

Lean Management Concept in the Environment of Cluster Enterprises

Irena Pawłyszyn

Poznan University of Technology, Poland

Increasing regional and local policy, aimed at boosting the competitiveness of regions and provinces is now becoming a common practice in the globalized economy. Therefore, in this article an important segment of the market is analyzed, which is regarded not only as a tool for enhancing the competitiveness of individual companies, but also of entire economies, namely - industrial clusters. The main research problem of this article was to determine if cluster enterprises are familiar with the Lean Management concept and if they practice it. The aim of the studies included in the paper was to identify the scope of usage of the Lean Management concept among cluster enterprises. At the same time within the study it was identified whether between businesses practicing the above-mentioned concept, there is any information exchange – any diffusion of knowledge.

Keywords: clusters, cluster enterprises, Lean Management, diffusion of knowledge.

1. INTRODUCTION

The success of economic development is directly related to the industrial growth. Therefore, economic sciences face the problem of recognizing, characterizing and developing the mechanism of industrial policy, the main objectives of which should be issues related to ensuring the pace of sustainable growth and competitiveness at all levels. The answer to achieving the set goals are cluster structures, which play the role of the so-called points of increase of regional and national economy.

The precursor of the clustering idea was A. Marshall, who in 1890 described the phenomenon of formation of regional clusters of enterprises of the same or related industry, calling them in his publications “the industrial district” (Gorynia, Jankowska, 2008, pp. 34-35). But the real popularity of the clustering phenomenon appeared after publication of the American economist Michael Porter in 1990 of his work ‘*The Competitive Advantages of Nations*’, in which he formulated the definition of a cluster. It sounded as follows: “the cluster is a geographic concentration of interrelated companies, specialized suppliers, service providers, companies operating in related

industries and associated institutions (e.g. universities, training companies, standardization bodies or industrial associations) in a particular field that compete but also cooperate with each other” (Porter, 2001, p. 246). The interest of researchers in clusters resulted in the appearance of a series of definitions of a cluster (Enright, 1996, p. 191; Simmie, Sennett, 1999, p. 51; Maskell, 2001, p. 93; European trend ..., 2003, p. 4; Cygler, 2007, p. 62; Wyrwicka, 2009b, p. 49; Knop, 2010, p. 151). Despite the great diversity of definitions, most of them are focused on the three most important aspects of a cluster: concentration on a specific area of interdependent enterprises operating in the same or related sectors of industry or services; interactions and functional relationships between companies; cross-sectoral dimension of a cluster, covering both the horizontal and vertical links (Brodzicki, Szultka, 2002, p. 46).

Clusters occur in practically all sectors of economy. There arise both in industry and services, in the sectors of high technologies as well as in the traditional ones. Companies operating within the cluster, acquire a number of advantages, such as: easier access to specialized suppliers and service providers, increase of productivity through

access to specialized production factors, better access to the deeper and more specialized labour market, more opportunities of cooperation with the scientific base, growth of innovative solutions, participation in joint ventures and reduction of their unit costs, access to networks of connections and contacts, etc. (Instytut Badań..., 2009, p. 16; Mikołajczyk et al., 2009, p. 17; Gorynia, Jankowska, 2007, pp. 7-8; Palmen, Baron, 2008).

One of the most important factors determining the competitive advantage of businesses on today's market is the ability to efficiently acquire knowledge and further apply it practically in business. Effective access to knowledge and technology from external sources includes both identification of the appropriate solution and its acquisition, as well as the ability to absorb this solution and its practical, commercial use (Ministry of Economy, 2009, p. 3). In this context, cluster structures create a highly favourable environment for the knowledge diffusion – the distribution of a particular type of information¹.

The diffusion of knowledge within the cluster contributes to the development of new ways to beat the competition and generate new opportunities. Human resources and their ideas create new combinations. The cluster thus becomes a way of overcoming the lack of openness, passivity, rigidity and collusion between competitors, which reduce or completely block the beneficial effects of competition (Шовкалюк В, 2009, p. 5). Diffusion within a cluster can relate to both explicit and tacit knowledge.

Knowledge flows more quickly and efficiently between cluster enterprises, giving them the opportunity to acquire valuable and valuable information, which might affect their innovativeness (Wiig, Wood, 1995, p. 34; Akdeve, Özkanli, 2006, pp. 365-374; Брижань, 2011, pp. 189-194; Макаренко, 2011, p. 197-206). Innovations resulting from the application of new knowledge can be divided into product and process. The result of the first one is the appearance of a new product on the market, and of the second - the introduction of new technologies.

New knowledge almost always stimulates changes in the organization. Well thought out and processed information can significantly impact the effectiveness and efficiency of processes.

Therefore, being familiar with the concept of Lean Management which deals with the need to eliminate all kinds of waste is, in the present reality the organization, the required knowledge.

The concept of Lean Management is a low-cost approach to management, targeting to eliminate waste and increase value-added activities. With the objective to define Lean Management, in this paper the definition of Luciekewski has been used, which indicates that it is "the management methodology that allows the existence in the organization of such a work culture that allows all its members to be interested in continuing the elimination of waste and raising the level of quality to maximize the customer expectations meeting and prosper, adapting continuously to changing market and environment conditions" (Luciejewski, 2010, p. 60)².

The most important assumption of the Lean Management concept is the elimination of any action, which is consuming time, absorbing resources and not giving enough value to manufactured products or services. The methodology of eliminating waste is a distinctive element of this concept. In order to produce the maximum value for the customer, Lean uses a number of tools, among which the following can be distinguished: Visual Management, teamwork, Jidoka, 5S, JiT, standardization, Poka-Yoke, VSM, TPM, SMED etc. (Durlik, 1996, p. 226; Ohno, 2008; Martyniak, 2002, pp. 103-107; Rother, Shook, 2009; Zimniewicz, 2009, pp. 38-40).

