

WAREHOUSE MANAGEMENT AND INVENTORY MANAGEMENT ON THE EXAMPLE OF EKOPLON S.A.

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Abstract: The purpose of the article is to attempt to systematize and broaden knowledge about warehouse management and analysis the storage processes which take place in manufacturing companies. The article presents the essence of storage as the basic function of the logistics system and the analysis of functioning of the storage in EKOPLON S.A. In addition, the importance of stocks, problems and challenges of the enterprise based on the storage of the goods has been focused on. The evaluation and recommendation of the described company have been made.

Keywords: warehouse, warehouse management, inventory management, storage, supply.

ZARZĄDZANIE GOSPODARKĄ MAGAZYNOWĄ I ZARZĄDZANIE ZAPASAMI NA PRZYKŁADZIE PRZEDSIĘBIORSTWA EKOPLON S.A.

Streszczenie: Celem artykułu jest próba usystematyzowania i poszerzenia wiedzy na temat zarządzania magazynem i analiza procesów magazynowych zachodzących w przedsiębiorstwach produkcyjnych. W artykule przedstawiono istotę magazynowania jako podstawową funkcję systemu logistycznego oraz poddano analizie funkcjonowanie magazynu w przedsiębiorstwie EKOPLON S.A. Ponadto zwrócono uwagę na znaczenie zapasów, problemów i wyzwań przedsiębiorstwa w oparciu o magazynowanie towarów. Dokonano również oceny i rekomendacji opisywanej firmy.

Słowa kluczowe: magazyn, zarządzanie gospodarką magazynową, zarządzanie zapasami, przechowywanie, zapas.

1. Introduction

Understanding the functioning of the company gave birth to the idea of analyzing one from its pillar, which is warehouse management. The motivation to address the issue was the importance of the existence of warehouse management in the context of the existence of the entire enterprise, as well as the presentation of duties and methods of rational storage on the example of the company EKOPŁON S.A. The development and progress that took place in the manufacturing and trade industry contributed to the increase in the importance of warehouse management. Warehouses have increased their functionality and usability. Enterprises wanting to maintain a proper position on the market should take care of the entire logistics strategy, and in particular the element that is warehouse management. Providing the ultimate consumer with the right product, at the right time and place, are the ingredients that make companies successful. The Just-in-time method, or everything on time, is not always functional, which is why the existence of warehouses is so important.

Warehouse management is not only the storage of goods, but also the care for their quality, adequate security and information flow that accompanies the entire process. Warehouse management plays an element connecting suppliers of raw materials and materials with final recipients of products. Warehouse management is also a properly integrated computer system that simplifies work in the warehouse. It eliminates some of the unnecessary paper documentation and organizes the activities of the staff better.

The main objective of the article is the verification and description of basic warehouse processes taking place in enterprises, also within the EKOPŁON company. In order to realize the assumed objective, the basic concepts of warehouse management were presented and their essence was shown, the company was analyzed and the challenges facing it were pointed out.

Getting familiar with understanding the functioning of the enterprises gave the idea to analyse warehouse management, which is one of its pillars. The motivation to tackle the issue was the importance of existence of the warehouse management in the context of the entire enterprise, as well as the presentation of duties and methods of rational storage on the example of the company EKOPŁON S.A. The growth and progress that have been made in the manufacturing and commercial sectors contributed to the increase in the importance of the warehouse management. The storages improved their functionality and usability. The enterprise which aim at maintaining a good position on the market should take care of the entire logistics strategy, in particular warehouse management. Providing the ultimate consumer with the product, at the right time, in the right place are the factors which assure the success of the company. The Just-in-time method is not always functional. For this reason, the existence of warehouse is important.

Apart from the storage of the goods, warehouse management takes care of their quality, adequate protection and information flow that accompany the entire process. Warehouse

management connects suppliers of raw materials and materials with final customers. Warehouse management is also well-integrated computer system which facilitates work in the storages. It eliminated unnecessary paper work and better organizes staff activities.

