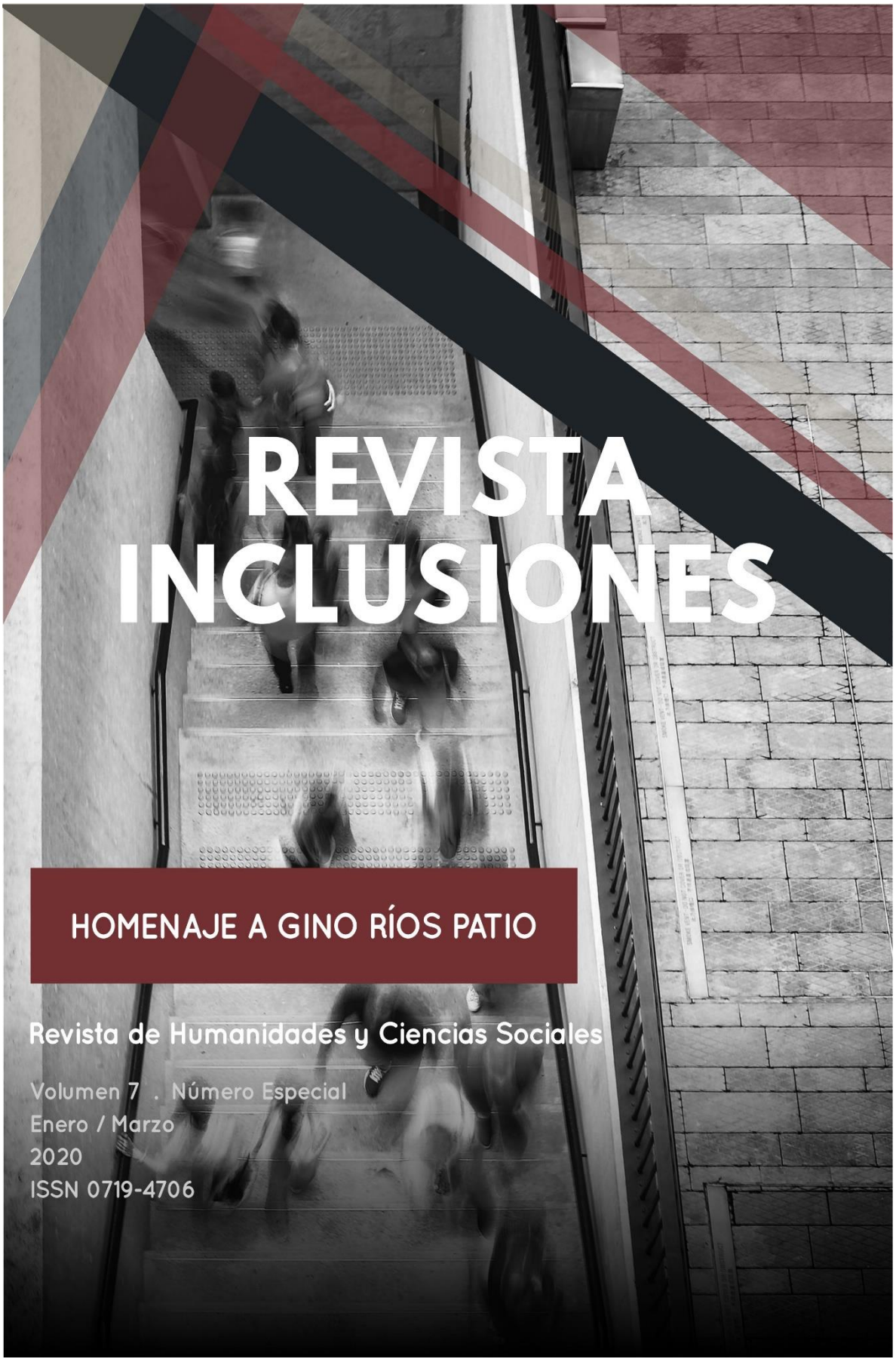

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LABOR COMMUNICATIONS WITHIN THE IMPLEMENTATION OF LEAN TECHNOLOGIES AT SMALL ENTERPRISES

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Abstract

The purpose of this article is to study the characteristics distinguishing small and medium enterprises from large ones in the context of the implementation of the lean production principle. Models and tools of lean production are highly demanded for the performance of a task of labor ramp-up at enterprises and organizations. The methodological basis of the study is a systemic approach to the process of implementation of lean production theory at industrial enterprises.

