



Management Based on the “Lean Production” Concept in the Industry of the Tula Region: Experience, Problems and Prospects

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Abstract. The purpose of the research was to get an insight into the experience in implementing “lean manufacturing” methods by industrial enterprises of the Tula region and develop recommendations for achieving sustainable success in that area. Reviewing the “lean production” implementation results showed that enterprises have sufficient reserves to reduce losses and increase labour productivity. To achieve these goals, no additional investment is required, so many enterprises have joined the National Project “Labour Productivity and Employment Support” in order to obtain the necessary competencies and attract investments at preferential rates for manufacturing improvements. Already in the first year, the introduction of “lean manufacturing” methods allows enterprises to significantly reduce the time of the production process, reduce unproductive losses, increase output, product quality and labour productivity. Analysis of various factors affecting the “lean production” implementation effectiveness discovered the need for changes in the development strategy, management system and organisation of production and auxiliary processes based on the implementation of accepted standards and the use of the intellectual potential of employees. Taking into account the traditions in Russia in the field of standardisation and personnel training in various qualifications and levels, the developed recommendations will make reducing losses and increasing labour productivity sustainable even in the absence of any state support.

Keywords: Production management techniques · Resource saving · Productivity

1 Introduction

The history of “lean production” as a business management concept was initiated at Toyota. The astounding success achieved in that globally famous company has pushed the management of organisations and enterprises in industries and countries to implement “lean manufacturing”. In Russia, at the moment, the implementation of “lean manufacturing” in industry is going through a new stage, when the implementation is taking place

in the context of a sharp reduction in the number of employees, economic sanctions and overcoming the global COVID-19 epidemic.

Studies conducted in Russia in 2019–2020 reflect aspects of the positive impact of the introduction of innovative manufacturing process management methods. It is noted that those methods influence the improvement of the financial condition of enterprises [1], the development of an entity in the digital economy [2], and in the case of large-scale implementations, the socio-economic development of the region as a whole [3].

The main principle of Toyota's "lean manufacturing" is uniform work based on the use of the intellectual potential of employees (their proposals for improving production processes), which ensures the high quality of the cars produced regardless of the country where the production is located [4]. It can be assumed that it is precisely the "combination of incompatible", namely standardisation and employee initiative that gives the outstanding result of the efficient production of high-quality equipment recorded in Toyota all over the world.

The "lean manufacturing" methodology assumes the reduction of all types of losses and the conservation of all types of resources, such as materials and components, time and labour costs. As a result of the multiplier effect, both labour productivity and production profitability increase.

The introduction of "lean" principles of organising production in Russian companies faces difficulties noted by researchers. One of the main among them is resistance to change, mistrust of employees in the management of enterprises, lack of respect for employees on the part of managers, low labour motivation [5].

It should be added that the effective implementation of new methods for organising production is hindered by the multilevel management system at Russian enterprises and organisations, as well as by the high wage gap between employees and management personnel. In this regard, it is necessary to address the problem of the systemic nature of changes at enterprises during the "lean production" implementation: what changes in management systems should it be accompanied by, what indicators of changes should be used for correction and subsequent planning of enterprise activities.

This research summarises the experience in implementing "lean manufacturing" at enterprises of the Tula region. Approaches to shaping a strategy for the introduction of new methods in manufacturing companies are proposed, including changes in the planning and management system, which will consistently ensure the economic effect of the changes.

2 Materials and Methods

In the proposed research, the goal was to study the impact of the introduction of "lean manufacturing" methods on the performance of industrial enterprises in the Tula region and develop recommendations for achieving sustainable success in that area. To achieve this goal, such challenges as studying the experience in introducing new approaches to organising production at industrial enterprises of the Tula region were solved; addressing issues arising during the implementation; developing recommendations to ensure sustainable results.

To achieve the set goal of the research, the methodological apparatus of system analysis, which allows us to consider the introduced "lean production" as part of a

higher-order management system – the management system of an enterprise as a whole, was used.

For the research, the data presented on the Tula region’s portal of national projects were used [6]. It should be noted that the portal contains the results of only organisations participating in the National Project “Labour Productivity and Employment Support”, which receive some support in the form of concessional lending and training at the expense of federal and regional budgets. In entities implementing new approaches to organising production processes on their own, the results may be different.

3 Results

In the Tula region, the introduction of “lean production” at industrial enterprises has entered an active phase as part of the implementation of the Federal Programme (2018), and then the national project “Labour Productivity and Employment Support” (2019–2021).

