

Study on the Cost of Placing Orders and Its Behavior in Manufacturing Enterprises

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Abstract: Due to the complexity, uncertainty and randomness of the market environment, it is common and more frequent in enterprises. In addition to the supply chain inventory compression, strong personnel mobility and streamlining of the establishment and other reasons, the interpolation resources are constrained, the time and space of movement is limited, and the overall efficiency is low. In this paper, the phenomenon of "order insertion" in manufacturing enterprises is investigated, analyzed and studied. Frequent insertion of orders to the original normal production plan and disruption, whether purchasing or production. The phenomenon of order insertion will disrupt the original production rhythm, lead to production chaos, produce a variety of waste, affect the reputation of enterprises, seriously reduce customer satisfaction. The author analyzes the reason of "insert order" and its influence on production and management, and puts forward the corresponding improvement measures and countermeasures.

1. Introduction

Although the business order is an important source of the company's operation and income, such as frequent order insertion on the original normal production plan impact and disruption, whether procurement or production. The phenomenon of order insertion will disrupt the original production rhythm, but also lead to chaos in the production of enterprises, produce a variety of waste, improper treatment will also lead to the production efficiency, product quality, cost control of the obvious decline. However, in order to meet the urgent needs of customers and specific sales market, manufacturing enterprises have to insert orders. Insert order refers to the temporary insert order generated on the basis of the prepared production plan within a planning period, which needs to squeeze, postpone or even stop the normal production of the current order to realize the delivery of insert order. The motivation of order insertion type is different, which can be divided into urgent order insertion, special order, rework order and sample order. According to the different ways of responding to market demand, the production mode of manufacturing enterprises can be divided into three types: sales forecast oriented, order oriented, or both.

At present, scholars have carried out extensive researches on the problem of insertion, including the determination of priority urgency of insertion, the method of insertion, and the influence of insertion on production, such as Ghosh JB (1997), Wu Weiwei (2005), Chen Zhixiang (2005), etc. They believe that the determination of order priority is the key to the problem of order insertion,

which is directly related to the order priority production sequence, and the determination of order priority sequence is a multi-objective decision-making problem [1].

It can be seen from the domestic and foreign research overview of the insertion problem that although the research in this field has achieved phased results, the systematic research is still in the initial stage. It is mainly reflected in the following three aspects: First, the research results mainly focus on the dynamic scheduling based on interpolation list, and there are few researches on the interpolation list problem when the production plan is not put into operation; Second, the research on the plug-and-order problem is limited to line work, and there is no treatment model for different products and different production workshops. Third, the research on the insertion of orders ignores the difficulty of order completion, which is an important factor affecting the priority and urgency of orders [2].

2. The Reason Analysis of Order Insertion Behavior

In the complex and changeable market competition environment, the production and operation system of A company needs to deal with many uncertainties. This uncertainty has both external and internal, so lead to company A single reason, both the external market factors, there are internal product quality, complexity of equipment failure, abnormal raw material supply, production, auxiliary resource constraints, workshop staff and A series of random interference factors, often makes it hard for established production plan in the execution of stability is carried out. The causes of order insertion problems can be summarized as follows.

2.1. Business and Market Factors: Changes in Demand (Orders) or Inaccurate Forecasts.

Customer's forecast demand, plan is not accurate or missing orders, resulting in inserted orders. In the development of self-owned brands, there are three channels: wholesale, retail and e-commerce. Among them, retail and e-commerce are difficult to predict orders due to uncertain demand. Rush orders are generated due to urgent needs of customers, end-of-season additions, design or quality standard changes. In order to strive for commission, some business personnel exaggerate at will without considering the internal capacity situation, technical ability and cost situation of the enterprise, and promise some unrealistic capacity, delivery cycle and preferential price to customers, which makes the enterprise in a passive position. At the same time, business personnel are not familiar with product production process and factory production process, and do not fully grasp customer order requirements, which is also an important reason for order insertion [3].

2.2. Order Delivery Factors.

The low quasi-delivery rate of orders is an important reason why a company often inserts orders. The customer is worried that the enterprise cannot deliver the goods on time. For example, the delivery is still not delivered in 15 days after the promise of 8 days. In order to ensure their production on time, the customer asks the enterprise to ensure the delivery time on the pretext of "urgent order insertion". "Frequent order insertion" is largely due to the low order quasi delivery rate of the enterprise, and the root cause of the low order quasi delivery rate of the enterprise is the extensive management which leads to the out of control of the production plan management. Therefore, manufacturing enterprises need fine management to solve the problem systematically.

