ASSESSMENT OF THE USE OF APPLICATION OF QUALITY MANAGEMENT METHODS AMONG THE COMPANIES MANAGERS: CASE STUDY OF PODLASIE REGION

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Introduction

An organisation operates in a dynamic environment, which results in the need of constant development and improvement in order to survive. To make this development possible, there have to be employees who have necessary knowledge and ability to look for new solutions concerning the improvement of organisations, while being supported with technology and resources necessary to conduct the changes (Brajer-Marczak, 2015, p. 78). The development is noticeable in relation to companies, that pay attention to qualification improvement of their staff, invest in their development, broaden their knowledge and increase their level of engagement (Urbaniak, 2010, p. 45). Orientation of employees to this type of activities requires effective management and such a directing, so that they would want their knowledge to grow and expand (Davenport, 2007, p. 162). Therefore, in order to improve the organisation, one should change not only the employees themselves, but the entire organisational culture. Changing the culture is a difficult and long-lasting process and one of its manifestations is broadening the knowledge of employees on topics of various methods and tools of quality management (Wolniak, 2012, p. 281). Managers, in order to properly direct teams involved in improvement, should set examples themselves as well as possess extensive knowledge, including the one on application of quality management tools and methods. This knowledge can contribute to a better understanding of processes in the organization (Starzyńska, Hamrol, 2012, p. 577) and at the same time make it a mature organization. Qualitative maturity is understood as a state in which the company fully understands what quality is, and comprehensively achieves it, and therefore meets the needs and expectations of stakeholders (Łukasiński, 2016, p. 95).

The purpose of this paper is to determine the level of knowledge and the extent to which selected quality management tools and methods are utilised among management personnel in Podlasie enterprises. The research was conducted in 2016 among the managers from Podlasie enterprises and it regarded organisations maturity level evaluation[1]. In this research, one of several discussed issues was the managers' knowledge concerning the quality management instruments, the degree of their implementation, and the purpose of these methods application.

Quality management instruments imply many different principles, strategies, techniques, tools, methods, concepts or methodologies of action (Starzyńska, 2013, p. 50; Bamford, Greatbanks, 2005, p. 377; Fotopoulos, Psomas, 2009, p. 566; Tarí, Sabater, 2004, p. 271). Numerous attempts have been made to classify them, one of them being a distinction of tools, methods and principles (Hamrol, 2015, p. 401). On the basis of the aforementioned classification, the following groups of instruments that support managers work, have been distinguished: classic tools, methods, additional tools/methods and concepts. The first group included: check sheet, control chart, fishbone diagram, flowchart, scatter diagram, histogram, and Pareto diagram. The group of methods contained: Quality Function Deployment (QFD), Failure Mode and Effects Analysis (FMEA), Design of Experiments (DOE), Measurement System Analysis (MSA), Statistical Reception Inspection, Analysis of Requirements and Satisfaction of Customer and Statistical tools. The following tools / methods were selected as additional ones: poka-yoke, SMED, 5S, Gantt chart, capability index, SWOT analysis and brainstorming. The selected concepts included: Lean Management, Six Sigma, Kaizen, TPM, Just in time, Benchmarking and Outsourcing.

Research sample

The study was carried out on 141 managers from 47 organizations. They came mainly from companies with a domestic capital (67% of companies) or foreign one (23%). There were not many representatives of cooperatives (6%) or state-owned enterprises (4%). They were mostly managers working in companies employing 50 to 249 people (42%). The number of the remaining respondents, working in the enterprises of different sizes (the level of employment of 0–49, 250–499, 500–1000 as well as 1000 and more) was similar (respectively: 17%, 14%, 13%, 14%). The analysis was conducted mainly with respect to companies whose main activities included: service (35.5% of organisations), trade (27.7%) or manufacture (22%). The other ones offered at least two of abovementioned forms of activity (Fig. 1).

The study was conducted with the use of PAPI method. The choice of enterprises was arbitrary, due to the fact that it covered only those organisations, which had agreed for the research to be carried out. After granting their approval to perform an interview, top management selected three managers, representing different scopes of company's business, who then completed the questionnaire. Those included: (1) managers of the departments responsible for contact with clients or suppliers, (2) persons inspecting primary activities

related to the company's operation, as well as (3) persons responsible for internal control or managing human resources.

