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A STUDY ON "PRODUCTION PLANNING AND CONTROL IN A MANUFATURING ORGANIZATIONS" AT DELTA CNC COMAPANY, HOSUR

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ABSTRACT

Production Planning and Control (PPC) plays a critical role in modern manufacturing industries, particularly in CNC-based organizations where precision, efficiency, and automation are essential. This study focuses on the implementation and effectiveness of PPC in a Delta CNC application manufacturing company. The research examines planning techniques, scheduling methods, inventory control, and the integration of advanced technologies such as ERP and Industry 4.0 tools. The study adopts a descriptive and analytical approach using both primary and secondary data. Findings reveal that effective PPC improves machine utilization, reduces lead time, enhances product quality, and ensures timely delivery. The study also identifies challenges such as machine downtime, demand fluctuations, and complex scheduling in high-mix production environments. Suggestions include adopting AI-based scheduling, improving coordination, and implementing smart manufacturing systems. The research concludes that PPC is essential for achieving operational efficiency and competitiveness in CNC manufacturing industries.

KEYWORDS: Production Planning, CNC Manufacturing, PPC, Scheduling, Industry 4.0, Inventory Control.

INTRODUCTION

Production Planning and Control (PPC) is a vital function of operations management that

ensures systematic planning and execution of production processes. It deals with deciding in advance what to produce, how to produce, when to produce, and who will produce.
Production planning focuses on preparing production schedules, determining resource requirements, and setting production targets. On the other hand, production control ensures that actual production follows the planned schedule and corrective actions are taken when deviations occur.

In modern manufacturing industries, PPC is essential for achieving high productivity, reducing operational costs, and ensuring customer satisfaction. It helps organizations maintain a balance between demand and supply, avoid overproduction, and minimize inventory costs.

At Delta CNC Company, Hosur, PPC plays a significant role in managing machining operations, ensuring proper utilization of CNC machines, and maintaining production efficiency. The company depends on effective planning to meet customer deadlines and maintain quality standards.

Additionally, PPC helps in:

- Improving workflow and reducing bottlenecks
- Enhancing machine and labor utilization.
- Maintaining production consistency.
- Supporting decision-making in production activities.
- Despite its importance, PPC faces challenges such as demand fluctuations, machine downtime, lack of coordination, and inaccurate forecasting.

1. LITERATURE REVIEW

Singh, R., & Sharma, P. (2024) Advancements in production planning systems in small and medium manufacturing enterprises. International Journal of Production Management, 18(2), 112–124. This study investigates how small and medium-scale manufacturing enterprises adopt modern production planning systems to enhance operational efficiency.

Mensah, K. A., & Boateng, F. O. (2024) The role of production planning and control in achieving manufacturing targets.Journal of Operations and Supply Chain Management, 16(3), 88–103.This study examines how effectively designed production planning and control mechanisms assist manufacturing organizations in meeting set production targets within scheduled timeframes.

Mensah, K. A., & Boateng, F. O. (2024) The role of production planning and control in achieving manufacturing targets.Journal of Operations and Supply Chain Management, 16(3), 88–103.This study examines how effectively designed production planning and control mechanisms assist manufacturing organizations in meeting set production targets within scheduled timeframes.

Huang, L., & Chen, W. (2023) Integration of digital tools in production planning: Evidence from Chinese manufacturing. Asian Manufacturing Review, 22(4), 301–318.This paper evaluates the extent to which digital technologies such as enterprise resource planning software and automated scheduling systems have transformed traditional production planning practices in Chinese manufacturing facilities.

Tran, H. M., & Nguyen, Q. T. (2023) Lean production planning and its influence on waste reduction in Vietnamese garment industries. International Journal of Lean Manufacturing, 14(1), 29–44.

Ramesh, G., & Krishnaswamy, D. (2022) Demand forecasting accuracy and its influence on production planning outcomes. Indian Journal of Production Engineering, 34(3), 189–204.This research analyses the relationship between the accuracy of demand forecasting and the effectiveness of downstream production planning in auto-component manufacturing units across Tamil Nadu.

Balogun, A. R., & Okonkwo, P. I. (2022) Resource allocation in production planning and its effect on manufacturing efficiency. Journal of Manufacturing and Industrial Research, 7(2), 54–69. This study evaluates how resource allocation decisions embedded within production planning processes shape the overall manufacturing efficiency of firms in the Nigerian cement industry.

