



BARRIERS TO EFFECTIVE IMPLEMENTATION OF LEAN MANAGEMENT PRINCIPLES – EMPIRICAL EXEMPLIFICATION IN THE INDUSTRY OF AGRICULTURAL MACHINERY

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ABSTRACT. Background: The constitutive aim of this paper is to explore the barriers to effective implementation of the principles of lean management among manufacturers of parts, subassemblies and ready-made agricultural machinery. The realization of the formulated goal requires –first of all – an attempt to create a catalogue of determinants implying the leanness of a manufacturing unit. Consequently, the conceptual study of the method will be preceded by extensive analysis and systematization of the current achievements, including: on the theoretical level, the analysis of the literature being in direct relation to the subject of research; it will find its expression in the set of barriers determined in source literature on the subject that compresses the leanness of the generation unit and – on the design level – their catalogue based on the point of view of experts invited to this research. On the empirical level, it is assumed that the hierarchy of importance will be recognized for each of the determinants listed in the catalogue, and it will be determined which one constitutes the largest barrier from the point of view of enterprises invited to research (self-assessment).

Methods: The interdisciplinary nature of management sciences creates problems in the selection of research methods with which one intends to describe a given problem. In empirical research, methods and research tools verified in other research are often used (directly or with some modifications). The authors of this paper also use verified methods and tools; however, the method and tools used by them will be selected in accordance with the adopted methodological concept. On the theoretical level – using the method of reconstruction and interpretation of the source literature – the authors, referring to the key principles of lean management, have selected key barriers to their effective implementation. Reconstruction and interpretation of the source literature was supported by practical experience of the authors, participant observation and creative discussion with deliberately chosen experts. The preparatory study conditioned the conduct of the proper research; the intention of the authors was to develop a form – a catalogue of barriers implying lean production, which is a tool enabling reconnaissance in the surveyed enterprises. The research will be both diagnostic and verifying in nature. It will relate to relationships between variables describing the barriers to effective implementation of lean management principles, and requirements implying leanness, identifying the reality under investigation.

Results: As a result of the research, it was found that the factors that significantly determine the effective implementation of lean management principles are possession of a permanent and competent managerial and executive staff. The entrepreneurs subjected to the research indicate the absence of permanent, qualified employees who are replaced by "random" employees, which does not serve continuous improvement (gap – 1.01). In view of the foregoing, they do identify lean management with reduction in the level employment in the company.

Conclusion: This publication was created as a result of reflection, research and authors' practical experience in managing the enterprises operating in the sector of agricultural machinery. It is an ambitious attempt to depict knowledge on implementation of the principles of lean management in a manufacturing company. Thanks to this, it can play the role of a scientific aid, and at the same time be a source of knowledge necessary in managerial activity. The authors hope that the presented publication will provide a new knowledge, the consideration of which may form the basis of for actions that will need to be addressed in the near future and can begin a discussion on the necessity of overcoming the limits regarding the implementation of lean management.

Key words: lean management, manufacturing unit, barriers to implementation of lean management rules

INTRODUCTION

Lean management becomes not only a domain of theoretical interests, but also a practical guideline for managers who are building new types of strategies. More and more companies appreciate the way of business management, where "leanness" is the point of reference. The method of management compatible with this concept meets, in a flexible and continuous manner, the challenges of demand variability and growing customer requirements, and thus gives the opportunity for further development, which, according to the authors, is a desirable feature of any organization. Leaning management is achieving such efficiency that makes the company flexible, lean, and trained. The "lean" enterprise builds its organization and manages the process so that the client actually pays for its production, not for the functioning of e.g. a huge organizational structure, warehouses, means of transport or excessively extensive administrative work, etc.

Consequently, the research was undertaken the main purpose of which was to define barriers to the effective implementation of the principles of lean management among manufacturers of parts, subassemblies and ready-made agricultural machinery. Realization of the so formulated goal required – first of all – an attempt to create a catalogue of determinants implying the leanness of the manufacturing enterprise. Consequently, the conceptual study of the method was preceded by extensive analysis and systematization of the current achievements, including: on the theoretical level, the analysis of the literature being in direct relation to the topic of research; it found its expression in creation of the set of barriers identified in the source literature that reduce leanness. And on design level – creation of their catalogue from the point of view of the experts invited to the research. On the empirical level, the authors assumed that they would recognize the hierarchy of importance of each of the determinants mentioned in the catalogue, and that they would find out which one constitutes the

largest barrier from the point of view of enterprises invited to the research (self-assessment).

The interdisciplinary nature of management sciences creates problems in the selection of research methods by means of which it is intended to describe a given problem. In empirical research, methods and research tools verified in other studies are often used (directly or with some modifications). The authors of this paper work in a similar way, however their method and tools have been selected according to the adopted methodological concept. On the theoretical level – by referring to the key principles of lean management and using the method of reconstruction and interpretation of the source literature - barriers to their effective implementation were selected. Reconstruction and interpretation of the source literature was supported by practical experience of the authors, participant observation and creative discussion with deliberately chosen experts. The preparatory study conditioned the conduct of the proper research; the intention of the authors was to develop a form - a catalogue of barriers implying lean production, which is a tool enabling reconnaissance in the surveyed enterprises. The conducted research was both diagnostic and verifying in nature. It applied to the relationships between variables describing barriers to effective implementation of lean management principles and the requirements implying leanness, thereby identifying the investigated reality.

