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Kazalo / Contents

Domen Kozjek, Marija Ovsenik

Knowledge Factors and Their Impact on the Organisation

Dejavniki znanja in njihov vpliv na organizacijo

283

Boris Miha Kaučič, Bojana Filej, Marija Ovsenik

The Influence of Social Factors on Life Satisfaction in Old Age

Vpliv socialnih dejavnikov na zadovoljstvo z življenjem v starosti

300

Tomaž Jurejevčič

Escalation Practices in Automotive Development

Eskalacijske prakse v razvoju v avtomobilski industriji

319

Dominik Žužman, Mirko Markič

Vpliv dejavnikov vodenja na zavzetost uniformiranih policistov

Influence of Leadership Factors on the Work Engagement of Uniformed Police Officers

332

Andrej Grebenc

Matematični model tranzicije tehnologij s stališča sistemskih inovacij

Mathematical Model of Technology Transition as Systemic Innovation

345

Mateja Kalan

Triangulacija teorij o odličnosti poslovnega modela McKinsey 7S

Triangulation of Theories on the Excellence of the McKinsey 7S Business Model

360

Knowledge Factors and Their Impact on the Organisation

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Abstract:

Research Question (RQ): The research question is whether managers in organisations recognize the benefits of knowledge management.

Purpose: The purpose of this research is to identify the factors of knowledge which have a significant impact on the organisation.

Method: We reviewed the relevant literature in the field of knowledge management. On this basis, we summarized the factors of knowledge. We performed a survey among the 69 biggest Slovenian commercial companies (public and banking sectors were excluded).

Results: Research has shown that managers recognize the positive effects of knowledge. Factor analysis, with the discovery of latent variables, additionally confirmed already established facts from the research literature. This led us to the discovery that knowledge is the common denominator of all companies, regardless of the business in which they operate.

Organisation: From the examined literature, we can conclude that knowledge management has a positive impact on the company's results. Identification of knowledge factors allows a more efficient use of company's resources and enables further development of the organisation.

Society: Knowledge has become a highly appreciated "resource", therefore it is necessary to be able to manage it. Knowledge is the foundation of progress, not only for the development of the company but for the entire civilization.

Originality: We see the original contribution in the identification of dilemmas in building connections between knowledge management and the company's success.

Limitations / further research: The research matter is extremely difficult because the evidence that knowledge is the most influencing matter of a company's success can not be easily confirmed. The connection (we remain inside the topic of human capital) between knowledge and company's result is also manifested with other elements of the business, such as organisational culture, public relations, etc. Additional question is whether all employees in companies have the same opinion about knowledge management, namely most of the responses to our survey were received from people who are managers, directors, etc.

Keywords: knowledge management, knowledge factors, human capital.

1 Introduction and Theoretical framework

Continued development and rapid distribution of information technology has caused a cyclical - continuous struggle for market share and fight for every customer between manufacturers and suppliers of similar products. The existence of a company primarily depends on the success of the materialization of the intellect of its employees and their intellectual potential. The purpose of this study is to determine which knowledge factors are identified as the most important for the success of the company and the goal is to determine whether there are other hidden knowledge factors (which can not be determined directly from the survey) that can significantly affect the company's results.

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Clerical skills to the company's success in the business environment are the creative ideas and knowledge which the company can realize at the right time and in the right market (Ovsenik & Ambrožič, 2010, p. 78). Knowledge is a multifaceted concept with a multifaceted range of meanings and is defined as justified true belief which results in a value increase (Nonaka, 1994, p. 21). On the other hand, Bhatt (Bhatt, 2001, p. 70) notes that the data are raw facts which, by means of processing and organisation, turn into information, whereas knowledge is logically completed information. Knowledge can be designed as tacit knowledge or explicit knowledge (Nonaka, 1994, p. 19). Tacit knowledge is knowledge which can not be identified and there is no word for it (Smith, 2001, p. 313). Tacit knowledge is automated and requires very little time for making a decision; we can talk about collective behavior and collective consciousness of the organisation (Smith, 2001, p. 314). It can also be defined as a structural concept that describes the relationship between different types of knowledge (Gupta, Iyer, & Aronson, 2000, p. 17). Explicit knowledge is academic or technical data (or only information) described in formal language (Smith, 2001, p. 316). Examples of explicit knowledge are manuals, mathematical expressions, copyrights and patents (Smith, 2001, p. 316).

Seen from the distance, the development of the company is directly connected to the development of employees (regardless of their position in the company) and their knowledge. However, under the microscope, on the basis of our own experience, we realize that the knowledge of individuals affects the sum of the collective knowledge of the company (e.g. the educational structure, the number of individual awards for outstanding achievements at work, etc.), but without an effective distribution network, filters and verified processes within large companies, it is not necessary that the company will be successful even if it has the largest amount of knowledge and skills in cumulative terms among its employees. The last finding also reflects the core of our research questions. Various authors, e.g. (Hsu & Shen, 2005, p. 355) establish a link between the life cycle of the product, knowledge and development of the company. The term life cycle of the product stands for stages which each product or service on the market goes through. When the life cycle of the product reduces, the role of knowledge management increases ("knowledge management" is hereafter referred to as KM), because the faster rotation of phases of the product, the greater competitiveness on the market. Therefore, the competition must adapt to the new situation or withdraw from the market.

There has been a lot of research done on the subject of knowledge and its relationship to the organisations' "put out". We focused on some research studies and findings on qualitative and quantitative analyzes of these studies. They offered us a previously installed and tested framework of the scientific matter of the study of the environment. Based on qualitative case studies of larger organisations, the finding of knowledge management has confirmed, that the most important internal KM factors which affect the result of the company's organisational culture, are the organisational infrastructure and employee motivation (Davenport & Prusak, 1998, p. 159) or "knowledge management is the management of people and vice versa" (Davenport & Volpel 2001, p. 218).

Similar as Davenport, the authors Wong and Aspinwall (Wong & Aspinwall, 2005, pp. 74-75) in 2005 also confirmed the hypothesis (the most important internal KM factors which affect the result of the company's organisational culture are organisational infrastructure and employee motivation), that these factors are the most important to achieve a business objective in the medium-sized companies. Later, a more recent study confirmed that the organisational infrastructure is a very important internal factor that has a significant impact on improved communication, collaboration and exploitation of knowledge within the organisation. All this has a positive effect on productivity. They also found that organisational culture is deeply rooted among the employees in the organisation and requires a lot of effort to change. Larger companies are managed centrally, therefore easier to change the organisational culture as smaller organisations, which, from this perspective, are given the advantage in the implementation of KM (Bharadwaj, Chauhan, Raman &, 2015, p. 430).

Valmohammadi (Valmohammadi 2010, p. 920) found great deviations from the confirmed hypothesis of Davenport, Wong and Aspinwall in his empirical research, namely the two factors of rewarding and motivating employees proved to be insignificant in the medium-sized companies. However, other factors, such as limitations in the implementation of KM, education and training and the importance of human resources, were perceived as very important in achieving the organisation's objectives. Valmohammadi notes that it is important to distinguish between large and small companies while exploring KM. Moreover, the results obtained should be interpreted correctly, for example, the KM factor which is ranked the highest in the survey must be addressed prior to other factors by the managers. With the empirical research on a sample of 301 selected respondents in major research centers, authors Akhavan et al (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 283-285) discovered that the scope of KM consists of three important factors. The first factor (human resources management) consists mainly of concepts that are the foundation of the KM system in the organisation. These include: organisational culture, collaboration and communication among employees, motivation, teamwork and job security. The second most important factor is KM or knowledge management (storage, transmission and renewal of knowledge). The third factor involves certain factors which are more general in comparison to the other ones. These are necessary for the successful establishment of a system of the organisation (not only for KM system). These factors are measurement, transparency and support of the company's management (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 283-285). An important aspect of KM is transferring the experience from the elderly to the younger. A survey among students (Jeleč Kaker, Ovsenik, & Zupančič, 2016, p. 68) who will work with the elderly in the future has shown that students who participated in a study have an honest and respectful relationship to the elderly, despite poor current economic situation. Intergenerational cooperation is essential because it especially allows the transfer of experience from the elder to younger generations. Experience is a basis for decisions and creative challenge (Ovsenik M., 2013, p. 71). Below we list the literature on which we built the factors of knowledge. Literature is summarized according to the article (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 276-288). Regarding the factors of knowledge relating to the organisational and cultural fields, we further examined these, updated them with the latest research and articles and found relevant literature from the environment of the study conducted.

Table 1. Reference literature of knowledge indicators

Knowledge indicators	Source
Transparency, trust and organisational culture	· (Akhavan, Jafari, & Fathian, 2006, pp. 97-113) · (Luo & Lee, 2015, pp. 62-75)
Database and technological tools for knowledge searching	· (Davenport E. , 2001, pp. 61-75)
Documentation of knowledge	· (Davenport & Volpel, 2001, pp. 212-221)
Measuring performance	· (Moffett & McAdam, 2009, pp. 44-59) · (Bharadwaj, Chauhan, & Raman, 2015, pp. 421-434)
Comparative analysis	· (Moffett & McAdam, 2009, pp. 44-59) · (Frost, 2014)
Structure of knowledge	· (Davenport & Prusak, 1998) · (Bharadwaj, Chauhan, & Raman, 2015, pp. 421-434)
Management of changes	· (Ovsenik & Ambrož, 2006)
Knowledge exchanging	· (Davenport & Volpel, 2001, pp. 212-221) · (Mustafa, Lundmark, & Ramos, 2016, pp. 273–295)
Company's willingness for KM strategy	· (Akhavan, Jafari, & Fathian, 2006, pp. 97-113)
Systematic approach to KM	· (Akhavan, Jafari, & Fathian, 2006, pp. 97-113)
Knowledge and measurement of knowledge	· (Wong & Aspinwall, 2005, pp. 64-82)
Architecture of knowledge	· (Skyrme & Amidon, 1997, pp. 27-37) · (Brahma & Mishra, 2015)
Continuous learning	· (Skyrme & Amidon, 1997, pp. 27-37) · (Luo & Lee, 2015, pp. 62-75)
Creating knowledge	· (Skyrme & Amidon, 1997, pp. 27-37) · (Manuel, 2016)
Head of knowledge	· (Moffett & McAdam, 2009, pp. 44-59)
Organisational structure	· (Ovsenik M. , 1999) · (Ovsenik & Ambrož, 2010)
Repositories and transmission of knowledge	· (Davenport E. , 2001, pp. 61-75) · (Kim, Mukhopadhyay, & Kraut, 2016, pp. 133-156)
Knowledge management	· (Davenport & Prusak, 1998)
Teamwork	· (Šumanski, Kolenc, & Markič, 2007, pp. 102-116) · (Jafari, 2015, pp. 82-93)
Information infrastructure	· (Wong & Aspinwall, 2005, pp. 64-82) · (Kim, Mukhopadhyay, & Kraut, 2016, pp. 133-156)
Cooperation and communication	· (Drucker, 2001) · (Mciver, Lengnick - Hall, Lengnick - Hall, & Ramachandran, 2013)
KM integration with existing systems	· (Moffett & McAdam, 2009, pp. 44-59) · (Kim, Mukhopadhyay, & Kraut, 2016, pp. 133-156)
Knowledge and winning organisation	· (Coulson - Thomas, 2007, pp. 108-112)
Job security	· (Egbu, 2004, pp. 301-315) · (Frost, 2014)
Climate in the organisation	· (Wong & Aspinwall, 2005, pp. 64-82)
Human resources management and motivation	· (Egbu, 2004, pp. 301-315) · (Jafari, 2015, pp. 82-93)
Flexible and dynamic organisational structure	· (Bukovec, 2009, pp. 4-23)
Management support and commitment to the goals	· (Davenport & Volpel, 2001, pp. 212-221) · (Bukovec, 2006)
Awareness and understanding of employees	· (Garrick, Chan, & Lai, 2004, pp. 329-338)
Training and education of employees	· (Garrick, Chan, & Lai, 2004, pp. 329-338)
Teamwork and problem solving	· (Zarraga-Oberty & De Saa-Perez, 2006, pp. 60-76) · (Jafari, 2015, pp. 82-93)

Source: Adapted from (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 276-288) and supplemented with newer sources.

We looked at the knowledge in organisations from 31 perspectives – hereafter defined as indicators of knowledge.

On the basis of the reference literature, we formed two survey questions (a total of 62 survey questions) for each indicator (Table 1). For the purposes of analytical data processing, we combined the 31 indicators of knowledge into 12 meaningful sets of "knowledge factors" (Table 2). When reducing the indicators of knowledge into the knowledge factors, we used the methodology used in the study (Valmohammadi 2010, pp. 915-924). The hypotheses are based on the 12 knowledge factors resulting from the examined literature. Table 2 shows the link between the indicators of knowledge and factors of knowledge (factor of knowledge is defined as a logical unit, consisting of different indicators of knowledge). It shows the indicators with which we based our knowledge factors.

Table 1. Link between factors and indicators of knowledge

Knowledge factor	Knowledge indicator
Factor 1: Leadership management and support	Teamwork
	Management support and commitment to the goals
	Transparency, trust and organisational culture
Factor 2: Culture of the organisation	Climate in the organisation
	Organisational structure
	Cooperation and communication
	Awareness and understanding of employees
Factor 3: Information technology	Database and technological tools for knowledge searching
	Information infrastructure
Factor 4: KM strategy	Company's willingness for KM strategy
	Knowledge management
	Administrator of knowledge
	Knowledge and measurement of knowledge
Factor 5: Performance measuring	Benchmarking
	Teamwork and problem solving
Factor 6: Infrastructure of the organisation	Documentation of knowledge
	Knowledge exchanging
	Repositories and transmission of knowledge
Factor 7: Processes and activities	Architecture of knowledge
	Systematic approach to KM
	Creating knowledge
Factor 8: Rewarding and motivation	Human resources management and motivation
	Knowledge and winning organisations
Factor 9: Elimination of restrictions	Job security
Factor 10: Training and education	Continuous learning
	Training and education of employees
Factor 11: Human resources management	Flexible and dynamic organisational structure
	Change management
Factor 12: Comparative analysis	KM integration with existing systems
	Measuring performance
	Structure of knowledge

Table 3 shows the structure of the questionnaire, resulting from links between indicators and knowledge factors.

Table 3. Knowledge factors and survey questions

Factor 1: Leadership management and support - Managers act as catalysts for KM. - Managers create the necessary conditions for KM. - Managers act as an example to show the desired behavior. - Managers encourage knowledge creation, sharing and use. - Managers recognize KM as an important factor that contributes to the business success. - Managers show attachment and support of KM. Factor 2: Culture of the organisation - High organisational culture that values knowledge and problem solving. - A high degree of trust among employees is important when exchanging knowledge. - Frank exchange of errors between employees without fear of punishment. - Collaboration between employees is important. - Encouraging of teamwork among employees. - Empowering employees to explore new possibilities. - Encouraging people to ask questions. - Accepting the exchange and sharing of knowledge (not accumulation) as organizational strength. Factor 3: Information technology - The use of an appropriate system for managing KM. - Using of technological tools (tools for collaboration, knowledge base, search engines, document management systems, intelligent systems, etc.). - The utilization of intranet or internet. - Easy use of technology. - Relevance of KM system according to the user's needs. Factor 4: KM strategy - Having clear goals and objectives of a shared vision that employees support. - It is necessary to develop a KM strategy at any cost. - Having clear tasks and clearly defined objectives of KM.	- Alignment of KM strategy with business strategy. Factor 5: Performance measuring - Measurement of the benefits of KM depending on initiatives stemming from KM. - Monitoring the progress of the development of the KM. - Assessing the impact of KM on financial performance. - Updating of indicators (financial and the organisational climate ones) for measuring KM. - Measuring the value of intellectual capital. Factor 6: Infrastructure of the organisation - The company has a knowledge trustee (administrator of knowledge, etc.). - The company defines the roles and responsibilities for the purpose of carrying out the tasks of KM. - The company has a clearly defined ownership of the initiatives arising from the KM group. - The company has a flat organisational structure of the KM working groups. Factor 7: Processes and activities - Generating new ideas and knowledge. - Documenting the key skills and knowledge. - Effective classification and storage of knowledge. - Improving procedures for finding the necessary knowledge. - Sharing knowledge with the use of electronic media or personal contact. - Communication (formal and informal) among employees. - Immediate implementation of best knowledge in products and services. - Promotion of continuing education at all levels. - Providing for the protection of knowledge assets from unauthorized exposure or theft. Factor 8: Rewarding and motivation - Guaranteeing the right motivators to encourage the production of new knowledge.	- Motivating employees to use new knowledge. - Visibly rewarding employees who share their knowledge. - Rewarding employees for successful teamwork. - Motivating work performance by means of assessment system. Factor 9: Elimination of restrictions - Provision of funds for investment in KM. - Sufficient funding investment for the construction of KM technological system. - Ensuring sufficient human resources to create new knowledge. - Providing employees with time for knowledge management related activities. Factor 10: Training and education - Training on the concept of knowledge and KM. - Training on the use of KM systems and tools. - Training individuals to assume roles related to KM. - Training to develop knowledge skills such as creative thinking, problem solving, communication, team building, etc. - The possibility that employees are involved in both internal and external learning opportunities such as conferences, training seminars, etc. Factor 11: Human resources management - Employment of workers in order to fill gaps related to knowledge. - Employment of workers due to their positive attitude to knowledge. - Rewarding employees for the purpose of retaining. - Providing opportunities for career promotion. Factor 12: Comparative analysis - Constant care for benchmarking system performance (measuring the usefulness of KM initiatives with regard to financial or non-financial indicators of the company). - Encouraging employees to compare with other organisations. - Establishing the internal mechanism with a view to coordinating the company's strategy, budget and human resources management.
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Source: Adapted from (Valmohammadi, 2010, pp. 915-924).

The survey questions were taken from a survey questionnaire (Valmohammadi 2010, pp. 915-924). As we partially corrected the indicators of knowledge due to cultural and other impacts, which we previously described in formulating hypotheses, we approached to the correction of the survey questions in the same way. We formed the 62 survey questions out of the 31 indicators of knowledge from the reference literature. Respondents were asked to respond to the question (Table 3) "To what extent do these arguments apply to the company in which you are employed (rating from 1 to 6)?" Below we show a link between the factors of knowledge and hypotheses (Table 4). Each hypothesis is based on the factors of knowledge management.

Table 2. Link between hypotheses and influential factors of knowledge management

Hypotheses	Influential factors of knowledge management
H 1 - Knowledge management creates innovation processes.	Factor 7: Processes and activities
	Factor 8: Rewarding and motivation
H 2 - Knowledge management realizes the company's strategies.	Factor 9: Elimination of KM restrictions
	Factor 4: KM strategy
	Factor 5: Performance measuring
H 3 - Knowledge management creates conditions for the competitiveness of the organisation.	Factor 2: Culture of the organisation
	Factor 6: Infrastructure of the organisation
H 4 - Knowledge management provides the foundations for new knowledge.	Factor 3: Information technology
	Factor 10: Training and education
	Factor 11: Human resources management
H 5 - Knowledge management helps to the success of the organisation.	Factor 1: Leadership management and support
	Factor 12: Comparative analysis

In formulating the hypotheses, we based on the already conducted research in the article »Identification of knowledge management critical success factors in Iranian academic research centers« (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 277-283). The hypotheses were partially summarized from the mentioned research, the difference being in the indicators of knowledge. We changed the reference literature (Table 1) for designing the indicators of knowledge in the fields where we found the research results stemming from our living environment. In particular, these areas relate to the cultural aspect, the organisational structure and understanding of the work in general. With this, we changed the content structure of the hypotheses. We also added a testing hypothesis that was not included in the summarized survey (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 277-283). Respondents could respond to the mentioned hypotheses with CONFIRM or REJECT. With the study, we wanted to identify the factors of knowledge that affect the performance of the organisation, so it was very important that the respondents identified KM - knowledge as a potential factor impacting the performance of the organisation. For this reason, in addition to the four statements, we also added hypothesis H5, to which respondents answered the same with CONFIRM or REJECT. This last argument allows us at least a partial view of the sincerity of the answers; indeed, if the respondent decided to reject the first four statements and confirm the fifth, this would mean that we can reasonably suspect the validity of the responses and eliminate the completed questionnaire. The same applies to the contrary, e.g., if the respondent rejected the last statement and confirmed the other four. The questionnaire was completed by collecting characteristics and demographic data of respondents.

2 Method

Before carrying out the actual survey, we conducted a pilot study. The pilot study was conducted with randomly selected people. They were selected randomly in our circles of associates, all of which met the conditions of "population research" in terms of education and the workplace. The purpose of the pilot study was to determine whether the measuring instrument is appropriate. By this we mean primarily the strength of connections between variables and verification of the statistical methods that were intended to be used in the right pattern. We conducted a survey among 21 people, but this time we interviewed them personally by dividing the questionnaire in printed form. A pilot survey data was collected and processed in SPSS program. We focused on the analysis of data reliability (reliability analysis) with Cronbach's coefficient α (alpha). The selected respondents evaluated the questionnaire twice, because the first time we did not reach the minimum value of the coefficient of 0.7 (the average of all factors was 0.54). Therefore, the questionnaire was corrected especially in terms of further clarifying the survey questions. Some questions were re-formulated and some of them excluded, because we realized that they did not contribute to the further clarification but, in certain aspects, even gave rise to doubts into question that had already been answered. The revised questionnaire was tested again in the circle of friends and associates but this time among different people. This pilot study included 19 people. This time, the Cronbach coefficient α (alpha) was reached (0.76). We used a predetermined set of companies or respondents. This is a method of a non-random sample, namely the sample was prepared in advance and based on published data on added value per employee in the article "300 biggest and best Slovenian companies in 2010" (Bertoncelj Popit, 2011) published in the electronic edition of the newspaper Delo. The list of companies included 300 of the biggest companies in Slovenia, excluding the financial sector. All companies gave prior consent to the publication of data in the electronic version of Delo.

The main reason for choosing these companies was that the list includes the majority of economic activities in general and which, from the revenue point of view, present the largest share. Selected companies are the largest companies not only from the revenue and employee point of view but also in terms of investments in research, technology and innovation, etc. The target research group were managers, researchers and professionals or people who make essential decisions in the organisations.

We carried out a parallel test of the correctness of the data published by the web app Gvin, which is a web service that allows registered users insight into registered Slovenian companies, ownership share, market developments, etc. The survey was carried out with the help of the online collection. As a tool for collecting survey responses, we used Google documents - Forms (Do more in cooperation with other office applications with Google Drive, 2013). Only selected companies could access the questionnaire. Invitations for filling out the questionnaire were distributed by e-mail.

The invitation listed all the necessary information related to the study, to whom the invitation is intended and the electronic link to the online form. In the e-mail addresses, we deliberately avoided the e-mail addresses that included personal names, so that the respondents would not regard (perceive) them as spam and delete them. Therefore, we preferred using e-mail addresses such as info@company.si.

