

Analysis of Production Planning and Control

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ABSTRACT:

In manufacturing organisations, production planning and control, or PPC, is a critical role that entails controlling and coordinating diverse operations to guarantee successful and efficient production processes. In order to illustrate the importance of PPC in attaining operational excellence, this research explores the essential PPC components, including its goals, processes, and approaches.

KEYWORDS:

Capacity Planning, Control, Manufacturing Operations, Material Requirements Planning (MRP), Shop Floor Control, Work Orders.

I. INTRODUCTION

Production planning and control are tools that management may use to attain the specified goals. As a result, the four variables cover a manufacturing system. Namely, number, quality, cost, and time. Production planning begins with an analysis of the given data, such as product demand, delivery schedule, and so on, and on the basis of the information available, a scheme of utilising firm resources such as machines, materials, and labour is devised to achieve the target in the most cost-effective manner. After the plan is developed, it is carried out in accordance with the specifics specified in the plan. If there is a discrepancy between the actual and planned output, production control is activated. Using control approaches, corrective action is conducted to meet the goals set forth in the plan. Hence, production planning and control may be described as the direction and coordination of a firm's resources towards the achievement of predetermined objectives. Production planning and control aid in achieving an unbroken flow of materials through the production line by making materials accessible at the appropriate time and amount [1]–[3].

Need For Production Planning and Control

India's current technoeconomic landscape places a premium on industrial competitiveness' to increase productivity, Indian enterprises must simplify production operations and make the most use of their resources. Production planning and control is a valuable instrument for coordinating the operations of the manufacturing system via adequate planning and control. The production system is analogous to the nervous system, with PPC serving as the brain. Production planning and control are required to accomplish the following goals:

1. Efficient use of businesses' resources.
2. To meet production targets in terms of quality, quantity, cost, and delivery timeliness.
3. To achieve an unbroken production flow in order to fulfil the varying demands of customers in terms of quality and promised delivery schedule.
4. Assist the organisation in supplying high-quality items to customers on a consistent basis at reasonable prices.

5. Preproduction activities include production planning. It is the planning of production needs such as personnel, materials, machinery, and the manufacturing process.

According to Ray Wild, production planning involves the determination, procurement, and layout of all facilities required for future product production. It illustrates the manufacturing system design. It will coordinate production in addition to planning resources. Based on the expected demand for the company's goods, the production programme will be established to reach the objectives specified utilising different resources. Despite meticulous preparation, it is not always feasible to accomplish 100% output as planned. There might be a plethora of elements influencing the manufacturing system, causing a divergence from the original design. Some of the factors that have an impact include:

1. Material nonavailability due to shortages.
2. Plant, equipment, and machine breakdown.
3. Changes in demand and rush orders.
4. Worker absenteeism.
5. A lack of coordination and communication between various functional areas of business.

As a result, if there is a difference between actual and planned production, the control function is activated. Production control, through the control mechanism, attempts to take corrective action in order to match planned and actual output. Consequently, production control monitors the progress of the job and takes corrective actions to guarantee that scheduled production occurs. Control activity requires the following steps: 1. initiating production, 2. progressing, and 3. corrective action based on feedback and reporting back to production planning[4], [5].

Action Phase

The primary stage in the action phase is dispatching. Dispatching marks the move from the planning to the action phases. At this stage, the worker is directed to begin producing the product. Dispatching duties comprise work orders, store issue orders, tool orders, time tickets, inspection orders, move orders and so on. The task order number is the crucial component that must be included in all other reports and orders. Stores issue order instructs shops to supply supplies for producing the product in accordance with product requirements. The tool order instructs the tool room to supply appropriate tools based on the tooling needs for producing the product. A time ticket is just a card that is used to record the amount of time spent on different procedures. This data is used to determine the costs of future tasks of a similar sort, as well as to undertake variance analysis, which aids in the exercise of control. The job order is the formal order to the shop floor to begin producing the goods. In most cases, the process sequence will include some examination and testing. Hence, they are to be informed to the inspection wing in the form of an inspection order for prompt testing and inspection in order to reduce the quantity of rework. Moving raw materials/subassemblies to the main route is part of the manufacturing process. A well designed materials handling system does this. As a result, suitable direction is delivered to materials handling facilities in the form of a move order for substantial moves of materials/subassemblies. Moves involving less distance and fewer weights are controlled at the shop floor level depending on operator requests.

Corrective Action

Corrective action tasks are generally concerned with preparing for an unexpected incident. Corrective activities include generating schedule flexibility, scheduling changes, capacity changes, making or buying choices, accelerating work, preplanning, and so on (Figure.1). It is likely that the schedule will not be met owing to unanticipated factors such as machine malfunction, labour absenteeism, excessive rejection due to poor material quality, and so on. In such circumstances, it is preferable to rearrange the whole marketing mix so that we can have a full view of the problem before moving forward. In such a case, it is necessary to reconsider the best course of action. Expediting implies acting quickly if progress reports show departures from the initial goals. Preplanning of the whole event becomes necessary if the expediting fails to get the diverted plan back on track.

