

Szymon Dziuba

Wrocław University of Economics

e-mail: szymon.dziuba@ue.wroc.pl

ORCID: 0000-0002-6509-5843

Anna Cierniak-Emerych

Wrocław University of Economics

e-mail: anna.cierniak-emerych@ue.wroc.pl

ORCID: 0000-0003-4435-4954

PREREQUISITES AND OPPORTUNITIES FOR THE USE OF THE 5S PRINCIPLES IN THE COMPANY LABORATORY IN AN ORGANIC MILL

PRZESŁANKI I MOŻLIWOŚCI ZASTOSOWANIA ZASAD 5S W LABORATORIUM PRZYKŁADOWYM EKOMŁYNA

DOI: 10.15611/pn.2019.8.14

JEL Classification: D24, J24, Q57, M50

Summary: The success of economic organizations depends on searching for new ways of maintaining and increasing competitive advantage. This is particularly true for the food industry and, in particular, the organic food processing sector, where consumers expect high-quality foods containing macronutrients and micronutrients that are essential for the proper functioning of the human body. With this in mind, managers relatively often use sophisticated tools and technologies to solve problems in these business entities rather than using existing and verified tools and technologies. This concerns especially the solutions which are based on the assumptions of common sense, such as the 5S method. In this context, it was considered appropriate to try to implement the 5S principles in the laboratory of a company producing organic flour. The case study method was employed to analyse the possibility of implementation of 5S in the laboratory. The empirical examinations were based on open observation, and free-form interviews with managers and laboratory workers. The available recorded materials were used. Using the analysis of the collected information, an attempt was made to show the prerequisites and opportunities for the implementation of 5S.

Keywords: 5S, ecology, *kaizen*, food quality, milling.

Streszczenie: Sukces organizacji gospodarczych wiąże się z poszukiwaniem przez nie nowych sposobów utrzymania i zwiększania przewagi konkurencyjnej. Szczególnie dotyczy to

branży spożywczej, a zwłaszcza sektora ekoprzetwórstwa żywności, którego klienci oczekują żywności wysokiej klasy, zawierającej makro- i mikroelementy niezbędne do prawidłowego funkcjonowania organizmu człowieka. Mając to na względzie, menedżerowie do rozwiązywania problemów pojawiających w zarządzanych przez nich jednostkach gospodarczych często wykorzystują wyszukane narzędzia i technologie, zamiast posługiwać się tymi już dostępnymi i zweryfikowanymi. Chodzi zwłaszcza o rozwiązania bazujące na założeniach zdrowego rozsądku, takich jak m.in. praktyka 5S. W tym kontekście uznano za zasadną próbę wdrożenia metody 5S w laboratorium przedsiębiorstwa produkującego ekomąki. W badaniach empirycznych prowadzonych metodą *case study* posilkowano się obserwacją jawną oraz swobodnymi wywiadami z kierownictwem i laborantami. Skorzystano z udostępnionych materiałów ewidencyjnych. Na podstawie analizy zebranych informacji ukazano przesłanki i możliwości wdrożenia 5S.

Słowa kluczowe: 5S, ekologia, *kaizen*, jakość żywności, młynarstwo.

1. Introduction

The dynamics of the modern world forces business entities to adopt a way of functioning that guarantees their continuous development, increases their competitive advantage and, above all, enables them to meet the expectations of customers. Therefore many companies from various industries are constantly looking for new tools and technologies that allow them to appear on the market. The situation of food companies is similar. Nowadays consumers place very high demands on food products, wanting them to be of the best quality, at the same time reducing the risk of diseases of an affluent society, have a positive impact on the mood and provide all necessary nutrients. It is believed that organic foods are healthy due to their exceptionally beneficial properties, which contributes to the rapid development of the market for such products. More and more organic food processing plants are being established (between 2005 and 2016, their number increased sevenfold from 99 to 705) (IJHARS, 2017), and currently the value of the organic market in Poland is estimated at almost EUR 235 million (IFOAM, 2019). Responsibility for the quality and the obligation to guarantee fully safe organic food products lies with the entrepreneurs. They should make sure that the functioning of the company has a positive effect on the quality of production, and, at reasonable costs, increases the effectiveness of all the employees (Zarychta, 2014).