When confirming the hypotheses, we took into account the answers provided in the questionnaire. To analyze the reliability of the questionnaire, we used the Cronbach's coefficient α (alpha). With this coefficient, we tested only those questions which belonged to the specific hypothesis. This confirmed that any differences between the answers were not the result of a questionnaire or unclear questions, in short, this means that the answers received vary because of different opinions of the respondents, and not because the survey was unclear or because multiple-choice questions could have several explanations (Cronbach, 1951, pp. 297-334). We confirmed or rejected the hypotheses in the following successive steps:

- 1) We reviewed the responses obtained according to each hypothesis. Each participant in the survey gave an answer for each hypothesis in the questionnaire. The first four hypotheses represented the arguments that we wanted to test. The fifth and final hypothesis was a test and a partial indicator of sincerity of the answers. Indeed in some cases, it appeared that the respondents confirmed the first four hypotheses but not the last one. This clearly indicates that we may reasonably doubt in the accuracy of the results, so we excluded such questionnaires altogether (we eliminated two of the questionnaires). None of the respondents confirmed the final hypothesis, but not the first four.
- 2) Each of the following hypotheses, as we have already explained, is based on the influential factors (Table 4). To confirm the hypothesis, we set the following rule in this part of the model: in order to confirm the hypothesis, the arithmetic mean of all the sub-questions (Likert scale from 1 to 6) must be at least 3.5 ($x \geq 3.5$) with the distribution within $+ - 1.3$ of the standard deviation. We believe that the Likert scale has the same spacing between the ordinal classes (e.g. responses 1 and 2 have the same interval distance).
- 3) We have tried to establish for each hypothesis (with factor analysis - PCA method) the existence of latent (hidden) variables, which could explain the greater part of the variability of the hypothesis, and whether the observed latent variables (factors) can be usefully applied to the hypothesis.

3 Results

When gathering the data, we realized that 14 (4.7%) of the companies from our range had ceased their activities for various reasons, therefore 286 or 95.3% of the initially planned electronic invitations were sent.

In 97 cases (33.9% of all outgoing emails), we received notice that the web address does not exist anymore. We concluded that these are mainly companies, which stopped working from the time of publication of the list to the implementation of our study. 71 questionnaires (24.8%) were completed, the others did not reply. We excluded four respondents from the analysis because of an incompletely filled out questionnaire. The survey was answered by 28 men and 34 women, five respondents did not indicate gender. The average age of participants was 43.2 years.

Table 3. Position in the company and the level of completed education

Job position/ Education	PhD	Master's degree	Specialization	High school	Higher education	College	Empty	Total
Operator	2	3	2	5	8	6	2	28
Expert		2	1	2	5	3	2	15
Head of department	3	3	2	1	5	6	1	21
(empty)					1		2	3
Total of	5	8	5	8	19	15	7	67

We calculated the descriptive statistics indicators, such as arithmetic mean, standard deviation, asymmetry and kurtosis. The calculations are based on the results of descriptive statistics directly from the questionnaire responses using values of the Likert scale (1 to 6).

Table 6. Descriptive statistics of the hypotheses

Hypotheses	Arith. mean	STATUS according to the Arith. mean (AR > 3,5)	Std. deviation of the hypothesis	STATUS according to the Std. deviation (Std < 1,3)	Asymmetry	Kurtosis
H 1 - Knowledge management creates innovation processes.	3,945	CONFIRMED	1,27	CONFIRMED	-0,33	-0,35
H 2 - Knowledge management realizes the company's strategies.	3,987	CONFIRMED	1,21	CONFIRMED	-0,33	-0,22
H 3 - Knowledge management creates conditions for the competitiveness of the organisation.	3,968	CONFIRMED	1,25	CONFIRMED	-0,50	-0,15
H 4 - Knowledge management provides the foundations for new knowledge.	4,007	CONFIRMED	1,26	CONFIRMED	-0,38	-0,24
H 5 - Knowledge management helps to the success of the organisation.	3,698	CONFIRMED	1,45	REJECTED	-0,43	-0,62

We confirmed all hypotheses except the last, fifth hypothesis. This one deviates due to an increased standard deviation. Also, the arithmetic mean of the responses suggests that respondents were the least inclined to the last fifth hypothesis in relation to the other ones.

In this stage of the analysis, we rejected hypothesis 5. Hypotheses were tested according to the assumed normal distribution.

We used the non-parametric Kolmogorov-Smirnov test for one sample. We found out that we can assume that it is a normal distribution (statistically significant value > 0.05). The exception is the hypothesis 3 where the average responses in regards to Kolmogorov-Smirnov test for one sample are on the border of the normal distribution but still acceptable (Table 7).

Table 7. Kolmogorov-Smirnov test for one sample

Hypotheses	N	Ar. mean	Std. deviation	Kolmogorov-Smirnov test	Feature (2-tail)
H 1 - Knowledge management creates innovation processes.	69	3,9458	,70704	1,211	,107
H 2 - Knowledge management realizes the company's strategies.	69	3,9884	,58639	1,161	,135
H 3 - Knowledge management creates conditions for the competitiveness of the organisation.	69	3,9691	,74064	1,357	,050
H 4 - Knowledge management provides the foundations for new knowledge.	69	4,0094	,70617	,859	,452
H 5 - Knowledge management helps to the success of the organisation.	69	3,9748	,67938	,899	,394

We used the factor analysis to determine whether there are hidden components that can explain the greater part of the hypotheses variability. We used the method of Principal Component Analysis (PCA). Before performing PCA analysis, we further tested the answers of the respondents with D'Agostino test. This test was chosen because of the structure of the responses received: namely, the answers were given in a Likert scale of 1 to 6. The test is particularly suitable for determining the normality of the distribution of variables which contain multiple identical responses, in our case from 1 to 6. The test was testing whether the answers received are distributed normally. The objective of the PCA analysis was to identify whether there are other - hidden knowledge factors which had not been detected yet. The results of our analysis (Table 8) are similar to the studied literature.

Table 8. Summary of PCA analysis - Hypotheses 1 to 5

Hypotheses	KMO test	Identified latent components	Rotation	% rot. comp.	Cum. %
H 1 - Knowledge management creates innovation processes.	0,752	1. Technical approach to knowledge in the company (storage, editing, sorting)	Direct Oblimin.	30,60%	
		2. The protection and transmission of accumulated knowledge (protection, intervention, learning, motivation in the application of new knowledge)		11,15%	41,75%
H 2 - Knowledge management realizes the the company's strategies.	0,643	1. The economic aspect of knowledge management (KM investment assets, measurement of KM yield, KM consistency with company's strategy)	Varimax	17,67%	
		2. Strength of intellectual capital (KM development, updating of indicators measuring KM and measuring the value of intellectual capital)		16,71%	34,38%
		3. Financial effects of KM per unit of time (the time to perform the KM tasks and effects on financial performance)		13,15%	47,53%
H 3 - Knowledge management creates conditions for the competitiveness of the organisation.	0,729	1. Motivation and teamwork (providing resources for research, knowledge administrators, promoting teamwork, confidence in the exchange of knowledge)	Varimax	23,59%	
		2. Constructive approach in resolving errors (frank exchange of errors without fear of punishment, promoting questions, clearly defined responsibilities)		23,32%	46,91%
H 4 - Knowledge management provides the foundations for new knowledge.	0,747	1. Use of information technology (provision of simplification and clarity of systems, use of technology systems)	Varimax	21,98%	
		2. Employment due to skills needs (priority in employment of those who accept and pass on knowledge, new employments to fill the gaps of knowledge)		15,64%	37,62%
		3. The adequacy of the current KM system (training of individuals to assume the roles associated with KM, training for skills development).		13,80%	51,42%
H 5 - Knowledge management helps to the success of the organisation.	0,738	1. Management support of KM (managers are acting as an example, as catalysts for KM, they recognize KM as an important factor).	Direct Oblimin.	31,90%	
		2. Comparative analysis (measurement of the usefulness of KM initiatives in relation to the financial or non-financial indicators of the company)		14,07%	45,97%

Table 8 shows the synthesis of the main findings of the PCA analysis. We conclude that we can in average explain 46.7% variabilities of all five hypotheses with new identified latent components.

4 Discussion

When we were determining hypotheses, we were partially relying on the previous study (Akhavan, Hosnavi, & Sanjaghi 2009, pp. 277-283). The hypotheses that we created are: “Knowledge management creates innovation processes”, “Knowledge management realizes company's strategy”, “Knowledge management creates conditions for better competitiveness of the organisation”, “Knowledge management provides the foundations for the new knowledge” and the final hypothesis “Knowledge management helps to the success of the organisation”.

The empirical analysis was made to determine how respondents understand the stated hypotheses. We tested the hypotheses and successfully verified four out of five hypotheses. The last, fifth, rejected hypothesis – “Knowledge management helps to the success of the organisation”, did not meet the requirements for approval. This was mainly due to diffuse answers. Respondents were selected from different sized companies and from different fields of activities, so large deviations in answers are not surprising.

It turned out that for H 1 – “Knowledge management creates innovation processes” the most important knowledge factor is technical approach to knowledge in the company (storage, editing, sorting). H 2 – “Knowledge management realizes the company's strategies” discovered that knowledge factor which contributes to the organisations success the most concerns the economic aspect of knowledge management (KM investment assets, KM consistency with the company's strategy). The most influential knowledge factor for H 3 – “Knowledge management creates conditions for the competitiveness of the organisation” is summarizing employee motivation and constructive approach in resolving errors (frank exchange of errors without fear of punishment, promoting questions, clearly defined responsibilities). Regarding H 4 – “Knowledge management provides the foundations for new knowledge”, the respondents replied that the most significant knowledge factor concerns the use of information technology and employment due to skills needs (priority in employment of those who accept and pass on knowledge, creating new employments to fill the gaps of knowledge). At the last hypothesis H 5 – “Knowledge management helps to the success of the organisation”, we realized that the most significant is management support of KM (managers are acting as an example and they recognize KM as an important factor). Compared to previous research by other authors (Akhavan, Hosnavi, & Sanjaghi, 2009) (Valmohammadi, 2010), (Davenport & Prusak, 1998), (Brahma & Mishra, 2015) (Bharadwaj, Chauhan, & Raman, 2015) our findings are in certain parts confirming and in some deviating.

Similar observations were made with the factor analysis: it turned out that the new identified factors, e.g. the area of human resources management, the importance of storing and distribution of knowledge and organisational culture were similar to those in the study (Valmohammadi 2010, pp. 915-924). In study, the authors Wong and Aspinwall (2005, pp. 74-75) confirmed the positive impact of employee motivation on the positive business result of the company. Our study also confirmed this finding. Motivation does not necessarily mean prizes in terms of increased income.

5 Conclusion

It is important for the company's management to know which of the knowledge factors are the most important for the organisation, and secondary, how much they contribute to the overall result of the company.

During the research we relied on already carried out survey of critical knowledge factors »Identification of knowledge management critical success factors in Iranian academic research centers« (Akhavan, Hosnavi, & Sanjaghi, 2009, pp. 276-283). Based on this research, besides taking into account local characteristics (with this we mean the Slovenian cultural specificities), we defined new knowledge factors. The most critical research moment was reduction of 31 knowledge indicators into 12 knowledge factors. With reduction, we created an important research matter. The survey contained questions designed by the elements of knowledge from the research literature. Besides the expected statistical methods, we also conducted factor analysis and found out, that respondents identified new knowledge factors even though they were hidden between questions in the survey. This led us to the discovery that knowledge is the common denominator of all companies regardless of the business in which they operate. The factor analysis with the discovery of latent variables additionally confirmed already established facts from the research literature.

The research goal was achieved. We determined which factors of knowledge are the most important. In our case, it turned out that commendation for a job well done is a positive pulse that in the long-term affects the company's success. But we have not investigated whether this assessment is reflected through higher productivity or innovation. With the study, we also confirmed that the technical approach to knowledge (storage and editing of knowledge) is the most important KM factor for creating innovative processes in the company. The most significant KM factor for the realization of the company's strategy is "the economic view", which defines investment funds and monitoring of the knowledge management results. Motivation and teamwork (providing resources for research, knowledge administrators, promoting teamwork) and constructive approach to resolving the errors are the KM factors that most influence the creation of conditions for competitiveness the organisation. The study also confirmed that the basis for the creation of new knowledge in the organisation stands in simple (user-friendly) use of information technology. We confirmed that knowledge management can positively contribute to the success of the organisation, if well managed.

As a limitation, we see the fact that the knowledge can also be expressed in other ways, not only as a "know-how", but also in collective forms of knowledge, such as organisational culture and climate in the organisation.

Identified knowledge factors that affect organisation's performance give managers in organisations additional useful information for managing companies. The additional value for the organisations in this study is also seen in upgrading and adapting the factors of knowledge. We adapted knowledge factors to the local area and "tested" them with the survey.

With the study, we successfully identified the KM factors, which have a significant impact on the organisation. For further research, we propose to establish a measure (for example added value in EUR per employee) with which it would be possible to determine the impact of KM on the company's result.

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Povzetek:

Dejavniki znanja in njihov vpliv na organizacijo

Raziskovalno vprašanje (RV): Raziskovalno vprašanje je bilo ali vodilno osebje v organizacijah prepozna pozitivne učinke upravljanja z organizacijskim znanjem.

Namen: Namen raziskave je ugotoviti dejavnike znanja, ki pomembno vplivajo na rezultat podjetja, cilj pa ugotoviti ali morebiti obstajajo še kakšni drugi skriti dejavniki znanja, ki jih v dosedanjih raziskavah nismo zasledili.

Metoda: Proučili smo relevantno literaturo s področja upravljanja z znanjem. Na podlagi tega smo povzeli dejavnike znanja. Izvedli smo anketo med 69 največjimi slovenskimi gospodarskimi družbami (javni in bančni sektor sta bila izključena).

Rezultati: Raziskava je pokazala, da menedžerji prepoznavajo pozitivne učinke upravljanja znanja v organizaciji, tudi faktorska analiza je pokazala, da so anketiranci uspešno identificirali dejavnike znanja. To nas je pripeljalo do odkritja, da je znanje skupni imenovalec vseh podjetij, ne glede v katerem sektorju gospodarstva delujejo.

Organizacija: Iz pregledane literature lahko zaključimo, da upravljanje znanja pozitivno vpliva na rezultate podjetja. Identifikacija dejavnikov znanja omogoča bolj učinkovito uporabo virov podjetja in nadaljnji razvoj organizacije.

Družba: Znanje je postala zelo cenjena "dobrina", zato je nujno potrebno upravljati z znanjem v organizacijah. Znanje je temelj napredka, ne samo za razvoj organizacije, temveč tudi za celotno civilizacijo.

Originalnost: Izvirni prispevek vidimo v identifikaciji dilem pri gradnji povezave med upravljanjem znanja in uspehom podjetja.

Omejitve/nadaljnje raziskovanje: Raziskave na tematiko »znanja« predstavljajo izziv, namreč ni mogoče zlahka potrditi teze, da znanje v podjetju najbolj vpliva na njegov uspeh. Povezava med znanjem in rezultatom podjetja se kaže tudi z drugimi elementi, kot so npr. organizacijska kultura, odnosi z javnostmi itd. Dodatno vprašanje, ki se postavlja samo po sebi je, ali imajo vsi zaposleni v podjetjih enako mnenje o kategoriji upravljanja z znanjem, namreč večina odgovorov naše raziskave je bilo prejetih od oseb, ki so menedžerji, direktorji itd.

Ključne besede: upravljanje z znanjem, dejavniki znanja, človeški kapital.

The Influence of Social Factors on Life Satisfaction in Old Age

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Abstract:

Research question (RQ): What is the connection between social factors and life satisfaction in old age?

Purpose: The purpose of this research was to establish the influence of social factors on life satisfaction in old age.

Method: The quantitative research method was used, a causal non-experimental method. As sampling data technique we used the technique of a survey questionnaire in ten statistical regions. For the analysis of causal effects and conditional associations we used the advanced statistical propensity score methods (Rubin, 2006). From the statistical set a simple random sample was chosen, we decided on proportionate stratification. For measuring life satisfaction we used Satisfaction with Life Scale (Diener), to which we added questions in order to study social factors. The research included 656 older adults aged 65 years and above, living in the home environment or in social care institutions.

Results: Closely connected to life satisfaction in old age is the living conditions index (housing conditions, environment, financial situation, safety), whereas the lifestyle index (physical activity, nutrition, smoking, alcohol consumption) is less closely connected.

Discussion: Life satisfaction in old age is importantly influenced by social factors – suitable living conditions and less influenced by a healthy lifestyle, both of which allow for a quality life also in old age.

Society: The research has an important influence on the society, as too little attention is being devoted to the phenomenon of ageing. By alerting the public we wish to contribute towards the detabuisation of ageing and ageism. For the stable healthcare system it is important that older adults remain healthy, independent and satisfied.

Originality: The originality of the research is in the studying of social factor in the holistic model of satisfaction with life in the old age, which also includes physical, psychological and spiritual factors.

Limitations/further research: The conducted research has its limitations in the chosen methodology and sample size. The results are the result of analysis, which was made on well-balanced study plan, therefore the results can be generalized to the population of older adults (65 years and above). In the future it will be necessary to pay attention to the study of elements of respective social factors indexes, and their influence on life satisfaction.

Key words: social factors, living conditions, lifestyle, old people, home environment, social care institution.

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1 Introduction

In Slovenia we face a number of phenomena, connected to the problematics of ageing, which require the development of new pathways in the planning of health care and the quality of life of older people (Kožuh Novak, 2006, pp. 12-13). All the reports of the Statistical Office of the Republic of Slovenia (SURS) predict a marked ageing of Slovenian population also in the future. The population of the Member States of the EU-27 is according to the predictions going to age rapidly. The share of people, aged 65 years and above among general population is in EU-27 expected to increase from 17,1 % to 30,0 %; whereas the number of residents in this age group is from the year 2008 to the year 2060 expected to increase from 84,6 million to 151,5 million. In Slovenia, however, according to medium variant population projections EUROPOP2008 the share of people aged 65+ among general population is expected to increase for 33,4 %, between the years 2008 and 2060 (SURS: Prebivalstvo Slovenije danes in jutri 2008-2060: projekcije prebivalstva EUROPOP 2008 za Slovenijo, 2009, str. 27-SURS: Slovenian population today and tomorrow 2008-2060: population projections EUROPOP 2008 for Slovenia, 2009, p. 27).

Jakoš (2009, pp. 22-24) states, that the present demographical picture of Slovenia is a consequence of more than one hundred years long demographic development of three demographic factors: mortality, fertility and migrations. Among the factors that influence the future demographic development the most stable factor is as a rule mortality, where we can expect the number to rise from the present 18.000-19.000 deaths to 30.000 deaths. The fertility, which represents the most important factor of demographic development, is also decreasing in Slovenia. From the projections until the year 2027 it is evident, that the number of women in the most reproductive age is going to decrease, which is the logical consequence of lower and lower number of births since the year 1980. In case we wished to maintain the present annual birth rate, the fertility should be increased by a quarter, which is according to the opinion of the author highly unlikely. The author also draws attention to the decline in young people in the population structure, in both absolute and relative terms, which has as a consequence a shortage in labour force (p. 31).

The World Health Organization (WHO) has prepared a strategy and action plan for healthy ageing in Europe for the period between 2012– 2020. The vision of this strategy is based on old age friendly European region, where ageing is considered as an opportunity rather than as a burden for society. The vision is based on the premise, that old people are capable of keeping their health, that they are functionally able and that they are feeling well, that they live a decent life, free from discrimination and with adequate financial means in the environment that supports them, offers them safety, enables them an active life, social inclusion and access to suitable high-quality health and social services. Old age friendly European region according to WHO helps old people to reach their old age in better health so that they can live actively according to their different roles, with an emphasis on employment

and voluntary work (Strategy and action plan for healthy ageing in Europe 2012-2020, p. 2012, p. 10).

The quality of life of old people has been the subject of research for a number of years. The quality of life is a subjective, multi-layered construct, which can be defined and assessed in a number of ways. The quality of life is becoming a central social value and a very complex field of study (Filej & Žvanut, 2015, p. 20). Lah, Pahor and Hlebec (2008, p. 88) state that as synonyms for the quality of life of older people, terms such as »successful ageing«, »good ageing« and »positive ageing« are frequently used.

Through the literature and data review it can be seen, that the European countries and among them Slovenia are facing demographic changes and a lower birth rate. The life expectancy of Europeans is increasing and the ageing is becoming an important phenomenon in the modern society, in which we are afraid of ageing, especially due to the lack of satisfaction with life. We can expect that the quality of life of old people will in future deteriorate even further. In the next years we face the comprehensive overhaul of the health care system and the pension system, which will, in the opinion of many experts, bring about the reduction in the rights of the users. The need for greater inclusion of old people in the society, the ensuring of the provision for a quality, healthy and active old age requires activities and measures, which are going to represent an innovation in the care for old people and their quality of life.

The projections indicate, that the number of old people (aged 65 years and above), is going to further increase and therefore it is important to pay special attention to the ensuring of wellbeing in the old age, which is an important element of the quality of life. In the field of health and social activity we establish that too little attention is being paid to the comprehensive, holistic treatment of the old person, even though the research shows that the physical, psychological, social and spiritual factors are importantly intertwined, and therefore studying their influence on satisfaction with life in the old age is of utmost importance.

The research problem that we examine in this paper is highly topical; as we wish that the people in old age feel well and are satisfied with their lives. We are of the opinion that the holistic model with the intertwining of all four factors (physical, psychological, social and spiritual) can represent the answer to the well-being of people in the old age and their satisfaction with their lives. In this paper we demonstrate the influence of social factors on life satisfaction in the old age. Living conditions, such as housing conditions, the environment, financial position and safety as well as lifestyle factors (physical activity, nutrition, smoking and alcohol consumption) have a great influence on the quality of life.

With the conducted research we wished to establish the influence of living conditions and lifestyle on life satisfaction in the old age. For this purpose we designed the following research purpose: to establish the connection between social factors and life satisfaction in the old age.

2 Theoretical framework

Musek (2005) states that life satisfaction is influenced by various domains of satisfaction, that is by the satisfaction with one's partner, marriage, friends, love, recreational activities etc. Positive affect involves positive emotions and emotional states such as joy, affection, pride, whereas negative affect involves negative ones such as anxiety, sadness, guilt, shame, anger, etc. (p. 119). Our assessment of subjective well-being is formed on the basis of our past experiences, present condition and also on our future expectations (p. 120).

Bond and Corner (2004, p. 4) state, that from the standpoint of critical perspective of social gerontology two key principles emerged. Firstly, the factors and criteria which define the good quality of life of elderly people and can be similarly applied also to the people belonging to other age groups. Secondly, the experience of being an old person in the modern society is defined by economic and social factors, as well as by biological and individual characteristics. The quality of life is in his opinion an individual experience, as every old person has their own basic expectations regarding life and their own perception of old age.

The quality of life is therefore a concept, which serves the recording and measuring the well-being of individuals and groups. Oparo et al. (2010; cited in Filej, Kröpfl, & Kaučič, 2015, p. 6) emphasize, that the concept of quality of life includes at least three wider domains, that is physical, mental and social.