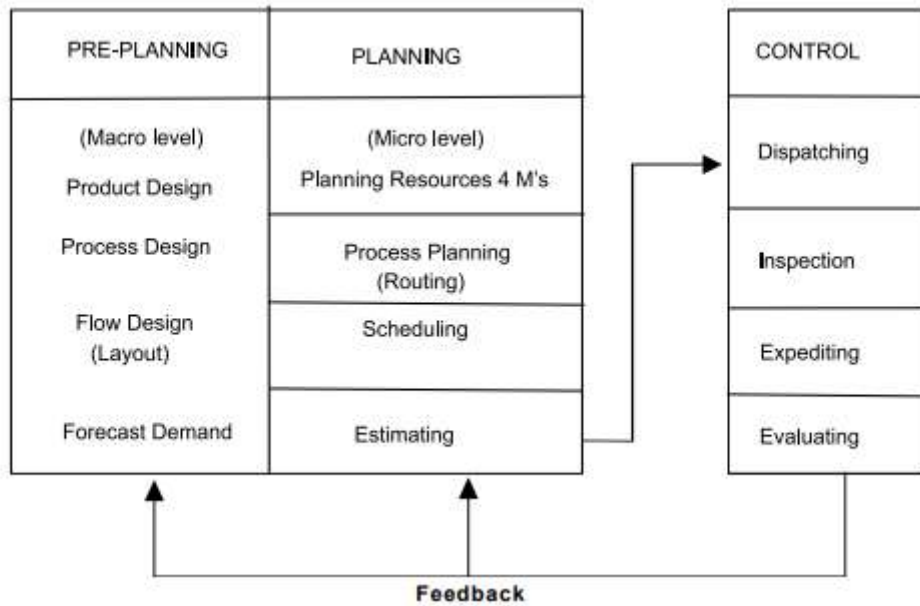


Figure 1: Represent the Functions of production planning and control [Kneconotes.co].

II. DISCUSSION

Scheduling Systems

Operations planning and scheduling systems are concerned with the volume and timing of outputs, as well as the optimal use of operations capacity for competitive effectiveness. These systems must fit together operations at multiple levels, from top to bottom, in support of one another. It's worth noting that as we go down the hierarchy, the temporal orientation shifts from long to short. Moreover, the amount of detail in the planning process spans from wide at the top to fine at the bottom.

Components of Operations Planning and Scheduling System

The Business Plan

The business plan is a statement of the organization's overall level of business activity for the next six to eighteen months, typically expressed in terms of outputs in terms of volume of sales for its various product groups, which are a collection of individual products that share or consume common blocks of capacity in the manufacturing process. It also outlines the total inventory and backlog levels that will be maintained throughout the planning period. The business plan is an agreement between all functional areas—finance, manufacturing, marketing, engineering, and R&D—on the amount of activity and goods they will support. The business plan is not concerned with all of the intricacies and precise timing of the activities required to carry out the strategy. Instead, it establishes a plausible overall strategy for competing to attain its key objectives. The resultant plan serves as a guide for lower-level, more detailed choices [6].

Aggregate Production Output Planning

The practice of establishing weekly or monthly production levels for product categories for the next six to eighteen months. It determines the total level of outputs to support the company strategy. The strategy takes into account the division's current fixed capacity as well as the company's overarching strategies for inventory and backlog maintenance, employee stability, and subcontracting.

Master Production Scheduling

MPS is a timetable that shows how many of each product must be produced each week based on client orders and demand estimates. Its goal is to fulfill the demand for the product group's particular items. This more thorough level of planning breaks down product groupings into specific goods and specifies when they will be manufactured. The MPS serves as a vital connection between marketing and

manufacturing. It indicates when incoming sales orders may be planned for manufacturing and when each shipment can be delivered. It also considers existing backlogs to ensure that production and delivery timetables are realistic.

Planning For Resource Requirements

The process of verifying the viability of a master production schedule in terms of capacity is known as resource requirement planning roughcut capacity planning. This stage guarantees that a proposed MPS does not overburden any important department, work centre, or equipment, rendering the MPS unusable.

Material Requirements Management

Material requirement planning MRP is a system for planning and scheduling timephased material needs for releasing and receiving supplies in order to execute the master production schedule. As a result, the master production schedule serves as the driving force. For material needs planning, MRP offers information like as component due dates, which are then utilised for shop floor management. Once this data is accessible, managers may estimate the precise needs for each work centre.

Planning For Capacity Requirements

Capacity requirement planning CRP is an iterative process of altering the master production schedule MPS or projected resources to make capacity compatible with the production schedule. CRP is a procedure that works in tandem with MRP to determine the capacity needed to carry out material requirement planning (Figure. 2). This level allows for more precise assessments of available and required capacity for planned workloads.

Shop Floor Control

The activities that execute and manage shop operations, such as loading, sequencing, precise scheduling, and expediting work in production, are included in shop floor control. It organises the weekly and daily tasks that get things done. Individual jobs are assigned to machines and work centres loading, the order of processing the jobs is determined for priority control, start times and job assignments for each stage of processing are determined detailed scheduling, and materials and work flows from station to station are monitored and adjusted expediting.