2.3. Lack of Statistics and Analysis of Order Insertion Loss Data.

In particular, indirect losses, the amount of damage caused by the ratio? What are the lost sales? Similar problems most of the enterprise managers do not see or do not understand. The loss caused by order insertion is rarely evaluated and analyzed in data, which is usually included in the production cost of the enterprise, so that the profit is invisibly reduced.

3. Order Insertion Behavior Solution

To solve the production and sales problems caused by urgent orders, supplementary orders, adding orders, reducing orders and stopping orders in the process of inserting orders, coordinate, standardize and optimize the processing to meet the abnormal orders of customers. Due to the inevitability of order insertion, enterprises should establish a long-term mechanism to cope with order insertion; Its response methods include customer classification and order classification, formulation of priority rules and procedures for urgent orders, and formulation of responsibilities of relevant departments, so as to deal with urgent orders methodically and efficiently. In order to make the insertion order more targeted, more accurate, more convenient arrangement to the right location, the right time, get the right result to customer satisfaction, and can let the enterprise managers understand the feasibility of insertion order, understand the negative consequences caused by insertion order, make decisions in advance. So everyone's usual practice is to formulate the rules of insertion, assessment mechanism, containment or constraint good insertion problem [4].

3.1. Stipulate the Principles of Order Receipt

For insert sheet first formulate an effective single rules, to regulate the single process control, first of all, according to the plan of the rigid principle to formulate the corresponding single rules, clear put single process and the arrangement of the single rule, according to the rules, determine different levels of examination and approval, clearly put single process and the arrangement of the single rule, specifically as follows.

First, customer classification management principles. According to the ABC classification method, the customers of the enterprise are divided into three levels: class A, class B, and class C. On the basis of classification and classification, the customers are classified again according to the urgency of specifications. When such orders are class A customers of the enterprise, that is, important customers that contribute A lot of value to the enterprise, in order to maintain a good cooperative relationship with the customer, they should be given high priority. If the customer is rated as a class C customer, and it is difficult to meet the requirements, you can refuse to accept the order. Customer priority refers to the enterprise grading customers according to their profit contribution rate, payment terms and other factors. Define the order priority order to arrange the production schedule and rules, adopt different planning strategies and order insertion coping strategies to consider the order insertion situation by using the customer priority or order priority, generally speaking, give priority to the customers with higher grades. However, there will be some enterprises that set the first time transaction customer as B, but for the first time transaction customer, delivery on time is particularly important. The hierarchical management of customers can retain and increase high-quality customers, constantly eliminate low-score customers, and improve production and delivery efficiency [5].

Second, the principle of ability matching. As mentioned above, the types and needs of customers are diverse and ever-changing, and the resources of enterprises are limited. When the customer's order requirements (technical difficulty, quality level, delivery date...), if it is far beyond the current capacity level of the enterprise, it must pay a high price, such as investing in expensive production

equipment, and the result is uncertain, it should refuse to accept the order.

Third, the impact of the minimum principle: (1) to minimize the priority of the affected orders; (2) minimize the number of affected orders; (3) minimize the total delayed delivery days of the affected orders; (4) minimize the average delayed delivery days (or delayed delivery rate) of the affected orders; (5) to minimize the total order amount of the affected orders. In order to apply the first order insertion strategy, when the business department receives an order, the system shall determine the production priority of each order according to unified rules (mainly considering factors such as batch size, customer relationship, credit, product type, amount, etc.).

3.2. Establish the Control Process of Insert Order Review

Pay attention to contract review, urgent order placement review for urgent delivery orders, call professional departments such as planning, procurement, production, engineering, quality, research and development and even financial and human resources departments to deal with "4M1E" matters, formulate specific action plans and reply to customers to determine the delivery date. Inserting orders is allowed but not at will. The enterprise should control inserting orders, establish mature stable and controllable PMC (production planning and material control), formulate specific action plans and reply to customers to determine the delivery date.

