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Selected aspects of logistics management of the production process in an enterprise

Key-words: production management, production logistics management, manufacturing company

Abstract

The following article presents selected aspects of management of production logistics process in enterprise. Companies treat this part of business as a way to empower market position. In the first part author explained the idea of process. The next part describes the definition of logistics production management, which is crucial for manufacturing enterprises. However, author described lots of tools related to production management based on polish production company. In the last part author summarize the importance of production logistics process in enterprises.

Introduction

Perfect logistics is one of the decisive advantages of today's business competition. Nowadays, there are no longer domestic markets, all however had became international, and currently many are heading towards a global character. What is more, not only companies compete, but in fact supply chains do. These challenges should be tackled by logistics, i.e. the science of providing the right resources, at the right time, in the right place, of the right quality and at the lowest cost[1]. Logistics has ceased to be regarded as a collection of methods useful only for solving operational problems. Thus most businesses have begun to treat this area as a strategic opportunity. Currently, it covers not only the flow of materials and goods, but also the flow of information

1 Chaberek M. (2002) Mikro- i makroekonomiczne aspekty wsparcia logistycznego, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, p. 11

and money. Based on the concept of logistics companies can freely create a system of know-how of a whole entity. Undoubtedly, logistics is an important element of economic and social development.

One of the business areas where logistics play a significant role is production. There are possible powerful optimization and cost reduction opportunities in this field. The growing level of tendency of integration in modern logistics has clearly its influence on production. Typically modifying its functioning and the overall way of the company. The basic task faced by logistics in this area is the proper control of material flow, hardware resources, human work and information availability.

According to the mentioned above, the aim of this article is to present a significant role of production logistics in dynamically changing market situations on the basis of the selected examples. The production logistics can be placed between supply and distribution logistics, combining however these two concepts together. As a research methodology, the author conducted analysis of the professional logistics literature as well as related to production management studies of scientific articles related to this topic. In addition, the analysis is also based on the materials of the investigated company together with observations of production processes that are conducted there.

Idea and definition of the process

In the present economic area there is a conviction that the importance of business orientation is primarily focused on process goals and strategies. Businesses increasingly focus on creating efficient processes and managing these activities on a wide basis as well as in the context of the business environment[2].

While describing and analyzing the following concept the crucial aspect is codification and clarification of the substance of the process when conducting logistics management. P. Blaik notes that the idea of *activity* and *process* are often incorrectly used as definitions are treated as substitutes. There are no doubts that these terms are directly related, but they are not identical. They perfectly illustrate relationships that characterize the link between the two concepts:

- The process involves performing tasks.
- The execution of tasks usually occurs as a result of several processes.

2 Blaik P. (2001) Logistyka. Polskie Wydawnictwo Ekonomiczne, Warszawa, p. 89.

In addition, Blaik in his book identifies the process as an integrated, purposeful arrangement or chain of activities, both as a result of integration and structuring of activities as well as an object of integrated management. The essence of the process is defined as the execution of inputs into higher value-added factors and outputs for customers[3].

M. Chaberek, who seek clarification of the concept, based the definition of described concept on the Polish language dictionary: "The process is a sequence of successive, causally related, specific changes that are the successive stages, phases, activities of development of something; progress, development, transformation of something." The mentioned definition shows dependencies, cause-effect relationships, which relate to changes in certain states of objects as a result of achieved states in previous periods. M. Chaberek notes that it is all about the mutual relations, i.e. referring one object to another. In order to initiate the process, there must be a logical set of relationships that can be used to reach the target for a given process[4].

Definitions and assumptions of production logistics

Many authors who participated in the business logistics literature pay the greatest attention to such processes as orders, procurement, storage as well as distribution of products. In the manufacturing company, the greatest amount of capital is involved in the processes of manufacture of products, since the success of the business depends significantly on that duty. Production causes the main stream of materials and intermediates follow through the production departments of the company. The following flow depends on several factors, but the structure of the production system is most influenced by it. The basic task of logistics in this area is proper control of material flows[5].

According to the definition proposed by H.-Ch. Pfohl, the production logistics covers all activities that are related to the supply of the production process to the relevant goods (raw materials, auxiliary materials and supplies together with semi-finished products and parts of the purchase) and transfers of finished goods together with ready

3 Blaik P. (2008) Logistyczny łańcuch tworzenia wartości. Wydawnictwo Uniwersytetu Opolskiego, Opole, p. 12–13.

4 Chaberek M. (2002) Mikro- i makroekonomiczne aspekty wsparcia logistycznego, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, p. 75.

5 Michlowicz E. (2011) Nowe zadania logistyki produkcji. [I:] „Logistyka". No 2, p. 465.

commodities to the warehouse outlets. According to the flow of materials, production logistics is localized between supply logistics and distribution logistics[6].

