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Significance of Material Planning, Production Control in Actualization of Organization Aims and Objectives

Gbadamosi Olaniyi Mufutau
The Federal Polytechnic, Ado – Ekiti
P.M.B 5351, Ado-Ekiti, Nigeri,School Of Business Studies, Department Of Purchasing And Supply

Abstract
The paper aims at evaluating the significance of material planning, production control in actualization of organization. Materials required for nay operation are based on the sale forecasts and production plans. Planning and Control is dome for the materials talking into account the materials not available for the operation and those in hand or in pipe line. It involves the task of making decision about what materials to purchase, when to purchase, how much to purchase and the best method of purchasing that should be adopted by the organization.The production estimating the individual requirement of parts, preparing materials budget, forecasting the level of inventories, scheduling the orders and monitoring the performance in relation to production and sales.The production control is also an important ingredient in the manufacturing flow process, the objective is to keep customers satisfied through meeting the delivery date at when due. Customer satisfactions should be a priority for any successful organization, satisfy customers in terms of quality and quantity of the order. In achieving this, there is need for proper establishment of routes and schedules for work that will ensure the optimum utilization of materials, workers, and machines and to provide means for ensuring operation in accordance with the plans.The paper revealed that any organization without adequate materials planning and control will lose its market shares, loss of customers, and may eventually die. This emphasizes the need for organization to pay a serious attention to how materials are being consumed in production process, adequate plan to be kept for optimum inventory level. Since the cost of inventory alone represent a huge amount of the total organization working capital.It is therefore imperative that organization should wary of the consequence it may cause if adequate plans were not made. An attempt to evaluate critically the topic in question was the primary purpose of this paper.

INTRODUCTION

Success of operation department of any organization is dependent upon an efficient production plan. One of the key essential of a production plan is material and production planning system. Materials planning plays a pivotal role in assembly-line production.

The primary purpose of existence of a manufacturing organization is production. Any manufacturing organization deals with procuring the raw material, undertaking activities required to manufacture the product and delivering the finished product to the customers. All these activities are not as simple as they sound to be. It involves good amount of planning. This is where materials resource planning comes into picture.

In a **MANUFACTURING** organization, bringing out the perfect output is as important as bringing it out at the right time with optimal utilization of the resources. Production can probably be summed as the coming together of procurement, manufacturing activities and delivery of the called simple processes involve cumbersome activities which need meticulous planning as in ‘what material to purchase’, ‘when to purchase’finished product. But these so, ‘how best the manufacturing process could be designed’, ‘what could be ideal inventory be’ etc, and there is no one solution for all the organizations. The needs, processes, requirements and the business as a whole varies form organization to organization and the implementation of materials resource planning in the organization varies accordingly to suit the business. Materials resource planning, talks of holding the least inventory possible which can cut down the costs incurred by the company. In the days prior to the advent of the concept of materials resource planning, great importance was attached stacking and storing a good amount of raw material (otherwise known as inventory) required for undertaking the production activities. This was a strategy on the part of the company to avoid uncertainty. But, one cannot deny the fact that exorbitant amount has to be shelled out on inventory. Apart from this, there is always a risk of the material going waste as a particular materials may not be needed to manufacture the finished product, or because the material is spoilt owing to the shelf life it has or because the storage conditions prevalent in the organization are not conducive to the material. This further escalates the cost of bringing out a product.

Materials planning provide information of production planning and scheduling but also provides information around dispatch and stocking. The globalization of the economy and the liberation of trade markets have formulated new conditions in the market place which are characterized by instability and intensive competition in the business environment. Competition is continuously increasing with respect to price, quality and selection, service and promptness of delivery. Removal of barriers, International cooperation, technological innovations

cause competition to intensify. In term of manufacturing emphasis is placed on reducing cost while improving quality.

Meanwhile, manufacturing organizations, whatever their products, face the same practical problems. A crucial aspect of the entire production mechanism is material planning. Material planning is something important that plays a very important role in the operations and production dimensions that is why it needs to be dealt with effectively. It is absolutely pivotal to keep accurate track of the materials needs of the organization. If a company fails to do so, then the compensation costs that the organization would need to pay and would quite pricey and severe.