The main objective of the article is the verification and the description of the basic warehouse processes taking place in the enterprise also within EKOPOLON company. With the aim of realizing objectives, the basic concept of warehouse management and their essence were presented. The company was analyzed and the challenges identified.

2. The essence of warehouse management

Nowadays, when the population consumes and uses products from various corners of the world, and the flow of goods takes place freely, the lack of a warehouse economy is impossible. All raw materials, materials, semi-finished products and even finished products, awaiting further use, are stored in warehouses. Therefore, each company must have its own warehouses or use a rented storage space. This is an unavoidable procedure from which there is no departure.

Warehouse management is a part of a logistics system that includes accepting goods, storing, maintaining, controlling and securing, issuing and recording of acquired goods. All materials, raw materials, semi-finished products, finished products and products commonly called stocks, stored in the warehouse space they are the subject of economic activity of the warehouse, i.e. they constitute a basic pillar of the functioning of warehouse management (Niziński, 1999a).

Warehouse management, as a result of its operation, covers every type of warehouse, regardless of whether it is a closed, open, ground or underground warehouse, regardless of the place and method of storage.

Warehouse management is very closely connected with materials management and inventory management. Material management is responsible for maintaining the correct amount of materials, raw materials or components produced as a result of production in progress. It is responsible for the rhythmicity necessary in the provision of production and service activities, proper organization of the warehouse, manipulation of stored inventory and their protection. In turn, inventory management is responsible for gathering the size of stocks appropriate for the company in the warehouse, in transport and in warehouses. It is mainly responsible for the cyclical nature of deliveries and business stability (Ficoń, 2009).

Warehouse management is expressed through the four most important function (Niziński, 1999b):

- accepting materials to the warehouse,
- storage of stocks,

- picking of loads,
- issuing material goods.

To take of materials to the warehouse is permanently associated with quantitative and qualitative control. The person responsible for picking up the delivery is obliged to check whether it comes from the proper manufacturer, whether its size and load unit are correct and whether it has a valid expiration date. Then the employee verifies the quality of delivery, i.e. makes an external inspection of the cargo. Checks whether the goods are not damaged, whether it is properly stacked on pallets or shortage. If the inspection results in a positive result, the employee to take the goods to the warehouse. At the same time a PZ document is issued (reception from outside).

Storage of materials are all activities related to the placement, storage, continuous control, maintenance and manipulation, i.e. the movement of stocks. Despite the control carried out in the first phase of the basic components of warehouse management, the material must be subjected to periodic inspection to avoid its deterioration. Warehouse personnel are responsible for ensuring that the stored loading unit is not on the ground, but only on pallets, at a distance of 50cm from the wall of the storage building. Additionally, the stored material must be properly protected and maintained in accordance with physicochemical properties and technical and technological requirements.

The picking of loads is carried out in accordance with the technology appropriate for the warehouse and the approval of the requirements of the stakeholders. It applies to the collection of inventories from storage racks or stacks, and then the creation of assortment groups consistent with the specification adopted by the specific recipient.

The release of finished products is the resultant production needs (WZ – release outside), it can also be a consequence of shifts to the area of another warehouse (MM – inter-warehouse shift). Both the release of manufactured finished goods and any displacement must be recorded in the register (Niziński et al., 2002a).

All new methods and technologies are building warehouse management. The structure of this economy includes static elements, warehouse infrastructure, understood as technical means and objects as well as dynamic components, which include all warehouse procedures and manipulative operations. Each of these elements must function in a harmonious manner, based on effective economic indicators, here it is about reducing operating costs in a systematic way. Permanent displacement of materials requires the use of an appropriate amount of specialized means of transport, an adequate number of storage spaces and a proper number of people assigned to work in the warehouse, responsible for unloading and loading of a given load unit. All this is permanently combined with the costs of storage and transport, and which costs are commensurate with the amount of storage and transported mass. For this reason, it is necessary to have a properly organized, just and reasonable storage network, which would enable the storage of stocks in the most optimal economic quantities and in a planned form. As a result of such accumulated stock, unnecessary transports of a given product mass will be eliminated,

which will also enable continuous supply of buyers and elimination of unproductive and time-consuming storage processes (Niziński, 1999c).

