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IMPROVING EFFICIENCY
THROUGH OPTIMIZATION OF THE PRODUCTION PROCESS

Optimization of the production processes affects the functioning of the enterprise and contributes to many benefits. By optimizing the production processes, businesses are able to increase their productivity, which is essential in a competitive market. The article presents possibilities of improving the efficiency of the researched enterprise by optimizing the production process, taking into account diagnosed functional problems.

INTRODUCTION

Regardless of the size of the company, efficient management is the most important. Efficient management covers well defined and conducted processes, which is the daily reality of each enterprise.

Production optimization is a constant introduction of the best practices that affect the efficiency of manufacturing processes. By optimizing production processes, companies have the opportunity to improve their productivity, which in the time of tremendous competition is critical.

Effective development of enterprises generally hinder daily struggles with problems in the field of operational activities, flow of information and the lack of a smooth connection of business processes taking place in the company. The growing demands of the market and the need to ensure high quality products generate the need to optimize manufacturing processes while maintaining optimal level of raw material consumption and the use of available resources.

The aim of the study is to present possibilities of increasing the efficiency of the researched companies thanks to the optimization of the production process, taking into account identified functional problems.

1. PRODUCTION PROCESS OPTIMIZATION

The modern market puts enormous pressure on manufacturing enterprises. To raise competitiveness of the enterprises in the market, it is crucial to find ways of improvement and optimization of all the processes taking place in the companies [1, p. 98].

The basis for improvement of the production processes are optimal binding and use of production factors resulting from the need to meet customers’ demands, adapt to the changing market conditions, competitiveness, cost pressure and increased role of internal and external flexibility. The aim is to achieve measurable economic and production effects such as efficiency of the production process, timeliness of tasks, identification of factors affecting the quality of products, shortening the inter-operational time and minimizing inventories. An important role in both the improvement of existing production systems and its redesigning play modern methods of organization and management of production processes, which arise from the desire to improve efficiency and reduce costs [2, p. 720]. Therefore, production processes should be regarded as the areas where you need to make improvements and modifications increasing productivity of the enterprise [3, p. 572].

2. PRODUCTION PROCESS IN THE RESEARCHED COMPANY

The researched manufacturing company was founded in 2009. It employs 57 people. The company specializes in the production of hassocks and sako bags filled with hypoallergenic polystyrene pellets. A great advantage of the company is the professionalism and the continuous expansion of design, according to the fashion trends and customer preferences. Long-term experience of the management board allowed achieving dynamic development of the company. However, the company is still looking for new, better and more functional solutions that may increase its productivity.

A simplified diagram presenting the flow of the production process in the researched company is shown in fig. 1. The production process begins with the collection of material from the warehouse. Then, it is delivered to the cutting rooms, where the fabric is cut according to the template. The fabric is collected from the warehouse on the basis of a collecting card, which contains information about the customer’s order and the standard measures of fabric that needs to be collected in order to comply with the customer’s order. Cutting operation begins with placing the fabric on specially designed tables. The previously prepared template is put on the layers of fabric. Then, it is traced and cut out. Finally, the cut out pieces of fabric pass quality control and are transported to the sewing room, where they are stitched up together.

Sewing operation must be performed very carefully and accurately, because mistakes made during the sewing process can cause a rupture of the seam. This, in turn, can result in spillage of pellets and lead to customer’s complaints. The sewn parts of fabric undergo the quality control concerning the seams, errors in sewing and other undesirable defects.
After the quality assessment, the sewn pieces of fabric are directed to the next stage, which is filling the hassocks or sako bags with the pellet. This is done automatically using a special machine because polystyrene pellets are a very specific material whose physical characteristics pose a problem when filling a large batch of orders. When the right amount of the polystyrene pellets is filled, the holes in the pieces of fabric are finally sewn. During the next step, the quality control aiming at checking the seams and preservation of the sewn pieces of fabric (flaws, discoloration, etc.) is conducted. After the quality assessment, the next stage is the packing of finished products and their labelling. Finally, the finished products can be collected.

3. FUNCTIONAL PROBLEMS OF THE COMPANY’S PRODUCTION PROCESS

Analysis of all the stages of the production process revealed a number of functional problems. Numerous irregularities due to poor organization of the production process have been revealed.

The biggest problem was diagnosed in the sewing room. The sewing process is carried out on 15 sewing machines. The process of sewing is non-standardized and causes lots of problems. The sewn tailored fabrics often do not pass quality assessment because they have manufacturing defects (flaws, protruding threads, discoloration, etc.). The sewn finished product with defects unnecessarily increases the company’s costs and often contributes to delays in the completion of orders. Moreover, it was noted that there is no quality control system regarding materials and raw materials that are collected from the warehouse. Then, such fabrics without the quality control are directed to the cutting room, where they are cut according to specific template. After that, they are sent to the sewing room. The quality of seams and detection of existing faults is introduced when all the pieces of fabric are sewn together. Further analysis of the sewing department also revealed another aspect that disturbs the smooth running of the process. This problem is frequent breakdowns of sewing machines, which cause disturbances in the entire production line, and the waiting time for the repair of the machine is relatively long. It was also noted that the company does not have spare parts that would allow repairing machines and equipment quickly after the time of the crash. Moreover, there is no service book of all the machines and equipment that are used in the company.

Another area causing problem is the labelling system for finished products. This is done by hand and involves putting stamps in a properly designated place on a paper tag. The analysis showed that tags often miss stamps. The paper label itself is also sometimes accidentally damaged or ripped. When such situation takes place, there is a problem to determine the identity of the product and its features.

