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Lean production principles in summer Lean School in Tomsk Polytechnic University Tomsk Polytechnic University

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Abstract

Lean Manufacturing is the system of industrial management focused on continuous activity improvement of industrial management and achievement of long-term competitiveness. According to Kaizen technology, continuous improvement process is the most important part of management industrial functioning. It includes: organization, management, training events, systematics, and incentive scheme. The main idea of this technology is that the system of lean production should be reoriented for searching the causes of problems, but not for punishment of employees. This method is based on five principles of workplace organization: sorting; order maintenance; standardization; improvement; good housekeeping. Based on the principles of lean manufacturing the program of summer Lean School TPU was developed, which helps people to use these principles. It is believed that implementation of lean manufacturing in all spheres of life is necessary, because it will make the production process more efficient.

Keywords: Lean production, Kaizen technology, 5C system, summer school, management;

1. Introduction

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Today the main goal of any firm is the effectivization of labour activity and elimination of manufacturing losses. Lean Manufacturing is the system of industrial management focused on continuous activity improvement of industrial management and achievement of long-term competitiveness. Lean Manufacturing supposes employee implication in business improvement and supreme consumer orientation. The main point of lean manufacturing is the value for the customer. [3].

According to end-customer, the product gets its value when there is a direct usage of these elements. Nevertheless, in traditional system of control all costs transfer to customers. Accordant with the concept of lean manufacturing all activities of the firm can be classified as follows: operations and processes that supplement value for the customer and the operations and processes that do not supplement value for the customer. Therefore, anything that does not supplement value to the customer, according to lean manufacturing, are classified as loss and should be removed.

2. History of Lean Manufacturing

Conception of Lean Manufacturing engendered in America in the 1920s. Architect of concept Lean was Henry Ford. But at that date new code were not accepted of business community, because then they are much outdistance of their time. Father of lean manufacturing was Ohno from Japan, who in the mid-1950s began to organize a special system of production organization called Toyota Production System. Toyota's system gets oneself a name in the West in the 1980s. The term lean («economical" - Eng.) was proposed by John Krafcik, one of the American advisers. First, the concepts of lean production apply in the automotive industry. Then the concept was accustomed to modalities of running production. Phased Lean ideas cross a line the production and the concept has been applied in trade, services, utilities, healthcare, military and the public sector. The advantage of this method is the exercise of tools lean manufacturing in a business environment, specializing in different sectors of promotion.

3. Instruments of Lean Manufacturing

Kaizen technology is one of the important implements which includes comprehensive concept, encompassing philosophy, theory and management tools, allowing achieving a competitive advantage in modern times.

Enterprises that use Kaizen technology, continuous improvement process is the most important part of management industrial functioning.

It includes:

- Organization (organizational structure, distribution of responsibilities, coordination, monitoring mechanism);
- Management (purpose differentiation, choice of themes, team building);
- Training events (behavioural training, methodical training);
- Systematics (regularity, documentation, scope of work teams, tools);
- Incentive scheme (encouragement, special benefits for moral and material incentives).

As an example of Kaizen technology, Application Company "Toyota" can be taken. The company was set up 60 years ago and during its existence, it is constantly trying to improve work efficiency.

As a result, Toyota has reached incredible success in business; today it takes a leading position in its sector.

Another tool as poka-yoke method (which translated from Japanese as "error protection") is a method of preventing errors, liquidating the possibility to make a mistake. Workers, engineers, executive directors together develop procedures and facilities for preventing errors wherever they may arise. Error prevention s at the place and time of their appearance is the most economical and cheapest method to avoid problems. Production planning and product supply in terms established by the customer are carried out on the "Lean" foreign firms due to the so-called Japanese system "Kanban". Kanban is an information card that provides the process at all stages of the production process. There are different types of Kanban. In the manufacturing process and goods supply there are mainly two types of cards: sampling and ordering ones.

Sampling card indicates the type and quantity of items that should be shipped from the previous area, and ordering card indicates the type and quantity of items that should be manufactured in the previous manufacturing stage.

4. Manager's steps

As for the action mode of executives, the system of lean production should be reoriented for searching the causes of problems, but not for punishment of employees.

The mistake is a motive for process optimization; it is a way to ensure that it will not appear in the future. Seeking infallibility today's leaders set simple tasks, but it is wrong, as problem should be complicated, and the existence of decision errors is a common practice. Lean manufacturing tools are simple but their application requires an effort. Following the philosophy of Toyota, Lean is a science that allows us to hypothesize, test it and to seek its confirmation [1, 2].

In all directions of safety, quality, cost the key to success will be corporate culture and manager's behaviour. It is impossible to change manager's thinking quickly. But if a new approach is shown to workers, tool selection is helped to find, they will see all benefits of such work.

5. Principles of workplace organization

It should also be noted that the lean production system is based on the 5 C-system, this is the restoration system of order, cleanliness, strengthen discipline that increases productivity and creates a safe working environment with the participation of all staff. This system allows not only keeping order in the enterprise, increasing productivity, reducing losses, reducing the level of marriage and injuries, but also creating necessary starting conditions for the realization of complex and costly industrial and organizational innovations to ensure their high efficiency due to radical changes of workers' consciousness and their relationship to their work. 5C system is five interrelated principles of workplace organization that create visual control and lean production. This method is based on five principles of workplace organization:

- sorting;
- order maintenance;
- standardization;
- improvement;
- good housekeeping.

6. Summer Lean School

Based on the principles of lean manufacturing the program of summer Lean School TPU was developed. This educational program is set in the framework of the project of establishing a competence centre in the field of modern industrial management at the Tomsk Polytechnic University. Organizers of the school were members of the Institute of Production Systems, Department of Engineering Entrepreneurship and Management Department of the Institute of Humanities, Social Sciences and Technologies. Participants were able to work in such companies as CJSC "Mikran", CJSC "Siberian Agrarian Group", OJSC "Tomsk Electrical Plant", group «DI GROUP», CJSC «Fiztech-Energo», LLC "Furniture woodland."

Thanks to the Summer School, participants were able to take a new look at production management, to master modern tools of business production systems, to take part in real projects to improve the efficiency of production systems. The main aim of the Summer School was to develop practical skills for using lean manufacturing tools.

The main method of work with the audience was learning through practice and action. Experts in the field of lean manufacturing and production systems development had seminars.

Firstly, there were several theoretical classes, such as lectures, business games and cases analyses. Next two weeks, participants had practices on production sectors. Some participants optimized assembly line modules for electronic systems and others - a line for ravioli production. The main advantage was a real opportunity to increase efficiency on the production sectors of partner schools. As a part of an educational program, participants were introduced the concept bases of lean production, some basic tools, such as "Mapping the value stream", "The system of workplace organization 5S», «Standardized work."

After two weeks of practical work participants presented their projects which were implemented at production sectors. More than half of the participants continued to cooperate with these enterprises.

7. Conclusion

Nowadays the need for developing lean production is particularly important in modern economy. The demand on young professionals possessing the instruments of lean production is growing, according to Headhunter.ru and Job.ru the profession of "Manager of lean production" is one of the most demanded and well-paid.

It should be mentioned that this project experience is positive, as it is very important for students to have an ability to apply theoretical knowledge in practice, and implement their own projects. It is believed that implementation of lean manufacturing in all spheres of life is necessary, because it will make the production process more efficient. I future more students should be involved in such projects.[4].

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