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THE ROLE OF PROCUREMENT AND FREIGHT FORWARDING IN DEALING WITH ON-SITE SCHEDULING PROBLEMS

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Abstract: *The problem of poor delivery schedules is one of the logistical problems that much more companies face than we should think at the first glance. But many companies may not realize this without the use of lean tools. This paper describes the role of procurement and supply management in dealing with a site scheduling problem, covering the concepts, history, responsibilities, sub-roles, and types.*

Keywords: *logistics, procurement, freight forwarding, site scheduling*

1. INTRODUCTION

The paper deals with the subject of transport, as this is a topic close to the first author's interest. There are many lean tools can be learnt about in logistics engineering and the topic of freight forwarding is covered in depth in several university lectures and also researches [1, 2], so it was an obvious topic to cover.

Within the topic of transportation, supply chain management has been chosen to focus on, including its scheduling. We believe that the difficulty of poor scheduling of deliveries is a problem facing much more companies than can be thought at the first glance. However, many companies may not realize this without the use of lean tools. Although the research was carried out with a fictitious company, we believe that it gives a good indication of the scale of the loss a company can incur from a potentially poorly scheduled supply. A further aim of the research is to illustrate the success of the A3 problem-solving system, which can improve a company's performance in many areas. Studies in logistics engineering have shown that the A3 method can make it much easier to identify problems. The A3 method is also frequently used in internship programs within different companies, which further confirms to the authors that it is indeed a method that larger manufacturing companies like to use.

In this paper, the focus is on the purchasing and the transport, some of the further parts are outside the scope of this paper. In the first part of the paper, the cornerstone of the whole transport business will be presented, namely procurement, without which transport itself would not be possible. In the second part of the paper, the subject of freight forwarding will be covered, its history, types, etc.

2. PROCUREMENT

In this chapter the concept, role, function, and historical overview of procurement is presented.

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Procurement as a process is more than just a purchase. In procurement, we have to plan the purchase and develop a purchasing strategy. Procurement's tasks include selecting the right supplier, concluding the contract, monitoring, and developing suppliers on an ongoing basis, and coordinating activities with other parts of the company. These activities greatly help the company to achieve its results.

Procurement plays an important role in business and corporate strategy. It is also very useful for production, helping to develop, support and service it. It is also an important link between suppliers and suppliers. It helps to understand each other's supplier needs and company needs. It also creates a two-way flow of information between the parties, in addition to the flow of materials.

It is clear that procurement is not as important for all companies. It is less significant in the case of high labour input, but for most manufacturing companies it can be a huge advantage to reduce costs even minimally, as material costs can account for more than half of their costs. Using the right procurement method, huge gains can be made through material cost reductions.

2.1. The role of procurement in product development

Sourcing is important in product development because it provides information on the different data of each product. This information is collected, analyzed, classified and broken down into departments, so that it can provide continuous information and data on changes in the purchasing market. It is important to be flexible to changes so that you can always choose the best option. They keep track of the technical characteristics and prices of potential partners and compare them in terms of value for money. It is also important to schedule stock with supply. The reasons for this are that, on the one hand, it is not advisable for a company to hold too much stock as a reserve, as this will result in high stockholding costs, and, on the other hand, by scheduling deliveries correctly, stockholding costs can be well optimized by the quantity of deliveries.

According to the literature [3], the task of price negotiation is: "One of the most important tasks in procurement is negotiating the purchase price. One of the most important aspects of purchasing is the price of the product or service:

- Quantity purchased (the discount available through negotiation improves as the quantity increases)
- Product standardisation or specificity (standardization can further reduce costs)
- Planned recurring or one-off purchases (bargaining power is better for recurring purchases)
- Quality (function-oriented and task-oriented quality)
- Quality of the service provided with the product or service
- Delivery conditions (parity, distance, means of transport)
- Packaging (small to large items)"

2.2. Historical overview of procurement processes

Purchasing as an activity existed before the 1950s, right back to antiquity, but its importance was not significant.

In the 1950s, the scarcity situation during World War II was eliminated, the market economy developed, and the role of procurement increased. The market became saturated,

new marketing approaches were developed, and competition between sellers developed as a result. Cost reduction became a significant factor in profitability due to competition. Managers recognized that one of the easiest ways to achieve this was through procurement.

The 1950s and 1970s saw the emergence of a so-called marketing revolution. This led to a broader product structure, shorter product life cycles and higher quality. These changes led producers to find suppliers capable of supplying a wide range of materials to meet increased demand.

The 1980s saw the introduction of several major methods, such as TQM (Total Quality Management) and JIT (Just In Time), which represented a major change in the way production was organised. However, in order to apply these systems, a supply system that delivers smaller quantities, but more frequently, at a good price and with good quality is essential.

The 1990s saw the emergence of outsourcing. The idea is that a company reorganizes its own system, outsourcing certain company activities, which leads to significant cost savings and staff reductions.

3. FREIGHT FORWARDING

This chapter presents the concept, history and different types of freight forwarding.