Dealing with material planning, a company encounters a diverse range of aspects, some of which are very important. For example, lot sizes and set up time is very important dimension of material planning. Not only that the issue of outside members of the supply chain holds great importance too. Logistical issue are another significantly development whilst a company is doing material planning.

Materials' planning is derived from the overall organizational planning and hence it is always a sub-plan of the broad organization plan.

What it does is forecasting and initiating for procurement of materials.

Factors affecting material planning:-

1. Macro factors:- Global factors such as price trends, business cycles, government's import and export policies etc are called macro factors. Credit policy of the government is a critical factor as banks follow these guidelines only while extending financial support to a business entity
2. Micro factors:- These are essential the factors existing within the organization such as corporate policy on inventory holding, production plan, investment etc for any organization, factors such as lead time of procurement, acceptable inventory levels, working capital, seasonality, delegation of power are micro factors.

Why Material Resources planning is best?

- The right raw materials are procured for the right output, but in wrong quantities (The quantities are either more than what are necessary or less than what are required).
- The right materials are procured for the right output in right quantities but, at the wrong time (Either there is a delay in the arrival of the materials required for the manufacturing to progress uninterrupted or the materials arrive so early that a lot of space is required to store them as inventory for future use).
- The materials procured towards manufacturing the finished product, is in the right quantity and arrives at the right time but, the material are found to be a mismatch to the one required for the manufacturing the finished product (mismatch id evident in the quality and specification required).
- Sometimes, in spite of everything being right, include the quality of the material, quantity of the material and the timing, the production activity does not go uninterrupted, owing to some unforeseen circumstance such as breakdown of the vehicle transporting the materials and goods or some other disturbances.

Possible consequences in the absence of material planning in the organization

- Material planning is a 'must use tool' which when adopted by the organizations benefits them immensely. But, if for any reason an organization fails to adopt this tool, there is a high possibility of the production activity getting disrupted and when the production activities do not go as planned, the purpose of the organization itself will be lost.
- Also, huge financial losses and marred reputation in the market come as accompaniments to the disrupted production activity. When the organization fails to keep its' promise of delivering the goods to the customers, the chances of the organization losing out business to its competitors are very high and this can prove to be too costly for a company to afford.
- Material Planning delves into designing the purchase activities, manufacturing activities and delivery schedules in such a way that the entire process exhibits a smooth flow without any hitches and glitches.

Sometimes, it requires an entire lifetime for reputation to be built just a fraction of second for it to be destroyed. So armed with the tool of materials resource planning, all the companies involved in production can march towards achieving their business purpose with confidence.

Techniques of Material Planning

There are few techniques used for planning materials for the given period. The following two are however, commonly used.

1. Material Requirement Planning (MRP)
2. Requirement based on past consumption

Material Requirement Planning as its starting point, the annual production plan of the manufacturing concern. Once a firm determines its annual requirement to meet the given production plan in worked out. It is a detailed analysis encompassing the materials and quantities available for use, material with quantities not available and hence needing procurement, the actual lead time for procurement etc.

MRP objectives

The main theme of MRP is "getting the right materials to the right place at the right time".

Specific organizational objectives often associated with MRP design and implementation may be identified among three main dimensions, namely: inventory, priorities and capacity:

Dimension: Objective specifics

Inventory:

- Order the right part
- Order the right quantity
- Order at the right time

Priorities:

Order with the right due date
Keep the due date valid

Capacity:

- Plan for a complete load
- Plan for an accurate load
- Plan for an adequate time to view future load

Objectives of MRP should be identified with regard to inputs and outputs associated with it.

Inputs are delineated with master production schedule, bill of materials, etc.

Therefore, a clear specification of MRP objectives should be associated with a respectively clear description of objectives of MRP inputs as well MRP outputs.

Methodology of MRP project implementation/alternative techniques

MRP represents an innovation in the manufacturing environment. Thus, its effective implementation requires explicit management action. Steps need to be clearly identified and necessary measures be taken to ensure organizational responsiveness to the techniques implemented.

"Cookbook" like models for implementing MRP does not exist. Each organization poses a unique environment and that means that specific actions need to be taken with due regard to environment specifics.