Warehouse management is not based on standardization, it is not identical in different sectors of the national economy. It depends on many factors, ie material turnover and demand specification, type of materials, which affects the turnover of the company, the scope of the organizational unit's functioning and its size. The form of the material economy and its entire turnover depend on the type of goods or materials being stored. There are five basic commodity and material teams (Niziński et al., 2002b):

- materials that do not require special protection against the activity of atmospheric factors, the group of these materials includes, for example: sewage and water pipes, minerals, products used for construction (ceramics and concrete), various types of steel, stone materials used in road engineering as well as solid fuels;
- materials with high sensitivity to solar radiation and atmospheric precipitation, but also not requiring protection against temperature fluctuations in the immediate vicinity, include: small diameter pipes, sawn timber, ropes and steel wires , shaped steel of smaller dimensions, scrap of independent metals (steel and iron), materials as well as sealed goods;
- materials which are heavily influenced by atmospheric conditions, air humidity and temperature fluctuations, eg: industrial products of various types that may be damaged and / or completely destroyed under the influence of meteorological conditions;
- flammable materials, i.e. goods prone to explosions (technical gases, carbide), varnishes, liquid fuels and solvents;
- poisonous materials, so-called poisons, i.e. agents that adversely affect health.

The scope of activity of enterprises undertaking material transactions, types of materials stored as well as methods directly affecting the supply process affect the entire warehouse management. These elements ultimately affect the size of warehouses and their types, which in turn are responsible for the balance, safety, time, stability and requirements related to stockpiling. Stored material goods, that is stock, are soon issued (in accordance with existing needs) from the warehouse for production in industrial enterprises, investment in the form of semi-finished products and to retail warehouses (establishments of goods) taking the form of final products (Niziński, 1999d).

Modern methods, which include combining object units in the entire logistics system, placing orders using devices equipped with ICT systems, that is using electronic means for communication, as well as using methods and management concepts causing the so-called. "Slimming" has had a huge impact on the existence of warehouse management. In spite of many speculations that the significance of modern warehouse processes will change under the influence of modification and increase in the importance of modern management methods. However, this did not happen, and this function belonging to the logistics system, through its

flexibility, quickly adapted to any changes, by enlarging and diversifying the existing services, that is, accepting, storing, completing and issuing material goods (Murphy, Wood, 257a).

"Popular additional warehouse services include labeling, packaging of product sets for promotion purposes, grouping and sorting of products, completion of production materials, folding and packaging of display stands and price sticking" (Murphy, Wood, 257b).

In a well-developed market economy, the overriding indicator of the logistic configuration is the minimization of stocks, which strongly affect the stock and material economy. As a result of the creation of differences between the amount of produced material goods and the demand for them, objects that act as warehouses were formed.

3. What is a warehouse and storage?

"Storage [...], this element (function) of the company's logistics system, which is responsible for storing products (raw materials, parts, work in progress/semi-finished products, finished products) from the moment of their manufacture or purchase until consumption" (Murphy, Wood, 257c).

Storage is a durable part of the logistics system, which is both the beginning of an economic process that begins at the breeder or producer and ends at the place where the customer as a consumer becomes the buyer of a particular good. Storage is also activities coupled with the functioning of warehouse management. Among the activities related to storage of stocks, the following are distinguished: receiving, storing and disposing of tangible goods are also additional activities between these procedures, i.e.: storage, completion, movement, maintenance, inventory and control. Warehousing is simply a temporary stoppage in the transport of material goods that await further use, from the moment of sale or production, to the time of consumption. These inventories are stored in storage infrastructure facilities, known as warehouses (Gubała, Popielas, 2005a).

