

«Design of implementation and development model of «Lean Production» in  
Russian enterprises»

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**Abstract:** The article describes the basic design of the author, aimed at improving the practice of using Lean Production (LP) Russian companies. For a basis of model implementation, application and development of LP were taken proposed conceptual model of the modern state LP, identified the condition that lead to using LP, and briefly shows the data of the results of testing of the new methodology.

**Key words:** Lean Production, Russian management.

The Russian economy is going through difficult times. According to Economic Development Minister Alexei Ulyukayev GDP will amount to 2.3% in 2016.

The survival rate of the economy and increase the share of GDP «rests on the shoulders» of the real economy. Before domestic enterprises question cost savings and compliance with market demands and international quality standards. LP is one of the approaches to the management of the operating system, guaranteed to give such an opportunity.

Despite the widespread practice of application and established the theoretical basis of this approach, both in Russia and abroad, there is no coherent perception and a single LP implementation of the algorithm in Russia, and the complexity of

adaptation of foreign models / techniques for national, business and political management of the enterprise specifics. Thus, the aim of the research is the design of implementation and development LP model that takes into account these features.

The first step to creating the model was researching of special literature on various aspects and problems of implementation, application and development of PL. Analyses of Russian and foreign literature (James P. Womack and Daniel Johnson<sup>1</sup>, Dennis P. Hobbs<sup>2</sup>, Stephen A. Ruffa<sup>3</sup>, George Alukal<sup>4</sup>, Lauri Koskela<sup>5</sup> and etc.) shows that a common understanding of PL is not currently available, but there are undisputed principles proposed by the classics of modern management, and based on the LP effect, as an organization management tool. The classic PL principles focused in tree group (see tabl. 1): 14 key principles for management Edwards Deming<sup>6</sup>, the key lean thinking principles from Womack and Jones<sup>7</sup>, 14 management principles of the Toyota way from Jeffrey Liker<sup>8</sup>.

Tabl. 1.

Allocation LP principles<sup>9</sup> BP in groups

Grope of LP principles	LP principles
Womack and Jones <sup>10</sup>	<ol style="list-style-type: none"> <li>1. Specify what creates value from the customers perspective</li> <li>2. Identify all steps across the whole value stream</li> <li>3. Make those actions that create value flow</li> <li>4. Only make what is pulled by the customer just-in-time</li> <li>5. Strive for perfection by continually removing successive layers of</li> </ol>

<sup>1</sup> Womack, J., Jones, D. & Roos, D. (1990) The machine that changed the world: The story of Lean Production. How Japan's Secret Weapon in the Global Auto Wars will Revolutionize Western Industry. New York: Rawson Associates;

<sup>2</sup> Dennis P. Hobbs. Lean Manufacturing implementation: A complete execution manual for any size manufacture. Fort Lauderdale, FL: J. Ross Publishing, 2003. - 264 p.;

<sup>3</sup> Stephen A. Ruffa. Going Lean: How the best companies apply lean manufacturing principles to shatters uncertainty, drive innovation, and maximize profits. New York: AMACOM, 2008. - 288 p.;

<sup>4</sup> Alukal G. Create a Lean, mean machine. Quality progress, Volume 36, No.4, April 2003, p. 29-35;

<sup>5</sup> Koskela, L. (1993). Lean production in construction. Proceedings of the 10th ISARC, Houston, Texas, May 24-26, 47-54;

<sup>6</sup> Deming E. Vihod iz krizisa: Novaya paradigm ypravleniya ludmi, sistemami i proessami / E. Deming. M. ID «Alpina Pablshers», 2009 g., s. 46 – 102;

<sup>7</sup> Womack J. and Jones J. Bereglivoe proizvodstvo: Kak izbavitsa ot poter i dobitsa prostevania vashei kompanii; Per. s angl. – 5 izdanie – M. Alpina Pablshers, 2010g. – s. 50 – 132;

<sup>8</sup> Liker J., Dao Toyota: 14 principov menedgmenta vedushei kompanii mira / J. Liker, r. M. ID«Alpina Pablshers», 2010 g., s.110-338;

<sup>9</sup> Numbering corresponds to generally accepted principles of LP;

<sup>10</sup> Womack J. and Jones J. Bereglivoe proizvodstvo: Kak izbavitsa ot poter i dobitsa prostevania vashei kompanii; Per. s angl. – 5 izdanie – M. Alpina Pablshers, 2010g. – s. 50 – 132.