Keywords

Small and medium enterprises – Communication – Implementation process

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Introduction

Currently, in terms of labor productivity, Russia is in the third ten countries of Europe, America, and Asia and is inferior to all countries of the Organization for Economic Development and Cooperation (OECD). The OECD average labor productivity per person is $54.8, while in Ireland and Luxembourg it is $99 per hour.

Labor productivity in Russia is $26.5 per hour. The lack of incentives for development due to the lack of competition, a technological lag, lack of special competencies among management, etc. are defined traditionally as the factors restraining the growth of labor productivity. It is generally recognized that the production of initial redistribution in Russia prevails with the observed pattern – "the higher is the redistribution degree, the lower is the productivity". Obviously, the economy sectors, including the industries with a high redistribution degree, need to intensify the growth of labor productivity[1].

Along with a low level of labor productivity at enterprises and organizations providing various kinds of services, the level of resource consumption of the processes of production of goods and the provision of services is unreasonably high in Russia[2]. At the same time, lean production models and tools are gaining particular demand, which makes it possible to optimize the production of products and services by minimizing all types of losses and increasing the value of processes by the involvement of every employee of the enterprise in the production improvement.

The lean production concept has been widely used in many enterprises such as: Matsushita, Canon, Nissan, Honda, Komatsu, Ricoh, Porsche (Germany), General Motors, Delphi, Ford Motor Co., Alberto Culver, American Axle, Art Iron, etc. An example of WireWorld (USA) shows the results of implementation of lean production principles. The implementation of the principles of lean production at this enterprise has significantly reduced the financial costs, increased productivity, shortened the completion times. The lean production concept is actively applied at The Boeing Company. The experience of implementation of the lean production concept at leading foreign enterprises proves its high efficiency and consistency, making it possible not only to reduce the losses[3], but also to increase competitiveness[4]. The introduction of this concept at Russian enterprises can provide a powerful leap in economic development.

As of today, Russian enterprises using this concept include: Instrum-Rand, GAZ Group, VAZ, KAMAZ, Rusal, EvrazHolding, Eurochem, VSMPO-AVISMA, KUM OAO, SeverstalAvto. Among the sectors of the national economy, the principles of lean production are used in the production of food, technology, equipment, and textiles. This is

[1] V. I. Zarubin; S. V. Gorbanev y E. A. Zakharchenko, "Analiz i napravleniya razvitiya proektnogo upravleniya v otraslyakh ekonomiki Adygei", Konkurentosposobnost v globalnom mire: ekonomika, nauka, tekhnologii num 10 Vol: 57 (2017): 434-436 y T. Luister y D. Tapping, Berezhlivoe proizvodstvo: ot slov k delu (Moscow: RIA Standarty i kachestvo, 2008).

[2] P. Rabunets, Proizvodstvennaya sistema predpriyatiya: kak s pomoshchyu berezhlivogo proizvodstva ustranit poteri i povysit effektivnost. 2011. Available: http://www.leaninfo.ru/2011/11/17/lean-konferenciya-2011-itogi/

[3] A. D. Zaretsky y T. E. Ivanova, Nauchnyi menedzhment: mezhdunarodnyi i otechestvennyi opyt (Krasnodar: Prosveshchenie-Yug; Kuban State University, 2014).

[4] S. K. Fomichev; N. I. Skryabina y O. Yu. Urazina, "Berezhlivoe upravlenie: upravlenie potokami sozdaniya tsennosti", Metody menedzhmenta kachestva num 7 (2004): 15-21.

also characteristic of the world economy. In the Krasnodar Territory, the partial use of the principles of lean production is typical for the Agroholding Kuban enterprise. The use of this concept made it possible to improve the condition of the unprofitable enterprise within a short time. Lean production principles are being implemented at other enterprises (for example, Philip Morris-Kuban OJSC).

Methods

Currently, a fairly wide variety of approaches to the implementation of the concept of lean production at enterprises is known. The most well-known approaches are the approaches of James Womack, Michael Vader, Jeffrey Liker, Shigeo Shingo, and Denis Hobbs.

The approaches of Womack and Hobbs are conceptual and fundamentally differ in the orientation from the process of implementing the principles of lean production at the enterprise. In turn, other approaches are more specific and specialized.

The aggregated approach of Womack[5,6] is shown in Figure 1a. In general terms, it can be described as the process of implementation of the lean production concept directed from the private to the general.