Laboratories play a particularly important role in organic food enterprises, as they are largely responsible for the safety and quality of the products placed on the market. Many processes, methods and ideas can be implemented to improve the actions taken throughout the company. One of them is certainly the *kaizen* philosophy (*kai* – change, *zen* – good), i.e. a Japanese way of improving work efficiency without incurring additional costs, related to the concept of improving the management and production processes, which should be accompanied by the elimination of activities that do not bring expected results (Cieśla and Mrówczyńska, 2015; Łangowska,

2014). According to Kaizen, continuous improvement must concern all employees in the company, both ordinary employees and managers, and should be based on lean management methods (Burgant-Korol and Furman, 2007; Golińska, 2012; Małkus and Sołtysik, 2013).

Many companies implementing *kaizen* start by using a tool that supports problem-solving related to the organization of activities i.e. the 5S principles (Imai, 2012). It is based on the assumption that proper work organization significantly improves its quality (Gajdzik, 2008). The term 5S stands for the first letters of the Japanese words *seiri – seiton – seiso – seiketsu – shitsuke* (Gapp, Fisher, and Kobayashi, 2008), which are most often translated into *sort – set in order – shine – standardize – self-discipline (sustain)*. The use of the principles enables the reduction or complete elimination of “waste”, while increasing the liquidity and work safety and minimizing the costs of reorganization of the workstation (Zimon, 2012). The essence of 5S is to create and maintain well-organized workplaces and to convince and motivate employees to implement order (Gajdzik and Wyciślik, 2016; Pietroń-Pyszczek, 2015). Although these practices have been implemented mainly in manufacturing companies, there are no counterindications to their implementation in order to facilitate and improve working conditions and work safety in a laboratory in an organic flour mill (Karaszewski, 2009).

2. 5S as an element of *kaizen* philosophy in the food industry: identification of a research gap

In order to evaluate the current state of knowledge and indicate the potential directions of scientific research, a meta-analysis of scientific papers on *kaizen* philosophy and its tool aspects was carried out. The research data were collected from 8 to 11 September 2019 from the ISI Web of Science, Scopus and BazEKon databases. Basic bibliometric methods with the option of the Boolean search were used for the analysis¹ with the support of HistCite software.

In the scientific literature available in the Web of Science and Scopus databases, 272 articles on the *kaizen* method were collected in WOS and 422 in Scopus.² In terms of the number of citations, the most important of them were published by Brunet, New (Brunet and New, 2003) (82 citations in WOS, 121 in Scopus); Glover, Farris, Van Aken, et al. (Glover, Farris and Van Aken, et al., 2011) (56 citations in WOS, 74 in Scopus), Aoki (Aoki, 2008) (49 citations in WOS, 72 in Scopus). The above

¹ Boolean search is based on a logic defined by British mathematician George Boole and has the following properties: variables can have only two values: 0 or 1. There are three basic operators: And, Or, Not Operator AND. For example, using the AND operator narrows the search, because it increases the number of expressions necessary for a document to meet the search criteria; the more words linked by the AND operator are entered, the fewer documents are obtained.

² Due to the repetition of most items in both databases, the numbers cannot be summed up. Obviously, the differences are due to a different collection of journals.

figures do not take into account the year of publication, but it is worth noting that the most cited publications date back to the 2000s and 2010s. This confirms the topicality and developing the character of the problems discussed. Most of the foreign language articles have dealt with this issue in many different aspects, including the use of *kaizen* to increase consumer satisfaction (Debnath, 2019), management efficiency in the industry (Villar-Fidalgo, Espinosa Escudero, and Dominguez Somonte, 2019), and health management (Carvalho Ferreira and Saurin, 2019).