According to the literature [3], the concept of freight forwarding can be defined as "Freight forwarding is the organisation of the process of transporting goods to ensure that the consignment reaches its destination in the most optimal way, at the lowest possible cost, in the safest possible way and at the right time. It can be considered as a branch of logistics".

The development of freight forwarding dates back to antiquity, but the concept of the freight forwarder itself only emerged in the Middle Ages. Merchant-associates appeared in the cities and included the characteristics of a carrier, a banker, and a trustee. These were processes involving the buying, selling, and transporting of goods and the movement of money.

However, it was only during the first industrial revolution in the 19th century that the transport sector developed in a revolutionary way. Inventions invented during the first industrial revolution, such as the steam engine and the diesel engine, made the transport process much faster and increased the amount of goods that could be transported at one time. Rail transport has become the most common form of transport with the development of rail networks alongside road transport. As traders could no longer cope with the increased demand for transport, more and more companies specializing in freight forwarding emerged. These new companies expanded their range of activities, with various companies specializing in transshipment, warehousing and freight forwarding.

At the beginning, different transport companies worked with different documents and different documents and interpreted the tasks differently. To remedy this, FIATA (Fédération Internationale des Associations des Transitaires et Assimilés) was created in 1926. The aim is to bring together freight forwarders' associations from different countries to defend and promote common economic and professional interests, in particular international organisations, institutions, governments and carriers. FIATA's objectives are to improve the quality of services provided by freight forwarders by developing and modernising uniform transport documents and commercial conditions. The documents bear the code of the country of the issuing forwarder and their wording is standard, non-

changeable and in English. Today, it represents 40,000 freight forwarding companies from approximately 150 countries. Its European Secretariat is based in Zurich and its Asian Secretariat in Bombay.

4. TYPES OF FREIGHT FORWARDING

Transport can be divided into different sub-areas, which are:

- road transport
- rail transport
- air transport
- river transport
- maritime transport
- or a combination of these

4.1. Road freight transport

The most common form of transport. Almost 75% of all transport in Europe is by road. Can be easily combined with other types of transport. One of its biggest advantages is that it can be used to deliver goods directly to the consignee. Road transport can be used for both international and domestic journeys, but it is preferable for shorter distances as it is more economical. The disadvantage is that in many countries the time limits and periods for delivery are regulated and that it is highly dependent on traffic and weather conditions. It is also expensive, requires labour and is very damaging to the environment [4]. An example for road freight transport can be seen on the Figure 1 [5]. Here more trucks are transporting goods on highway, which is most typical situation in the road freight transport.

Figure 1. Example for road freight transport [5]

4.2. Rail freight transport

The second most common type of transport. Rail freight accounts for roughly 17% of all transport in Europe. It is used for both domestic and international transport, typically over long distances. It has its advantages and disadvantages.

Advantages include the ability to transport large quantities of goods by rail at a time, which may be mixed. It is also more economical than road transport for longer distances. It is not limited by weather conditions or traffic.

However, there are also disadvantages. One of the biggest disadvantages is that it can be used on a fixed route, so it cannot be used to reach all locations except those where the rail network is built. It is not economical to transport small quantities of goods and is therefore recommended for larger volumes. It is rarely used on its own and must be combined with other modes of transport [4]. The Figure 2 shows an example for water freight transport [6]. Here the train is carrying different size of containers, which needs terminals.

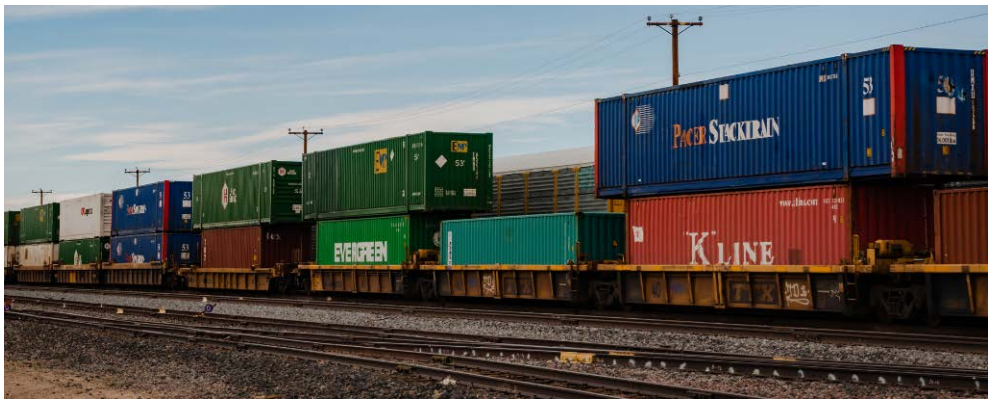

Figure 2. Example for rail freight transport [6]

4.3. Water freight transport

Freight transport by water includes both river and sea transport. Depending on where it takes place, it can be carried by smaller vessels or by larger barges, including giant transport vessels. It is usually combined with road transport and is only worth using if large quantities of goods have to be transported over long distances. The advantage is that it is cheap, large quantities can be transported at once and it is more environmentally friendly than other modes of transport. Its disadvantages are its slowness and the high stress on the goods. [4]. A typical example is illustrated on Figure 3, where a ship is carrying more hundred containers, and approaching a dock equipped with crane [7].