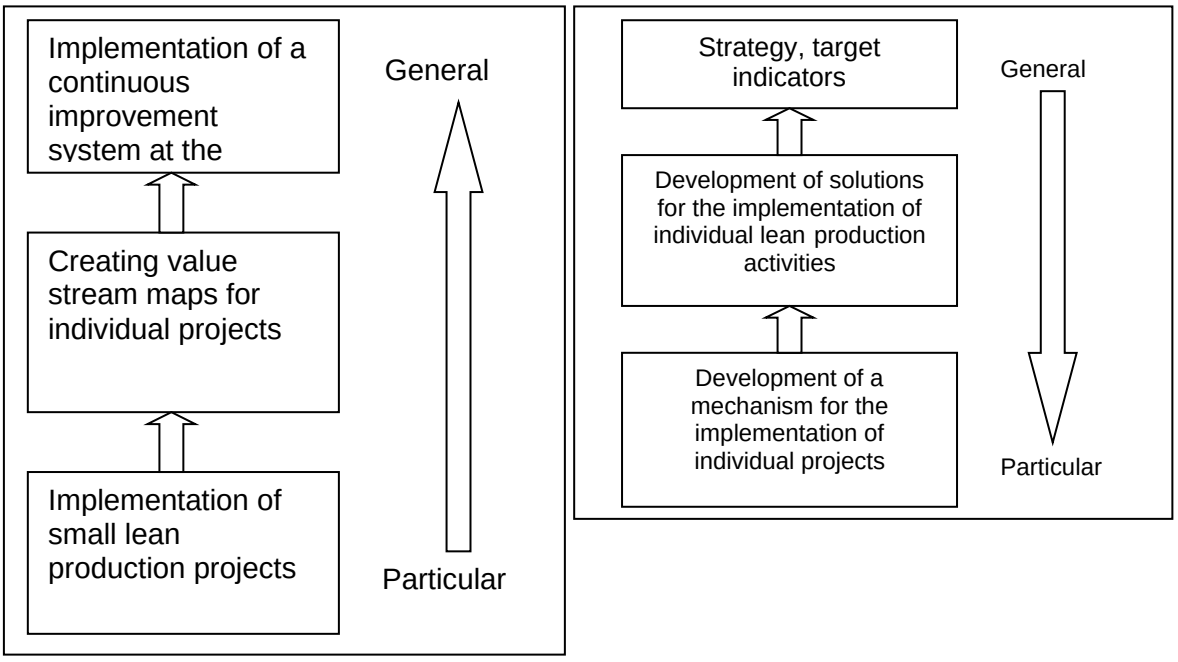
In contrast, the direction of implementation of lean production principles according to Hobbs[7] (Figure 1b) is essentially the opposite: from the general to the particular.

Among the well-known approaches to the implementation of the concept of lean production at an enterprise, there are two most common ones:

- from the implementation of individual specific projects to the construction of a common management system based on lean technologies (the algorithm for implementing lean production according to James Womack – from bottom to top, from the private to the general);

- from defining a strategic vision for the future of the company through an audit of all business processes to their reengineering (implementation algorithm according to Dennis Hobbs, from top to bottom, from the general to the particular).

[5] J. Womack y D. Jones, Lean Thinking. (New York: Simon & Schuster, 2005): 37-49.
[6] J. Womack; T. D. Jones y D. Ross, The Machine that Changed the World: How Lean Production Revolutionized the Global Car Wars (London: CPI Bath Press, 1990).
[7] D. Hobbs, Lean Production Implementation: A Complete Execution Manual for Any Size Manufacturer (J. Ross Publishing, 2013).



a b

Figure 1
Approaches to the process of implementation of the principles of lean production according to Womack – a) and according to Hobbs – b)

In terms of strategic orientation, Jeffrey Liker's algorithm[8] is very close to Hobbs's algorithm (Figure 2), which also provides for the refinement of the strategic priorities of the enterprise and the development of the enterprise philosophy.

