

THE IMPACT OF THE IMPLEMENTATION OF THE NEW PRODUCTION LINE ON THE ORDER PROCESSING PROCESS

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Abstract: The purpose of the publication is to present an analysis of the impact of the implementation of a new production line on the process of order execution on the example of an industrial enterprise. In order to analyse the process, it was divided into detailed steps and a detailed dimensioning of the activity was defined - the minimum and maximum time for each activity. Analysing the activities before and after the introduction of a new production line determines the effects of the company's actions on the process itself and on the customer.

Keywords: production management, production process, process map, activity time analysis, quality management, process management, processes.

1 Introduction

Over the past several decades, the importance of innovation in the company has been recognized as an important factor of the company development. Manufacturers around the world are striving to streamline the manufacturing process [1, 5, 6, 9, 11, 22, 24, 25]. The main goals of such pursuits may be different, for example, reducing production costs, improving product quality, or extending the range of goods offered. This usually requires changes in the production process.

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2 The concept of process

The definition of the term "process" refers to all activities and situations that last for some time, which can happen unsettled, one after the other, or simultaneously. In addition, they can interact with one another, leading to the goal being achieved [13].

ISO standard defines "process" as a single or collective action, transforming input resources into outputs. Processes can be subdivided into sub processes, which together make up the whole.

Each of them performs other functions that change the input objects in the process to the desired output state [8, 23].

On the other hand, M. Hammer and J.Champa stated that the process is a group of activities with the required inputs and outputs that produce value for the customer. Also, processes in the process are carried out by a group of employees, not by a single person.

Processes are classified into [10]:

- Main - adding value to the company, are related to the main business, affect the financial result.
- Supporting - a source of cost for the enterprise, however, the main processes could not function without them.
- General - These include management processes that allow for problem-free business operations.

One of the types of processes are business processes, which were referred to in the article by J. Rutkowska. According to her, the business process is: "A whole consisting of successively performed operations to achieve predetermined results. The process uses input resources (information, raw materials, semi-finished products) that are processed and transferred to the next process or to the final customer [12, 14, 15, 16].

With the concept of process, the process approach is closely linked, which in quality management is part of the eight basic principles. They are based on the collection of measurement of results from the operation of processes, and on continuous improvement, which is to solve problems. In the process approach, in order to develop and improve a company, the focus is most heavily on [13]:

- resources,
- methods,
- materials.

3 Measures of process efficiency

Efficiency of the process may concern economic, financial, social, spiritual, moral and ecological values. It can be defined as the relationship between the results obtained and the resources used. Due to the measurement of processes in the enterprise, financial, economic and operational efficiency is distinguished. The first is the monetary relationship between the results obtained and the means used. On the other hand, operational efficiency refers to the organization of processes and the reduction in the use of means of production per unit of product. Economic efficiency is the link between the specific effect and the factors of production or the group. In practice, different performance measures are used, depending on what is defined as the effect and the effort [7, 17, 18, 19, 20, 21]. From the example relationship you can associate the ratio of the obtained effects to the spent effort [3, 4].

The first is it [2]:

- added value,
- production,
- profit,
- income.

Performance indicators use quantitative indicator methods that use synthetic or partial indicators or meters to identify, measure and evaluate economic or non-economic effects.

4 Process Analysis

Process map in general outlines processes and important sub processes. A sub process is a separate part of a process that can be treated as a separate, smaller process, for its own sake and distinct from other parts (for example, in the process of recruiting a large company, sub processes of employee adaptation can be separated). There is no single mapping standard. It most often shows information or material flows between processes.

In order to present the changes that occurred in the examined enterprise after the implementation of the change, the process of order realization was analyzed. A map of the process is used, which shows all the major activities taking place in each area of the surveyed enterprise. Graphical presentation of the order of the process fulfillment gives you the possibility to specify each activity from receipt of the order until delivery to the customer. All of these steps in the order to fulfillment the process were numbered sequentially and then characterized in table number 1. After analyzing the duration of each stage, the problem faced by the company before the implementation of the innovative solution emerges.

Table 1. Actions in the process of order execution before implementation of the change

Action No	Description of activities	Minimum time	Maximum time
1	The company by telephone, electronic or in person receives a product inquiry - its availability and price	1 min.	15 min.
2	In the sales department is checked the stock status in the electronic database, or send a query about the availability of goods to the warehouse.	2 min.	10 min.
3	Where the product is available, information about availability and price of the product is sent to the customer.	1 min.	5 min.
4	In the absence of goods availability, the production department receives a request from the warehouse for the possibility of producing the goods.	5 min.	20 min.
5A	In the case of the possibility of producing the ordered goods, the technical department sends the information to the sales department.	5 min.	120 min.
5B	When there is no possibility to produce the ordered item, the sales department sends the request to the supplier and awaits the reply.	5 min.	24h
6	The sales department draws up and provides the customer with an offer containing the price and delivery date.	5 min.	60 min.
7,8	The customer's decision to place an order or resignation awaits.	1 min.	3 months
9A	Where the order relates to own goods, the inventory is re-checked.	2 min.	10 min.
9B	When an order is for an item to be purchased from an outside supplier, the sales department orders the product. There is waiting for order fulfillment and delivery.	24h	14 days
10	Where the goods are in stock, the department	10 min.	120 min.