A number of various researches have shown that an old person has quality a life when he experiences good interpersonal relationships, help and support; lives in a home or in neighbourhood that offers him satisfaction, a feeling of safety, and has available in the vicinity of the institution facilities, including transport. Some of the important elements of quality of life in the old age are the inclusion of older people in hobbies and free-time activities, as well as the engagement in social activities and preserving an active role in the community. For an older person it is also important that he or she is in good health, is mobile, and has sufficient financial means to meet the basic life needs and participates in the society (Lah, 2007, p. 20).

An important element in the concept of life quality is satisfaction, which is an important driving force in life and an important factor of an individual's personal stability as well as a multi-layered indicator of the quality of life and personal well-being (Starc & Zabukovec, 2013a, pp. 3-4). Ramovš and Lipar (2013, p. 49) are of the opinion, that the satisfaction with one's life is represented by an individual's wellbeing due to experiencing one's own life as in accordance with one's own needs and wishes. A satisfied person has a positive attitude towards one's own life.

Old people are a group, which is according to the income and material indicators a group more vulnerable than the rest of the population (Hlebec, Kavčič, Filipovič Hrast, Vezovnik, & Trbanc, 2010, p. 36). Poverty represents a socio structural problem, as life in poverty is specific and therefore also the ways of coping with it are specific. The latter depend on social

power, access to resources and on possibilities for a way out of poverty (Leskošek, 2012, pp. 22, 30). A higher degree of risk of poverty is present in older women (Filipovič Hrast & Hlebec, 2015, p. 99).

The quality of life and satisfaction with life in old age is strongly influenced by a healthy lifestyle. Hlebec, Kavčič, Filipovič Hrast, Vezovnik and Trbanc (2010) state, that also an old person can importantly contribute towards the maintenance of one's own health. Davies (2011) claims that with a change in lifestyle, such as for instance with healthy nutrition and physical activity, we can importantly promote healthy ageing and improve the quality of life of the elderly. (p. 43) Golob (2011) states, that healthy, balanced nutrition, regular and moderate physical activity, as well as one's connection with one's surroundings, less stress and maintaining one's mental health are the key to one's healthy and active old age. (p. 11) Healthy nutrition is according to the opinion of Bilban (2010) a basic prerequisite for the maintenance of an individual's health, well-being and for a quality life in the old age. In order for an old person to remain healthy, the nutritional status is of utmost importance. The eating regime of an old person and their nutritional status is importantly influenced by physiological, psychological, economic and social factors. (p. 40) Physical activity and eating habits are the key factors that enable the old people to remain physically and mentally healthy and protect themselves from the development of chronic diseases (Zurc, Hlastan-Ribič, & Skela-Savič, 2015, p. 9). Unpleasant emotions like concern, sadness, anxiety, restlessness, pain, hunger, thirst, heat, cold, tiredness, feelings of guilt, shame and fear, which can appear also in old age, are by many suppressed by alcohol consumption. All these emotions are, however, a sign that warns us that something is wrong. (Židanik, cited in Sabotin, 2015, p. 4) Excessive alcohol consumption in old age can also lead to alcohol addiction.

Equally harmful to the health as alcohol is tobacco smoke, which was confirmed by a number of researches, however, there is one important difference between the two. Whereas alcohol has a negative influence on the health of the user, the tobacco smoke exerts a negative influence also on the health of non-smokers in the vicinity, and represents a health hazard for them, which is called passive smoking (Butala, 2006). It can be said, however, that also alcohol indirectly negatively influences the health of people in the social network of alcohol user. Kerčmar (2014, pp. 26-28) states that in families with alcoholics different forms of violence are present. Alcohol also negatively influences the children and their growing up. As a consequence of traumatic events in the family, people living with a person who excessively consummates alcohol are more susceptible to mental health problems. Čakš (2006) states that epidemiological studies have shown a whole array of problems, caused by passive smoking. The problems can thus show themselves as irritation of the eyes and the nose, an increased numbers of inflammations of the respiratory system, a dysfunction of the respiratory tract, angina pectoris, an increased risk for the coronary heart disease, and especially for cancer. According to the data by Koprivnikar (2006) men are more likely to smoke than women. The share of smokers is getting reduced with age. The smallest proportion of smokers is in the age group of 61 years and above.

We formulated the following research hypothesis: **Social factors influence life satisfaction in old age.**

Living conditions, such as housing conditions, environment, financial conditions and safety, as well as lifestyle conditions (physical activity, nutrition, smoking and alcohol consumption), have a considerable influence on the quality of life of old people. With our research we wanted to establish the influence of living conditions and lifestyle on the satisfaction of people with life in the old age. The indexes »living conditions« and »lifestyle« represent social factors.

3 Method

For the purpose of our research work the quantitative research method was used. Due to the complexity of the research problem we chose several quantitative methods, which are intertwined and enable us the research and the displaying of knowledge about the research problem. We used the *deductive method*, which enables us that we on the basis of general findings deduct the characteristics of an individual, *causal non experimental method*, with which we explain and are looking for sources for the present condition, *the descriptive method*, which enables us the description of facts, processes and phenomena, and *comparative method*, with which we discovered the similarities and differences (Rodica, 2012, pp. 25-26).

The benefits of the chosen methodology are:

- Standardized and objectified manner of approach towards the research problem;
- The chosen methods enable reliable statistical analysis based on stratification sample;
- Methodological reproducibility and upgrade of research in future,
- Ensuring the anonymity of respondents.

In order to collect the data, we have on the basis of literature drafted a survey questionnaire, which was completed by respondents aged 65 years and above in social care institutions and in the home environment. For measuring life satisfaction we used the scale Satisfaction with Life Scale - SWLS (Diener, Emmons, Larsen, & Griffin, 1985, pp. 71-75), which consists of five claims. The level of agreement with the claims was by the respondents evaluated according to a seven-stage scale (1- strongly disagree; 2- disagree; 3- partially disagree 4- neither agree nor disagree; 5- partially agree; 6- agree and 7- strongly agree). The SWLS scale was translated into Slovenian language and validated. The consent for the conduction of the research was given by Dr. Ed Diener (July 21, 2013). In order to study the living conditions index we formed 7 questions, and to study the lifestyle index 13 questions were formed. The questions could be answered by: 1-nothing, 2-a little, 3-a moderate amount, 4-well, 5-very well; 1-very dissatisfied, 2-dissatisfied, 3-neither satisfied nor dissatisfied, 4-satisfied, 5-very satisfied.

The social factors include two indexes: living conditions index and lifestyle index. **Living conditions** index includes data about housing conditions (*q23*), environment (*q9, q24, q25*),

financial state (*q12, q141*) and safety (*q8*). **Lifestyle** index includes the data on physical activity, nutrition, smoking and alcohol consumption (*q36-q48*), whereby the scale of the questions that concern smoking and alcohol consumption was adjusted to those who smoke/consume alcohol daily in a way that lower values were ascribed to them in comparison with other people. Something similar was made with the question concerning the consumption of meat and dairy products, as the daily intake of those products is not recommended.

The reliability of SWLS scale and the general questions about old age and the quality of life were tested with Cronbach's coefficient alpha. For SWLS scale the coefficient was 0,848 and for general questions 0,728, which means that the scale and with it the collected data are highly reliable.

We used a simple random pattern. According to the size of the population of people aged 65 years and above, we chose, according to regions, proportionate stratified samples (sample sizes in strata are proportional to the size of the stratum). For the accuracy of the sample we have chosen confidence interval (+/-3%). Such a trust interval means that if 70 % of the respondents answer a certain question in the affirmative, we can expect that the result in the entire studied population will be with the reliability of 95 % ($\alpha=0,05$) between 67 % and 73 %.

In our research we included the sample of 1064 older adults, living in the home environment (urban or rural environment) or in the social care institutions (public or private institutions with concession) in each statistical region. The number of correctly completed survey questionnaires was 656, which means that the realization of the sample was 61,6 %. The realization of the sample was better in home environment (57,9 %), which indicates better state of health of older adults in the home environment. The share of older adults who have correctly and completely completed the questionnaire in social care institution represented 42,1 % of all surveyed people in the population.

Table 1 shows the demographic characteristics of the respondents.

Table 1. Demographic characteristics of respondents

Demographic factor	n=656	%
Gender		
Male	186	28,4
Female	470	71,6
Marital status		
Married	246	37,5
Single	48	7,3
Widowed	302	46,0
Divorced, separated	43	6,6
Non-marital partnerships	17	2,6
Demographic factor	n=656	%
Education		
Elementary education	132	20,1
Vocational education	146	22,3
Secondary (high school) education	229	33,9
Higher education	97	14,8
University graduates and post-graduate degrees	52	7,9
	AV±SD	Range
Age (in years)	78,2±8,0	65-98
The amount of monthly income (in EUR)	722±293	0-1800

n=number; AV=average value; SD=standard deviation

The majority of the respondents were female and widowed, 33,9 % of them have completed secondary (high school) education. The average age of the respondents was 78,2 (SD=8,0) years and their average monthly income was 722 (SD=293) EUR. Some of the respondents did not want to specify the amount of their monthly income.

Data were collected in ten statistical regions across Slovenia. The procedure of data collection took place in domestic environment (in the homes of old people, at the meetings in local communities, day activity centres, at social gatherings of retired people) and in 21 social care institutions. 43 interviewers were involved in the process of data collection. In order to complete the questionnaire, in the home environment old people needed 45 to 60 minutes for the task, whereas in social care institutions they needed up to 120 minutes to complete the questionnaire. Data collection took place from June 1st, 2014 until September 30th, 2015.

In order to be able to show the desired influences or interconnections between social factors and life satisfaction we used the advanced statistical methods for the analysis of causal effects and conditional associations, that is the so called *propensity score methods* (Rubin, 2006). Propensity score methods are intended for association or causal effect statistical analysis of balanced study design, and enable the comparison of two statistically comparable groups. Our aim was to show as reliable estimates of associations as possible, which are contingent on the variables and used to balance the data/study plan.

Before carrying out the study, we obtained a permission of the Commission for Scientific Research of the Faculty of Organisational Studies in Novo mesto, where the Commission

assessed the ethical aspects of the research. The Commission for Scientific Research made the decision (Item no.: 130-014/ 2014 dated 21st March 2014) that the study and the measurement instrument take into account all ethical aspects of research and that they are appropriate for conducting the research. All respondents who were included in the study were acquainted with the purpose and the course of the study beforehand. Each respondent gave an informed consent prior to the inclusion in the study. They were told that they can withdraw during the course of the study. We took into account the principles of the Code of Ethics in Nursing Care of Slovenia (Kodeks etike v zdravstveni negi in oskrbi Slovenije, 2014), the Oviedo Convention and the Declaration of Helsinki.

Methodology of the analysis: since this is a comparative study of the data that have not been collected on the basis of a completely randomised design, but with a survey, we first balanced the study plan so that the group of those with a high level of the index is comparable to the group with a low level of the index. To carry out this process, we used a propensity score (Rosenbaum & Rubin, 1983, p. 41-55), which is a balancing score and methods of matching (Chapin, 1947; Greenwood, 1945). The propensity score was estimated on the basis of the observed covariates, which were selected based on the logicity with regard to the studied data and the objective of the analysis (influence of factors on life satisfaction). The objective was that the models for assessing the propensity score in all comparability studies would be the same. This means that all the comparability studies will be made on the study plan which is balanced based on the same covariates. Selected observed covariates are the following: gender, education, location of residence and age. The propensity score was estimated by using logistic regression where we used the following model:

$$\text{logit}(\text{IK}) = \beta_0 + \beta_1 \text{gender} + \beta_2 \text{education} * \text{location} + \beta_3 \text{age} * \text{gender}$$

where IK represents each index within each individual studied factor. For the criterion of model specification we used the balance of observed covariates. The selected model enabled us to balance observed covariates between units that reach the high and low levels of each index.

To carry this out we used the package R of MICE (Van Buuren & Groothuis-Oudshoorn, 2011, pp. 1-67).

4 Results

Welch's t-test of the comparison of a matched sample between individuals with a high and a low index of living conditions estimates that there is a statistically significant difference between the two groups. As we can see from Table 2, those that have a high index of living conditions ($\bar{X}_V$) are more satisfied with life than those who have a low index of living conditions ($\bar{X}_N$). According to Diener's life satisfaction scale, individuals with a high index of living conditions on average reach a high level of satisfaction $\bar{X}_V = 25.418$. Individuals with a

low index of living conditions on average reach an average or slightly below average level of satisfaction with life ($\bar{X}_N = 19.923$).

Table 2. Welch's t-test index of living conditions

LIVING CONDITIONS	$\bar{X}_V$	$\bar{X}_N$	95% confidence interval of difference between $\bar{X}_V$ and $\bar{X}_N$	p-value	Maintained n (effective n)
Welch's t-test comparison of two samples	25.418	19.923	[4.445, 6.544]	0.000	58.14 % n=388

An estimate of the conditional association (Table 3) supplements the results of the t-test and evaluates the positive correlation between satisfaction with life and living conditions. If basic living conditions of the individual improve, while all other factors remain unchanged, the individual's life satisfaction increases.

Table 3. Estimate of conditional association (relationship) between living conditions and satisfaction with life

	Estimated value	Standard error	p - value	Maintained n (effective n)
Living conditions	26.671	2.092	0.000	58.14 % n=388

Welch's t-test of the comparison of a matched sample among individuals with high and low lifestyle index estimates that there is a statistically significant difference between the two groups (Table 4). From the table we can see that those who have a high lifestyle index are more satisfied with their lives ($\bar{X}_V = 24,280$) than those with a low lifestyle index ($\bar{X}_N = 21,190$). Despite the statistically significant difference, the average values of life satisfaction of both groups fall into the same Diener's category of life satisfaction, i.e. the average value of life satisfaction (20-24 points). It is true that the group with higher level of lifestyle is on the margin of the next Diener's category, i.e. high value of life satisfaction, while the group with low lifestyle value only slightly exceeds the threshold between the category of below average and average life satisfaction.

Table 4. Welch's t-test of lifestyle index

LIFESTYLE	$\bar{X}_V$	$\bar{X}_N$	95% confidence interval of difference between $\bar{X}_V$ and $\bar{X}_N$	p-value	Maintained n (effective n)
Welch t-test comparison of two samples	24.280	21.190	[2.001, 4.179]	0.000	64.33 % n=422

The effective sample which was used in the analysis of this index amounted to 422 (64.33%). On the basis of the calculation of the confidence interval it can be seen that there is a 95% chance that the difference between the two groups is in the interval of [2.001, 4.179] (Table 4).

Based on the results of the assessment of conditional associations we observed a positive relationship between satisfaction with life and lifestyle (Table 5). When the lifestyle of the

individual improves, while all other factors remain unchanged, the individual's life satisfaction increases.

Table 5. Assessment of conditional association (relationship) between lifestyle and satisfaction with life

	Estimated value	Standard error	p - value	Maintained n (effective n)
Lifestyle	21.600	3.095	0.000	64.33 % n=422

The purpose of the comparative analysis of multiple R-squared is to show the size of the connection that each index has with satisfaction with life.

Estimates of multiple R-squared result from the analysis of variance, which was made based on the matched data. The dependent variable was satisfaction with life and the independent variable was the individual index (living conditions, lifestyle). Table 6 represents the values of the multiple R squared for each index, their level of statistical significance and the size of the matched sample (maintained/effective sample) on the basis of which the analysis of variance was made.

Table 6. Multiple R-squared for individual index

	Multiple R-squared	Maintained n (effective n)	p - value
SOCIAL FACTORS			
Life conditions	0.296	58.14 % n=388	0.000
Lifestyle	0.104	64.33 % n=422	0.000

Table 6 shows that the life satisfaction was strongly connected to the index of living conditions and weakly connected to the index of lifestyle.

The hypothesis can be confirmed, because we found that social factors influence satisfaction with life in old age, regardless of the fact that the two indexes (living conditions, lifestyle), which define social factors, have differently strong influences.

5 Discussion

With our research we wished to establish the connection between social factors and life satisfaction in the old age. We have established a positive connection between lifestyle and living conditions (social factors) and life satisfaction. We have as well established that living condition index is more closely connected to life satisfaction, whereas the lifestyle index is less closely connected to it. Therefore we can conclude that housing conditions, environment, financial position and safety are more closely connected to life satisfaction.

Valenčak (2012) notes that the qualitative research has shown, that it is, as regards the place of residence, old age friendly if the elderly can live at home, in their hometown. As old age unfriendly are, however, considered the following factors: the distance from a bigger town or

city, distance from the shopping centres and remoteness of the neighbours (p. 12). The ability to drive a car independently is in old age associated with the values of freedom and independence. In frame of the project »Old age friendly city« the research has shown that old age friendly public transport can in many ways ease the decision of old drivers to give away their driver's licence, in the interest of their own safety and the safety of others. (Voljč, 2010, p. 15). Valenčak (2012) also notes that in the field of old age friendly environments, old people living in cities and those living in rural areas have pointed out similar problems and values. That means that old people living in urban as well as those living in rural areas value the importance of the proximity of a doctor, shops, banks, acquaintances etc. (p. 18). In case of the old age weakness the majority of older people would, in case they would not be able to live at home, wish to live in a nursing home in their hometown.

The income and the socioeconomic status of an individual is, similarly to the other external factors of subjective well-being (gender, age, education, medical condition), connected to life satisfaction only to a lesser extent. According to the opinion of Kodrič (2014, p. 82), the quality of spending life in the third age is to a greater extent connected to the lifestyle and material status of an individual prior to retirement.

It is common knowledge that in Slovenia the living standard of old people is deteriorating. It looks like the old age has in this way become a financial risk for a considerable number of old people (Železnik, 2014, p. 50). Samek Ladovici et al. (2015) note that in elderly women, who live alone, the risk of poverty is higher (24,9%), than in single men (18,6%). More prone to poverty are single women and man with lower levels of education (p. 28). Older people, who are less educated, are generally speaking more prone to poverty.

Also Hlebec et al. (2010, p. 36) note that the data for Slovenia shows, that the old people are a highly vulnerable group, with almost twice as high a risk of poverty as the rest of the population. (p. 27). Saražin Klemenčič (2013) notes that the monthly income of 1200 EUR is received by 11 % of men and only by 4,2 % of women, whereas an income below 400 EUR is received by 32,2 % of women and 17 % of men (p. 152). The income of more than a half of the respondents is between 401 and 800 EUR (p. 156). Also the analysis of personal data leads to the conclusion that women are in old age more prone to poverty than men and more than their peers in the European union, yet despite their low income more than a quarter of them helps supporting their nearest. (p. 152).

Another factor that has a negative influence on the quality of life and consequently on the satisfaction with life are falls. Kavčič (2011, p. 181) states, that falls endanger old people's health, as they at an unfavourable outcome can change the life quality of an individual. The injuries, that can be caused by falls, are, according to R. Cijan and V. Cijan (2003, p. 95) taking the sixth place on the scale of the causes of death among the population of old people. Also when such injuries are not fatal, we can talk about severe physical injuries, which can cause immobility the emergence of the fear of moving, and are frequently a direct cause for

the person being placed in a social care institution. Akyol (2007, pp. 191-196) states, that approximately 30 % of old people aged 65 years and above experience falls, and that one half of people, aged 85 years and above, experience falls every year. According to the opinion of Zupan and Grmek Košnik (2011, p. 213) falls can be a consequence of ageing, that is the result of the weakening of the physical and mental functions of the organism.

Rodrigues, Lima and de Azevedo Barros (2013, p. 49) define falls as events that influence the health of old people, as they cause limitations, which show themselves in worse medical condition and worse quality of life of old people. Gullberg, Johnell and Kanis (1997, p. 409) state, that with the increasing old age the number of fractures has increased exponentially. More prone to fractures are women. The results of the above mentioned research show, that the number of the hip fractures is going to substantially increase in the next 35 years. According to the most conservative estimates, the number of hip fractures is going to increase for 135 % in men and for 100% in women. This expected increase in hip fractures is in men connected with the improved life expectancy (Lancaster, 1990, pp. 2-3). Zurc and Skela Savič (2012, p. 215) note, that the most frequent injury in an old person is a fracture, the most commonly injured body parts are an arm in women and a leg in men. Hip injuries are more common in women. Pfeifer and Krokter Kogoj (2014, p. 797) state, that regular physical activity can prevent falls and new fractures.

Starč and Zabukovec (2013b) have in an expansive Slovenian research titled »Staranje v Sloveniji« (*Ageing in Slovenia*) established that two thirds of inhabitants, aged 50 years and above, are satisfied with their lives. Similar findings are noted by Železnik (2012, p. 28). Stegmüller and Bakračević Vukman (2012) state, that people in middle and late adulthood are on average happy with their lives. The results of the research, conducted by Borg, Halberg and Blomqvist (2006) have shown, that a general self-assessment of one's own health as bad and insufficient financial resources influence life satisfaction in an important way, whereas gender and living conditions do not influence life satisfaction in any considerable way.

In order to improve the living conditions of an individual, we have to:

- Improve an individual's housing conditions in a way that an individual is more satisfied with the conditions and with more healthy environment (for instance with the better quality of air, water, etc.),
- To improve the accessibility of healthcare services and social services,
- To improve the possibility of transport availability, which includes bus, train or own transport,
- To ensure that each individual has enough financial means to fulfil their daily needs,
- To ensure the safety of each individual in a way, that the individual feels more safe in their daily life.

As the lifestyle of an individual, as it was established in our case, is to a lesser degree connected to life satisfaction in old age, it can nevertheless be improved in the following manner:

- That the individual has five regular meals per day and that the composition of meals is in accordance with a balanced diet recommendations and food pyramid,
- With the prevention of excessive food intake, which can lead into over nourishment, due to metabolic changes in old age,
- By preventing malnutrition in an old person,
- That an old person follows the 12 steps to healthy eating,
- With the improvement of physical activity (regular daily physical activity, exercises for improving balance and muscle mass, attending group exercise classes for the elderly etc.),
- By abstaining from smoking and only moderate alcohol consumption, in accordance with the recommended guidelines.

The quality of life and with it connected satisfaction with life is therefore connected to the general level of wellbeing of an individual. (Fahey, Nolan, & Whelam, 2003, p. 9), which is connected to the level of the satisfying of his needs, aims, expectations and standards, and depends on the physical health of the individual, their psychological state, the state of their independence and their attitude towards their environment.

In spite of the fact, that our sample is not representative, we can on the basis of the results analysis generalize the results on the entire population of old people, as the analysis was conducted on balanced data. The hypothesis can be confirmed, as we have established that social factors influence the life satisfaction in old age, irrespective of the fact that two indexes that define social factors (living conditions, lifestyle), do not influence it to the same extent.