We approach MRP as an organizational innovation and identify the necessary measure which management should adopt in implementing it. Motivational influence underlying MRP implementation include:

1. Recognition of business opportunity for the timely acquisition of MRP.
2. RECOGNITION of technical opportunity for the timely acquisition of the technologies supporting MRP implementation.
3. Recognition of need for solving manufacturing and/or inventory problems using MRP.

Given the above motivational factors one may readily identify what and how issues underlying MRP design and implementation.

What refers to a generic process model composed of steps and indicative levels of effort to implement each step.

How refers to management involvement with respect to the process.

Generic model for implementing MRP

Cost is specified in terms of % total effort and represents manpower (i.e, in person- months). Cost associated with capital acquisition (hardware or software) is not included. However, capital acquisition often represents less than 33% of the total cost. IN addition, cost associated with MRP operation is not included (to this end often cost is absorbed by company overhead).

Organizational measure for effective MRP implementation

Experience shows that failures in MRP system implementation draw from two factors, namely:

1. Lack of strategic choices needed to configure MRP system and processes; and,
2. Implementation, which spins out of business control.

Key to MRP success is organizational involvement. Successful implementations are, more often than not, linked with Chief Executive Officer (CEO) involvement in the process. CEO involvement sets the necessary conditions to concerted organizational action.

Another rule is to avoid system development based on 'nice to have features'. Information provided by the MRP system should tune with level of detail required in manufacturing. A system may be impressive; however,, incorporate unnecessary functionality. For example, when a manufacturing system using Japanese Kanab visual signals needs more raw materials from a supplier, production workers pull a card and send it to the supplier. It would therefore be a mistake to place a firewall and to separate current practice form MRP system implementation. This is the reason that 'assessment of current situation' (see process model) should be

performed at the level indicated in the diagram to capture and model organizational specifics and to try to fit MRP around them.

Continuous monitoring of design and implementation activities drives successful MRP instances. To this end, an issue, which should not be overlooked, is interfaces with other organizational information resources. Indeed MRP is part of organizational information management infrastructure and from that point of view it contributes to the achievement of broader goals associated with quality, customer satisfaction, just in time delivery, etc. On the other hand, monitoring requires metrics. Metrics need not be universal; instead they should correspond to production planning requirements with respect to both supply and production output.

In terms of products we distinguish between three types by focusing on demand profile and production setup cost. With respect to materials we distinguish between four types of material by focusing on pattern of usage in production (steady vs., varying use), degree of cooperation with supplier, demand and cost. Entries of the table may be used to specify performance metrics with due regard to production specifics. Note that a single MRP system may be assessed using different metrics according to product manufacturing to which is targeted.

A different perspective about metrics is identified when MRP is placed in context with organizational resource planning.

Classes of MRP user/companies

MRP systems fall into four categories, often identified as ABCD, in items of use and organizational implementation.

Class A represents full implementation of MRP. MRP system is tied up with company's financial system and includes capacity planning, shop floor dispatching, and vendor scheduling as well as links with human resource planning. There exists continuous monitoring of performance and inventory records and master production schedules are accurate.

Class B represents a less than full implementation. MRP system is confined in the manufacturing area; however, it encompasses master production scheduling. Class C represents a classical MRP approach in which the system is confined to management of inventories.

Class D represents a data processing application of MRP. System is used for keeping track of data rather than as decision-making tool.

The other technique involves a situation where some parts of an assembly are available and some others not available bill of materials is exploded. It is quantifying all materials (components) needed as per the production plan. Bill of material is thus a list displaying the code, nomenclature of an item, its unit and quantity, location of use and also estimated price for each component. A explosion chart is a series of bills of materials grouped together in a matrix firm so that combining the requirements of different component can be made.

Once the bill of materials is ready, the same is handed over to the purchasing wing which initials the purchasing activities. Material Requirement Planning thus keeps in view the lead time also. Using computers, preparation of Bill of Materials through explosion of list is quite and smooth.

Advantages and Disadvantages of Material Resource Planning

As with every system based process, material resource planning also has its advantages and disadvantages, and they are as follows:

Advantages of Material Resource Planning

- It helps in maintain minimum inventory levels.
- With minimum inventory levels, materials planning also reduces associated costs.
- Material tracking becomes easy and ensures that economic order quantity is achieved for all lot orders.
- Material planning smoothens capacity utilization and allocates correct time to products as per demand forecast.