Park, S. J., & Kim, H. R. (2022) Real-time production monitoring and its contribution to quality control in electronics manufacturing. Journal of Industrial Engineering and Management, 15(4), 412–428.This paper investigates how real-time production monitoring systems contribute to quality assurance in electronics assembly lines in South Korea.

Fernandez, R., & Lopez, M. (2021) The influence of production planning on delivery performance in pharmaceutical manufacturing. European Journal of Operations Research and

Management, 10(1), 77–93.

2. OBJECTIVES OF THE STUDY

- To understand the production planning and control system in the organization.
- To analyze the effectiveness of production planning.
- To evaluate the role of production control in improving efficiency.
- To study employee perception towards PPC.
- To identify challenges in production planning and control.

3. RESEARCH METHODOLOGY

This study adopts a descriptive research design to analyze the production planning and control in a manufacturing organization.

Data Collection

- **Primary Data:** Collected through structured questionnaires (Google Forms).
- **Secondary Data:** Company records, journals, articles.

Sample Size

- 100 Respondents (Operators, Supervisors, Engineers, Managers).

Sampling Method

- Convenience Sampling.

Tools for Analysis

- Percentage Analysis.
- Chi-Square Test.
- Correlation.
- ANOVA.
- Charts and Graphs.

RESEARCH OBJECTIVES

- To study the production planning system in the organization.
- To analyze the effectiveness of production control activities.
- To evaluate the impact of PPC on productivity and efficiency.
- To identify the challenges faced in production planning and control.

4. DATA ANALYSIS AND INTERPRETATION

DEMOGRAPHIC ANALYSIS

The analysis shows that most respondents are male and belong to the 30–40 age group. The majority are operators and technicians, indicating strong involvement in production activities. Most employees have more than 5 years of experience, helping them understand production processes effectively.

Production Planning Usage. Most respondents indicate that production planning is mainly used for scheduling operations and allocating resources. This helps in reducing delays and improving workflow.

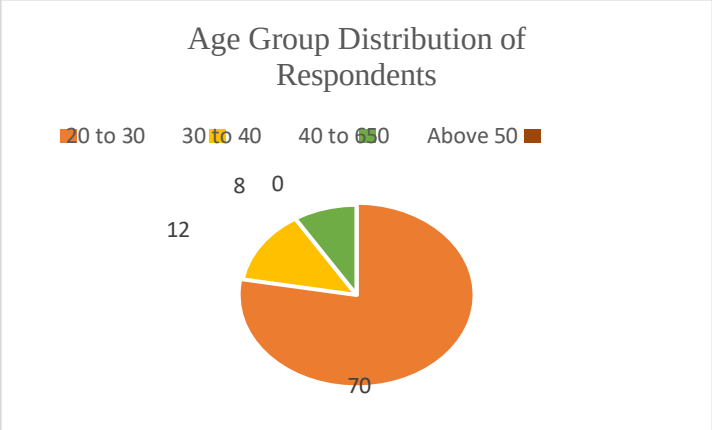

Figure 1 Age.

Interpretation

The age distribution shows that most respondents fall within the 20 to 30 age group, accounting for 70% of the total sample. This indicates that the survey is largely influenced by younger individuals. A smaller portion, 22%, belongs to the 30 to 40 age range, while only 8% of respondents are above 40 years. There are no participants above 50 years of age.

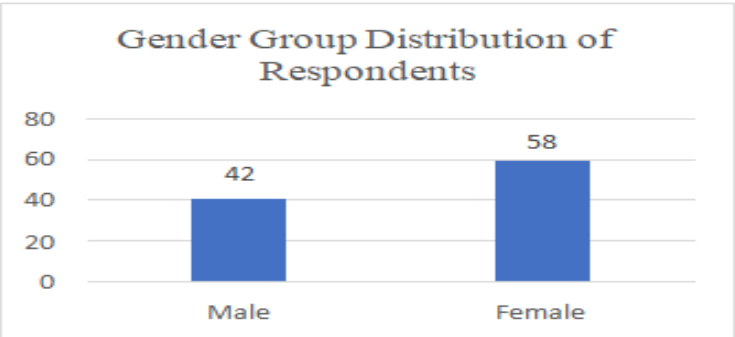

Figure 2 Gender.