Business personnel should keep good communication with customers, pay close attention to the changes of customers' needs at any time, timely warn the internal supply chain, avoid or reduce the sudden demand; For confirmed orders, we should communicate with customers based on the actual capacity, technology and cost of the company, and strive for factors conducive to the internal supply chain of the company, such as delivery time, partial delivery, delivery quality, etc. When necessary, we should strive for the cooperation and support of the internal quality, R&D, engineering, production and other professional departments. It is strictly forbidden to promise more than you can control. To receive an urgent order, first of all, it is necessary to determine whether it is caused by customers or their own reasons. We can consider whether we can accept the order according to the customer level, the order benefits, the possible amount of profit, our own ability, and the impact on the corporate reputation. If it is caused by their own reasons, in principle, we should try our best to meet the original delivery demand. If it cannot be met, we should actively communicate with the customer, accurately grasp the customer's demand for delayed or phased delivery, and strive for customer understanding. If the impact of order insertion is not big, the enterprise can adjust by working overtime; If the impact is larger, the enterprise should consider whether to allow the insertion of a single from the whole. The last resort is to communicate with the business department. First, explain and inform the customers and the business department about the production situation, strive for understanding, and take the way of partial delivery or delay delivery [6].

3.3. Quantify the Loss of Order Insertion

Managers need to evaluate the losses caused by the order insertion behavior, so as to measure whether it is worth the order insertion production. Based on the actual data of the past statistics, the loss of insert order is presented visually, and the adjustment, change and loss caused by the production plan are recorded effectively and objectively through the insert order. Therefore, the enterprise first set up a complete order record for order insertion problem, including complete management elements in the order insertion record. The management elements are as follows: (1) Order information of order insertion: such as time of order insertion, personnel of order insertion, quantity of order insertion, reason of order insertion, customer of order insertion, and product category of order insertion. (2) Production information of order insertion: on-line production time,

production place, completion date and delivery date. According to the recorded data of the insertion order, a multi-dimensional analysis was made from the reasons of order searching, insertion order, insertion person, insertion product, insertion nature and order quantity distribution of the insertion order. (3) When a large number of orders are inserted into the enterprise, the first thing to do is to calculate the number of orders that affect the other normal delivery time by inserting a single order, and how much is the loss? For example, the number of back orders caused by an insert order, the loss of line changing hours in the production line, the increase of labor cost, the increase of material control cost required for insert order, and the increase of purchasing management cost should be presented in a data-oriented way [7].

3.4. Rolling Plan, Temporary Increase of Capacity or Outsourcing

Different departments of the enterprise place different expectations on shop scheduling decisions from their own interests: the business department wants to better meet the delivery time promised to customers; The manufacturing department wants to improve the utilization of equipment; Management wants to reduce costs; Enterprise executives hope to improve the utilization rate of production resources as much as possible to produce more products. The production plan certainly cannot be implemented according to the requirements of individual departments, but at the same time, it must take into account the target needs and interests of each department. Therefore, it is necessary to make a reasonable compromise and balance between the interests of multiple departments and formulate a comprehensive plan that can meet various goals. The first method systematically considers the production plan, the first consideration is the customer's delivery date and priority level or order priority level; In the second method, the first consideration is whether the existing production plan is locked. If it is locked, no adjustment can be made. If there is no lock, the existing production plan will be adjusted according to the delivery date, priority level and other factors.

3.5. Rapid Procurement, Guarantee Supply, and Establish Safety Stock

Appropriately increase the stock of generic semi-finished products: cultivate the habit of selecting and reserving suppliers with strong awareness, high quality and quick response, and ensure the supply quality and response speed. Combine demand forecast with production experience analysis and application. The production department of the enterprise can analyze the behavior pattern of the customer through the demand forecast, and keep the inventory to deal with the possible inserted orders. At the same time, the enterprise according to the previous production experience, such as the products affected by the season, in advance of the peak season to prepare the goods, in order to deal with the unexpected inserted orders. The advantage of this approach is reflected in that when the insertion order arrives, the enterprise can avoid the temporary purchase cost as much as possible, including the higher price and transportation cost paid for the urgent shipment of raw material suppliers. Keeping the inventory required for proper order insertion can not only enable the enterprise to meet the production needs of regular orders, but also meet the delivery date of order insertion by increasing the working time and days appropriately. In this way, the enterprise can not only obtain higher income brought by inserting orders, but also guarantee the scheduled delivery of inserting orders, which greatly improves the customer's trust in the enterprise. In the long run, it increases the potential customer base and improves the soft power of the enterprise [8].

