INNOVATIVE MANAGEMENT TO THE CHANGE OF THE LOGISTIC PROCESS IN THE WAREHOUSE

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Abstract

One of the several important goals of all companies around the world today is to streamline logistic processes, which affect several key factors in the company. Streamlining logistic processes contains several options that companies can focus on. Companies usually focus on production and logistic processes, methods of production management and setting the material flow, which is related to the change in layout or the most appropriate location of workplaces and material. The production process is closely related to the warehousing, so it is also very important that companies find the optimal and efficient connection between warehouse and production. The aim of this paper is the innovative management approach to the change of the specific logistic process in the warehouse in the chosen manufacturing company. The paper uses the case study as one of the qualitative research methods. This paper is based on the search of the papers from the Web of Science database, which is in the context of the innovative management to the change of selected logistic process in the warehouse.

Key words: warehousing, logistic process, EUR pallet, material handling

JEL Code: M11, M21, O31

Introduction

The production process is closely related to the warehousing, so it is also very important that companies find the most optimal and efficient connection between warehouse and production line. Businesses strive to ensure that the connection between all processes takes place without unnecessary downtime, which can save companies the costs incurred. The proposed measures may be differently successful in different companies. This finding is primarily due to the fact that all actions in the company are interconnected, which means that each activity affects a different activity in the company and in many cases it is not possible to predict in advance what will be the resulting impact.

With the growing demands and demands of customers, a high level of cooperation and collaboration of employees in individual branches of the company is no longer enough

for the smooth implementation of the company process. Cooperation must be supported by information technologies not only for the effective management of communication between company departments, customers or suppliers, but also for the effective management of warehousing processes and stocks; the area of which is currently becoming a very frequently discussed topic.

The aim of this paper is the innovative management approach to the change of the specific logistic process in the warehouse in the chosen manufacturing company.

1 Theoretical Background and Methodology

Logistics plays an important role in everyday work and is becoming one of the main factors in market differentiation (Melnyk, Lummus, Vokurka, Burns and Sandor, 2009[1]; Bowersox, Closs and Cooper, 2013). The article uses sources from the Web of Science database.

The requirements for the quality of logistic services are getting higher and higher. At the same time, however, the available financial resources are quite limited to companies. According to Bokor (2013), logistic companies must pay special attention to the optimal allocation of resources in various decision-making tasks in such a business environment (Bokor, 2008; Bokor, 2009[1]). Naturally, every company wonders how to reduce costs and waste while maintaining profit growth in the free market environment. Weaknesses, bottlenecks and processes need to be identified and eliminated (Kučera and Konsbul, 2020).

In recent years, with the rapid development of the new retail economy, the modernization of the logistic industry has been accelerated, bringing great convenience to people. However, the accumulation of goods in a logistic warehouse leads to a higher fire load and the logistic warehouse also has several sorting and packaging functions, which differ from the traditional warehouse with a single storage function (Tao, Dong, Tan, Wei, Wang and Huang, 2019[1]; Gao, Chang, Fang and Luo, 2018[1]).

An important part of logistics is the process of material handling, which are operations associated with the transport of materials. Traffic routes are a sensitive part of the production and distribution of the flow with the potential for traffic and information chaos. This is associated with unpleasant situations where not only distortion or delays can occur, but also the loss of information about the products being transported. Therefore, means are being sought to ensure reliable monitoring of facilities during logistics and distribution operations. The amount of data in the process of handling products and materials during their

[1] Sources from Web of Science database

transport in the production or distribution process may vary (Pivarčiová, Karrach and Tučková, 2018[1]). Logistics is a field that deals with the optimization, coordination and synchronization of all activities necessary to ensure a flexible and economical production process at optimal costs. Modern logistic centres focus not only on the constant expansion of storage capacities of their warehouses, but also on the efficiency and process of operation when storing individual items in the warehouse. At present time, every company strives to optimize logistic processes, material flows and inventory (Neradilová and Fedorko, 2016[1]). Material handling is an important part of logistics. Handling is a set of operations consisting of loading, transport, transhipment and landing. Other activities concern warehousing, weighing, packaging, sorting, measuring and waste management. Material handling and transport determine how fast the product moves from one place to another. In modern logistic centres can be find automatic, manual and intelligent conveyor belts and hook conveyors. In larger warehouses, their use is necessary to speed up the entire process of loading and unloading or transporting pallets between racks (Pivarčiová, Karrach and Tučková, 2018[1]; Kučera, 2017[1]).