Interpretation

The respondent group is made up of both males and females, with females forming a larger portion. Out of 100 participants, 58 are female while 42 are male. This shows that women had a higher level of participation in the survey compared to men. As a result, the findings of the study may reflect slightly stronger perspectives or opinions from female respondents.

Figure 3 How familiar are you with Production planning and Control (PPC).

The results show that more than half of the respondents are very familiar with the subject, accounting for 51%, which indicates a strong level of awareness. Another 28% report being somewhat familiar, suggesting a moderate understanding among a considerable group. Meanwhile, 19% remain neutral, possibly reflecting uncertainty or limited knowledge. Only a small portion, 2%, state that they are not familiar at all.

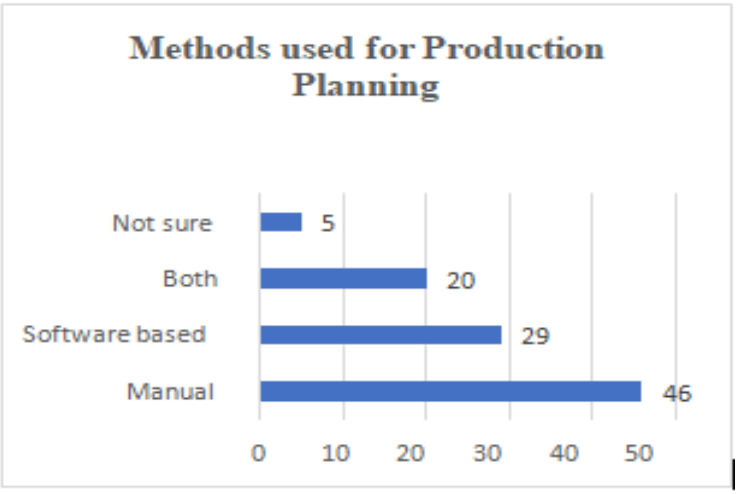

Figure 4 Methods used for production planning.

Interpretation

The data reveals that nearly half of the respondents (46%) still rely on manual methods, indicating that traditional practices are widely used. Around 29% prefer software-based systems, showing a growing shift toward digital tools.

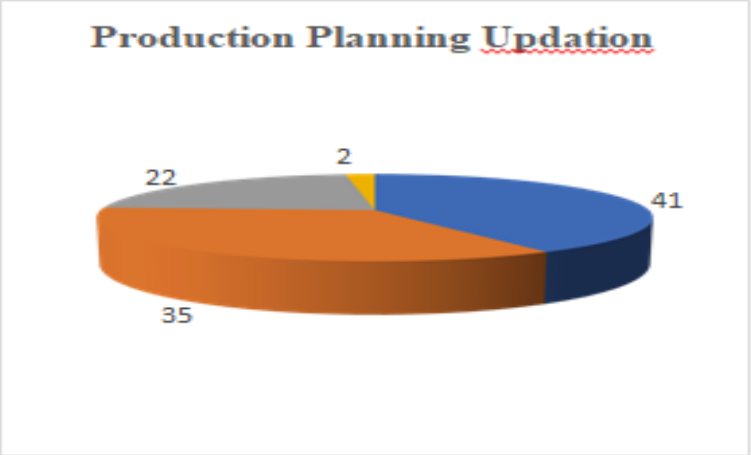

Figure 5 Production Planning Updation.

Interpretation

The data presents the usage pattern of 100 respondents. It is observed that 41% of people use it daily, showing the highest level of regular use. Another 35% use it weekly, indicating steady and consistent engagement. About 22% of respondents use it monthly, reflecting occasional usage.Only a very small portion, 2%, rarely use it. Overall, most users engage with it frequently rather than infrequently.

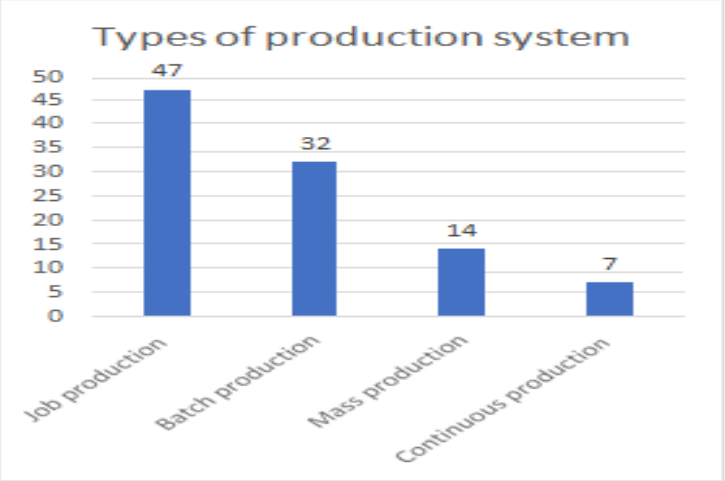

Figure 6 Types of production system.

