a goal or goals: (The term socio-technical system is also used for the same thing.) To establish control over the 'organisational system' production managers need to have knowledge of how this system works. They must control (if they can) the variables of the system and need information for this purpose. They need to know when



the system is going out of control. For all these purposes paperwork system are needed. Inevitably production management will have some information on which base decisions- late order reports labour efficiency statements, machine breakdown data: total cost of production etc. It may be produced in a timely way and citable corrective action to be introduced if things are going wrong. Yet in many cases this tends not to happen. The information available will not usually have resulted form a coherent and well though though out plan, which relates the information to the objectives of the managers of work groups in production. Usually information will have grown up more by chance than design.

Activity B

What impact would (a) the technological revolution (b) Research and development (c) product ranges (d) information explosion have on the need for information by management in an automobile manufacturing company? A hospital? A university?

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10.4 CROSS FUNCTIONAL SYSTEMS AND OPERATIONAL PLANNING

The 'broad production system' is only part of the overall company system. While the production function may have the majority of the resources in the organisation, it cannot exist as an independent activity. For example, if production control 'is mainly concerned with the use of production resources and how these relate to inventories and market demand, then it is essential that the related paperwork systems have to be cross functional covering production, marketing stock control and distribution - if they are to be truly effective in their purpose.

The interdependence of functions shows the need for resource balance. For example the relationship between production capacity usage and inventory levels is often vital. This suggests the need for short-term or operational planning where the various resources are planned in order to achieve tactical goals.

Resource Systems

If the overall production system is concerned with the complex groupings of men and machines, paperwork systems should be mainly, if not completely, concerned with 'resources' -inputs to the system and how these resources affect the outcome of the system, helping to measure, plan and control resource use.

In most manufacturing companies the resources which are fixed and nearly permanent are by far the most valuable. Plant the recruitment' can gradually reduce the work force, but the ability to reduce either could be a problem. Direct labour for example, was once considered by management accountants to be a variable cost, but now it is as fixed and as variable as the administrative staff. Management accounting systems based on absorbing the fixed cost and presenting, standard costs to production managers comprising both fixed and variable elements, do not help in maximising the use of production resources. They tend to hide the desirability of maximising the difference between the variable costs that arc incurred in production and i he sales revenue received for the products which are made.

Production Management

The concept of production management emerges with the development of the factory system. As the factory system becomes more complicated, dedicated, and integrated, the tasks and functions involved in production management have been expanding. This makes comparison of the achievement in production management between firms very difficult, if not impossible. The three basic functions Of production management have been classified as production planning, resource planning and materials supply. The three basic functions are elaborated into eighteen subjects as shown below:

- Design of manufacturing processes
- Management of product design



- Facility planning
- Work measurement
- Materials handling
- Production planning
- Purchasing management
- Control and Management of production progress
- Statistical quality control
- Storage and warehousing management
- Management, of occupational safety
- Management of equipment and tools
- maintenance management and reliability
- Data (released to production management) collection and analysis
- Implementation of production information system
- Suggestion systems
- Coherence of manufacturing and marketing
- Total quality management

Activity C

Make a list of management reports that the MIS might provide to ensure control throughout for

- i) a manufacturing firm
- ii) a bank
- iii) a hospital
- iv) a chain of department stores.

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10.5 NEEDS OF PRODUCTION MANAGEMENT AND WORK ORGANISATIONS

These are identified to be:

- a) Closer links between production and other parts of the business systems, to ensure better balance between capacities, stock levels and customer demand.
- b) The introduction of interactive systems to answer 'what if?' types of question
- c) Improved information flow to shop stewards and shop floor personnel, so expressed that it is understandable
- d) Better 'money' information to ensure that management and supervisors are aware of financial implications of decisions they make
- e) An ability to relate information to objectives

10.6 INFORMATION NEEDS-THE BUSINESS APPRAISAL

Anyone who has the opportunity to redesign or introduce new production systems should initially carry out a business appraisal of the production function and its relationship with other parts of the business. There should be an environmental analysis of the production function. The following should be covered:



- 1) What important changes will occur, in the next few years? These could include the setting up or closing down of production lines, the use of new equipment, the establishment of new work organisations, general emphasis on some aspect of resource utilisation. Each factor will need a new or developed paperwork system to ensure that full benefit is being of will be obtained from it.
- 2) What are the overall objectives of the business (both now and in the future)? What impact do these have on the production function and on production management? Can objectives be established in a hierarchical way? Do objectives relate to resources which have been allocated to production manager at all levels?
- 3) What are the greatest problems facing the production function? What might be done to pull things right or to improve the situation?
- 4) Is it likely that improved systems will be of benefit in any of the situations described in 1 to 3 above? If so could the benefits be quantified so that the cost benefit of development can be calculated?
- 5) If systems are to be changed or new ones introduced, what priorities should be established?

The completed approval should specify where systems development is required, so among the more important elements in the report will be:

- 6) Where serious discrepancies have come to light between objectives, resource allocation and information available to measure, plan and control such resources.
- 7) What key business, business elements and business decisions have been identified?
- 8) What opportunities and benefits will exist from improving management information?
- 9) What obvious advances in production efficiency could be obtained through the use of computers, and particularly modeling, which will help to answer 'what' if we did this?

The following is an example of a completed business appraisal for the type recommended.

10.6.1 Objectives of the Appraisal

These are:

- 1) To determine the minimum paperwork systems and information requirements which will aid the production function in measuring, planning and controlling its resources, so that the function will help to achieve either who or in part the corporate objectives.
- 2) To highlight the benefits which better systems and improved information will help to achieve. These should include:

Identifying the changes which are occurring and are likely to occur in the production environment - especially the external environment - and ensuring that appropriate adaptation within the production function is carries out.

Achieving corporate objectives, particularly the wages/ added value ratio.

Planning the strategic as well as the tactical use of production resources.

The business appraisal team

This comprises the following personnel:

Works manager

Production managers of fabrics and pressing

Production trainees (2),

Systems analysis (one senior, one junior)

Shop steward where appropriate.

Method of appraisal used.

The following arc to be identified:

The production business



- a) Products (product differences), machines. capacities
- b) Relationship between product markets and current capacities.
- c) Future product markets v future current capacities
- d) Relationships between stock values and capacities
- e) Contribution per product type
- f) Cost, profit/volume relationships
- g) Relationship between work organisation needs and overall business requirements

Information needs

These are seen to be concerned with:

- a) Measurement - production line statements
- b) Planning - operational planning
- c) Control - by responsibility and resource
- d) Motivation - general motivational systems

Current systems

The following are recorded in detail:

- a) Planning and machine scheduling systems
- b) Labor efficiency systems
- c) Material control systems
- d) Wages payment systems

Systems improvement is considered essential for the following activities:

- a) Operational planning - all aspects
- b) Material productivity
- c) Role identification and design of appropriate systems, especially for:
 - Production management hierarchies
 - Resource allocation
 - Work organisation
- d) Adaptation to external environment

General problems (faced during appraisal)

- a) Lateness in production reports if any kind, particularly management accounting control systems, is prevalent.
- b) Administrative cost of supporting production system.
- c) Lack of computer support in systems prevents production managers from adequate decision making in many instances.
- d) There is a need to develop closer links with other parts of the business, through strategic and tactical planning.
- e) Resource allocation based on inadequate plans and control systems needs to be strengthened.
- f) There is a need to develop new performance measurements to ensure that operational planning is effective e.g.;
 - added value
 - contribution
 - Material yield
- g) Inadequacy of available data.

Activity D



Think of your organisation what are the types problems your organisation face during an appraisal?

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**10.8 POTENTIAL BENEFITS IN IMPROVING
MANAGEMENT INFORMATION SYSTEMS**

The principal benefits are:

- a) Closer links between the production function, its organisation and its external environment, will ensure that sufficient adaptation is made to improve industrial relations, create a good motivational ethos, and ultimately ensure survival of the business.
- b) Improved case of production resources, by preplanning production (through a cost model) which could gain cost savings in resource utilisation.
- c) Improved materials productivity
- d) Much improved management effectiveness; the precise monetary benefits are doubtful, but substantial all the same.

