# BUSINESS EXCELLENCE IN SLOVENIAN COMPANIES
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**Abstract:** The aim of this paper is to report on study results showing the differences in total quality items (TQM) items of the companies taking part in Slovenian national quality award - Slovenian business excellence prize (PRSPO[1]) as compared with the other studied groups of companies in Slovenia. The study was conducted in 110 Slovenian companies regarding their approach to systematic quality improvement process. The differences in the use of quality management approaches and tools were examined in the three groups of companies: a group of "top companies" (according to their financial results), a randomly chosen group of companies and PRSPO applicants. Factor analysis, cluster analysis and t-test were used for studying the sample and to compare the differences among the groups. The research findings comparing two clusters of companies proved significantly better results for Cluster 1 (consisting of 59% of PRSPO applicants) as compared to the other studied groups of companies. The main differences were related to the: proposals for improvement, non material recognition, self-assessment, national quality award participation, benchmarking, knowledge and best practice exchange as well as employee satisfaction.
**Key words:** TQM, business and quality award, continuous improvement, EFQM excellence model

## 1. INTRODUCTION

Implementation of continuous improvement means nowadays the basis for progress in organizations and on the other hand it generates necessary condition for successful business performance, encouragement of technological development and gaining of competitive advantage. For decades total quality management (TQM) system in organizations has been recognized as an important ground for setting up approaches and tools for monitoring and measuring of their business performance, and therefore contributes to the continuous improvement of their business quality. Today's companies use different total quality management approaches and tools such as ISO standards, EFQM Excellence Model, Six Sigma, 20 Keys, etc. Various TQM approaches, tools and methods are used differently by different organizations. Nevertheless, every organization has to find its own process and an optimal selection of TQM tools, techniques and approaches ([1], [2], [3], [4], [5], [6] and [7]) in order to gain the advantages of their introduction.

Worldwide a number of quality and business excellence awards have been based for decades, as the first the Deming Prize was founded in Japan in 1951, the Malcolm Baldrige National Quality Award (MBNQA) was founded in USA in 1988 and the

European Excellence Award (EEA) was found in 1991. In Europe there have been over 26 national quality awards, based on criteria of the EFQM excellence model. Research studies conducted in USA, New Zealand, Australia and Europe within applicant companies have confirmed positive effects of systematic use of quality tools and approaches for the development of TQM. Basically, national quality awards were established to implement TQM by encouraging exchange of best practices, inter-organizational learning, benchmarking and to foster continuous improvement and global competitiveness. In Slovenia in 1998 a national quality award named Slovenian Business Excellence Prize (PRSPO) was established, which operates on the basis of EEA criteria. A number of researches show that systematic implementation of TQM approaches and tools positively affect: closer relationships with customers and innovativeness [1]; improvement in organizational performance [8]; definition of organizational key performance indicators [9]; improvement related to organizational processes, customers and employees [10]; innovativeness and employee satisfaction [11]; and generating ideas for improvement [2]. Further research findings conducted among applicants for quality awards showed that systematic implementation of TQM principles also influences business results. Quality award winners improved significantly their financial performance as compared to other companies

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PRSPO - Priznanje RS za poslovno odličnost

in the USA ([12] and [13]), Europe [14], Australia [15] and New Zealand ([16], [17], and [18]). The purpose of this paper is to identify the characteristics of Slovenian Business Excellence Prize (PRSPO) applicants in comparison with the other two groups of companies in the survey. The aims of this paper are to contribute to the understanding of TQM characteristics in the companies participating in quality awards such as PRSPO in Slovenia [21].

## 2. RESEARCH METHODOLOGY

The paper examines the studied sample of the companies in Slovenia. Within the sample three groups of companies were contained: a list of Slovenian companies, chosen according to their good financial indicators - hereinafter called the "top group"; the second group of large companies was randomly chosen and hereinafter called "control group"; the third group consisted of the applicants-large companies taking part in PRSPO, hereinafter called "the PRSPO group" [7].

The methodology used in the survey was based on fundamental approaches described in the literature. The main steps used in the research procedure followed the basic scientific approach described in literature ([22], [23] and [24]) including collection, review and study of theory, identification of the research question, conceptual assumptions, collection, analysis and interpretation of data. The questionnaire was pre-tested by pilot respondents and improved according to their feedback [7]. Data were analyzed by using multivariate analysis to identify the main characteristics of the sample. Significance tests were performed to study differences between sample means of the top group, the control group and the PRSPO group.

