

дения отдельных стран не могут прокомментировать даже эксперты Всемирного банка [6].

Таким образом, анализ позиций стран в рейтинге индекса LPI показал, что наиболее интенсивно развивается логистика в странах с более высоким уровнем развития экономики. Такие государства поддерживают больше торговых связей с различными странами мира, а также располагают большим объемом денежных средств, необходимых для развития логистической сферы. Также положительное влияние оказывает выгодное географическое положение страны. Снижение уровня развития логистики в некоторых странах вызвано введением санкций, падением экономики в целом, затяжными кризисами, а также в отдельных случаях – политическими событиями различного рода.

Библиографические ссылки

1. Всемирный банк : [сайт]. URL: <https://lpi.worldbank.org> (дата обращения: 20.04.2018).
2. В рейтинге эффективности логистики Беларусь заняла 120 место [Электронный ресурс]. URL: <http://www.baifby.com/posts/1501> (дата обращения: 21.04.2018).
3. Падение логистики [Электронный ресурс] // Экономическая газета. 08.07.2016. URL: <https://neg.by/novosti/otkrytj/padenie-logistiki> (дата обращения: 19.04.2018).
4. Всемирный банк удивил логистов [Электронный ресурс]. URL: <http://www.logists.by/library/view/vsemirnyy-bank-udivil-logistov> (дата обращения: 21.04.2018).
5. В Беларуси доходы от транзита вырастут в два раза [Электронный ресурс] // Экономическая газета. 07.01.2018. URL: <https://neg.by/novosti/otkrytj/v-belarusi-dohody-ot-tranzita-vyrastut-v-dva-raza> (дата обращения: 19.04.2018).
6. Индекс эффективности логистики LPI-2016 [Электронный ресурс] // Компас : информ.-аналит. журн. Июль/август 2016. URL: http://www.tc.by/download_files/2016/kompas_4_16_inet_small.pdf (дата обращения: 22.04.2018).

LEAN MANUFACTURING PRINCIPLES IN BELARUSIAN HEAVY AND LIGHT INDUSTRIES

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This article is devoted to the problem of inefficiency of Belarusian industries, which slows down the economic development of the country. However the problem can be solved with the help of the application of lean manufacturing principles. Lean practices may present a great interest for both practitioners and researchers in supply chain management and operational logistics as well as for BSU students who plan to start their own business or improve the performance of existing companies. The object of our research are companies aimed at deploying lean manufacturing principles. The subject of our research is the appli-

cation of lean principles in Belarusian heavy and light industries. The objective of our project is to find and suggest the ways of making major Belarusian industries more effective and efficient according to the lean manufacturing principles. Thus in the course of work a set of guidelines to improve the situation in heavy and light industries is created.

Key words: lean manufacturing; waste of transportation; waste of waiting; waste of overproduction; waste of defects.

Belarus is trying hard to achieve effective, sustainable economic growth and integrate into the world's best economies. It may become impossible, if Belarusian industries use their resources inefficiently and produce items, which cannot satisfy the needs and criteria established not only of those living in Belarus, but also of those buying our products abroad, due to defects our products may contain.

Nowadays, major world's economies are striving to follow lean manufacturing principle, which helps to eliminate any kind of waste occurring at the production stage. Lean manufacturing has already become a trend and proved its reliability by helping such companies as Toyota, Ford, Intel, Caterpillar and Nike to increase their profits and to develop sustainably by keeping high quality and enjoying reduced production costs.

The objective of our project is to find and suggest the ways of making major Belarusian industries more effective and efficient according to the lean manufacturing principles.

To attain our objective, the following corresponding tasks have to be completed:

1. To study the essence of the lean manufacturing concept.
2. To prove the applicability and significance of lean manufacturing for ones of the most important Belarusian industries.
3. To develop a set of guidelines aimed at improving the current situation in light and heavy industries according to lean principles.

In this research we applied qualitative research methods such as analysis, synthesis, generalization and comparison.

We hypothesized that lean principles are not really applied in Belarusian industries, which may lead to inefficient use of scarce resources and increase production costs. So, there should be left a lot of room for improvement.

