

UDK 005.1:005.7

Assessment of Key LEAN Dimensions Implementation in Organisations from Developing Region

Milan Delić

Assistant Professor, University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management, Trg Dositeja Obradovića 6, Novi Sad, Serbia, delic@uns.ac.rs

Ivan Beker

Full Professor, University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management, Trg Dositeja Obradovića 6, Novi Sad, Serbia, beker@uns.ac.rs

Nela Cvetković

Teaching Assistant, University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management, Trg Dositeja Obradovića 6, Novi Sad, Serbia, nelacvetkovic@uns.ac.rs

Nenad Medić

Teaching Assistant, University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management, Trg Dositeja Obradovića 6, Novi Sad, Serbia, medic.nenad@uns.ac.rs

Slobodan Morača

Associate Professor, University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management, Trg Dositeja Obradovića 6, Novi Sad, Serbia, moraca@uns.ac.rs

Received (12.10.2017.); Revised (06.11.2017.); Accepted (22.11.2017.)

Abstract

This paper shows research results about the assessment of the implementation of key LEAN dimensions in the organisations of AP Vojvodina (Serbia). The study is supported by the Provincial Secretariat for Science and Technological Development of AP Vojvodina. The sample is composed of 217 organisations, from various industry sectors. For the research purposes the questionnaire is used as a research instrument. The questionnaire development process is carried out in accordance with literature recommendations, theoretical backgrounds and previous research findings in the field. The study results have shown that organisations from the research population do not implement, neither do they recognise higher LEAN concepts. Thus, it could be said that there is a lack of awareness about mentioned research concepts among organisations from the research population. Given the EU enterprises possess far superior level of technological development, extensive innovative potential and higher knowledge about the advanced organisational-management concepts, it can be said that organisations from the research population are not competitive and ready for competition with EU economy.

Key words: LEAN, Vojvodina, Questionnaire

1. INTRODUCTION

This research is conducted within the project entitled "Readiness of the economy of Vojvodina for competition with the European Union economy", realised by a team of experts from the Faculty of Technical Sciences, University of Novi Sad in 2016. One of the main goals of this project, which was supported by the Provincial Secretariat for Science and Technological Development of AP Vojvodina was to determine and evaluate the level of implementation of key dimensions of LEAN concepts in organisations of AP Vojvodina. The importance of this research is reflected in growing interest of organisations to implement LEAN concepts as a source of competitive advantage [1], [2]. It should be noticed that research in this field applied to organisations of AP Vojvodina is rather scarce. Consequently, the approach to deal with

this kind of issues is not unified. In addition, Serbia is in the process of EU integrations, which will inevitably expose organisations of AP Vojvodina to extremely competitive market of EU. This could create business environment in which organisations of AP Vojvodina could be easily taken over by strong EU competition, or even distinguished in worst case scenarios. Therefore, this research is of great importance in the sense of preserving local economy. Research results from this study could be used for development of regional strategies in the field of economy and action plans to improve competitive advantage of local organisations. In order to draw valid conclusions from this research, it is conducted based on the literature and academic recommendations and good research practice. For this purpose, project is implemented in several phases. These phases include following processes:

questionnaire design, estimation and calculation of research population and representative sample size, distribution of questionnaires to respondents, and data gathering from respondents.

These phases are explained in more details in this paper. Finally, descriptive statistics is used to present important elements that were the subject of this research project.

2. IDENTIFICATION OF KEY DIMENSIONS OF THE RESEARCH FRAMEWORK

The questionnaire is developed based on recommendations presented in [3]. Consequently, psychometric methods were used for the questionnaire design [4], [5]. Therefore, only dimensions that were empirically confirmed in previous research are considered for the research framework. This implies that assessment of selected research dimensions in previous research through reliability and validity tests showed satisfactory results. Additionally, dimensions are empirically confirmed based on positive results in different cultural, economic and social contexts. Same principals were used for operationalization of these dimensions in the form of questions.

Based on the literature review, it was determined that implementation of LEAN concept can be expressed through 9 key dimensions, which are as follows: Quality, Customer/User, Process, Human Resources, Delivery, Suppliers, Time Efficiency, Cost, and Supplies. Identification of these particular dimensions represents the synthesis of large number of previous research and systematic literature review in the field [1], [2], [6]–[10]. Although there are semantic differences in description of research concepts, similarities in their representation and definition are pointing to the possibility of their unification under the aforementioned names and terms. This conclusion is also based on the similarities of questions which were selected to constitute these dimensions in previous research. Each of these dimensions has been operationalized by at least four manifest variables (i.e. questions) in accordance with recommendations presented in [11]. Detailed representation of questions by dimensions is presented in Appendix 1.