The warehouse, as part of the system, consists of three types of resources (Gubała, Popielas 2005b):

- material – storage space and all equipment, tools and all equipment,
- human – personnel, his knowledge, skills, qualifications,
- financial – budget maintained at an appropriate level.

The basic elements influencing the creation of the warehouse are: proper technology, the most effective organization of work and a good location. In the warehouse, all stocks (raw materials, semi-finished products and finished products) are temporarily stored and then transferred to further parts of the logistics chain (Niemczyk, 2009a).

„A warehouse is a functional and organizational unit intended for storing material goods (stocks) in a separate warehouse space according to established technology, equipped with appropriate technical means, managed and operated by a team of people” (Niemczyk, 2009b).

Every stock stored in a warehouse must be stored in accordance with physical and chemical properties. There are such types of warehouse ((Niziński et al., 2002c):

- **open warehouses** – storage yards (equipped with storage devices – stands – bucks, platforms, elevations, limestone, portable canopies elevations or without these devices) with the ground surface:
 - offset,
 - hardened,
 - hard;
- **semi-open warehouses:**
 - roofing and stacks,
 - shelter,
 - shed,
 - arcodades;
- **closed ground storage:**
 - unheated,
 - heated,
 - cooled,
 - ventilated,
 - irrigated,
 - ground-floor,
 - storey,
 - multistorey,
 - basement,
 - stone,
 - skeletal,
 - woodem,
 - other,
 - compact buildings,
 - scattered buildings;
- **underground closed storage:**
 - basements and multi-storey buildings,
 - mounds,
 - undergrounds and semi-undergrounds bunkers,
 - tanks,
 - other special,
 - with devices to regulate indoor conditions or without these devices;

- **special magazines:**
 - flammable and explosive materials,
 - floor and chamber granaries for cereals,
 - storage rooms, e.g. fruits,
 - cold store,
 - tanks for liquid and semi-liquid products,
 - silos for loose materials, e.g. cement,
 - bunkers for loose materials, e.g. coal,
 - other.

Proper use of the storage area within its reach includes the separation and preparation of storage fields, rows of shelves, narrow aisles, transport routes, storage areas and all storage activities.

4. The concept of stocks and their types

Analyzing the warehouse process, it should be noted that the largest share in it is determined by inventories that, in cooperation with other production factors, determine the effective implementation of all economic processes taking place in the area of the enterprise.

"Stock is a defined quantity of goods located in the logistics system (enterprise or supply chain) under consideration, not currently used and intended for subsequent processing or sale" (Fertsch, 2006).

The creation of inventories is the result of the lack of rhythmicity of the flow of goods. The size of material batches delivered for production is often inadequate to the number of customer orders or to the opportunity to process orders. The accumulation of stocks is also a safety related to the possibility of failure. Inventories are the continuity of production, they are a quantitative reserve that is expected to be used.

The classification has a huge impact on activities related to inventory management. The division of stored material goods is used so that products can be adapted to the current demand. When analyzing the state of processing, four generic groups stand out among the stored stocks (Skowronek, Sarjusz-Wolski, 2012), (figure 1).

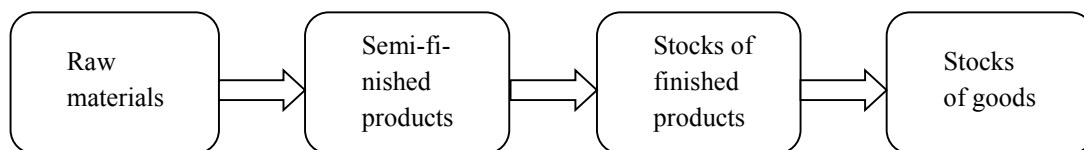


Figure 1. Commodity groups. Adapted from: "Sterowanie zapasami w przedsiębiorstwie" by Z. Sarjusz-Wolski. Copyright 2000 by PWE.