### 2.1 Sample and data collection

The questionnaire was sent to 500 large Slovenian companies (within it: 250 companies from the first group – "the top firms" – with the highest net profit and 250 randomly chosen companies from the second group –"the control group" in 2007. These two groups also contained 42 applicants taking part in PRSPO assessments in 1998-2006 hereinafter. The study was limited to the 2006 business year data. Empirical research was conducted on the basis of 110 responses from Slovenian companies (response rate: 22%): the top group 48 responses (44%); the control group 39 responses (35%) and the PRSPO group 23 responses (21%). Within the PRSPO applicant group we received responses from 12 finalists (representing 54% of all PRSPO finalists) and 7 responses from the winners (78% of all the winners). The study included companies with up to 250 employees (31%), between 251 and 500 employees (34%), between 501 and 1050 employees (28%) and over 1500 employees (7%). The majority of companies were involved in manufacturing (55%) and a minority in mining, water supply, sewerage, waste management, environmental remediation, real estate, and health and social care (all of them 1%).

The questionnaire developed in this study consisted of ten main complex sets of items:
- general data on company,
- financial and human resources invested in continuous improvement,
- use of continuous improvement tools, measurement and rewarding of employees for continuous improvement,
- realization and rewarding proposals for improvement,
- number of proposals for improvement, TQM approaches,
- TQM recognition schemes, identification of TQM changes and
- Management implications on TQM process.

The questionnaire consisted of open questions and questions using a 6 – points scale ranging from 0 to 5 points (0 - approach / tool not known/ and not used, 5 - most often used /most important).

Section one (3 questions) consisted of general information on the company.

Section two consisted of 10 questions related to investments in financial and human resources in the company. The respondents were asked open questions about the number of employees working in TQM, HRM and R&D departments, financial resources invested into encouragement of continuous improvement, education and R&D and invested days of training per employee.

Sections three and four consisted of closed questions related to TQM approaches (10 questions) and to the measurement of continuous improvement (4 questions).

In section five the respondents were asked open questions related to the realization and rewarding proposals for improvement (3 questions) and in section six they were asked about number of proposals for improvement and number of employees which proposed improvement (2 questions).

In section seven respondents were asked closed questions related to the TQM approaches (13 questions).

In section eight the respondents were asked closed questions related to the TQM recognition schemes (7 questions).

In section nine the respondents were asked closed questions related to the identification of TQM changes (7 questions).

In the section ten the respondents were asked questions related to the management implications on TQM process (seven questions).

Section eleven consisted of financial indicators Return on Equity (ROE) and Return on Assets (ROA) (2 questions) [7].

We further divided the data into eleven sections covering each quantitative variable according to its content. The reduction of items was conducted using multivariate analysis, which aims at clarifying the observed variables by a smaller number of factors ([21] and [ 25]).

Therefore the method used first was the method of principal components (with Varimax rotation) to reduce the number of variables which resulted in 19 main indexes. In second step the 32 representative items were selected from the main indexes [7]. For further analysis t-test and cluster analysis were used to study the detailed features of the sample of involved companies and subgroups.

## 3. RESULTS

### 3.1 Factor analysis and reliability

We conducted factor analysis to identify the main characteristics according to its content meaning of studied sample. The factor analysis was applied according to the following rules: (1) seven main components with Eigen value > 1; (2) factor loading > 0.3; (3) correlations with main components > 0.3 and (4) total variance explained > 61.64. For the purpose of this study the reliability of the seven main components was determined using Cronbach's alpha on standardized items. Cronbach's alpha on standardized items is used when items have relatively heterogeneous variances [25]. An adequate alpha coefficient should be higher than 0.5. Cronbach's alpha on standardized items for construct validation was calculated and it was acceptable. The Kaiser-Meyer-Olkin (KMO) indicator was calculated to assess sample size adequacy. The minimum acceptable level is 0.5. Bartlett's test of sphericity is a statistical test for the overall significance of all correlations within a correlation matrix [25]. The KMO was 0.699 and Bartlett's test of sphericity $\chi 2 = 1826.994$; df = 496; p < 000), which is acceptable. In summary, the adequacy and reliability of the selected components were suitable for further study and research. Table 1 gives the summary of factor analysis resulting in seven main factors based on main characteristics of the sample.