There is also rich literature available in Polish. Using the BazEkon (BazEkon, 2019) database, it can be estimated that a total of 162 articles with the keyword “*metoda kaizen*” (the *kaizen* method) are available. After reviewing the most recent publications, one may notice that they refer to a very broad approach, concerning both the management of the quality of the production process (Wiśniewski and Dobrowolska, 2019), cost management in the company (Bochenek, 2018), or even the determinants of the post-war development of Japan (Osmolak, 2018). In the last five years, 71 of such articles have been published.

When reviewing the publications from WOS and Scopus found as a result of the above described search, it can be noted that in recent years there have also been many publications on *kaizen* tools (or more broadly, tools in lean management), including those in the context of the 5S practices (Cardoso, Bassi, Bertosse, et al., 2018), the suggestions system (Golas, Mazur, Gruszka, et al., 2016; Moica, Veres and Marian, 2018) or lean management in general (Chan Tay and Huay, 2018). While performing a similar review of journals indexed in the BazEkon database, it is possible to identify publications of particular interest in the context of the tools for the management of the *kaizen* method in manufacturing companies. Among the most recent publications on *kaizen* and its tools, it is not difficult to identify those that are interesting for a more in-depth study of the problem discussed. In addition to the items listed above, it is worth mentioning studies devoted to the following problems: knowledge of lean management methods among employees of a manufacturing company (Piasecka-Głuszak, 2019) the use of lean management techniques in innovation management (Łangowska, 2019), *kaizen* improvement processes in the company (Piasecka-Głuszak and Karaś, 2018) and evaluation of the role of *kaizen* in a production company (Bogatko and Nitkiewicz, 2016). It is worth emphasizing that the apparent richness of Polish literature in comparison with foreign publications available in databases indexing scientific journals is the result of the large number of studies of a local nature or continuing previous analyses. As will be further presented, there is a large research gap in the scope of articles devoted to a detailed analysis of selected tools used in Kaizen, especially in the context of a food production company. Next, searching through the last five years in the indexed databases of articles focused on 5S yields a total of 34 publications in the WOS database, with the keyword “5S” in the title of the publication, the category “articles”, and topic “management” and “operations research management science” and 76 in the Scopus database (the keyword “5S” in the title, the category

“articles”, and topic “business, management and accounting”). Due to the research interests analysed in the present study, an alternative search was also used to find articles with the keywords “5S, Food”. This is used to check the availability of items related to the use of 5S in food companies, in journals outside the groups to which management economic journals are usually assigned. In the last five years, this meant 12 and 42 articles, respectively. The vast majority of publications found in this way do not concern the subject matter discussed, with the exception of two articles indexed in WOS (Shah and Ganji, 2017; Viteri Moya et al., 2016), and additionally one indexed in Scopus (Burawat, 2016). The lack of articles related to the use of the 5S principles in food industry enterprises published in indexed journals demonstrates the existence of a huge research gap related to this subject. The same conclusions can be also drawn from the analysis of the attached bibliography of the indicated publications. As regards Polish language journals indexed in the BazEkon database, after selecting the keyword “5S principles”, the database shows 50 results, including 26 for the last five years. A review of the publications from the entire available time period in terms of articles on the food industry yields only two results on “Concepts and tools for lean production management in the context of modern service and commercial processes” (Feliks and Madeja, 2018), and the use of quality management methods and tools in food businesses (Kafel and Sikora, 2013). As in the case of foreign journals, there is a very clear research gap here. It is very likely that it is partly filled with book-based publications, but its lower availability and lack of a generally accepted bibliometric assessment system compared to journals makes the use of the 5S method in food businesses virtually imperceptible among generally available scientific research results.

The indicated research gap makes it difficult to discuss the results of other authors’ research in more detail. Considering the above and the fact that there is a growing interest in the products of the food processing sector where buyers expect high-quality food containing macro and microelements essential to the proper functioning of the human body, the focus of this paper is on attempting to answer the following research questions:

1. Is the lack of widely available scientific studies on the use of 5S in the food industry caused by significant limitations in the possibility of using these practices in this sector?
2. Are the 5S practices applied in the organic grain processing enterprise, especially in the laboratory of the enterprise producing the organic flour?

