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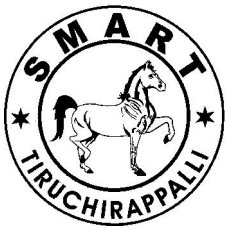

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CHANGING TRENDS IN PRODUCTION PLANNING - POTENTIAL CHALLENGES AND THE RESOLVING WAYS AHEAD

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Abstract

Today's ERP systems offer MPS and MRP Modules to address the inventory requirements. Beyond the I.T. systems, elaborate understanding of these Modules are required to keep inventory at a minimum without compromising on service levels. A good PP system will make the company more flexible and allow spending only on what is completely necessary to make the product. The primary objective of the present paper is to study the existing systems and to explain the possible improvements to the existing practices. This can help in understanding the possibility for improvement and to redesign the existing systems for better productivity at optimum cost possible. This, in turn, can help organizations to improve profitability and to serve the society with low cost products and services. The ultimate objective of any system is to serve the stakeholders interests and to survive in the long run. The present paper focuses on many aspects relating to production challenges and the strategies to resolve the same.

Key words: *Vendor- Processing Time- Replenishment- Make to Stock- Make to Order- Lot to Lot.*

1.1: Introduction

Manufacturing and production industries face a constant challenge. They must bring a wide number of resources together and efficiently create a new product in a way that effectively meets demand. If these industries do not succeed in these tasks, they will not be able to make a profit and they will eventually fail. In order to ensure profit, companies that use manufacturing and production processes, carefully plan out their processes known as Production Planning and Control, or simply PP. Production Planning and Control is the process of allocating all supplies that the business takes in and ensuring they are taken to the proper places and used at the proper time to make enough products to satisfy demand. PP serves as a vast organizational system that tracks the creation of products from beginning to end. Some forms of planning include examining existing systems and seeking to improve them, while other types plan for products that have not yet been created.

Production Planning and Control is designed, like most business strategies, to generate higher profits. Most production planning methods, like lean manufacturing, are used to increase efficiency and reduce error. Production Planning manages company time, machines and workers, finding ways for them to work together as seamlessly as possible. A good PP system will make the company more flexible and allow spending only on what is completely necessary to make the product. Once the strategy is complete, the planning and control department usually moves on to tactics, or how the company will obtain the necessary resources in the first place. Operational control, meanwhile, is used to help train laborers and make sure the business has the necessary machines and tasks in place to create the products.

1.2: Challenges in Production Planning:

1. Understanding True Costs

Cost Estimating is essential to determine a production strategy that will be within the

budget. Labor costs depend on knowing rates for each cast and crew member. If working for a production company with a flat hourly rate, you need an accurate estimate of the total production hours needed. Tally all material expenses relating to props, costumes and location fees for mobile production. In the studio, getting accurate cost estimates from production service vendors and understanding all licensing fees attached to the use of music used in the production. The list can seem endless, but one should thoroughly research every item that contributes to the production cost.

2. Scheduling

Beyond knowing how long a production task will take and how much it will cost is the need to know when the task needs to be done. Planning a production timeline involves different factors for different phases. When scheduling an outdoor shoot, one may need to know when the sun is in the best position and which direction the light will come from at certain hours.

3. Factoring in Surprises

Added to the previous list of challenges is the need to prepare for the unknown. Murphy's Law is always valid. Production tasks, going exactly as planned, are rare. Factor in time and money for the unknown. Adding 20 percent to your best estimate is a good rule of thumb. Keeping calm, with a person whose attitude reflects his ignorance of the process, may be the single greatest challenge. The tendency to consistently ask for the impossible is often referred to the needing a "magic wand" that can make everything come together as requested.

1.3: Parameters in I.T System for Planning Implementation

Lead Time: Lead Time is the time taken to replenish the item independent of purchase or production. It can be defined as Days, Weeks or Months. Purchase Lead Time should include Order Processing Time at the Vendor's place, Vendor's Production Time, Shipment, Clearance at Ports/Checkpoints and Internal Processing Time at the time of Receipts. Production Lead Time includes Internal Order Processing Time, Issue from Stores, Actual Production and Updating Produced Stock in System.

Reorder Point: Replenishment is triggered when Inventory goes below the specific quantity. Forward planning is done to bring the projected balance up.