*Table 1: Factor analysis, construct validity test results*

| | | Reliability (alpha)* | Item loadings | Squared eigen values | Variance explained (%) | Number of items |
|---|---|---|---|---|---|---|
| **Factor 1** | Internal encouragement and rewarding | 0.85 | 0.810-0.302 | 4.688 | 14.67 | 9 |
| **Factor 2** | Recognition schemes and self-assessment | 0.86 | 0.882-0.494 | 3.382 | 10.57 | 5 |
| **Factor 3** | Managerial implications | 0.72 | 0.746-0.558 | 2.746 | 8.58 | 5 |
| **Factor 4** | Quality certificates and standards | 0.88 | 0.868-0.834 | 2.444 | 7.64 | 2 |
| **Factor 5** | Knowledge transfer | 0.75 | 0.647-0.537 | 2.421 | 7.56 | 5 |
| **Factor 6** | Financial and human resources | 0.59 | 0.776-0.391 | 2.086 | 6.52 | 4 |
| **Factor 7** | Internal approaches for improvement | 0.78 | 0.714-0.703 | 1.956 | 6.11 | 2 |
| **Total** | | | | | **61.64** | **32** |

\* based on standardized items

The first factor explains 14.65% of observed variability. It identifies the importance of internal encouragement and rewarding and consists of nine items: implementation of material and non material recognition of proposals for improvement, internal comparison of number of proposals for improvement, average % of realization of proposals for improvement, internal audits and certification using ISO 9001 and process indicators.

The second factor explains 10.57% of observed variability. It identifies importance of recognition schemes and self-assessment and consists of five items: PRSPO projects, self-assessment, participation on quality award competitions, participation in national excellence award and involving employees as auditors or assessors.

The third factor explains 8.58% of observed variability. It identifies importance of factors of leadership and changes and consists of five items: leadership (monitoring of employee satisfaction, conducting personal interview, leadership style, value system and attendance at seminars and trainings.

The fourth factor explains 7.64% of observed variability. It identifies importance of quality certificates and standards and consists of two items: accreditation and internal audits using ISO 17025.

The fifth factor explains 7.56% of observed variability. It identifies the importance of knowledge transfer and consists of five items: collaboration with consultant companies, collaboration with professional institutions and universities, benchmarking, attendance at conferences and peer assessments.

The sixth factor explains 6.52% of observed variability. It identifies importance of financial and human resources and consists of four items: invested financial resources for education, number of employees on R&D, financial indicator - ROA and invested days of trainings per employee.

The seventh factor explains 6.11% of observed variability. It identifies the importance of internal approaches for improvement and consists of two items: use of Six Sigma and 20 keys [7].

### 3.2  Cluster analysis and t-test

The next step involved hierarchical cluster analysis to study three groups of Slovenian companies according to the 32 items describing their characteristics related to the use of tools and approaches for systematic implementation of TQM. Cluster analysis is an analytical method which forms relevant subgroups of subjects or objects. The aim is to classify the sample entities (subjects or objects) into a small number of groups that are established on the basis of similarity among the entities. The method of hierarchical grouping includes at least three steps.

The second step includes the scope of the actual process of implementation of clustering to connect the entities into clusters.

The last step includes the creation of a profile of persons or variables (in groups) to describe their structure and characteristics [25]. Using Ward's method [26] the units within groups are as homogeneous as possible. As a measure of homogeneity the method uses the sum of the squares of differences among units within the group and their arithmetic means. Ward's method attempts to build groups in such way that total sum of squares, calculated for all groups, is as small as possible ([26], [27], [28] and [29]).

Further more significance tests using t-tests were carried out for the perceived items (items) in order to investigate whether there were any significant differences between Cluster 1 and Cluster 2 (Table 2). The null hypothesis used within t-test is as follows:

**H0**: μ1 - μ2 = 0,

that is, there are no significant differences between Cluster 1 and Cluster 2 in the mean values of perceived items [21].

Table 2 shows mean values for the perceived items for both clusters of companies. Differences in the mean values between both clusters of companies in favour of Cluster 1 companies could be detected. Those items which are printed in bold (in Table 2) we can reject null hypotheses (H0) and confirm that there are significant differences in items between Cluster 1 and Cluster 2 companies included in the survey. As far as classification of the three groups (top, control and PRSPO) is concerned Cluster 1 is predominantly composed of companies from the PRSPO group (58%) containing all PRSPO finalists and winners. The results of comparison related to TQM items

(items) of the three groups (Table 2) show that in general, the mean values of the PRSPO group exceed the other two groups.