Disadvantages of Material Resource Planning

- Material planning is highly dependent on inputs it receives from other systems of department. If input information is not correct than output for material planning will also be incorrect.
- Material planning requires maintenance of robust database with all information pertaining inventory records, production schedule, etc. without which output again would be incorrect.
- Material planning system requires proper training for end users, as to get maximum out of the system.
- Material resource planning system requires substantial investment of time and capital.

Material Resource Planning-Inter dependency of Business Function

Material planning not only benefits operation department but is also beneficial to the other department of organization. They are as follows:

Material planning is useful determining cash flow requirement based on material requirements and final dispatch schedules.

It helps procurement team is scheduling purchase of necessary material.
It helps the sales team in determining delivery dates for final products.

Implementation of Material Resource planning

Implementation and success of material resource dependent on following factors

Acceptability of by top management about advantages and benefits
Proper training and participation of all workers and personnel
Precision and accuracy of input data for accurate and reliable results.

Production Planning and Control

In any manufacturing enterprise production is the driving force to which most other functions react. This is particularly true with inventories; they exist because of the needs of production. In this chapter the relationship of production planning and control to work in-process inventories is stressed.

Objective of Production Planning Control

The ultimate objective of production planning and control, like that of all other manufacturing controls, is to contribute to the profits of the enterprise. As with inventory management and controls, this is accomplished by keeping the customers satisfied through the meeting of delivery schedules. Specific objectives of production planning and control are to establish routes and schedules for work will ensure the optimum utilization of materials, workers, and machines and to provide the means for ensuring the operation of the plant in accordance with these plans.

Production Planning and Control Functions

All of the four basic phases of control of manufacture are easily identified in production planning and control. The plan for the processing of materials through the plant is established by the functions of process planning, loading, and scheduling. The function of dispatching puts the plan into effect; that is, operations are started in accordance with the plant. Actual performance is then compared to the planned performance, and, when required, corrective action is taken. IN some instance re-planning is necessary to ensure the effective utilization of the manufacturing facilities and personnel, Let us examine more closely each of these functions.

Process Planning (Routing)

The determination of where each operation on a component part, subassembly, or assembly is to be performed results in a route for the movement of a manufacturing lot through the factory.

Loading

Once the route has been established, the work required can be loaded against the selected machine or workstation. The total time required of perform the operation is computed by multiplying the unit operation times given on the standard process sheet by the number of parts to be processed. This total time is then added to the work already planned for the workstation.

Scheduling

Scheduling is the last of the planning functions. It determines when an operation is to be performed, or when work is to be completed; the difference lies in the detail of the scheduling procedure. In a centralized situation - where all process planning, loading, and scheduling for the plant are done in a central office- the details of the schedule may specify the starting and finishing time for an operation. On the other hand, the central schedule may simply give a completion time for the work in a given department.

Combining Functions

While it is easy to define “where” as process planning, “how much work” as loading, and “when as scheduling, in actual operations these three functions are often combined and performed concurrently. How far in advance routes, loads, and schedules should be established always presents an interesting problem. Obviously, it is desirable that a minimum of changes be made after schedules are established. This objective can be approached if the amount of work scheduled for the factory or department is equal to or slightly greater than the manufacturing cycle. For optimum control, is should never be less than manufacturing cycle.

Dispatching

Authorizing the start of an operation on the shop floor is the function of dispatching. This function may be centralized or decentralized. Again using our machine-shop example, the departmental dispatcher would authorize the start of each of the three machine operations- three dispatch actions based on the foreman’s routing and scheduling of the work through his department. This is decentralized dispatching.

Reporting or Follow –up

The manufacturing activity of a plant is said to be “in control” when the actual performance is within the objectives of the planned performance. When jobs are started and completed on schedule, there should be very little, if any, concern about the meeting of commitments. Optimum operation of the plant, however, is attained only if the original plan has been carefully prepared to utilize the manufacturing facilities fully and effectively.

Corrective Action

This is keystone of any production planning and control activity. A plant in which all manufacturing activity

runs on schedule in all probability is not being scheduled to its optimum productive capacity. With a optimum schedule, manufacturing delays are the rule, not the exception.