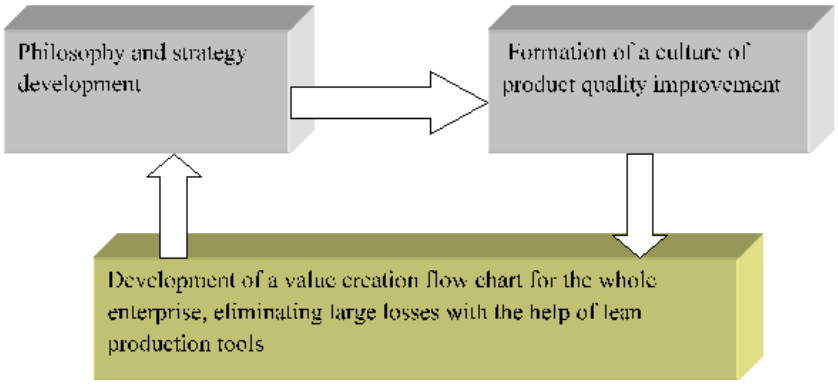


Figure 2
Lean Production Principles Implementation Scheme (Liker's approach)

[8] J. K. Liker, Becoming Lean: Inside Stories of US Manufacturers (Portland: Productivity Press, 1998) y J. K. Liker y M. Hoseus, Toyota Culture: The Heart and Soul of the Toyota Way (New York: McGraw-Hill, 2008).

In contrast to the approaches considered, the algorithms for implementing lean production by Shingo[9] and Wader[10] are more private. So, Shingo's algorithm is an environmental infrastructure based on the basic tendency to ensure safe working conditions and the development of employee competencies. At the same time, it is planned to form an effective system for increasing the level of professionalism and competencies of the employees (Figure 3).

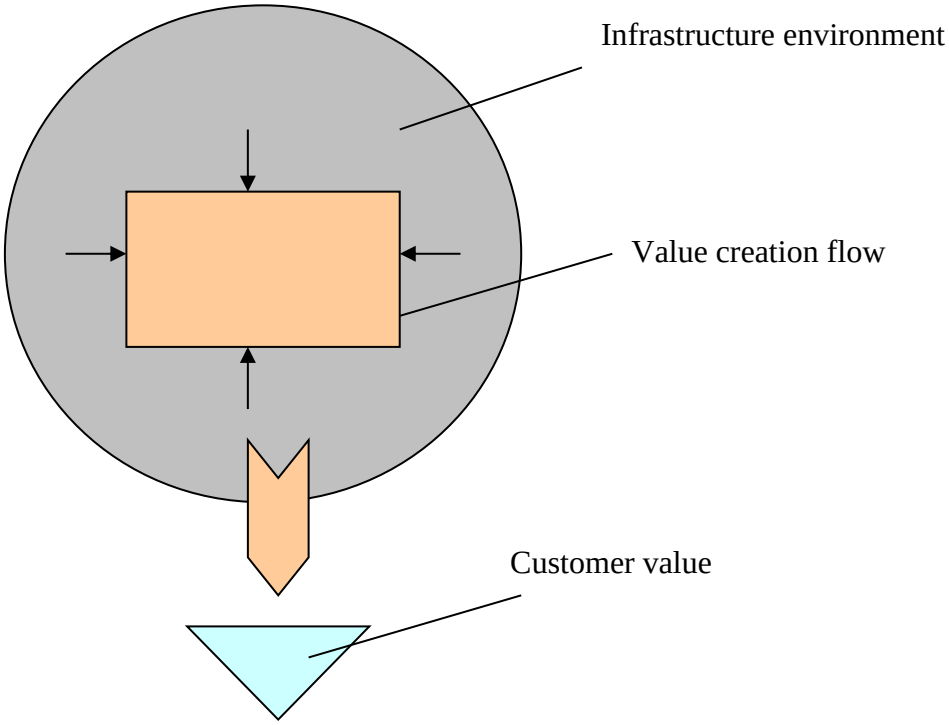


Figure 3
Implementation of the process of production improvement according to the concept of Shingo

In this case, first of all, the social and production environment in which production processes take place is being improved. Further, a process of continuous improvement is implemented, which provides for the achievement of stability and ensuring the production processes with a sufficient number of standards in order to improve system quality while eliminating losses. An equally important stage in the implementation of Shingo's algorithm is the alignment of processes in accordance with the strategic parameters of the enterprise. The final result is in creating the value for the consumer.

The subject-process approach to improvement processes at the enterprise is presented in the algorithm of Wader (Figure 4).

[9] S. Shingo, A Study of the Toyota Production System (Portland, Oregon: Productivity Press, 1981).
[10] M. Wader, Lean Tools: A Pocket Guide to Implementing Lean Practices (Productivity and Quality Pub., 2002).