Research results

One part of the survey concerned the level of knowledge and implementation of not only tools, but also methods and concepts connected with quality management. An overview of results has been respectively presented in Figures 2–5.

In Figure 2, the answers of the managers regarding the usage of tools called "Golden Seventh" can be observed. The most recognisable techniques include check sheets and control charts. Those tools were also the most systematically used ones from the described scope. Half of the managers did not know flowchart diagram, histogram, fishbone diagram or Pareto diagram. Those are also the techniques which are rarely implemented. The least known tool from „golden seventh" seem to be a scatter diagram – this technique was totally unknown by 67% of the survey respondents.

Figure 3 shows how managers responded in regard to seven primary quality management methods. The most popular among respondents proved to be the analysis of customer requirements and satisfaction. Even 16% of organisations, according to the knowledge of managers, use it systematically. More than a third of the respondents are unable to use the next method – statistical tools. Other methods were unknown for the majority of the managers. The failure mode and effects analysis were unknown to about ⅔ of the surveyed, but even more did not know quality functions deployment and statistical reception inspection, measurement systems analysis and design of experiments.

The next group of tools, presented in Figure 4, covers other techniques or methods not mentioned in the collections above. Among those instruments (as well as all described in

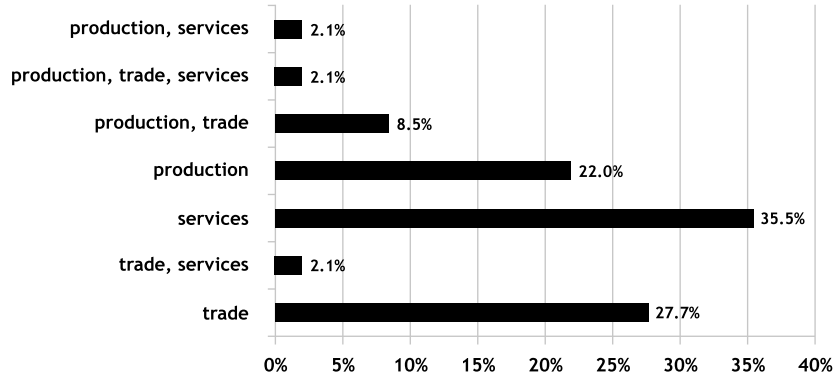

Figure 1. An overview of analysed companies considering their core activity
Source: own study

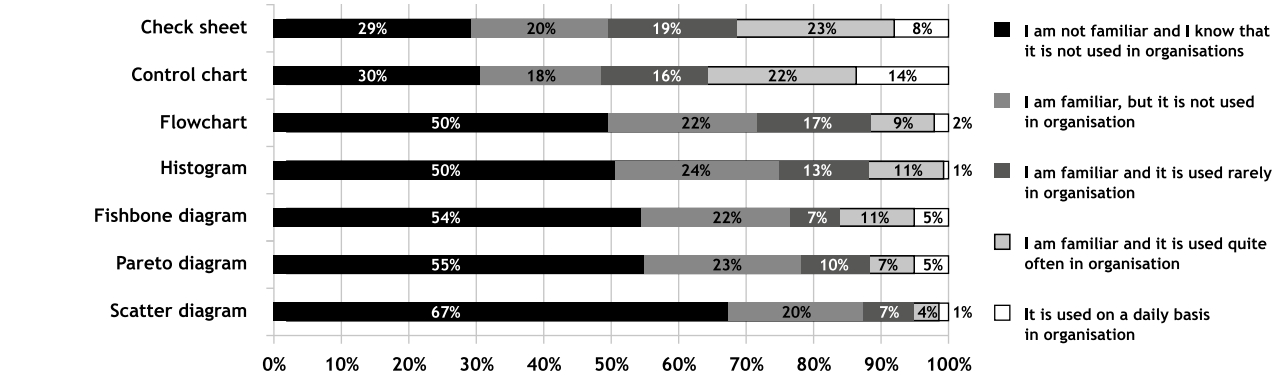

Figure 2. A summary of respondents' answers regarding implementation of the tools from the "Golden Seventh"
Source: own study