Inventories of raw materials and materials generally concern construction and industrial enterprises. Their goal is to ensure production continuity. As a result of frequent occurrence on the area of business units they constitute a very diverse group, this is mainly due to technological differences. This stock group includes items already subjected to processing processes, i.e. cooperative teams, as well as homogeneous materials.

Inventories of production in progress is the effect of various and heterogeneous phases of production processes. These inventories are often called semi-finished products of the production sphere and inter-operable stocks. They fulfill an analogous function to stocks of raw materials and materials. Their overriding task is to minimize or even eliminate the imbalance of performance between specific workstations for further processing. In addition, they perform a compensating function and an important component of current inventories.

Inventory of finished products is a type of inventory allocated to the sales process. Their basic task is to meet the emerging demand, which is expressed by means of the size of consumer demand. Demand provides feedback from commercial enterprises.

Inventories of goods are material goods allocated directly to satisfy the needs of final consumers and producers rendering their services in the industrial sector.

In addition, it is also possible to distinguish, for example, speculative stocks created on the basis of predicting price increases for a given good, promotional stock resulting from a price reduction, excessive stock, i.e. too much accumulated good that will never be used,

and it only generates company costs, a buffer (safety) stock created in the event of a malfunctioning batch or breakdown.

The classic concept of inventory management is convinced that each type of supply should be stored at a minimum level, responsible for the appropriate transport facilities and communication between all participants in the process of material goods flow, that is suppliers, manufacturers, wholesalers, retailers and final customers. In the direction from the supplier to the consumer, a specific product flows, whereas in the reverse direction feedback is created about this particular product. This circulation takes place only between neighboring links in the logistics chain.

5. The characteristics of the company EKOPOLON S.A. and analysis of its functioning

The company EKOPOLON S.A. was created in 1989 and was one of the few enterprises operating in Kielce province at that time. In 1994 EKOPOLON purchased production buildings of the former State Machine Center in Grabki Duże. At the beginning of its activity the company produced preparations used for fertilizing plants, both fertilizers in liquid form as well as loose (crystalline) fertilisers. In the following years, the production of feed supplements was

launched and then feed concentration, for animal nutrition. The company became the owner of „Wytwórni pasz w Baborowie” in 2011. EKOPŁON is private, family-owned enterprises. The company exports its products to the market of Lithuania, Estonia, the Czech Republic, Ukraine and Belarus. It also successfully sells its products on the Polish market.

EKOPŁON is a constantly growing company, and the processes implemented in its area, and all the organization are good. Adequate control and computer program promotes predictability. The company is completely aware of the size of its stocks. The company does not allow for shortages and unnecessary material goods. Engaged employees are also the strong side of the company. The company is in possession of high storage warehouse (equipped with ramp racks) tent halls, tent magazines, tanks for liquid products special magazines in the form of silos and a retail warehouse.

Submitting a detailed analysis of the EKOPŁON company requires a thorough presentation of the studied phenomenon. The considerations taken in this chapter are based on the observation basis and the method of the diagnostic survey, namely the questionnaire technique. The survey was conducted on a set of 20 employees (6 women and 14 men) who are employed in the EKOPŁON company, which are its staff in the area of warehouse management.

The evaluation of warehouse management was created based on the verification of the current warehouse management system and the possibilities of changes.

The results of the study showed that the employees see opportunities to increase work efficiency mainly through "Reconstruction of warehouse halls". This answer was chosen by 8 employees of the EKOPŁON company, followed by the "Increase in the number ramps" – 6 respondents, then "Purchase of bag closing machine" – 4 employees. Two respondents supported the answer "Replacement of stretch device". Nobody has marked "Other" and "Additional employee training". Employees are distinguished by adequately high qualifications, which affects the speed of implementation of warehouse processes. However, they also see opportunities to increase efficiency in the purchase of new machines and devices (figure no 2).