6 Conclusion

Each human being is a unique and unrepeatable whole in space and time, who has social, physical, psychological and spiritual needs. An individual as a whole is to a greater extent influenced by social factors, which enable a person to lead a fulfilled and quality life also in old age. In order for this to happen, suitable living conditions and a healthy lifestyle are important. Our research has shown that suitable housing conditions, safe environment and suitable financial position are more important factors for life satisfaction in old age than physical activity, nutrition, smoking and alcohol consumption. Irrespective of the differing levels of the influence that the indexes of both of the social factors exert, we have to be aware of the fact that ageing and the old age are perceived in different ways by each of us, therefore it is worth paying enough attention to the quality of life and consequently to the satisfaction with life, and to integrate the findings through research into the modern society, which is thus going to develop a positive attitude towards suitable living conditions of the old people.

The originality of our research shows itself in the studying of social factors within the holistic model of life satisfaction in the old age, which also includes the physical, psychological and spiritual factor.

The shortcomings of our research can be seen in the fact that no triangulation (review from different angles) was carried out, due to the size and complexity of our quantitative research, which was conducted in ten statistical regions. In respect to the research design we did not choose the constructivist approach (qualitative paradigm), which would enable us additional possibilities to discover new knowledge and search for in-depth answers to the research questions. In future we propose the use of qualitative research method, where we will not be interested in the opinion of the majority, but of the individual, as each human being has in the opinion of Zurc (2016) their own truth and their own construct of the world.

The conducted research has its limitations in the chosen methodology and the size of the sample. The results are the result of analysis, which was conducted on a balanced study plan; therefore the results can be generalized on the population of older adults. In the future the attention will have to be paid to the study of elements of respective indexes and their influence upon life satisfaction.

This paper with its originality importantly contributes to the understanding of life satisfaction in old age and to the importance of the holistic treatment of the elderly adults in their old age.

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Povzetek:

Vpliv socialnih dejavnikov na zadovoljstvo z življenjem v starosti

Raziskovalno vprašanje (RV): Kakšna je povezanost socialnih dejavnikov z zadovoljstvom z življenjem v starosti?

Namen: Namen raziskave je ugotoviti vpliv socialnih dejavnikov na zadovoljstvo z življenjem v starosti.

Metoda: Uporabili smo kvantitativno metodo raziskovanja, kavzalno-neeksperimentalno metodo. Za tehniko zbiranja podatkov smo uporabili anketiranje v desetih statističnih regijah. Za analizo vzročnih učinkov in pogojnih asociacij smo uporabili napredne statistične metode nagnjenja (propensity score methods, Rubin, 2006). Iz statistične množice je bil izbran enostavni slučajnostni vzorec, odločili smo se za proporcionalno stratifikacijo. Za merjenje zadovoljstva z življenjem smo uporabili lestvico Satisfaction with Life Scale (Diener) ter ji dodali vprašanja za proučevanje socialnih dejavnikov. V raziskavo je bilo vključenih 656 starejših odraslih starih 65 let in več, ki živijo v domačem okolju ali v socialno varstvenem zavodu.

Rezultati: Z zadovoljstvom z življenjem v starosti je močno povezan indeks življenjski pogoji (pogoji bivanja, okolje, finančno stanje, varnost) in šibkeje povezan indeks življenjski slog (gibanje, prehrana, kajenje, uživanje alkohola).

Razprava: Na zadovoljstvo z življenjem v starosti pomembno vplivajo socialni dejavniki - ustrezni življenjski pogoji ter manj pomembno zdrav življenjski slog, ki človeku omogočajo kakovostno življenje tudi v pozni starosti.

Družba: Raziskava ima pomemben vpliv na družbo, saj se staranju namenja premalo pozornosti. Z ozaveščanjem javnosti želimo doprinesti k detabuizaciji staranja in ageizma. Za stabilen zdravstveni sistem je pomembno, da starejši odrasli ostanejo zdravi, samostojni in zadovoljni.

Originalnost: Izvirnost raziskave je v proučevanju socialnega dejavnika v holističnem modelu zadovoljstva z življenjem v starosti, ki vključuje še fizični, psihični in duhovni dejavnik.

Omejitve/nadaljnje raziskovanje: Izvedena raziskava ima omejitve v izbrani metodologiji in velikosti vzorca. Rezultati so plod analize, ki je bila narejena na uravnoteženem študijskem načrtu, zato lahko rezultate posplošimo na populacijo starejših odraslih (65 let in več). V prihodnje bo potrebno pozornost nameniti proučevanju elementov posameznega indeksa socialnih dejavnikov in njihovih vplivov na zadovoljstvo z življenjem.

Ključne besede: socialni dejavniki, življenjski pogoji, življenjski slog, stari, domače okolje, socialno varstveni zavod.

Escalation Practices in Automotive Development

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Abstract:

Research Question (RQ): In automotive business many risk-involved situations occur and when detected, an escalation process takes place. Although defined and controlled by process guidelines and being supported by experts, escalation brings increased emotional pressure and stress for parties involved. Do escalation processes in automotive industry maintain all implied challenges?

Purpose: The purpose of the article is to present current status of escalation processes and gaps between theory and practice cases. Results of the analysis are recommendations of good engineering practice derived also from actual experiences and learned lessons.

Method: The method involves analysis of practical cases from automotive development process, lessons learned, anonymous survey of automotive engineers and classification of experiences.

Results: Results of the survey have shown that the controlled escalation process for know-how related escalations is needed in order to establish the environment where the team is able to provide new, sometimes unconventional ideas for the problem to be solved.

Organization: Presented recommendations and measures enable organization and managers to put the expertise and experiences of employees into action for problem solving during escalation.

Originality: In this article some practices are presented that, although simple and some yet seen, with proper adjustment stemming from real life processes give a fruitful settlement of escalations in automotive development business.

Keywords: escalation process, stress, lessons learned, supplier chain, automotive development.

1 Introduction

1.1 Competitive business environment

Traditionally engineering was always highly creative activity that tried to give answers and solutions to various technical and construction problems. From early days of engineering those answers are always expected to be final, correct, long-term reliable and in terms of the targeted products, successful both from technical and economy aspects.

At the beginning of automotive era the development time and resources were more flexible, especially for first-of-kind products. Lead times have been longer and more capacity to finish the job was available. Engineers were more versatile in terms of their knowledge about products and technologies. They have got experienced in more comfortable way because processes were slower hence there was time to re-think critical steps and process decisions.

Today however the development activities in automotive industry are executed as projects, that are organized within design & development network, formed by one or more companies acting in supply chain, fig.1. Due to the project nature of development activities today we are

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faced both with technical know-how challenges as well as capacity- and resources related challenges.

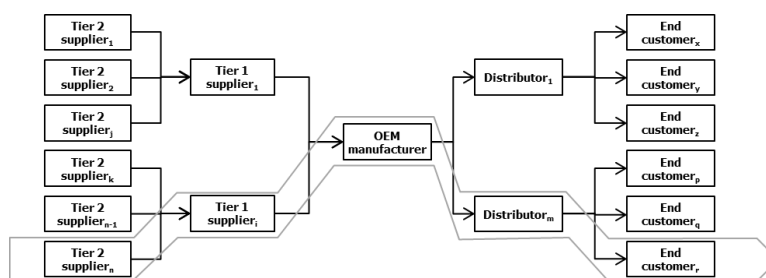


Fig. 1. Supply chain (ISO/TS 16949:2002(E), p.2).

1.2 Risk of product over- and under-engineering

In past 30 years information technologies intensified development & production processes and the market has become highly competitive environment where the probability of ill-posed project in the company's project portfolio increased. Each project with negative technical and economical results can represent a factor of non-survival for development- /production company. In such cases negative financial impact can end-up in excessive non-planned costs. A failure mode that is not assumed during product development phase but can happen during product lifetime represents a constant risk for a financial collapse of the company, fig.2.

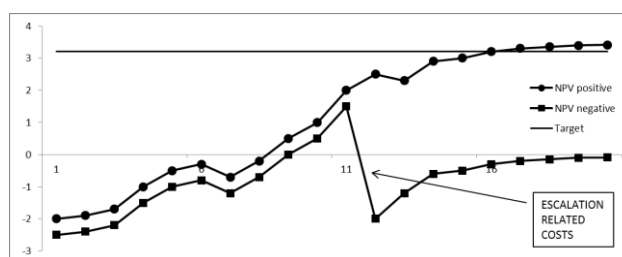


Fig. 2. Net Present Value, positive, negative.

Those threats can yield a working environment where the engineers are put under extreme pressure and stress. The consequence can be:

- On one hand that engineers are forced to design a product to the limit of its performance capability hence product tends to fail at higher failure rates.
- On other hand that, instead of taking advantage from the fine-tuned balance between performance capabilities and operating boundary conditions, engineers don't dare to design the product to its limits. Products are thus becoming over-engineered hence in time due to non-optimized product costs the company can become non-profitable.

Both risks can produce states where engineering organization is faced with the crisis at product development or production processes being resolved through escalation process.

2 Theoretical framework

2.1 Definition and classification of escalations

When open issue at the project is detected then countermeasures are planned and introduced. If counter measure is not successful then additional management tool is used – the escalation process. During escalation an additional pressure is applied from the (internal- or external) customer towards the (internal- or external) supplier to resolve the issue as soon as possible.

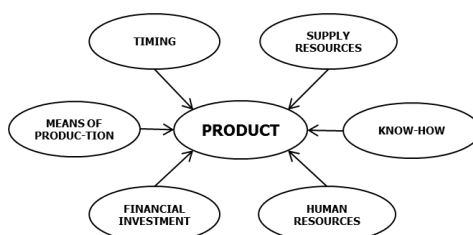


Fig. 3. Resources – when short then possible reasons for escalation.

We can distinguish among several types of escalations, fig.3, but for automotive the two most important would have been:

- A. Escalation based on deviation from planned activities during development – name it “resource escalation”, fig.4.
- B. Escalation based on unplanned events during product design and especially during production process – name it “know-how escalation”, fig.4.

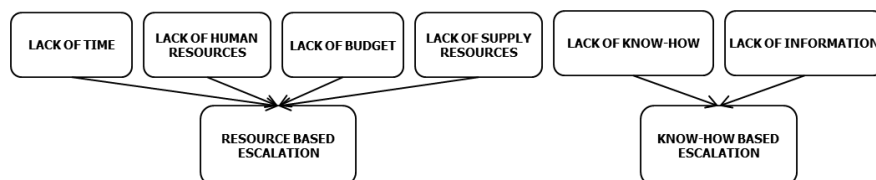


Fig. 4. Types of escalations.

The first type - resource escalation – arises typically when there is lack of resources on the project – either we are talking about:

- Human resources needed to do additional tasks or
- financial budget to cover extra expenses on the project or
- too short time available to accomplish planned tasks or non-planned extra tasks.

The second type – know-how escalation – takes place when a non-planned event occurs, e.g.:

- After production ramp-up of new product a series failure occurs at the beginning of product operation, or
- during the DVP&R (Design Verification Plan and Report) testing and verification phase results are negative, meaning the product does not fulfil customer specifications.

At know-how escalation the fundamental root-cause is lack of information or/and lack of know-how. Both are also basic conditions to be fulfilled for the solution to be found.

2.2 Escalation as problem solving in production process

As already mentioned the majority of escalations in production process deal with problem of resources – therefore it is more of resource-type and less of know-how-type.

In general the target of escalation is the introduction of the problem solving process at the supplier, fig.5, using tools like DMAIC, PDCA, 8D-report.

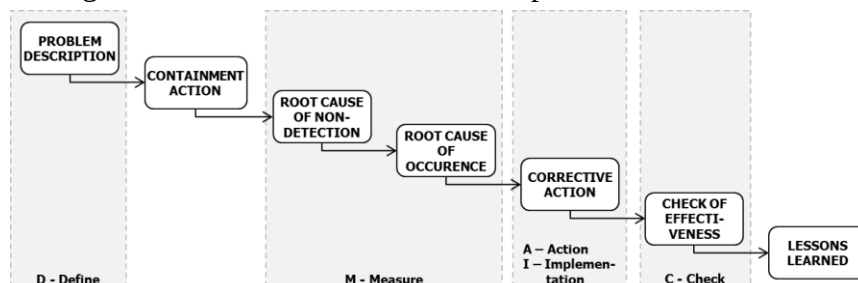


Fig. 5. Escalation problem solving steps / DMAIC. (ISO/TS 16949:2002: PDCA, p.x).

Problem solving should consist of the following structure and control questions:

- Step 1: **Problem description** - What are the problem and the root cause?
- Step 2: **Risks on similar products and processes** - Do we have same problem and systematic fundamental root cause also on other products or processes?
- Step 3: **Containment actions** (<24h) - How to contain? What kind of containment can we do in 24 hours and what in longer lead-time?
- Step 4: **Root cause for non-detection** - Why compromised products were delivered?
- Step 5: **Root cause for occurrence** - Why compromised products were produced?
- Step 6: **Corrective action plan** (<10days) - What is corrective action?
- Step 7: **Effectiveness** - Is corrective measure effective?
- Step 8: **Lessons learned** (<60 days) - What did we learn? How we will transfer learned lessons to other products and processes?

The escalation process is defined by *guidelines* and *norms* (Swift 2015) (Vorest AG, 2014) (ISO/TS 16949:2002(E), pp.28 - 30) mainly for the production processes. There are several levels of production process escalations in case of flaws detected:

- Level E0, **Standard process** - special 100% inspection of deliveries for 1-month.
- Level E1, **Intensified process** - corrective measures must be fulfilled to downgrade the level from E1 to E0.
- Level E2, **Warning** - corrective measures and additional customer conditions must be fulfilled to downgrade the level E2 to E1.
- Level E3, **New Business Hold** (NBH) - supplier is temporarily blocked for new business and exit criteria must be fulfilled to be removed from NBH.
- Level E4, **Disqualification** – exclusion of supplier from supplier base.

Typically as a consequence of escalation process the supplier management is involved in order to assure more resources, shorten lead-time and discuss with the customer exit conditions on proper managing levels.

3 Method

In order to check various aspects of escalations an anonymous survey was executed at automotive Tier-1 supplier from Slovenia where 189 potential respondents were asked to answer the survey. The survey consisted of 20 questions with predefined answers (from 6 to 9 answers per question possible) in order to get normalized response database for later analysis.

The method of this analysis was implemented using following survey inquiries:

- To understand the age, educational background, level of experiences of respondents several questions were raised, like:
 - How old are you? How many years you are working at the company?
 - What is your position in company's organization?
- To understand the working pressure and the handling of daily stress of respondents several questions were raised like:
 - How often do you experience escalations at development projects?
 - How do you feel and how are you acting when escalation happens? Is your thinking ability and creativity influenced by the escalation pressure? Does stress represent positive or negative stimulation for you?
 - What do you do first when customer escalates the issue (claim, concern)? Who do you ask for help and support when escalation happens? Whom would you rather have as a teammate: young good educated colleague (potentially less experience) or matured professional with long-term experiences (potentially less theoretical background)? What is more important during escalation: good relationship with the customer or good theoretical background?

4 Results and Discussion

4.1 Survey results

The survey lasted 5 working days and out of 189 addressed respondents 72 of them (38%) have given feedbacks. Some of results are presented in fig 6 and fig.7.

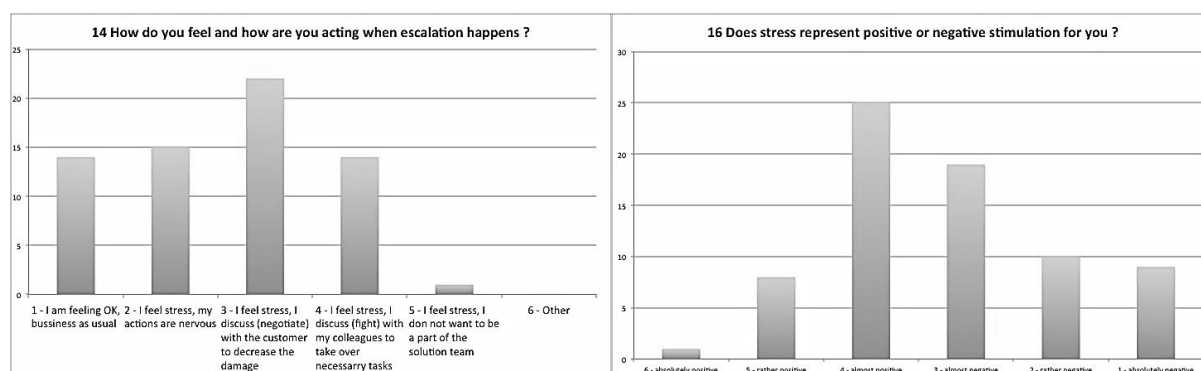


Fig. 6. Relationship between escalation and stress: it seems that the respondents escalation cause stress which is approx. 70% cases challenging experience for and if subjected to stress 53% of respondents feel it as rather negative experience.

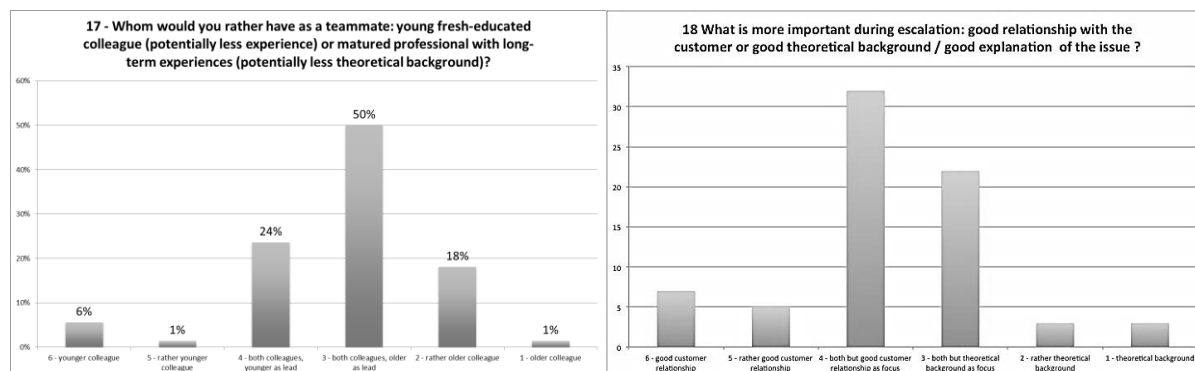


Fig. 7. Relationship between theoretical background, experiences and customer relationships: the respondents rely slightly more on experiences and good relationship with customer than on good theoretical background.

4.2 Escalation as problem solving in development process

4.2.1 Development process deliverables and escalation type

Compared to production processes also during design and industrialization development phases many risk-involved situations can produce an escalation. Similar to escalations in production also this escalation process must have root-cause analysis and corrective actions.

So far in the presented text the automotive escalation process is declared and defined in detailed way. But looking at second glance we can see that definition is aimed mainly to the production processes. Why mainly for the production processes?

The answer lies within the fact that the production process differs from the development process in terms of deliverables and their quantities. For example:

- When dealing with production process then objects of the statistical analyses are produced parts (goods). In automotive production there is almost always considerably large product series available where, when faced with issues, the principles of statistical analysis can be applied. Based on that analysis one can find and deal with root causes, introduce corrective measures and track the effects of corrective measure implementation.
- But when dealing with design process then we are talking about one-of-kind deliverable, represented as a set of technical data, drawings and technical documents, that define information base for the related tools and production technologies yet to be developed. When faced with an issue of design deliverables one cannot get solution using statistical approach, based on which corrective actions would be introduced. There are no quantity of deliverables in design process where statistics would enable steering toward solution.

For later example the know-how is essential. Therefore it can be concluded that in development the know-how escalation takes place more often than resource escalation.

This has been proven with the results of the survey with answers to the question "What is by your opinion the most often root cause for escalations during product's development phases?".

Answers on fig. 8 show that the cause with highest vote of 24% was "hidden errors at the product due to improper design (concept, maturity)". The second most probable cause (22%) was "improper quality of developed products due to lack of proper formal agreements with the customer..." which also reflects lack of information and know-how.

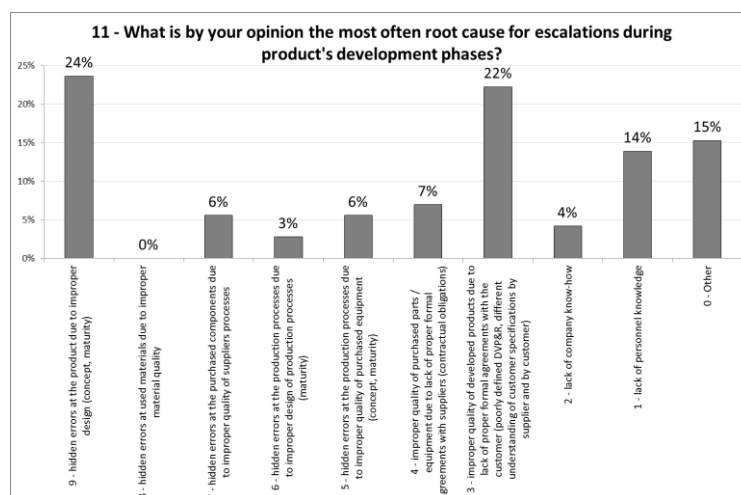


Fig. 8. Root causes for escalations in design phases.

4.2.2 Experiences as performing factor in escalation process

The escalation process in development phase relies on definitions valid for escalations in production and that do not comply perfectly with the nature of development process. Although such escalation process is defined by process guidelines and being supported by technical experts, it still brings increased emotional pressure and stress for the parties involved.

There are several methods and theories (Swift, 2015, p.1; Vorest AG, 2014, p.1; DMAICTools, 2016, p.1) on how to handle critical situation in the development teams. There are many customer guidelines for suppliers (Schaeffler, 2015, pp.1-3; VOSS Automotive Group, 2014, pp.12-14; Faurecia, 2013, pp.25-30) that describe requirements of escalation and step-out of escalation. But a methodology about how to maintain the resulting pressure during escalation and how to use energy and ideas in best way to find solution is rare. Majority of recommendations are considering organizational aspects of the situation during escalation but few of them could offer reliable path toward the resolution using the technical expertise and experiences of involved personnel.

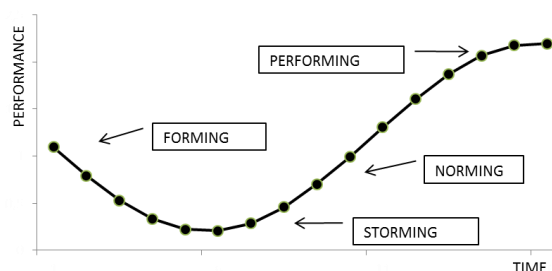


Fig. 9. Development phases of project team as performing resource.

We know however that during every team set-up four significant phases happen: forming, storming, norming and performing phase, fig.9. Let us check how escalation process can be casted into those phases in order to recognize significance of experiences and know-how to maintaining escalations. For involved project team-members the escalation represents even more workload pressure and stress compared to the ordinary problem solving. What happens?

The first reaction on customer escalation message is team forming phase. If organization has escalation process defined and people are skilled they try to follow those process guidelines where team is defined and conceptual roadmap toward solution is explained.

Beside regular problem-solving which typically consist of solving of technical problems, the team must also assure information flow toward customers and toward management stakeholders. This communication tends to become difficult therefore the level of stress at team-members is even increased, their working time dedicated to problem solving is reduced and due to this we might end-up with higher costs and longer lead-times.