Logistics, especially warehousing, is an area that has recently played an irreplaceable role in the business. The chain of warehousing activities ensures a smooth production process and warehousing costs are associated with each warehousing activity (Kučera, 2019[1]). Warehousing is one part of the logistic chain, one of the activities that cannot be missed. Warehousing solves many critical issues, inventory levels, order cycles, warehouse equipment and spatial distribution, warehouse management distribution and inventory management (Kučera, 2017[1]). Logistic coordination and synchronization of material, information and financial flows has affected the company in the conflict of partial goals, which are pursued by individual organizational units and are very diverse (Kučera and Dastych, 2018[1]).

The case study is the qualitative research method based on the study of one or a small number of situations for the application of findings to some similar cases. The case study is briefly characterized as a detailed study of one or a small number of cases in order to use the knowledge gained to understand similar cases (Hendl, 2016).

2 Results and Discussion

The case study discusses possible changes of the logistic process in the warehouse within a manufacturing company focusing on the production of wires with different properties. The company manufactures, sells and uses so-called coils with rewinding. The production

part called "rewinding", which processes the smallest wire diameter in the company, and from which the rewinding employees are able to wind the final product. The final product, which the employees achieve in rewinding thanks to the processing of a larger wire diameter into a smaller one, looks like this in Figure 1. This is exactly what the final product that customers buy looks like. Of course, the company does not produce only one type of product, but the customer can choose the final product according to the size of the wire diameter, the quality of the wire, or whether it is copper-plated or non-copper-plated wire.

The final wire wound on the spool can weigh 15-18 kg depending on the type of the product. To rewind, employees manually stack these spools on a EUR pallet of 56 pieces with an even distribution. The EUR pallet is taken by a worker using forklifts about 100 meters to the packing house, where the automatic robot packs these wire spools into foil and into a cardboard box. Figure 1 also shows this box. Wire spools are also shipped in 56 pieces per EUR pallet. If a pallet with 56 spools is transported to the packer, the robot automatically packs the entire pallet of the 56 spools it is programmed into cardboard box and aligns the products on a EUR pallet for wrapping in "roof" foil and then shipping to the transhipment yard. Therefore, it is obvious that the problem arises already on rewinding, where it would be appropriate to increase this number of final spools stored on a EUR pallet so that the automatic robot is able to pack and prepare for shipment all products on a given EUR pallet. Of course, this is also related to the automatic robot, which would have to go through a slight reprogramming to a new number of final products for packaging and a new way of layout when placing products on a pallet.

Fig. 1: Final product of the production

Source: Authors

As already mentioned by the authors of the paper, the current state reaches 56 pieces per EUR pallet, which is transported from the rewind to the packing house and then the pallet is shipped to the transhipment yard. One piece weighs 15-18 kg depending on the type of the product. The authors consider the upper limit of the product weight range, because the most common type of product that is manufactured weighs the mentioned 18 kg. It is also worth mentioning the load capacity of one EUR pallet, which reaches a load capacity of 1,000 kg - 2,000 kg depending on the load distribution. In the case of uneven distribution, the load capacity of the pallet reaches the lowest value, namely 1,000 kg. However, the company's products are stored on a pallet with an even load distribution, and thanks to this it is possible to store up to 1,500 kg of load on a EUR pallet. The actual weight of the EUR pallet ranges from 20-24 kg depending on the moisture content of the wood. The total height of the pallet with 56 pieces of final products reaches 879 mm. Figure 2 shows the distribution of 56 pieces of coils on the EUR pallet in the current state in the selected company.

