PLANNING OF DELIVERIES IN MODERN LOGISTICS SYSTEMS

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Abstract

A production company in the current demanding market situation has to optimize the process of planning deliveries in close cooperation with the production team and with the support of modern IT tools. The customer needs to have goods delivered at the promised time, in the ordered quantity and in the required quality. Ideally, the planning of production, tracking of production, planning of deliveries and the realization of deliveries are covered by one integrated IT solution. However, this process is usually split between MES that collects information from production, dedicated planning software and an ERP system where deliveries are finally made. This solution can be expanded by a customer portal where customers can see the information related to their orders and plan the delivery of orders that are ready in the stock of finished goods. This article will describe how such a process is designed and what the benefits are for the company and its customers.

Keywords: Delivery term, decoupling point, storage costs, logistics

1. INTRODUCTION

Today, manufacturing firms of traditional industries must - like their counterparts from the modern sectors - improve their delivery planning systems to meet the growing demands of their customers. The customers demand their products of the highest quality, in the shortest possible and exact delivery times and in the agreed amount. Businesses unable to keep pace with these growing demands are slowly but surely becoming uncompetitive.

The actual planning and delivery of products to the customer itself precedes the entire production logistics process, which must be capable of delivering the products in the required quality, quantity and within the required deadlines to the warehouse of finished goods. This cannot be achieved without feedback from the production information systems.

The most significant conditions of effective delivery planning are:

- Exact production planning.
- Reliable monitoring of the production process.
- Appropriate organization of warehouse management.
- Effective communication with the customer.

2. PRODUCTION PLANNING

If the company is unable to plan its production accurately and reliably, it then needs to count on a reserve, directly proportional to the lack of control of the manufacturing process, in confirming the delivery date to the customer. This condition will result in postponing the product delivery dates. In this case the customer of course prefers producers with **shorter delivery periods** because it enables him to respond to changes in demand more flexibly and he can also optimize his costs.

In practice, we encounter instances where the customer prefers a manufacturer with longer lead times if this is balanced by higher product quality or a lower price. This cannot alter the fact that longer delivery times are an obvious competitive disadvantage.

However, even more important for customers than delivery time is **meeting the promised delivery date**. The customer uses the delivery schedule to optimize his warehouse management or to plan his own production. Any deviation from the agreed deadline means additional costs for the customer who of course prefers suppliers who meet their delivery deadlines [1].

There are a number of auxiliary methods and tools for good quality planning including integrated IT solutions for advanced production planning (**APS - Advanced Planning and Scheduling**).

3. MONITORING OF THE PRODUCTION PROCESS

In order to effectively plan and manage the entire logistics process, the company must be able to obtain the necessary feedback from the manufacturing information systems (**MES - Manufacturing Execution Systems)**. Information from MES must be provided at sufficiently short intervals in reliable quality and cover the largest possible part of the logistics process. Only then can this information be used to effectively assess and manage the ongoing production, storage and preparation of delivery.

MES then sends the information to the ERP system or to the APS tool, if the company implements it. The flow of information may look as you can see in **Figure 1**:

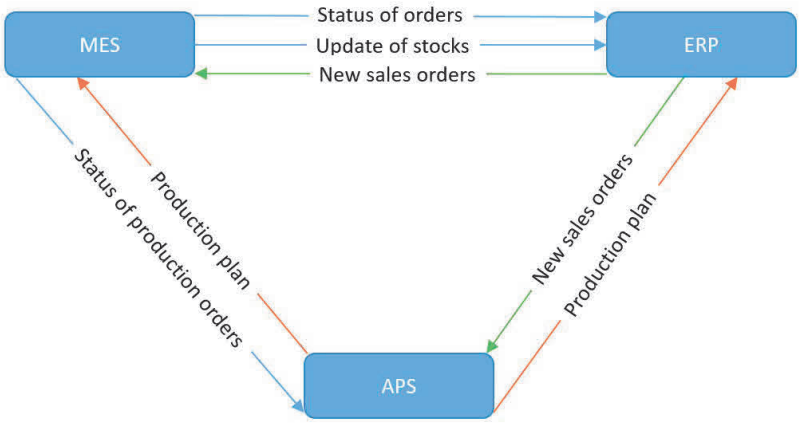

Figure 1 Interfaces between MES-ERP-APS

4. ORGANIZATION OF WAREHOUSE MANAGEMENT

Another condition for the effective planning of deliveries is the proper organization of the warehouse of finished products. The products must be stored so that the final preparation for loading and loading itself takes place in the shortest possible time and with minimum requirements on moving products before the delivery itself. The process of organization of warehouses is closely related to the type of product, type of transport, the quantity of target locations etc. [2].

Warehouse management is in most cases done primarily in MES and synchronized with the ERP system or with the customer portal which we will explore later.

The facilitating and streamlining of warehouse management is possible with the help of various technologies, mainly using solutions based on records of individual products / packages using bar-codes or QR codes. They carry the information about the type of product, production order and the customer both in the format required by the manufacturer and in the format used by the customer [3].

5. PLANNING OF DELIVERY

If the products are properly manufactured and stored in the warehouses of finished products, it is possible to start planning their delivery to the customer. In most cases the planning of delivery takes place in the ERP systems that draw data from MES and APS systems. Two approaches may exist:

- Delivery is planned without the assignment of specific products / packages. The completion of delivery itself takes place after the physical loading to the transport vehicle. In this case it is apparent that the company loses the ability to effectively prepare for the delivery because it does not know what will be loaded. In these cases the customer selects the goods during loading. This approach is mostly used by companies that do not have accurate information on storing products in warehouses of finished products and do not know which packages are ready for immediate dispatch and which are still to be handled. It requires the presence of workers handling the deliveries in the ERP system at all possible times of deliveries. The logistical documents can be prepared only after the completion of loading, which extends the time of realization of the delivery.
- The second approach is based on accurate records of stocks of finished products including individual storage locations, and plans the deliveries depending on which packages are ready and where these packages are. The employee then sees all packages that are ready for dispatch in the ERP system. He then creates individual deliveries based on the mode of transport and assigns the available packages to them, orders the transport and notifies the customer. This significantly decreases the time needed for the loading as such [4].