Currently, 60 enterprises are participating in the national project in the Tula region. In 2020, Process Factories were opened at Aerosol Novomoskovsk LLC and in the Octava cluster. During the project implementation, more than 4,000 employees of enterprises, including more than 700 members of working groups engaged in changes in processes at their enterprises, were trained. Training programmes are designed for specialists and workers of various profiles and include issues not only directly related to lean production methods but also quality management, personnel management, labour rationing etc. [6]. All enterprises involved in the project note positive results. So, in 2020, the introduction of “lean production” at “TKF” Yasnaya Polyana” OJSC provided a reduction in the cooling time of the filling by 24 h, which made it possible to increase the production of gingerbread by 13%. At the Shchekinskiy Linoleum enterprise, equipment downtime was reduced by 30%, and at the Tula macaroni factory, due to a 69% reduction in changeover time, the total output was increased by 12%. At Present Packaging LLC, by means of work standardisation and changes in the production process, the process development was increased by 44% [6].

It should be noted that the labour productivity indicator calculated as the ratio of revenue to the average headcount depends on not only the organisation of the production process of an enterprise. In the event of a decrease in demand for the production of basic products, the company’s revenue may decrease. With the release of reserves, it becomes possible to additionally make other products with the same capacities, which allows maintaining the achieved level of labour productivity and jobs, including skilled workers, which is quite essential in modern conditions.

In this regard, the problem of how to most economically integrate the “lean manufacturing” methodology into the development strategy of an enterprise arises. Given the Toyota experience, the solution to this problem is the introduction of lean manufacturing methods into enterprise standards for production, support and management processes. However, it was noted at none of the enterprises considered, whose experience was studied during the research, that the introduction of new approaches influenced management processes and led to a reduction in management levels and management personnel. This also indicates that, with new manufacturing process management methods, they

do not use or insufficiently use the second component of “lean production”, namely the intellectual potential of workers.

The research into the experience gained allows us to offer for enterprises, that implement “lean manufacturing” methods, recommendations concerning:

- 1) Enterprise development strategies;
- 2) Enterprise management systems;
- 3) Organisation of main and auxiliary production processes.

The development strategy, in addition to the innovation and investment section, should include a section dedicated to the principles of standardisation of all processes. As these principles, it is recommended to use as follows:

- An approved standard is mandatory;
- Every employee has the right to propose a change in an operation standard.

The company’s development strategy highlights new investment cycles associated with upgrading production facilities or opening new production facilities. Within each investment cycle, a project should also be evaluated according to the enterprise standard, during which, labour productivity indicators should be used along with economic efficiency indicators.

The management system of an enterprise should reflect the new role of personnel as a carrier of intellectual potential. It is necessary to track the dynamics of indicators of the people who have completed training and advanced training and the number of proposals submitted for improving processes, including those who have completed training. To involve staff in process improvement activities, personal interaction between managers and employees is required, which increases trust in managers.

Reducing losses and non-productive costs as a result of improved processes should become a source of financing for the growth of personnel remuneration. Remunerative incentives should be understandable for the staff.

It is necessary to set the goal of achieving the minimum required number of levels in the management system hierarchy (depending on the complexity of production).

In the production and auxiliary process standards, indicators to assess the performance of processes should be used: the time of a production process, the volume of work in progress, the time to change the process, etc. Deviations of the actual values of indicators in any direction should be the subject of discussion of all stakeholders in the process. Staff should have the right to propose new process indicators.

4 Discussion

The positive aspects of the “lean manufacturing” implementation identified as a result of the research are also noted by other authors, for example, in reducing the cost of production [7], increasing the economic efficiency of the enterprise [5], increasing the competitiveness of the organisation [8], improving the efficiency of enterprise management [9] and designing organisational changes [10].

To consolidate organisations’ positive results obtained at the first stages of the introduction of new processes, it is very important that this area of activity becomes permanent without turning out to be some kind of campaign temporarily carried out while the national project is in effect. This will depend on the factors presented in this research as recommendations. Some of them correspond to the results of other research activities, in particular, the involvement of the management of enterprises in the new organisation of production, which face the challenge of overcoming resistance to changes on the part of the team [11], continuous personnel training and professional personnel development [12], the need to change the wage level [13].

5 Conclusion

The research into the experience of introducing “lean production” at industrial enterprises of the Tula region showed that the enterprises received the first positive results. However, there is still a risk that the existing problems may subsequently level out all the results achieved at the first stage of implementation, if the new production organisation methods fail to become a common thing.

The proposed recommendations for changes in the enterprise development strategy, management system, organisation of production and auxiliary processes, which should accompany the introduction of a new labour organisation system, allow ensuring the stability of the results achieved at the enterprises of the Tula region.

It can be assumed that enterprises, that have fully mastered the new approach to organising production, will have a lower level of necessary costs, which will enhance their investment attractiveness and will allow attracting additional investment resources from outside. In the case of using a systematic approach to changing processes based on “lean production”, not only the economic growth of individual enterprises in the region will be ensured but also an increase in the socio-economic development of the region as a whole.

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