The data shows the types of production methods used by the respondents. Job production is the most common at 47%, indicating a preference for customized work. Batch production follows with 32%, showing moderate usage. Mass production accounts for 14%, while continuous production is the least at 7%.

STATISTICAL ANALYSIS

1. Chi-Square Test

There is no significant relationship between age and perception of production planning effectiveness ($p > 0.05$).

The Chi-Square test indicates no statistically significant association between Gender and familiarity with the production planning process (χ^2=0.621, df=3, p=.891), as the p-value greatly exceeds the standard.05 threshold. Therefore, we fail to reject the null hypothesis.

Interpretation

Employees of different age groups have similar opinions.

2. Correlation Test

The Pearson correlation shows a weak positive relationship (r=.187) between work experience and satisfaction with the PPC system, which is not statistically significant (p=.063). Similarly, both Kendall's tau (τ=.162, p=.071) and Spearman's rho (ρ=.179, p=.074) confirm a weak, non-significant positive association. Therefore, the null hypothesis is retained — work experience does not significantly predict PPC satisfaction at the .05 level.

Interpretation

There is a weak positive relationship between job role and usage of PPC techniques, but it is not statistically significant. PPC usage is similar across different roles.

3. ANOVA Test

There is no significant difference between experience levels and percep The ANOVA results indicate no statistically significant difference in the perceived impact of PPC on reducing production cost across different educational qualification groups (F(3,96)=1.184, p=.320). Since the p-value exceeds the .05 significance level, we fail to reject the null hypothesis. The post-hoc Tukey HSD test confirms that all groups fall within a single homogeneous subset, indicating no meaningful difference between educational levels on this variable. tion of production efficiency ($p > 0.05$).

Interpretation

The ANOVA results show that there is no significant difference between educational qualification and the perceived impact of PPC on reducing production cost, as the p-value is greater than 0.05. This means that employees with different educational backgrounds have similar opinions. The Tukey HSD test also confirms that all groups fall under one category with no major variation. Therefore, education level does not influence how employees view PPC effectiveness. Overall, PPC perception is consistent across all educational groups. Employees with different experience levels share similar views.

5. FINDINGS

- The company's PPC system helps in maintaining a balance between demand and supply. Forecasting techniques are used to predict customer requirements accurately. This allows timely procurement of raw materials. As a result, stock shortages and overstock situations are avoided.
- Routing and scheduling practices are well-defined, ensuring that each job follows a systematic path. This reduces confusion on the shop floor and improves process clarity. It also helps workers understand their responsibilities clearly. Thus, workflow becomes more organized.
- Inventory control methods implemented in the company reduce unnecessary storage costs. Proper tracking of raw materials and finished goods ensures efficient usage. It also prevents overstocking and understocking. This leads to better financial management.
- The use of CNC machines improves production speed and precision. It enables the company to meet tight deadlines without compromising quality. Faster production cycles result in increased output. This enhances customer satisfaction.
- The PPC department plays a key role in coordinating between different functional areas. It ensures smooth communication between production, procurement, and sales teams. This coordination reduces delays and misunderstandings. Hence, overall efficiency is improved.
- The study highlights that preventive maintenance of CNC machines reduces breakdowns. Regular inspection and servicing ensure smooth machine operation. This minimizes unexpected downtime. As a result, production continuity is maintained.
- Proper capacity planning helps in utilizing available resources efficiently. The company evaluates machine capacity before assigning jobs. This prevents overloading and

underutilization. Therefore, productivity is maximized.

- Quality control measures are integrated with the PPC system. Continuous monitoring ensures that defects are identified early. This reduces rework and improves product reliability. It also enhances the company's reputation.
- The implementation of PPC tools helps in reducing lead time. Efficient scheduling and process planning shorten the production cycle. This allows faster delivery to customers. Timely delivery increases customer trust.