The development of supply chain concepts has led to a broader perception of logistics. An important element in analyzing an enterprise's operation is the awareness that it functions as one of the larger components. Such system of views and perceptions on the organization provides an opportunity to perceive not only the internal processes, but also those occurring in the whole environment (system). This also leads to a more broaden view of the relationships that exist in both environments. The development of supply chain management forces an enterprise to transform itself from a functionally oriented organization to a process organization. This applies to all logistic chain links. Different approaches to logistics combine one element of material flows to be managed appropriately. Hence the new concepts and tasks of production logistics were created. Nyhuis and Wiendhal underline that the primary goal of production logistics can be defined by the ability to increase and deliver reliability at the lowest possible logistical and production costs. It is also noted by Coyle, stating that nowadays, in many enterprises, integration of production planning with logistics has been becoming more and more common. This core process used to perform orders for specific products is increasingly being used to improve the performance of a company on the market[7].

For an in-depth understanding of the concept of production logistics, it is necessary to explain several other concepts such as production, which is one of the most important activities of the production system as it results in new usable values. Observing this concept from a purely technical and organizational point of view, it adapts and transforms the material of work into a product with the help of human labor and appropriate means of work[8]. The manufacturing arrangement, on the other hand, is a deliberately designed material, information and energy scheme that is used by human and is executed to produce specific products that serve the needs of consumers[9]. The last of important definitions is the production system, i.e. the transformation of

6 Pfohl H.Ch. (1998) Systemy logistyczne. Instytut Logistyki i Magazynowania, Poznań, p. 17.
7 Michlowicz E. (2011) Nowe zadania logistyki produkcji. [I:] „Logistyka". No 2, p. 466.
8 Szymonik A. (2012) Logistyka produkcji. Difin. Warszawa, p. 31.
9 Michlowicz E. (2002) Podstawy logistyki przemysłowej. AGH, Kraków, p. 127.

incoming factors (e.g. raw materials) into ready-made products of good value for the customer, according to human labor and production factors as well as to supply customers with these products and to offer the appropriate service[10].

Modern manufacturing systems

The other issue which should be considered is the form of organization of production to be adopted by the company. This means how workstations will be linked to technological operations in the production process of particular products. One can distinguish two groups of such patterns of manufacturing process. The forts, non-quantitative (non-tones) are characterized by a variable direction of work items between the cooperating positions. The order of technological operations may be variable. Such form of organization is characterized by poor efficiency resulting, inter alia, from the low degree of instrumentation, the accidental operation of on-site operations, the lack of a timetable, the large and variable inventories of work in progress, and the commissioned production planning system.

The other form of organization of production is a rhythmic (stream) form associated with the steady direction of work items between particular points. The order of placement of workstations corresponds to the individual stages of production. This form, as opposed to the former, is characterized by relatively higher efficiency achieved through close links of workstations with technological operations, reproducibility of the manufacture of the same commodities, possibility of creating a process schedule and maintenance of minor interoperable inventories[11].

In the current economic reality the new, computerized and automated manufacturing systems were created. Such forms of production organization are CM, i.e. independent machining and assembly station. It is equipped with specialized numerically controlled devices, with an automatic pre-cutter and work replacement. Such positions are a transitional stage to more advanced solutions to the organization of production. The following requirements fulfils the criteria of FMS (Flexible Manufacturing System), without which modern production companies were not be effective. This is a computer-controlled complex of machines and technological equipment that is able to produce

10 Szymonik A. (2012) Logistyka produkcji. Difin. Warszawa, p. 32.
11 Szymonik A. (2012) Logistyka produkcji. Difin. Warszawa, p. 40.

any good belonging to a specific class of subjects that has similar technological features. Another worth noting manufacturing system is CAM (Computer Aided Manufacturing), a computer-aided manufacturing and production system. This method consists of computer-linked design phases (production planning) and manufacturing (flow control of materials, work and tools). The most advanced system is CIM (Computer Integrated Manufacturing), a computer-integrated manufacturing. It involves the cooperation of computers, which is feasible by connecting them to a network, which finally links particular users. The system enables processing of data between CIM technical subsystems defined as CAx techniques. The first two letters of this abbreviation stand for Computer Aided (computer-assisted), while the third letter defines the function of the software, such as CAD (Computer Aided Design), Computer Assisted Planning, Computer Assisted Planning, CAQ (Computer Aided Quality Assurance) Quality[12].

Practical aspect of managing production logistics in an enterprise

In order to control the vastness of the processes that exist in the researched manufacturing company it is crucial to provide level of production logistics . In that way various methods and tools are used, which make it possible to exploit almost the full production capacity of machinery and equipment.

