

I. ПРОБЛЕМЫ ЭКОНОМИЧЕСКОЙ ТЕОРИИ И ИСТОРИИ ЭКОНОМИЧЕСКОЙ МЫСЛИ. ФИЛОСОФИЯ ЭКОНОМИЧЕСКОЙ НАУКИ

УДК 658.51

M.I. Radzhabov, V.E. Bydanov,
G.K. Ivakhniuk

THE PHILOSOPHY OF LEAN MANUFACTURING OF STRUCTURAL MATERIALS

The philosophy of lean manufacturing (LM) is a modern management approach aimed at maximizing value for the customer while minimizing losses. This article examines the key principles of LM, its historical roots, its impact on organizational culture and ethical aspects. Examples of successful implementation of LM in various industries and its role in sustainable development are also discussed.

Keywords: lean manufacturing, structural materials, sustainable development.

М.И. Раджабов¹, В.Е.Быданов²,
Г.К.Ивахнюк³

ФИЛОСОФИЯ БЕРЕЖЛИВОГО ПРОИЗВОДСТВА КОНСТРУКЦИОННЫХ МАТЕРИАЛОВ

Философия бережливого производства (БП) представляет собой современный подход к управлению, направленный на максимизацию ценности для клиента при минимизации потерь. В данной статье рассматриваются ключевые принципы БП, его исторические корни, влияние на организационную культуру и этические аспекты. Также обсуждаются примеры успешного внедрения БП в различных отраслях и его роль в устойчивом развитии.

Ключевые слова: бережливое производство, конструкционные материалы, устойчивое развитие.

DOI: 10.36807/2411-7269-2025-1-40-6-9

The lean manufacturing philosophy originated in Japan in the middle of the 20th century and was developed at Toyota as a response to the need to improve efficiency and quality in a resource-constrained environment. The philosophy of lean manufacturing originates in the Toyota Production System (TPS), developed by engineers Taiichi Ono and Jizo Ono. In the post-war years, Japan needed to optimize production processes in order to cope with resource shortages and increase competitiveness. TPS has focused on eliminating losses, improving quality, and creating value for the customer.

The main goal of LM is to create value for the customer while minimizing losses, which requires the formation of an appropriate organizational culture. In the context of globalization and growing competition, lean manufacturing is becoming an important tool for achieving sustainable development and corporate social responsibility.

Over time, the LM concept has expanded beyond the automotive industry and has been applied to various industries such as healthcare, education, and services. The implementation

¹ Раджабов М.И., аспирант; ФГБОУ ВО "Санкт-Петербургский государственный технологический институт (технический университет)", г. Санкт-Петербург

Radzhabov M.I., Postgraduate; Federal State Budgetary Educational Institution of Higher Education "Saint Petersburg State Institute of Technology (Technical University)", Saint Petersburg

E-mail: magomed.radzhabov@inbox.ru

² Быданов В.Е., заведующий кафедрой философии, кандидат философских наук, доцент; ФГБОУ ВО "Санкт-Петербургский государственный технологический институт (технический университет)", г. Санкт-Петербург

Bydanov V.E., Head of the Department of Philosophy, PhD, Associate Professor; Federal State Budgetary Educational Institution of Higher Education "Saint Petersburg State Institute of Technology (Technical University)", Saint Petersburg

E-mail: follibilizm@yandex.ru

³ Ивахнюк Г.К., заведующий кафедрой инженерной защиты окружающей среды, доктор химических наук, профессор; ФГБОУ ВО "Санкт-Петербургский государственный технологический институт (технический университет)", г. Санкт-Петербург

Ivakhniuk G.K., Head of the Department of Environmental Engineering, Doctor of Chemistry, Professor; Federal State Budgetary Educational Institution of Higher Education "Saint Petersburg State Institute of Technology (Technical University)", Saint Petersburg

E-mail: fireside@inbox.ru

of LM principles has become possible through the adaptation of methods and tools such as value stream mapping, 5S, kaizen, and others.

The percentage of man-made accidents at various enterprises in our country has increased significantly. This is most often due to the high rate of wear of structural materials, and the possibility of improving the characteristics of these materials by 10-15% without major changes in the production process looks very promising.

The consumption of construction materials also has philosophical aspects. Society should be aware of the importance of responsible consumption, which includes choosing sustainable and safe materials, as well as supporting companies that practice lean manufacturing.

The first step in the LM philosophy is to define value from the customer's perspective. This implies understanding the needs and expectations of customers, as well as which processes and actions really create value for them. It is important that all employees of the organization are involved in this process and understand how their work affects the final product.

LM focuses on identifying losses that may occur at various stages of the production process. Classic types of losses include:

- **Excess inventory:** Accumulation of materials that are not currently in use.
- **Waiting times:** The time when workers or equipment are idle.
- **Unnecessary movements:** unnecessary movements of employees or materials.
- **Defects:** errors that require recycling or disposal.

Eliminating these losses can significantly improve efficiency and reduce costs.

The philosophy of LM is based on the principle of kaizen — continuous improvement. This means that organizations must constantly strive to improve their processes, products, and services. Kaizen includes regular meetings where employees can share ideas for improvement and discuss possible changes.

Lean manufacturing emphasizes the importance of involving all employees in the improvement process. This not only increases employee motivation, but also helps identify problems and find solutions on the ground. Leaders should create an atmosphere of trust and openness so that employees can freely express their ideas and suggestions.

The philosophy of lean manufacturing is closely related to the concept of sustainable development. Companies applying LM principles strive to reduce their environmental impact, which includes using recycled materials, reducing waste, and optimizing resource consumption. This allows not only to reduce costs, but also to enhance the company's image.