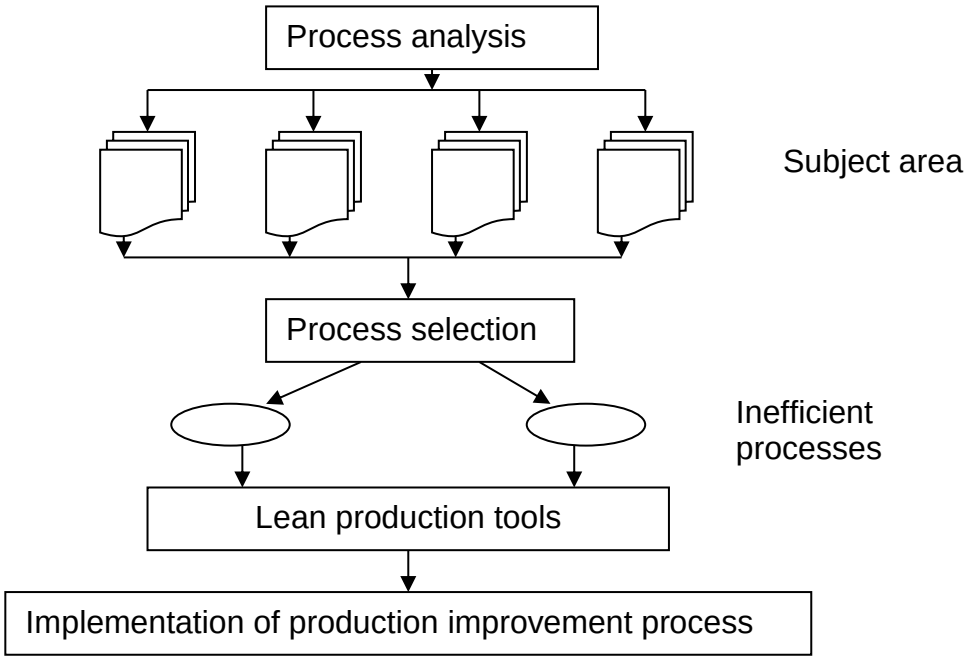


Figure 4
Wader's approach to the implementation of lean production principles at the enterprise

This approach involves the implementation of the improvement process in the subject area of the implementation of the processes: finance, production, personnel, infrastructure, etc. At the same time, many processes are implemented in each subject area. For example, in the field of finance: payroll, bonuses, incentive payments; settlements with suppliers, banks, etc. In the field of production – technological, logistics, design, transport processes, etc. For example, the processes in logistics are described in sufficient detail in the work of Kizim and Berezovsky “Integration of logistics tools in lean production”[11].

Thus, the first three approaches (Liker, Hobbs, Womack) seem to be more conceptual. However, in relation to small enterprises in Russia, their use is quite problematic[12]. First of all, this is due to the difficulty in finding among the personnel of a small enterprise a leader capable to inspire the employees with the idea of thrift and with perfect knowledge in the field of lean production methodology[13]. The central element of the process of implementing the principles of lean production according to the algorithms of Shingo and Wader is an instrumental set of lean production theory. Deep knowledge of the tools and the ability to use them in specific processes is the key to the success of lean production[14].

[11] A. A. Kizim y E. E. Berezovsky, “Integratsiya logisticheskikh instrumentov v berezhlivoe proizvodstvo”, Logistika num 3 (2012).
[12] O. N. Melnikov y A. A. Zaitsev, “Perspektivy perekhoda predpriyatii na innovatsionnye kontseptsii upravleniya sovremennym proizvodstvom”, Kreativnaya ekonomika Vol: 9 num 6 (2015): 721-734.
[13] E. E. Khodak, Optimizatsiya biznes-protsessov v rossiiskikh kompaniyakh (Moscow: Delo, 2005).
[14] K. Deranek; S. Chopra y G. A. Mosher, “Lean Adoption in a Small and Medium Enterprise: Model Validation”, The Journal of Technology, Management, and Applied Engineering Vol: 33 num 3 (2017).

The above approaches have common elements: enhancing the creative potential of enterprise employees through training in philosophy, values, and tools of lean production or in another way, highlighting, visualization and analysis of the individual business processes. However, these approaches have no potential for replication; they can be applied in practice only after significant individualization and adaptation to the conditions of specific industries. Moreover, these approaches are highly labor-intensive, which makes it possible to apply them mainly in large companies.