Analysis of the environment, enterprise resources and competition clearly shows that there is a great need for strategic action. The analysis tool used to compare economic aspects of the enterprise, i.e. strengths, weaknesses, opportunities and threats, is nowadays one of the most popular heuristic analytical techniques organizing information – SWOT analysis [4]. The information gathered from the SWOT analysis is presented in table 1.

<table>
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<th>Tab. 1. SWOT analysis of the researched manufacturing company.</th>
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<td><strong>INTERNAL FACTORS</strong></td>
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<td>- flexible adaptation to the requirements of customers;</td>
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<td>- innovative pellet dosing system;</td>
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<td>- flexible and easy access to customers due to own means of</td>
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<tr>
<td>transport;</td>
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<tr>
<td>- many years of experience in design and technology;</td>
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<td>- experienced staff;</td>
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<td>- high quality of products;</td>
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<td>- orders consistent with the customer’s order;</td>
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<td>- high culture of customer service;</td>
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<td>- competitive prices.</td>
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Weaknesses of the company, which can decide about the effective functioning and performance of the company, are internal facts that include the area of the organization of the production process. These weaknesses can be overcome by the usage of available methods, systems and tools for optimizing the production process.

The strengths of the company are, among others, long experience in design and technology, high quality products, execution of orders according to customer’s needs, flexibility to adapt to customer requirements and competitive prices.

The SWOT analysis was followed by the analysis of needs and potential of the company presenting challenges for the company and the analysis of the market potential, which identified and evaluated market opportunities based on the analysis of the market structure, customer needs and requirements, strengths and weaknesses of the competition.

All the conducted analyses showed, among other things, unused potential which lies in the power of the company, correct implementation of the production process as well as extensive experience in the industry. Unused potential can be activated through the implementation of tools for optimizing the individual steps of the production process.

4. SUGGESTIONS FOR OPTIMIZATION OF PRODUCTION PROCESS

Among the proposals concerning optimization of the production process, that could increase productivity of the business enterprise, first of all it is suggested to introduce the quality control of collected materials and raw materials, which are directed to the cutting room. Quality control would help to detect defective fabrics and would not allow for their further processing.

Another optimization suggestion is to introduce standardization of working time in sewing room. Such standardization of time would allow determining the time of particular activities, tasks and operations at different positions. As a result it would be possible to obtain information on the complexity of the operations, activities and tasks, which is very important in the implementation of the production process. The company thanks to the proper organization of particular job positions concerning sewing tasks, determination of the actual processing time of particular operations as well as manner of performing activities, could get a lot of important benefits such as greater efficiency, minimization of unjustified downtime and interference occurring in the manufacturing process.

Another suggestion is to make regular reviews of sewing machines and cooperating devices. Maintenance of machinery and equipment in proper condition ensures the continuity of use and consistency of work. In addition, periodic monitoring of machinery and equipment reduces failure rate to a minimum. It is also recommended to keep service books for machinery and equipment.

Another proposal, thanks to which it would be possible to optimize production process, is to create technical facilities equipped with spare parts for machinery and equipment that could be used in the event of failure to respond quickly and immediately bring the machines and equipment to functional efficiency. This would definitely bring many benefits and savings for the company.

Another proposed solution is to introduce marking and/or labeling of finished products using barcodes or RFID labels, which would include the necessary information concerning orders and product characteristics. The use of bar codes or RFID labels would allow streamlining work and registering operations performed on the individual production position. Moreover, it would enable to conduct ongoing monitoring of implementation of the work in progress. Among significant benefits of using barcodes or RFID labels must be also included rational use of resources, efficiency and minimization of costly mistakes.

In addition, it is proposed to use 5S and SixSigma systems. The 5S is a good tool to create and maintain well-organized, clean job positions. SixSigma method is an optimization proposal, which is based on the concept of continuous improvement of work organization. It is achieved thanks to continuous monitoring and control in order to eliminate and prevent a variety of inconsistencies in the production process.

In summary, each of these proposals for the optimization of the production process can bring many benefits for the enterprise and increase its efficiency at the same time. It is not recommended to implement all of the proposed solutions and improvements at the same time. Optimization of various stages of the production process in a company should be implemented gradually and progressively. Furthermore, it should be individually tailored to the needs of the company.

It must also be remembered that before implementation of any optimizing methods and tools, production processes taking place in particular enterprises should be carefully analysed. It is due to the fact that only on the basis of correct conclusions it is possible to determine what actions can bring the best results [5, p. 225-240]. Organization of the production process should be based on regularities, interdependencies occurring in the actual production processes and experiences identifying right methods and ways of efficient and cost-effective production processes [6, pp. 721-727].

SUMMARY

The aim of the study was to present some opportunities that can increase efficiency of the enterprise thanks to optimization of the production process. The research takes into account all the functional problems that were diagnosed. The analyses revealed quite a few functional problems as far as the production process is concerned. In order to increase efficiency of the company, several solutions optimizing production process were introduced.

It was proposed to organize the quality control system concerning all the materials and raw materials, which are directed to the cutting room. It was also suggested to introduce standardization of working time in sewing room. Moreover, it was noticed that the enterprise should make regular reviews of sewing machines and
A cooperative effort was suggested to create technical facilities equipped with spare parts for machinery and equipment. Then, it was proposed to introduce marking or labelling of finished products using barcodes or RFID labels. The final proposal involved the use of 5S and Six Sigma systems.

The proposed solutions optimizing the production process may improve many of the actions and activities occurring in the manufacturing process. It should be emphasized that the optimization of manufacturing processes is of fundamental importance for the proper and efficient functioning of the company, a well-functioning production has many benefits for the enterprise.

REFERENCES