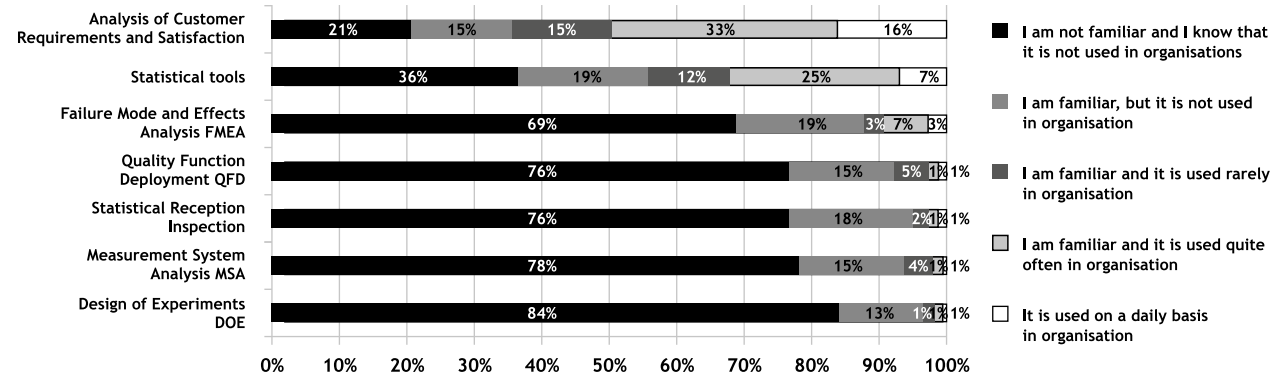

Figure 3. A summary of the answers regarding the degree of implementing primary methods of quality management in organisation
Source: own study

this article) brainstorming is recognised best. Only 11% of the managers have not heard of this technique. This method is also most often implemented in analysed organisations. Even 2/3 of the enterprises implement it systematically, that is often or every day. The second, unknown method to the surveyed managers, is the SWOT analysis. Almost a third of the managers use it systematically. The next method is 5S, which is unknown to almost a half of the surveyed. This is the method, which is declared to be used on a daily basis by 16% of responders. The least known in the considered group of instruments are: capability index, Gantt chart, poka-yoke method and SMED analysis. Those are also the tools/methods that are hardly ever used. Almost 11% of the respondents admit they implement it frequently or on a daily basis.

The survey also included slightly more extensive methods, usually treated as concepts (Fig. 5). Those included: Outsourcing, Just in time, Benchmarking, Lean Management, Six Sigma, Kaizen and TPM. The most frequently implemented and best known in this scope of methods/concepts is Outsourcing. In comparison the least known in this group is TMP.

With regard to indicated methods and tools, managers were asked about the purpose of their implementation. Among others, a need for changes, resulting from rapid company development was given, as the purpose of their implementation for many instruments. Their use was also the result of failing to meet the planned objectives, the need of processes simplification or the need to improve employee productivity or working conditions. It was also indicated that the reason for implementing many of the mentioned tools and methods is the need to introduce strict quality control over products or services, too many loopholes, discrepancies and inconsistencies in the processes or the need for customer relationship improvement.

Enhanced analysis

It can be interesting to identify which of the considered above tools or methods are used by managers of different types of organisations. A question can be asked which of the analysed enterprises find the quality management instruments to be of everyday importance, and which organisations do not introduce them at all. The analysis of correspondence was used in order to provide an answer to this question. It is a statistical analysis technique dedicated for variables presented on nominal or order scale. It allows to indicate a simultaneous appearance of variables of certain categories (Stanimir, 2005, p. 15). In this case, the answers regarding the knowledge and frequency of implementing the quality management instruments have been matched with the type of activity, capital and size of the organization.

To determine which of the variables shall be included in the correspondence analysis, the chi-squared dependence test was conducted, the results of which, for each instruments, have been presented in Table 1. The software Statistica 12.0 was used to perform the calculations. Moreover, for the purpose of the subsequent data presentation, the variables describing the degrees of familiarity with the certain method were reduced to three levels: (1) I am not familiar and I know that it is not used in organisation, (2) I am familiar, but it is not used in organisation, (3) I am familiar and it is used in organisation.