6. COMMUNICATION WITH THE CUSTOMER

Whether the transport is organized by the manufacturer or the customer, careful communication with the customer is always necessary. The customer must know that his goods are finished and ready for shipment and that the delivery can be scheduled. It is also necessary to inquire about the carrier (whether external or internal). Confirmation of the final scheduled delivery date is possible only after the transport is secured [5].

The above clearly indicates that the communication with the customer during scheduling of the delivery is very intense. The standard means of communication are phone or e-mail. This communication is mostly handled by a dedicated **customer care department (Customer Service)**, because its nature is different from the ordinary mercantile activity and is therefore usually detached from it [6].

In an effort to optimize this process, businesses implement portals for customer communication. The customer portal activities fulfill these main tasks:

- **Provide the customer with information about the ongoing production and readiness of his orders for delivery.**

The customer can monitor the status of his orders online, also which of them are already ready for delivery. This eliminates or minimizes the communication with the Customer Service department and since all information is available online there are no typical time delays due to e-mail communication.

- **Delivery scheduling tool.**

The next step is to allow the customer to schedule the delivery itself based on the acquired information. The customer then can create delivery orders on packages that are ready in the warehouses of finished products. This order is then confirmed by the supplier. If the manufacturer organizes the transport of his products, he must also confirm the availability of transport and only then confirm the delivery date. The delivery is therefore created, ordered and confirmed without need for e-mail or telephone communication.

- **Providing documentation.**

Another possible use of the customer portal is to print all the necessary logistical, financial and customs documents for the already delivered products. This eliminates the need to print them by the manufacturer or send them to the customer electronically by e-mail. Everything is in one place, transparent and ready to preview or print at any time.

- **Feedback, checks, reporting.**

Because the customer portal contains all information about the warehouses of finished production and ongoing deliveries, the data should be used to obtain feedback on the quality of the provided service and the development of key logistics indicators. The managers can then monitor the development of delivery time, fulfilment of the promised deadlines or the length of time from the ordering of the delivery to its realization.

The customer portal can also be used to order products, or the customer can check the list of available products in supplier warehouses in case of production to stock.

7. CUSTOMER PORTAL AND ITS LINKS WITH OTHER ENTERPRISE SYSTEMS

The customer portal of course needs to draw data from other enterprise systems. It draws information regarding new orders entering into production from the ERP system, and the information on the delivery schedule goes back, if that is being created in the customer portal.

The planning APS system then provides data about the planned completion of orders, allowing customers to schedule deliveries in advance and to optimize their warehouse management or their own production.

The MES system then provides the current information on the state of production and finished products ready for delivery. In cases where the creation of an order and delivery takes place primarily in the MES system, the customer portal provides the delivery schedule (if one can be obtained from the ERP system).

The basic information flow then looks like in **Figure 2**:

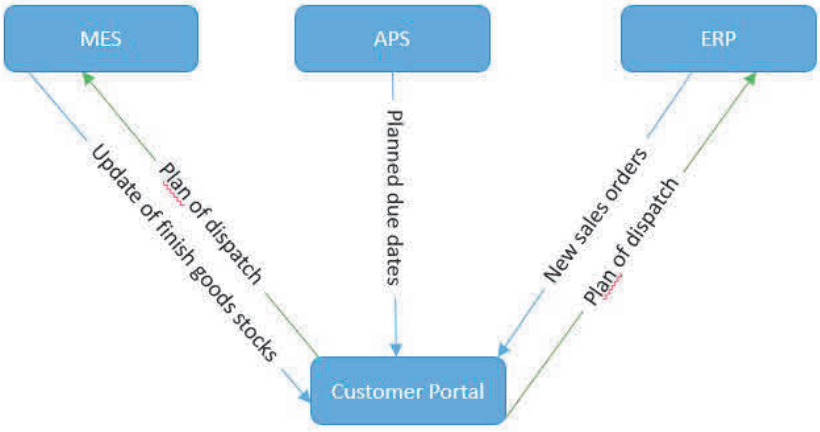

Figure 2 Interfaces with Customer Portal

For the most up to date manufacturing companies such as in the automobile industry, where the Just In Time approach is being used for the management of logistics processes, this whole process is replaced by direct communication between the customer and supplier information systems (IS).

The production order is created in the end manufacturer's system based on demand on his side. It creates the need for the supply of specific materials or semi-finished products and the system itself sends these requests

to vendors' ISs and these return the exact date on which the material will be delivered. Based on this date, then the IS of the final manufacturers compiles a schedule of production and delivery to end customers.

This approach is however very difficult to apply to traditional metallurgical sectors that are not able to achieve the accuracy of production in hours or days.

8. CONCLUSION

Modern management of the logistics and delivery process is not possible without close links to corporate MES, APS and ERP systems. Only by knowing the plan and production process and readiness of products in warehouses of finished products, can deliveries to customers be scheduled efficiently. Delivery scheduling takes place in close communication with the customer and it is therefore appropriate to also support this part of the process with an IT solution - in this case with the customer portal. Here the customer receives information about the readiness of his orders; he can schedule the deliveries and obtain logistics documents. The company management can then closely monitor the quality of customer service and the development of key logistics indicators.

ACKNOWLEDGEMENTS

The work was supported by the specific university research of the Ministry of Education, Youth and Sports of the Czech Republic No. SP2016/59.

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