PRINCIPLES OF LEAN MANAGEMENT - CONCLUSIONS AND RECOMMENDATIONS

Currently, many Polish and foreign representatives of agricultural machinery manufacturers [Fertsch 2010; Hadaś, Stachowiak and Cyplik, 2014; Golińska, 2014; Konecka, 2010; Domański and Hadaś, 2008] and foreign [Khan, Haq, 2015; Lin Zhiang Hui Chun, 1996] show interest in solutions from the broadly understood scope of the so-called "lean management", which basically depends on creating a flexible system that responds to

the changing needs of the client [Goda, Medina, Zsidai, 2017]. A suitable configured system can deliver products and services in accordance with the expectations of customers, i.e. with the highest quality, in the right place, time and at the lowest possible cost. Lean production relays on the continuous elimination of waste and continuous improvement. This concept strongly emphasizes the need for elimination of waste and use of such forms of production units that the effectiveness and efficiency of the enterprise would not be reduced [Nogalski, 2010]. Therefore, the elimination of waste has become one of the decisive elements helping to build an effective and lasting competitive advantage of a production company. Thus, a lot is said about the system that allows increased productivity and efficiency, reducing production costs and the broadly understood Lean Manufacturing philosophy is being considered [Niewiadomski, Pawlak, 2016, Leite et al. 2015]. In addition, it solves the elimination of waste and makes the flow process more streamlined and efficient. Consequently, lean management has become the current management paradigm, which has developed over the recent decades and is currently one of the most popular management concepts. The more so that companies increasingly appreciate the way of managing a company in which "excellence" is the reference point.

Lean Management is a management methodology that creates a kind of work culture in an organization. It comes down to the fact that all people associated with a given organization are interested in a constant reduction of costs, shortening the delivery cycles and improvement of quality. Leaning management is achieving such efficiency that makes the company flexible, lean, trained and fit. A lean company builds its organization and manages the process so that the client actually pays for its production, not for the functioning of e.g. a huge organizational structure, warehouses, means of transport or excessive administration works, etc. Therefore, Lean Management is a lean, resilient and flexible production that allows achieving above-average profits. Lean Manufacturing is a concept that is defined as a "slimmed-down"

production that consumes less resources, less human effort, less equipment, less time and space, while striving to supply the customer with exactly what he currently expects [Koch et al. 2003, Belekoukias, Garza-Reyes, Kumar 2014, Feizabadi, Singh, Motlagh 2014, Dora et al. 2015]. J. According to some authors the main goal of Lean Management is to achieve at the same time a high level of economic efficiency, quality and flexibility [Leite et al, 2015]. The complexity of activities related to this means, that the chain of various undertakings aimed at "slimming down the organization" should never end or be closed.

The concept of a lean enterprise is aimed at eliminating all manifestations of waste, thanks to which the economic efficiency of operations is improved, as the company uses less resources to achieve the same goal. Consequently, the concept of lean should be understood as a set of activities that influence the reduction of activities that do not add value to the product and enable the achievement of results that allow defining the enterprise as lean. It can be said that lean is a concept of action, leading to reduction of the enterprises' costs by minimizing the involvement of the means of production in the production process as well as through so-called current company behaviour adjusted directly to the changing requirements of the environment.

In conclusion, it is worth emphasizing that lean as an organization of lean enterprise manifests itself in the application of the above-mentioned principles not only in the field of manufacturing, but also in product design, its technology, supply chain, customer relations and sales. All these activities need to be harmonized, creating a lean enterprise. The organization of such an enterprise is characterized by transferring as many tasks as possible to employees who add value to the product during its production, and equip the company with a system detecting defects, their causes and granting their removal.

The feature of lean production is the detailed, optimal design of "value chains". In such case, one should concentrate on their structuring which means creating a production system, which is generally based on Just in

Time concept. Structuring of the production system – is based on searching for the best configuration of "value chains". According to the lean concept, it is necessary to create flexible, subject oriented solutions for organization of the production process [Domański and Pawlak, 2007]. In addition, construction of a production system according to the principles of this concept is an improvement-oriented, long-term task. This is because the scope of changes that must be made depends largely on the organizational conditions of the enterprise, to the main extent, on the complexity of the manufactured products, size and repeatability of production, and especially on the production resources and their features.

In the context of considered issue, it should be emphasized that the implementation of the principles of lean management often fails: the changes are not being maintained or the organization does not receive the expected benefits. The estimated amount of such cases reaches up to 90 percent. [Bhasin, 2012, Juliani, Oliveira 2017]. In literature as well as in the conducted research, many barriers to the use and maintenance of lean management have been identified [e.g. Albliwi, et al., 2014], what is being discussed in detail in a later section of this publication.

SCHEME OF RESEARCH IMPLEMENTATION

STRUCTURE OF THE RESEARCH FORM - PREPARATORY RESEARCH

During the preparatory study [B1] in which the authors aimed at developing the research form, they used: the method of literature study, documentary research, expert's knowledge, participant observation as well as practical work experience. The preparatory study conditioned the conduct of the proper research [B2a; B2b]; the intention of the authors was to develop a form - a list of factors determining the implementation of the principles of lean management. At this stage of the research design, an evaluation sheet was used, as developed by P. Walentynowicz [2013]

supplemented with proposals of Polish [Borkowski and Ulewicz, 2009; Nogalski, 2010; Czerska, 2014a, 2014b; Ulewicz and Mazur, 2015; Bednarek, 2015; Ulewicz and Kucęba, 2016] and foreign [Womack 2012; Liker, 2005; Mann, 2014, Bilge 2017] researchers. The authors believe that their own experience and participant observation have a significant cognitive value to the study. Consequently, it was considered reasonable to use them as one of the sources used to create the assessment form. One of the authors is associated with production companies operating in the sector of agricultural machinery for over 15 years; and as a member of the board, he directly coordinates lean projects. The other author - conducts consulting and training activities, and as a coordinator is involved in running lean projects; assisting in organization and realization of projects to the company's management staff in the initial and subsequent implementation period. At this stage of formulating the list - in order to match the research tool to a specific sector and limit the number of generated determinants - the open discussion technique was used within a group of people directly related to enterprises operating in the sector of agricultural machinery and experts in lean management.

The expert discussion was conducted among 14 targeted owners and managers of production companies operating in the Polish agricultural machinery sector. In each case, experts were professionally active, actively involved in managing the enterprise from which they came (11 people - owners actively involved in the implementation of the principles of lean management) or for which they operate (3 people – directly responsible for the process, actively participating in various types of projects as the substantive support for the executive staff). Two stages were distinguished in the discussion: in the first stage, after viewing the list of factors favouring the implementation of the lean management rules, which was generated on the basis of preliminary research, experts proposed new ideas in order to point out the barriers that exist in practice. In the second stage, the significance of the occurrence of each of these barriers was assessed.