The concept of Lean Management has found wide application in Western Europe as well as in Poland. More often, however, it includes individual entities rather than enterprise networks. So the question arose whether Polish cluster enterprises apply the Lean Management concept. Desiring to achieve a high level of competitiveness, cluster enterprises (and therefore the cluster as a whole) should consider measures aimed at improving the processes occurring in them. That is particularly important in a network of cooperating firms, where the imperfection of processes (causing possible shortages, outages, failures, etc.) of one of the cluster cells, may affect negatively the other cells. The development and diffusion of the knowledge of Lean concept within the cluster can have positive effects, particularly, the significantly reduced production time, reduced

¹ Wyrwicka indicates that through the diffusion of knowledge (know-how) should be understood further use of the same set of knowledge, e.g. in the next cell of Network (Wyrwicka, 2009, p. 137).

² Cf. (Womack, Jones, 2001, p. 17; Wince, 2004, pp. 136-137; Mikołajczyk, 2006, p. 271; Крот, 2011, p. 212).

costs and synergistic effects of jointly undertaken activities. The objective of such actions should be to produce high-quality products, tailored to the requirements of individual customers, in less time and at a competitive price.

A goal pursued in the framework of this study is to identify the scale of application of the Lean Management concept in cluster enterprises, namely, to verify the knowledge of this concept, identify the most frequently used tools and the most important benefits of its use, or the causes for resignation from Lean activities. The study also aimed to analyse reasons for implementing Lean activities or the absence of the latter, as well as to

interviews (CATI – Computer Assisted Telephone Interview) and Internet surveys (CAWI – Computer-Assisted Web Interview). Questions addressed to individual companies were modified depending on responses received.

As a part of the interviews, 245 responses were received from representatives of cluster enterprises, of which 108 companies (44%) carried out solely manufacturing activity, while 137 companies (56%) were operating in the production and service sector. The chart below shows the distribution of enterprises surveyed in terms of their size (Fig. 1).

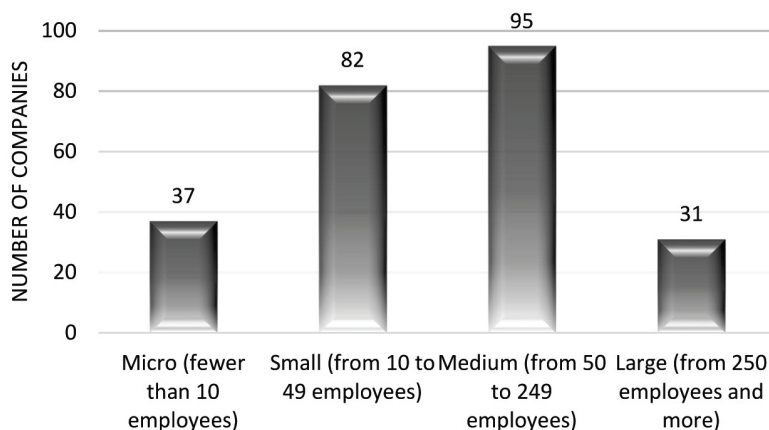


Fig. 1. Breakdown of enterprises surveyed based on their size.

Source: own elaboration.

obtain information about the exchange of knowledge concerning Lean Management with other members of the cluster.

2. LEAN MANAGEMENT IN CLUSTER ENTERPRISES

Cluster initiatives in Poland first appeared in late 1990s (Okoń-Horodyńska, 1998, p. 207). In 2002, the Institute for Market Economics conducted a survey that helped identify 18 clusters of enterprises in eight Polish provinces. The report on cluster inventory in Poland dated 2015, which was presented by the Polish Agency for Enterprise Development, identified 134 clusters in all 16 provinces (Raport z inwentaryzacji..., 2016, p. 16). Even though Lean Management has its origins in the production sphere, while gradually entering the services' sector, the companies engaged in production activity, as well as production and service activity have been selected for the purpose of this study. Precisely these companies have been contacted. The methods of survey used in the study were: a quantitative research technique – telephone

The highest number of companies participating in the study were medium-sized enterprises – 95 companies (39%). Small companies made up another large group – 82 companies (33%). The smallest group comprised large companies (31 companies; 13%) and micro enterprises (37 companies; 15%). In both groups the number of enterprises participating in the survey was 15 (14%). In Poland, clusters are mostly created by micro, small and medium-sized enterprises. Large companies constitute the smallest group in clusters (Raport z inwentaryzacji..., 2016, p. 22).

The breakdown of the enterprises surveyed according to Polish provinces is presented in the table below (Tab. 1).

The majority of cluster enterprises that participated in the survey were located in Podkarpackie, Lubelskie and Wielkopolskie province. While the lowest number of enterprises were in Opolskie, Świętokrzyskie and Lubuskie province. There were not received any responses in Warmińsko-Mazurskie province.

Table 1. Breakdown of cluster enterprises surveyed according to provinces.

Province	<i>Dolnośląskie</i>	<i>Kujawsko-Pomorskie</i>	<i>Łódzkie</i>	<i>Lubelskie</i>	<i>Lubuskie</i>	<i>Małopolskie</i>	<i>Mazowieckie</i>	<i>Opolskie</i>	<i>Podkarpackie</i>	<i>Podlaskie</i>	<i>Pomorskie</i>	<i>Śląskie</i>	<i>Świętokrzyskie</i>	<i>Warmińsko-mazurskie</i>	<i>Wielkopolskie</i>	<i>Zachodniopomorskie</i>
Number of companies surveyed	17	19	5	29	4	8	20	1	56	20	9	17	2	0	23	15
Share in percentage	7%	8%	2%	12%	2%	3%	8%	0%	23%	8%	4%	7%	1%	0%	9%	6%

Source: own elaboration.