The bold printed results (in Table 2) show that the Cluster 1 companies possess higher levels of achievements compared to Cluster 2 companies related to:

- Factor 1 "Internal encouragement and rewarding" including eight items out of nine.
- Factor 2 "Recognition schemes and self-assessment" including all five items.
- Factor 3 "Managerial implications" including four items out of five.
- Factor 4 "Quality certificates and standards" including one item out of two.
- Factor 5 "Knowledge and best practice exchange" including all five items.
- Factor 6 "Financial and human resources" including two items out of four.
- Factor 7 "Internal approaches for improvement" including one item out of two.

For all other presented items (in Table 2) in we cannot reject the null hypothesis, because there are no significant differences in mean values of items between the Cluster 1 and Cluster 2 under survey as follows:

- Factor 1: "Internal encouragement and rewarding" composing of material recognition of proposals for improvement.
- Factor 3: "Managerial implications" including impact of leadership style on improvement.
- Factor 4: "Quality certificates and standards" including ISO 17020, 17025 accreditation.
- Factor 6: "Financial and human resources" including number of employees in R&D and number of educational days for encouragement of proposals for improvement.
- Factor 7: "Internal approaches for improvement" including use of 20 keys [21].

## 4.  CONCLUSIONS

This paper presents the results of a survey conducted among Slovenian companies with the main purpose to find out the main differences among the studied groups in terms of the TQM characteristics. The findings show that PRSPO companies received higher results in the observed characteristics. The main differences of the PRSPO group as compared to the other studied companies can be found in non-material recognition of employees for their proposals for improvement, using regular self-assessment, importance of participation in national quality award, involving employees as external assessors or auditors, taking part in award assessment, benchmarking, collaborating with professional and scientific institutions supporting knowledge and best practice transfer and last but not least achieving better financial results (ROA).

*Table 2: Mean values of two clusters of companies and t-test (p<0.05, \*p<0.09) (C1=Cluster 1, C2= Cluster 2)*

| Factor | Item | C1 | C2 | p |
|---|---|---|---|---|
| 1. Internal encouragement and rewarding | Material recognition of proposals for improvement | 2.667 | 2.364 | 0.481 |
| | **Non-material recognition of proposals for improvement** | **2.364** | **1.545** | **0.022** |
| | **Internal comparison of number of proposals for improvement (with financial evaluation)** | **2.667** | **1.740** | **0.027** |
| | **Internal comparison of number of proposals for improvement** | **1.879** | **1.247** | **0.082\*** |
| | **% of realized proposals for improvement** | **5.149** | **3.666** | **0.058\*** |
| | | | | |
| | **Number of proposals for improvement per employee** | **0.557** | **0.180** | **0.020** |
| | **ISO 9001:2000 internal audits** | **5.000** | **3.896** | **0.001** |
| | **Process indicators using statistical tools** | **4.152** | **3.130** | **0.002** |
| | **ISO 9001:2000 certification** | **4.697** | **3.714** | **0.005** |
| 2. Recognition schemes and self-assessment | **Self-assessment using EFQM Excellence model** | **2.727** | **0.481** | **0.000** |
| | **Importance of** PRSPO | **2.000** | **0.390** | **0.000** |
| | **Collaboration in** PRSPO **projects** | **2.606** | **0.442** | **0.000** |
| | **Employees involved as auditors/assessors** | **3.152** | **1.091** | **0.000** |
| | **Collaboration in quality awards** | **2.273** | **0.649** | **0.000** |
| 3. Managerial implications | **Following changes and novelties on seminars and trainings** | **3.939** | **3.377** | **0.021** |
| | Impact of leadership style on improvements | 4.576 | 4.338 | 0.240 |
| | **Impact of value system on improvement** | **4.152** | **3.481** | **0.019** |
| | **Impact of employee satisfaction on improvement** | **3.848** | **3.234** | **0.030** |
| | **Impact of annual employee interview on improvement** | **4.030** | **3.013** | **0.001** |
| 4. Quality certificates and standards | **ISO 17025, 17020 internal audits** | **1.697** | **1.039** | **0.061\*** |
| | ISO 17025, 17020 accreditation | 1.364 | 0.987 | 0.272 |
| 5. Knowledge and best practice exchange | **Collaboration with academic and professional institutions to encourage best practices** | **2.818** | **1.429** | **0.000** |
| | **Collaboration with consultant companies to encourage improvement** | **2.455** | **1.143** | **0.000** |
| | **Benchmarking with best in class** | **3.576** | **2.351** | **0.000** |
| | **Use of peer assessments** | **2.242** | **0.935** | **0.000** |
| | **Following changes and novelties on conferences and workshops** | **3.788** | **3.104** | **0.008** |
| 6. Financial and human resources | Number of employees in R&D per 100 employees | 2.785 | 2.216 | 0.532 |
| | **Financial resources for education in 10000 EUR per 100 employees** | **3.926** | **2.484** | **0.071\*** |
| | Number of educational days for encouragement of proposals for improvement per employee | 0.366 | 0.518 | 0.424 |
| | **ROA - Return on assets** | **6.408** | **3.598** | **0.051\*** |
| 7. Internal approaches for improvement | **Performance of 6 sigma** | **1.364** | **0.896** | **0.075\*** |
| | Performance of 20 keys | 1.424 | 1.078 | 0.252 |