On the basis of expert consultations, a research tool was prepared in the form of a sheet of assessment of practical barriers to the implementation of the principles of lean management in the sector of agricultural machinery. As part of the proper study, an assessment of the occurrence of individual barriers in purposefully selected enterprises was made.

RESEARCH MATERIAL AND METHOD

The prepared list of barriers to the effective implementation of lean management rules was verified among 71 production companies in the agricultural machinery sector. The research was carried out in three stages, i.e. during:

- Agricultural Exhibition Green AGRO SHOW 2018 held on 26th-27th of May 2018 (survey among 23 enterprises, which accounts for 32.39% of all surveyed enterprises);
- 15th edition of the agricultural exhibition OPOLAGRA held on 15th -17th June 2018 (survey among 19 enterprises, which accounts for 26.76% of all surveyed enterprises);
- 41st Agro-Industrial Trade Fair AGROTECH 2018 held on June 30th - July 1st 2018 (survey among 29 entrepreneurs, which accounts for 40.85% of all surveyed enterprises).

Interviews were conducted among 32 [i.e. 45.07%] owners and 39 [i.e. 54.93%] representatives of deliberately selected production companies operating in the sector of agricultural machinery. When deciding on the selection of the respondent, his direct relationship with researchers was an important criterion. It allowed to determine whether the person making the assessment is independent in his views and opinions and, above all, whether he has sufficient knowledge in the subject matter. The selection of respondents considered their practical experience in the agricultural machinery sector. Considering the communication barriers, only people who were able to attend direct meetings and thus have the possibility to be interviewed were invited to the research. In the opinion of the authors, this

resulted in high efficiency and quality of the research. As the survey was conducted using a questionnaire technique as a research tool, it enabled the determination of the anticipated and current (self-assessed) level of implementation of the indicated determinants. The distribution of answers to questions in individual thematic blocks is presented in the further part of the work.

Defining barriers to implementation of the principles of lean management requires assessment of the level of implementation of favourable factors (desired state). Respondents are reluctant to reveal the weaknesses of their company; they are more likely to talk about its strengths. Notwithstanding the foregoing - apart from the assessment of the required level of implementation of favourable conditions [B2a] - in the next stage of research [B2b] respondents assessed the current level of their implementation (self-assessment). The difference between the desired level and current level of implementation in fact determines the significance of the barrier with which modern manufacturers of the machine sector are struggling.

BARRIERS TO EFFECTIVE LEAN MANAGEMENT IMPLEMENTATION - RESULTS OF AUTHORS' OWN RESEARCH

What factors affect the effectiveness of implementation of lean management? Theoretically, it is known to every owner, manager or even the employee. Therefore, when looking for optimal methods for constructing a model of a lean enterprise, and assessing factors influencing the effectiveness of the implementation, the authors decided to conduct research among selected management practitioners. The objective impossibility to fully develop all the threads of this rather complex problem does not relieve the authors of their responsibility for presenting the obtained results of research (which are presented in Table 1).

Table 1. Determinants of an effective lean management implementation - current and postulated status

Item	DETERMINANT	Postulated state [B2a]	Current state [B2b]	Significance
a	b	c	d	e = c-d
1.	Having permanent managerial and executive staff	4,74	3,73	1,01
2.	Competences of the executive staff	4,69	3,68	1,01
3.	Patience, discipline and the ability to plan and implement activities in the long-time perspective	4,66	3,72	0,94
4.	An employees' sense of identification with the company; a sense of belonging to the company; identification with the problems and needs of the company	4,65	3,82	0,83
5.	Trust in employees	4,56	3,77	0,79
6.	Motivating employees	4,80	4,06	0,74
7.	Good communication; proper internal and external communication system; impeccable flow of information between employees and managers	4,18	3,48	0,7
8.	Support in the matter of training for both regular employees and management and help in understanding the nature and principles of lean management	4,46	3,76	0,7
9.	Creativity of employees	4,90	4,31	0,59
10.	Creation of a map of activities that will increase the value of the product and remove those activities that do not lead to its increase	4,21	3,76	0,45
11.	Help of business partners	4,20	3,77	0,43
12.	Barrier between the management and the employees	4,24	3,82	0,42
13.	Not limiting lean management to the production area alone, by perceiving it as an isolated element of the enterprise	4,23	3,82	0,41
14.	Identifying values from the point of view of the customer	4,55	4,14	0,41
15.	Enforcement of work implying the possibility of implementing the principles of lean management	4,01	3,61	0,40
16.	Leadership	4,79	4,42	0,37
17.	Benchmarking of effects and solutions	4,63	4,28	0,35
18.	Level of remuneration in the company	4,66	4,34	0,32
19.	Adequate financial resources	4,82	4,55	0,27
20.	Engaging all company's employees in problem solving and continuous improvement	4,45	4,21	0,24
21.	Employees' responsibility for their own work (decentralization of duties)	4,49	4,27	0,22
22.	Competences of the managerial staff; understanding the idea of Lean by the whole managerial staff; as a consequence, support for changes from all managers (their acceptance)	4,82	4,62	0,20
23.	Regular training increasing employees' knowledge	4,45	4,25	0,20
24.	Clear vision and precise goals for improving the entire organization; unification of goals that give managers a single course of action	4,38	4,21	0,17
25.	Having a modern, flexible technology that fosters lean production	4,66	4,54	0,12
26.	A wide, holistic look; not focusing only on setting goals and holding employees accountable for the extent to which they have achieved them	3,97	3,92	0,05
27.	Leaving "from behind the desk" management. Making decisions based only on own observations and judgments; no decisions are made solely on the basis of data collected and provided by subordinates	4,35	4,31	0,04
28.	Not complicated and non-hindering instructions and procedures; unusable, difficult to interpret or read data are collected. Often, the interpretation of such data does not allow you to draw any conclusions or they are misleading. Most of the collected data are put on the shelf – they lack analysis.	4,00	3,99	0,01
29.	Pressure of the environment (partners, customers of the company)	4,56	4,55	0,01
30.	Not identifying the processes of lean management only with decreasing company's employment level.	3,82	4,01	-0,19

Source: authors' own study

An important element determining the effectiveness of implementation of the lean management principles is the possession of a permanent managerial and executive staff (average score 4.74, 76.1% indications for 5 points score). This is an increasingly difficult

goal to accomplish today (average score 3.73, 35.2% of indications for 5 points score), but it is the basic challenge to increase profits and reduce losses to a minimum. Currently, due to the lack of qualified executive staff, permanent employees are very often replaced by

"accidental" employees, which do not help to implement the principles of lean management culture.