When carrying out the study, attempts were made to reach top executives or specialists with a good knowledge of the subject area. Thus, chief executives (including presidents, vice presidents, owners, partners, members of the board) – 86 people (accounting for 35%) made up the largest number of respondents. The second group included respondents holding directors' positions (including those responsible for management, production, research and development, operative management, etc.) – 69 people (28%). Another group comprised respondents holding managerial positions (including managers of quality departments, production, sales and project management, marketing and procurement, etc.) – 30 people (12%). The next group included a group of specialists (including specialists for research and development, production preparation, marketing and trade, etc.) – 9 people (4%). The last group comprised other people (includes persons in charge of the quality management system, or supervising production processes, project and development coordinators, etc.) – 51 people (21%).

The survey was seeking to divide companies into five groups, as was initially planned:

1. Enterprises that have carried out and are carrying out activities related to Lean Management (A group);
2. Enterprises that used to carry out activities related to Lean Management, but do not do it any more (B group);
3. Enterprises that have not carried out any activity related to Lean Management, but they intend to undertake such an activity (C group);

4. Enterprises that have not carried out, and have no plans to carry out activities related to Lean Management (D group);
5. Enterprises that are not familiar with Lean Management concept (E group).

The results of the survey showed that 160 cluster enterprises surveyed (65%) were familiar with Lean Management concept, while 85 enterprises (35%) – were not. The verification of enterprises that are familiar with Lean Management suggests that (Fig. 2):

- 98 enterprises (40%) have carried out and are carrying out activities related to a given concept;
- 8 enterprises (3%) used to carry out such an activity, but do not carry it out now;
- 39 enterprises (16%) have not carried out Lean activities yet, but plan to carry them out;
- 15 enterprises (6%) have not carried out such activities, and have no plans to carry them out.

The analysis of the results indicates that more than 1/3 of the companies surveyed have no knowledge about Lean Management. However, most of those surveyed (about 2/3 companies) being considered in this study, are familiar with the concept. The chart in Figure 2 shows that the largest group includes companies that have carried out Lean activities and continue implementing them. A significant group also represents companies that have the knowledge about benefits that the Lean Management concept can bring, thus they are preparing for its implementation. A small but very important group includes companies that have ceased applying the concept. A small number of companies were not interested in the

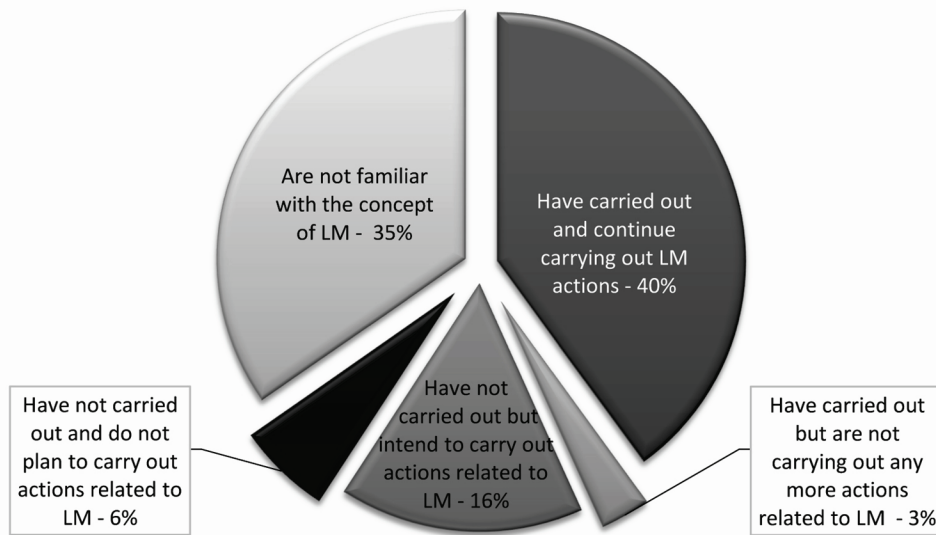


Fig. 2. Interest in Lean Management concept in cluster enterprises.

Source: own elaboration.

implementation of Lean Management, despite being familiar with the concept.

Let us consider in more detail each group of companies.

A. Companies that have carried out Lean activities and continue implementing them. This group, consisting of 98 companies, comprises 5 micro enterprise, 24 small companies, 47 medium-sized companies and 22 large companies. The companies, which have taken actions to eliminate waste and continue implementing them, have been asked to outline tools that are most commonly used by them. The results have been categorized in Table 2 (Tab.2).

Responses received indicate that the most common method of Lean Management used by the

companies is teamwork (81 responses). It constitutes a key aspect in creating a Lean culture and the pursuit of perfection. The next two methods that are often applied by the companies are 5S (workplace improvement) and Kaizen (small steps for improvement). They are quite simple to implement because they do not require specialized knowledge and high costs. Some authors suggest that Lean implementation should be based on these methods. Standardized Work, Visual Management and Production levelling are other tools that are frequently applied by cluster companies. The least frequently used tools are Jidoka (suspension of the production line in case of error detection) and Andon (error signalling system). Jidoka is one of the fundamental pillars of Lean Management enabling to control quality at

Table 2. The most frequently used tools and methods of Lean Management in A group of companies.

No.	Tools/method	Number of responses	No.	Tools/method	Number of responses
1.	Teamwork	81	11.	Tact time	22
2.	5S	56	12.	SMED	17
3.	Kaizen	47	13.	One piece flow	17
4.	Standardised work	43	14.	VSM	17
5.	Visual Management	33	15.	JiT	16
6.	Production levelling	30	16.	Pull	13
7.	Kanban	27	17.	Supermarket	12
8.	Production cells/lines	27	18.	Jidoka	8
9.	TPM	26	19.	Andon	7
10.	Poka-Yoke	24	20.	Other	7

Source: own elaboration.

source and achieve high quality of a product. However, this method often remains undervalued when it comes to Lean implementation.