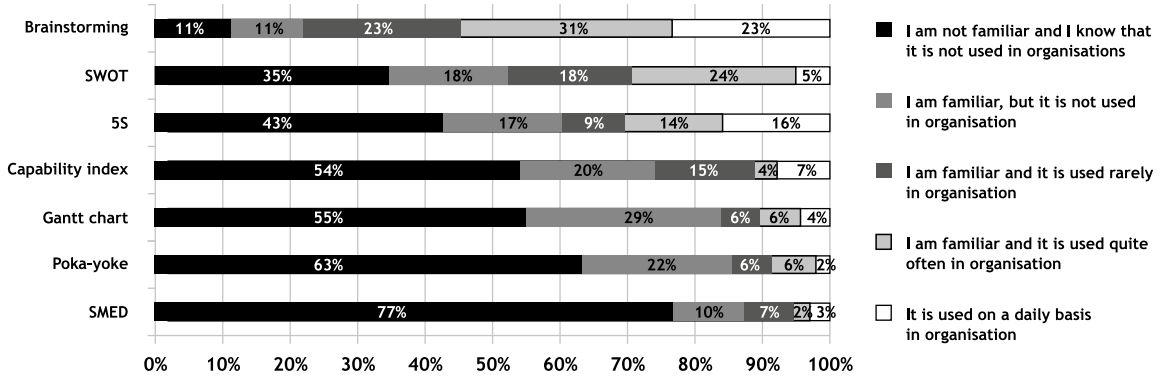

Figure 4. A summary of the answers regarding organisation implementation of the remaining methods/tools of quality management
Source: own study

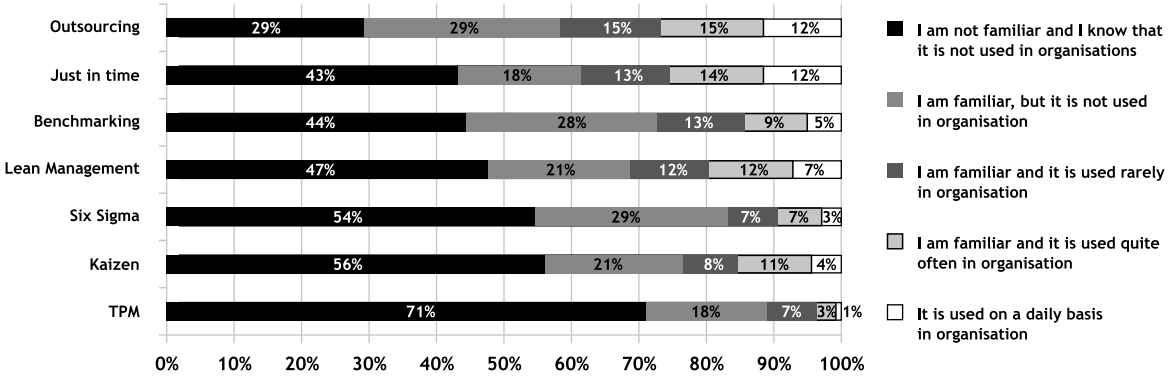

Figure 5. A summary of the answers regarding organisation implementation of the remaining methods/tools of quality management
Source: own study

Table 1. Results of the chi-squared dependence test (p-value)

Methods/tools	Type of activity	Capital	Size
Scatter Diagram (Scat.)	**0.076**	0.019	0.035
Pareto Diagram (Paret.)	0.011	0.001	0.000
Fishbone Diagram (Fish.)	0.002	0.002	0.032
Histogram (Hist.)	0.020	0.010	**0.091**
Flowchart (Flow.)	0.027	0.007	0.005
Control chart (Cont.)	0.001	0.000	0.021
Check sheet (Check.)	0.047	0.004	0.002
Design of Experiments (DOE)	0.000	**0.737**	**0.117**
Measurement System Analysis (MSA)	0.007	**0.345**	0.013
Statistical Reception Inspection	0.408	**0.952**	**0.159**
Quality Function Deployment (QFD)	0.470	**0.703**	**0.166**
Failure Mode and Effects Analysis (FMEA)	0.000	0.022	0.014
Statistical tools (Stat.)	**0.287**	**0.149**	0.002
Analysis of Customer Requirements and Satisfaction (Cust.)	0.063	**0.370**	**0.133**
SMED	0.000	**0.881**	**0.595**
Poka-yoke (Poka.)	0.000	0.006	0.022
Gantt Chart (Gant.)	0.003	**0.179**	**0.730**
Capability index (Capab.)	**0.261**	**0.137**	0.003
5S	0.000	0.001	0.010
SWOT	0.009	**0.277**	**0.091**
Brainstorming (Brain.)	0.002	**0.497**	**0.847**
TPM	0.002	**0.708**	**0.216**
Kaizen	0.000	0.000	**0.146**
Six Sigma (Six.)	0.002	0.038	**0.103**
Lean Management (Lean.)	0.002	0.039	**0.344**
Benchmarking (Bench.)	**0.068**	0.019	**0.091**
Just in time (Just.)	0.000	0.003	**0.133**
Outsourcing (Out.)	0.015	**0.093**	**0.516**

