

An overview of production planning and control in the make-to-order industry

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Abstract: Production planning and control (or PPC) is a maintenance strategy that aims to improve efficiency by allocating human resources, manufactured goods, and machinery/equipment. To remain competitive, manufacturers must produce high-quality goods at a low cost while maintaining adequate flexibility to meet rapidly changing consumer needs. Production planning and control (PPC) is a critical function that enables a company to control and monitor all aspects of production. It enables greater efficiency, collaboration, and use of production-related data. Production planning and control examines any equipment outages or maintenance schedules to ensure that things run smoothly. This will help the facility be more productive and on-time with larger transactions. Schedules, dispatching, inspections, quality control, inventory control, and supply are all part of the job. This study discusses PPC advantages, stages included in production planning and control, issues affecting production planning and controls, the function of PPC in business management, and PPC's interconnectedness with other parts of the production department.

Keywords: Manufacturing, Control, Planning, Production, and Scheduling.

I. Introduction

Production planning is the process of planning and allocating raw materials, people, and workspaces to ensure on-time delivery of production goods. Manufacturing purchases, also known as project tasks in a make-to-order situation, are created when customer payments are received. Work orders will be created on time by a company that uses the make to stock manufacturing model. Production plans are frequently set by the production department, which oversees the shop floor. A smart production strategy makes the most of available resources to deliver orders on time [1]. PPC Systems are critical tools for meeting rising consumer needs and expectations in today's highly competitive industrial environment. The typical duties of a PPC System include material needs preparation, ultimatum management, performance tuning, and work scheduling. [2] Arrangement and sequencing Work in Progress (WIP) is reduced, Shop Floor Throughput Times (SFTT) and lead time are reduced, stock-holding costs are reduced, response to demand variations is improved, and delivery date (DD) adherence is improved. Because these are significant objectives, selecting the best PPC system is a critical strategic decision [3]. Furthermore, evaluating the applicability of PPC approaches is difficult due to the growing number of different techniques and the tendency of many software makers to claim that one strategy is generally applicable. The latter is sometimes suggested by a lack of indication of the type of firm that may benefit from a specific PPC system, implying a need to broaden the method's application [4]. Production planning encompasses many different aspects, such as what should be produced, when it should be produced, how much should be produced, and so on. A longer time view of production preparation is required to fully maximize the manufacturing run. Production control employs a variety of control approaches to achieve throughput objectives and obtain optimum performance from the production system. Figure 1 depicts the benefits of production planning and control [5].

1.1 Production Planning and Controlling Procedures:

When an organization has proper production planning and control operating systems, it is very easy to ensure a cost-effective manufacturing process, encourage timely delivery of goods, reduce overall time, satisfy customers, synchronize manufacturing with other department heads, and ensure that the best man is assigned the best tasks [6]. The heart of any industrial plant is production planning. Other responsibilities include material forecasting, planned order processing, long-term management, infrastructure development, and other responsibilities [7]. The PPC process starts with anticipating a product's demand and then developing a production plan to meet that demand in order to move the product forward. Production planning is a method of organizing a sequence of actions so that producers are in the right places at the right times. at the right time to make the most of their resources Production planning and control are divided into two categories: planning and controlling, which are further subdivided into stages. Figure 2 depicts the PPC flowchart, which is explained further below.

1.1.1 Planning:

Managers provide detailed information to the planning department about the amount to be produced and the dates when delivery to consumers is guaranteed. This enables for the precise planning of productive activities The engineering department also provides the necessary engineering and drawing specifications to the planning department.



Figure 1: Profits of Production’s Planning and Controlling [5]

1.1.2 Routing:

Routing entails deciding on the direction of the work as well as the order in which specific tasks will be completed. The goal of routing is to find the most efficient and cost-effective sequence of events. When developing the Keep in mind that the plant's equipment is operating at full capacity, and that people and other resources are being utilized to their full potential.

1.1.3 Schedule:

Scheduling is defined as the process of estimating the time of completion and operation, as well as the time required to complete the entire series as planned, while taking into account all relevant factors. It entails developing a timetable that details the total time required to create a product as well as the time spent at each piece of equipment and procedure.

