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# АКТУАЛЬНЫЕ НАУЧНЫЕ ИССЛЕДОВАНИЯ В СОВРЕМЕННОМ МИРЕ

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## **АКТУАЛЬНЫЕ НАУЧНЫЕ ИССЛЕДОВАНИЯ В СОВРЕМЕННОМ МИРЕ**

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## DEVELOPMENT OF A LEAN MANUFACTURING SYSTEM AS A FACTOR IN INCREASING THE COMPETITIVENESS OF INDUSTRIAL ENTERPRISES

**Abstract.** *This article outlines aspects of the development of a lean production system, in which it is considered as the main factor in increasing the competitiveness of industrial enterprises. The issues of the influence of the lean production system on the identification of the hidden potential of enterprises and the increase of their competitiveness, and the principles of lean production are analyzed.*

**Key words:** *production, competitiveness, lean manufacturing, tools of lean manufacturing, principles of lean manufacturing.*

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## РАЗВИТИЕ СИСТЕМЫ БЕРЕЖЛИВОГО ПРОИЗВОДСТВА КАК ФАКТОР ПОВЫШЕНИЯ КОНКУРЕНТОСПОСОБНОСТИ ПРОМЫШЛЕННЫХ ПРЕДПРИЯТИЙ

**Аннотация.** *В данной статье изложены аспекты развития системы бережливого производства, в он рассматривается как основной фактор повышения конкурентоспособности промышленных предприятий. Проанализированы вопросы влияния системы бережливого производства на выявление скрытого потенциала предприятий и повышение их конкурентоспособности, и принципы бережливого производства.*

**Ключевые слова:** *производство, конкурентоспособность, бережливое производство, инструменты бережливого производства, принципы бережливого производства.*

In a highly competitive environment, the effective work of a company in the market, and, at times, its survival largely depends on the measures taken to increase the competitiveness of the products and the enterprise as a whole. This is possible only on condition of production of products that meet modern quality requirements of market consumer value. To increase the level of profitability of an enterprise, it is necessary to achieve a reduction in the cost of production without compromising its quality. Enterprises of any industry today exist in an environment where it is almost impossible to focus on the mass production of large consignments of goods, to maintain excessive production capacity and an extra staff, due to the serious influence of competition. The greatest success is achieved by the one who achieves the desired result with lower costs.

Among the many approaches and techniques that make it possible to improve production efficiency, one can single out the lean production system, which has been

gaining more and more popularity in recent years, but is also subject to fair criticism from practical application.

Lean manufacturing is the conceptual position of Toyota's management, which is based on the principle of eliminating losses in the production of products through the use of special methods and procedures that must be mastered and applied by all employees of the enterprise without exception.

Lean production (English Lean production, Lean manufacturing, from Lean - "skinny, slender, without fat") - a concept of managing a manufacturing enterprise, based on a constant desire to eliminate all types of losses [1]. D. Wumek and D. Jones define Lean Manufacturing as a process that includes: determining value for the consumer, building a consistent stream of this value creation, ensuring the continuity of this flow, ensuring "pulling" from the customer, striving for excellence [1]. Lean manufacturing, which began its existence in factories of the automotive industry, has over time been adapted to the conditions of production in enterprises in various industries and at various scales. Lean production methods are widely known and well covered in the scientific press, but it is more about increasing profitability by reducing costs [1, 2] than about the role of lean production in the formation of the competitiveness of an enterprise. There is an obvious relationship between the implementation of lean production measures and the growth of the competitiveness of the products and the enterprise as a whole.

Each area of application requires the mandatory adaptation of tools and approaches to lean manufacturing in accordance with the specific conditions prevailing in the workplace or in the organization. Manufacturing enterprises have access to a wider range of tools offered by lean manufacturing than organizations that do not have a production component. At the same time, it is also much more difficult to achieve success at manufacturing enterprises, but the achieved result with successful implementation can be several times higher. The main goal of lean manufacturing is to build an efficient production system that functions with minimal costs and minimum lead times for high quality products at the lowest cost.

At the initial stage, the implementation of lean manufacturing can help to achieve the required level of such an explicit indicator of competitiveness as the ratio "price-quality", because allows to improve the quality of manufactured products and at the same time to reduce its cost. As you master the lean manufacturing methodology, it is possible to achieve more "subtle" indicators of competitiveness, for example: certification of products and increasing the attractiveness of goods in international markets; conducting advertising campaigns and increasing the authority of the manufacturer; raising the technical level of the product through the use of modern achievements of science and technology.

The lean manufacturing methodology is quite simple, but, nevertheless, when implementing it in a specific production or in any other area of activity, we face serious difficulties. They are connected, first of all, with the fact that, like any change, the introduction of lean production causes a certain resistance from the collective of an enterprise or organization. For a successful implementation, you should devote the necessary amount of time and effort to mastering the principles and tools of lean production by all, without exception, a team.