Fig. 2: Current state of the number of spools on the EUR pallet

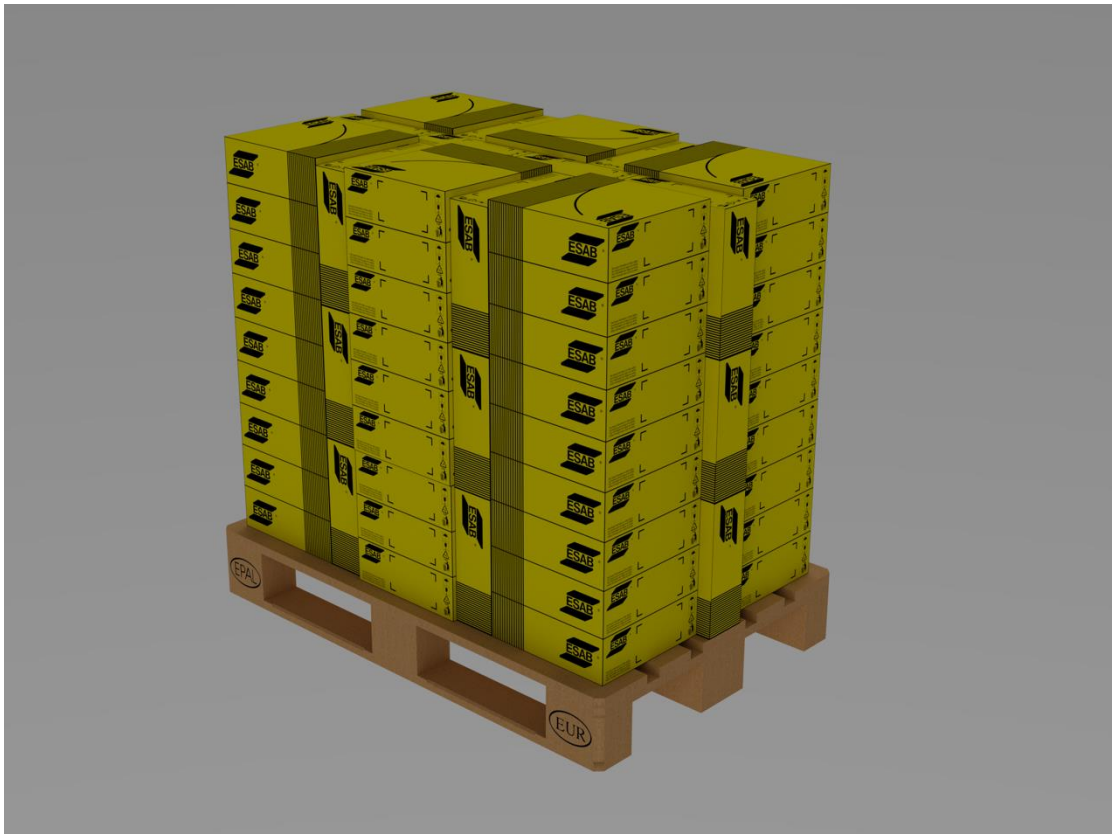
Source: Authors

Thanks to all the data, the authors of the paper are able to calculate the current load on the EUR pallet. In the current situation in the company, employees store a pallet of coils with a final wire with a total weight of 1,008 kg and an even distribution on EUR pallet. The authors calculated this total weight by multiplying the number of wire spools

per EUR pallet with the weight of one spool. This means that the calculation was as follows: 56 pieces · 18 kg = 1,008 kg. By simply subtracting this total current weight on a EUR pallet from the maximum possible weight of 1,500 kg, the authors found that it was possible to store another 492 kg of final wire spools. In the case of dividing 492 kg by the weight of one piece, i.e. 18 kg, the authors obtain a value of 27.33. This value must be rounded down, because it is not possible to store on a EUR pallet e.g. a third of the spool, but only whole pieces, which means that in case of increasing the possible maximum weight by 492 kg per pallet, it is possible to use this possible weight and increase the total number of spools on a EUR pallet by up to 27 spools with the final wire. In other words, the current number of 56 pieces per EUR pallet could theoretically be increased to a total of 83 pieces per EUR pallet and the total weight of the load would be 1,494 kg. The total weight of the pallet is not included in this total weight, because it is only the load capacity of the EUR pallet, to which it is also possible to subsequently add the actual weight of the pallet. However, the authors propose to increase the number of final products on the EUR pallet to a total of 78 pieces. The reason for this decision to increase the number of products on the pallet to 78 pieces compared to 83 pieces, which would theoretically meet all criteria by weight, is due to the establishment of another new range of products on the pallet, which would increase the height of the entire pallet with another 105 mm, and at the same time the newly established line would contain only 5 products alone. Authors also concluded that a certain weight reserve is important for safety reasons. The total weight of the final products on the EUR pallet would therefore reach the following calculated weight: 78 pieces · 18 kg = 1,404 kg. Here it is possible to easily calculate the weight difference between the maximum permissible weight of 1,500 kg and the proposed weight of 1,404 kg. The difference is 96 kg and should also serve as a weight reserve for greater safety when handling the EUR pallet or storing it itself. In the case of including the weight of 20 kg of the EUR pallet alone, the total weight of the pallet with final products would reach 1,424 kg. The total height of the pallet with all 78 final products (measured from the ground) will change to 1,111 mm compared to 879 mm of the original version. The change in the height of the total load on the pallet has suitable parameters for subsequent dispatch in railway wagons, which is a very important parameter for the selected company. Pallet stacking is not possible due to the limited height of the railway wagon and, of course, due to the very probable damage to the final products. The company does not stack pallets with final products even in the current state in the case of the number of 56 pieces on a EUR pallet. The authors also considered the overall load capacity of the pallet racks in the transhipment yard, where