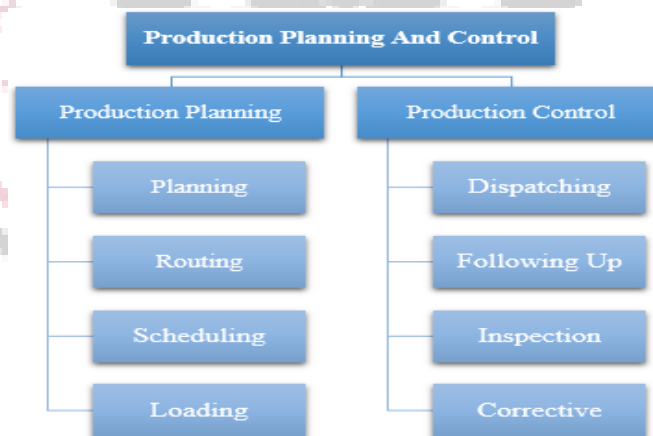


Figure 2: Phases Involved in Production’s Planning and Controlling

1.1.4 Loading:

A load is a quantity of work, and loading is the process of allocating that quantity of work to the processes required to produce each item. Loading is the process of assigning jobs to work centres or equipment within work centers.

1.1.5 Dispatching:

Dispatching is the act of sending something to a specific location. It refers to the completion of all steps required to carry out the production schedule outlined in the routing and scheduling processes [8].

1.1.6 Follow-up

Follow-up is a control component of production planning and control. It entails determining whether work is progressing as planned and how far deviations from norms have occurred, as well as taking corrective measures to restore law and order.

1.1.7 Inspections:

The control component of production planning and control is follow-up. It entails determining whether or not work is proceeding as planned, as well as determining how far deviations from norms have occurred and taking corrective measures to restore order.

1.1.8 Correction:

Other stages of the production control process are assessed, and changes are implemented as needed. Routing, job scheduling, and even discussions with employees who are taking extended breaks are all part of this [9].

1.2 Factors Influencing Production Planning and Control:

The following factors influence the application of production planning and control to manufacturing:

1.2.1 Product Form:

As a result, it is the product's complexity that is important, not the produce itself, except insofar as it relates to the customer being served. The controlling processes in the production of numerous vapor turbines generating units to consumer demands are much more complicated and require numerous more histories than in the production of large amounts of a typical product entailing only rare individual components, such as an electrical blanket, vapor iron, or similar small electronics.

1.2.2 Manufacturing Type:

In the control scenario, this is most likely the most important factor. The route had previously been incorporated into the design of the plant for a large nonstop production facility. The following factors influence the application of production planning and control to manufacturing:

1.3 PPC's Role in Operations Management:

Production planning and control in operations is broad and important due to its interactive function and interdependence with almost every sector of the manufacturing process. Figure 3 clearly demonstrates this. Production planning and controlling (PPC) not only provides an overall approach to the manufacturing and production division, but it also provides supervises and controls every aspect of the working environment, receiving product feedback Divisions of process design and engineering [10]. PPC communicates with all other departments in the manufacturing department, including production and service, attaining and cataloguing, construction and replacement, quality controller, manufacturing engineering, and work studies, in both directions.

1.3.1 Acquisition and Catalogue Management:

Scheduling the timely acquisition of new materials, machinery, and replacement parts in the correct quantities and stipulations from the correct source at the correct price. Other material-related tasks include acquisition, storage, inventory controls, regularization, diversity reduction, target costing, and examination.

1.3.2 Manufacturing and Assemblage:

Production planning and control entails organizing and planning the entire production process. Routing, scheduling, dispatch, inspections, and coordinating are just a few examples. in addition to material management, techniques, tools, and operating hours The ultimate goal is to determine the supplies and movements of constituents and labor, as well as machine usage and associated operations, in order to achieve the desired production outcomes in terms of quality, quantity, time, and location.