Results and discussion

Various features of small forms of management do not provide the opportunity to use the fully accumulated theoretical and practical experience of implementing the principles of lean production. Meanwhile, a significant part of the gross national product is created precisely by small enterprises. In turn, the implementation of the principles of lean production allows increasing labor productivity at these enterprises. The peculiarities of small and medium-sized enterprises traditionally include, first of all, structural ease of management, responsiveness to environmental disturbances, a high share of working capital in relation to fixed assets. Many researchers include the complexity of access to information and financial resources among the features. In addition, small and medium-sized enterprises often do not have the ability to train staff on the principles of lean production. In addition, small enterprises are unable to use the criteria common to large enterprises: flexibility of service, trust. These characteristic properties also determine the quality of the process of continuous improvement and the features of the process of implementing the principles of lean production at the enterprise (Table 1). These properties suggest the use of special algorithms in the process of implementing the principles of lean production at these enterprises. In essence, in small enterprises, there is no understanding of the need to form an integrated lean production system. Obviously, in this case there is a lack of knowledge in the field of management and directly in understanding the concept of lean production. The way out of this situation may be the invitation of a highly qualified specialist who is competent in this field. However, hiring such a professional requires attracting resources, unavailable for small enterprises as a rule.

Feature	Large enterprises	Small and medium-sized enterprises	Manifestation in the implementation process of lean production
Owner participation	The owner is an investor	The owner is directly involved in the affairs of the enterprise	The result of the lean production process depends on the degree of motivation
Possibility to attract qualified specialists from the internal environment to implement lean production	High	Low	The company's specialists involved in lean production are well versed in the processes to be improved with insufficient knowledge of the theory of lean production
The ability to attract qualified specialists from the external environment to implement lean production	High	Low	Specialists recruited from the external environment are well versed in lean production tools; no time is required for their preparation and training

Access to financial resources	Relatively open	Limited	Availability of financial resources provides a solution to a wider range of lean production tasks
Degree of mobility	Low	High	The time and activity of production process improvement depend on mobility
Specialization	Wide	Narrow	The number of processes requiring improvement depends on the degree of specialization, especially in the technological field
Information transparency	Low	High	Information transparency determines the possibility of an objective assessment of lean production effectiveness

Table 1
Differences between small and medium enterprises from large ones in relation to the process of implementation of lean production principles

In general, small enterprises lack an understanding of the need to form an integrated lean production system. Obviously, in this case, there is a lack of knowledge in the field of management and directly in understanding the concept of lean production. The way out of this situation may be the invitation of a highly qualified specialist who is competent in this field. However, hiring such a professional requires attracting resources, which are usually unavailable for small enterprises. The second way is based on the thesis that the owner or manager of a small enterprise knows some provisions of the concept of lean production and its usefulness for production. The owner attracts 2-3 employees to study lean production, who implement the process of cross-training on the principles and tools of lean production at the enterprise. The result of training is the creation of cross-functional lean groups. The goal of these groups can be defined as a continuous reduction of various kinds of losses: labor, financial, material, etc. In essence, the enterprise is in a state of permanent optimization of production processes. Of course, the success of the implementation of the lean principles in this case largely depends on the psychological attitude of the employees within the group[15]. The various professional and functional features of these people contribute to finding effective solutions to improve production processes. Inside the enterprise, these teams constantly exchange information about the work being done, the process of finding solutions to problems of lean production. Thus, there is not only an intensive exchange of knowledge and information on the implementation of the principles of lean production at the enterprise, but the corporate spirit also rises significantly, and confidence in the positive results of teamwork comes.

Differences in the main features of large and small enterprises determine the specifics of the lean production process. The composition of tasks and tools of lean production (planning, allocation, visualization, etc.) does not depend on the size of the enterprise. It should be noted that these tools are not sufficiently adapted to the working conditions of small and medium enterprises in Russia[16]. In a number of cases, small enterprises implement the principles of lean production, but not on a structured system

[15] G. E. Zborovsky y N. B. Kostina, Sotsiologiya upravleniya: uchebnoe posobie (Moscow: Gardariki Publishing House, 2004).
[16] R. R. Gorchakova, “Instrumenty i metody formirovaniya i razvitiya imidzha sovremennogo rukovoditelya”. 2010. Available: http://sisupr.mrsu.ru/2010-2/pdf/gorchakova.pdf

basis, but as part of solving a local production problem. Table 2 shows the lean production tools in the context of the specifics of the tasks to be solved at small and medium enterprises.