After identification of key dimensions and their operationalization in the form of questions, questionnaire was adapted to Serbian language and pre-test of the questionnaire was conducted. In order to preserve semantics, meaning and content of the questionnaire, the adaption was made in accordance with the recommendations presented in [4]. Furthermore, pre-test phase was conducted on a sample of 11 experts, from 11 organisations which are different in structure, activity, and assortment. Also, relevant professors from the Faculty of Technical Sciences in Novi Sad were consulted. Minor adjustments to the questionnaire were made based on the suggestions. There were no major complaints regarding the text of the questionnaire and the semantics of questions. Also, the respondents did not show significant degree of fatigue while completing the questionnaire [4], thus the commitment of respondents to the process of completing the questionnaire was assessed as satisfactory.

3. POPULATION, SAMPLE, AND DATA GATHERING PROCESS

Assessment of the population and the representative sample size is performed based on recommendations presented in [12], [13]. Calculation of the representative sample size is based on the Equation 1:

$$n = \frac{t^2 * s^2}{d^2} = \frac{1.96^2 * 1.11^2}{(5 * 0.03)^2} \cong 211 \quad (1)$$

Where:

t – Value of selected trust interval – 1.96 for significance level of 0.05

s – Assessed standard deviation of the population – 1.11

d – Acceptable margin of error for mean being estimated; (number of points on primary scale * acceptable margin of error); points on primary scale 5; acceptable margin of error = 0.03 (error researcher is willing to expect)

Number of organisations in AP Vojvodina based on their size, which is obtained from the Statistical Office of the Republic of Serbia, is as follows: from total number of organisations (24.279), there are 21.094 micro, 2.472 small, 583 medium, and 130 large organisations [14]. Considering a population size of approximately 20.000 elements for phenomena that can be measured on a continuous scale and with significance level of 0.05, representative sample size is set to 119 elements based on recommendations presented in [13]. If a phenomenon is measured on a discrete scale, than the representative sample size is set to 370 elements. Five-point Likert scale, which can be considered as a continuous scale, was used in this research. However, some authors consider this scale as a discrete one. Therefore, the estimated representative sample size of 211 organisations represents a compromise solution which is considering differences in opinions of the academic community regarding the application of Likert scale and psychometric methods in this type of research. Furthermore, since there are no official records about response rates to this type of research for Serbia or even wider region, initial sample size is increased to 707 organisations based on recommendations presented in [15]. Invitation to participate in the research is sent to 717 organisations, different in structure, activity, and assortment. Total number of organisations that have validly completed and returned the questionnaire is 217, which was the value needed to consider the sample representative. Descriptive statistics of this phase of research is presented in Table 1.

Distribution of questionnaires and data gathering procedure is based on Dillman's modified total design survey method and it operationalizes Social exchange theory for the purpose of better responsiveness of the respondents. First, each respondent, as a representative of his/her company in the domain of the research subject, was invited by telephone to participate in the research on behalf of his/her organization. This was a perfect opportunity to explain to the potential participant about purpose, goal, and importance of his/her participation in the project. After receiving consent to participate, an e-form of questionnaire together with invitation letter was sent to each participant. If there was no response from

participants in planned intervals, reminders were sent to them to complete the questionnaire. With this approach, the response rate of 30.69% was achieved. It is interesting to note that a similar response rate was achieved in other surveys that used Dillman's approach [16], [17]. Consequently, it can be concluded that it is possible to achieve the response rate of as much as 40% in Serbia. However, it should be stressed that this result was achieved using Dillman's approach [15].

Table 1. Descriptive statistics of the data gathering phase

Phase	N	%
I, Pre-test		
I, invited to participate	32	-
I, accepted to participate	15	46.9
I, partially completed questionnaire	4	12.5
I, full completed questionnaire	11	34.4
II, Mass distribution		
II, invited to participate	707	-
II, accepted to participate	516	72.98
II, completed questionnaire	217	30.69

4. SAMPLE DEMOGRAPHY

Following table represents the number of organisations by their region (i.e. Chamber of Commerce) that participated in the research (Table 2).

