As a result of joining the European Union and expanding the market, Polish traders were forced to reevaluate their approach towards directing production. Strong competition extorted an increase in modernizing machinery as well as forced changes in the system of directing production. This article contains a proposition of the spectrum of changes in a small production company.

INTRODUCTION

The opening of new markets increased the interest of contractors in the matter of increasing productivity of existing production lines, maximizing responsiveness in realizing orders, and forced by competition, in reducing their own costs. Hence, the increasing number of offers concerning the evaluation of transport and storage systems in small companies [1].

The demand for wooden products and post-production waste (of which the main recipients are power plants making use of biomass) has led to a definitive increase of financial situation in this group of companies. Owing to this fact, the afore mentioned companies poses the means of increasing the range of production as well as introducing changes in the technological, storage and transport systems.

1. DESCRIPTION OF THE PROPOSED SYSTEM OF PRODUCTION MANAGEMENT

The foundation of any well-functioning production company is an organized and logically functioning production system.

Managing production contains elements of planning on three levels of management (strategic, tactical and operative) [8]. Directing the flow of production on the other hand turns towards operative planning. Thereupon two basic approaches may be enumerated:

The modern approach- directing production through the employment of methods applying the new philosophy of managing production.

The classic approach- directing the production flow via methods of traditional organization of production in conventional production systems.

The modern approach towards managing a company and production focuses on integrated management. The basic philosophy of integrated management is logistics, as a concept of planning, conducting, organizing and controlling the physical flow of goods which incorporates computer programmes in the system of managing a company. The logistics is oriented towards modernizing a company’s organizing system, the physical flow of products and the circulation of information inside the company and its nearest environment [6].

The classic methods on the other hand, which have been tested in practice and still used in companies across the nation and abroad, focus around two areas: intercellular and inner cellular piloting.

Intercellular piloting concerns each production cell, in reference to all levels of complexity in the structure of manufactured products. The scope of inner cellular piloting encompasses defining and supervision of the ongoing process and meeting production demands solely in the basic production cells (workplaces).

As already mentioned, the classic methods of production management can be divided into two groups: the intercellular and inner cellular methods of controlling production flow. They both base upon the basic principles of directing the production flow. Both mention two types of flow:

Ongoing flow (lasting in time) which may be piloted through the amount of products and stockpile (separately or simultaneously).

Discreet flow (short-lasting) which may be piloted through the dates of inflow and the amount of time the goods are being stocked (separately or simultaneously).

The intercellular method of directing production flow concerns all production cells operating above the basic level. They are directed by receiving tasks resulting from the company’s operative plan of production, according to their specialization and current production ability. It also encompasses the setting of outflow plans and activating the production process for these cells while taking into account the present and necessary stockpile of the ongoing production as well as stockpile shortage. The supervision over realizing production flow must be introduced and the case of deviation from the norms making appropriate decisions. The development of intercellular piloting methods came along with the increasing complexity of production processes and the means of processing information. These are as mentioned:

- Directing according to timings of production.
- Directing according to repetition periods of production.
- Directing according to the program and stockpile.
- Directing according to maximum-minimum stock of supplies.
- Directing according to the amount of ordered supplies.
- Direction according to precedence.
- Direction according to the production cycle.

The inner cellular method of directing flow encompasses tasks regarding appointing and supervision of the realized production tasks concerning basic production cells. It relies on preparation and supervision of the means used to execute the production tasks (materials, workplaces, assistance, crew, transport) and the supervision and recording the executed tasks. The goals of inner cellular direction of production flow:
Completing tasks according to schedule.

Minimizing the time of production cycles of products.

Minimizing time of routines concerning preparation and post-production.

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The modern approach towards managing production means accepting the fact that a company’s elements compose a unity, which aims at integrating its systems. The technical, economic and psychological actions are treated as systems possessing features that determine their contact with the environment. This is depicted below:

![Pic. 1. The basic features of a company](Image)

Source: Own elaboration according to [7]

Chart number 1 depicts the basic features of a company. Arranging the socio-technical processes taking place in a company is done through realizing the goal of a people by people using technical means. Complexity is a number of interacting units of various size and destination. These systems are hierarchical systems due to the complexity of a company. The ability to improve is adapting to the ever changing environment in order to satisfy the expectations of the consumers buying from a given company.

The openness of a company is displayed by the necessity of constant exchange of materials, energy and data with the environment.

Companies undertake various actions which aim at retaining or regaining its position on the market. This may be achieved through restructuring their processes, modernizing their managing and organization systems, or by expanding the range of products.

In comparison with the traditional approach, modern methods of directing production offer far greater possibilities of adapting to the constant changes in demand on the market. This owes to:

- Increased humanization of production processes, displayed by engaging employees in making production-related decisions.
- More elastic methods of planning production incorporating modern methods of predicting market demands, as well as the newest achievements in logistics marketing.
- Improving currently undergoing processes, this can be recognized by a significant reduction of pre-production stock, production stock, the amount of products being stocked as well as increased reliability of information-flow systems inside the company.
- Practice leads to the conclusion, that the best course of action is applying an integrated system of material flow [5].

The striving for increasing the production output and adapting to market demands has forced the decision to implement a modern method of managing production, called OPT- optimized production technology [4]. OPT is one of the newest methods of directing production [3].