Re-planning

Re-planning is not corrective action. Re-planning revise routes, loads, and schedules; a new plan is developed. In manufacturing this is often required. Changes in market conditions, manufacturing methods, or many other factors affecting the plant will often indicate that a new manufacturing plan is needed.

Factors Affecting Production and Control

The factors that affect the application of production planning and control to manufacturing are the same as the factors we have already discussed that affect inventory management and control.

Let us briefly review these in relation to production planning and control.

Types of Product

Again, it is the complexity of the product that is important, not what the product is, except as this may in turn relate to the market being served. Production control procedures are much more complex and involve many more records in the manufacture of large steam turbine generator sets or locomotives to customer order then in the production of large quantities of a standard product involving only a few component parts, such as electric blankets, steam irons, or similar small appliances.

Type of Manufacturing

This is probably the most influential factors in the control situation. For a large continuous manufacturing plant producing a standard product, we have already indicated that the routing was included in the planning of the plant layout.

Production Planning and Control Procedures

Though no production control functions can be entirely eliminated, the least control that results in effective operation of the factory is the best control. It must be remembered that production planning and control systems should be tools of management. The objective is not an elaborate and detained system of control and records, but rather, the optimum operation of the plant for maximum profits.

Production Planning and Control Systems

Because production planning and control places an emphasis on the control of work-in-progress, the system will in effect tie together all previous records and forms developed in all planning for the manufacture of the product.

Market forecast

Its value to production planning and control is that it will indicate future trends in demand for manufactured product. Work shift policies, plans for an increase or decrease in manufacturing activity, or possible plant expansions may often be based upon the market forecasts and in turn affect the planning of the production and control group.

Sales Order

This is the second of the five classes of orders. It is a rewrite of the customer' order specifying what has been purchased-product and quantity and authorizing shipment of the goods to the customer. Multiple copies are prepared and all interested functions are finished a copy. Sales orders may be written by marketing, inventory controls, production control.

Stock Order

This third class of order is not always used. In the preceding paragraph we indicated how it may be used after sales order accumulate to an economical manufacturing lot. It is, of course, the principal order when manufacturing to stock. It will authorize production in anticipation of future sales.

Shop Order

This fourth class of order deals with the manufacture of component parts. Customer orders, sales orders, and stock orders are for the finished product. In the preceding chapters we discussed how, by product explosion, the requirements are established for component parts of assembled products.

Standard Process sheet

This form is prepared by process engineering and it is the source of basic data as to the type of machine to be used, the time required for processing and the sequence of operations in the manufacture of the product. Routing and scheduling of shop orders, as well as loading of workstations in advance of scheduling, depend on up-to-date standard process sheets being available to the production planning and control group.

Engineering Specifications

Blueprints and bills of materials are used by production planning and control when they become a component part of the packaged instructions issued to the shop through the control office. One good planning procedure is to accumulate all necessary data for a shop order in single package the standard process sheet, the blueprint, the bill of material (if an assembly operation is involved), the route sheet, and possibly the schedule for the production of the order.

Route Sheet

This is the form on which the route of a shop order is indicated. In practice, this form is generally combined with one of the other forms in the system. For example, the shop order, the standard process sheet, and the route sheet are often one piece of paper-usually called the shop order or the manufacturing order.

Load Charts

These charts are prepared to show the productive capacity that has been "sold" – and at the same time the available productive capacity. These charts may be prepared for each workstation or machine in the plant, or they may be for groups of machines of departments.

Job Tickets

This is the fifth and last type of order in a manufacturing situation. Job tickets authorize the performance of individual operations in the manufacturing process

Project Planning Methods

The product to be produced are often manufactured in quantities of more than one, and their total processing time can be measured in hours, or at most, days.

The best-known methods that have been developed ate CPM (for Critical Path Method) and PERT (for Program Evaluation and Review technique). The original PERT technique is now considered, more accurately, PERT TIME, whereas a later development is known as PERT.

Cost

From the optimistic, most likely and pessimistic times, the expected elapsed time (tee) can be obtained by statistical techniques.

Systems Analysis

As with other manufacturing control systems and procedures, production planning, and control lends itself to modern mechanization techniques such as machine accounting and use of computers. Careful study of the control system through procedure analysis will indicate the savings that may be effected by the utilization of modern equipment.