The respondents could also outline other tools and methods they apply. Among those methods are 6S (which is complementary for 5S method and places great emphasis on work safety), 5 Why method, IPMA (project management), TOC (theory of constraints) and Six Sigma (quality management). Although the last three tools do not actually belong to Lean methods, as they are distinct concepts, but when combined with Lean Management they produce substantial benefits for a company.

Further, respondents have been asked to indicate the three most important benefits of Lean implementation that companies have received/receive. The distribution of responses is shown in figure 3 (Fig. 3).

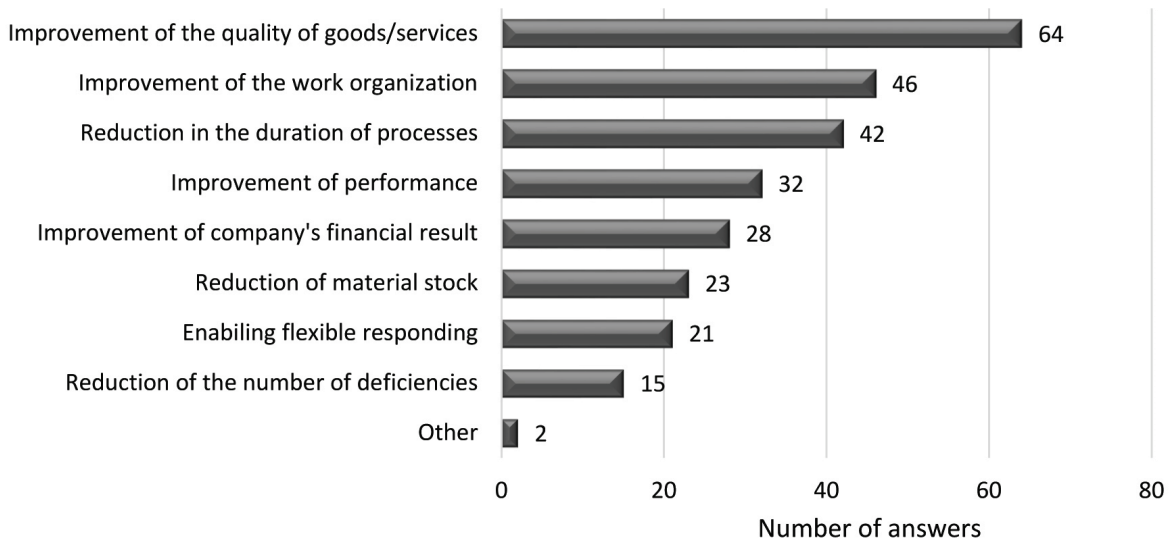


Fig. 3. Benefits received from implementing Lean Management.

Source: own elaboration.

Among the biggest benefits of implementing the concept identified by the respondents is a significant improvement of the quality of manufactured products and services rendered. Precisely, the quality improvement is one of the most important priorities in the application of Lean Management. The improvement of work organization and the reduction of the process cycle are, according to cluster enterprises, the next two important aspects that are referred to when carrying out Lean activity. The improvement of work organization implies specific changes in behaviour patterns and habits. New knowledge and skills prompt changes in the behaviour with a view of identifying waste and striving for continuous

improvement. Streamlining operations at each stage then results in the reduction of certain business processes.

The participants of the survey could also provide their own responses. Two respondents used this option, having mentioned such benefits as improving cooperation with a client and increasing labour productivity.

In the next part of the survey, questions were asked concerning the exchange of information (transfer/acquiring) with other business partners in the cluster in terms of methods, tools and effects of Lean implementation. 40 organizations indicated that such an exchange took place between the company and other members of the cluster, while 58 organizations denied that the exchange existed.

The last question was related to providing a short description of the exchange of information about the Lean concept, if relevant, or indicating

the causes for lack of any such exchange.

Companies that confirmed the exchange of information, indicated that in most cases it related to information regarding the methods, techniques and tools, as well as the results obtained from Lean implementation (14 responses). Respondents mentioned that the exchange of experiences was based not only on consultations regarding the applicable tools and methods, but also on benefits and results obtained, or problems faced in the course of their implementation. The exchange also concerned information about production techniques and technologies used (7 responses). Indications of respondents also considered the training courses and conferences, which allowed

companies to communicate and exchange experiences (4 responses). Other indications were related to the development and promotion of new products and projects, production and human resources management, opportunities of business processes optimization, extension of distribution networks, and the search and acquisition of new markets.

These responses indicated that cluster companies look to obtain some proven methods and tools from their business partners with a view of implementing the selected ones. In other words, they look for a good example to follow.

Companies that signalled the lack of information exchange, most frequently attributed it to lack of time, as well as lack of interest on the part of their business partners (30 responses). Another reason for the lack of exchange of Lean-related information was the lack of knowledge that such exchange can actually take place (8 responses). 5 companies paid attention to the lack of close cooperation within the cluster. Other indications included other priorities in the company, absence of need or immaturity of the company for such information exchange, high competitiveness, lack of exchange due to the relatively short period of belonging to the cluster, a short period of implementation of the concept, or lack of experience of other companies in the implementation of Lean.

The analysis revealed that the main factors hindering the exchange of information between companies in the cluster was the lack of time and interest in such an exchange among participants of the cluster. It is also worth mentioning a group of companies that declared that such an exchange could have taken place but the issue (issue under consideration) was not discussed in a cluster.

B. Companies that have carried out activity related to Lean Management, but do not carry out it now. This group comprising 8 enterprises includes 1 micro enterprise, 3 small companies, 2 medium-sized companies and 2 large companies. Similarly to A group of enterprises, the representatives of this group were asked about the implementation of the above-mentioned Lean methods and tools. Results are shown in table 3 (Tab. 3).

Table 3. Lean Management tools and methods applied by companies included in B group.

No.	Tools/Methods	Number of responses
1.	Teamwork	5
2.	5S	3
3.	Kaizen	2
4.	Standardized work	2
5.	Production levelling	2
6.	Production lines/cells	2
7.	Kanban	1
8.	Visual Management	1
9.	JiT	1
10.	One piece flow	1
11.	Supermarket	1
12.	Andon	1

Source: own elaboration.