Until recently, the quality of the executive staff was measured by professional qualifications, expressed by the level of formal education and acquired experience. Currently, this approach is no longer valid. The development of new professional challenges requires greater effectiveness and often interdisciplinary in terms of substantive knowledge as well as in predispositions and soft skills. To be effective in implementing lean management principles, the skills of practical and flexible application of knowledge, professional skills and dispositions as well as the motivation to disclose them, namely competences are necessary (average score 4.69; 74.6% of the indications for 5 point score) As a result of the conducted research, it has been determined that, though regular direct executive employees know what is lean management, what are its objectives, requirements and possibly achievable effects (average score 3.68; 23.9% of the indications for 5 point score), there is a visible gap (1.01 point) between the present and the desired level in this scope.

The implementation of the principles and the most important lean management tools usually takes 2 to 4 years. This undertaking requires patience, discipline and the ability to plan and implement activities in the long term (average score 4.66, 71.8% of the indications for 5 points score). Meanwhile, many managers and business owners are focused on quick actions that will bring results in a short time.

Enterprises should pay special attention to the most important resource of the company, that is employees. Satisfaction from work, a sense of unity and solidarity of employees with the company significantly determines the culture of lean management (average score 4.65, 69.0% of the indications for 5 points score). Thus, they determine competitive advantage and better functioning of the company in the environment. In this respect, entrepreneurs point out quite a significant gap of 0.83 points. The feeling of belonging to the

company, identifying with its problems and needs constitutes a significant barrier with regard to lean management (average score 3.82, 19.7% indications for 5 points score).

Of all the positive traits that an employee should have, commitment is of utmost importance from the point of view of a lean company. The role of managers is to create such working conditions for their people, so that they would be able to use their skills and potential to fulfill the company's goals with satisfaction. In order to successfully implement Lean Management in the company, so as to continuously improve efficiency and processes, build flexibility and innovation, it is necessary not only to implement appropriate techniques, but above all to learn to rely on the employees. This ability is conditioned by both internal interpersonal and organizational factors, and one of such factors is trust (average score 4.56, 62.0% indications for 5 points score) which the surveyed entrepreneurs should work on (average score 3.77, 26.8% of the indications for 5 point score).

Commitment, trust and, as a result, success come from the emotional attitude of employees and the atmosphere at the workplace affects it. The key factor of this atmosphere is the right motivation (average score 4.80, 83.1% indications for 5 points score). Therefore, the key is to build a coherent motivational system, considering the existing knowledge on the subject, organizational culture of the company, its history, situation in the sector or the profile of employees. Activities in the area of human emotions - and this is the sphere of motivation - are very fragile, it is easy to make a mistake here, to venture trust, and it takes a long time to rebuild it. The surveyed enterprises should take care of the implementation or improvement of the employee motivation building strategy (average grade: 4.06, 21.1% of indications for 5 points score); gap at the level of 0.74 points. Effective increase in employee involvement must involve open communication. It should be clear at every level of the company, so that everyone is aware of what is going on around them (average score 4.18, 43.7% of indications for 5 points score). Meanwhile, it was observed that managers are not in constant, direct dialogue

with their subordinates, the flow of information between employees and managers raises concerns. It is easy to sense moods that negatively affect the teams' effectiveness of work (average score 3.48, 12.7% of the indications for 5 points score).

Introduction of lean culture in an enterprise is associated with one of the biggest problems which is the employees' resistance to changes. In order for the applied solutions to be sustainable and effective, the employees themselves should understand the purpose of their implementation. Therefore, it is important to support both regular employees and the management staff in training, including assistance in understanding the nature and principles of lean management (average score 4.46, 63.4% of the indications for 5 points score). Resistance to changes does not have to apply only to employees who produce products directly in the production hall, and may also appear among the management staff. Lack of understanding and, consequently, lack of support for changes (or at least their acceptance) from managers and contractors is often a huge barrier to business development in line with the Lean concept (average score 3.76, 25.4% of indications for 5 points score; gap on the level of 0.7 point).

The manager's role is to work with their people in a way that makes human creativity become part of their everyday work (lean.org.pl). To be competitive, enterprises need to act today, and develop an ability to improve in their employees. So how to resurrect creative solutions in the company? As a first step, the leader must adopt an attitude of openness to the whole range of ideas. Provide an environment in which these ideas will be born. Secondly, work out a model for their initial verification. It is about creating a climate that will ensure that employees, without fear of being disrespected, will submit ideas concerning improvement of their workplace, produced products and the company itself (average score 4.90, 91.5% indications for 5 points score). In many enterprises such model of its functioning has been developed (average score 4.31, 38.0% of the indications for 5 points score). Unfortunately, for many companies it is a one-

off initiative, not a systemic solution in which the principles of reporting, giving opinions, implementing and rewarding ideas are standardized.

Implementation of lean management rules is aimed at eliminating waste. Therefore, it is crucial to create a map of activities that will increase the value of the product and prevent those activities that do not lead to its increase (average score 4.21, 45.1% of the indications for 5 points score). In practice, enterprises operating in the sector of agricultural machinery use various tools supporting the implementation of management functions, used to organize, monitor and measure the effects of activities and consequently operational efficiency (average score 3.76, 26.8% of the indications for 5 points score), which means that the gap between the desired and the current level of implementation is negligible.