the pallets with the products are shipped. The load capacity of these pallet racks should be in full compliance with the total weight and height of EUR pallets shipped from the company. Figure 3 shows the modelled proposal of one EUR pallet with 78 coils. The pallet in the proposal differs from reality only in that it is not wrapped in "roof" foil, which strengthens the products more, and thus the pallet is much safer to handle. The process of wrapping in foil roofs followed in the next production process.

Fig. 3: Proposal of EUR pallet with the final products



Source: Authors

With the change in the number of final products on one EUR pallet comes the possibility of reducing the number of required EUR pallets for the company. Authors are able to calculate pallet savings in the event of an increase in the total number of products on the pallet. In the case of the current state of production, when the company ships its 56 products on a pallet, approximately 10,000 pieces of EUR pallets are handled in the transhipment yard, which, multiplying the number of products by the number of EUR pallets, is: $10{,}000 \cdot 56 = 560{,}000$ pieces of final products in transhipment. It could be possible to store these 560,000 pieces of final products on a smaller number of EUR pallets, applying the proposal to increase the number of products on the pallet.

This means that by increasing from 56 pieces to 78 pieces on one pallet, it is possible to calculate how many EUR pallets, the company can save. Dividing the total number of 560,000 pieces with 78 pieces on one pallet, the authors are able to calculate the new required number of pallets for all products. The calculation is therefore as follows: 560,000 : 78 = 7,179.48. After rounding the result, the authors found that, in contrast to the current number of 10,000 EUR pallets, this total number could be reduced to 7,180 EUR pallets. Compared to the current state of 10,000 EUR pallets, the authors arrive at an exact difference of 2,820 EUR pallets that the company would not have to use. Based on this proposal and this saving of EUR pallets in the logistic circulation, the selected company is able to reduce the total number of pallet manipulations not only internally in the company but also in the transhipment yard. This proposal could also have ambitions to ship its final products to the transhipment yard less frequently. The innovative approach will lead to high savings of EUR pallets, namely 2,820 EUR pallets, due to the greater number of final products per pallet. At the same time, employees would handle fewer pallets and at longer intervals on each shift. By applying this proposal to the company's normal daily practice, it is possible to reduce the cost of handling EUR pallets in the transhipment yard, as the company is charged fees for individual handling of each pallet. With a lower number of pallets, it would be possible to reduce these costs and at the same time there could be the possibility to ship to the transhipment yard at longer intervals (for example, once every 2 days), or to use fewer railway wagons.

Conclusion

The company ships its products on a EUR pallet in the number of 56 pieces to a transhipment yard, where EUR pallets are stored and then distributed to the customers. One product or one final spool of wire weighs 18 kg. The authors of the paper found from the calculation that the current weight of the entire EUR pallet with final coils and the EUR pallet weight itself reaches a total weight of 1,028 kg, which is 472 kg less than the theoretical maximum load capacity of the pallet. It is proposed to increase the current number of 56 pieces of final products on the EUR pallet to the proposed number of 78 pieces, when the total weight of the EUR pallet with final products will increase from the original 1,028 kg to the proposed 1,424 kg. Changing the number of final products on a pallet also saves the necessary EUR pallets. The savings of the pallets used are also calculated from 10,000 EUR pallets for the storage of their products, and with the proposed solution, this number of EUR pallets would be reduced to 7,180 pieces. This means that changing the number of products

on a pallet will save the total used EUR pallets, resulting in a reduction in the total number of EUR pallet handling. Thanks to the innovative management approach, it is possible to reduce the total cost of handling by increasing the number of products on the EUR pallet.

Acknowledgment

The work was created in connection with the scientific research project of the University of Pardubice no. SGS_2021_018. The authors are grateful for their support.

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