Additional results of cluster analysis which was used for classification of companies according to their TQM characteristics showed that the majority of the PRSPO companies (58%), including all finalists and award winners, gathered in Cluster 1. However, the findings of cluster analysis also show that there are some companies which have similar TQM characteristics as the PRSPO group (although they have not taken part in award assessment). These companies could be regarded as »potential PRSPO applicants« for future award assessments in Slovenia and at the European level ([7] and [21]).

The main differences of the PRSPO group as compared to the other studied groups of companies can be found in higher scores related to proposals for improvement and non-material recognition, which indicates the importance of employee involvement in the continuous improvement process and their satisfaction, and confirms the findings of different authors ([1], ([2], [11], [19] and [20]) about positive effect of conducting regular self-assessments and external assessments ([15], [17], [18] and [30]), and improved financial results ([12], [13], [14] and [21]). It can be concluded that in general, the companies which apply for the national quality award (the PRSPO group) have higher mean scores of observed characteristics as compared to the other m that studied groups of companies [21]. Support of top management is main precondition which is common for all demanding organizational projects related to implementing continuous improvements and change of organizational culture for implementing business excellence [30]. For further progress in Slovenian companies stronger leadership support in continuous improvement process is needed. Therefore we claim that the main challenges are remained in development of managerial implications on TQM in Slovenian companies. Further studies could be done focusing on implementation of proposals for improvement, non-material recognition and leadership role in Slovenian companies and abroad [7]. This would contribute to better understanding and use of TQM principles and help to improve business results in the companies in Slovenia and abroad.

## ACKNOWLEDGEMENT

## *REFERENCES*

[1] Peters, T. J., Waterman, R. H., *In Search of Excellence, Lessons from America's Best-Run Companies*, Harper & Row, Publishers Inc., New York, USA, 1982.

[2] Robinson, A., Schroeder, D. M., *Ideas Are Free: How the Idea Revolution is Liberating People and Transforming Organizations*, Berret - Koehler Publishers, Inc., San Francisco, USA, 2004.

[3] Sokovic, M., Pavletic, D., *Quality Improvement – PDCA Cycle vs. DMAIC and DFSS*, Journal of Mechanical Engineering, vol. 53, no. 6, pp. 369-378, 2007.

[4] Mann, R., *Revisiting a TQM Research Project: The Quality Improvement Activities of TQM*, Total Quality Management, vol. 19, no. 7-8, July-August 2008, p. 751-761, 2008.

[5] Maglic, L., Kondic, Z., Kljajin, M., *Quality Audits of Management System*, Journal of Mechanical Engineering, vol. 55, no.11, pp. 695-700, 2009.

[6] EFQM, *EFQM Excellence Model*, ISBN 978-90-5236-501-5, European Foundation for Quality Management, Brussels, 2009.

[7] Kern Pipan, K., *The Impact of Human Capital and Continuous Improvement on Business Excellence in Organization*, Doctoral Dissertation, Faculty of Organizational Sciences, University of Maribor, Slovenia (in Slovene), 2010.

[8] Busteed, K., Vogel, N., *Achieving Business Excellence, A study How Australian Organizations Approach Business Improvement*, Australian Quality Council and Delloite Touche Tohmatsu, Australia, http://www.stratum.co.nz/, (accessed on 2009-05-15), 2000.

[9] Johnson, S., *Applying (Total) Quality Models, How to Improve Processes without Creating Extra Bureaucracy*, EUPAN, 2004. http://eupan.essenceserver.com/ (accessed on 2007-06-30).

[10] Piskar, F., Dolinsek, S., *Implementation of the ISO 9001: From QMS to Business Model*, Industrial Management & Data Systems, Vol. 106, No. 9, Emerald Group Publishing Ltd., pp. 1333-1343, 2006.