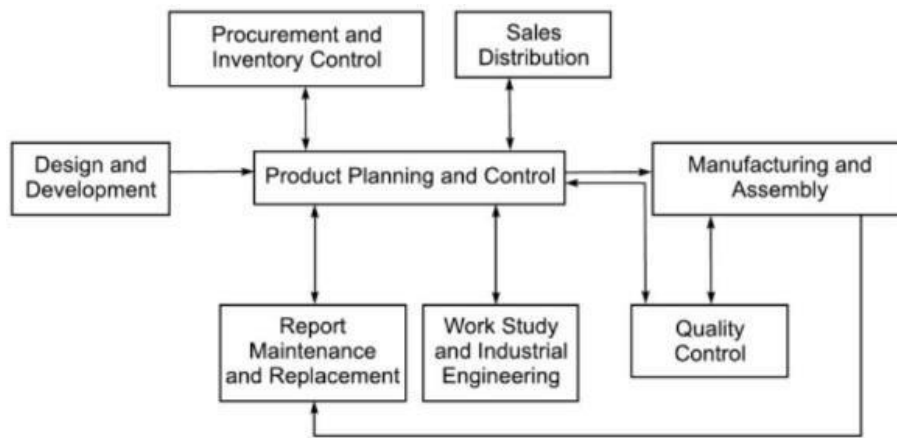


Figure 3: Role of Production Planning and Control in Operations Management [9]

1.3.3 Market Prediction:

Because it forecasts future demand patterns for manufactured goods, marketplace prediction is useful for production planning and management. Work shift rules, plans for increased or decreased manufacturing activity, and potential plant expansions are frequently influenced by market projections, which have an impact on production and control group planning.

1.3.4 Engineering Requirements:

Planning and control have used blueprints and bills of constituents as part of the packed directions provided to the workshop over controlling workplace. Gathering all critical data for a shop order in a single unit, which includes the process development sheets, blueprint, purchase orders, routing template, and possibly the order's production process, became one careful planning strategy.

1.3.5 Quality Assurance:

A good PPC campaign will ensure that quality standards are met, and the product is of high quality. PPC is invaluable to the entrepreneur in terms of capacity utilization and inventory control. More importantly, it speeds up and improves the quality of his responses. As a result, effective PPC contributes to company success in terms of interval, superiority, and cost [9].

II. Related Work

Different Roland Van Dierdonck and Jeffrey G. Miller provide a contingency model that describes the total deviations in production planning and control of specific requirements between firms. A company's functional requirements are related to its competitiveness and environment defined in terms of data processing systems and an organization's technology investments. Analysis of data from a small group of companies and executives demonstrates the accessibility of the model idea and its potential use. The main concept of this study is that the proper management of the production system consistently represents the economic plan of the firm. This link is established in a model developed to represent this hypothesis. As a first step, production planning tasks are derived from a conservative scheme. The second stage determines the system characteristics suitable for the job, such as the level of Information Processing System Involvement (IPSI) and the resources that need to be maintained [12].

Maurice Bonney analyzes the current state of production planning and control (PPC), highlights specific technological and systematic developments in recent years, and relates them to market demands. PPC is expected to become more dynamic, improve resource management and delivery performance, and better adapt to these internal and external changes. Some of the specifications that new PPC systems must meet are specified. To meet these standards, more knowledge is needed about how various factors affect the performance of PPC systems, suggesting that management processes need to be improved. PPC is considered in terms of its quantitative, managerial, and behavioral components. A framework is provided for creating action and research goals [13].

Vaidyanathan Jayaraman and others Described the characteristics of the remanufacturing environment Remanufacturing is rapidly gaining importance as a valuable resource for waste reduction and environmentally responsible manufacturing. For a variety of products, it has proven to be a profitable method for businesses while enhancing the company's image of being environmentally friendly. This setup considers the remanufacturing company's production planning and control capabilities. The research is evaluated in various decision areas that make up the production planning and control functions. There are still many zones that are under-researched. It highlights the lack of a comprehensive integrated structure and model for production planning and control functions. It's also worth noting that most companies are still dealing with these issues and lack formal processes to address them. Prototypes and sketches based on these remanufacturer challenges and requirements are required [14].