Escalation is not normal mode of operations hence the involved people are mentally and emotionally challenged. An instant seek of way out is induced by higher level of adrenaline and people react instinctively saving them against disaster. It is a storming phase.

It is evident that for successful development process results it is necessary to save developers from high level of negative stress and keep them in good mental condition. In order to do this, a controlled escalation process should be introduced also for know-how related escalations.

It is very important that in the team there are (senior) colleagues with lots of expert experiences. They can suggest proper steps while searching the solution, they are helpful with their broad professional network when seeking the expert information and in psychological aspect they can act as pillars of stability within the team. This has been proven with the survey answers to the question "Whom would you rather have as a teammate: young fresh-educated colleague (potentially less experience) or matured professional with long-term experiences" where the highest score (50%) gets the answer "both colleagues, older as lead" and second highest scored answer (24%) was "both colleagues, younger as lead", fig. 7.

A controlled escalation process for know-how related escalations represent the environment where the team can provide new, maybe unconventional ideas for the problem to be solved. In this way the chances for fast and successful resolution of the problem are higher and the crisis can be brought in a controlled way to successful end. All these influences happen normally within norming and performing phases.

4.2.3 Stress factor during escalation process

As mentioned the breakthrough should be done within the norming phase of the team lifetime. In order to do that it is important for the team to understand what is happening on rational and on emotional level of cooperation. Generally during escalation certain psychological pressure

exists which can be intensive – the team-members need to perform in an excellent way under very challenging conditions - to list just few of them:

- Short or zero timing for execution of needed activities.
- Need to control several activities running in parallel.
- Regular / daily cross-examinations from customer side.
- Customer demand to present solution in person at the customer location.
- Customer demand to provide interim solution with high level of confidence.
- Customer demand to provide final solution with ultimate level of confidence.
- Lack of proper information and know-how.
- Lack of internal and external resources (availability of production, materials & stock).
- Lack of budget.
- Lack of stakeholder's (management) support, etc.

All these conditions represent at the same time the levers used by the customer (and sometimes suppliers) to push the team to provide the solution in zero time.

Team members with organizational- and especially with customer relationship experiences are extremely important here. They are able to steer the discussion with the customer in a way to calm down the situation hence enabling the rest of the team to start thinking without burden of stress in order to provide new ideas for interim- and final solution of the problem.

4.2.4 Development escalation process and measures

In order that problem is maintained in fast and efficient way the escalation must be handled as process where necessary steps and actions take place. The following principles and measures are recommended when organizing escalation in development as a controlled process:

- **Principle 1:** after information that something went wrong the immediate reaction is necessary! For the one who got the information no delay is allowed and no weekend off-line mode is acceptable, no excuse for passive approach should be accepted. He/she must immediately raise the voice and escalate the issue within own organizational structure.
- **Principle 2:** Top management must be informed about the escalation accordingly and must provide full support for organization of escalation process with corrective actions.
- **Principle 3:** All relevant experts from different fields should be summoned and delegated/nominated by stakeholders (management) to the Task force team (TF).
- **Principle 4:** The leader of the Task force team is nominated. He must be awarded with full authority and power for decision making within the scope of escalation.
- **Principle 5:** Team Room (War Room, Large Room, Obeya – Toyota Production System) should be organized as physical location where Task force team meets or is located. For the team to work and exchange information with working environment and customer the Team Room should have all necessary infrastructure, e.g. mail access, phone line, telecon equipment, overhead projector, computer, whiteboards, pinboards, flipcharts, digital photo camera, scanner, printer, enough electrical power plugs, extension cables, cabinet/rack for

keeping of samples and prototypes, accessories for marking of samples (pens, markers, etc.), brainstorming accessories (pens, markers, pins, Post-it, glue, tapes, cardboards, paper sheets, etc.), furniture (desk, chairs), Cafeteria/ refreshment corner.

- **Principle 6:** Immediate systematic work of the TF team must be organized and scheduled.

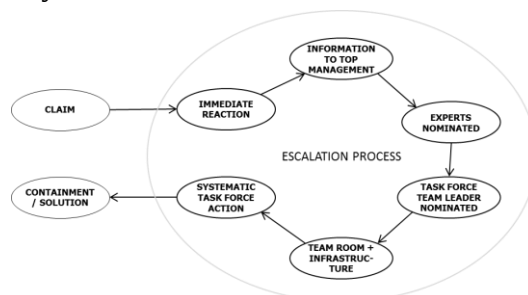


Fig. 10. Development escalation process.

Activities that should be systematically executed when escalation happens are:

- Each information contents must be declared with additional data like source of information, time of collection. Information should be presented at one spot (e.g. whiteboard, pin-board, common folder on file server, common database, etc.) where they can be further classified / clustered. For clustering of information different approach should be used, e.g. clustering according to expert areas or clustering according to geographical locations of sources.
- When Task Force team members are nominated they must be at the same time released from other tasks - what should be assured by their line-managers.
- Kick-off meeting must be organized, Task force team and all stakeholders have to attend.
- Regular meetings must be scheduled (daily) – it is very important that the team meets at regularly scheduled routines in order to keep strong focus to tasks and to react on changed circumstances instantly.
- Team meeting must be clearly structured – it must have fixed agenda with clear reporter names, meeting coordinating person and List of open points (LOP).
- Information and communication channels with the customer as well as with important suppliers must be established. Customer relationships can be established both on formal level and also on informal, personal level. At later, the relationships are more informal and it is likely that also unofficial information that is important for problem solving (e.g. details about particular claim or failure mode) can be acquired from customer.
- The suppliers and customers can be involved in technical discussions. With this we are acting as partner dealing with customer in transparent way which is beneficial for increase of trust at the customer side. During this activity it is important that every team member understands the level of transparency that is appropriate to particular external party at given moment. It must not be the case that two or more team-members are communicating about the same issue with one external party unless otherwise agreed upon.
- Before communication to the customer / supplier (by emails, with official statements) it is essential to align in the team about standpoint and wording of the message.

- Supporting environment must be established (extended team), e.g. simulation engineering support, laboratory support, purchasing and sales support, production technology support, maintenance support, prototyping support, engineering design support, etc. Some of the experts from this extended supporting environment can be also members of the TF team.
- The rest of organization should be informed that the regular daily tasks of the TF team-members will be delayed or even cancelled, therefore the escalation might have a negative impact also on their projects.
- Every small step toward successful resolution of the problem must be a reason for celebration. With this approach we keep high level of team-members' motivation. Every team-member must get full support and trust from other team-members. It is essential that the team takes special care for integrity of its team-members, in order that if things go completely wrong the team disintegration does not occur (e.g. mutual accusations between team-members). The later situation can occur due to high negative stress levels, where the cause is fundamental one: the fear against loss of personal careers.
- After successful solution of the problem the technical lessons-learned workshop must be organized in order to collect new know-how and implemented technical ideas, which should be included into FMEA master model.
- After the solution also lessons learned workshop about the organization of escalation must be organized in order to collect experiences and provide facts-feedback throughout organization and to management. The most valuable contributors must be rewarded by management. Successful resolution of crisis must be celebrated within the team.
- At the end of escalation the Task force team should be formally disengaged by stakeholder decision upon final report on executed actions and solution of escalation.

In order to maintain escalation process successfully those principles should be considered in the company quality system in escalation process guideline.

5 Conclusion

As summary we can conclude that escalation types are important for solution approach selection. To distinguish escalation types it is important to understand boundary conditions and requirement scope of particular escalation. Generally only two major types of escalation occur in automotive: resource escalations and know-how escalations.

Solving of resource type of escalations is relatively easy because it only requires management to approve additionally needed capacities and resources. However solving of know-how type of escalations is more complex because one should find and implement expert knowledge or in worst case where there is no knowledge available, one must generate new ideas and know-how. Moreover the generation of new know-how must be done in zero time frame. How?

The ordinary approach of involvement of higher management does not help a lot. Generally one must rely on usage of new ideas generation methods like brainstorming, and afterwards supported by functional checking of rapid prototyped products. For this kind of escalation activities one must have available personnel that is professionally trained for coordination of

escalations and for communication with the customer. Research has showed that experienced personnel is therefore of crucial importance for efficient steering toward solution: 69% of respondents trust more to “matured professional with long-term experiences”, fig.7.

To successfully maintain escalation process an important principles should be respected and must be considered in the process guidelines that are essential to management and organization of the company. Escalation process must have ultimate priority compared to other activities in the organization. All other processes must be de-prioritized or even put to the ice during escalation period. The best people must be engaged and proper team must be nominated to the task-force team. Budgeting and other resources must be assigned to escalation process and management must follow-up progress of escalation continuously until the final solution of the crisis.

The research was rather limited to the sample from local environment not including the intercompany aspects and international base of respondents. As potential further research opportunity the collection, assessment and classification of know-how resulting from organization lessons-learned sessions should be considered.

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Povzetek:

Eskalacijske prakse v razvoju v avtomobilski industriji

Raziskovalno vprašanje (RV): V avtomobilski industriji nastopa veliko situacij s povečanimi tveganji in ko jih detektiramo, nastopijo eskalacijski postopki. Čeprav so eskalacijski postopki definirani s procesnimi navodili, izvedeni skladno z njimi in čeprav so pri reševanju problema udeleženi strokovnjaki, pri vsaki eskalaciji nastopa povečan emocionalni pritisk in stres za vse udeležence. Ali definirani eskalacijski procesi odgovorijo na vse tehnične in organizacijske izzive?

Namen: Namen tega članka je prikaz trenutnega stanja procesa eskalacije in odstopanj med teoretičnim pristopom in prakso. Rezultati analize so tudi priporočila dobre inženirske prakse, ki so oblikovana tudi na osnovi dejanskih izkušenj iz vsakdanje prakse.

Metoda: Metoda je vsebovala analizo praktičnih primerov iz razvojnega procesa avtomobilske industrije, na osnovi napak pridobljenih znanj, anonimne ankete avtomobilskih inženirjev in klasifikacijo pridobljenih izkušenj.

Rezultati: Rezultati ankete so pokazali, da je v primeru eskalacij zaradi pomanjkanja know-howa, potrebno izvajati eskalacijski proces na nadzorovan način zato, da zagotovimo procesno okolje, v katerem je tim sposoben priskrbeti nove, včasih tudi nekonvencionalne ideje za razreševanje problema.

Organizacija: Prikazana priporočila in ukrepi omogočijo organizaciji in menedžerjem da v eskalacijsko razreševanje problema vključijo znanje in izkušnje svojih zaposlenih.

Originalnost: V tem prispevku so prikazani praktični napotki, ki so sami po sebi enostavni in nekateri že poznani, a s primernim prilagajanjem na osnovi ugotovljenih spoznanj, omogočajo uspešno izvajanje eskalacij v avtomobilski industriji.

Ključne besede: eskalacijski proces, stres, pridobljene izkušnje, dobaviteljska veriga, avtomobilski razvojni proces.

Vpliv dejavnikov vodenja na zavzetost uniformiranih policistov

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Povzetek:

Raziskovalno vprašanje (RV): Ali obstajajo statistično značilne povezave med dejavniki vodenja v Policiji in stopnjo zavzetosti med uniformiranimi policisti.

Namen: Namen raziskave je bil proučiti vpliv dejavnikov vodenja na zavzetost uniformiranih policistov na izbranih PP, kakor tudi podati predloge za izboljšanje ugotovljenega stanja.

Metoda: Kvantitativna raziskava je bila opravljena med 932 uniformiranimi policisti na vseh 22 PP na območju PU Ljubljana.

Rezultati: Pozitivna povezava med dejavniki vodenja vodstva PP in stopnjo zavzetosti med uniformiranimi policisti ni bila ugotovljena. Ugotovljena je bila pozitivna povezava med stopnjo zavzetosti uniformiranih policistov in njihovo delovno dobo, medtem ko pri ugotavljanju odvisnosti dejavnikov vodenja vodstva PP od delovnega mesta anketiranih policistov, ta ni bila ugotovljena.

Organizacija: Izidi raziskave bodo lahko v praktično pomoč vsem vodjem PP na območju PU Ljubljana pri načrtovanju, organiziranju, vodenju in kontroliranju organizacije, kot tudi drugim raziskovalcem, ki bodo lahko na osnovi ugotovitev te raziskave in na osnovi dodatno zbranih podatkov izpeljali še dodatne analize.

Originalnost: Na osnovi podatkov raziskave smo ugotovili in razjasnili dejavnike vodenja na PP in dejavnike zavzetosti uniformiranih policistov na PP. Pridobili smo nova znanja, ki jih ni bilo mogoče prebrati v domači ter tuji strokovni in znanstveni literaturi, s katerimi smo prispevali k nadgradnji že obstoječih znanj.

Omejitve: Anketiranje je bilo izvedeno med uniformiranimi policisti na PP na območju PU Ljubljana, zato izidov iz raziskave ni mogoče posploševati na vse PU v Sloveniji.

Ključne besede: anketa, policijska postaja, raziskava, uniformiran policist, vodenje, zavzetost zaposlenih.

1 Uvod

V svetu se podjetja in druge organizacije srečujejo z spreminjajočim družbenim okoljem in prehajajo v dobo, kjer stari dejavniki uspeha v večini nimajo več pomena. Novi dejavniki narekujejo novo obliko in stil vodenja, ki so oblikovani tako, da so uporabni v praksi. Ključno je, da zaposleni pri izvajanju dejavnosti za doseganje zastavljenih ciljev čim bolje uporabijo svoje zmožnosti, pri čemer je ključna vloga managerja, ki naj bi za uresničevanje skupne vizije znal organizirati delo in sodelavce spodbuditi k čim boljšim izidom. Dober manager bo zaposlenim dodelil takšno delovno mesto in naloge, da bodo lahko čim bolje uveljavili svoje prednosti. Njihove temeljne naloge v organizaciji so načrtovanje, organiziranje, vodenje in nadzorovanje (Kavčič, 1991, str. 772; Možina, 1994, str. 15; Kralj, 2005, str. 2; Drucker, 2007, str. 43).

Vodenje se dogaja v sedanosti, v okviru tekoče oz. sprotne politike organizacije (izpolnjevanje razvojnih smotrov in ciljev organizacije: dosežki dejavnosti v določenih časovnih obdobjih, dosežki po merilih uspešnosti ipd.), ki udejanja koncepte in usmeritve ter strategije, določene v srednjeročni ali dolgoročni temeljni politiki organizacije (Tavčar, 2006, str. 17). Definicij vodenja je skoraj toliko, kolikokrat je bilo vodenje predmet preučevanja različnih ved. Splošne značilnosti vodenja, ki jih navajajo različni avtorji, veljajo za vodenje tako pridobitnih kot nepridobitnih dejavnosti. Če povzamemo različne avtorje (Kavčič, 1991, str. 772; Možina, 1994, str. 498; Anželj, 2001, str. 84; Tavčar, 2006, str. 206; Yukl, 2010, str. 12; Kaluža & Bojnec, 2016, str. 49 in drugi), je vodenje proces usmerjanja, vplivanja, spodbujanja in spremljanja posameznika ali skupine s komuniciranjem, zgledom in motiviranjem, da bi dosegli zasnovane smotre in cilje. Uspešnost vodenja organizacij se presoja po doseženih smotrih in ciljih v organizaciji. Ti smotri in cilji so v pridobitnih organizacijah predvsem ekonomsko-finančni, v slovenski policiji pa so cilji operativna uspešnost, učinkovitost in legitimnost (Anželj, 2001, str. 77).

V zadnjih letih je bilo izvedenih veliko raziskav o merjenju učinkovitosti delovanja policije (Thanassoulis, 1995, str. 641; Carrington idr. 1997, str. 415; García-Sánchez, 2009, str. 59 in drugi). V teh so merili učinkovitost na nacionalni ravni, ki kaže vloške v sistem policije iz drugih virov (npr. iz proračuna) in učinke policije na druge sisteme (npr. prispevek policije k družbeni blaginji in varnosti). Izidi raziskave o učinkovitosti slovenske policije na regionalni ravni (Aristovnik, idr. 2012, str. 7) so pokazali visoko stopnjo neenakosti (primerjava statističnih podatkov ocen (ne)učinkovitosti opravljanja policijske dejavnosti pri preprečevanju, odkrivanju in preiskovanju kaznivih dejanj v časovnem obdobju 2005–2010, podatkovna baza je temeljila na letnih poročilih PU, dodatnih podatkovnih bazah MNZ in SURS) med posameznimi obravnavanimi PU. Prav tako je Gorenak (2003, str. 114) uspel v svoji raziskavi z vplivom osebnih značilnosti vodij (materialna stimulacija vodij, njihov delovni staž in stopnja izobrazbe ter njihova usposabljanja), njihovih vedenjskih dejavnikov (odnos do podrejenih, kompetentnost vodij pri opravljanju nalog ipd.) in situacijskih dejavnikov (demografski dejavniki, materialni pogoji za delo ipd.) pojasniti 56 % variance v uspešnosti PP.

Zaradi do sedaj ugotovljenega o menedžmentu in vodenju ter zaradi dejstva, da je slovenska policija v zadnjih dveh desetletjih doživela mnoge spremembe (Aristovnik idr. 2012, str. 8) (na področju smotrov in ciljev, vrednot, organiziranosti, opreme, infrastrukture, načini nagrajevanja – plačilni razredi), postaja vodenje v Policiji še toliko večji izziv.

Uspešnost vodenja organizacij je povezana s stopnjo zavzetosti zaposlenih (angl. employee engagement) (Fleming & Asplund, 2007, str. 317). Zavzetost zaposlenih je stanje čustvenega in intelektualnega zadovoljstva in pripadnosti organizaciji – sega preko zadovoljstva (npr. kako so mi všeč stvari tukaj) in pripadnosti (npr. koliko si še želim biti tukaj) do zavzetosti (npr. koliko si še želim biti tukaj in koliko dejansko sam storim za izboljšanje delovnih izidov) (Gruban, 2005, str. 10). Zavzeti zaposleni delajo s strastjo, čutijo globoko povezanost z vrednotami in s poslanstvom organizacije, gojijo zaupanje do sodelavcev in do svojih vodij ter so vir inovacij in izboljšav (Gallup, 2012, str. 1). Zavzeti zaposleni so pri svojem delu uspešnejši kot njihovi sodelavci, kar dokazujejo tudi raziskave (Towers Perrin, 2004, str. 7; MacLeod & Clarke, 2009, str. 16; Gallup, 2012, str. 2, ipd.). Zaradi tega se, poleg v pridobitnih, tudi v vse več nepridobitnih organizacijah (predvsem v javnem sektorju) osredinjajo na človeške dejavnike poslovanja, da bi izboljšali nizko stopnjo zavzetosti med zaposlenimi. Statistični podatki Gallupove študije zavzetosti zaposlenih dokazujejo manjšo fluktuacijo in celo 37 % nižji absentizem (Gallup, 2012, str. 2). Za orientacijo navajamo informacijo MNZ (2013), da je bilo v Sloveniji leta 2011 na bolniškem staležu v povprečju 4,0 % zaposlenih, v PU pa je delež višji, in sicer 5,78 % zaposlenih.

Največji vpliv na (ne)uspešnost in (ne)zavzetost zaposlenih imajo vodje in njihov odnos do zaposlenih (Gruban, 2005, str. 13), saj avtor (prav tam) navaja: *»Čeprav najbolj talentirani v ekonomiji znanja pri iskanju zaposlitve iščejo delodajalce, ki ponujajo najboljše ugodnosti, najvišje plače ali priložnost za osebni razvoj, sta njihova kasnejša delovna uspešnost in čas, v katerem so pripravljeni maksimalno zavzeto delati ali sploh ostati v podjetju, predvsem odvisna od odnosov z vodji.«*

Na podlagi pregleda strokovne literature in opravljenih raziskav na področju vodenja in njegovega vpliva na zavzetost sodelavcev smo ugotovili, da tovrstna raziskava v slovenski policiji še ni bila izvedena. Zaradi navedenega smo se odločili za podrobnejšo raziskavo problematike vplivov dejavnikov vodenja na osebno zavzetost zaposlenih v slovenski policiji.

2 Metodologija raziskovanja

Raziskovanje je temeljilo na teoretičnem in empiričnem, raziskovalnem delu.

V teoretičnem delu smo uporabili metodo deskripcije in metodo kompilacije, kot ju navaja Zelenika (2000, 338–339). Zajema analizo vsebin relevantne tuje in domače strokovne literature ter drugih virov. Na ta način smo sistematično preučili 23 bibliografskih enot (monografskih publikacij, člankov iz strokovnih in znanstvenih revij, prispevkov iz zbornikov ter drugih javno dostopnih primarnih in sekundarnih baz podatkov).

V empiričnem delu raziskave smo preverili naslednje hipoteze:

H1: Elementi vodenja v Policiji signifikantno pozitivno vplivajo na stopnjo zavzetosti zaposlenih.

Hipotezo smo preverili s korelacijsko in regresijsko analizo. Pri regresijski analizi smo kot neodvisno spremenljivko določili »vodenje«, kot odvisno spremenljivko pa »zavzetost zaposlenih«.

H2: Elementi vodenja predpostavljenega so odvisni od delovnega mesta anketirane osebe.

Hipotezo smo preverili z analizo variance (ANOVA). Kot odvisno spremenljivko smo določili »vodenje«, kot neodvisno spremenljivko pa »delovno mesto«.

H3: Stopnja zavzetosti zaposlenih je odvisna od njihove delovne dobe.

Hipotezo smo preverili s Pearsonovim hi–kvadrat (test), s katerim smo preverjali odvisnost (značilne razlike) med posameznimi stopnjami zavzetosti uniformiranih policistov in delovno dobo v Policiji.

Raziskavo smo izvedli z uporabo anketne metode, kot jo opisujejo Easterby–Smith, Thorpe & Lowe (2007, str. 163–169). Za zbiranje podatkov in informacij smo uporabili modificiran vprašalnik, ki je sestavljen iz treh sklopov:

- prvi sklop: splošni demografski podatki (spol, starost, izobrazba, delovno mesto, čas zaposlitve v Policiji);
- drugi sklop: trditve s področja vodenja v Policiji (uporabili smo modificiran vprašalnik Gorenak, 2003, str. 203);
- tretji sklop: trditve s področja osebne zavzetosti zaposlenih (trditve, povzete po Wagner & Harter, 2006, str. 386).

Vprašalnik je vseboval vprašanja zaprtega tipa. Stopnjo strinjanja s posamezno trditvijo v drugem in tretjem sklopu vprašalnika so anketirane osebe označile na lestvici 1–5 (Likertova petstopenjska ocenjevalna lestvica).

V raziskavo smo vključili cenzus uniformiranih policistov na vseh 22 PP na območju PU Ljubljana, kar je predstavljal tudi vzorec anketiranih. Na izbranih PP je bilo 1. avgusta 2013 zaposlenih 932 uniformiranih policistov. Za potrebe anketiranja smo pripravili vprašalnike s prazno pisemsko ovojnico, katerih število smo prilagodili številu uniformiranih policistov na posamezni PP. Vprašalniku smo priložili spremni dopis z osebno predstavitvijo, namenom anketiranja ter zagotavljanjem anonimnosti v anketi.