Priorities

- a) Undoubtedly, enhancing operational planning is a first priority. Production management tends to think in a tactical rather than strategic way. This makes decision making rather short - sighted. Enhanced operational planning will provide the means to plan production resources in a superior way to that now possible.
- b) To achieve better operational planning, a considerable improvement in information will be necessary. This means, not just collecting data (an essential prerequisite to any production system's development) but so recording it that it can be used as the basis for decision making.
- c) It is essential that production control in its widest definition must be improved with emphasis on the ability of production management to co-operate better with marketing and distribution managers..

Activity E

Production management tends to think in a tactical rather than strategic way Explain.

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Data for production systems and data bases

Many production systems suffer from a lack rather than a surfeit of information. Often the limited information available is apparently accurate but a test-particularly when computers are used to process the data-proves it inadequate in some way

It is surprising that much common information concerning production and machine or operation capacities is needed throughout a business system. For example, production capacities are needed for strategic as well as in promising deliveries to for plant scheduling as well as in promising deliveries to customers, for stock control as well management accounting use.

These common usage suggest that failing and using information for one purpose only, say plant scheduling, will not make the best use of the data files which are needed.



10.9 INFORMATION

Information requirement for different activities are discussed below: Production control

For production control purposes, two sets of basic information will be required. These are:

- a) **Operational data:** Information about capacities, machine constraints, potential bottlenecks, etc.
- b) **Products** - product specifications -sizes, technical details, tolerances of various kinds.

Operational planning

Largely, operational planning should be concerned with maximising the use of current resources measured by either 'contribution' of 'added value' or perhaps some other way. It will be necessary to have three measurements:

- a) **The technical maximum resource usage:** For machine usage this will normally be the speeds at which be an engineering originally designed to operate. This will be an engineering or technical decision. With some operations, it will be occasionally found that basically similar machine-possibly purchases or modified at different dates - may have dissimilar technical rates of production.
- b) **Standard capacity:** Starting with the technical maximum, the various standard allowances are recorded and deducted. For example, there may be regular meal break interruptions, setting and starting up times etc. which can be calculated. The standard sales mix will indicate the number of change-over needed.
- c) **Current capacity:** This is the capacity currently being obtained. For various reasons it may differ considerably from the standard capacity - e.g. lack of orders, sales mix deterioration, excessive machine breakdowns, etc.

It is likely that operational information will be changing most of the time. It may be possible to issue to all production managers and supervisors a line status report which shows in bold terms the current capacity situation. The current potential or 'limiting factors' need to be established so that appropriate resource planning and usage can be decided. Fig. 10.1 gives a framework for Information System requirements.

Activity F

Give a framework for information system requirement (w.r.t. Fig. 10.1) of your organisation.

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Product Information

The information needed for products will probably be established under a product category or code or both. Weight and material yield will be important. so that product size and raw or semi-finished material origins can be quoted.

The production process through which the product has to pass should be recorded and processing times per 100 products are calculated. The information should be set out so that batching is possible in production and maximum resource utilisation settled.

Production Cost Information

The costs produced should support decisions on resource utilisation. For example the contribution which each product makes should be know. This can be determined by adding together all marginal costs (usually the direct expense) and deducting the result form the net sales revenue obtainable for the product.

For bottleneck operations it may be necessary to calculate a contribution hour rate so providing the basis for priority scheduling

10.10 COMMON INFORMATION SYSTEMS/DATA BASEDS



Many people have fallen into the rather painful trap of designing systems as if functions within an organisation have independent existence. Where this information is on a computer file, cross functional access to it is very difficult.

Data is a valuable commodity in any organisation. Using it for one process only can largely be avoided if a 'business system' viewpoint is taken in designing information systems.