Comparing the results received with A group of cluster enterprises, it can be noted that B group of companies applied the same tools and methods. In this case, teamwork, 5S and Kaizen ranked at the top. As mentioned above, these methods do not require special financial resources, nor highly specialized knowledge. But it is necessary to look into the cause why Lean activity undertaken proved unsuccessful.

The next question in the survey aimed at identifying causes for the refusal from applying the Lean concept. The respondents could give a maximum of three responses. The results are summarized in the chart (Fig. 4).

Among the main reasons for resignation there were 3 answers: the lack of a good example, lack of interest among the authorities and costs of Lean implementation (3 responses each). The above-mentioned state of indications does not display a clear answer to the set question, however it is possible to draw some conclusions from it. Companies need strong management support in the implementation of Lean solutions. Without them the success is unlikely to be reached. A good, practical example of the applied solutions is a stimulus to take action aimed at processes improvement. Absence of such example is the undoubted difficulty in taking certain actions, which also does not mean that it makes it impossible to take them individually. Resignation from the implementation of Lean Management due to its cost is debatable. Especially considering the fact that the basic Lean tools do not require at all, or require only a small cash expenditures for their implementation. It should also be taken into

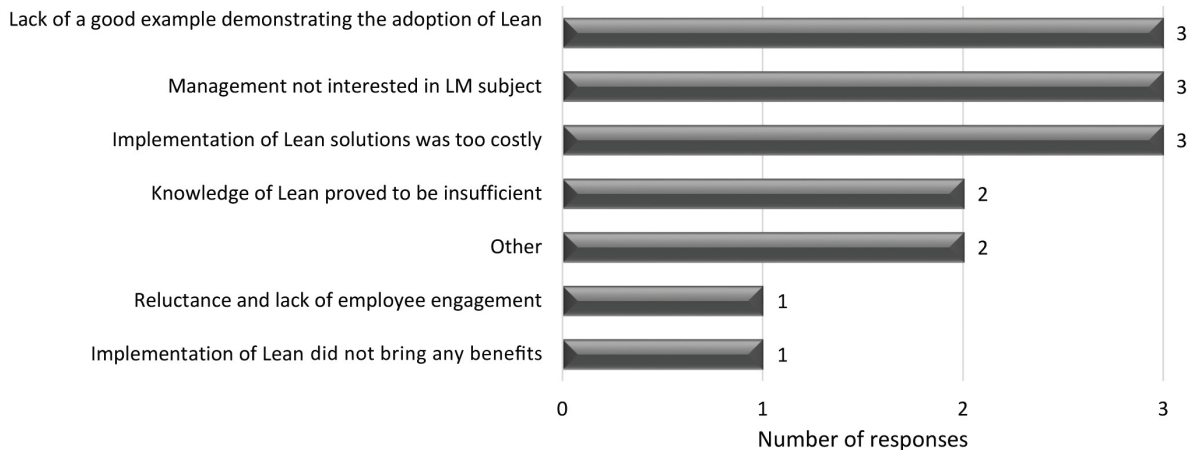


Fig. 4. Reasons for resignation from implementing Lean Management.
Source: own elaboration.

account that quite a small number of companies in the group were surveyed.

Two respondents indicated that knowledge of Lean proved to be insufficient. Reluctance and lack of involvement of employees in Lean activities, as well as implementation of the concept were of no benefit – these are the responses which received only one indication.

Respondents could also give their own answer. This option was used by two respondents who indicated that the abandonment from Lean practices was caused by the company's reorganization and implementation of the new quality system.

As in the previous group of companies surveyed, respondents were asked about the exchange of knowledge. Two companies which indicated that such an exchange took place, pointed to the exchange relating to the improvement of production, methods, tools, data flow, HR management, provision of the best product and service to a customer. The other six respondents attributed the absence of exchange of information concerning the Lean Management concept to the lack of time and interest in exchange among business partners, the diversity of companies and institutions within the cluster, as well as due to the fact that mainly large companies were involved in such exchange.

C. Companies that have not carried out any actions related to Lean Management, but intend to undertake them. This group comprising 39 companies includes 7 micro enterprises, 12 small companies, 19 medium-sized companies and 1 large company. Enterprises of this group were first of all asked about the most important benefits they

expect to derive from implementing the Lean Management concept (the respondents could give a maximum of three answers). The distribution of answers of representatives of individual companies is shown in figure 5 (Fig. 5).

Companies intending to implement this concept seek primarily to achieve with its help the improvement of quality of products manufactured and services provided. The improvement of business processes, and, consequently, the quality of products is expected to translate into the improvement of the company's financial performance, which was highlighted by respondents as the second most important benefit they expect to obtain. They pointed out also that through the implementation of Lean solutions they sought to reduce the duration of processes. The respondents could provide their own answers, but none of them used this option.

Comparing these results to the data received in A group of cluster companies, which implement Lean actions on a constant basis, the similarity can be noted. Two of the three first replies in both groups are similar, certifying the fact that the intended objectives can be achieved with an appropriate approach to implementing various Lean Management tools and methods.

As in the previous two groups, representatives of the companies were asked about whether there was an exchange of information about the concept among business partners. 14 companies indicated that such an exchange with other members of the cluster took place, and 25 companies denied the fact.



Fig. 5. Benefits that cluster enterprises expect to obtain from implementing LM concept.
Source: own elaboration.

Brief characteristics of knowledge sharing mentioned by companies referred to: sharing of the results of the implementation of Lean solutions, as well as techniques, methods and tools applied (8 answers); exchange of information regarding work organization (2 answers); exchange of information on manufacturing processes and technologies (3 answers); joint implementation of projects (1 answer).