Na tako pridobljenih podatkih in informacijah smo opravili osnovno in zahtevnejšo statistično obdelavo – prikazani na Tabeli 1., 2., 3. in 4. ter Sliki 1. Poleg računanja opisnih statistik smo izvedli regresijsko analizo, analizo variance (ANOVA) in Pearsonov hi–kvadrat (test). Izhode smo ustrezno interpretirali, preverili hipoteze in oblikovali ustrezne zaključke.

3 Rezultati in razprava

3.1 Splošni demografski podatki anketiranih oseb

V raziskavi je sodelovalo 411 (80,0 %) uniformiranih policistov in 103 (20,0 %) uniformiranih policistk zaposlenih na izbranih PP – Tabela 1.

Iz Tabele 1 je razvidno tudi, da je povprečna starost anketiranca 34,2 let. Najmlajši anketiranec je star 19 let, najstarejši pa 52 let. Več kot tri četrtine anketirancev (406 anketirancev; 79,0 %) je imelo končano srednješolsko izobrazbo (srednja poklicna, gimnazijska, srednja tehniška oziroma druga strokovna), 11,1 % (57) anketirancev je imelo končano izobrazbo 1. bolonjske stopnje (visoka strokovna izobrazba), 7,2 % (37) anketirancev višjo strokovno, 2,5 % (13) anketirancev končano izobrazbo 2. bolonjske stopnje, 1 anketiranec (0,2 %) pa končan znanstveni magisterij ali doktorat znanosti. Povprečno število let dela anketiranca v policiji znaša 12,2 let. Anketiranec z najmanj delovne dobe je v policiji zaposlen 1 leto, anketiranec z največ delovne dobe v policiji pa 32 let.

Iz Tabele 1 je razvidno tudi, da je v raziskavi glede na delovno mesto sodelovalo 205 (39,9 %) policistov, 122 (23,7 %) vodij patrulj, 71 (13,8 %) policistov kriminalistov, 51 (9,9 %) vodij policijskega okoliša, 34 (6,6 %) dežurnih policistov in 31 (6,0 %) vodij izmen.

Tabela 1. Demografski podatki anketiranih oseb

Karakteristike	Deskriptor		%
Spol	Moški	411	80,0
	Ženski	103	20,0
Starost	Min	19 let	
	Max	52 let	
	Povprečna starost	34,17 let	
Število let v Policiji	Min	1 leto	
	Max	32 let	
	Povprečno število let	12,20 let	
Delovno mesto	Vodja izmene	31	6,0
	Vodja policijskega okoliša	51	9,9
	Policist kriminalist	71	13,8
	Dežurni policist	34	6,6
	Vodja patrulje	122	23,7
	Policist	205	39,9
Izobrazba	Srednja poklicna (strokovna), gimnazijska, srednja tehniška oziroma druga strokovna	406	79,0
	Višja strokovna	37	7,2
	Visoka strokovna, univerzitetna dodiplomska (1. bolonjska stopnja)	57	11,1
	Univerzitetna izobrazba, specializacija, strokovni magisterij (2. bolonjska stopnja)	13	2,5
	Znanstveni magisterij, doktorat znanosti	1	0,2

Analiza je pokazala, da regresijski model pojasni 46,5 % variabilnosti odvisne spremenljivke – v našem primeru stopnje zavzetosti uniformiranih policistov. F–test ($F = 221,770$) in raven značilnosti kažete ($\text{sig} = 0,000$), da obstaja odvisnost med temi spremenljivkami (stopnja značilnosti sig manjša od 0,05).

Tabela 2. Ocene regresijskih koeficientov (Model 1)

Model 1	Nestandardni koeficienti		Standardni koeficient Beta	t	sig
	Beta	Standardna napaka			
Konstanta	1,258	0,137		9,153	0,000
Neodv. sprem. Odnos	0,635	0,037	0,762	17,207	0,000
Neodv. sprem. Potrebe	- 0,117	0,041	-0,127	-2,867	0,004

Zato regresijsko funkcijo za ocenjevanje odvisne spremenljivke z ocenjenimi vrednostmi regresijskih koeficientov zapišemo v obliki enačbe regresijske hiperravnine:

Stopnja zavzetosti uniformiranih policistov = $1,258 + 0,635 * \text{Odnos} - 0,117 * \text{Potrebe}$.

Koeficient regresijske enačbe pri *Odnos pove*, za koliko se v povprečju spremeni *Stopnja zavzetosti uniformiranih policistov* (odvisna spremenljivka), če se neodvisna spremenljivka *Odnos pove*ča za enoto pri nespremenjeni vrednosti spremenljivke *Potrebe*.

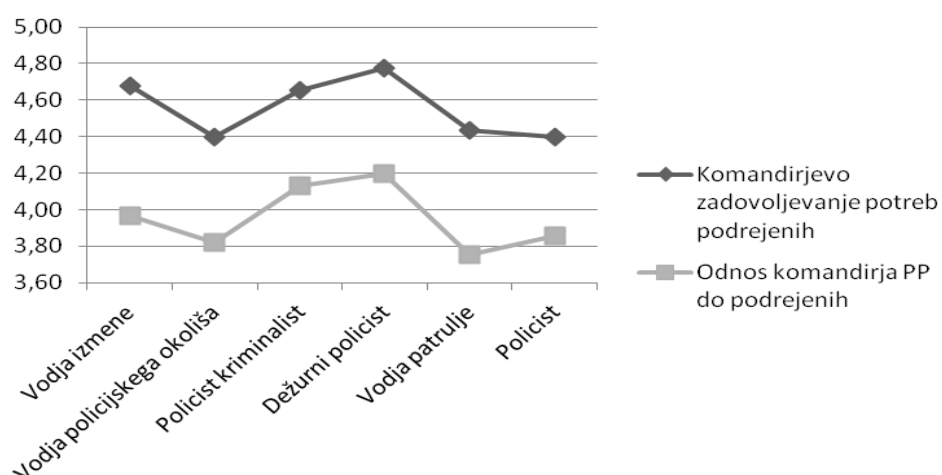
Ugotovitev: S hipotezo smo predvidevali, da elementi vodenja v Policiji signifikantno pozitivno vplivajo na stopnjo zavzetosti uniformiranih policistov. To domnevo smo preverili z izvedbo (multiple) linearne regresije in prišli do ugotovitve, da moramo hipotezo zavrni.

3.2 Elementi vodenja predpostavljenega so odvisni od delovnega mesta anketirane osebe

Z analizo variance (ANOVA) smo preverjali, ali se povprečne vrednosti posameznih elementov vodenja predpostavljenih statistično značilno razlikujejo glede na delovno mesto anketirane osebe (vodja izmene, vodja policijskega okoliša, policist kriminalist, dežurni policist, vodja patrulje, policist).

Analiza je pokazala (Tabela 3), da med elementi vodenja »Komandirjevo zadovoljevanje potreb podrejenih« (*Potrebe*) in »Odnos komandirja PP do podrejenih« (*Odnos*), obstajajo statistično značilne razlike glede na delovno mesto anketiranih oseb. Najbolje element vodenja PP »Komandirjevo zadovoljevanje potreb podrejenih« (*Potrebe*) ocenjujejo dežurni policisti (povprečna vrednost = 4,77), najmanj pa vodja policijskega okoliša (povprečna vrednost = 4,40) in policist (povprečna vrednost = 4,40). Element vodenja PP »Odnos komandirja PP do podrejenih« (*Odnos*) najbolje ocenjujejo dežurni policisti (povprečna vrednost = 4,19), najmanj pa vodja patrulje (povprečna vrednost = 3,76).

Pri elementu vodenja »Komandirjeva pomoč podrejenim« (*Pomoč*) pa statistično značilnih razlik analiza ni zaznala.



Slika 1. Razlike v odgovorih glede na delovno mesto.

Tabela 3. Razlike v odgovorih glede na delovno mesto

	Delovno mesto	Povprečna vrednost	Sig
Komandirjevo zadovoljevanje potreb podrejenih (Potrebe)	Vodja izmene	4,68	0,024
	Vodja policijskega okoliša	4,40	
	Policist kriminalist	4,65	
	Dežurni policist	4,77	
	Vodja patrulje	4,43	
	Policist	4,40	
Odnos komandirja PP do podrejenih (Odnos).	Vodja izmene	3,97	0,021
	Vodja policijskega okoliša	3,82	
	Policist kriminalist	4,13	
	Dežurni policist	4,19	
	Vodja patrulje	3,76	
	Policist	3,85	

Ugotovitev: s hipotezo smo predvidevali, da so elementi vodenja predpostavljenega odvisni od delovnega mesta anketirane osebe – ali se povprečne vrednosti posameznih elementov vodenja predpostavljenih statistično značilno razlikujejo glede na delovno mesto anketirane osebe (vodja izmene, vodja policijskega okoliša, policist kriminalist, dežurni policist, vodja patrulje, policist). Izidi analize variance (ANOVA) kažejo, da moramo hipotezo prav tako zavrniti.

3.3 Stopnja zavzetosti zaposlenih je odvisna od njihove delovne dobe

S Pearsonovim hi–kvadrat (test) smo preverjali, ali se med posameznimi skupinami anketiranih oseb po stopnji zavzetosti zaposlenih (aktivno nezavzeti zaposleni, nezavzeti zaposleni in zavzeti zaposleni), obstajajo statistično značilne razlike glede na njihovo delovno dobo.

Za namen analize smo odgovore anketirancev glede na število let delovne dobe v Policiji razdelili v tri skupine. V prvi skupini so anketiranci z do 10 let delovne dobe, v drugi skupini anketiranci z od 10 do 20 let delovne dobe in v tretji skupini anketiranci z nad 20 let delovne dobe.

Ugotovili smo, da med posameznimi skupinami anketiranih oseb po stopnji zavzetosti zaposlenih obstajajo statistično značilne razlike (sig. = 0,048). Iz Tabele 4 je razvidno, da je v vsaki izmed skupin anketiranih oseb največ nezavzetih zaposlenih in najmanj aktivno

nezavzetih zaposlenih. Iz Tabele 4 je prav tako razvidno, da se število zavzetih zaposlenih do 20 let delovne dobe v Policiji zmanjšuje in število nezavzetih zaposlenih povečuje (aktivno nezavzetih in nezavzetih zaposlenih). Medtem, ko je bilo pri anketiranih z nad 20 let delovne dobe v Policiji ugotovljeno občutno povečanje števila zavzetih zaposlenih v razmerju do skupine anketirancev z od 10 do 20 let delovne dobe v Policiji.

Tabela 4. Razlike v odgovorih glede na delovno dobo

			Delovna doba v policiji			Skupaj
			Do 10 let	Od 10 do 20 let	Nad 21 let	
Stopnje zavzetosti zaposlenih	Aktivno nezavzeti zaposleni	Frekvenca	46	37	7	90
		% Število let v policiji	19,5 %	17,6 %	10,3 %	17,5 %
		% od Skupaj	8,9 %	7,2 %	1,4 %	17,5 %
	Nezavzeti zaposleni	Frekvenca	135	128	35	298
		% Število let v policiji	57,2 %	61,0 %	51,5 %	58,0 %
		% od Skupaj	26,3 %	24,9 %	6,8 %	58,0 %
	Zavzeti zaposleni	Frekvenca	55	45	26	126
		% Število let v policiji	23,3 %	21,4 %	38,2 %	24,5 %
		% od Skupaj	10,7 %	8,8 %	5,1 %	24,5 %
Skupaj		Frekvenca	236	210	nadaljevanje na naslednji strani	
		% Število let v policiji	100,0 %	100,0 %	100,0 %	100,0 %
		% od Skupaj	45,9 %	40,9 %	13,2 %	100,0 %

Ugotovitev: S hipotezo smo predvidevali, da je stopnja zavzetosti uniformiranih policistov odvisna od delovne dobe v Policiji. Rezultati Pearsonovega hi–kvadrat (test) kažejo, da hipotezo lahko v celoti sprejmemo.

3.4 Razprava

Največja raziskava do danes, ki so jo leta 2001 izvedli v organizaciji Gallup, je pokazala, da pri zaposlenih, ki so že dalj časa v organizaciji, zavzetost pada. Po šestih mesecih je bil delež zavzetih zaposlenih 38 %, medtem ko je zavzetost po teh letih padla na 22 % (Hudovernik, 2006, str. 70). Tudi v naši raziskavi smo ugotovili, da dejavniki vodenja v Policiji

signifikantno pozitivno vplivajo na stopnjo zavzetosti uniformiranih policistov in da je kljub dobri oceni policistov glede vodenja PP odstotek nezavzetih uniformiranih policistov velik. Se pa naši rezultati bistveno razlikujejo od navedenih, ker je merjenje zavzetosti policistov na PP pokazalo, da jih je glede na stopnjo zavzetosti pri svojem delu največ nezavzetih (58,00 %), sledijo zavzeti policisti (24,50 %), najmanj pa jih je pri delu aktivno nezavzetih (17,50 %).

Gruban (2005, str. 17) trdi, da vzrokov za nezavzetost ne moremo iskati samo v vodjih in njihovem vodenju, nesposobnosti organizacije motivirati zaposlene in nezmožnosti vpliva zaposlenih na svoje delo ali drugih okoliščinah, ki zaposlene delajo nezadovoljne, temveč tudi v zavestni odločitvi zaposlenih za drugačne prioritete v življenju, kot so na primer: družina, prijatelji, prosti čas, osebni strokovni razvoj in bolj rezultatsko pogojevana kariera. V naši raziskavi so policisti najslabše ocenili trditev, da je njihov najboljši prijatelj iz službe (povprečna vrednost = 2,2), kar naj bi sodilo v kategorijo prostega časa.

Poklicni razvoj se je v raziskavi, ki so izvedli James, McKechnie & Swanberg (2011, str. 188), izkazal za najpomembnejšega napovedovalca zavzetosti razen pri zaposlenih, ki so pred upokojitvijo. Tudi v naših izidih je razvidno, da je priložnost za izobraževanje v zadnjem letu imelo 30,15 % vprašanih in to ocenjujemo kot spodbudno napoved za rast zavzetosti.

4 Zaključek

Namen naše raziskave je bil proučiti vpliv dejavnikov vodenja na zavzetost uniformiranih policistov na izbranih PP ter podati predloge za izboljšanje. Opravili smo kvantitativno raziskavo med 932 uniformiranimi policisti na vseh 22 PP na območju PU Ljubljana.

Pri preverjanju hipotez nismo ugotovili pozitivne povezave med dejavniki vodenja v Policiji in stopnjo zavzetosti med uniformiranimi policisti. Policisti so zadovoljni z vodenjem PP (povprečna vrednost = 4,00). Na osnovi dobre ocene vodenja PP lahko sklepamo, da za ugotovljen velik odstotek nezavzetih uniformiranih policistov na PP ne vpliva vodstvo PP. Izidi nakazujejo na to, da se policisti zavedajo, da za vse slabši finančni položaj, kadrovske podhranjenosti in s tem povezanim dodatnim povečanjem dela na posameznega policista ter slabo opremo niso odgovorni njihovi neposredni vodje, ampak zunanji dejavniki, na katere vodje neposredno nimajo vpliva.

Med elementi vodenja *Potrebe* in *Odnos* obstajajo statistične značilne razlike, medtem ko pri elementu vodenja *Pomoč* analiza statistično značilnih razlik ni zaznala. Na v hierarhiji PP najnižje razvrščenih delovnih mestih, kot so policist, vodja patrulje in vodja policijskega okoliša, je bila ugotovljena nižja ocena pri zadovoljevanju njihovih potreb kot pri vodjih izmen, dežurnih policistih ter kriminalistih. Sklepamo, da je nižja ocena lahko posledica narave njihovega dela, ki je izmensko in večino časa na terenu. V prostorih PP so omenjeni policisti malo prisotni in še tedaj so obremenjeni z administracijo, ki jo je potrebno poenostaviti. Vodstvo PP predlagamo, da več časa namenijo vodenju dela policistov na teh delovnih mestih. Več časa, namenjenega policistom, bo koristno tako za vodje kot policiste.

V raziskavi je bila ugotovljena tudi pozitivna povezava med stopnjo zavzetosti uniformiranih policistov in njihovo delovno dobo. Število zavzetih zaposlenih se do 20 let delovne dobe zmanjšuje in število nezavzetih zaposlenih povečuje (aktivno nezavzetih in nezavzetih zaposlenih). Medtem, ko je bilo pri anketirancih z nad 20 let delovne dobe v Policiji ugotovljeno občutno povečanje števila zavzetih zaposlenih v razmerju do skupine anketirancev z od 10 do 20 let delovne dobe v Policiji.

Izidi iz raziskave prinašajo teoretični in empirični prispevek k managerski znanosti in stroki. Teoretični prispevek raziskave k znanosti je tako v strnjeni in sistematično podani literaturi s področja vodenja in zavzetosti zaposlenih. Na osnovi podatkov iz empirične raziskave smo ugotovili in razjasnili dejavnike vodenja na PP in dejavnike zavzetosti uniformiranih policistov na PP. Pridobili smo nova znanja, ki jih ni bilo mogoče prebrati v domači ter tuji strokovni in znanstveni literaturi, s katerimi bomo prispevali k nadgradnji že obstoječih znanj.

Ugotovitve raziskave imajo tudi praktične implikacije saj bodo izidi lahko v praktično pomoč vsem vodjem PP na območju PU Ljubljana ter drugim raziskovalcem, ki bodo lahko na osnovi ugotovitev te raziskave in na osnovi dodatno zbranih podatkov izpeljali nadaljnje analize, povezane z vodenjem PP in zavzetostjo uniformiranih policistov, ter si z njimi pomagali pri načrtovanju, organiziranju, vodenju in kontroliranju organizacije.

Raziskava ima metodološke in vsebinske omejitve med katerimi je potrebno izpostaviti, da je bilo anketiranje izvedeno med uniformiranimi policisti na PP na območju PU Ljubljana, zato izidov iz raziskave ni mogoče posploševati na vse PU v Sloveniji. Pri izvedbi terenske raziskave smo se soočili tudi s težavnostjo zbiranja podatkov, ki so bili potrebni za raziskavo (zasedenost in obremenjenost uniformiranih policistov). Zadnja pomanjkljivost se kaže v tem, da je anketiranje temelji na subjektivnem mnenju anketirancev ter povzetem vprašalniku, ki ga nismo posebej preverjali v ta namen in zato smo podali tudi predloge za nadaljnje raziskovanje.

Pri nadaljnjem raziskovanju vpliva dejavnikov vodenja na zavzetost uniformiranih policistov na PP na območju PU Ljubljana, bi bilo smiselno raziskavo v določenem časovnem obdobju ponoviti. Izide posameznih raziskav bi nato med seboj primerjali in ugotavljali napredek oziroma spremembe, ki so izid ukrepov za izboljšanje vodenja in povečanja zavzetosti zaposlenih. Med posameznimi PP bi lahko opravili tudi primerjave (npr. po velikosti, uspešnosti). V nadaljnjih raziskavah bi bilo smiselno ugotoviti in izpostaviti vpliv, posameznih dejavnikov vodenja, na katere vodstvo PP nima vpliva (npr. tehnična opremljenost, plača, napredovanja, napadi na policiste, nevarnost pri delu, osebni neuspeh, zakonski problemi, alkoholizem ipd.). Pri nadaljnjem raziskovanju vpliva dejavnikov vodenja na zavzetost uniformiranih policistov na PP bi bilo smiselno razširiti raziskavo na vse PP v Sloveniji. Informacije, zbrane v magistrskem delu bodo koristne vsem bodočim raziskovalcem s področja dejavnikov vodenja in zavzetosti. Dejavnikov vodenja in zavzetosti med policisti pred nami ni raziskoval še nihče, tako da smo s svojimi ugotovitvami doprinesli prvi delček k mozaiku sestavljanke stanja zavzetosti med uniformiranimi policisti, ki je zelo pomembna sestavina uspešnosti v sleherni organizaciji.

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Dominik Žužman je zaposlen v slovenski policiji in dela v Centru za varnost in zaščito. Magistriral je področju organizacijskih znanosti na temo zavzetosti zaposlenih v slovenski policiji na Univerzi na Primorskem. Je doktorski študent, ki v cilju izboljšanja zavzetosti uniformiranih policistov pri njihovem delu še naprej raziskuje učinke vodenja in socialnega kapitala na zavzetost uniformiranih policistov.

Mirko Markič je doktoriral na Fakulteti za organizacijske vede Univerze v Mariboru s področja organizacijskih ved na temo inoviranja. Po dvanajstih letih delovanja v gospodarstvu se je zaposlil na Fakulteti za management Univerze na Primorskem. Je redni profesor za področje menedžmenta in znanstveni svetnik ter vodja ali član 15 raziskovalnih projektov in projektov z gospodarstvom. Njegova bibliografija obsega več kot 550 enot s področja upravnih in organizacijskih ved.

Abstract:

Influence of Leadership Factors on the Work Engagement of Uniformed Police Officers

Research question (RQ): Are any statistically significant correlations between the factors in the management of the police and the degree of engagement between uniformed police officers.

Purpose: The aim of this master's thesis is to examine the influence of leadership factors on the work engagement of uniformed police officers in the analysed police stations, as well as to provide recommendations for improvement.

Methodology: A quantitative survey was conducted among 932 uniformed police officers from all 22 police stations of the Police Directorate Ljubljana.

Results: No positive correlation was found between elements of police station leadership and the level of work engagement of uniformed police officers. A positive correlation was identified between the level of work engagement of uniformed police officers and length of service. There was no positive correlation between leadership factors and the police officers' posts.

Organization: The findings will be of practical use to police station managers of Police Directorate Ljubljana in planning, organizing, leading, and controlling. They can also serve as a foundation for other researchers to conduct further research on the subject with the help of additional data.

Originality: Based on the survey data, we identify and clarify the factors keeping on Police stations and factors engagement uniformed police officers at police stations. We have gained new knowledge that cannot be read in the domestic and foreign literature, with which we have contributed to the upgrading of existing knowledge.

Limitation: The survey was carried out between uniformed police officers at police stations in the area of the Ljubljana Police Directorate, and the results from the study cannot be generalized to all Police stations in Slovenia;

Keywords: survey, police station, research, uniformed police officer, leadership, employee engagement.

Matematični model tranzicije tehnologij s stališča sistemskih inovacij

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Povzetek:

Raziskovalno vprašanje (RV): Tranzicija tehnologije (TT) je inovacijski makro proces, pri katerem inovativna tehnologija nadomesti staro. Dinamika tranzicije tehnologije loči vzpon, stagnacijo in zaton tehnologije. Raziskovalno vprašanje se glasi, kako je možno matematično opisati tranzicijo tehnologije.

Namen: Cilj raziskave je razviti univerzalen matematični model, ki bo opisal različne tranzicije tehnologij s pomočjo spreminjanja parametrov.

Metoda: Analiza pojava in določitev eksogenih in endogenih spremenljivk ter njihovih vzročnih povezav, vključno z matematično formulacijo. Model bo verificiran s konkretnimi podatki.