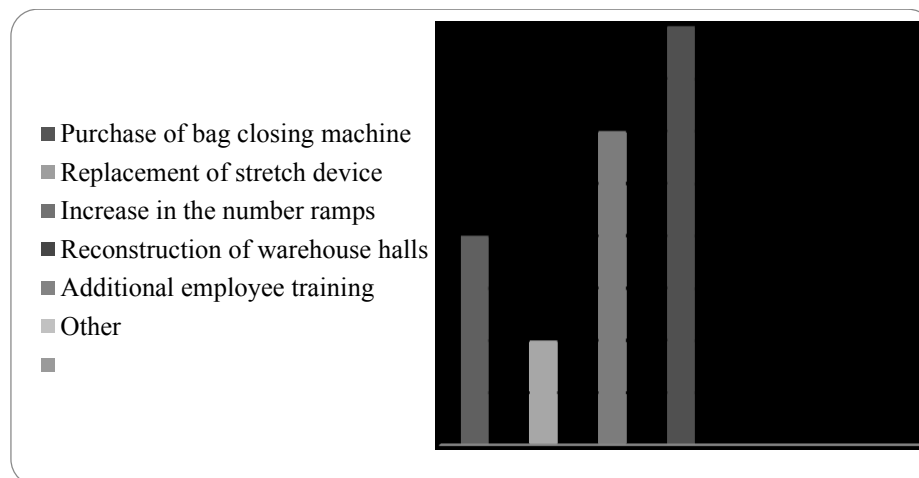


Figure 2. Survey of respondents on the improvement of efficiency in the area of warehouse management. Adapted from: based on the conducted study.

Despite the vision of the possibility of increasing work efficiency, the staff evaluates the supply process in the EKOPLON company as efficient. so thinks 11 employees consider. 7 employees are not fully familiar with the results of work, this may be due to poor information flow or low employee interest in their results. Only 2 employees chose the answer indicating the lack of effectiveness of the supply process (figure 3).

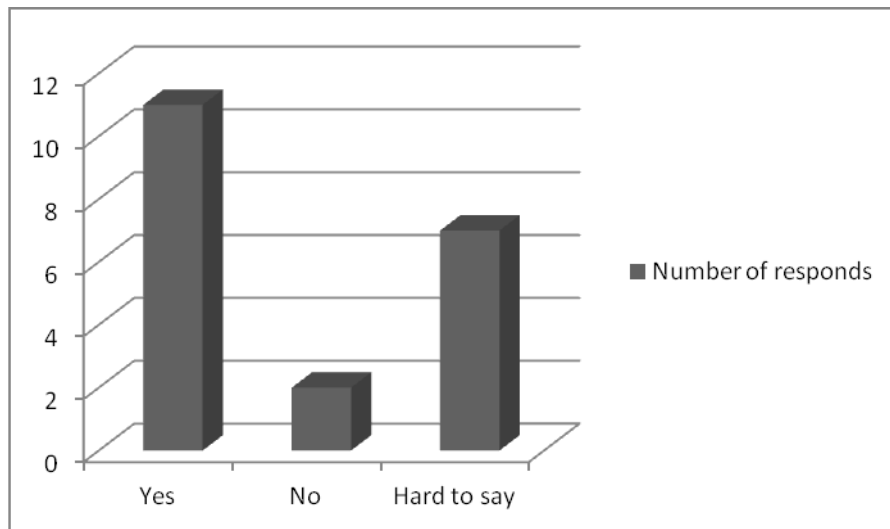


Figure 3. Efficiency of the supply process. Adapted from: based on the conducted study.

The work of the staff is to a large extent the result of the competence of the top management. This management sets development directions, motivates employees and indicates how to properly perform tasks. The competences of the top management in the field of warehouse management are rated as "Rather high" and "Definitely high". Such responses were chosen by as many as 18 employees. Only 2 people have recognized the competence of their superiors as average. None of the respondents gave the answer "Definitely low" and "Rather low", which proves high qualifications of the management (figure 4).