These savings may be in the clerical help required administration of the system or in the advantages f quick compilation of data, which in turn results in up-to-date control data.

Production Planning and Control Organization

It should be obvious that there is no single pattern for the organization of the production planning and control activity. In many small plants the routing, loading, and scheduling functions may well be included in the duties of the operating line; the shop manager, superintended, and foremen. But it is difficult to combine day-to-day work with adequate planning, and as a result it is often more feasible to break away the production planning and control functions and assign them to qualified specialist. These groups should be organized as staff sections normally reporting to the top manufacturing executive.

Centralized Production Planning and Control

Centralized or decentralized of duties of the production control staff depends upon the design of the production planning and control system. In a completely centralized setup, determination of shipping promises; analysis of sales, stock, and shop orders; preparation of routes, load charts, and schedule charts; and dispatching of work to the shop complete with job tickets and all other necessary paper would be accomplished by a central production planning and control unit. In addition, as work is completed, a careful analysis of the actual performance would be made, and if corrective action were required, it would be initiated by this group.

Decentralized Production Planning Control

Some companies are endeavoring to make each foreman a manager of his own departmental operation. In these cases the foreman is furnished with a complete staff for the production planning and control of the activities in the department.

Control Phase

The completed job ticket, or its equivalent, is the key to this phase of the production planning and control system. It is the means of reporting back from the shop floor that indicates that a job is completed; or if daily job tickets are turned in, the daily progress of a job can be determined.

Relation to Other Functions

Good relationships with all the other functions in the enterprise are essential to effective production planning and control. Full cooperation with the marketing group is necessary, particularly in view of the importance of market conditions and the goodwill of customers. Both product engineering and process engineering must kept production planning and control informed as to their plans to avoid the manufacture of goods either to incorrect specifications or by an improper method.

Measurement of Effectiveness

In determining the effectiveness of a production planning and control system, there are quite a few problems. The key criterion might well be whether or not shipping promises are being kept the percentage of the order shipped on time. This, however, would not be a true criterion if excessive overtime of expediting costs were involved in getting any of these orders shipped.

The cost of the control system is relation to the value of goods shipped is another possibility.

Again, however, this may not be sound: if markets slump, a bad ratio will develop. Many good production planning and control systems have been discontinued because of "high costs" under these conditions- and have never revived after business picket up.

In a study of benefits and costs of computerized production planning and control systems might be judge.

1. Inventory turnover
2. Delivery lead time
3. Percent of time meeting delivery promises
4. Percent of orders requiring "splits" because of unavailable materials.
5. Number of expeditors
6. Average unit cost.

Procurement and Production Planning

The interface between procurement and production planning is an extremely important one. Production planning decisions influence the parameter within which purchasing does its work. At the same time, the effectiveness with which purchasing does its job directly influences the success of the production planning. In recent years, with the aid of computerized systems, production planning has evolved into a highly specialized and sophisticated activity. Closed loop MRP systems, MRP 11 systems, and JIT systems all significantly affect the design and implementation of a firm's purchasing and supply systems. To a great extent, purchasing strategies used in prior years must be modified, and in some cases replaced with new approaches, to create the supply environment required to support and sustain these evolving planning systems.

In this dynamic environment it is imperative that the procurement and production planning functions be developed in close coordination because of the interdependencies they share and that operationally they be coordinated effectively on a day to day basis

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CONCLUSION

Materials planning are not just a fancy name but, a well planned approach towards making the optimal use of the resources and inventory of the organization. The importance of production control cannot be over emphasized. Any organizations that want to survive and keep pace with dynamism in ever changing competitive environment, Organization has to be proactive in term of adequate planning and production execution. Effectiveness and efficiency matter in material planning as it is a matter of procuring the right items in the right quantities for the right kind of job to get the right output with time playing a crucial role in all the aspect. This meticulous planning of each and every aspect pertaining to the production of goods is what Materials Planning is all about.

In any integrated materials management environment, planning to get materials is starting point of the whole of material management function. Material planning sets procurement function and subsequent material function rolling. As with material planning, production control is another important area that organization has to cope with, this is to establish and schedules for work that will ensure the optimum utilization of materials, workers, and machines and

Provide the means for ensuring the operation of the plant in accordance with these plans and introduce corrective action where and when it necessary.

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