Table 2. Representation of organisations by the region

Region	N	%	Cumul.
Missing value	11	5.1	5.1
Kikinda	7	3.2	8.3
Novi Sad	38	17.5	25.8
Pančevo	56	25.8	51.6
Sremska Mitrovica	34	15.7	67.3
Sombor	15	6.9	74.2
Subotica	35	16.1	90.3
Zrenjanin	21	9.7	100.0
Total	217	100.0	

Production and service organisations were equally represented in the sample (Table 3).

Table 3. Representation of production and service organisations in the sample

Type of organisation	N	%	Cumul.
Production	74	34.1	34.1
Service	66	30.4	64.5
Production and service	77	35.5	100.0
Total	217	100.0	

By the nature of the capital ownership, the most of the organisations in the sample are private, while the least number of organisations are public. Results are presented in Table 4.

Table 4. Representation of organisations by the nature of the capital ownership

Capital ownership	N	%	Cumul.
Private	184	84.8	87.2
National	23	10.6	98.1
Public	4	1.8	100.0
Total	211	97.2	
Missing values	6	2.8	
Total	217	100.0	

Based on the origin of capital, most of the organisations participating in the research were domestic (169, 77.9%), following with organisations with foreign capital (30, 13.8%), while the least number of organisations had mixed origin of capital (13, 6.0%). From 217 participants, 5 (2.3%) did not complete this question. Representation of organisations based on their size (i.e. number of employees) is presented in Table 5.

Table 5. Representation of organisations by their size

Number of employees	N	%	Cumul.
Between 1 - 9	66	30.4	30.8
Between 10 - 49	59	27.2	58.4
Between 50 - 249	60	27.6	86.4
Over 250	29	13.4	100.0
Total	214	98.6	
Missing values	3	1.4	
Total	217	100.0	

Table 6 represents the number of organisations participating in the research based on their primary activity. The data show that organisations with various economic activities are represented in the research. As expected, the most of the organisations belong to Industry, followed by Trades and Agriculture. These three groups constitute ¾ of the sample.

Table 6. Representation of organisations by their activity

Activity	N	%	Cumul.
Public administration	1	0.5	0.5
Chemistry and Pharmacy	1	0.5	0.9
Industry	113	52.1	53.0
IT Sector	6	2.8	55.8
Communal	18	8.3	64.1
Culture and Sport	2	0.9	65.0
Education	1	0.5	65.4
Agriculture	25	11.5	77.0
Mining and Energy	1	0.5	77.4
Transport	7	3.2	80.6
Telecommunications	4	1.8	82.5
Trade	32	14.7	97.2
Tourism and catering	5	2.3	99.5
Health care	1	0.5	100.0
Total	217	100.0	

Table 7 represents the number of respondents based on their age. This variable is included in the research

considering recommendations of some authors who suggest that there should be a dispersion of respondents by their age in order to have representative sample, since responses are conditioned by respondents' age [18].

Table 7. Representation of respondents by their age

Age	N	%	Cumul.
Up to 30	23	10.6	10.6
Between 31 - 40	66	30.4	41.0
Between 41 - 50	66	30.4	71.4
Over 50	62	28.6	100.0
Total	217	100.0	

5. DISCUSSION

In order to assess the validity and reliability of the questionnaire, PLS-SEM method was used. This method has been chosen for two reasons. Firstly, PLS-SEM approach has proved to be useful also with the small samples. Furthermore, this method is easier (*Variance-based methods*) since it is not conditioned by various assumptions about the nature of the variable and its distribution, unlike with the approach based on covariance-based methods [19]. Second reason is exploratory nature of this research [19]. Although key LEAN dimensions previously have been examined in different cultural, economic and social context, this is probably the first research to empirically investigate those dimensions in the area of research population.

Reliability of the questionnaire was performed using Cronbach reliability test (α). Based on suggestions from relevant literature [4], [19] dimension, i.e. construct applied in exploratory research may be considered as reliable if the value (α) is higher than 0.7. All the constructs in this research have satisfied this criterion (appendix 2). However, it is important to mention that reliability of the questionnaire is not equivalent to validity of the questionnaire. Considering that, proved reliability of the questionnaire does not necessarily imply its validity too, that is, does not indicate the comprehensive consistency of the questionnaire as a measuring instrument [4]. Regrettably, many researchers from Serbia and region are conducting these tests incorrectly, assuming that it is enough for questionnaires to have the characteristics of reliability and excluding the validity test. It is not possible to conclude if such approach is intentional or accidental, and it is not the subject of this study.