Lean manufacturing is a set of principles that are used to improve productivity, quality, and lead-time by eliminating different kinds of waste through the implementation of continuous improvements. Such wastes include a waste of overproduction, waste of waiting, waste of unnecessary processing, waste of transportation, waste of unnecessary inventory, waste of overproduction and waste of defects [1].

To understand whether lean principles are applied in some of the major industries of Belarus, which are heavy and light industries, we decided to gather

data concerning such principles from the companies, which represent each industry. The responded companies were Belarusian Metallurgical Plant and Svitanak, the textile manufacturer. They can be considered as typical representatives of Belarusian heavy and light industries.

With respect to heavy industry, it applies lean principles more often compared to the other industries in the world. That can be explained due to higher value of heavy industry products compared to those produced in a light industry. Here we conducted an interview, where a set of open-ended questions, concerning lean manufacturing and major problems occurring in the production line of the company were asked. We have identified that Belarusian Metallurgical Plant has already done much in order to make its production lean. However, as they admit, nowadays, the most pressing issues are waste of waiting, increased carrying costs connected with holding inventory stock, which can not be used for a certain period of time, supply delays and, at times, defected products. Demand is very stable, that is why the level of finished inventories kept as a safety stock may be reduced to zero. Some steps have already been taken to optimize production process. For example, all the equipment is put at a distance where it is much easier to get and which reduces production lead time. However, distances between working centers are long, which contributes to such a waste of waiting. In turn, the waste of waiting is driven sometimes by inability of some stages of the process to be performed in time, equipment breaks and supply delays [2]. Supply delays usually occur because of inability of a plant to pay their suppliers, which leads us to the fact that a better financial planning is needed. Besides, in case of equipment breaks, having a supplier close to the plant with the details needed will be preferable. Total quality management system at every level of production line can help to eliminate defects, spot them right at the point where they appear and, therefore, not to invest money in the production of defected items, until the defects are eliminated. This step will help to ensure quality and avoid recalls.

As for textile manufacturing, management of a company does not consider to apply lean principles. Similar interview was held with Svitanak's representatives to identify the problems of the production line and today's situation at the factory. It was found that the main problems of Svitanak are occurrence of defects, which can be caused by high level of manual labor operations. Each sewer starts and finishes a final item herself/himself, that is why some small defects can be not noticed. Besides, carrying costs are really significant, which becomes a large disadvantage as the company's clothes' low price is considered to be their competitive advantage. High inventory levels are justified by the willingness to have no stock outs in the retail network. As a result of this fear there is not only extra waste of inventory, but also the waste of

overproduction. However, the demand does not really change and is considered to be stable enough, at least for the last 4 years. Svitanak also admits that due to in time payments, they have their supplies in time and it is not a problem for them [3].

We see that there is still some space for improvement. For example, defects, which are so common in Belarusian industries can be eliminated with the help of total quality management. There should be a policy according to which if the defect is seen, an item will not be finished until the mistake is corrected. Waste of overproduction and inventory can be eliminated through gathering more accurate data on demand, which is considered to be stable. As a result, the waste of transportation of final goods to retail stores can also be abolished.

Thus, we see that lean manufacturing can be applied in different spheres of manufacturing and can always be beneficial in making production process more efficient. The major problems, identified by us have to deal with waste of defects, too much work-in-process inventory held in the stock, waste of overproduction and unnecessary transportation. All the wastes are interconnected and by making initial steps towards eliminating at least one of them we are making a huge step to continuous improvement and production efficiency.

References

1. Lean production [Electronic resource]. URL: <https://www.techopedia.com/definition/14441/lean-production> (date of access: 03.03.2018).
2. An online interview with Svitanak's representative [Interview script]. Date of the interview: 07.04.2018.
3. An interview with Belarusian Steel Works' representative V.V. Pavlyukevich [Interview script]. – Date of the interview: 25.03.2018.

ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ СИСТЕМ FREE FLOW ПРИ ВЗИМАНИИ ОПЛАТЫ ЗА ДОРОГИ

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Статья посвящена проблемам и перспективам использования различных систем сбора платы за пользование автомобильными дорогами. Авторы приходят к выводу, что различные системы оплаты проезда должны формировать единую систему для удобства пользователей.

Ключевые слова: транспортный поток, Free Flow, транспондеры, BelToll, системы оплаты проезда.