LM also includes social responsibility. Companies should take into account the impact of their activities on society, including job creation, respect for employee rights, and participation in social initiatives. This may include training, professional development, and community support programs.

The introduction of lean manufacturing requires changes in organizational culture, which can be one of the most difficult aspects of its implementation. Companies must create an environment where innovation, collaboration, and openness to change are valued. Leaders should demonstrate commitment to the principles of LM and inspire employees to participate in the improvement process.

Examples of successful LM implementation can be found in various industries. For example, in healthcare, many hospitals have begun to apply LM principles to optimize processes and improve the quality of patient care. The introduction of lean methods has reduced waiting times, improved the quality of medical services, and reduced costs.

In the manufacturing industry, companies such as Boeing and General Electric are also successfully applying LM principles to increase efficiency and reduce production time. These examples demonstrate that the philosophy of lean manufacturing can be adapted to different conditions and requirements.

Reports on sustainable development by industry affiliation of Russian companies as of 10.25.2023 are shown in Table 1.

Table 1 – Reports on sustainable development by industry affiliation of Russian companies as of October 25, 2023.

Name of the industry	Number of companies	Number of SD (PR) reports
Oil and gas industry	23	144 (20)
Energy	58	80 (174)
Metallurgical and mining	27	93 (37)
Production of machinery and equipment	6	2 (21)
Chemical, petrochemical, perfumery	14	37 (48)
Woodworking, pulp and paper	6	3 (6)
Production of food and other consumer goods	14	38 (2)
Telecommunications and communications	17	30 (12)
Finance and insurance	28	56 (17)
Housing and communal services	5	3 (4)
Transport, road construction and logistics services	9	13 (15)
Construction	7	11 (6)
Healthcare and sports	3	5 (0)
Other types of production, services	9	16 (0)
Education, healthcare	7	2 (0)
Trade, retail	7	14 (14)
Non-profit organizations	7	8 (0)
Industry reports	4	1 (0)

Russia adopts the best foreign practices (for example, "green projects", "green financing, especially developed in European countries, which is facilitated by the presence on its territory of large international organizations that are obliged to be guided by both international and national standards. Large banks of the Russian Federation (Sberbank, Gazprombank, Sovcombank, Rosselkhoznadzor, ICD) They have already switched to ESG guidelines themselves and stimulate enterprises to this transition by implementing programs to support "green projects", socially significant projects, and implementing environmental education (Sberbank).

Examples of such companies:

- Nestle: switching to electricity from renewable sources, which reduces CO2 emissions into the atmosphere, investments in energy efficiency projects to reduce energy consumption;
- Vittel: sale in bottles made of recycled plastic (from 35% to 100%);
- Kimberly-Clark: within the framework of the strategy for sustainable development until 2030, the goals for improving the quality of life of 1 billion people. The program is aimed at consumers (the use of natural fibers for the production of products), employees (gender, age equality programs), the planet (reuse of recycled material, reduction of waste disposal areas, biodegradable wet wipes, reduction of greenhouse gas emissions).

According to the results of the Essentials Initiative Survey 2020–2021, conducted by Essity2, an international manufacturer of hygiene and health products, the number of buyers assessing the impact of the purchased hygiene product on the environment has more than doubled. 46% of respondents think about the environmental impact of products before buying hygiene items. The percentage is especially high in India (72%), China (64%), Brazil (60%), among European countries – in Italy (52%). Attention is drawn to the rather low significance and decline of this indicator after the Covid-19 pandemic among buyers in the USA (a decrease from 45% in 2018 to 34% in 2020) and in Russia (a decrease from 30% in 2018 to 28% in 2020). Still, quite low requirements in the world to reduce the use of plastic (24%), in Russia the percentage is slightly higher than average (25%). The importance of this problem was most highly appreciated in Mexico (38%), lower in Germany (13%) [33], which is quite strange, given that Germany entered the TOP 5 in the implementation of the SDGs.

In general, Russia is inferior to European countries, for example, Finland, Sweden, Denmark, Germany in the implementation of the previously mentioned Sustainable Development Goals (SDGs), especially in the field of ecology, ahead in the field of education.

According to the 2023 Sustainable Development Report, Russia ranks 49th among 166 countries (its overall score for achieving all 17 SDGs is 73.79% out of 100% possible). Finland is the leader in this indicator (86.76%), Sweden and Denmark are in second and third places, respectively. Figure 3 shows the Russian Federation, the USA, China, as well as the first 11 leading countries in sustainable development with a rating and points. The choice of the USA

and China as countries for comparison is based on their size and significance for Russia in terms of the division of spheres of influence.

The lean manufacturing philosophy is a powerful tool for improving the efficiency and sustainability of organizations. In a rapidly changing world where not only economic performance is important, but also social responsibility, the principles of LM are becoming particularly relevant. Their implementation requires not only the use of certain methods, but also profound changes in the organizational culture. The future of lean manufacturing lies in its ability to adapt to new challenges and integrate ethical aspects into daily business practices.

References

1. Womack J.P. & Jones D.T. (2003). Lean Thinking: Banish Waste and Create Wealth in Your Corporation. Simon & Schuster.
2. Ohno T. (1988). Toyota Production System: Beyond Large-Scale Production. Productivity Press.
3. Imai M. (1986). Kaizen: The Key to Japan's Competitive Success. Random House.
4. Elkington J. (1999). Cannibals with Forks: The Triple Bottom Line of 21st Century Business. Capstone.
5. Rother M. & Shook J. (2003). Learning to See: Value Stream Mapping to Add Value and Eliminate MUDA. Lean Enterprise Institute.