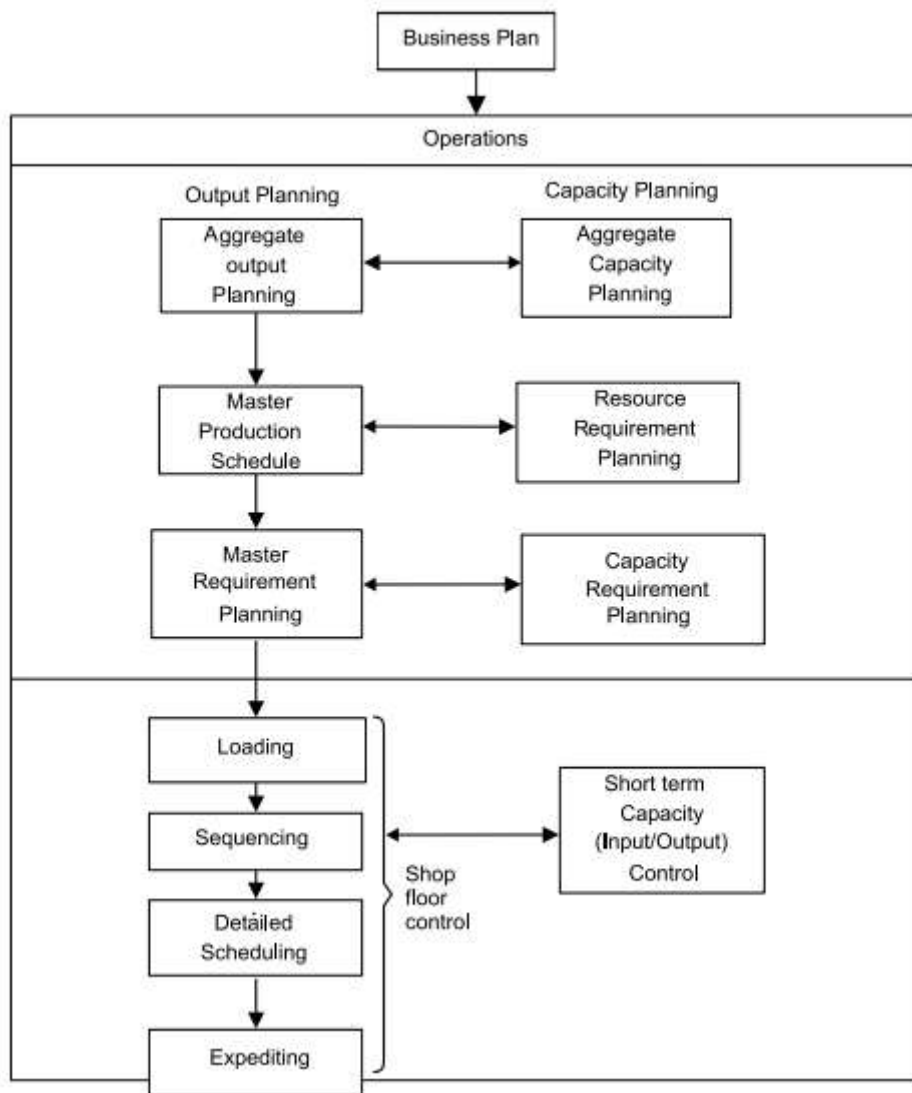


Figure 2: Represent the Operations planning and scheduling system [Research Gate.Net].

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Each job client order may have its own unique product specification, and hence it is distinct throughout the facility's multiple work centres. Once new task orders are published, they are distributed or allocated to work centres, determining how much of a burden each work centre must handle during the next planning period. This task is known as loading also known as shop loading or machine loading.

Extensive Scheduling

Start and end hours, as well as work assignments, are determined by detailed scheduling for all occupations at each work centre. When job orders, people, and supplies inputs, as well as job completion outputs, should occur at each work centre, calendar times are indicated. Schedulers may define start and completion dates and construct the comprehensive plan by calculating how long each work will take to complete and when it is due[7]–[9].

Expedition

The practise of monitoring a job's progress and taking specific activities to move it through the facility is known as expediting. Special action may be required to keep a task moving through the facility on schedule while monitoring its progress. Disruptions in manufacturing or service operations equipment failures, unavailable supplies, lastminute priority changes force managers to detour from plans and timelines and accelerate a vital project on a special handling basis[10], [11].

III. CONCLUSION

Organisations must use efficient production planning and control procedures if they want to maximise their manufacturing operations. Companies may increase their competitiveness, customer happiness, and overall profitability by executing the right strategies, ensuring effective resource allocation, and keeping a focus on quality and continual development. Sequencing defines the priority for tasks in the work centres' queues waiting lines. Priority sequencing governs the order in which waiting tasks are handled; it necessitates the use of a priority sequencing rule.

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