Figure 3. Example for water freight transport [7]

4.4. Air freight transport

Air transport is dwarfed by other modes of transport. It is recommended when you need to transport goods over long distances in a short time. Only a limited amount of goods can be transported at a time, and it is also more expensive. Air transport should always be combined with road transport. [4]. A loading process into cargo airplane can be seen on the Figure 4 [8].

Figure 4. Example for air freight transport [8]

5. SITE SCHEDULING

In this chapter the role and coordination of supply, warehousing and production strategies, and the types of scheduling for incoming shipments are detailed.

According to the [9] literature, the concept of scheduling theory can be defined in the following way: "Scheduling theory is a branch of operational research that focuses on calculating optimal task execution dates. This requires very often simultaneous allocation of resources for the implementation of these tasks. The scheduling problem can be seen as a planning sub-problem in which decisions must be made about the operational execution of scheduled tasks."

When solving scheduling problems, it is necessary to fulfill the time organization of the fulfillment of tasks, taking into account time constraints and the availability of the necessary resources. A common solution to scheduling problems is to create a Gantt chart. When solving scheduling problems, you can choose between two main types of strategies that aim to make solutions optimal or, more simply, just acceptable. The optimization approach assumes that candidate solutions to the problem can be rationally ordered according to one or more numerical evaluation criteria built on the basis of performance indicators. That is why we strive to minimize or maximize such criteria. Based on this, we distinguish between resource- or time-related solution goals.

5.1. JIT method

The JIT (Just In Time) method is a novel method of inventory management and production organization. The JIT method works on a pull principle. With its use, they strive to reduce

the time of production and the lead time of the product, and to eliminate the intermediate storage of semi-finished products and parts. One of the reasons for its appearance is that manufacturing companies mostly want to deal only with their main production processes, leaving complementary production processes, such as quality control, warehousing and transportation, to suppliers. When using JIT, the supplier supplies its product only when it is needed by the production company or supplies as much quantity as is needed at once. Deliveries thus arrive more frequently and in smaller quantities to the production company.

The advantages of the JIT method are that warehouse and inventory costs can be reduced; establish a relationship of trust, regular cooperation with suppliers; increase productivity; lead time can be reduced; Committed capital costs can be reduced. The disadvantages of the JIT method are interdependence and an increase in shipping and inspection costs. A very important condition for using the JIT method is that it only pays off if it is 100% quality. In JIT procurement, it is recommended to conclude long-term contracts with a small number of suppliers in order to be transparent and to help and get to know each other. After carrying out quality control, the supplier must bring flawless quality both at product and service level. Suppliers need to be punctual in every supply, while producers need to accurately forecast production needs. Adherence to the three principles of JIT is also an important factor in its application: waste prevention, continuous improvement, simplicity and transparency [10].

5.2. MRP system

MRP (Materials Requirement Planning) is a system during the use of which the manufacturing company prepares a production program based on preliminary needs assessments, purchases the raw material, i.e. dependent stocks, in the appropriate schedule, and then implements the production program. The essence of this is to keep raw material stocks low, as arrivals are aligned with the production program, but in the case of finished products there is a risk that stocks will increase due to inaccurate customer demand assessment. MRP is a push type, that is, a compression system.

One of the main objectives of logistics is to minimize stocks, but at the same time to ensure a high level of customer service, high availability of products. For this reason, it is necessary to increase the speed of rotation of stocks and to ensure an efficient flow of products and information. This can only be achieved if the forecasts are accurate. If a certain level of forecast accuracy can be achieved, push planning methods can be applied well. ESOP is a technique that adjusts purchases to production use. The MRP technique is based on time scheduling and relies on a computer information system.

The objectives of the ESOP are [11].

- Provide raw materials, assemblies, components for production and products for delivery.
- Maintain the lowest possible stock level.
- Plan production processes, delivery schedules, procurement activities.
- Promote mutually beneficial cooperation between buyer and supplier. This allows the supplier to reduce lead times and costs.
- Flexible handling of emergencies and unexpected circumstances.

6. SUMMARY

In this research, we set out to solve a scheduling problem in a fictitious company using the A3 method after reviewing the literature on supply chain management. The paper only detailed the role of procurement and freight forwarding. Thus, at the beginning of the paper, the various logistics topics related to transportation were detailed, first discussing procurement as the process that initiates transportation itself and its complexity. The overview section on the subject of freight forwarding is more familiar to most people, but new information can still be found through a literature search. Furthermore the most used methods in site scheduling were introduced.

As a plan for further development of the research, it is proposed to investigate the process by other problem-solving methods than A3 in the future.

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