Source: own study

In Table 1 p-values, that are higher than the threshold value of 0.05 were bolded. While analysing the results, it can be noticed that the knowledge and usage of classic tools depends on the three given variables (except for the two instances, where p-value is close to the threshold value of 0.05 either way). Therefore, their knowledge and usage is dependent upon the form of activity, property as well as the size, among the studied group of enterprises. In case of seven methods, the dependence is noticeable primarily in the context of activity form. Statistical tools are the only exception. In addition, in the analysed group of methods, the usage of a majority of them is not dependent on the form of ownership (except FMEA) and the size of enterprise (except MSA, FMEA and Statistical Tools). In the next group – additional tools and methods, dependence upon the type of activity (except capability indices) is also noticeable. The implementation of Poka-yoke and 5S depends on the size as well as ownership, while capability index – on size only. The use of concepts and more complex methods depends mainly upon the form of activity (only Benchmarking reaches the p-value, slightly exceeding 0,05) and property (except TPM and Outsourcing). The implementation of any of these concepts was not dependent on the size of the enterprise.

The correlations obtained in this way served as the basis for the subsequent analysis of correspondence. However, due to the reduction in content, this publication presents only cumulative perception maps for which, unfortunately the total inertia is rather low. However, it should be noted that detailed analyses carried out in the two-dimensional analysis of correspondence showed in each analysed case high values of inertia.

The first map (Fig. 6) concerned classic quality management tools. Three variables were selected, which identify the organisations where the managers were employed. Those included: base activity (Z1), capital (Z2) and size (Z3).

Figure 6 presents a perception map in relation to seven primary quality management tools. These techniques are known and applied mainly by managers employed in manufacture companies with foreign capital, employing 250 to 499 people. They are known, but not applied by those who are employed in state-owned enterprises. On the other hand, those who are not familiar with given techniques are most likely to be found in domestic trade or service companies with no more than 249 or more than 500 employees.

The next perception map (Fig. 7) concerned quality of management methods. In this summary, two variables have

been selected: business type (Z1) and size (Z3). The type of capital was omitted, due to lack of dependence among most of analysed methods.

These methods are known and used mostly by managers of manufacturing companies that employ 250 to 499 people. Managers employed in enterprises whose primary activity is trading or providing services, are those ones, who are not familiar with the methods or do not implement them. They are familiar with and use two of the mentioned methods: statistical tools and customer satisfaction analysis.

The next map (Fig. 8) was created for the remaining groups of tools and methods. All three variables were selected for dependency indication.

Analysis of perception map of Figure 8 leads to the conclusion, that managers employed in manufacturing organisations with foreign capital, employing 250 to 499 people, know and implement following methods: SMED, 5S, Gantt chart or Poka-yoka. Managers employed in service or trade companies with domestic capital, do not use mentioned methods or tools, although in some cases they are familiar with them. The methods that are known and implemented among those organisations include: Customer Requirements Analysis, SWOT Analysis and brainstorming.

The last map was prepared for quality management concepts (Fig. 9). The first and second variables were selected for its preparation: business type and origin of capital.

In the last presented map, one can notice areas indicating that concepts are first of all known and implemented by manufacturing enterprises with the advantage of foreign capital. In service and trade companies with a predominance of domestic capital, employed managers often did not know studied concepts.

Conclusions

In conclusion, the majority of managers employed in the studied companies did not have extensive knowledge of methods, tools or concepts of quality management. If they had such knowledge, they often did not use it in professional practice. The most commonly known and implemented instruments were: brainstorming, customer requirements and satisfaction analysis, control sheets, control charts and Outsourcing. The least known included: Design of Experiments (DOE), Quality Function Deployment (QFD), Measurement System Analysis (MSA), Statistical Reception Inspection, SMED and TPM.

It should also be noted that much more often the knowledge on quality management instruments could be found among managers employed in manufacturing companies employing 250 to 499 people as well as in those with a predominant share of foreign capital. They were also most often implemented in such organizations.