When forming an algorithm for implementing the principles of lean production, first of all, it is necessary to determine the leader in introducing the concept of lean production in the enterprise. If in large-scale production this role can be successfully fulfilled by one of the top managers, then in medium and small enterprises this role should be played by the owner of the enterprise. He or she must have at least basic knowledge of the concept of lean production. In this case, he or she will be motivated by the possibility of increasing labor productivity in various areas of the enterprise's functioning and, above all, in its activities[17]. Of course, further actions should be associated with the organization of deepening the owner's knowledge in the field of lean production and the selection of a team to implement the principles of lean management[18].

Tasks of lean production	Tools and methods	Contents
1. Development of production factors	Improvement of the quality of products, processes, and technologies; training; controlling the achievement of target parameters	Improvement of production processes to increase productivity. Minimization of time and resources of production processes. Multifunctional employee training. Unification of product design.
2. Production flows management	Job optimization; implementation of kanban and just-in-time systems; approach to the supplier as a partner.	Timely and complete provision of jobs with raw materials. Optimization of movement of parts and assemblies between processing points. The release of part of the finances from the processes of supplying materials, raw materials and components.
3. Movement management	Optimization of the logistics system; Poka-yoke system implementation.	Minimizing downtime of the transport system, waiting times for the start of the production process, reducing waste and material losses.
4. Formation of multifunctional teams	Classification and categorization of work; organization of a system of horizontal movement of workers.	Multifunctional employee training. Ensuring collective responsibility for the effectiveness of the site.
5. Fast changeover of equipment. Quality assurance.	Increased technological flexibility; ensuring quick production control in the workplace.	Organization of a quick reconfiguration system. Implementation of a system of measuring templates and standards.
6. Strengthening production safety factors	Introduction of innovative working methods taking into account process ergonomics	Implementation of mechanisms and systems ensuring the safe and effective work of employees.

Table 2
Tools for lean production in small and medium enterprises

[17] D. Stukalov, "Berezhlivoe proizvodstvo. Schego nachat peremeny?". 2008. Available: http://www.leanzone.ru

[18] D. Liker y D. Meyer. Talantlivye sotrudniki. Vospitanie i obuchenie lyudei v dukhe dao Toyota (Moscow: Alpina Business Books LLC, 2008).

The proposed approach (Figure 5) to the application of lean production principles in the environment of enterprises of small and medium organizational forms is implemented in the form of two components that differ in the degree of localization – the general part, which does not depend on the industry sector of the enterprise, its scope of activity, etc., and private one, taking into account the features of a particular enterprise (organization). In the first part (general), it is planned to develop a special system for supporting the processes of implementing lean projects, which will expand the possibilities of its replication; in the second part, it is planned to develop a set of organizational and methodological solutions that facilitate adaptation of the lean production process to the conditions of a particular enterprise (organization).