Partners are the most important element of every business. They are treated as the greatest value for an enterprise which determines its development. That is why managers attach great importance to building the loyalty of business partners and thus seeking sources of competitive advantage (average score 4.20, 36.6% of the indications for 5 points score). Consequently, the design of effective Lean programs is, to a large extent, supported by business partners (average score 3.77, 22.5% indications for 5 points score); leads to an efficiency increase of up to 20-40%.

A factor that significantly influences the culture of lean management is the relationship between employees and the superior. The determinants of this state of affairs are mutual trust, respect and freedom of expression. None of these elements is independent from the others. Both trust and respect and the ability to express oneself openly must apply to both sides. In order to build well-functioning relations, regular contacts, during which both parties will be able to reach conclusions jointly, are also needed (average score 4.24, 50.7% of the indications for 5 points score), which in practice are sometimes forgotten (average score 3.82, 26.8% of the indications for 5 points score).

An important problem that often arises during the implementation of lean management is the limitation to the production area alone, as it is perceived as an isolated element of the enterprise (average score 3.82, 15.5% of the indications for 5 points score). However, it should not be forgotten that production coexists only in cooperation with other areas or departments of the company (average score 4.23, 29.6% of the indications for 5 points score). An important barrier to the implementation of a lean management culture is the ability to identify values from the customer's point of view (average score 4.14, 28.2% of the indications for 5 points score), which entrepreneurs should assimilate on a slightly higher level (average score 4.55; 63.4% of the indications for 5 points score).

For organizations striving to implement the Lean Management concept, it should be particularly important to enforce the execution of tasks by individual employees (average score 4.01, 36.6% of the indications for 5 points score). The obtained results should be carefully controlled. Controlling helps to check whether the actions undertaken by the employees lead to the achievement of the goal. For this to happen, it is necessary to establish clear indicators and constantly measure efficiency with which modern manufacturers sometimes have a problem (average score 3.61, 25.4 of the indications for 5 points score). For this you need a leader who knows and uses the tools appropriate for lean management. A wide range of competences allows them to quickly notice potentials and efficiently manage improvement projects. An effective leader notices the sources of waste, organizes effective workplaces, coordinates the realization of optimization activities, has knowledge how to standardize and visualize processes, and above all promotes a culture of continuous improvement and supports employees at the highest level (average score 4.79, 81.7% of the indications for 5 points score). Practicing the abovementioned skills by the leaders of the surveyed enterprises, at any level of the organization, results in them being perceived by their teams as competent managers (average score 4.42, 56.3% of the indications for 5 points score), who are aware of the fact that that benchmarking is an

important method of managing manufacturing companies, which enables the organization to be improved on the basis of learning from the best. It can be effectively used virtually in all areas of their operation. This means that this method should be used in lean management (average score 4.63, 69.0% of the indications for 5 points score). This method is therefore aimed at the continuous activity of the organization, it is not enough to compare the results, it is also necessary to review the practices leading to such results, which is sometimes neglected by modern managers (average score 4.28, 43.7% of the indications for 5 points score).

Financial resources are very important from the point of view of effective implementation of lean management principles (average score 4.82; 83.1% of the indications for 5 points score) as these make it possible e.g. to ensure an appropriately high level of remuneration in the company (average score 4.66, 70.4% of the indications for 5 points score). On this background, there is no significant discrepancy between the anticipated and the actual level of implementation. Similarly, on a high level, entrepreneurs declare engagement in problem solving and continuous improvement of all employees employed in the company (average score 4.21, 33.8% of the indications for 5 points score). A small gap indicates the high responsibility of employees for their work (average score 4.27, 35.2% of the indications for 5 points score). Respondents highly rated the frequency and level of training (average score 4.25, 35.2% of the indications for 5 points score). From the point of view of lean management implementation, it is important to communicate a clear, comprehensible vision and to unify goals that indicate one direction to managers (average score 4.38, 45.1% of the indications for 5 points score), which in practice is implemented by enterprises at a high level (average score 4.21, 32.4% of the indications for 5 points score). Lean production is favoured by the possession of modern and flexible manufacturing technology (average score 4.66, 71.8% of the indications for 5 points score), which is practically not a barrier (average score 4.54, 63.4% of the indications for 5 points score). In the course of the completed research, the authors' previous

assumptions announcing the end of the idea of "from the desk" management have been confirmed. Decision making is based on own observations and judgments; there is a decline in decision made based solely on data collected and delivered by subordinates. Contemporary managers are characterized by a broad, holistic view. Managers do not focus only on setting goals and holding employees accountable for the extent to which they have achieved them; the whole performed work is taken into consideration (average score 3.92, 23.9% of the indications for 5 points score), what fits into the canons of lean management (averages core 3.97; 26.8% of indications for 5 points score).

As a result of the conducted research, it has been established that modern enterprises are not "over-formalized". Companies rather use not very complicated, work-friendly instructions and procedures. For today's enterprises, only specific data matters, which, after interpretation, allow them to reach the desired conclusions. Also, the pressure from the company's partners or clients is not a barrier to the effective implementation of lean management. Noteworthy is the fact that lean management is not identified solely with reduction of employment in the company. Declared level of implementation of the variable (average score 4.01, 38.0% of the indications for 5 points score) slightly exceeds the anticipated level (average grade 3.82, 31.0% of the indications for 5 points score), which causes over-competence in this area.

The presented research shows a number of difficulties and barriers in the implementation of lean management and emphasizes the synergic nature of the tools appropriate for lean. Probable reasons for the unsatisfactory level of implementation of all categories should be sought not only in the method and level of implementation of individual tools, but also in the use of the self-assessment research tool. This paper assumes that the ability to self-assess weaknesses and strengths of the surveyed enterprises is a key competence of the managers invited to the research. The authors assumed that the respondents are a "selected professional elite", which due to the profession (everyday contacts with the

environment and related feedback), has many opportunities to collect information on the given topic. It was decided to make use of this fact; hence the self-assessment questionnaire was selected as the most rational research tool, solving the problem of effective implementation of lean management. Of course, the authors are aware of the fact that opinions on the usefulness of this method of study are divided. Nevertheless, it was assumed that the method of self-assessment could be used despite its limitations. The aim of the conducted research was to recognize in which area of the lean management companies see any shortcomings and which ones are considered as barriers that should be overcome in order to improve the level of lean management implementation.