In conclusion it should be noted that the knowledge of employees, especially managers, is the basis for building a qualitatively mature organization. However, in order to reach such a maturity, it is necessary, first of all, to have the awareness that tools helping to achieve it actually exists. Blikle pointed out four levels of knowledge (Blikle, 2017, p. 354), which, related to the familiarity with quality management instruments, may contribute to the distribution of managers into four groups: (1) those who do not even know that such instruments exist, so they do not feel the need to get familiar with and implement them, (2) those who know of their existence, but do not use them, (3) those who know and implement them, (4) those for whom they are a natural part of everyday functioning. The resulting survey data revealed that subjected managers of Podlasie in the majority belonged to the first group, so the

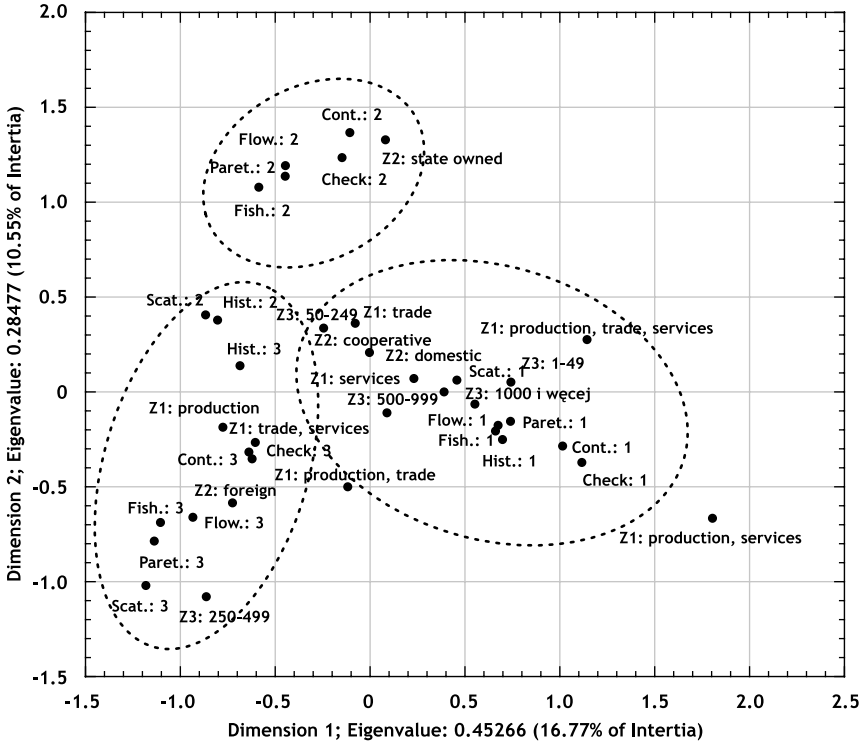

Figure 6. Perception map for classic quality management tools
Source: own study

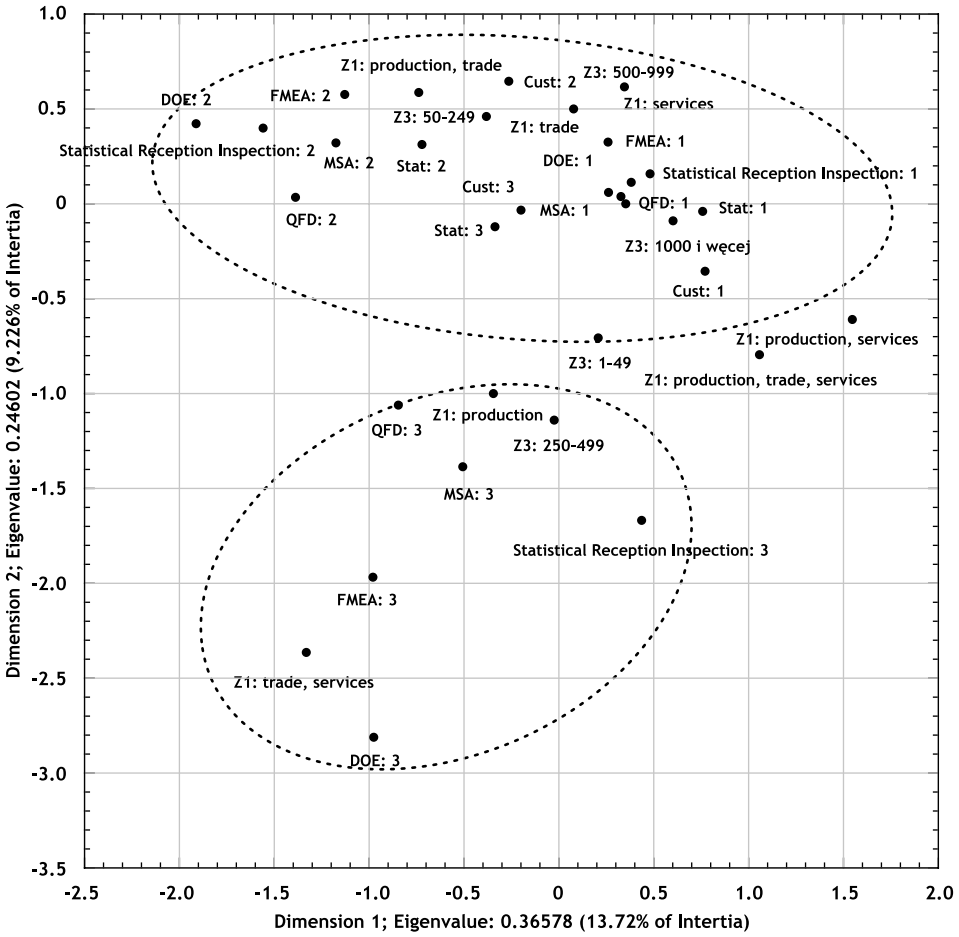

Figure 7. Perception map for quality management methods
Source: own study

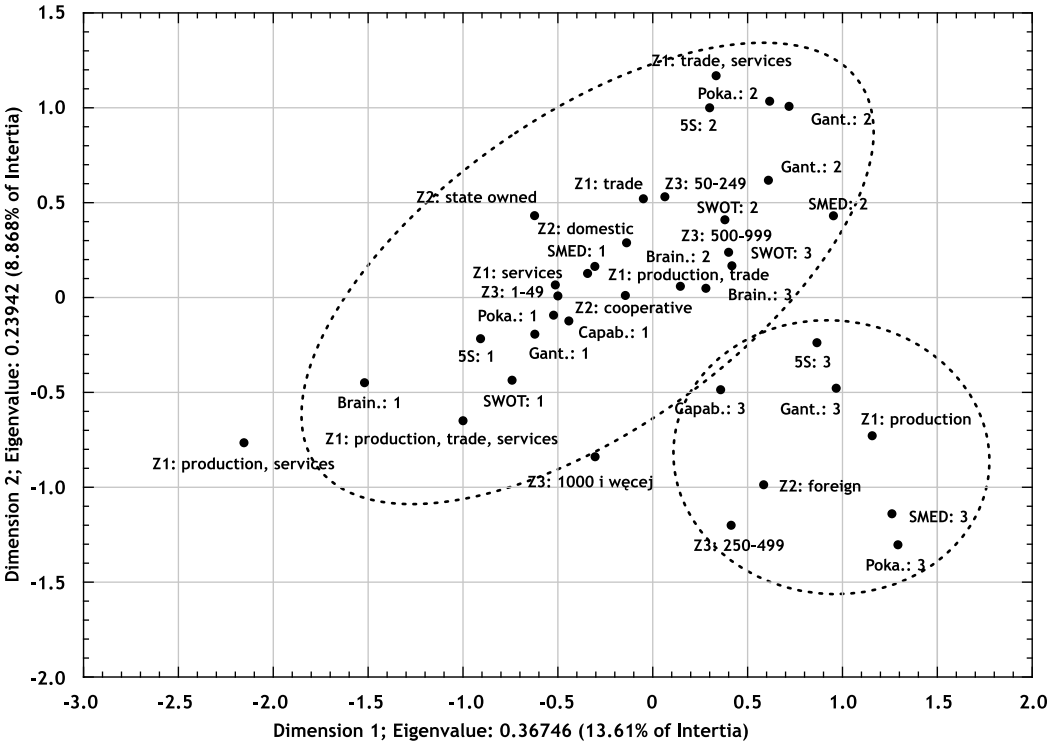

Figure 8. Perception map for remaining quality management methods and tools
Source: own study