Reorder Quantity: Standard lot size that can be used for all order proposals. This is also sometimes the minimum order quantity which may result in excess quantities more than actual demand. This is used only with the reordering policy of Fixed Reorder Quantity.

Maximum Inventory: The Replenishment quantities will be Maximum Inventory defined here minus the actual quantity available at the time of order. This field is used only with the reordering policy of Maximum Quantity.

Minimum Order Quantity Field: This is the minimum allowable quantity for replenishment of an item. The replenishment quantity may be increased, if required, to meet the minimum order quantity defined here. It can be selectively used with a make-to-stock manufacturing policy or purchase.

Maximum Order Quantity Field: This is the maximum allowable quantity for replenishment of an item. The replenishment quantity may be decreased, if required, to meet the maximum order quantity defined here and it is selectively used with a make-to-stock manufacturing policy or purchase

Order Multiple Field: Used to round-off the replenishment quantities upwards to match the multiples of the number defined here. This is typically used to optimize the load units like pallets, containers etc for shipping.

Lot Size Field: Used to define the quantity of the item that is usually produced in one production lot. This is also used to distribute the fixed cost of manufacturing the products.

1.4: Manufacturing Policy: To calculate additional orders for related components.

Make-to-Stock: Make-to-Stock item is produced to specific inventory levels. Typically, these are standard items with a relatively short manufacturing lead time or items that are used as required sub-assemblies for other items. This manufacturing policy is generally used with the reordering policies of Fixed Reorder Quantity or Maximum Quantity.

Make-to-Order: When you do not want to produce items for any specific inventory levels and production is based on specific orders, it is called Make-to Order. This manufacturing policy is generally used with the reordering policy of Order and possibly, Lot-for-Lot.

Reordering Policy Field: When the need for replenishment is detected, the system uses the reordering policy to calculate the lot size for each planning period.

Fixed Reorder Quantity: The system uses the quantity specified as Fixed Reorder Quantity to determine the re-order lot size.

Maximum Quantity: The system uses the quantity specified in the Maximum Inventory Field to determine the re-order lot size.

Order Quantity: For each individual requirement, a corresponding replenishment order is generated and reorder cycle is not used. The order proposal quantities may be further adjusted according to the order modifier fields: Minimum Order Quantity, Maximum Order Quantity and Order Multiple. Some of these options can only be selectively used with the Reordering Policies mentioned above.

Reorder Cycle Field: Used to define the planning time frame for any item. The demand for this time frame is consolidated. This is also selectively used with Reordering Policy and Manufacturing Policy.

Safety Lead Time: Additional time used as buffer in the case of delays. The Safety Lead Time is factored additionally with the Lead Time mentioned above.

Safety Stock Quantity: Additional quantity used as buffer in case of peaks in demand. Backward planning is done to ensure that Safety Stock Quantities are always maintained. Typically replenishment is triggered when the stocks in the planning horizon becomes zero or negative. But when Safety Stock Quantities are defined, the replenishment quantity at the minimum will match this quantity.

1.5: Types of Uncertainties in Production Planning and Control

External: In any supply process, there is some amount of uncertainty in the deliverables which is external. This may be due to Supplier's Internal Supply Chain Issues like capacities, quality etc. To factor these uncertainties, the replenishment lead times and replenishment quantities can be effectively used.

Internal: Just like external, the internal systems can also be plagued with delays due to labour problems, machine breakdowns etc. To factor these uncertainties, Safety Lead Time and Safety Stock Quantities are commonly used. They are not major showstoppers but depending upon how lean the Supply Chain is designed, these parameters become critical.

Inherent: All production plans are derived from some kind of forecast either extrapolated from historical trends or assumed business plan based on some strategy and/or market research. These forecasts are not accurate and the actual demand is different from forecast. The lead time data indicates how much in advance the planning needs to be done. Here we have shown that there are so many parameters to be defined to use a system driven MRP. The two parameters which are very critical are Lead Time and Reorder Point. The other parameters are used to make a system learn. When the system has to be lean, it implies that service levels cannot be compromised. This remains a classical

challenge for all planners to maintain minimum inventory with the highest service levels. The service level here is not just the time from Order to Delivery. It becomes important to track the number of orders being serviced from existing stocks and how many are planned and executed after orders are received.