SUMMARY AND RECOMMENDATIONS

In every company there are many barriers to effective implementation of lean management. Many of them depend directly on the people who create, implement and supervise them and indirectly on the contractors who participate in their implementation. While concentrating on the minimization of the barriers to implementation, one should focus on changing the employees' attitude. They must reject passivity and conservative behaviour by adopting an offensive style of action, which requires inventiveness, courage and the ability of quick reaction to external stimuli. Managers should encourage employee participation in creating changes and make them sensitive to the processes occurring in the enterprise by introducing such forms of work that would encourage cooperation and taking responsibility.

New directions of research in management science are necessary for creating more durable and more effective development strategies. Therefore, the authors considered the presentation of conditions for effective implementation of selected lean management tools as justified in this publication. The presented barriers and ways of avoiding them do not exhaust the issues of lean management

implementation, but it is important that they can become a guide for those who want to make changes in their own enterprise.

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REFERENCES

- Albliwi S., Antony J., Lim S.A.H., van der Wiele T., 2014. Critical failure factors of Lean Six Sigma: a systematic literature review, "International Journal of Quality & Reliability Management", 31, 9.
<http://dx.doi.org/10.1108/IJQRM-09-2013-0147>
- Bednarek M., 2015. Zastosowanie Lean Manufacturing w Polsce i Meksyku. Modele-praktyka- doświadczenia [Lean Manufacturing application in Poland and Mexico. Models-practice-experience]. Di-fin, Warsaw. ISBN: 978-83-8085-027-9
- Belekoukias I., Garza-Reyes J.A., Kumar V., 2014. The impact of lean methods and tools on the operational performance of manufacturing organisations, *International Journal of Production Research*, 52:18, 5346-5366,
<http://dx.doi.org/10.1080/00207543.2014.903348>
- Bhasin S. 2012. An appropriate change strategy for lean success, *Management Decision*, 50, 3.
<http://dx.doi.org/10.1108/00251741211216223>
- Bilge P., 2017. Sustainable value creation by applying industrial engineering principles and methodologies, Doctoral Thesis , Technische Universität Berlin, 2017,
<http://dx.doi.org/10.14279/depositonce-5907>
- Borkowski S., Ulewicz R. 2009, Instrumenty doskonalenia procesów produkcyjnych [Instruments of Production Processes Improvement], PTM, Warsaw. ISBN 978-83-61949-00-8 version polish, ISBN 978-83-61949-00-6 version english.
- Czerska J. 2014a. Podstawowe narzędzia Lean Manufacturing [Lean Manufacturing Basic Toolbox], LeanQTeam, Gdańsk. ISBN: 978-83-938415-1-6.
- Czerska J. 2014b. Doskonalenie strumienia wartości [Value stream improvement], LeanQTeam, Gdańsk. ISBN: 978-83-938415-1-6.
- Domański R., 2008. Technological and organizational similarity coefficient (α) as a basis for value streams in lean production. *LogForum* 4, 2, 3.
- Domański R., Pawlak N., 2007. Wytyczne projektowania i stosowania szczupłych systemów produkcyjnych [Guidelines for designing and using lean production systems], *Logistyka* 1/2007, Instytut Logistyki i Magazynowania, Poznań, materiał elektroniczny CD.
- Dora M., Lambrecht E., Gellynck X., Van Goubergen D., 2015. Lean Manufacturing to Lean Agriculture: It's about time. Abstract ID: 1293. Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Norcross (2015): 633-642.
- Feizabadi J., Singh M., Motlagh S.A., 2014. Contribution of supply chain to corporate strategy: a case study in agriculture machinery industry, *International Journal of Logistics Systems and Management*, 18, 4,
<http://dx.doi.org/10.1504/IJLSM.2014.063981>
- Fertsch M., 2007. Organizacja produkcji i logistyki w przemyśle samochodowym [Organization of production and logistics in the automotive industry], *Logistyka* 2/2007.
- Goda A., Medina V., Zsidai L., Examination of the Hungarian agricultural machinery manufacturers' product planning, quality management techniques and production coordination, *Hungarian agricultural engineering* 2017, 32, 16-21,
<http://dx.doi.org/10.17676/HAE.2017.32.16>
- Golińska P., 2014. The lean approach for improvement of the sustainability of a remanufacturing proces, *Logforum*, 3, 5.
- Hadaś Ł., Stachowiak A., Cyplik P., 2014. Production-logistic system in the aspect of