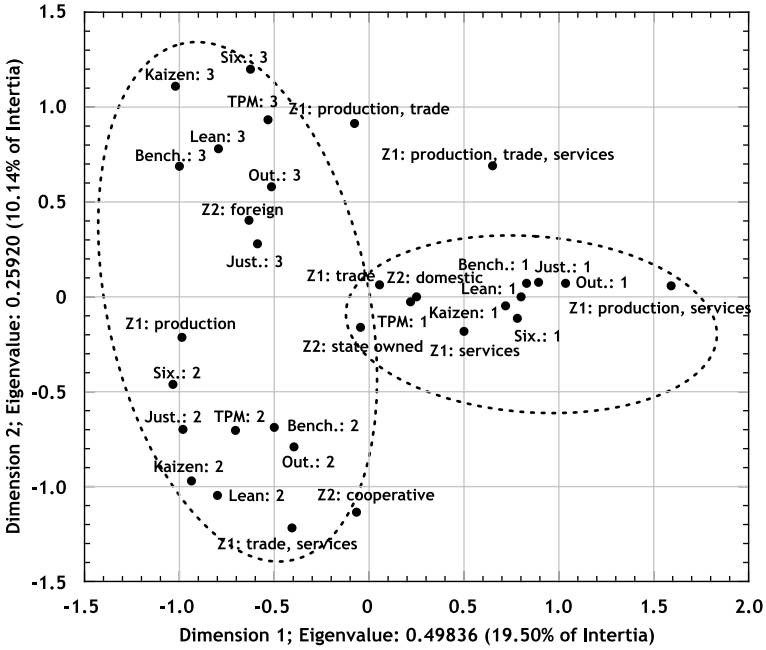

Figure 9. Perception map for quality management concepts
Source: own study

people, who do not know primary as well as advanced methods and quality management tools. However, the need to complete the questionnaire made them get promoted from the first to second level, which might be an impulse for their further development. Nonetheless taking part in the study is not enough. The change of the way of thinking among not only managers, but all workers is needed. This type of adjustment is essential for shaping the awareness about quality development necessity. Interest may be prompted by the fact, that the same managers, who did not know about described instruments, at the same time pointed to the quite high quality of implemented processes or offered products. That is why those types of people need courses and trainings, which would acquainted them with knowledge on how to shape quality, which techniques to use and what results they bring.

In the context of future studies, determining the level of knowledge in all kind of enterprises localised in different regions of Poland, not only Podlasie, seems crucial. However, the problem of getting information and willingness of managers to share it, is still relevant. Many managers are absorbed by their everyday life, and do not want to participate in this kind of studies, treating them as a waste of time. This is also the reason why getting representative results is so difficult[2].

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Endnotes

1) Presented results are the part of survey research conducted in 2016 by a research team consisted of: A. Jurczuk, A.M. Olszewska, as part of the project financed from Ministry of Science and Higher Education funds S/WZ/1/2017.

2) The research was conducted within S/WZ/1/2017 project and was financed from Ministry of Science and Higher Education funds.

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Ocena stopnia wykorzystania metod zarządzania jakością wśród kadry zarządzającej na przykładzie podlaskich przedsiębiorstw

Sreszczenie

Pracownicy organizacji stanowią najważniejszy jej zasób, a ich wiedza jest podstawą budowania dojrzałości jakościowej przedsiębiorstwa. Jednak dojrzałości tej nie można osiągnąć, jeżeli menedżerowie nie dysponują odpowiednią wiedzą związaną z zarządzaniem jakością, a w szczególności z wykorzystywanymi w niej narzędziami i metodami. Nieznajomość metod i narzędzi staje się podstawową barierą rozwoju projakościowego przedsiębiorstw. Celem artykułu jest określenie poziomu znajomości metod i narzędzi zarządzania jakością wśród kadry menedżerskiej w podlaskich przedsiębiorstwach oraz wskazanie stopnia ich wykorzystania. Dane otrzymane w wyniku badania ankietowego poddano analizie statystycznej. Zastosowano analizę korespondencji, której przeprowadzenie pozwoliło wskazać typy organizacji, w których wykorzystuje się wiedzę o narzędziach i metodach zarządzania jakością.

Słowa kluczowe

narzędzia i metody zarządzania jakością, wiedza, analiza korespondencji, województwo podlaskie