	waste
Edwards Deming <sup>11</sup>	<ol style="list-style-type: none"> <li>1. Create constancy of purpose toward improvement of product and service.</li> <li>2. Adopt the new management philosophy</li> <li>3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.</li> <li>4. End the practice of awarding business on the basis of price tag. Move toward a single supplier for any one item, on a long-term relationship of loyalty and trust.</li> <li>5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.</li> <li>6. Institute training on the job.</li> <li>7. Institute leadership. It's necessary to review the methods of supervision of management is in need of overhaul, as well as supervision of production workers</li> <li>8. Drive out fear, so that everyone may work effectively for the company</li> <li>9. Break down barriers between departments; include people in research, design, sales, and production, make work as a team.</li> <li>10. Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity, and make aims which thus lie beyond the power of the work force.</li> <li>11. The responsibility of supervisors must be changed from sheer numbers to quality</li> <li>12. Remove barriers that rob people in management and in engineering of their right to pride of workmanship.</li> <li>13. Institute a vigorous program of education and self-improvement.</li> <li>14. Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job.</li> </ol>
Jeffrey Liker <sup>12</sup>	<ol style="list-style-type: none"> <li>1. Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals.</li> <li>2. Create a continuous process flow to bring problems to the surface.</li> <li>3. Use 'pull' systems to avoid overproduction.</li> <li>4. Level out the workload (work like the tortoise, not the hare).</li> <li>5. Build a culture of stopping to fix problems, to get quality right the first time.</li> <li>6. Standardized tasks and processes are the foundation for continuous improvement and employee empowerment.</li> <li>7. Use visual controls so no problems are hidden.</li> <li>8. Use only reliable, thoroughly tested technology that serves your people and process.</li> <li>9. Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others.</li> <li>10. Develop exceptional people and teams who follow your company's philosophy.</li> <li>11. Respect your extended network of partners and suppliers by challenging them and helping them improve.</li> <li>12. Go and see for yourself to thoroughly understand the situation.</li> </ol>

<sup>11</sup> Deming E. Vihod iz krizisa: Novaya paradigm ypravlenia ludmi, sistemami i prosessami / E. Deming. M. ID «Alpina Pablshers», 2009 g., s. 46 – 102;

<sup>12</sup> Liker J., Dao Toyota: 14 principov menedgmenta vedushei kompanii mira / J. Liker, r. M. ID«Alpina Pablshers», 2010 g., s.110-338.

	<p>13. Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly.</p> <p>14. Become a learning organization through relentless reflection and continuous improvement.</p>
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Principles of LP are fundamental implementation, application and development rules of LP tools. Thanks to the analyses of the researching results about LP practice in foreign and domestic sources of information was defined modern composition LP tools. The basis of modern composition LP tools include 14: 5S (visualization and standardization of the workplace), haijunka (smoothing of production and work schedule), hansey (constant self-examination), JIT (just – in – time), kaizen (continuous improvement), kanban (reduction of inter-operational reserves), MRP (material requirements planning), SMED (single minute exchange of dies), standard work, team work, TPM – (total productive maintenance), TQM (total quality management), visual control, VSM –(value steam mapping).

Based on the preliminary work on the study of the principles and tools of LP, it has been proposed a conceptual model of modern state of LP (see Fig. 1).

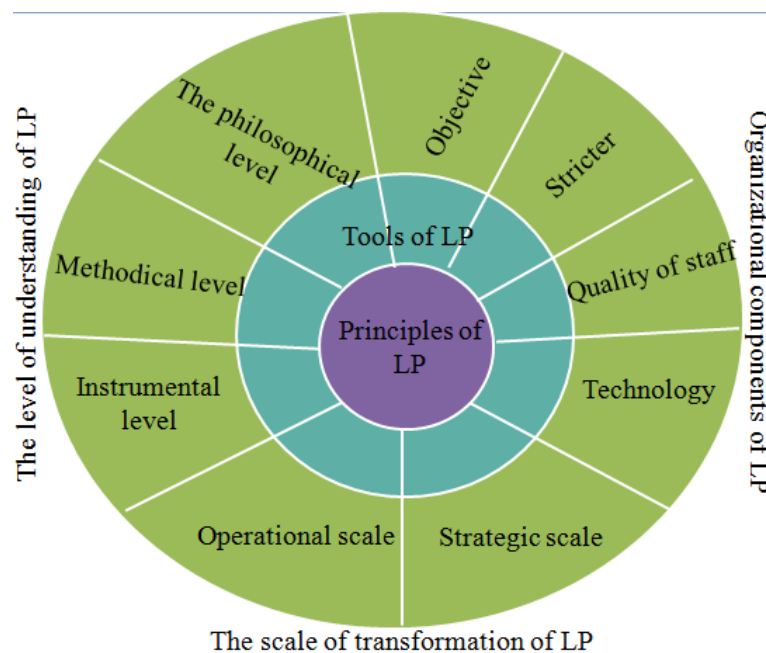


Fig. 1. The conceptual model of modern state of LP

The conceptual model shows that using tools of LP (by taking into account the principles of LP) depends on the depth of LP penetration in the company, the organizational components of the enterprise, and on the scale of transformation of LP.