	prepares the goods according to the way of receipt.		
11	If the order relates to one's own product that is not available in stock, the sales department receives information on the need to start the production process.	2 min.	10 min.
12	Production order is issued by the sales department.	5 min.	20 min.
13	Production of ordered goods is started.	30 min.	Unpredictable
14	The produced goods are subjected to quality control.	10 min.	60 min.
15	The tested products go to the warehouse where they are prepared for sale.	5 min.	Unpredictable
16	It defines how the goods are delivered to the recipient and the preparation of the delivery documents. Documents are uploaded to the magazine.	10 min.	30 min.
17A	Waiting for pick up.	Unpredictable	
17B	Loading a company car.	5 min.	15 min.
17C	There is a selection of the carrier and the shipping of the goods.	5 min.	48h
18	Pick up a personal item by the customer.	1 min.	10 min.
19	The goods are transported to the customer by company or carrier transport.	10 min.	48h
20	The sales department stores archives related to the sale of goods. An electronic inventory database is being updated. The order processing process is closed.	5 min.	15 min.

Source: On basis [7].

Tables with a list of activities in the realization of the process contain situations where the maximum time is difficult to specify. For steps 13 and 15, the maximum duration depends on the size of the order (orders for larger quantities can be divided into lots) or the decision to continue production to increase stock. At point 18, the maximum time for picking up is dependent on the customer's decision. The company stores the product as long as the customer wishes.

In the case of waiting for a client's decision to place an order, the maximum time is the validity period of the offer, for example in the case of mine auctions. The customer after receiving the tender offer has a maximum of 3 months to decide on the order. After this period, the offer becomes obsolete and you must submit a re-inquiry.

By measuring the times of individual situations, you can make the following conclusions:

1. When the goods are in stock, the time from the acceptance of the order to the time of leaving the company does not exceed 1 hour.
2. In case ordered items have to be produced, the minimum time is prolonged by approximately 1 hour. It depends on how many pieces you have to make. For larger orders, the time is relatively long, but it is possible to determine precisely.
3. Minimum order execution time for rolled sealing orders that must be ordered from another manufacturer is drastically increased and due to the necessary shipping of the product is at least 1 day. This time is completely dependent on the external provider and is difficult to determine accurately.

By analyzing the times of different stages of the order processing process, the time of order fulfillment by the external supplier is considered. If your order is received by a company for a small

particulate seal other than that produced by the injection molding method, the company is awarded to an outside supplier. It is often the case that the declared lead time of the order discourages the customer from ordering this type of seal at Kreon. Long waiting times can be caused by several factors. The external seal supplier can have a long queue of orders waiting. This may also be caused by a production line failure or lack of raw material. Long waiting time is one of the main reasons for taking action to install your own production line.

Eliminating the problem of not being able to produce atypical seals for the mining industry makes it possible to become independent from the external suppliers of these products. Therefore, the time of order fulfillment is significantly shortened. The additional benefit of the ability to produce seals for each type of actuator is the predictability of the contract completion date. Existing suppliers of rolled seals often had delays in relation to the declared deadline. Due to the fact that organization Kreon was entirely dependent on the suppliers, it could not afford to give up their services and had to accept such situations. The result of the delays was a clear dissatisfaction of customers and even a resignation from further cooperation with Kreon. The installation of the new production line has helped to eliminate this problem. After the change was made, the order processing process was again analyzed.

Conclusion

Analyzing of the process map to show the process of order execution after the installation of the new production line, it can be seen as a simplification compared to the previous situation. The company is now able to produce any type of sealed order, so it is not dependent on external suppliers. As a result, there is considerable shortening and predictability of order fulfillment time. The shortest possible lead time for this type of product is now close to the time of ordering seals produced on injection molding machines. The positive effects of this change are numerous. By improving the customer service process, the company can retain existing customers and acquire customers specializing in other industries. After implementing the new method of sealing, the company undertook marketing activities, informing both current and new customers about the expansion of production capacities. As a result of these efforts, the number of customers increases, which translates into significantly increased orders and improved financial condition of the company.



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WPŁYW WPROWADZENIA NOWEJ LINII PRODUKCYJNEJ NA PROCES REALIZACJI ZAMÓWIENIA

Streszczenie: Celem publikacji jest przedstawienie analizy wpływu wdrożenia nowej linii produkcyjnej na proces realizacji zamówienia na przykładzie przedsiębiorstwa przemysłowego. Aby dokonać analizy procesu podzielono go na szczegółowe etapy i dokonano szczegółowego zwymiarowania czynności – określenia czasów minimalnych i maksymalnych dla każdej czynności. Analizując poszczególne czynności przed i po wprowadzeniu nowej linii produkcyjnej określono skutki działań firmy dla samego przebiegu procesu produkcyjnego jak i dla klienta.

Słowa kluczowe: zarządzanie produkcją, proces produkcji, mapa procesu, analiza czasów czynności, zarządzanie jakością, zarządzanie procesami, procesy.