3. Characteristics of the object and testing methodology

Based on the research gap observed, it was decided to undertake a study whose main objective was to assess the feasibility and then the application of the 5S principles in an organic grain processing enterprise (enterprise X) with particular emphasis on the application of this idea in the laboratory. In order to achieve the research goal,

the *case study* method was used, supported by open observation and free interviews with the management and laboratory staff. The choice of the research method was dictated by the specificity of the considerations conducted here and the volumetric requirements of the study. It should be emphasized that the major focus was on the in-depth understanding of the analysed problem rather than on the analysis of variables, which justifies the choice of this method (Wójcik, 2013). The available recorded materials were also used. It was assumed that the implementation of the 5S practice should be considered both from the perspective of the employer and employees.

Enterprise X is a company with a long production tradition, with the status of a limited liability company. Its headquarters are located in the Wielkopolska region, and the neighbouring agricultural areas are the source of raw materials. The laboratory is an integral part of the industrial mill, which produces wheat and rye flour and ensures that the certified processing of organic flour is performed. The use of high quality organic raw material and the appropriate tests to control its condition aims to guarantee very good quality flour intended for both industrial customers and the retail market. Due to the high requirements of consumers and the competitors from the bakery and confectionery market, the company also imports grain from Western Europe.

The quality of the product manufactured by the company is considered both according to the generally accepted guidelines provided for in Polish standards, as well as according to the requirements specified by the consumers. In order to implement both of them, inspections are carried out both at the “entry” and “exit”, both for grain (reception, transfer, delivery to the mill) and flour (production, dispatch to the customer). The high standard of the final product is largely controlled by the laboratory, which is why new solutions that can improve customer satisfaction in the long term should be implemented there. The Quality Director, who was directly responsible for the laboratory, was particularly involved in the 5S implementation project in enterprise X.

4. Implementation of the 5S practices in the laboratory of the organic grain mill

When implementing the 5S practice, it is particularly important to convince the managers that it is a necessary foundation for effective management systems and also contributes significantly to increasing the reliability of performing tasks by maintaining greater order in the workplace, which is particularly important due to the complexity of the analytical and research process. The clearly defined guidelines showing what laboratory workstations should look like also influence the results of tests, increasing their accuracy and reliability.

Table 1. Steps in the implementation of the 5S principles

First stage	
Step one – <i>seiri</i> (selection, sorting)	The maximum number of tools needed to properly perform the duties of a laboratory assistant was estimated. Only those objects that were necessary to carry out the tests were left in the given workstation, whereas all other objects were removed. A good and helpful solution was the development of a selection card*, the content of which was agreed with the Quality Director.
Step two – <i>seiton</i> (systematics, set in order)	All necessary tools left at the workplace were assigned a fixed location. This has contributed to easier, faster and, above all, safer use of the equipment and auxiliary materials. Wherever it was possible and did not lead to additional inconvenience, the equipment was placed intuitively, while disputable situations were resolved based on a compromise obtained from employees. There was also space for waste, which was collected in special containers for disposal.
Step three – <i>seiso</i> (shine)	The managers wanted to develop the habits of regular cleaning and maintaining order in the workplace. Cleaning was always carried out after the completion of each laboratory analysis. A procedure (based on a checklist) was established to clearly define the steps that had to be taken to keep the various workstations in order.
Second stage	
Step four – <i>seiketsu</i> (standardisation)	In order for the laboratory assistants to perform their duties accurately and safely, they must follow specific procedures and instructions. Wearing suitable protective clothing, glasses and gloves should also be taken into account. Laboratory standardization also referred to documenting and systematizing of all solutions and practices related to maintaining order at the workplace through the introduction of official regulations, instructions and audit schemes. The correct implementation of 5S also included the definition of standards for marking. The instruments used for testing in accordance with the new guidelines are regularly checked, cleaned, maintained and calibrated. Standards were also introduced for collecting and archiving results of analyses so that finding them is not problematic. All these activities were supposed to improve work efficiency and reduce downtime caused by searching for tools or specific instructions.
Step five – <i>shitsuke</i> (self-discipline)	Self-discipline was the connecting point of all stages of the 5S method, with proper implementation depending on this item and on the willingness to improve. Laboratory assistants started to notice waste and mistakes they made, tried to solve the problems themselves, thus reducing the risk of improperly conducted inspections.