Furthermore, to validate the questionnaire, tests of convergent and discriminatory validity have been applied. Convergent validity was tested through *beta* coefficients (*outer loadings*) and by AVE method (*average variance extracted*). Relevant literature points out that, in order to demonstrate the characteristics of convergent validity, the value of beta coefficient for the construct should be at least 0.7, and to be statistically significant ($\alpha \leq 0.05$, $t \geq 1.96$). However, for the most of the items in the questionnaire this value was far below the recommended. Likewise, AVE value for the examined constructs was not at the satisfying level (AVE

$t \geq 0.05$). Accordingly, it can be concluded that questionnaire does not have convergent validity and that the nature of the subject of measurement with mentioned constructs is arguable. In other words: *What is measured by the questionnaire if not what we have assumed?*

Deeper insight into the questionnaire reveals that the lack of convergent validity is mostly observed within the items measuring advanced LEAN concepts or items formed by words such as poka-yoke, SMED, 5S, kanban etc. Understanding the substance of what is trying to be measured by those questionnaire items demands deeper knowledge of LEAN principles and greater comprehension of this topic. Besides the satisfying results of pre-test phase, great part of respondents demonstrated fundamental unfamiliarity with holistic approaches of LEAN.

As stated in the relevant literature [19], items that could lead to the lack of reliability and validity of measuring instrument should be removed from the questionnaire, which requires afterwards reassessment of reliability and validity. Items removed from the questionnaire are marked with an asterisk (*).

After removing above mentioned items, validity and reliability of questionnaire was repeated. In this case, tests revealed satisfying results. Finally, discriminatory validity was performed using Fornell-Larcker criteria [19]. These tests also demonstrated that by removing discussed items discriminatory validity was reached. These values are presented in appendix 2.

However, as already stated, taking in consideration that significant number of items from given constructs was removed it could be asked what is being measured with these constructs and whether they truly represent the phenomenon studied in the first place.

At last, it may be concluded that research framework, its constructs and questionnaire as the measuring instrument are not positively confirmed in the context of empirical application on the territory of AP Vojvodina. Since it is highly probable that this result is constrained with respondents' comprehension of advanced LEAN concepts, it can also be assumed that the level of LEAN implementation on this research area is still relatively low. Furthermore, it should be highlighted that discussed constructs have been empirically confirmed in the cases of previous studies, while it is not the case with domestic organizations.

6. CONCLUSION

This research assesses the evaluation of LEAN concepts implementation level on the sample of 217 organizations in AP Vojvodina. Research is performed based on survey and supported by Provincial Secretariat for Science and Technological Development of Autonomous Province of Vojvodina.

It is revealed that in most of the cases items related to the advanced concepts of LEAN do not constitute their higher-order constructs. Since the assessment is conditioned by the respondents' answers, it can be said that the comprehension and awareness about these concepts are on lower level.

This further implies the question related to the level of implementation of LEAN concepts on the territory of Vojvodina.