Cheng Wang and Xiao-Bing Liu discussed integrated production plans. The purpose of this article is to propose an optimization model for multi-purpose production planning. This model is defined as the integration of production planning and control for business management modeling and manufacturing. A prototype of multi-objective production planning optimization is presented based on a study of the strengths and weaknesses of ERP planning systems, as well as related research and literature. The model's coverage includes multiple performance management objectives, such as supply, production balance, inventory, and overtime production, to maximize industrial processes under various objectives, as well as net demand and potential. can be managed and organized in As a result, product development management in small-scale manufacturing considers a variety of goals to measure the performance of manufacturing processes, not just power and machinery, and multi-objective optimization models are used to manage and monitor enterprises. It turns out that there is Production optimization is efficient [15].

Nikos I. Karacapilidisa and Costas P. Pappis focus on Total Production Planning and provide an interactive model-based solution for production management in a textile production system. Scheduling these systems has become extremely difficult due to the unique nature of the industry, including multi-stage processes with multiple units per stage, different scheduling perspectives, and production needs. Different for each stage. The aforementioned characteristics are evaluated and their influence on the production control system discussed, in addition to a complete explanation of all the modules that make up the system, and the relationships between them. . The system is also linked to MRP-II and Optimum Manufacturing Technology, two highly recognized production control programs. Data structure diagrams are used to demonstrate the system's features, while Appendix A presents the full methodology for the main production prep modules in the pseudocode method, as well as the relevance of basic data concepts [16].

III. Discussion

We to fulfill orders on schedule, manufacturing planning is critical. Customers will not be satisfied if employees are unaware of stock quantities, available workstations, or task schedules. Production planning is essential whether the individual is a new producer who is oiling the equipment for the first time or an experienced manufacturer who is delivering thousands of goods. Production plans, including scrums and monthly plans, guarantee that resources are used to their full potential. Charts and graphs can handle a few production orders, but for major manufacturing companies, the complexity skyrockets. Production planning assists in the purchasing of raw materials based on the number of manufactured goods to be generated. Stockpiles, cash flow, sales, and distribution are all impacted. Production's planning is essentially the planning of resources for delivering goods, while production control is the regulating of the production system to accomplish objectives as efficiently as possible. Manufacturing control is more about keeping an eye on the production line and intervening when things aren't going as planned. The term "production's planning and controlling" simply refers to the utilization of all of these ideas in order to achieve an efficient production line. PPC serves a variety of purposes, including improved organization for on-time delivery to customers, optimum resource usage, reduced inventory investment, avoided resource wasting, enhanced efficiency, and cost savings by identifying and eliminating faults. The study found that the kind of product and the manner of manufacture have an impact on the PPC.

IV. Conclusion

Over the final numerous decades, the producers enterprise as a whole has visible massive versions in phrases of gauge, intricacy, and expertise, and that is authentic of maximum gift high-tech production packages in engineering, semiconductors, aircraft, and automobiles. Manufacturers have to create first-rate items at a reasonably-priced value even as keeping good enough flexibility to meet quick converting purchaser wishes with a view to live profitable. Production's making plans and controlling is a essential characteristic that lets in a employer to have prominence and controls upon all factors of manufacturing operations. PPC is a topic of studies in in of itself, with simulation procedures proving to be the maximum

beneficial techniques for investigating and comparing commercial difficulties. The evaluation makes a speciality of cutting-edge imitation procedures in PPC on this overview article to demonstrate its relevance to modern production challenges. PPC advantages, techniques in manufacturing's making plans and controlling, variables impacting manufacturing's making plans and controlling, characteristic of PPC in enterprise management, and PPC's interconnectedness with different components of the producing system are all mentioned on this study. According to the findings, destiny studies ought to recognition on an intensive exam of hybrid strategies for adapting to a number of PPC challenges, in addition to the improvement of truthful analytical simulation equipment for powerful PPC implementations.

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