* For an example of a card form see more in e.g. (Kraśniński, 2014).

Source: authors' own elaboration.

The whole process of implementation of 5S in enterprise X lasted five months and was intended to supplement the Good Laboratory Practice (GLP). In the surveyed company it covered all areas of the laboratory's activity, from managing materials and reagents, through calibration of measuring instruments, to preparing reports and storing data. The 5S implementation was supposed to additionally facilitate and optimize the work, thus contributing to the reduction of waste, resulting from e.g. additional waiting or inappropriate processing.

The enterprise decided to gradually implement the 5S idea, starting from the workstations where the simplest single actions were performed. An important part of the implementation was interviews with employees, whose opinions significantly influenced taking the further steps in its implementation. Laboratory assistants were surveyed and the results showed reluctance and scepticism towards changes in the present habits. Since reluctance of the staff is usually the greatest obstacle to the implementation of this method, the managers decided to prepare a series of training sessions for employees, which, through answers to classic organizational questions (what? where? when? how? who?) and checklists (why?) were to facilitate the accurate diagnosis of workstations. In the course of the training, the laboratory assistants jointly answered the questions about what works well and what works badly, how to improve the performance of the tasks entrusted to them and how to improve the work stations. In the opinion of the employees and managers, this training has contributed to the better implementation of the 5S principles.

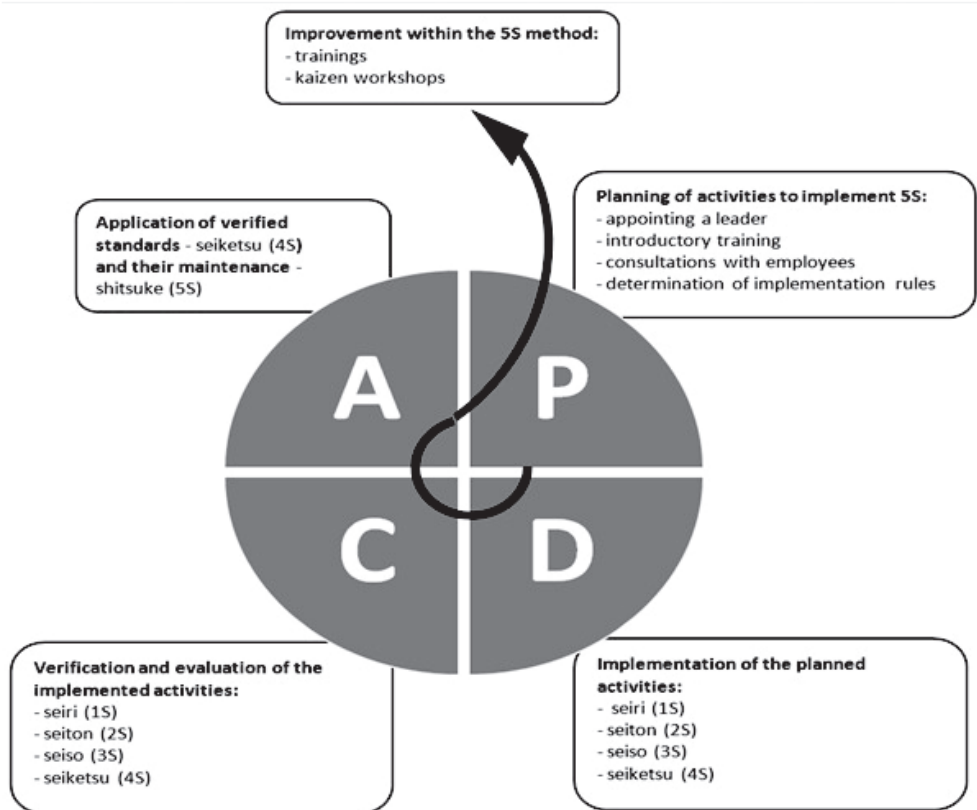


Fig. 1. PDCA cycle as an expression of the improvement of the 5S principles in enterprise X

Source: authors' own elaboration based on (Gajdzik, 2016; Wolnowska, 2010).