- strategies for production planning and control and for logistic customer service, *Logforum*, 3, 9.
- Juliani F., de Oliveira O.J., 2017. Synergies between critical success factors of Lean Six Sigma and public values, *Total Quality Management & Business Excellence*, <http://dx.doi.org/10.1080/14783363.2017.1383153>
- Koch T., Kornicki L., Sobczyk T., Oleksy S., 2003. Wdrażanie szczupłego podejścia w Polsce [Implementation of lean approach in Poland], III Konferencja Lean Manufacturing, materiały konferencyjne, Wrocław.
- Konecka S., 2010. Lean and agile supply chain management concepts in the aspect of risk management, *Logforum* 4, 3.
- Leite, Higor dos Reis, Vieira, Guilherme Ernani, 2015. Lean philosophy and its applications in the service industry: a review of the current knowledge. *Production*, 25(3), 529-541. Epub February 27, 2015. <http://dx.doi.org/10.1590/0103-6513.079012>
- Liker J. K. 2005. Droga Toyoty. 14 zasad zarządzania wiodącej firmy produkcyjnej świata. Wyniki badań BOST [Toyota's route. 14 management principles of the leading manufacturing company in the world. BOST research findings], MT Biznes, Warszawa. ISBN: 978-83-8087-147-2
- Lin Zhiang Hui Chun, 1996. Should Lean replace mass organization systems? A comparative examination from a management coordination perspective, *Journal of International business studies*, 30, 1: 45-80. <http://dx.doi.org/10.1057/palgrave.jibs.8490060>
- Mann D. 2014. Tworzenie kultury Lean [. Wydawnictwo ProdPublishing.com, Wrocław. Creating a lean culture: Tools to Sustain Lean Conversions, ISBN 978-83-62776-05-4
- Nogalski B., 2010. Lean Management, [in:] *Koncepcje zarządzania*, red. M. Czerska, A. Szpitter, Wydawnictwo C. H. Beck, Warszawa
- Niewiadomski P., Pawlak N., 2016. Analysis of raw material participation in the production process, part II - practical aspects, *Research and logistics & production*, NR 1/2016, Poznan University of Technology, 29 January, 72, <http://dx.doi.org/10.21008/j.2083-4950.2016.6.1.7>
- Ulewicz R., Kucęba R. 2016. Identification of Problems of Implementation of Lean Concept in the SME Sector. *Economics and Management* 8, 19-25. <http://dx.doi.org/10.1515/emj-2016-0002>
- Ulewicz R., Mazur R., 2015. Doskonalenie transport wewnętrznego z wykorzystaniem koncepcji Lean- Studium przypadku [Improvement in internal transport using the lean concept- Case study]. *Przegląd Organizacji* nr 7, 6-13
- Walentynowicz P., 2013. Uwarunkowania skuteczności wdrażania Lean Management w przedsiębiorstwach produkcyjnych w Polsce [Determinants of the effectiveness of implementing Lean Management in production enterprises in Poland], Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, 15.
- Womack J. P., Jones D. T. 2012. Lean Thinking szczupłe myślenie. Eliminowanie marnotrawstwa i tworzenie wartości w przedsiębiorstwie. [Lean Thinking. Waste elimination and value creation in a company.] Wydawnictwo ProdPublishing.com, Wrocław.

BARIERY SKUTECZNEJ IMPLEMENTACJI ZASAD SZCZUPŁEGO ZARZĄDZANIA – EGZEMPLIFIKACJA EMPIRYCZNA W PRZEMYŚLE MASZYN ROLNICZYCH

STRESZCZENIE. Wstęp: Konstytywnym celem niniejszej pracy jest eksploracja barier skutecznej implementacji zasad szczupłego zarządzania wśród producentów części, podzespołów i gotowych maszyn rolniczych. Realizacja tak sformułowanego celu wymaga – w pierwszej kolejności - podjęcia próby sprokurowania katalogu determinant implikujących szczupłość jednostki wytwórczej. Wobec powyższego przeprowadzenie studium conceptualnego metody poprzedzone zostanie rozległą analizą oraz usystematyzowaniem dotychczasowego dorobku, w tym: na płaszczyźnie teoretycznej analizą piśmiennictwa pozostającego w bezpośredniej relacji z tematem badań; znajdzie to swój wyraz w zestawie – zidentyfikowanych w literaturze przedmiotu – barier komprymujących szczupłość jednostki wytwórczej oraz na płaszczyźnie projektowej opracowaniu – z punktu widzenia ekspertów zaproszonych do badań – ich katalogu. Na płaszczyźnie empirycznej zakłada się rozpoznanie hierarchii ważności dla każdej z wymienionych w katalogu determinant, oraz ustalenie która stanowi największą barierę z punktu widzenia przedsiębiorstw zaproszonych do badań (samoocena).

Metody: Interdyscyplinarność nauk o zarządzaniu, stwarza problemy w doborze metod badawczych, za pomocą których zamierza się opisywać dany problem. W badaniach empirycznych często wykorzystuje się (bezpośrednio lub z pewnymi modyfikacjami) zweryfikowane w innych badaniach metody i narzędzia badawcze. Podobnie postępują autorzy pracy, jednakże metoda i narzędzia zostaną dobrane według przyjętej koncepcji metodycznej. Na płaszczyźnie teoretycznej – wykorzystując metodę rekonstrukcji i interpretacji literatury przedmiotu - wyselekcjonowano, odnoszące się do kluczowych zasad szczupłego zarządzania – bariery ich skutecznej implementacji. Rekonstrukcja i interpretacja literatury przedmiotu wsparta została praktycznymi doświadczeniami autorów, obserwacją uczestniczącą oraz twórczą dyskusją wśród celowo dobranych ekspertów. Badanie przygotowawcze warunkowało przeprowadzenie badania właściwego; intencją autorów było opracowanie formularza – katalogu barier implikujących szczupłą produkcję, który stanowi narzędzie umożliwiające rekonesans w badanych przedsiębiorstwach. Prowadzone badania będą miały charakter zarówno diagnostyczny, jak i weryfikacyjny. Dotyczyć będą związków pomiędzy zmiennymi opisującymi bariery skutecznej implementacji zasad szczupłego zarządzania oraz wymaganiami implikującymi szczupłość, identyfikując badaną rzeczywistość.

Wyniki: W wyniku prowadzonych badań ustalono, że czynnikami istotnie determinującymi skuteczną implementację zasad szczupłego zarządzania są posiadanie stałej oraz kompetentnej kadry menedżerskiej i wykonawczej. Poddani badaniu przedsiębiorcy wskazują na brak stałych, wykwalifikowanych pracowników, których zastępuje się pracownikami „przypadkowymi”, co nie służy ciąglemu doskonaleniu (luka – 1,01). Wobec powyższego, w żadnym razie, nie utożsamiają szczupłego zarządzania ze zmniejszaniem poziomu zatrudnienia w firmie.

Wnioski: Niniejsza publikacja powstała jako efekt przemyśleń, badań oraz praktycznych działań autorów w zarządzaniu przedsiębiorstwami działającymi w sektorze maszyn rolniczych. Stanowi ambitną próbę zobrazowania wiedzy z zakresu implementacji zasad szczupłego zarządzania w przedsiębiorstwie wytwórczym. Dzięki temu może ona odgrywać rolę pomocy naukowej, a równocześnie stanowić źródło wiedzy niezbędnej w działalności menedżerskiej. Autorzy żywią nadzieję, że prezentowana publikacja – chociaż w minimalnym stopniu – dostarczy nowej wiedzy, której uwzględnienie może stanowić podstawę działań wymagających rozwiązania w najbliższej przyszłości oraz stać się załącznikiem dyskusji dotyczącej konieczności przełamania granic dotyczących implementacji szczupłego zarządzania.