7. REFERENCES

- [1] F. Pakdil and K. M. Leonard, (2014), "Criteria for a lean organisation: Development of a lean assessment tool," *International Journal of Production Research*, Vol. 52, No. 15, pp. 4587–4607.
- [2] G. Harris, K. B. Stone, T. Mayeshiba, (2014), P. J. Compton, and P. A. Farrington, "Transitioning from teaching lean tools to teaching lean transformation," *Journal of Enterprise Transformation*, Vol. 4, No. 3, pp. 191–204.
- [3] J. V. Saraph, P. G. Benson, and R. G. Schroeder, (1989), "An instrument for measuring the critical factors of quality management," *Decision Science*, Vol. 20, No. 4, pp. 810–829.
- [4] K. C. Nunnally and I. H. Bernstein, (1994), *Psychometric Theory*. New York, United States: McGraw-Hill Inc.
- [5] A. Bukvić, (2007), *Nacela izrade psiholoških testova*. Beograd: Zavod za udzbenike Beograd.
- [6] I. Belekoukias, J. A. Garza-Reyes, and V. Kumar, (2014), "The impact of lean methods and tools on the operational performance of manufacturing organisations," *International Journal of Production Research*, Vol. 52, No. 18, pp. 5346–5366.
- [7] L. Di Pietro, R. G. Mugion, and M. F. Renzi, (2013), "An integrated approach between Lean and customer feedback tools: An empirical study in the public sector," *Total Quality Management & Business Excellence*, Vol. 24, No. 7–8, pp. 899–917.
- [8] S. Gao and S. P. Low, (2014), "The Toyota Way model: An alternative framework for lean construction," *Total Quality Management & Business Excellence*, Vol. 25, No. 5–6, pp. 664–682.
- [9] A. Longoni, M. Pagell, D. Johnston, and A. Veltri, (2013), "When does lean hurt? - An exploration of lean practices and worker health and safety outcomes," *International Journal of Production Research*, Vol. 51, No. 11, pp. 3300–3320.
- [10] A. Taylor, M. Taylor, and A. McSweeney, (2013), "Towards greater understanding of success and survival of lean systems," *International Journal of Production Research*, Vol. 51, No. 22, pp. 6607–6630.
- [11] R. E. Joseph F. Hair Jr., William C. Babin, Barry J. Anderson, (2010), *Multivariate Data Analysis*.
- [12] W. G. Cochran, (1977), *Sampling techniques*.
- [13] J. . Bartlett, I. J. W. Kotlik, and C. C. Higgins, (2001), "Organizational Research: Determining the Appropriate Sample Size in Survey Research," *Inf. Technol. Learn. Perform. J.*, Vol. 19, No. 1, pp. 43–50.
- [14] "Preduzeca u Republici Srbiji, prema velicini u 2014. god.," (2015), Beograd.
- [15] D. A. Dillman, J. D. Smyth, and M. L. Christian, (2014), *Internet, phone, mail, and mixed-mode surveys: The tailored design method*.
- [16] B. Lalić, N. Medić, M. Delić, N. Tasić, and U. Marjanović, (2017), "Open Innovation in Developing Regions: An Empirical Analysis across Manufacturing Companies," *International Journal of Industrial Engineering and Management*, Vol. 8, No. 3, pp. 111–120.
- [17] U. Marjanović, B. Lalić, M. Delić, and N. Tasić, (2017), "Industry 4.0: Evidence from Transitional Economy," *International Journal of Global Business*, Vol. 10, No. 1, pp. 26–36.
- [18] W. H. Starbuck and J. M. Mezias, (1996), "Opening Pandora's box: Studying the accuracy of Managers' perceptions. Journal of Organizational Behavior," *Journal of Organizational Behavior*, Vol. 17, No. 2, pp. 99–117.
- [19] J. F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, (2016), *A primer on partial least squares structural equation modeling (PLS-SEM)*. USA: SAGE.

8. APPENDICES

APPENDIX 1 - Overview of dimensions and questions in questionnaire

Quality:

- Workers are identifying irregular piece/product/document/data and stop the process if necessary;
- Process management is performed based on the control values measured during the process;
- The number of irregularities is significantly reduced in the last 3 years;
- Hours spent on rework is significantly reduced in the last 3 years;
- (*) *The number of poka-yoke (preventing from the errors in the process) systems in our processes is constantly increasing.*

Customer/User:

- We are regularly monitoring and analysing feedback about the quality of our products/services together with our key buyers;
- Based on regular monitoring and analyses we know that customer satisfaction is in steady increase;
- Total number of complaints is decreasing;
- The percentage of regular customers in comparison to the total number of buyers is in constantly increasing;
- The share of our products on the market is in steady increase;

Process:

- (*) We use Kanban signals for management of production/service delivery processes;
- (*) Equipment location in working space is organized in order to ensure continuous flow of product/service delivery processes;
- (*) *Process work results are regularly published on bulletin boards in working space;*
- We use tools for statistical process control in order to reduce process variations;
- Total Productive Maintenance (TPM) is implemented in the whole organization;
- (*) *5S (system for accomplishing and maintaining neatness and cleanness of working space) is an integral part of business;*
- *Value Stream Mapping is implemented in every process of organization;*
- (*) *Resolving problems through identification and elimination of problem roots is integral part of business;*
- (*) *Production/service delivery is organized according to principle of autonomous working cells;*
- (*) *We use SMED (Single-Minute Exchange of Dies);*

- (*) *Our working processes are organized by principle of one-piece flow.*
- The capacity utilisation degree is in constantly improving;