1.6: Results and Discussion

Production Plan Implementation: Based on the forecast, I.T. programs predict the gaps in demand versus availability and generate replenishment tasks based on the replenishment parameters like Production or Purchase. The system must be capable of doing this for products which have multiple levels in the BOM. The following are the observations in executing the MPS and MRP.

Capacity Constraints: In most cases, these constraints are not accurately incorporated and in few cases, they are not even considered. If this is not done accurately, it becomes difficult to identify bottleneck in the system. Capacity Constraints are also factored using planning parameters like Lead Time, Reorder Points etc. Whenever bottlenecks are identified after much damage is done, they are addressed through overtime and/or subcontracting. And it becomes difficult to factor these overtime costs into the product.

Trade off between Important-Urgent Tasks and Important-Not-Urgent Tasks: The MPS generated by the system generally ensures that inventory is built up during off-season. This is often ignored and overruled by users because they mostly prioritize Important-Urgent Tasks and the neglect of the Important-Not-Urgent tasks which eventually become Important-Urgent tasks.

Non-Standard Delivery Lead Times: Planners, who source materials and generate the Master Production Schedule, know by their experience that delivery lead times may drastically vary based on order quantities. On the other hand, people in sales are often under pressure to commit delivery dates with no regard to order quantities. Therefore, when orders are committed, there has to be a transparent system through which stake holders can identify the dynamic lead time that can be committed.

1.7: Observations:

Inflated Lead Time: It is a common practise to use the Planned Lead Time to indirectly create additional safety stock. There may be so many reasons to do this like not being able to push Vendors to commit a Standard Lead Time,demand for the product being not consistent, tendency of the planners to be on the safer side and capacity constraints are not accounted. Whenever these Lead Times are inflated, the WIP also increases. It is also found that the WIP is actually acting as a safety stock and its purpose is to provide additional buffer to protect against uncertainties. This WIP is not in the warehouse but sitting on the shop floor. This is attractive to planner as there is more work from which to select and to expedite to meet demand, once it has been realized. A longer lead time results in more uncertainty in demand forecast, with more uncertainty in shop needs, even more safety stock, which results in pressure to increase further the planned lead times.

Re-Planning: At some regular frequency, the planning system is rerun to create a new plan. Often this frequency corresponds to the frequency with which the demand forecast gets updated. This is done even more frequently in order to capture the dynamics of the internal and external supply processes. There are substantial inefficiencies in the deployment of these tactics as they are generally reactive ad-hoc measures.

Inventory Buffers: In most systems, Inventory Buffers are maintained for either raw material or finished goods. Inflated Lead Time creates WIP safety stock as buffer for raw materials, excessive finished goods inventory and/or

underutilized capacities for the system to function. As the level of complexity increases in the manufacturing process, it is better to maintain several Inventory Buffers, strategically located across the production and supply system. These buffers act as safety stock and allow the downstream to operate independently from any noise/disturbances from upstream process and vice versa. The size of the buffer, where to locate and inventory holding costs are some of the important considerations in this context. In cases where Inventory Buffers may not make economical sense, Capacity Buffers may also be maintained.

1.8: Conclusion

Excess Inventory in any system indicates inefficiencies. They may exist in different silos as a result of inefficient planning or production, incorrect distribution strategies, unreliable backend supply chain etc. Instead of following a Push Replenishment System, companies should focus on implementing a Pull Replenishment System.

Using Inventory Triggers: Triggers are established using historical patterns, lead times and replenishment frequencies.

Develop a Monitoring Mechanism: Periodical review and if required, even on a daily basis, is now easily possible with location wise inventory reports available in almost all ERPs.

Define Rules for Response: Clear rules must be defined for Inventory Triggers like EOQ, Top-Up Order, Fast Moving Product, use of less than full truck load etc.

Responsibility for Regular Reviews: Regular Reviews, with key stake holders, across procurement, manufacturing, distribution and sales will help to take corrective actions and analyze root cause problems of non-compliance.

Performance Measures for all Stake holders: Right performance measures in place will align the entire organization.

Collaboration with External Partners: Vendors and Distributors must be treated as partners by sharing expectations and benefits. Pull System requires long term relationships as it calls for time and resource commitments.

Pilot before Scaling Up: Proof of concept helps convince skeptics and secures hands-on real-world experience. In any kind of systems, there must be efforts to minimize variability in supply and demand. This can be done by trade promotions, consolidating inventories and postponing product configuration closer to the customer.

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