The entire team must be involved in training, because the success of lean production is possible only where each direct performer is interested in reducing losses and increasing not his own productivity, but the productivity of the entire value

production process as a whole. The performers are determined to increase their own productivity, because often their wages depend on it. But in some cases, it may be necessary to produce more rare parts or products (value), depending on consumption, in order to avoid the loss of excess inventory. The tasks of managers of the highest echelon of the enterprise include not only determining the necessary needs for the production of a particular value, but also timely bringing this to the immediate performers. Enterprise managers should pay special attention not only to personnel training, but also to the organization of the remuneration system, which should be built in such a way that after the introduction of lean production, the wages of production personnel do not decrease.

The principles and stages of implementation of lean manufacturing are directly related to the gradual increase in the competitiveness of the enterprise.

The competitiveness of the company's products largely depends on the qualities and properties of the products. The demand for products can exist only when these are in demand. Applying the system of lean production, you need to understand that this is a concept of continuous improvement of the entire production process at each stage of implementation of lean production, competitiveness behaves differently.

One of the basic principles of lean manufacturing and the first stage of its implementation is to define the qualities that make the manufactured product value for the consumer. This is where the implementation of lean manufacturing begins. Activities performed in the enterprise that do not create value for the customer are waste. Consequently, even the very initial stage of implementation of lean manufacturing already has an impact on increasing competitiveness.

The next stage - the stage of building a map of the value stream for the current state of the production process [2, 3] - is fundamental for the production of competitive products in the future. This describes the complete chain of the production process and measures the amount of time spent at each stage of the chain. Some of the time can be spent without creating value. The current state value stream map allows you to identify points at which potential process improvements are possible. These are the points at which expectations, downtime, or other losses are found. In this way, a flow map of the current state of the process reveals potential opportunities for improving competitiveness. Building a flow map of the future state of the value production process allows you to evaluate:

- the time required to produce value without loss;
- the amount of potentially possible production (additional) products for the saved time;
- resources required for the production of additional products;
- the cost of resources required for the production of additional products;
- the amount and cost of resources that can be saved as a result of eliminating losses.

Having such data and knowing the market needs for the products manufactured by the enterprise, it is possible to easily assess the competitiveness of products and determine possible growth points.

The construction of a new production process may entail the introduction of more modern production methods and methods, because often in enterprises, the production of products is carried out according to technological processes developed



decades ago and practically not subjected to correction. New technologies are one of the main ways to improve competitiveness.

The introduction of lean production is possible both for the whole enterprise and for the production of only one value or group of values produced by the enterprise. It is inappropriate to introduce lean production only at a separate site or in a separate workshop (as it is commonly called, a pilot site), because in this case, the results achieved can be leveled out in subsequent areas of value production, which have not been transformed by the lean manufacturing system. If you plan to introduce lean manufacturing not all at once throughout the enterprise, then it is advisable to choose the value (type of product) that has the largest share in the company's profit and introduce the most effective tools of lean manufacturing throughout the entire stream of this value creation. Let's highlight the following main stages of implementation of lean manufacturing at the enterprise:

I - mapping and analysis of the processes of production of values at the enterprise;

II - the introduction of individual tools of lean production in the production of individual values (the most important from the point of view of the formation of the company's profit);

III - the introduction of individual tools of lean production in the production of all values of the enterprise;

IV - implementation of all lean manufacturing tools in the production of all values of the enterprise;

V - Execution of Lean supporting tools.

Each step of the implementation of lean manufacturing leads to a constant and gradual improvement in the competitiveness of the enterprise and products. Applying the lean manufacturing system, you need to understand that this is not a one-time event, but the concept of continuous improvement of the entire production process. The search and elimination of losses should accompany an enterprise that has undertaken the implementation of lean manufacturing throughout its life cycle. Only in this case competitiveness will constantly and steadily grow.

Competitiveness behaves differently at each stage of Lean implementation. A significant increase in competitiveness relative to the initial level is possible only after sufficiently large-scale transformations using the lean manufacturing system (stages III, IV). Moreover, after the introduction of a large number of tools in the production of most of the company's products, the growth of competitiveness may slow down significantly. In this case, supporting measures and tools of lean manufacturing, such as continuous improvement of Kaizen, technology for creating an effective workplace 5C, quick changeover of equipment, general maintenance of equipment [1], are able to maintain the current level of competitiveness of the enterprise, preventing it from dropping below the achieved level.

In conclusion, we can draw the following conclusions:

- the introduction of lean production has a systemic effect on the competitiveness of products and the enterprise as a whole, allowing both to increase competitiveness, realizing its potential, and to maintain it at the required level. The dynamics of the growth of competitiveness shown for the first time, depending on the number of implemented tools of lean production, depends on the total volume of implemented measures, which are combined into a number of stages, for each of which a schematic representation of the behavior of competitiveness is given.

- the introduction of lean production requires serious strategic decisions of the top management of the enterprise and unswerving adherence to the chosen path of improving production and increasing competitiveness. The practical significance of the presented materials lies in the fact that the study provides an opportunity for participants in implementation projects and enterprise managers to realize that the real effect of lean production measures can be obtained only when a sufficiently large number of implemented tools is achieved, when there is an opportunity for a qualitative leap in competitiveness.

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