[11] Hiam, A., *Motivating & Rewarding Employees, New And Better Ways to Inspire Your People*, Adams Media Corporation, ISBN 1-58062-130-9, Holbrook, Massachusetts, USA, 1999.

[12] Hendricks, K. B., Singhal, V. R., *Firm Characteristics, Total Quality Management and Financial Performance*, Journal of Operations Management, vol.19, no.3, pp. 269-285, 2001.

[13] NIST, *Ten Years of Business Excellence for America*, Baldrige National Quality Program, National Institute of Standards and Technology, 1998. http://www.nist.gov/ (accessed on 2010-09-15).

[14] Boutler, L. et al., *Report on EFQM and BQF funded Study into the Impact of the Effective Implementation of Organizational Excellence Strategies on Key Performance Results,* Centre of Quality Excellence, The University of Leicester, GB, 2005.

[15] Vogel, N., *Business Excellence Awards: The Australian Experience*, Report of the Symposium on Quality and Business Excellence Awards, Asian Productivity Organization, Fiji, pp. 41-50, 2000.

[16] Mann, R., Grigg, N., *Helping Kiwi to Fly: Creating World-Class Organizations in New Zealand*

*through a Benchmarking Initiative*, Total Quality Management & Business Excellence, vol. 15, issue 5 & 6 July 2004, pp. 707-718, 2004.

[17] Mann, R., Saunders, M., *Self-Assessment in a Multi-Organizational Network*, International Journal of Quality & Reliability Management, Emerald Group Publishing Ltd., vol. 22, no. 6., pp. 554-571, 2005.

[18] Angell, C., L., Corbett, L., M.: *The Quest for Business Excellence: Evidence from New Zealand's Award Winners*, International Journal of Operations & Production Management, vol. 29, no. 2, Emerald Group Publishing Ltd., pp.170-199, 2009.

[19] Labowitz, G., Chang, Y., S., Rosansky, V., *Making Quality Work, A Leadership Guide for the Results - Driven Manager*, Harper-Collins Publishers, Inc., New York, USA, ISBN 0-88730-582-2, 1993.

[20] Imai, M. (1996) Kaizen, Der Schluessel zum Erfolg der Japaner im Wettbewerb, ISBN 3-548 35332-0, Berlin.

[21] Kern Pipan, K., Gomiscek, B., Kljajic, M., Jesenko, M., *An empirical study on comparing total quality management (TQM) items of national quality award applicants in Slovenia*, AJBM African Journal of Business Management, vol. 5, no. 33, pp. 12829-12840, 2011.

[22] Eisenhardt, K. M., *Building Theories from Case Study Research*, The Academy of Management Review, vol. 14, no. 4, pp. 532-550, 1989.

[23] Yin, R. K., *Case Study Research: Design and Methods*, Sage publications, California, USA, 1999.

[24] Chang, H. H., *The Influence of Continuous Improvement and Performance Factors in Total Quality Organization*, Total Quality Management, vol. 16, no. 3, pp. 413-437, 2005.

[25] Hair, J. F., Black, W. C., Barry, J. B., Anderson, R. E., Tatham, R. L., *Multivariate Data Analysis*, Sixth Edition, Pearson, Prentice Hall, New Jersey, ISBN 0-13-032929-0, 2006.

[26] Ward, J., *Hierarchical Grouping to Optimize an Objective Function*, Journal of American Statistical Association, 58, pp. 236-244, 1963.

[27] Ferligoj, A., *Classification into Groups, Theory and Use in Social Sciences, Advances in Methodology and Statistics*, Faculty of Social Sciences, Political Sciences and Journalism, University of Ljubljana, No. 4, ISSN 1318-1726, Slovenia, 1989.

28] Jesenko, J., Jesenko, M., *Multivariate Statistical Methods*, University of Maribor, Faculty of Organizational Sciences, ISBN 978-961-232-198-7, Slovenia, 2007.

[29] Ferligoj, A., Kronegger, L., *Clustering of Attribute and/or Relational Data, Advances in Methodology and Statistics*, Journal of Statistical Society of Slovenia, University of Ljubljana, Faculty of Social Sciences, vol. 6, no. 2, pp. 135-153, 2009.

[30] Kern Pipan, K., Sokovic, M., *Encouragement of Continuous Improvement, Open Innovative Organizational Culture and Self-Assessment as the Basis for Quality and Business Excellence*, Sixth International Working Conference, TQM - Advanced and Intelligent Approaches, Mechanical Engineering Faculty, Belgrade, Serbia, pp. 371-374, 2011.