Replies of the companies that plan implementation, focus on obtaining information from their business partners about applicable Lean Management solutions and their results. This knowledge is said to reassure them as to the expediency of using such solutions, and will enable them to receive information on the implementation of proven tools, or difficulties of implementing the selected tools.

Companies that indicated the lack of exchange attributed this to: the lack of time or interest among partners in the cluster in the exchange (17 answers); the lack of discussions on this concept or insufficient number of meetings relating to the subject (3 answers); poor communication between companies (2 answers); the absence of necessity for such an exchange (1 answer); the lack of companies with a similar business profile in the cluster (1 indication); short period of implementation of the concept (1 answer).

As in the case of A group of companies, which also signalled the lack of knowledge exchange, this group emphasized that the lack of information exchange between companies in clusters was caused by the lack of time and interest of members of the cluster in such an exchange.

D. Companies that have not carried out, and have no plans to carry out actions related to Lean Management The group comprising 15 companies, includes 5 micro enterprises, 6 small, 3 medium-sized enterprises and 1 large enterprise. Representatives of the group were asked only one question – what are the reasons for the lack of willingness to implement Lean solutions in the company? Respondents could provide a maximum of three answers. The answers received are summarized in the figure below (Fig. 6).

Cluster enterprises which do not plan to take Lean actions indicated primarily the lack of apparent need to implement such solutions (8 indications). Another indications signalled the lack of a good example to follow and the lack of interest in the topic among the authorities (6 indications each). 2 indications received both the answer about the insufficient knowledge of Lean and about the unfavourable culture in the organization. Respondents also had the opportunity to independently identify other reasons. Thus, 2 answers were obtained, one of which suggested that the company is too small and the work is too variable for the implementation of such a concept, while the other pointed to the lack of time to implement Lean solutions.

The analysis of responses received in this group of companies indicates that companies do not see the need to identify waste in the company. Such an approach may be due to the belief that certain processes cannot be improved. Answers from outside the list suggests that the concept of Lean Management is suitable only for large enterprises, which is not true, and which is also confirmed by a

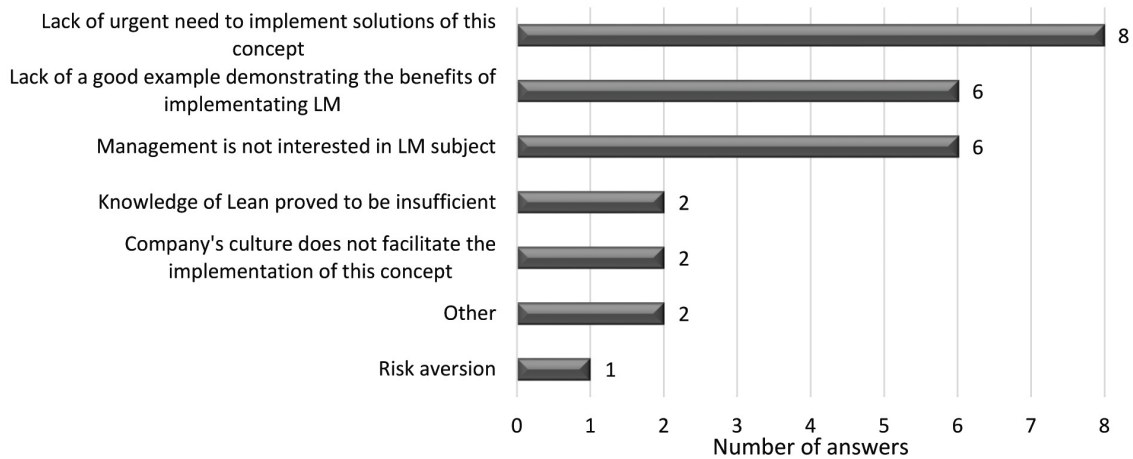


Fig. 6. Reasons for the lack of willingness to implement Lean Management. Source: own elaboration.

number of small companies implementing Lean. It should also be emphasized that a small number of companies in this group was analysed.

E. Companies that are not familiar with the Lean Management concept. This group comprising 85 companies includes 19 micro enterprises, 37 small enterprises, 24 medium-sized enterprises and 5 large companies. As in D group, representatives of this group were asked one question concerning their willingness to expand knowledge about benefits of the Lean Management concept. Answers are shown below (Fig. 7).

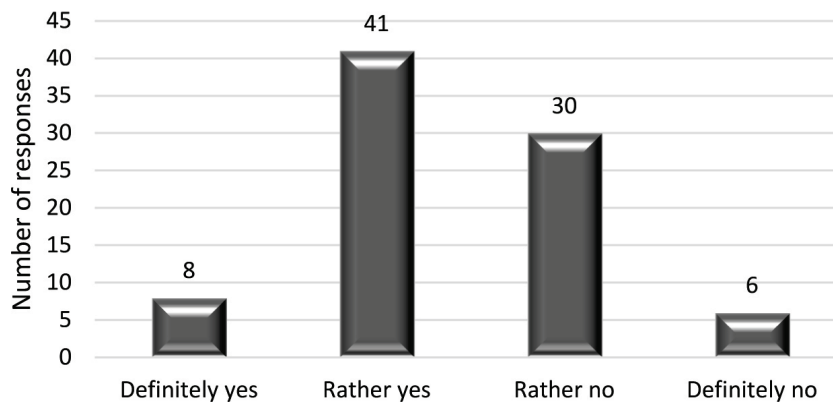


Fig. 7. Number of answers concerning the willingness to learn about benefits of implementing LM. Sources: own elaboration.

The majority of respondents that are not familiar with the Lean subject, answered that they would rather learn more about the concept (41 answers). Eight respondents indicated that they were definitely interested in the concept. A relatively large group (30 answers) said they would rather not want to expand their knowledge about

the subject. And six answers indicated a definite lack of interest.

The analysis of the results shows that 58% of respondents that are not familiar with the Lean Management concept would like to expand their knowledge about the subject, while 42% are rather not interested in it.