Depth implementation of LP includes three levels of understanding of LP (philosophical, methodological and instrumentality). On the instrumental level of LP is a set of tools as a means of production in the various stages of business - processes, the organization as a whole or in its various functional areas. Unlike instrumental level, on a methodical level of understanding of LP it is possible to use the system power supply equipment. On the philosophical level, it represented a system of values and power supply regulations governing corporate culture of thinking of all the enterprise.

Application of LP tools (by taking into account the principles of LP) also depends on the organizational components of the organization activities (tasks, quality of staff, organizational structure, using technology) (see. Fig. 1). These components are closely related to the levels of understanding of LP. At the instrumental level, the tasks are global in nature, the quality of staff, primarily describes the basic skills qualifications, changes in the structure are to confer new responsibilities on the current work and technology means developing new technology of LP tools. On the methodological level, changes in technology require changes in production methods; quality of staff is estimated inclusion of labor composition in the process of change; in the organizational structure may be necessary changes in the cross-functional coordination, assignment of tasks; at this level may relate to an integrated approach to the implementation of changes.

On the philosophical level, the objectives have a strategic character, quality of staff is estimated in compliance with the company's new values, norms, attitudes and behaviors in the structure of the organization introduced a new position (for example, a manager on the improvement of business - processes), the transition to new technologies require a revision of the basic and auxiliary processes.

The scale of the transformations in the organizational activities should be considered at the operational and strategic level, which determines the task, affect

the choice of technology and development of staff quality, and a change in the organizational structure, the relevant requirements on the levels of aggregation of the company.

For developing model of using LP, which taking into account the peculiarities of Russian specifics, it required an analysis how Russia and abroad use LP. Database sources of «ProQuest» it possible to evaluate the experience of some 100 enterprises from 110 foreign countries, «e-Library» was rated the experience of about 60 companies. Among the most popular sources of information can be identified articles, dissertations, conference proceedings.

Analysis of the results of research practice of LP application in different countries has allowed the group to formulate the characteristics of the external and internal environment to encourage CEOs to use LP. Related the groups' characteristics and goals leaders were formulated conditions for the application of LP. External conditions of use LP are called "the results for customers." The internal conditions of application of LP were called "the results of internal processes in the organization".

Under the results for the client understands the expectations of consumers who purchase a service or product (see tabl.2).

Tabl. 2

List of language «results for customers» category

Language «results for customers» category	
1)	Reduction of the order of the waiting period
2)	Increasing the operating period
3)	The availability of the product / service and relevance of information
4)	Reduction of prices
5)	Reduce costs
6)	Compliance with standards
7)	The reliability (durability, reliability)
8)	A high level of after-sales and service

By the results of internal processes in the organization (see tab. 3) is taken to mean the possibility of domestic enterprises provide are desired results for the customers.

List of language «The results of internal processes in the organization»  
category

Language «the results of internal processes in the organization»	
1)	Increase the speed of changeover
2)	Reduce lead time
3)	Increase in productivity
4)	Cost reduction
5)	Reduction of operating costs
6)	Reduction of stocks
7)	Reduction of reject rate
8)	Increased process transparency
9)	Increased safety

In the step of development model has been proposed by the author organizational and structural scheme of implementation and development LP step by step, which includes 4 consequently stages about preliminary estimating required changes of the company's activities, about the implementation and developing of LP, and about the assessing the results of the application of LP.

As a part of LP development stage form the organizational and structural scheme has been developed a method for increasing LP tool group features internal and external environment conducive to improving the decision-making process. The author also developed a model of detailed degree of influence tools to achieve internal and external results and indicators tables about measuring for each specific result of using LP.

Model implementation and development of the LP was tested at 4 enterprises of various industries and sizes of business. The economic effect of the application of the model was obtained in the company «A.C. and PALITRA». To do this, the application program LP model was developed at the company LLC «A.C. and PALITRA».

The reporting period was 6 months, of which 2 weeks in May, were allocated for the preparatory phase of 3 months from June to August - a period of introduction, 2 months from September to October - the period after the

introduction. Economic and financial results of the experimental testing of the model confirmed its viability.

In the conclusion, the results of the study become a conceptual model for understanding LP, formulated a list of «results for customers» and «internal processes results in the organization», developed an algorithm LP implementation at Russian enterprises, and experimental confirmation of the viability of the model of implementation and development of LP.

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