Rezultati: Verifikacija z dejanskimi podatki je pokazala, da je matematični model ustrezen, ker zadovoljivo opisuje tri stanja: vzpon, stagnacijo in zaton tehnologije.

Organizacija: Model je splošnega značaja, vendar je uporaben tudi za tranzicijo tehnologije v organizacijah, če seveda organizacije imajo ustrezne podatke.

Družba: Model je splošnega značaja in omogoča modeliranje tranzicije tehnologije na svetovni ravni.

Originalnost: Raziskava je originalna. V literaturi nismo našli matematičnega modela, ki bi opisoval tranzicijo tehnologije.

Omejitve/nadaljnje raziskovanje: Pri raziskavi in iskanju parametrov modela smo uporabili dve sigmoidni funkciji. Nadaljnje raziskave so možne v smeri preverjanja modelov z novimi sigmoidnimi funkcijami in na podatkih za druge države.

Ključne besede: tranzicija tehnologije, matematični model, inovacije, sigmoidne funkcije, vzpon in stagnacija ter zaton tehnologije.

1 Uvod

V zadnjih letih na različnih znanstvenih področjih prihaja do poenotenja raziskovalnih pristopov. V tem obdobju so znanstveniki različnih znanstvenih smeri ugotovili, da se znanost v čedalje večji meri ukvarja s kompleksnimi problemi. Za reševanje teh problemov se vedno bolj uporabljajo različni modeli. Modeliranje je postalo sestavni del kvantitativnega opazovanja ekonomskih pojavov. Razvoj modelov običajno zahteva globljo analizo in s tem razumevanje obstoječih ali še neraziskanih oz. ne dovolj raziskanih področij in pojavov. Eno takšnih področij, kjer po pregledu literature s področja inovacij nismo našli matematičnih modelov, je tudi področje tranzicije tehnologije. Pri opisanih tranzicijah gre za konkurenco starih obstoječih in novo nastajajočih tehnologij ter časovni potek njihove tranzicije.

V zadnjih desetletjih je bilo kar precej pozornosti posvečene raziskovanju in modeliranju ekonomske rasti, razširjanju tehnologij, invencij in inovacij ter ustvarjanju in razširjanju znanja, ne pa tudi njihovega zatona.

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2 Pregled literature o sistemskih inovacijah

Za začetnika sodobnega raziskovanja inovacij velja Tarde (1890), ki je postavil temelje za sodobno raziskovanje inovacij. Njegova teorija obravnava tri koncepte: invencija, nasprotovanje in posnemanje. Schumpeter (1912) je inovacije raziskoval s poudarkom na ekonomskem vidiku. V svoji knjigi Teorija ekonomskega razvoja govori o »ustvarjalnem uničevanju« in trdi, da nove tehnologije uničujejo stare.

Na področju ekonomije sta ključne prispevke v 50. in 60. letih prejšnjega stoletja dala Nelson (1959) in Schmookler (1966). Nelson je delal na področju ekonomike invencij, Schmookler pa je pokazal, da tehnološke inovacije niso samo rezultat tehnološkega razvoja, pač pa tudi povpraševanja po rešitvah določenih problemov (demand pull).

Burns in Stalker (1961) sta inovacije raziskovala s stališča menedžmenta. Zavedala sta se, da inovacije ne pridejo same od sebe, pač pa jih je treba upravljati.

Rogersa (1962, str. 247–250) je zanimalo, kakšni mehanizmi vplivajo na razširjanje (difuzijo) in sprejem inovacij in kakšno vlogo imajo tehnologije pri ekonomski rasti. Razvil je teorijo o sprejemu tehnologije s strani uporabnikov, ki jih je razdelil v pet kategorij: inovatorji, zgodnji usvojitelji, zgodnja večina, pozna večina in zamudniki. Ena njegovih bistvenih ugotovitev je, da gre pri sprejemanju tehnologije za proces rasti.

Raziskave inovacijskih sistemov so se kasneje razvile v smeri nacionalnih inovacijskih sistemov (Lundvall 1985, 2010, Lundval in dr. 2009, Freeman 1987 in 1995, Nelson 1993, Fagerberg 2006). Nadaljnje raziskovanje je privedlo do sektorskih in regionalnih inovacijskih sistemov (Bresci in Malerba 1997, Cooke, Gomez Uranga in Etxebarria 1997).

Carlsson in Stankiewicz (1991, 1995) sta dala poudarek na tehnološke inovacijske sisteme, kar je eden najpomembnejših okvirov za naše raziskovanje. Tehnološki inovacijski sistemi so lahko del nacionalnih inovacijskih sistemov, lahko pa nacionalne inovacijske sisteme v določenem tehnološkem segmentu presegajo in predstavljajo horizontalni (cross cutting) segment inovacij (Carlsson in Stankiewicz 1995, str. 49–50). Kot primer takih tehnoloških inovacijskih sistemov bi tukaj navedli elektronsko in računalniško industrijo, ki sta v zadnjih petdesetih letih bistveno premaknili meje na mnogih področjih, npr. obdelavi in shranjevanju podatkov, telekomunikacijah, mikronizaciji elektronike ipd. V našem prispevku je pomemben ravno ta vidik: splošna vloga tranzicije tehnologij in modeli, ki to tranzicijo tudi matematično opisujejo.

Resničen preboj v inovacijskih sistemih je prispevek Endquista (1997), ki je na področje raziskovanja inovacij vnesel elemente sistemske teorije, ki na določen način sistemsko zedini različne vidike: nacionalne, regionalne, sektorske in tehnološke.

V zadnjem obdobju je na področju raziskovanja inovacij opaziti trend k sistemskim inovacijam in inovacijskim sistemom v povezavi s tranzicijo tehnologij (Elzen in dr. 2004, Geels 2005). Oba avtorja sta predstavnika nizozemske šole sistemskih inovacij, ki vključuje raziskovalce s področja tranzicije tehnologij in sistemskih inovacij. Tako Geels in Schot (2007, str. 405–412) v članku o izboljšavi Geelsovega modela o tranziciji tehnologij govorita o tranzicijskih poteh tehnologij.

3 Razvoj modela tranzicije tehnologij

3.1 Temelji za model omejene funkcije sprememb

3.1.1 Sigmoidne funkcije

Raziskovalci so ugotovili, da eksponentna funkcija rasti nezadovoljivo opisuje spremembe. Opisuje namreč spremembe, ki so neomejene, česar pa v realnosti ni. Iskali so torej funkcije, ki bi opisovale omejene spremembe. Verhulst (1838) je pri raziskovanju rasti prebivalstva razvil diferencialno enačbo, katere rešitev je bila funkcija, ki jo je poimenoval logistična in je omejena navzdol in navzgor. Kasneje je bilo razvitih še več takšnih funkcij, ki so jih, glede na obliko, podobno črki S, poimenovali sigmoidne funkcije. Pregled sigmoidnih funkcij za modeliranje rasti dajeta Tsoularis & Wallace (2002).

Sigmoidne funkcije matematično zapišemo kot:

$$y = A \cdot s(a(t - t_0)) , \quad (1)$$

kjer je

y odvisna spremenljivka,

A parameter velikosti (magnitude),

s sigmoidna enotska funkcija,

a naklonski koeficient,

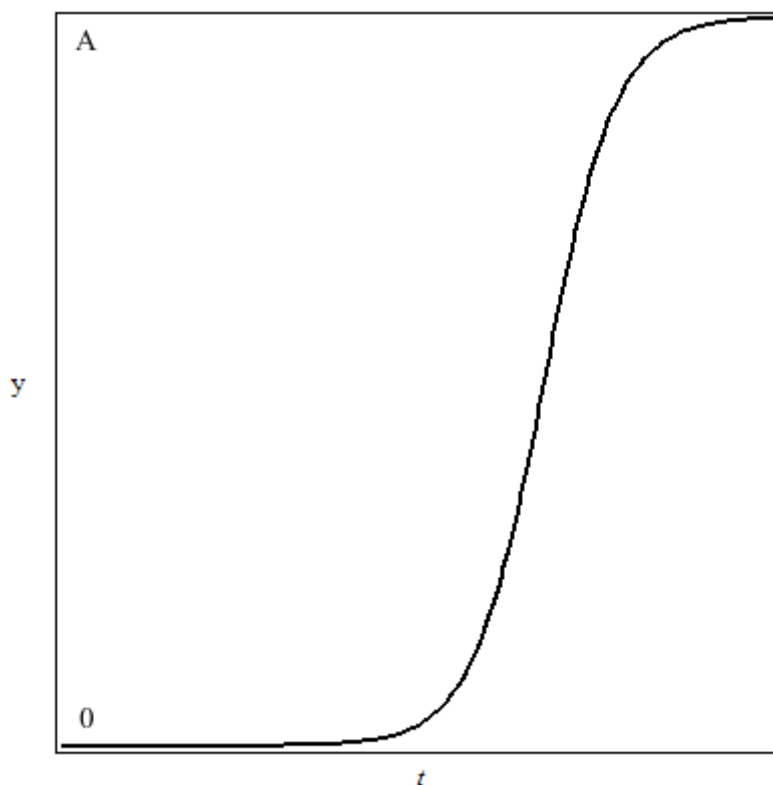
t čas,

t_0 časovna zakasnitev.

Sigmoidna enotska funkcija je naraščajoča funkcija na intervalu $(-\infty, +\infty)$, ki obsega vrednosti odvisne spremenljivke med 0 in 1.

Graf sigmoidne funkcije je prikazan na sliki 1.

Trdimo, da so te funkcije primerne za opisovanje tranzicije tehnologij.



Slika 1. Sigmoidna funkcija

3.1.2 Kontinuitetna enačba in njen odvod

Kot smo že povedali, bomo obravnavali dve tehnologiji (v splošnem bi jih lahko tudi več), pri čemer nas zanimajo odnosi med številom enot posamezne tehnologije. Enote tehnologij so rezultat inovacijsko-proizvodnega procesa in so v materialni obliki. Če vsaka od tehnologij da na tržišče določeno število enot, je skupno število enot v vsakem trenutku enako vsoti vseh enot. Število enot se samo na sebi ne more povečevati, ker enote tehnologije nimajo avtopoetske lastnosti (lastnosti reprodukcije oz. lastne replikacije). Enačbo, ki opisuje to dejstvo, imenujemo kontinuitetna enačba s splošnim zapisom v obliki:

$$y_M(t) = \sum_{i=1}^n y_i(t) , \quad (2)$$

kjer je

$y_M(t)$ količina enot proizvodov vseh tehnologij v določenem trenutku,

$y_i(t)$ količina enot proizvodov tehnologije i v določenem trenutku.

Nadalje velja za odvod kontinuitetne enačbe

$$\frac{d}{dt} y_M(t) = \sum_{i=1}^n \frac{d}{dt} y_i(t) . \quad (3)$$

3.2 Splošen matematični model tranzicije tehnologij

3.2.1 Osnove za matematični model tranzicije tehnologij

Naš model temelji na pristopu, da se določeni obstoječi tehnologiji kot konkurenca pojavi nova tehnologija, ki ima svojo rast. Ker sprejemanje nove tehnologije na začetku na trgu nima velikega vpliva, prevzame obstoječa tehnologija skoraj ves del rasti povpraševanja na trgu. Sprejem obeh tehnologij se na trgu povečuje. Kolikor večja je kvantitativna rast nove tehnologije, toliko večji tržni delež dobiva. Če je nova tehnologija zares boljša, je njen sprejem toliko boljši. Nova tehnologija običajno pridobiva dodatne kupce, ki jih stara tehnologija ne bi.

Ker je splošno znano, da ni neomejene rasti, bomo tudi v našem modelu tranzicije tehnologije pričeli s to predpostavko. Nadalje, ko nova tehnologija kvantitativno narašča bolj, kot je skupna rast obeh tehnologij, stara tehnologija nujno upada. To dejstvo v našem modelu upoštevamo tako, da naraščajočo sigmoidno funkcijo pomnožimo s padajočo funkcijo. S tem smo dosegli univerzalnost modela na celotnem časovnem območju od nastanka tehnologije do njenega zatona.

Za model bomo izbrali naslednje spremenljivke in parametre:

- količino enot $y(t)$, ki so v vsakem trenutku na razpolago za uporabo. Ta spremenljivka je endogena in meri izhod iz našega modela in je odvisna od časa,
- čas t , ki je neodvisna, eksogena spremenljivka. Zanima nas namreč, kako tranzicija tehnologije poteka v času,
- t_0 je parameter časovnega zamika sigmoidne funkcije,
- τ_0 časovni zamik v funkciji zatona,
- A , B sta parametra, ki določata največje število enot tehnologije, ki je na razpolago v zasičenju tržišča,
- q je omejena funkcija vzpona. Omejena funkcija vzpona je naraščajoča funkcija, ki na intervalu naraste do določene omejene vrednosti. To funkcijo smo izbrali, ker je že več kot stoletje jasno, da neomejene rasti ni,
- r je funkcija zatona tehnologije, ki je padajoča funkcija na intervalu in določa potek tehnologije, ki izginja s tržišča,
- a je parameter vzpona tehnologije in
- b parameter zatona tehnologije.

Splošno obliko matematičnega modela tranzicije tehnologije zapišemo kot:

$$y(t) = A \cdot q(a \cdot (t - t_0)) \cdot r(-b \cdot (t - \tau_0)) . \quad (4)$$

3.2.2 Skupen časovni potek količin stare in nove tehnologije

Pričnimo razvoj našega modela najprej z opazovanjem celotnega tržišča, ki ga v našem idealnem sistemu obvladujeta dve tehnologiji. Razširitev na več tehnologij je možna z zaporedji več modelov dveh tehnologij.

Skupen časovni potek dveh tehnologij lahko opazujemo na dva načina, in sicer:

- z enačbo splošne oblike modela tehnologije, kjer za vzpon uporabimo naraščajočo sigmoidno funkcijo s in za zaton padajočo nesingularno funkcijo r in dobimo

$$y_M(t) = A \cdot s_M(a_M \cdot (t - t_M)) \cdot r_M(-b_M \cdot (t - \tau_M)) , \quad (5)$$

- kot vsoto stare in nove tehnologije, izraženo z enačbo

$$y_M(t) = A \cdot s_L(a_L \cdot (t - t_L)) \cdot r_L(-b_L \cdot (t - \tau_L)) + \\ B \cdot s_N(a_N \cdot (t - t_N)) \cdot r_N(-b_N \cdot (t - \tau_N)) , \quad (6)$$

kjer so:

L, N, M indeksi, ki označujejo staro, novo in vsoto obeh tehnologij in
 α parameter nesimetrične rasti sigmoidne funkcije, glede na neodvisno spremenljivko t .

S tem ko sigmoidno funkcijo potenciramo, dosežemo časovno nesimetrično rast, kar izboljša prilaganje modela dejanskim podatkom.

Prvi način (enačba 5) je bolj primeren tam, kjer imamo opravka z dvema tehnologijama, drugi (enačba 6) pa tam, kjer imamo več tehnologij. Načeloma pa je možno uporabiti katerikoli način.

Ko opazujemo dve tehnologiji, ima kontinuitetna enačba naslednjo obliko:

$$y_M(t) = y_L(t) + y_N(t) , \quad (7)$$

njena diferencialna oblika pa je

$$\frac{d}{dt} y_M(t) = \frac{d}{dt} y_L(t) + \frac{d}{dt} y_N(t) . \quad (8)$$

3.2.3 Časovni potek količin nove tehnologije

Nova tehnologija se na tržišču pojavi, ko je stara že prisotna, torej s časovnim zamikom glede na staro tehnologijo. Nova tehnologija običajno poleg potencialnih kupcev stare tehnologije ustvari tudi nove kupce, ki ne bi želeli kupiti stare tehnologije. To poveča končni obseg nove tehnologije.

Časovni potek nove tehnologije, ki ima omejeno rast, zapišemo s pomočjo sigmoidne funkcije kot

$$y_N(t) = B \cdot s_N(a_N \cdot (t - t_N)) \cdot r_N(-b_N \cdot (t - \tau_N)) . \quad (9)$$

3.2.4 Časovni potek količin stare tehnologije

Pri razvoju novega modela si bomo najprej ogledali časovni potek stare tehnologije. Stara tehnologija je časovna predhodnica nove. Z difuzijo količina enot stare tehnologije narašča in stara tehnologija sama zadovolji potrebe tržišča. V določenem trenutku obstoja stare tehnologije se pojavi nova. Takrat stara tehnologija ne izpolnjuje več sama zahtev na tržišču. Ima konkurenco, ki ji odvzame del njene rasti. Kolikor hitrejša je rast nove tehnologije, toliko večji je upad stare. Stara tehnologija preneha obstajati, ko je nova tehnologija dosegla raven, ko sama zapolni vse potrebe tržišča. Matematično tak potek lahko opišemo s sigmoidno funkcijo, ki pa jo pomnožimo s časovno zamaknjeno funkcijo upada r , kar je izraženo z enačbo

$$y_L(t) = A \cdot s_L(a_L \cdot (t - t_L)) \cdot r_L(-b_L \cdot (t - \tau_L)) . \quad (10)$$

Ker običajno stara tehnologija po določenem času, ko se pojavi nova, začne upadati, je enostavneje uporabiti kar razliko med vsemi tehnologijami skupaj in novo tehnologijo. Tako dobimo iz kontinuitetne enačbe naslednji izraz:

$$y_L(t) = A \cdot s_M(a_M \cdot (t - t_M))^{a_M} \cdot r_M(-b_M \cdot (t - \tau_M)) - B \cdot s_N(a_N \cdot (t - t_N))^{a_N} \cdot r_N(-a_L \cdot (t - \tau_N)) \cdot (11)$$

3.2.5 Časovni potek funkcije zatona r

Usmerimo se še na funkcijo zatona $r(\cdot)$. Ta funkcija je padajoča. Najenostavnejša nesingularna funkcija je eksponentna z negativno vrednostjo parametra, vendar zamaknjena za τ . Njen matematični zapis je:

$$r(t) = e^{-b \cdot (t - \tau)} \cdot (12)$$

4 Rezultati in razprava

4.1 Izračun parametrov modela na osnovi podatkov

V prejšnjem poglavju smo razdelali model za tranzicijo tehnologije na osnovi analize in teoretičnih spoznanj. Model, ki smo ga razvili, lahko uporablja različne funkcije, ki opisujejo tri stanja: vzpon, stagnacijo in zaton tehnologij in tranzicijo tehnologij med stanji. Model, ki smo ga razvili, je parametrični model. To pomeni, da je za konkreten primer tranzicije tehnologije treba najti:

- ustrezno funkcijo tranzicije tehnologije in
- parametre funkcije tranzicije tehnologije.

Za izdelavo konkretnega modela torej potrebujemo časovno serijo podatkov s časom kot neodvisno spremenljivko in enotami tehnologije kot odvisno spremenljivko. Z metodo najmanjših kvadratov poiščemo parametre matematične funkcije tranzicije tehnologije.

V naslednjih podpoglavjih bomo zaradi verifikacije našega modela tranzicije tehnologije predstavili primera, za katera bomo izračunali parametre. Izračunane parametre bomo nato vstavili v model in izračunali razliko med modelom in podatki. Ker pa razlika v velikosti ni najboljše mera za ugotavljanje ustreznosti modela, bomo izračunali še relativno odstopanje, in sicer v odstotkih, od največje vrednosti. Takšna relativna mera veliko bolj ustreza kot kriterij za verifikacijo, ali je naš model ustrezen. Da bi zagotovili kar najširšo možno potrditev modela, bomo poleg tehnologije proizvodov verificirali tudi tehnologijo storitev.

Naj opozorimo še na dejstvo, da smo pri obeh modelih absolutne vrednosti za leto spremenili v relativne vrednosti tj. zaporedno leto. V modelu vedno pričnemo šteti zaporedno leto z vrednostjo 1.

4.2 Tranzicija tehnologije osebnih avtomobilov v Sloveniji

Značilnost glede tranzicije tehnologije osebnih avtomobilov v Sloveniji je, da v državi obstajajo vozila na bencinski in dizelski pogon ter v zadnjem času tudi vozila na alternativna goriva. Statistične podatke o številu registriranih vozil vodi UNECE (United Nations Economic Commission for Europe), kjer smo dobili podatke o številu registriranih osebnih vozil na bencinski, dizelski in alternativni pogon v Sloveniji. Časovno si tehnologije sledijo v naslednjem vrstnem redu: bencinski pogon, ki ji sledi tehnologija na dizelski pogon, in v zadnjih letih tehnologija na alternativni pogon. Podatki za Slovenijo so prikazani v preglednici 1.

Preglednica 1. Tranzicija tehnologije osebnih avtomobilov: podatki za Slovenijo v 000.

leto	zap. leto	bencin	dizel	alternativno	skupaj
1993	1	57,851	2,004	0,023	59,878
1994	2	45,619	1,582	0,016	47,217
1995	3	59,748	1,909	0,043	61,700
1996	4	56,859	2,468	0,031	59,358
1997	5	59,421	4,856	0,080	64,357
1998	6	64,721	6,167	0,134	71,022
1999	7	73,437	8,134	0,298	81,869
2000	8	58,163	6,515	0,168	64,846
2001	9	46,149	9,061	0,222	55,432
2002	10	36,379	15,652	0,279	52,310
2003	11	34,016	26,497	0,018	60,531
2004	12	35,078	24,802	0,005	59,885
2005	13	38,584	29,199	0,008	67,791
2006	14	43,543	27,486	0,008	71,037
2007	15	37,442	19,945	0,004	57,391
2008	16	38,173	22,599	0,005	60,777
2009	17	34,042	25,770	0,001	59,813
2010	18	24,845	24,847	0,008	49,700
2011	19	23,942	28,016	0,010	51,968

Vir: UNECE Transport Division

Vidimo, da je tehnologija osebnih avtomobilov na alternativni pogon šele na začetku svoje poti in je zaradi nepomembnega deleža v našem modelu nismo upoštevali. To pomeni, da osebnih avtomobilov na alternativni pogon nismo odšteli od skupnega števila vozil.

Funkcija, ki jo želimo verifisirati pri tem primeru, je naraščajoča in padajoča iracionalna sigmoidna funkcija v obliki

$$y = \left(\frac{A}{2} \cdot \left(1 + \frac{a(t-b)}{\sqrt{1+(a \cdot (t-b))^2}} \right) e^{-c(t-d)} \right)^\alpha, \quad (13)$$

kjer je:

y endogena spremenljivka – število osebnih avtomobilov,

t eksogena spremenljivka – zap. številka leta,

A, a, b, c, d in α parametri, ki jih iščemo z modelom.

To funkcijo bomo uporabili za modeliranje bencinskega pogona in za vse osebne avtomobile skupaj. Za tehnologijo dizelskega pogona pa bomo uporabili razliko obeh funkcij.