3.6. Flexible Manufacturing, Operation Standardization, Fast Line Change

Product to complete a single amount as the standard of each process production roughly balanced; There is a general balance between each process in product production; The balance rate below 95% should be improved; Change personnel and equipment to fit the beat rather than vice versa. Improve internal efficiency and use all available time and capacity to tap potential capacity. Improve and innovate the process, improve the production efficiency of professional equipment, improve the operation method. Lean production. The key and most difficult point to realize the balanced production characterized by "multi-variety" and small batch is the rapid installation and adjustment of processes, products, materials and equipment. Quick preparation, synchronization and coordination; Sample test and identification; Preparation of process method and standard operation instruction; Preparation of technological procedures and inspection procedures; Working hours quota, material consumption quota preparation; Process production equipment and identification; Tools, molds, special equipment preparation. Through these capabilities, the process can carry out rapid and frequent variety replacement, so as to be able to produce a variety of products in a unit time, to meet the needs of the next process; Establish flexible lines. In order to reduce the impact of order insertion on the existing production management, the production line was rearranged in accordance with the U-shaped (unit production mode), and the small flexible line strategy was adopted to avoid the influence on the production of the large assembly line and the great loss of production conversion.

Standardization of homework. Minimize errors and keep variables consistent. Content of homework standardization: standardization of processing methods; standardization of processing sequence; standardization of processing cycle; standardization of equipment operation; standardization of tool placement; standardization of stacking position; standardization of inspection procedures; standardization of exception handling; standardization of tools, stations and handling; work in process quantity standardization.

3.7. Establish Supply Chain Coordination System to Shorten Order Production Cycle

The long production cycle of orders and the production of all orders are mutually restricted and incompatible. As mentioned above, the primary reason for frequent order insertion is that the delivery cycle is too long, and the long delivery cycle is caused by frequent order insertion and disorderly plan, and then the normal delivery orders need to be inserted to meet the delivery cycle, thus forming a vicious circle. Establish a flexible enterprise internal management information system. The smooth production process needs a good management system, avoid the production plan due to changes and confusion, affect the work efficiency, which requires managers at all levels must have information system cooperation ability and high administrative efficiency ability; When the insertion order is received, the system can quickly check the materials and resources needed to meet the order, as well as the inventory and purchase status of the corresponding materials, and the capacity occupation status of the production line. If it is to receive orders, it is necessary to count the affected (that is, delayed) orders, and then negotiate with the customer, if the customer can not accept the order delay, the enterprise will not receive inserted orders. To information technology as a platform of science and technology, between the member enterprises in the supply chain is full of information sharing and collaboration mechanism, through the establishment of joint scheduling scheme in step to product production, so that it can improve the supply chain response speed, shorten the product delivery time, improve customer satisfaction, at the same time also can reduce the production costs of the whole supply chain [9].

4. Implementation Effect Evaluation and Conclusion

With the improvement of PMC management, more than 90% of enterprise orders can be delivered, customers will increase their trust in the enterprise, and the phenomenon of order insertion will also be reduced. The above real-time dynamic production scheduling scheme has been preliminarily observed through scheme design and trial operation of the enterprise. The evaluation of the effect is mainly reflected in the following aspects.

4.1. Accuracy Assessment of Production Plan.

Before the implementation of new dynamic production scheduling plan, production planning department reply to customer delivery date according to experience, the error is bigger, generally speaking, there are 40% ~ 50% of the order do not deliver the goods in accordance with the delivery time, plan implementation, production planning department to be able to accurately calculate the earliest possible date of delivery, remove the single effect, reply the delivery date is accuracy reached 95%.

4.2. Evaluation of Overtaking Orders.

The business department can grasp the equipment load and residual capacity status through the production planning department. Avoid over orders when capacity is insufficient.

4.3. Evaluation of Order Insertion Disorder.

Since order insertion is carried out in accordance with certain order insertion strategies and principles, the order insertion behavior can be orderly and optimized, and the number of affected orders is greatly reduced. At the same time, I can know the affected orders and their affected degree immediately after placing orders, so as to ensure timely communication with customers and take corresponding measures, and gradually improve customer satisfaction.

The phenomenon of "order insertion" often appears in the production process of manufacturing enterprises, and the key technologies and key problems of order scheduling. The key steps of order scheduling mainly include order prioritization, material and capacity requirement calculation, scheduling calculation, etc., while the step of order insertion mainly includes order prioritization, order insertion method analysis, and order insertion material and capacity solution strategy. Minimize the priority of the affected order to be affected; The minimum number of orders to be affected; The total delay of the order number of days to minimize the impact; The total order amount of the order is minimum etc [10].

5. Conclusion

If an enterprise wants to face customers with a stable attitude for a long time, it should treat customers' orders selectively, find suitable customers, form stable relationships with some customers rather than all customers to achieve production planning, and truly do a good job of focusing on customers. In short, ideas must be changed: managers and employees must change their thinking, through the establishment of rapid response team, operation mechanism, system and process to meet the needs of market development.

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