The introduction of the 5S principles must be carried out in a proper sequence of successive steps (sort, set in order, shine, standardize, self-discipline). Changing the rules and methodology makes it impossible to achieve final success. In the laboratory, the implementation of the principles was divided into two stages. The first one included “sort” and “set in order” and “shine”, while the second was composed of “standardize” and “self-discipline”, which were aimed to enable the maintenance of new standards in the long term. A detailed discussion of the different steps in both phases is provided in Table 1.

The enterprise’s managers were aware of the fact that the correct implementation of the 5S idea is possible only when a proper incentive system is introduced. Hence the development of such a system was commissioned to the HR department. Various motivators were supposed to motivate employees to comply with the newly adopted rules and influence their willingness to improve. The 5S process is a continuous process and therefore the management of its implementation and subsequent improvement was based on the Deming cycle, as shown in Figure 1.

The presented PDCA (Plan, Act, Check, Do) cycle is a repetitive process, and its implementation leads to more and more efficient quality improvement. The PDCA cycle also means searching for improvements, including those proposed by employees who have the opportunity to influence the appearance and organization of their workplace through, for example, participation in dedicated *kaizen* training or workshops.

5. Conclusion

The introduction of the 5S principles in the enterprise analysed in the study was aimed at the general improvement of its functioning, increasing productivity and improving the quality of work, as well as motivating employees to self-development. Furthermore, it also allowed them to acquire new skills related to the techniques used and increased creativity, broadened their knowledge and encouraged them to continue searching for improvements. Laboratory assistants became more involved in their own work, coped better with problem-solving and more often made right decisions. It was noticed after the implementation of the 5S method that despite the initial resistance to changes, the employees accepted the new system, and over time, they started to strive for perfection in taking care of the workstations, which resulted in a much better work organization. Each laboratory employee felt responsible for the order or the lack of order in the workplace, which resulted in an improvement in the functioning of the entire enterprise.

The analysis of the implementation of the 5S practices in enterprise X showed that the success of this project depends to a large extent on the commitment and determination of the managers. It was also important for the entire process to divide it into two stages. The first stage focused on the implementation of individual elements, whereas the second involved activities aimed at maintaining the system

in the long term. After obtaining full standardization and achieving satisfactory self-discipline in the laboratory, the senior managers decided to implement the 5S practice in other branches of the company.

The considerations presented in the paper allow, however, for the conclusion, only in relation to the described case, that the implementation of 5S in the examined laboratory contributed to the improvement of the quality of work and products manufactured in this enterprise. It facilitated, among other things, timely deliveries, reduced additional costs and, above all, increased the food safety and the performed work, as well as improved the morale of employees.

Therefore, while seeking answers to the research questions asked, it is difficult to generalize conclusions due to the nature of the research but it can be concluded that in this case no significant restrictions were demonstrated for the use of 5S practices. Furthermore, in regard to the second research question, it was found that the 5S practices in the present case were applied by a food sector enterprise involved in the organic grain processing, and, more specifically, in the enterprise's laboratory.

The presented considerations, also due to the lack of representativeness of the research, do not allow for drawing generalized conclusions, although they do not exhaust the previously indicated research gap. However, they theoretically provide a good basis for further in-depth research in this area. With regard to practice, they constitute an example of 'good practice' for other enterprises operating in similar circumstances.