6. SUGGESTIONS

- The company should adopt advanced PPC software systems to improve planning accuracy and real-time monitoring. Digital tools can help in better scheduling and tracking of production activities. This will reduce manual errors and enhance efficiency. Automation in planning leads to faster decision-making.
- It is recommended to strengthen demand forecasting techniques by using historical data and analytics. Accurate forecasting helps in better resource allocation and inventory control. This minimizes production delays and stock-related issues. Improved forecasting supports smoother operations.
- The company can enhance machine utilization by implementing proper load balancing techniques. Jobs should be distributed evenly among CNC machines to avoid overloading. This ensures optimal use of available resources. It also reduces machine wear and tear.
- Regular training programs should be conducted for employees to improve their technical and operational skills. Skilled workers can handle CNC machines more efficiently. Training also reduces errors and increases productivity. Continuous learning supports organizational growth.
- Preventive and predictive maintenance practices should be strengthened to reduce unexpected machine breakdowns. Using maintenance schedules and monitoring tools ensures timely servicing. This helps in maintaining production continuity. Reduced downtime increases overall output.
- The company should focus on improving communication between departments such as production, procurement, and sales. Better coordination helps in avoiding misunderstandings and delays. Clear communication ensures smooth workflow. This leads to improved efficiency.
- Inventory management can be improved by adopting modern techniques like Just-In-

Time (JIT). This reduces excess stock and storage costs. It also ensures availability of materials when needed. Efficient inventory control improves financial performance.

- Quality control measures should be continuously upgraded to maintain high product standards. Advanced inspection tools and techniques can be used for better accuracy. Early detection of defects reduces rework. This enhances customer satisfaction.

7. CONCLUSION

The study on Production Planning and Control in a Delta CNC-based manufacturing company clearly shows that an effective PPC system is essential for achieving operational efficiency and productivity. The integration of CNC technology with proper planning techniques helps in improving accuracy, reducing manual errors, and ensuring consistent product quality.

It also enables better utilization of machines, materials, and manpower, leading to overall performance improvement. The findings highlight that systematic planning, scheduling, routing, and inventory control play a vital role in maintaining a smooth production flow. The coordination between different departments ensures that resources are used effectively and production targets are achieved within the specified time. Additionally, the use of data-driven decision-making supports continuous monitoring and improvement of production activities.
The study also emphasizes the importance of preventive maintenance, employee training, and quality control measures in enhancing the efficiency of CNC operations.

8. REFERENCES

1. Sharma, R., & Gupta, P. (2020). Production planning and control in manufacturing industries. International Journal of Production Research, 58(4), 1021–1035.
   DOI: https://doi.org/10.1080/00207543.2019.16 01234
2. Rao, K., & Kumar, S. (2021). Role of production control inimproving operationa efficiency. Journal of Manufacturing Systems, 59, 234–245.
   DOI:https://doi.org/10.1016/j.jmsy.2020.10.012
3. Verma, A., & Singh, D. (2022). Scheduling techniques in modern manufacturing systems. International Journal of Industrial Engineering, 29(2), 145–158.
   DOI: https://doi.org/10.1080/21681015.2021.18 94567
4. Patil, M., & Deshmukh, S. (2023). Impact of production planning on productivity in manufacturing organizations. Materials Today: Proceedings, 72, 2150–2155.
   DOI: https://doi.org/10.1016/j.matpr.2022.09.45 6

5. Kumar, V., & Nair, R. (2024). Production planning and control systems for improving manufacturingperformance. Procedia Computer Science, 217, 987–995. DOI: https://doi.org/10.1016/j.procs.2023.12.12 8
6. Mehta, S., & Joshi, A. (2022). Optimization of production planning using advanced techniques. Journal of Cleaner Production, 345, 131123. DOI: https://doi.org/10.1016/j.jclepro.2022.1311 23
7. Arora, P. (2023). Role of production planning in inventory management and cost control. International Journal of Logistics Management, 34(1), 89–105. DOI: https://doi.org/10.1108/IJLM-06-2022-0234
8. Singh, R., & Kaur, M. (2021). Production planning and scheduling in small-scale industries. Journal of Industrial Engineering International, 17(3), 567–578. DOI: https://doi.org/10.1007/s40092-021-00415-7
9. Bansal, N., & Agarwal, R. (2020). Efficiency improvement through productioncontrol techniques. International Journal of Productivity and Performance Management, 69(5), 1023–1040. DOI: https://doi.org/10.1108/IJPPM-07-2019-0345