The traditional approach to computer systems design has been to computerise existing systems. While this has often proves satisfactory, it has not generated cross functional data usage. While production managers may feel this is mainly a problem that should be solved by systems personnel, the nature of the problem should be fully understood by production people, especially where they have need seconded to lead systems development teams. It also happens that the line managers are often much more aware of the type of data needed to run the business than are systems analysis. Given that a data base is necessary, line managers should designate what it will comprise. Systems personnel should translate required data to a technical data base form. An example of development of MIS plan is given below:

MIS Plan

Contents of MIS plan	Answers the question
Corporate guidelines Environment	Where are we?
Current operations	
Mission/direction statement	
Objectives/goals Assumptions/risks	Where do we want to go?
Strategies, Policies	How do we get there
Programs/projects	
Management control Transition	
Priorities and schedules	
Organisation and delegation	When will it be done and who will do it?
Resources, Budget	How much will it cost?

10.11 QUALITY

Quality in information systems has a number of characteristics. This importance of each depends on the application and its context. The following are some of the characteristics include in the concept of quality in information systems.

Information system quality characteristic	Implementation of quality concepts
Complete data	All data items are captured stored for use Data items are properly identified with time periods
Accurate data	The correct data values are recorded
Precise data	Measurement of variables meets user needs for precision
Understandable output	The output of the system is understandable to the users.
Timely output	The output of the application is available in Time for actions and decisions.



Relevant output	The outputs are relevant to the actions and decisions to be taken
Meaningful output	The format, labeling, data provided, and context in which data is presented makes the output meaningful for actions and decision waiting.
User friendly operation	The system provides user interfaces that are understandable and designed to conform to human capabilities.
Error resistant operations	Suitable error prevention and detection procedures are in place. There are procedures for reporting and correcting errors. Various audit procedures

10.12 DEVELOPMENT OF PRODUCTION -MATERIAL INFORMATION SYSTEM

A total picture of production Management information system may look like as given in Fig. 10.1.

This starts from either forecasted demand or customer orders. Subsequent activities are interrelated and a comprehensive information system tries to help the manager keep a tab on each activity.

This information system helps to follow up the orders placed with vendors, proper receipt of materials from vendors inspection and inward material quality control and finally its proper storage. Similarly on the production side, the production schedule is prepared based on the despatch schedule. Production plan ensures that material is issued timely from warehouse and any rejection must be properly salvaged. The produced material must go through quality control process and it goes to warehouse or customer only after it has passed quality assurance test.

Fig. 10.2 gives us an idea as to how important production management information system is? Any delay in material procurement, improper or poor quality material may incur heavy losses to the organisation. Similarly if we are not able to prepare suitable production plan or dispatch schedule the material purchase may be delayed. Improper production process if not detected in time may lead to heavy rejections thus causing heavy loss of goodwill as well as money. Above all the product costing has to be done and this can be appropriately done only if we have information from all concerned i.e. material section production section and distribution section. All this make production management information system so important in today's competitive market

10.12 SUMMARY

Major problem Faced by manufacturing industries today can be attributed to the lack of information We have looked into the facts that information technology has entered into the operations management for solving the complex problems and reduce the improper flow of information among various departments. The managers must control the variables of the system and need information for that purpose It has been emphasized that closer links between production and other parts of the business systems to ensure better balance between capacities stock levels and customer demand The business appraisal objectives of appraisal methods of appraisal and general problems are discussed in details

Close links between production function, improved use of production resources improved material productivity are the issues considered important of production management coupled up with information system Finally highlighted that information is required from production control operational planning and product information A total picture of production management information system is depicted very clearly.