The main aim of the OPT system is maximizing the production score in certain production conditions while eliminating „bottlenecks” comes with an optimized plan of action. The „bottleneck” is an element of the production process of which 100% must be taken advantage of in order to ensure maximized production. By dividing orders into several manageable batches and organizing the order in which these batches are moved, the production time is reduced and the queues to the „bottleneck” machinery or processing stations ensure a constant limitation of stock. Taking this into account, the OPT calculates nearly the most optimal schedule. The OPT incorporates a set of managing co-factors, which determine the factors controlling production. These factors are such elements as: the composition of a product, the efficiency of the company, the progress of the task, how demanding the deadlines are, time of assembly. The input data are similar to those used in MRP/MRP II systems. Basing on sales forecasts and routing, a network of resources is created including data concerning specific workstations (the required resources of employees and machinery). The computer system performs a series of tests and prepares a back-tracked schedule of delivery (starting with the date of completion), applying unlimited production capability. This schedule is used to define critical and non-critical supplies, depending on the level of their exploitation. From this point on, the critical supplies are treated as „bottlenecks”. Next, the so called „owner’s algorithm” is implied to compile the „optimal” schedule of moving products through these „bottlenecks” of the system. In the final stage, the flow of products through non-critical elements of the system is planned, so that it does not interfere with the optimal utilization of the critical ones (this includes, inter alia, production capability reserves in order to compensate for potential interference) [2].

The OPT rules do not force a company to apply specialist, informatics programs. This is a great advantage of this system, since it reduces the costs of introducing it.

2. DESCRIPTION OF A REALISTIC INTERNAL TRANSPORT SYSTEM

A realistic internal transport system has been has been shown in pic. 2.

![Pic. 2. A realistic internal transport system](Image)

1- carpentry shop, 2- warehouse for prepared products, 3- boiler-house, 4- drying plant and seasoning plant
Materials and semi-finished products are delivered to the first department by wheeled transport. It is worth noting, that because of the production technology, the internal transport of the first department is railed. After processing, the material is taken from the trolleys to a truck’s trailer and transported to department two. Although department I and II are only a dozen or so meters apart, the vehicle must travel nearly five hundred meters to reach its destination. Transport in the departments takes place by rail and transport between departments makes use of wheeled vehicles. Stockpiles of materials are randomly situated within a department’s territory.

3. SUGGESTIONS OF CHANGES IN THE INTERNAL TRANSPORT SYSTEM

Implementing the OPT system has forced a change in the internal transport system in department II. The first fact which draws attention is the elimination of wheeled transport.

While performing the analysis of a plant in the aspect of the implementation of the production control system, based upon OPT (Optimized Production Technology), it was observed that the weakest link of the system of transportation is the access road connecting two departments of an enterprise. The road in question is 500 meters long, and it is used for the transportation of materials between the departments of the same business. Due to the fact that the second of those departments cannot be reached by means of rail transportation, it is indispensable to transport materials by means of road transportation. Even though both of the departments are situated 30 meters from one another, the time of the transportation of materials, together with manipulation operations, amounts to 35 minutes. A solution consisting in extending the lines of track transportation, and connecting them with the second branch of the enterprise, has been put forward. What has also been selected, is changing the internal transportation of the second department, and replacing the (hitherto in use) system of road transportation with a narrow-gauge railroad. This step requires constructing additional 290 meters of tracks, and also using the additional turntables of narrow-gauge railroads.

The costs of the completion of the tasks will be partly reduced by fitting the turntables and trackswitch which are in the warehouse of the enterprise. Homogenizing the means of internal transportation will be advantageous because it will make it possible to eliminate the costs connected with the maintenance and operating lorries. The time of transportation between the departments of the enterprise will also be significantly reduced. According to the estimations, it is possible to expect that the time in question will not exceed 5 minutes at the longest. The simplification of the system of internal transportation will also make it possible to significantly increase the area of the warehouses, which is advantageous due to the manufacturing processes conducted in the enterprise.

SUMMARY

Aiming at achieving maximized profit is the main reason to look for savings [10]. As is well known, the greatest profit can be reached by optimizing the utilization of machinery and minimizing the number of transport and manipulation operations and finally reducing warehousing space.

Incorporating production management systems to a small company results in measurable economic effects when it affects all aspects of the production system: technological machinery, warehouses and buffers as well as roads and means of transportation. The performed analysis suggests that the best management system for this company would be one based on OPT and JIT.

Applying the above mentioned systems has led to modernizing the transportation system. Unifying the transportation system should reduce the number of time-consuming loading operations and eliminate unnecessary means of transportation. An additional profit is achieved by organizing the storage and warehousing in the company.

The proposed solution is depicted in pic. 3.

LITERATURE

Wpływ zmian systemu zarządzania przedsiębiorstwem na system transportu wewnętrznego i magazynowania

Wstąpienie Polski do krajów Unii Europejskiej i otwarcie się nowych rynków zbytu spowodowało zmiany w podejściu rodzimych przedsiębiorców do problemu sterowania produkcją. Dużą konkurencję wymusiła zwiększenie inwestycji nie tylko w unowocześnianie parku maszynowego, ale też w zmiany w systemie sterowania produkcją. W artykule przedstawiono zakres zmian zaproponowany w małym przedsiębiorstwie produkcyjnym.

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