3. SUMMARY

A cluster is more than just a group of entities characterized by geographical proximity. This is a purposely created network that through mutual

interaction and influence has the ability to generate a sustainable competitive advantage. The role of clusters for the Polish economy was recognized at the turn of the twentieth/ twenty-first centuries. Using the potential of clusters, the country's economy can gain a competitive advantage on the global market.

It is important to be aware that the development of cooperative relations depends primarily on mutual trust and willingness of cluster members to cooperate. Coordinators (agents) of the clusters, as well as local authorities should direct their efforts towards integrating cluster enterprises to seek synergies, which result from such a cooperative approach.

Process and organizational innovations are becoming increasingly important in the functioning of the market economy. The Lean Management concept provides a wide range of these solutions. According to the authors, the right approach, along with the implementation and expansion within a cluster of knowledge about the possibilities of eliminating waste are believed to bring tangible benefits to each of the participants in the network.

It is necessary to state the fact that 65% of all cluster enterprises that are familiar with the Lean Management concept, 56% still continue to implement or plan to implement actions related to it. This means that more companies have become aware of Lean and that it brings the anticipated results. However, there is still a big number of companies (more than 1/3 of surveyed enterprises) that do not know about the existence of this concept, and therefore do not possess knowledge that could help streamline processes in a company through the elimination of waste. The results of the study also confirm the effectiveness of applying Lean methods and tools, which is mainly reflected in the improvement of quality of products and services, as well as the reduction of process cycles.

Companies that abandoned the Lean concept (3%) most likely did not have a good example, and thus the necessary knowledge for proper implementation of solutions within the framework of this concept. The lack of management's involvement in actions undertaken is another important aspect that was mentioned. When it comes to Lean implementation, the management is the most important example to follow. If they are not interested in changing the organizational culture, chances are small that the implementation of Lean solutions will be successful.

Enterprises that are familiar with the concept, but do not show interest in it (6%), are probably not able to identify waste within their structure, and therefore do not undertake any actions for improvement. This demonstrates that such companies have a short-sighted approach, because TaiichiOhno pointed out that the process of continuous improvement is endless, even a well-functioning system can be improved. Another

reason may be the fear of making changes in the organization, because, as it has been mentioned earlier, new knowledge leads to changes, which organizations often try to avoid.

A positive signal is the fact that most of the companies which were not familiar with the Lean Management concept (35%), after the presentation of the concept's definition, expressed their interest in expanding knowledge on the subject (58%).

As for the diffusion of knowledge in cluster enterprises, it should be noted that almost 40% of the companies surveyed have exchanged their experience with other members within a cluster. In this way it acquires valuable knowledge on the proved tools and techniques related to the Lean concept. This approach enables closer cooperation and integration of members of the cluster. However, more than 60% of the companies do not engage in the exchange of information, pointing to the lack of time and the involvement of partners in the cluster. The reason for the lack of exchange of information about Lean Management may also be the fact that the diffusion of knowledge is a relatively young and developing concept of cooperation of geographically concentrated diverse business entities (Godlewska, 2014, p. 46). Another fact is the young age of the Polish clusters and, therefore, the cooperation within it has not yet acquired permanent features of trust. It is worth quoting the words of Clement, who notes that "the longer the companies cooperate together actively and effectively, the greater is their tendency to share all kinds of resources, including knowledge" (Klemens, 2014, p. 42). It is necessary to emphasize an important role of a coordinator who should act as a link connecting cluster enterprises with one another with a view of exchanging information which is useful for them.

The analysis of the survey has contributed to forming an initial overview concerning the implementation of the Lean Management concept by cluster enterprises. It does not include, however, the diagnosis of such aspects as barriers or facilitation of Lean implementation, nor does it indicate precisely which areas have undergone improvements. These and other issues should be tackled in further research on this subject.

The clustering idea in Poland is relatively new and it is still developing. For this reason, local and regional authorities should support its development in order to create added value for both domestic and foreign customers. Its development should be supported not only through financing, but also making sure that cluster enterprises get specific

knowledge and information which is crucial for the development of clusters in Poland.