Human Resources:

- Program for providing improvement suggestions is based on employees;
- (*) *All employees are trained for multiple working positions;*
- (*) *Leaders are assuming responsibility for accomplishing all the necessary work in value creation chain;*
- (*) *Work force fluctuation is constantly decreasing;*
- (*) *Absence from work is constantly reducing;*
- *Average number of improvement suggestions is in steady increase;*
- The percentage of implemented improvement suggestions (compared to the total number of suggestions) is increasing;
- The number of teams for problem solving is continuously on the rise;

Delivery:

- Organization is making constant effort to establish long-term relationships with its suppliers;
- Suppliers are actively involved in solving problems related to delivery of raw material;
- Key suppliers are engaged in continuous improvement programmes;
- Key suppliers are involved in process planning and long-term goals settings;
- Organization is regularly sending delivery quality reports (due dates, quantities, quality...) to each of its supplier;

- Overall Equipment Effectiveness (OEE) is in constant increase for all equipment;

Time Efficiency:

- Average time spend on preparation of working space for new product/service is constantly decreasing;
- Average product/service lead time is continuously reducing;
- Average cycle time is in constant decline;
- Average unavailability of equipment (time to failure/total time) is constantly decreasing;

Cost

- Average time for new product development is in constant decline;
- Total transportation costs is continuously decreasing;
- Total supply costs is constantly decreasing;
- Total complaints costs are in constant decline;
- Total costs caused by poor quality are constantly decreasing;

Supplies

- Business profit of organization is constantly increasing;
- (*) *Total number of supplier is decreasing;*
- Total annual inventory turnover is constantly decreasing;
- The ratio between the value of unfinished production/service and total sales is in constant decline;
- The ratio between finished goods stock and supplies of raw material is constantly decreasing (only for manufacturing companies).

(*) – Questions removed from the questionnaire

APPENDIX 2 – Results of confidence and validity tests

Construct	α	1	2	3	4	5	6	7	8	9
1. Cost	0.86	0.80*								
2. Delivery	0.72	0.48	0.80*							
3. Human Resources	0.88	0.52	0.46	0.86*						
4. Process	0.85	0.52	0.54	0.69	0.79*					
5. Quality	0.78	0.39	0.58	0.47	0.49	0.78*				
6. Suppliers	0.83	0.49	0.60	0.56	0.61	0.58	0.77*			
7. Customer/User	0.84	0.52	0.67	0.45	0.62	0.58	0.61	0.78*		
8. Supplies	0.82	0.64	0.65	0.60	0.66	0.49	0.56	0.61	0.76*	
9. Time Efficiency	0.90	0.76	0.65	0.50	0.56	0.51	0.52	0.58	0.72	0.87*

*Note: Values after removing items from the questionnaire; *AVE value*

Procena implementacije ključnih LEAN dimenzija u organizacijama iz regiona u razvoju

Milan Delić, Ivan Beker, Nela Cvetković, Nenad Medić, Slobodan Morača

Primljen (12.10.2017.); Recenziran (06.11.2017.); Prihvaćen (22.11.2017.)

Abstrakt

Ovaj rad pokazuje rezultate istraživanja o proceni primene ključnih dimenzija LEAN koncepta u organizacijama AP Vojvodine (Srbija). Istraživanje je podržano od strane Pokrajinskog sekretarijata za nauku i tehnološki razvoj AP Vojvodine. Uzorak je sastavljen od 217 organizacija iz različitih industrijskih sektora. U istraživačke svrhe upitnik se koristi kao istraživački instrument. Proces izrade upitnika sproveden je u skladu sa preporukama iz literature, teorijskim iskustvima i prethodnim nalazima istraživanja na terenu. Rezultati istraživanja pokazali su da organizacije iz istraživačke populacije ne implementiraju, niti prepoznaju kompleksnije LEAN koncepte. Stoga, može se reći da postoji nedostatak svesti o pomenutim istraživačkim konceptima među organizacijama istraživačke populacije. S obzirom na to da preduzeća u EU imaju daleko superiorniji nivo tehnološkog razvoja, širokog inovativnog potencijala i više znanja o naprednim konceptima organizacionog upravljanja, može se reći da organizacije iz istraživačke populacije nisu konkurentne i spremne za konkurenciju sa ekonomijom EU.

Ključne reči: LEAN, Vojvodina, Upitnik