Bibliography

- Aoki, K. (2008). Transferring Japanese kaizen activities to overseas plants in China. *International Journal of Operations & Production Management*, 28(5-6), 518-539.
- BazEkon. (2019). Retrieved 11.09.2019 from: <https://bazybg.uek.krakow.pl/bazekon/szukaj>
- Bochenek, M. (2018). Kaizen costing jako narzędzie zarządzania kosztami w przedsiębiorstwie. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (506), 9-17.
- Bogatko, A. and Nitkiewicz, T. (2016). Ocena wdrożenia filozofii kaizen i kaizen costing w przedsiębiorstwie produkcyjnym, *Zeszyty Naukowe Wydziału Zamiejscowego w Chorzowie Wyższej Szkoły Bankowej w Poznaniu*, 18, 265-280.
- Brunet, A. P. and New, S. (2003). Kaizen in Japan. An empirical study. *International Journal of Operations & Production Management*, 23(11-12), 1426-1446.
- Burawat, P. (2018). Guidelines for improving productivity, inventory, turnover rate, and level of defects in manufacturing industry. *International Journal of Economic Perspectives*, 10(4), 88-95.
- Burcgant-Korol, D. and Furman, J.,(2007). *Zarządzanie produkcją i usługami*. Wydawnictwo Politechniki Śląskiej, Gliwice, 135.
- Cardoso, W., Bassi, E., Bertosse J. F., et al. (2018). The implementation and use of the "5 S" and kaizen program for the management of sewing offices of a medium family company. *Independent Journal of Management & Production*, 9(3), 767-784.
- Carvalho Ferreira, D. M., and Saurin, T. A. (2019). A complexity theory perspective of kaizen: a study in healthcare. *Production Planning & Control*, (30).

- Chan, Ch. O., and Tay, H. L. (2018). Combining lean tools application in kaizen: a field study on the printing industry. *International Journal of Productivity and Performance Management*, 67(1), 45-65.
- Cieśla, M. and Mrówczyńska, B. (2015). Analiza istotności wprowadzania systemu Kaizen w przedsiębiorstwie branży motoryzacyjnej. *Zarządzanie Przedsiębiorstwem*, (4), 2-5.
- Debnath, R. M. (2019). Enhancing customer satisfaction using Kaizen: a case study of Imperial Tobacco Company (ITC). *Journal of Advances in Management Research*, 16(3), 277-293.
- Feliks, J. and Madeja, K. (2018). Koncepcje i narzędzia szeregowego zarządzania produkcją w kontekście współczesnych procesów usługowo-handlowych. *Marketing i Rynek*, (9), 192-205.
- Gajdzik, B. (2008). Zasady wdrażania technik 5S w urzędach miast i gmin. *Problemy Jakości*, 1(37).
- Gajdzik, B., and Wyciślik, A. (2016). Ramowe zasady implementacji metody 5S w laboratorium chemicznym. *Przemysł Chemiczny*, 95(2), 176-179.
- Gapp, R., Fisher, R., and Kobayashi, K. (2008). Implementing 5S within a Japanese context: An integrated management system. *Management Decision*, 46(4), 565-570.
- Glover, W. J., Farris, J. A., Van Aken, E. M., et al. (2011). Critical success factors for the sustainability of Kaizen event human resource outcomes. An empirical study. *International Journal of Production Economics*, 132(2), 197-213.
- Golas, H., Mazur, A., Gruszka, J., et al. (2016). *Application of the suggestion system in the improvement of the production process and product quality control* (IOP Conference Series: Materials Science and Engineering No. 145). DOI: 10.1088/1757-899X/145/6/062005.
- Golińska, P. (Ed.). (2012). *Lean Management w produkcji i logistyce*. Poznań: Wydawnictwo Politechniki Poznańskiej.
- IFOAM Report. (2019). *Into the future consolidated annual report of IFOAM – organics international*, 323.
- IJHARS. (2017). *Raport o stanie rolnictwa ekologicznego w Polsce w latach 2015-2016*, Warszawa: Główny Inspektorat Jakości Handlowej Artykułów Rolno-Spożywczych.
- Imai, M. (2012). *Gemba kaizen. Zdroworozsądkowe podejście do strategii i ciągłego rozwoju*. Wydawnictwo MT Biznes, 103-105.
- Kafel, P., and Sikora T. (2013). Wykorzystanie metod i narzędzi zarządzania jakością w przedsiębiorstwach branży spożywczej. *Żywność: Nauka – Technologia – Jakość*, 20(1), 204-216.
- Karaszewski, R. (2009). *Nowoczesne koncepcje zarządzania jakością*. Toruń: Wydawnictwo TNOiK, Stowarzyszenie Wyższej Użyteczności „Dom Organizatora”.
- Kraśniński, M. (2014). *Kulturowe uwarunkowania wykorzystania japońskich koncepcji, metod i technik zarządzania*. Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.
- Langowska, D. (2014). Zarządzanie łańcuchem wartości w systemie logistycznym z wykorzystaniem japońskiej filozofii pracy Kaizen. *Logistyka*, (4), 2114-2122.
- Langowska, D. (2019). Wykorzystanie Kaizen w zarządzaniu innowacyjnym przedsiębiorstwem na przykładzie spółki MALOW w Suwałkach. *Roczniki Kolegium Analiz Ekonomicznych*, 54, 319-331.
- Małkus, T., and Sołtysik, M. (2013). *Współczesne uwarunkowania rozwoju przedsiębiorstw*. Kraków: Mfiles.pl.
- Moica, S., Veres (Harea), C., and Marian, L. (2018). Effects of Suggestion System on Continuous Improvement. A Case Study (2018 IEEE International Conference on Industrial Engineering and Engineering Management, Bangkok, December 16-19, pp. 592-596). DOI: 10.1109/IEEM.2018.860804.
- Osmolak, J. (2018). Determinanty powojennego rozwoju gospodarczego Japonii. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (505), 233-242.
- Piasecka-Głuszak, A. (2019). Poziom znajomości wybranych narzędzi i metod Lean Management wykorzystywanych w logistyce wśród pracowników przedsiębiorstwa produkcyjnego – wyniki badań ankietowych. *Przedsiębiorczość i Zarządzanie*, 20(7), 137-155.