REFERENCES

- [1] Akdeve, E., Özkanlı Ö., (2006), Cluster and Innovation as Regional Development, Presented in II. International Strategic Management Conference 8-10 Mayıs 2006, Conference Proceedings Book, İstanbul, pp. 365-374.
- [2] Brodzicki T., Szultka S., (2002), Koncepcja klastrów a konkurencyjność przedsiębiorstw, [in:] Organizacja i Kierowanie, Nr 4, p. 46.
- [3] Брижань І., (2011), Вплив кластерних об'єднань на розвиток підприємств в регіоні, [in:] Вісник Хмельницького національного університету, №2, p. 189-194.
- [4] Cygler J., (2007), Kooperencja – nowy typ relacji między konkurentami, [in:] Organizacja i Kierowanie nr 2/2007; p. 62.
- [5] Durlik I., (1996), Inżynieria zarządzania. Strategia i projektowanie systemów produkcyjnych, cz. 1 i 2, Agencja Wydawnicza Placet, Warszawa, p. 226.
- [6] Enright M., (1996), Regional clusters and economic development: a research agenda, [in:] Staber U., Schaefer N., Sharma B., Business Network: Prospects for regional development, Walter de Gruyter, Berlin, p. 191.
- [7] European Trend Chart on Innovation, Thematic Report Cluster Policies, Covering Period up to March 2003, European Commission Enterprise Directorate General, p. 4.
- [8] Godlewska S., (2014), Klastry jako katalizator rozwoju gospodarczego i myśli innowacyjnej, [in:] Kwartalnik nauk o przedsiębiorstwie, Nr 4, SGH, Warszawa, p. 46.
- [9] Gorynia M., Jankowska B., (2008), Klastry a międzynarodowa konkurencyjność i internacjonalizacja przedsiębiorstwa. Difin, Warszawa, pp. 34-35.
- [10] Gorynia M., Jankowska B., (2007), Wpływ klastrów na konkurencyjność i internacjonalizację przedsiębiorstw, Gospodarka Narodowa, p. 7-8.
- [11] Klemens B., (2014), Koncepcja klastrów a zagadnienia transferu wiedzy w perspektywie 2014-2020, [in:] Barometr Regionalny, Wyższa Szkoła Zarządzania i Administracji w Zamościu, Tom 12, Nr 2, p. 42.
- [12] Knop L., (2010), Kształtowanie struktury klastra [w:] R. Borowiecki, A. Jaki (red.), Restrukturyzacja w obliczu nowych wyzwań gospodarczych. Zarządzanie-Strategia Analiza, Wydawnictwo Akademii Ekonomicznej, Kraków, p. 151.
- [13] Крот Ю., (2011), „Непродуктивні витрати: визначення та міст”, [in:] Науковий вісник ЧДІЕУ, Управління підприємством, №4 (12), p. 212.
- [14] Luciejewski W., (2010), Primum non prodiagere. Recepta Lean Management nazdrowa organizacji, [in:] Lean Unlimited Homepage, p. 60.
- [15] Luo Y., (2007), A cooperation perspective of global competition, [in:] Journal of World Business, Nr 42(2), pp. 129-144.
- [16] Макаренко М., (2011), Формування регіональної кластерної політики, [in:] Актуальні проблеми економіки, №1, p. 197-206.
- [17] Maskell P., (2001), Towards knowledge-based theory of geographical clusters, Industrial and Corporate Change, Vol. 10, Nr 4, p. 926.
- [18] Martyniak Z., (2002), Nowe metody i koncepcje zarządzania, Wydawnictwo Akademii Ekonomicznej w Krakowie, Kraków, pp. 103-107.
- [19] Mikołajczyk Z., (2006), Metody zarządzania zmianami w organizacji, [in:] Metody organizacji i zarządzania. Kształtowanie relacji organizacyjnych, W. Błaszczak (red.), PWN, Warszawa, p. 271.
- [20] Ministerstwo Gospodarki, (2009), Kierunki i polityka rozwoju klastrów w Polsce, Warszawa, p. 3.
- [21] Ohno T., (2008), System produkcyjny Toyoty: więcej niż produkcja na wielką skalę, ProdPress, Warszawa.
- [22] Okoń-Horodyńska E., (1998), Narodowy System Innowacji w Polsce, AE, Katowice, s. 207.
- [23] Palmén L., Baron M., (2008), Przewodnik dla animatorów inicjatyw klastrów w Polsce, PARP, Warszawa.
- [24] Porter M., (2001), Porter o konkurencji, PWE, Warszawa, p. 246.
- [25] Raport z inwentaryzacji klastrów w Polsce 2015, (2016), Polska Agencja Rozwoju Przedsiębiorczości, Warszawa, p. 16, www.pi.gov.pl (dostęp 01.09.2016).
- [26] Rother M., Shook J., (2009), Naucz się widzieć (second edition), Lean Enterprise Institute Polska, Wrocław.
- [27] Simmie J., Sennett J., (1999), Innovation In the London Metropolitan Region, [in:] Hart D., Simmie J., Wood P., Sennett J., Innovative Clusters and Competitive Cities in the UK and Europe, Oxford Brookes School of Planning Working Paper 182, p. 51.
- [28] Instytut Badań nad Gospodarką Rynkową, (2009), Tworzenie i zarządzanie inicjatywą klastrów, Gdańsk, p. 16.
- [29] Wiig H., Wood M., (1995), What Comprises a Regional Innovation System? An Empirical Study, STEP Working Paper R-01, Oslo, p. 34.
- [30] Wince J.P., (2004), Lean Supply Chain Management, Handbook for Strategic Procurement, New York, p. 136-137.
- [31] Womack J., Jones D., (2001), Odchudzanie firm: eliminacja marnotrawstwa - kluczem do sukcesu, Centrum Informacji Menedżera, Warszawa.

- [32] Wyrwicka M. K., (2009a), Dyfuzja wiedzy w klastrze, [in:] Wyrwicka M.K. (ed.): Struktury klastrowe i ich funkcjonowanie, Wielkopolska Izba Przemysłowo-Handlowa, Poznań, p. 137.
- [33] Wyrwicka M. K., (2009b), Proces rozwoju inicjatywy klastrowej, [in:] Wyrwicka M.K. (ed.), Struktury klastrowe i ich funkcjonowanie, Wielkopolska Izba Przemysłowo-Handlowa, Poznań, p. 49.
- [34] Шовкалюк В., (2009), Кластери та інноваційний розвиток України / Створення та функціонування інноваційних кластерів, Інформаційно-аналітичні матеріали Державного агентства з питань науки, інновацій та інформатизації України, Київ, p. 5.
- [35] Zimniewicz K., (2009), Współczesne koncepcje i metody zarządzania, PWE, Warszawa, p. 38-40.
- [36] Zintegrowana analiza ekonomiczna województwa podkarpackiego, (2004), Rzeszowska Agencja Rozwoju Regionalnego S.A., Rzeszów, p. 68.

BIOGRAPHICAL NOTES

Irena Pawłyszyn is an Assistant at the Chair of Production Engineering and Logistics at the Faculty of Engineering Management, Poznan University of Technology. She teaches subjects involved organization and production management such as “Production and supply logistics”, “Warehouse designing”, “Supply chain management” etc. Her professional interests include logistics of production, Lean Management, Lean tools and clusters. She is the author and co-author of several publications in journals and monographs.

The study has been prepared as a part of the project: 503225/11/140/DSMK/4137

Date submitted: 2016-11-29

Date accepted for publishing: 2017-10-30

Irena Pawłyszyn
Poznan University of Technology, Poland
irenapawlyszyn@wp.pl