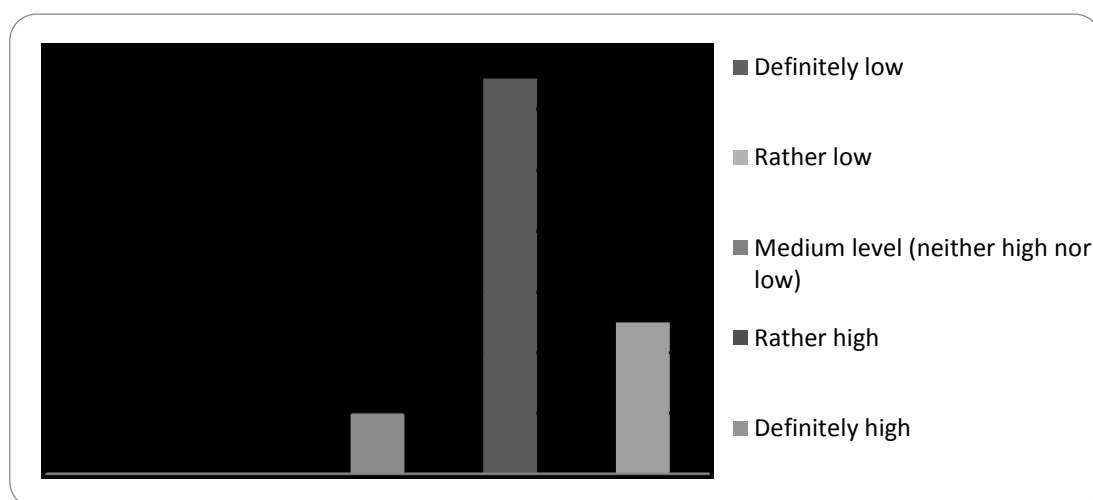


Figure 4. Competences of top management in warehouse management. Adapted from: based on the conducted study.

Good company position, qualified staff and properly selected management brings large profits for the company. However, in order to expand into new markets and achieve the leading position on the feed and fertilizer market, the company should modernize some machines. However, employees are afraid of automation and new technology, which may initially affect "Additional loads", "No time", "Additional training" (figure 5).