The first way to improve the processes operating in the production environment of the plant under study is to standardize the work. This is the development of the most effective and safest working method. It should be noted that this procedure is not created once and for all cases but can be modified if there is an improvement in the standardized operation. The guiding principle of this method is an endless search for improvements. Such standardization also allows the increased flexibility between areas within an entity. An example might be posting a workforce to work in another area or factory. With the standards development method, employees will be prepared for the task assigned to the new patterns in the environment[13]. What is more, the communication boards located in production areas are extremely important for running the most efficient manufacturing process.

12 Szymonik A. (2012) Logistyka produkcji. Difin. Warszawa, p. 42.

13 Podsiadło M. (2012) Wielkie odliczanie rozpoczęte – Audyt III fazy już w czerwcu [I:] „Elektro Kontakt", No 2, Piła, p. 18.

In the surveyed production facility, it included, inter alia, display indicators, work instructions, and other information when needed. Employees can easily understand the level of the most important indicators. In addition, one can find weekly results, a list of area employees or improvements that have recently been performed.

There are many tools that can reduce process losses, improve quality, or delivery time to the customer. However, the implementation of such methods is not enough. One can also require a maintenance system for deployed tools. This is what the so-called Kamishibai is. This can be described as a specially designed board with a set of cards with instructions providing the audit.

The board consists of two parts. In the first place there are pockets for placing cards after consecutive audits. The second part of the table is organized in a way that problems can be observed, as well as corrective actions could be undertaken. During the design of Kamishibai in the surveyed enterprise for specific areas, the highest attention was paid to elements such as the workplace system (number of changes, number of working days), frequency of audits (depending on the standards of the leader's work and the levels of organizations involved in the audit) as well as the scope of the audit Area or specific positions, key issues[14].

Another important method is the so-called Escalation (Escalation Process), which is used for unpredictable moments such as breakdowns on production lines. The escalation of the process consists of conveying a problem that has arisen in a given area to a higher level of competence. An employee who is unable to resolve a fault within a certain time should inform the supervisor who is responsible to deal with the problem. If such actions do not bring the expected effect, the supervisor should transfer the case to a higher level.

The other, noteworthy, mechanism for enforcing the problem is the Andon signal – a control device located in the production hall, which presents the light signals problems[15].

The other method used in the described company was Value Stream Mapping. VSM illustrates the combination of all processes and activities necessary to produce a final commodity. The value stream

14 Nowak M. (2012) Kamishibai – nowe podejście do przeprowadzania audytów [I:] „Elektro Kontakt". No 4, Piła, p. 15.

15 Kosieradzka A., Maciągowski D. (2005) Usprawnienie procesów produkcyjnych w Philips Lighting Poland S.A. z wykorzystaniem koncepcji Lean Manufacturing. [I:] „Zarządzanie Przedsiębiorstwem", No 1, p. 54.

map allows one to visualize and present the flow of materials, information, and people. If one have already created an image of the whole process it should be proceed to the next step. It consists in developing improvements on the so-called Kaizen Event. These are meetings of a specially selected group of people, which aims to develop improvements, Kaizen for a specific, already mapped process. After discussing the appropriateness of the design improvements of the previous process, it is time for the implementation stage[16].

Total Productive Maintenance (TPM) is a system to maximize the efficiency of maintenance of machinery and equipment throughout their lifetime. In the surveyed enterprise, this system was implemented in one of the plants. The first step in building TPM was the implementation of four pillars:

- To eliminate losses on machines by solving problems in multifunctional teams.
- To include operators in the responsibility for maintenance of machines.
- To build a prevention system by the Traffic Maintenance Department.
- To create a training system.

The difference between the Total Productive Maintenance and traditional machine approach by the Maintenance Department is that everyone should become responsible for keeping the machinery in perfect condition. The crucial element is the involvement of operators in the improvement program, as they have the most effective information to prevent accidents[17].

The surveyed company is a complex of factories where huge quantities of more or less complex production processes are realized. To take care of the whole system, one must take care of the highest level of logistics. For this purpose, the tools described in the article as well as used in researched manufacturing company fulfilled their function.

16 Kwiatkowski M. (2013) Wszystko co chciałbyś wiedzieć o… Mapowaniu Strumienia Wartości (VSM) cz.1 [I:] „Elektro Kontakt", No 6, Piła, p. 6.

17 Cofał E. (2012) Total Productive Maintenance w Zakładzie Rurek Ceramicznych [I:] „Elektro Kontakt", No 3, Piła, p. 11.

Conclusions

In order to attract new contractors, businesses that operate in current environment are forced to apply modern management methods. Through the implementation of new products, the use of modern technology and efficient systems, is the key support of the development of the enterprise. The conducted analysis shows how important logistics in production is, together with well-organized, efficient flow of information, hardware, as well as material and human resources.

The logistics management tools presented in the article are only some of the methods that can be used in the production area. They significantly reduce production costs and improve the quality of final products. The methods of production logistics management influence also the increased involvement of employees inside the processes. This type of approach is extremely beneficial in the context of improvement of the production sphere in an enterprise.

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