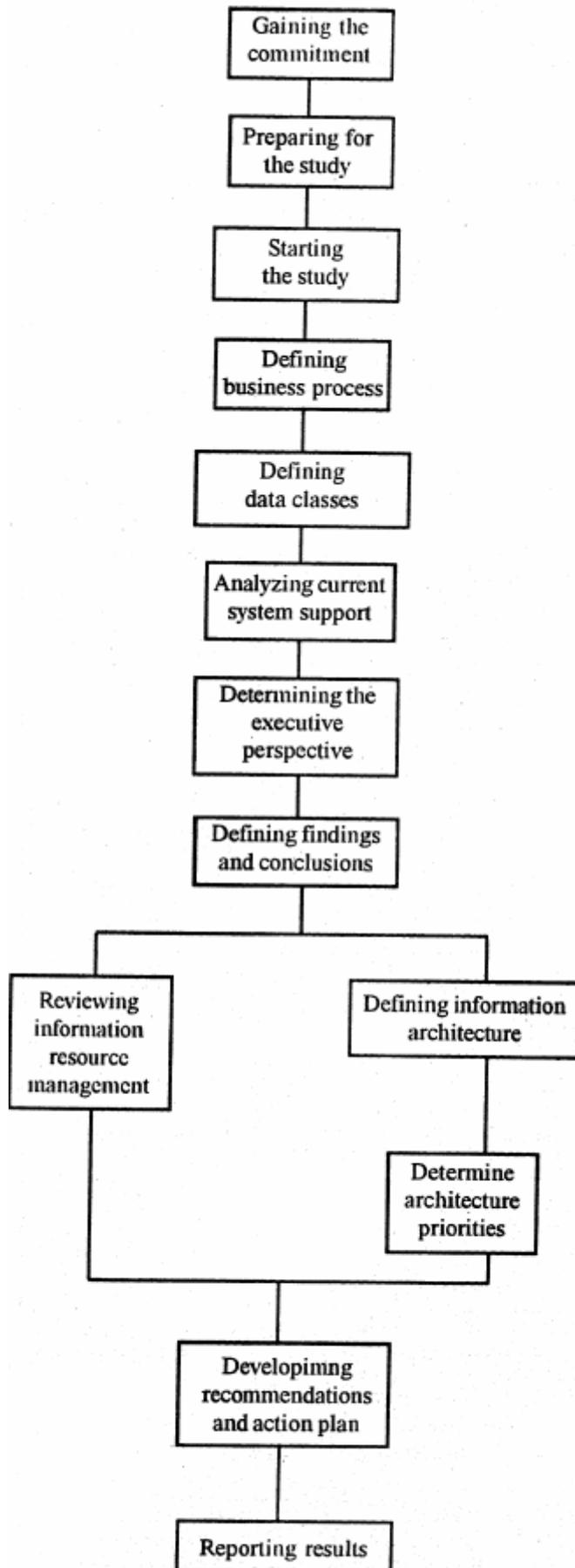


Fig. 10.1: Information System Requirement

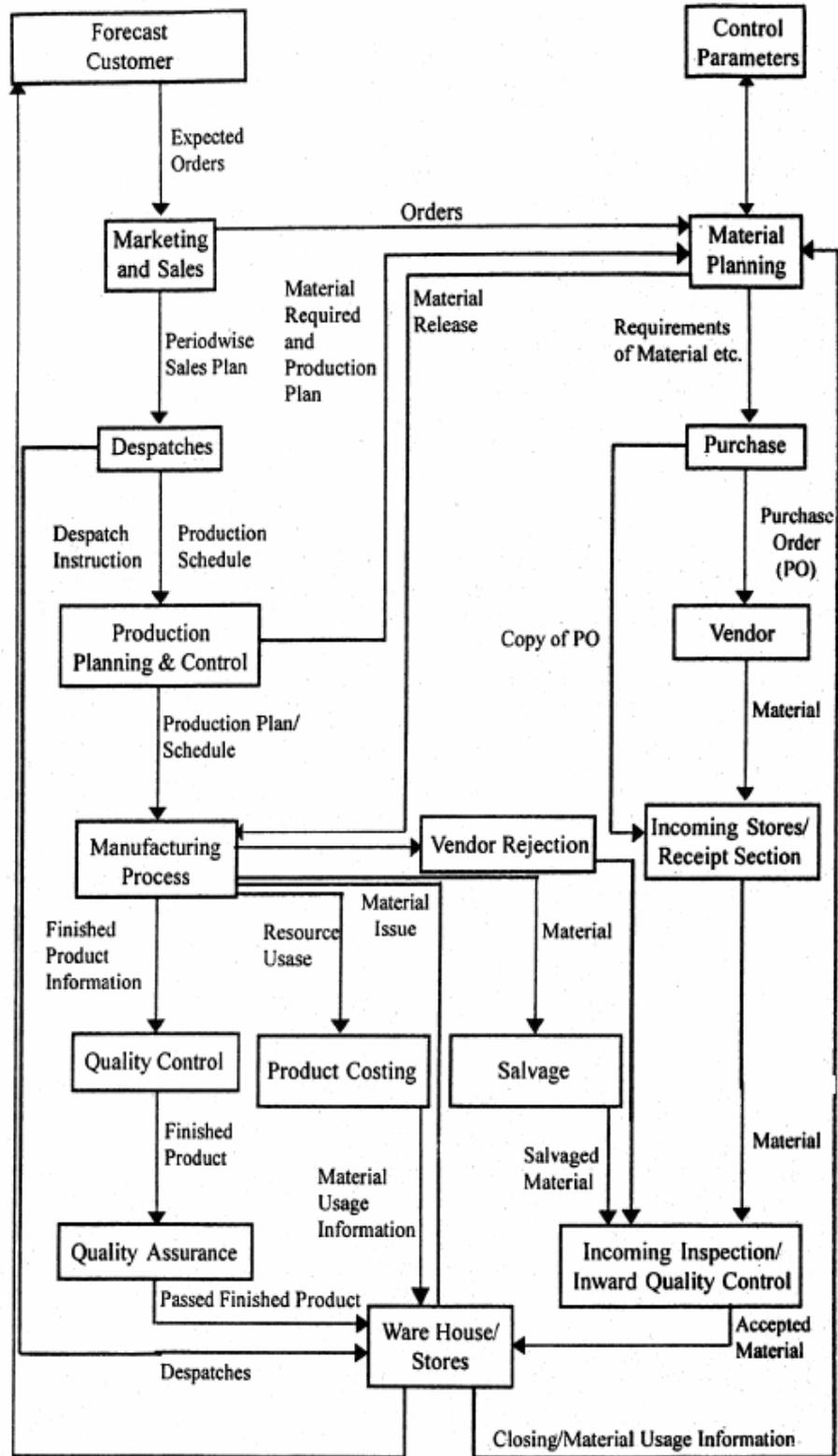


Fig. 10.2: Production—Material Information System



10.13 SELF-ASSESSMENT EXERCISES

- 1) List five applications that lead themselves to programmed decision rules_ List Five that do not. For the five that do not, show how an MIS would help snake the decision.
- 2) It is said that an information system will avail you nothing unless it is backed up by a management system. Explain.
- 3) List at least eight steps involved in inventing a manual system to a computer-based system.. Do nay of these logically proceed other?
- 4) What are the advantages of having a companywide data bank? What typical items are contained in a databank and how are they structured? Show how different functions e.g. cost accounting, sales, imentary.) can be integrated with a databank.
- 5) Do you think that your organisation should more towards computerisation ? Evaluate your manufacturing management information system if presently prevails in your organisation.
- 6) Production system cannot exist as an independent system in an organisation. It has to be dependent on other functional areas. Explain.
- 7) List out two softwares that which are available in operations management. Give some important features of commonly used software.
- 8) Evaluate the need of information system for planning, organising and controlling operations management.
- 9) Draw a systematic diagram showing flow production subsystem interacts with all major functions of a manufacturing company.
- 10) MIS is a technique for making programmed decisions. Draw a programmed decisions in a manufacturing subsystems.
- 11) What is an integrated manufacturing information system? Draw a detail flow diagram if an integrated manufacturing information system for your manufacturing unit.

10.14 FURTHER READINGS

- 1) Davis gordon B & Olson Margrethe H., Management information System. 2nd Ed. Me Graw Hill International Edition.
- 2) Walley B.H., Production Management Handbook, 2nd Ed, Metropolitan N. Delhi.
- 3) Mundick, Robert G., Ross, Joel E. and Claggett. James R., Information Systems for Modern Management, 3rd ed., PHI, N. Delhi.