Słowa kluczowe: szczupłe zarządzanie, jednostka wytwórcza, bariery implementacji zasad szczupłego zarządzania

EINSCHRÄNKUNGEN FÜR DIE EFFEKTIVE IMPLEMENTIERUNG VON PRINZIPIEN DES LEAN-MANAGEMENTS – EINE EMPIRISCHE EXEMPLIFIKATION IM LANDWIRTSCHAFTLICHEN MASCHINENBAU

ZUSAMMENFASSUNG. Einleitung: Das Hauptziel der vorliegenden Arbeit ist es, Einschränkungen für die effektive Implementierung von Prinzipien des Lean-Managements unter Herstellern von Ersatzteilen, Baugruppen und kompletten landwirtschaftlichen Maschinen wahrzunehmen. Die Ausführung eines so formulierten Ziels erfordert – in der ersten Reihenfolge – die Aufnahme eines Versuchs zwecks der Aufstellung eines Katalogs von Determinanten, die das Lean-Management der betreffenden Produktionsstelle implizieren. Angesichts der oben angeführten Prämissen wird einleitend eine eingehende Analyse und Systematisierung von bisherigen Erkenntnissen auf diesem Gebiet einen Auftakt für die Durchführung eines konzeptuellen Studiums der betreffenden Methode bilden. Im theoretischen Bereich bezieht sich das auf die Analyse des betreffenden Fachschrifttums, wobei anhand der Gegenstandsliteratur die das Lean-Management der Produktionsstelle beeinflussenden Einschränkungen identifiziert werden. Im projektbezogenen Teil der Bearbeitung werden sie – aus dem Gesichtspunkt der zu den Forschungen eingeladenen Experten - in Form eines Katalogs zusammengestellt. Auf der empirischen Ebene werden die Erkenntnis der Relevanzhierarchie für jede der im Katalog

genannten Determinanten und die Festlegung der größten Einschränkung aus dem Gesichtspunkt der zu den Forschungen eingeladenen Unternehmen (Autobewertung) angenommen.

Methoden: Die Interdisziplinarität der Management-Wissenschaften generiert Probleme mit der Auswahl von Forschungsmethoden, mit Hilfe deren man es beabsichtigt, das betreffende Problem zu erläutern. Bei empirischen Forschungen nimmt man oft (direkt oder mit gewissen Modifikationen) die in anderen Forschungen verifizierten Methoden und Forschungstools in Anspruch. Ähnlich handelten auch die Autoren der Arbeit, wobei jedoch die Methode und die Forschungstools anhand eines angenommenen methodischen Konzeptes ausgewählt wurden. Auf der theoretischen Ebene – unter Anwendung der Methode einer Rekonstruktion und Interpretation der Gegenstandsliteratur – identifizierte man die Einschränkungen für die effektive Implementierung der schlüsselhaften Prinzipien des Lean-Managements. Die Rekonstruktion und Interpretation der Gegenstandsliteratur wurden durch die praktische Erfahrung und die beteiligende Wahrnehmung der Forscher sowie eine schöpferische Diskussion der dazu gezielt ausgewählten Experten unterstützt. Die einleitende Erforschung des Problems bedingte die Durchführung der eigentlichen Forschungen, wobei die Absicht der Autoren es war, ein Formular – einen Katalog der die Lean-Produktion implizierenden Einschränkungen auszuarbeiten. Der Katalog stellt ein brauchbares Tool für die Durchführung einer einleitenden Inspektion in den untersuchten Unternehmen dar. Die auszuführenden Untersuchungen haben gegebenenfalls sowohl den diagnostischen als auch verifizierenden Charakter. Sie werden sich auf die Zusammenhänge zwischen den Variablen, die die Einschränkungen bei der effektiven Implementierung der Prinzipien des Lean-Managements beschreiben und den Anforderungen, die das Lean-Management angesichts der untersuchten Realität implizieren, beziehen.

Ergebnisse: Im Ergebnis der durchgeführten Forschungen stellte man fest, dass die Faktoren, die wesentlich die effektive Implementierung der Prinzipien des Lean-Managements determinieren, die Verfügbarkeit über eine kompetente Geschäftsführung und Produktionsleitung seien. Die in die Untersuchungen involvierten Unternehmer weisen jedoch auf den Mangel von festeingestellten, hochqualifizierten Mitarbeitern, die man schlechthin mit „zufälligen“ Mitarbeitern zu ersetzen versucht, hin, was nun einer ständigen Vervollkommnung zuwiderläuft (die Lücke – 1,01). Angesichts dessen identifizieren sie auf keinen Fall das Lean-Management mit der Herabsetzung des Beschäftigungsniveaus in ihren Firmen.

Fazit: Die vorliegende Veröffentlichung entstand als Ergebnis der Überlegungen, Forschungen und praktischen Aktivitäten der Autoren im Bereich des Managements von Unternehmen, die auf dem Gebiet des Maschinenbaus für die Landwirtschaft tätig sind. Sie stellt den ehrgeizigen Versuch einer Projizierung des Wissen über die Implementierung der Prinzipien des Lean-Managements in einem erzeugenden Unternehmen dar. Dank dessen kann sie auch eine Rolle als Lehrhilfsmittel spielen und gleichzeitig eine für die Manager unentbehrliche Wissensquelle sein. Die Autoren hegen die Hoffnung, dass die unterbreitete Veröffentlichung – wenn auch in einem minimalen Grad – ein neues Wissen, dessen Berücksichtigung eine Grundlage für die lösungsbedürftigen Aktivitäten in der nächsten Zukunft bildet und sie zu einem Ausgangspunkt für die Diskussion bezüglich der Notwendigkeit der die Implementierung des Lean-Managements anbetreffenden Überwindung von Grenzen werden lässt, mit sich bringt.

Codewörter: Lean-Management, Produktionsstelle, Einschränkungen für die Implementierung der Prinzipien des Lean-Managements

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