- Piasecka-Głuszak, A., and Karaś, E. (2018). Procesy usprawnień kaizen w przedsiębiorstwie produkcyjnym – wyniki badań empirycznych. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (523), 324-342.
- Pietroń-Pyszczek, A. (2015). *Motywowanie pracowników. Wskazówki dla menedżerów*. Wrocław: Wydawnictwo Marina.
- Shah, S. R., and Ganji, E. N. (2017). Lean production and supply chain innovation in baked foods supplier to improve performance. *British Food Journal*, 119(11), 2421-2447.
- Villar-Fidalgo, L., Espinosa, Escudero M., & Dominguez Somonte, M. (2019). Applying kaizen to the schedule in a concurrent environment. *Production Planning & Control*, 30(8), 624-638.
- Viteri Moya, J., Matute Deleg, E., Viteri Sanchez, C., et al. (2016). Implementation of lean manufacturing in a food enterprise. *Enfoque UTE*, 7(1), 1-12.
- Wiśniewski, T., and Dobrowolska, A. J. (2019). Kaizen jako podstawa systemu zarządzania jakością procesu produkcyjnego – przypadek przedsiębiorstwa SONEL SA. *Problemy Jakości*, (4), 31-37.
- Wolnowska, A. (2010). Praktyka wdrażania koncepcji 5S. Retrieved 11.09.2019 from <https://docplayer.pl/4942875-Praktyka-wdrazania-koncepcji-5s-anna-wolnowska.html>
- Wójcik, P. (2013). Znaczenie studium przypadku jako metody badawczej w naukach o zarządzaniu. *E-mentor*, 1(48), 17-22.
- Zarychta, Z. (2014). Kaizen – czynnik kreatywności pracowników źródłem oszczędności w organizacji. *Prace Naukowe Wałbrzyskiej Wyższej Szkoły Zarządzania i Przedsiębiorczości*, 30(5), 277-290.
- Zimon, D. (2012). Rola jakości w logistyce produkcji. *Przedsiębiorczość i Zarządzanie*, (12), 130.