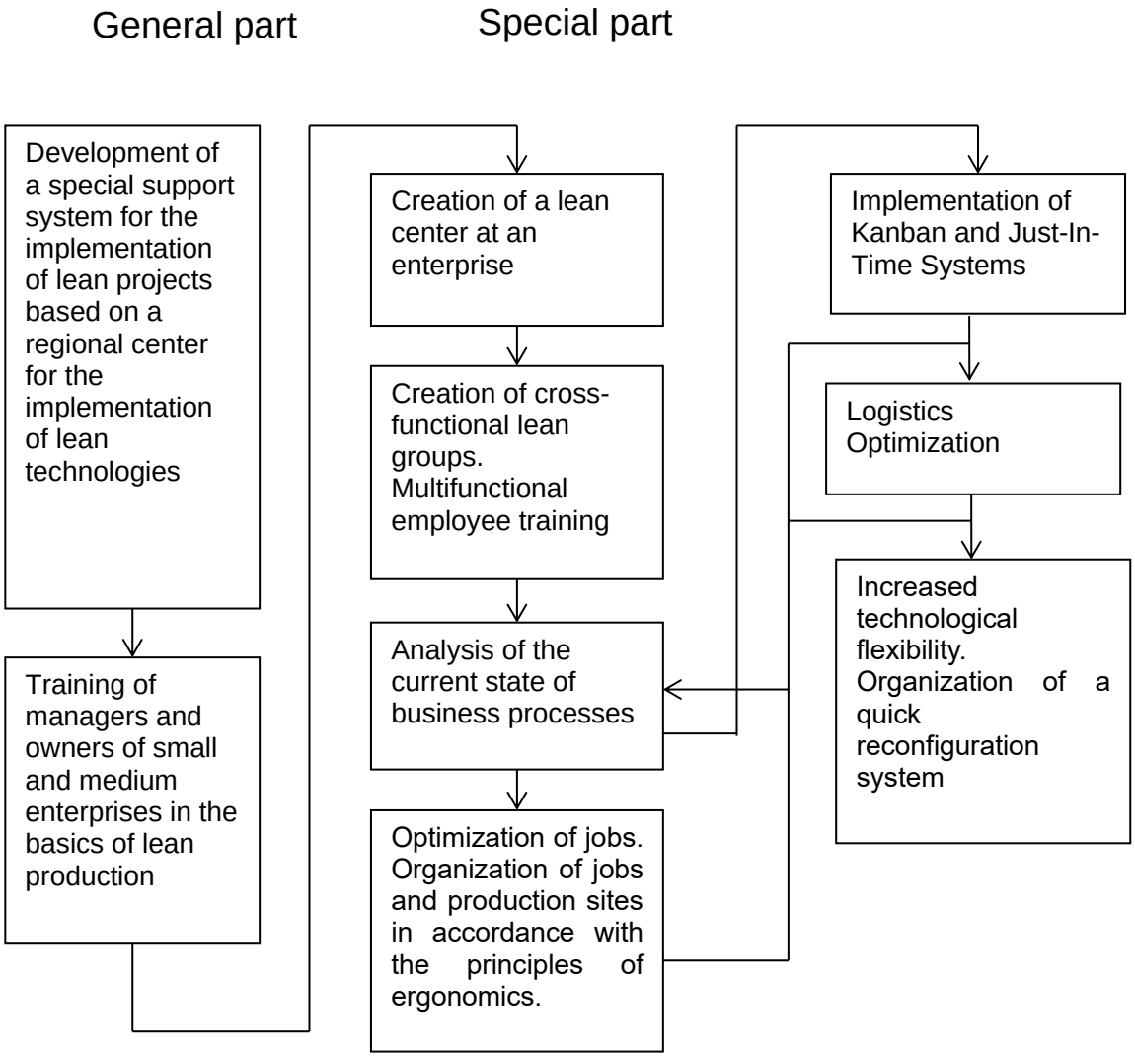


Figure 5
Scheme of the implementation of the principles of lean production in small and medium enterprises

This scheme has a fairly simple structure and a system of basic relationships to understand, which makes it easy to implement it in small and medium enterprises of various profiles[19]. The initial and most important step in this scheme is to teach the owners and managers of enterprises the basics and principles of lean production. It is proposed to create such a training center in each region as a self-sufficient or university-based learning structure. Understanding by the owner of the need and usefulness of introducing the principles of lean production at the relevant enterprise will make it possible to adapt easily the accumulated methodological tools to the specifics of particular production. In connection with the characteristics of small enterprises, it is the owner and his or her assistants who represent the center of thrift in a small enterprise. This center implements the creation of cross-functional teams and implements the functions of controlling the processes of implementing the lean principles at the enterprise. The effectiveness and overall orientation of this center will determine the effectiveness of the overall process of continuous improvement of production. Typical lean production tools (schedules, roadmaps, kanban, just-in-time, etc.) may differ from conventional ones and take into account the specifics of the enterprise. Specificity often makes it necessary to adapt the software used in the enterprise's information environment when introducing lean production[20].

Conclusion

This article offers a methodological basis for the implementation of lean production principles in small enterprises in Russia. If large enterprises and organizations, such as engineering plants, retail chains with stable and conservative production processes, can fully use the experience of such foreign enterprises and organizations, then small enterprises require lean production tools, if not special, then at least adapted to the specifics of functioning. A review of the main methodological schemes for the implementation of lean production showed that none of them could be the methodological basis for the organization of lean production in small enterprises. The enterprises of this type need a simple and understandable scheme for implementing the principles of lean production, which is due to the features of small enterprises highlighted in the article. The studies made it possible to argue that at small enterprises in Russia there was no awareness of the need to form a lean production system. The insufficient awareness of the owners and managers in the field of management and directly in understanding the concept of lean production is proposed to be helped out through training in regional lean production centers. The main goal of the proposed scheme for implementing the principles of lean production is to present the technology for implementing the idea of continuous improvement of the production of small enterprises, regardless of their type and size.

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[20] N. B. Feigenson; I. S. Matskevich y M. S. Lipetskaya, Berezhlivoe proizvodstvo i sistemy menedzhmenta kachestva: seriya dokladov v ramkakh proekta "Promyshlennyi i tekhnologicheskii forsait Rossiiskoi Federatsii" (St. Petersburg: Fund "Center for Strategic Research "North-West", 2012).

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