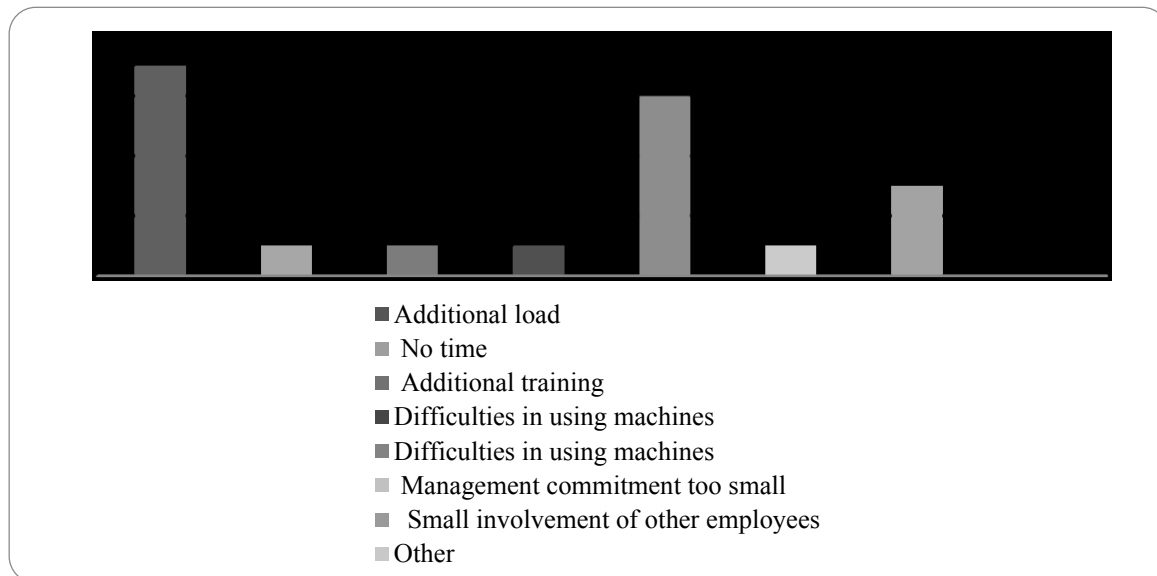


Figure 5. The type of difficulty that may occur after upgrading some machines. Adapted from: based on the conducted study.

The staff is not sure if they will learn quickly how to operate new machines, if they will not have to stay longer in the work place in order to gain knowledge and if the engagement will be the same among all employees to avoid the situation one or two people learn quickly to handle the devices and they will be responsible for work.

There is no doubt that the identification of direction of action can positively affect the development of the company. The implementation of innovation and meeting the disadvantages will bring positive results and will contribute to the growth of the competitive position of the company, both on the domestic and international market.

6. Assessment and recommendation

The EKOPLON company conducts a very fair activity on the production market and distribution of foliar fertilizers and animal feeds. He has a very good reputation and the right attitude towards contractors. The company is also identified with an appropriate approach to employees, which is confirmed by the award for the "Best Employer of the Year 2009 in the Small and Medium Enterprises category". The organizational culture and motivating employees

play a huge role in the company. Teamwork as well as beneficial, individual behaviors are appreciated.

The warehouse management plays a huge role in the company. As a result of manufacturing own products, as well as obtaining raw materials and materials for these processes, it was necessary to build own storage facilities. Warehouse management is a very difficult task, requiring precision, knowledge, huge discipline and a good layout of the entire company.

In order to increase productivity and/or increase the speed of operation, the company should do more frequent machine inspections and in some cases purchase new devices. Work automation is a very important element of the functioning of warehouse management. In order to improve the work, the company should purchase a bag stapler, which as a result of its work shortens the time allocated for activities related to placing fertilizers in packaging, and thus reduces operating costs. The company should also invest in the purchase of an additional packaging labeling machine. One from such devices is located in the area of production of liquid fertilizers, therefore the staff producing crystalline fertilizers is obliged, immediately after obtaining information about the size of the order, go to the place where production processes are subjected to liquid fertilizers and print appropriate labels there. Again, this is related to time, and exactly to its wasting and making unnecessary movements.

Another element that would affect the company's efficiency is the increase in the number of loading ramps. Very often, in the place where they are located, a row of cars is waiting for loading or unloading, through this company can handle a smaller number of orders during the day, that is, its effectiveness is reduced.

Analyzing the company's warehouses, one should mention a small number of places for products intended for production and impractical storage halls, where the problem of obtaining the first-tangible material assets is visible. In addition, these halls are unheated and have a small size, which is why it is not possible to store larger loading units. The company should be equipped with a new, additional, specialized warehouse.

In spite of the current inconveniences, the employees cope with them skillfully and the level of services related to inventory management is high. The company also constantly cares about its development, which is why it will soon start exporting to the markets of Central Asia (Uzbekistan) and Northern (Russia).

It is worth quoting the mission of the EKOPLON company "Thinking about the future, we focus on quality." The company pays a lot of attention to market position and cooperation with stakeholders, providing them with the highest quality products.

7. Summary

Warehouse management is very important element of the proper functioning of every production company. The inventory accumulated in it should be maintained at an appropriate level that will ensure continuity of production and will not generate excessive costs. The work in the warehouse should process safely, efficiently and automatically. In turn, the storage space must be properly used and ordered to avoid problems caused by searching for a given assortment. The warehouse must be equipped with appropriate devices and have right means of transport.

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