Z metodo najmanjših kvadratov dobimo naslednje parametre in enačbe za tranzicijo tehnologije osebnih avtomobilov v Sloveniji:

za vse osebne avtomobile skupaj:

$$A = 102.16, a = -0.0049, b = 51.08, c = 0, d = 0 \text{ in } \alpha = 1 \quad (14)$$

$$y = 51.08 \cdot \left(1 - \frac{0.0049 \cdot (t - 51.08)}{\sqrt{1 + (0.0049 \cdot (t - 51.08))^2}} \right), \quad (15)$$

za avtomobile na dizelski pogon

$$A = 69.24, a = -0.077, b = 15.32, c = 0, d = 0 \text{ in } \alpha = 1 \quad (16)$$

$$y = 34.62 \cdot \left(1 - \frac{0.077 \cdot (t - 15.32)}{\sqrt{1 + (0.077 \cdot (t - 15.32))^2}} \right) \quad (17)$$

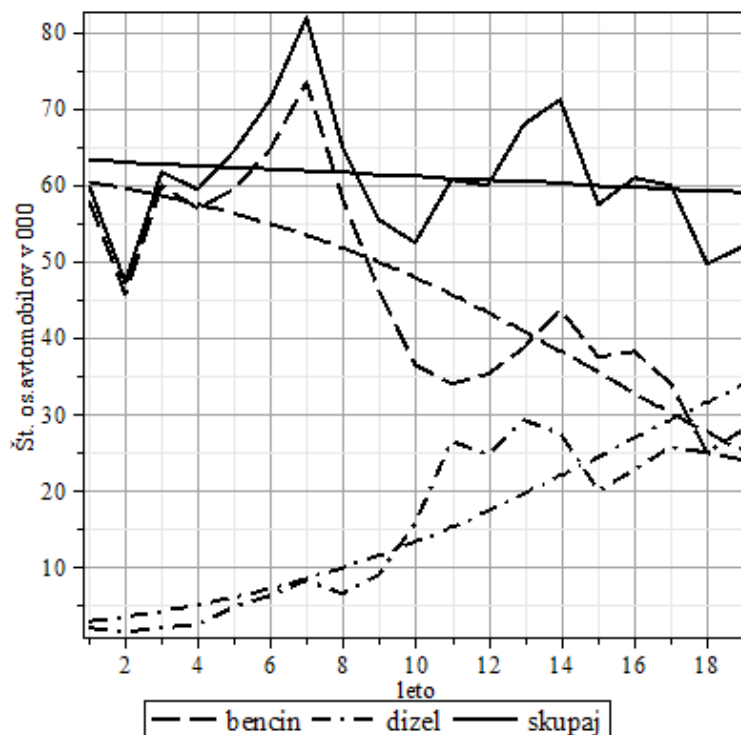
in za avtomobile na bencinski pogon

$$y = 51.08 \cdot \left(1 - \frac{0.0049 \cdot (t - 51.08)}{\sqrt{1 + (0.0049 \cdot (t - 51.08))^2}} \right) - 34.62 \cdot \left(1 - \frac{0.077 \cdot (t - 15.32)}{\sqrt{1 + (0.077 \cdot (t - 15.32))^2}} \right). \quad (18)$$

Kot vidimo iz zgornjih enačb modela, so parametri iz enačbe (13) $\alpha=1$, $c=0$ in $d=0$, kar pomeni, da ustreza celo enostavnejši model.

Grafični potek podatkov in rezultata modela je prikazan na sliki 2. Gladke krivulje predstavljajo model, medtem ko podatke predstavljajo krivulje z večjim raztrosom.

Odstopanja podatkov od izračunov modela so prikazana v preglednici 2, in sicer vrednost in odstotek odstopanja. Poudariti moramo, da so podatki za bencinski pogon in s tem tudi podatki za vse osebne avtomobile zelo razpršeni in je modeliranje zato težje. Opazimo lahko, da je odstopanje ponekod večje od 10 odstotkov, vendar model dobro predstavlja padajoči in rastoči trend. To kaže, da je model tranzicije tehnologije osebnih avtomobilov v Sloveniji ustrezen. Na raztresenost podatkov model namreč ne more vplivati.



Slika 2. Tranzicija tehnologije v avtomobilski industriji: podatki in model za Slovenijo.

Preglednica 2. Tranzicija tehnologije osebnih avtomobilov v Sloveniji: odstopanje podatkov od modela.

leto	vrednost v 000				odstotek		
	zap. leto	bencin	dizel	skupaj	bencin	dizel	skupaj
1993	1	2,428	0,834	3,238	3,853	2,778	5,140
1994	2	13,804	1,884	15,672	21,911	6,280	24,876
1995	3	-1,286	2,289	0,961	-2,041	7,632	1,525
1996	4	0,525	2,580	3,074	0,833	8,600	4,879
1997	5	-3,246	1,172	-2,155	-5,153	3,905	-3,420
1998	6	-9,900	0,984	-9,050	-15,714	3,279	-14,365
1999	7	-20,126	0,296	-20,128	-31,946	0,987	-31,949
2000	8	-6,529	3,361	-3,336	-10,364	11,203	-5,296
2001	9	3,633	2,434	5,845	5,766	8,114	9,278
2002	10	11,375	-2,362	8,734	18,055	-7,872	13,864
2003	11	11,538	-11,241	0,280	18,315	-37,469	0,444
2004	12	8,120	-7,423	0,691	12,888	-24,744	1,097
2005	13	2,122	-9,564	-7,450	3,369	-31,880	-11,825
2006	14	-5,429	-5,494	-10,931	-8,618	-18,313	-17,351
2007	15	-1,982	4,464	2,479	-3,145	14,882	3,935
2008	16	-5,381	4,242	-1,144	-8,541	14,140	-1,815
2009	17	-3,886	3,470	-0,417	-6,168	11,567	-0,662
2010	18	2,751	6,715	9,458	4,367	22,383	15,013
2011	19	1,209	5,753	6,952	1,919	19,176	11,035

4.3 Tranzicija v letalskem potniškem prometu v Sloveniji

Letalski promet doživlja prepoved. Priča smo združevanju letalskih družb in internacionalizaciji letalskega prometa. Inovacijo v storitvah potniškega letalskega prometa predstavljajo nizkocenovni prevozniki. S svojim inovativnim poslovnim modelom ustvarjajo dvoje: a) nove stranke, ki ne bi uporabljale letalskih prevozov, če ne bi bilo nizkocenovnih letalskih prevozov, in b) prevzemajo letalske potnike klasičnim letalskim prevoznikom. Za konkreten primer smo izbrali Slovenijo, za katero bi radi preverili model tranzicije tehnologije v storitvenem sektorju.

Z nastavkom modela

$$y = \frac{A e^{-c t}}{1 + e^{-a(t-b)}} \quad (19)$$

dobimo naslednje parametre in enačbe, in sicer:
za število potnikov na nizkocenovnih letih

$$A = 131.34, a = 14.82, b = -0.995, c = 0 \quad (20)$$

$$y = \frac{131.34}{1 + e^{-14.82 \cdot (t - 0.995)}} \quad (21)$$

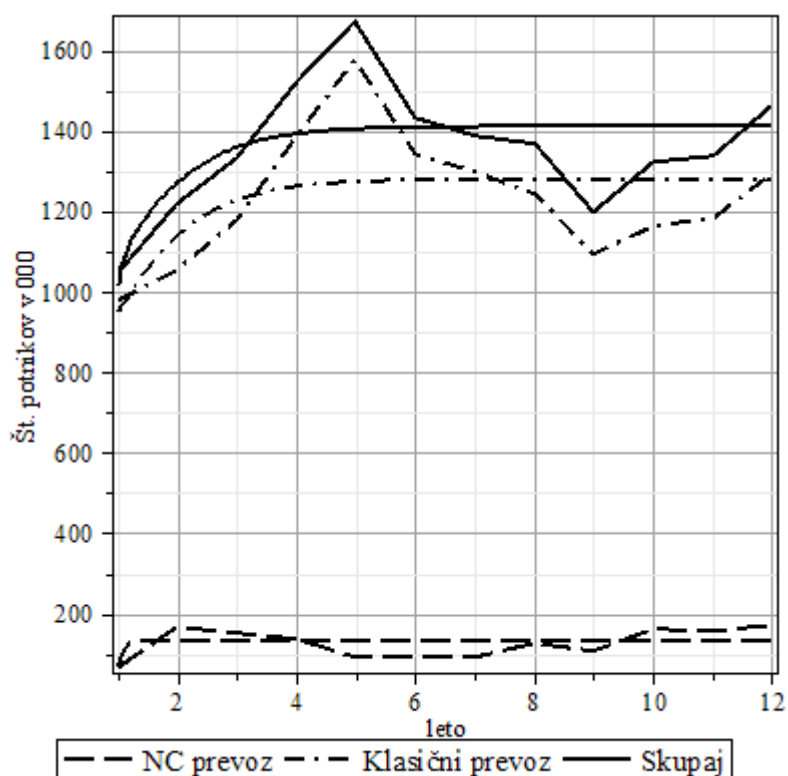
za število potnikov klasičnih prevoznikov

$$A = 1279.59, a = 1.06, b = 0.012, c = 0 \quad (22)$$

$$y = \frac{1279.59}{1 + e^{-1.06 \cdot (t - 0.012)}} \quad (23)$$

ter za skupno število potnikov

$$y = \frac{131.34}{1 + e^{-14.82 \cdot (t - 0.995)}} + \frac{1279.59}{1 + e^{-1.06 \cdot (t - 0.012)}} \quad (24)$$



Slika 3. Tranzicija tehnologije v letalskem prevozu: model in podatki za Slovenijo.

Preglednica 3. Tranzicija tehnologije v letalskem prometu: št. potnikov v Sloveniji v 000.

leto	zap. leto	nizko-cenovni prevoz	klasični prevoz	skupaj
2004	1	68,27	979,97	1048,24
2005	2	164,89	1054,01	1218,90
2006	3	154,08	1180,28	1334,36
2007	4	134,73	1389,30	1524,03
2008	5	93,56	1579,49	1673,05
2009	6	90,16	1343,69	1433,86
2010	7	89,85	1298,80	1388,65
2011	8	124,42	1245,06	1369,49
2012	9	105,61	1093,30	1198,91
2013	10	159,23	1161,92	1321,15
2014	11	157,15	1181,47	1338,62
2015	12	171,08	1293,50	1464,58

Vir: Lapajne in Rauch

Rezultati modela in podatki so prikazani v preglednici 3 in na sliki 3. Gladke krivulje predstavljajo model, medtem ko podatke predstavljajo razpršene krivulje.

Iz modela izhaja, da število potnikov pri nizkocenovnih prevoznikih ne narašča niti v prihodnjih letih tega ni pričakovati. To je klasičen primer stagnacije dveh tehnologij, ki bosta verjetno ostali v takem razmerju, kot sta sedaj, tudi nekaj časa v bodoče.

5 Zaključek

V ekonomski literaturi in literaturi o inovacijah je redkeje slišati o vlogi tehnologije v inovacijah. Tehnologija je nekako bolj v domeni inženirjev in družboslovcev. S tem člankom smo naredili korak v smeri matematičnega modeliranja in razumevanja tranzicije tehnologije. S tranzicijo tehnologije je mišljen družbeni proces zamenjave enot določene obstoječe tehnologije z novo. Pri tem ni bil naš interes samo proces substitucije tehnologije, pač pa tudi vpliv nove tehnologije na rast povpraševanja in ustvarjanja novih usvojiteljev, ki so se pojavili prav zaradi nove tehnologije.

Poleg teoretskega prispevka k sistemski teoriji inovacij smo ob uporabi že znanih matematičnih elementov za modeliranje razvili nov pristop s tem, da smo se naslonili na sigmoidne funkcije, ki omogočajo modeliranje omejenih sprememb.

Razvili smo torej splošen generični matematični model tranzicije tehnologije (enačbe 5 do 12), ki ob uporabi različnih sigmoidnih funkcij na različnih intervalih dajejo obilo možnosti za številne konkretne aplikacije modelov.

Teoretične modele smo verificirali na osnovi pridobljenih podatkov iz dveh virov. Modele smo verificirali tako za tranzicijo tehnologije avtomobilov kot tudi za tranzicijo pri letalskih prevozi, oboje za Slovenijo. Za tranzicijo avtomobilov smo izdelali osnovni model nadomeščanja vozil na bencinski pogon z vozili na dizelski oz. alternativni pogon. Ugotovili smo, da je tranzicija tehnologije v teku in da še ni končana. Pri modelu tranzicije letalskih prevozov potnikov smo upoštevali tehnologijo oz. poslovni model klasičnih in nizkocenovnih letalskih prevoznikov. Slednji v svetu povečujejo promet zaradi učinkov substitucije pa tudi zaradi novih potnikov, ki zaradi cene ne bi leteli s klasičnimi prevozniki, z nizkocenovnimi pa letijo. Za tranzicijo v letalskem potniškem prometu v Sloveniji smo ugotovili, da gre za stagnacijo, ki bo predvidoma trajala še nekaj časa, verjetno pa ne bo nikoli prišlo do popolnega izrinjenja klasičnih prevoznikov. Ni namreč pričakovati, da bodo nizkocenovni prevozniki popolnoma nadomestili klasične letalske prevoznike.

Razviti model smo preskusili samo na nekaterih sigmoidnih funkcijah. Model omogoča nadaljnje raziskovanje v smeri uporabe drugih sigmoidnih funkcij ter uporabo tistih, ki omogočajo najboljše prilaganje modelov podatkom.

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Andrej Grebenc je magister ekonomije in dipl. inž. el. Ima 12-letne izkušnje v menedžmentu raziskovalnih projektov in raziskavah v Evropski komisiji v Bruslju. Področje njegovega raziskovanja so bodoče vrhunske tehnologije in njihova tranzicija, energetika, transport, IKT in varnost ter MSP. V poklicnem življenju je bil zaposlen v Iskri, Siemensu in Delta Computers, bil je direktor MSP-ja in konzultant. V zadnjem obdobju je bil zaposlen v javnem sektorju, povezanim z ministrstvom za promet. Ima mednarodne izkušnje in je dlje časa deloval ali bival v Nemčiji, Avstriji, Luksemburgu, Španiji, Belgiji ter Saudski Arabiji.

Abstract:

Mathematical Model of Technology Transition as Systemic Innovation

Research Question (RQ): Technology transition (TT) is innovation macro process where new technologies replace the old ones. Dynamic of technology transition distinguishes raise, stagnation and fall of technology. Research question is how it is possible to describe technology transition qualitatively.

Purpose: Research work is to develop a universal mathematical model that will describe various technology transitions by means of parameter change.

Method: The phenomenon was analysed and exogenous and endogenous variables have been identified along with their causal relations, including mathematical logic and induction. The model was verified with specific data.

Results: Verification on actual data has shown that developed mathematical model adequately describes three technology transition states: Raise, stagnation and fall of technology.

Organisation: Model is of generic nature but is as well applicable for technology transfer in organisation, provided the adequate data are available in the organisations.

Society: Model is of generic nature and enables the technology transition modeling.

Originality: Research is original. We could not find any mathematical model that would describe technology transitions.

Limitations/Future Research: Two sigmoid functions have been used for parameter identification for personal car technology transition and passenger air transport transition in Slovenia. Further research is possible in model verification with other sigmoid functions and data for other countries/regions.

Keywords: technology transition, mathematical model, innovation modeling, sigmoid functions, raise and stagnation and fall of technologies.

Triangulacija teorij o odličnosti poslovnega modela McKinsey 7S

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Povzetek:

Raziskovalno vprašanje (RV): Raziskava je temeljila na ugotavljanju ključnih razlik med posameznimi avtorji, ki so v svojih raziskovanjih uporabili model McKinsey 7S.

Namen: Namen raziskave je bil ugotoviti in izpostaviti nasprotujoče si zaključke, do katerih smo prišli na osnovi proučevanja člankov različnih avtorjev, katerih raziskave so potekale na modelu McKinsey 7S.

Metoda: Metodologija naše raziskave je temeljila na triangulaciji teorij različnih avtorjev, katerih raziskave so potekale na omenjenem modelu. Ugotavljali smo tudi metodologijo raziskovanja posameznega avtorja.

Rezultati: V naši raziskavi smo pričakovano prišli do različnih interpretacij avtorjev glede uporabnosti modela McKinsey 7S. Nekateri avtorji ugotavljajo, da v modelu manjkajo pomembne spremenljivke, oziroma je določene treba zamenjati, drugi ugotavljajo, da je model zadosten in ga ni treba spreminjati.

Organizacija: Analiza je pokazala, da je uspešnost organizacije v veliki meri odvisna od tradicionalno manj vključenih zaposlenih, potrošnikov in partnerjev v neposredno odločanje, na katere pa lahko vplivamo le z »mehkimi dejavniki«.

Družba: Ključni vpliv na družbo predstavlja vključitev mehkih dejavnikov modela, kar se nanaša na socialno odgovornost do vseh deležnikov podjetja in vključitev gradnikov, ki bi model posodobili v smislu elektronske uporabe, s čimer bi pokazali na odgovornost do okolja.

Originalnost: Pripravili smo zadnji aktualni pregled spoznanj iz proučevane literature in virov na področju poslovnega modela McKinsey 7S, raziskavo teorij podkrepili z lastno raziskavo o vplivnih dejavnikih modela ter predstavili model McKinsey 7S na primerno celovit način ter v luči, ki je do sedaj ni obravnaval še nihče in je v svetovni znanstveni literaturi še neraziskano področje.

Omejitve/nadaljnje raziskovanje: Omejitve v raziskavi so predstavljale razlike med posameznimi članki, saj so imeli avtorji različen namen, metodologijo raziskovanja in raziskovalna vprašanja. Predlogi za nadaljnje raziskovanje se nanašajo predvsem na posodobitev relativno zastarelega modela (1980).

Ključne besede: poslovni model, model odličnosti, McKinsey 7S, poslovodska molekula, triangulacija teorij.

1 Uvod

Delovanje ljudi v organizaciji je učinkovito in uspešno le, če ga nekdo načrtuje, organizira (ureja), usmerja (vodi) in nadzira (meri). Lastniki (ustanovitelji, razpolagalci ipd.) pa ustanovijo organizacijo zato, da bi učinkovito in uspešno dosegala cilje skladno z njihovimi interesi. Da bi organizacija tako delovala, ji postavijo na čelo človeka, ki naj načrtuje, organizira, usmerja in nadzira delovanje drugih sodelavcev. Ta človek je menedžer (Biloslavo 2006, str. 18). Izbrati dobrega menedžerja pomeni izbrati podjetnega, sposobnega, treznega človeka, vrednega zaupanja – izbrati torej takšnega, ki ima primerno strokovno znanje, ki zmore voditi ljudi in je pokončen, verodostojen, pošten človek. Merila so jasna in utemeljena, izbira pa je zelo težavna. Med organizacijskimi procesi zagotovo ni najpomembnejši

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razmišljanje o identiteti in prihodnosti podjetja, vendar pa razprava o vrednotah, poslanstvu in viziji predstavlja pomemben okvir za razmišljanje o sedanjosti in usodi v prihodnje katerega koli podjetja.

Skupne vrednote, ki so za posameznika najbolj pomembne, so praviloma tudi najmanj uresničene. Tu se kaže največji izziv, ki se ga je menedžment pravzaprav dolžan lotiti. Poenotenje uresničitve posamezne skupne vrednote z njeno pomembnostjo za posameznika bi pomenilo poistovetenje s samo organizacijo oziroma večjo pripadnost tej, kar pa predstavlja prednost, ki jo organizacija lahko na tak način pridobi pred konkurenco.

Boljše možnosti za preživetje imajo podjetja, ki se znajo učinkovito učiti, spreminjati in prilagajati. Učinkovito prilagajanje okoliščinam se najlažje zgodi v podjetju, ki se zna spreminjati, a hkrati obdržati svoj notranji »kompas«. Od vsakega podjetja in njegovega menedžmenta je odvisno, ali bo vire iskalo v sebi ali pa mu bodo identiteto določali drugi, in od vsega tega je v veliki meri odvisna tudi prihodnost podjetja oziroma njegova odličnost. Osnovno gibalno večine podjetij ni proaktivno načrtovanje prihodnosti, pač pa reaktivno odzivanje na pretekle dogodke. To pomeni, da se s kratkoročnimi odločitvami le odzivajo na trenutne težave in istočasno zamujajo priložnost, da ustvarijo lastno prihodnost.

Primarna skrb menedžerjev je res oblikovanje strategije, strukture in sistemov kot trdih dejavnikov na poslovni poti uspešne organizacije, vendar se mora sleherni menedžer zavedati pomembnosti mehkih dejavnikov, kot so skupne vrednote, iskanje in odkrivanje spretnosti, ki jih imajo zaposleni, spoznavanje odnosov med sodelavci po vertikali in horizontali ter slog vodenja in delovanje vodilnih ter vodstvenih sodelavcev. Temeljna naloga menedžmenta je, da v razpravo o pomembnih vprašanjih vključuje vse deležnike, prav posebno mesto pa bi tu morali imeti zaposleni. Vključitev slednjih namreč najbolj pozitivno vpliva na njihov odnos do podjetja, vpliva tudi na ugodnejšo klimo v podjetju, večja njihovo pripadnost, zadovoljstvo in zvestobo podjetju. Vse to se odraža v večji zavzetosti za delo, od česar ima največ koristi spet podjetje. Vse to so pogoji, na osnovi katerih podjetje lahko izboljša kakovost in naredi korak naprej k odličnosti.

Temeljno raziskovalno vprašanje se nanaša na proučitev zadostnosti trenutnih sedmih gradnikov modela McKinsey 7S (struktura, strategija, sistemi, skupne vrednote, spretnosti, sodelavci in slog vodenja).

Namen raziskave je najti ključne razlike med posameznimi avtorji, ki so v svojih raziskovanjih uporabili model McKinsey 7S, ter vzroke zanje. Pomembnost raziskavi dajejo predlogi za izboljšanje modela, ki smo jih navedli ob koncu članka.

Glavna cilja, ki ju v raziskavi zasledujemo, sta proučitev znanstvene literature, člankov tujih in domačih avtorjev z najnovejšimi teoretičnimi spoznanji o modelu McKinsey 7S ter ugotovitve in izpostavitve nasprotujočih si zaključkov, do katerih so prišli avtorji člankov ob proučevanju modela McKinsey 7S.

2 Teoretična izhodišča

Doseganje čim večjega dobička je pogosto prvi cilj lastnika podjetja. Menedžment je pravzaprav prisiljen iskati najrazličnejše vzvode, s katerimi bi lahko zadovoljil vse deležnike pri poslovanju podjetja. Harner (2015, str. 509–527) v svojem članku ugotavlja vpliv mehkih spremenljivk na podjetje. Še posebno to velja za tista podjetja, pri katerih obveznosti družbe presegajo vrednosti njihovih sredstev.

Menedžment za lažjo presojo uspešnosti uporablja različne modele, kot so uravnotežen sistem meril po Kaplanu in Nortonu (1996, str. 2–61), Porterjev model petih silnic (E. Dobbs 2014, str. 32–45), benchmarking in še mnoge druge. Eden najpogostejše uporabljenih pa je model McKinsey 7S.

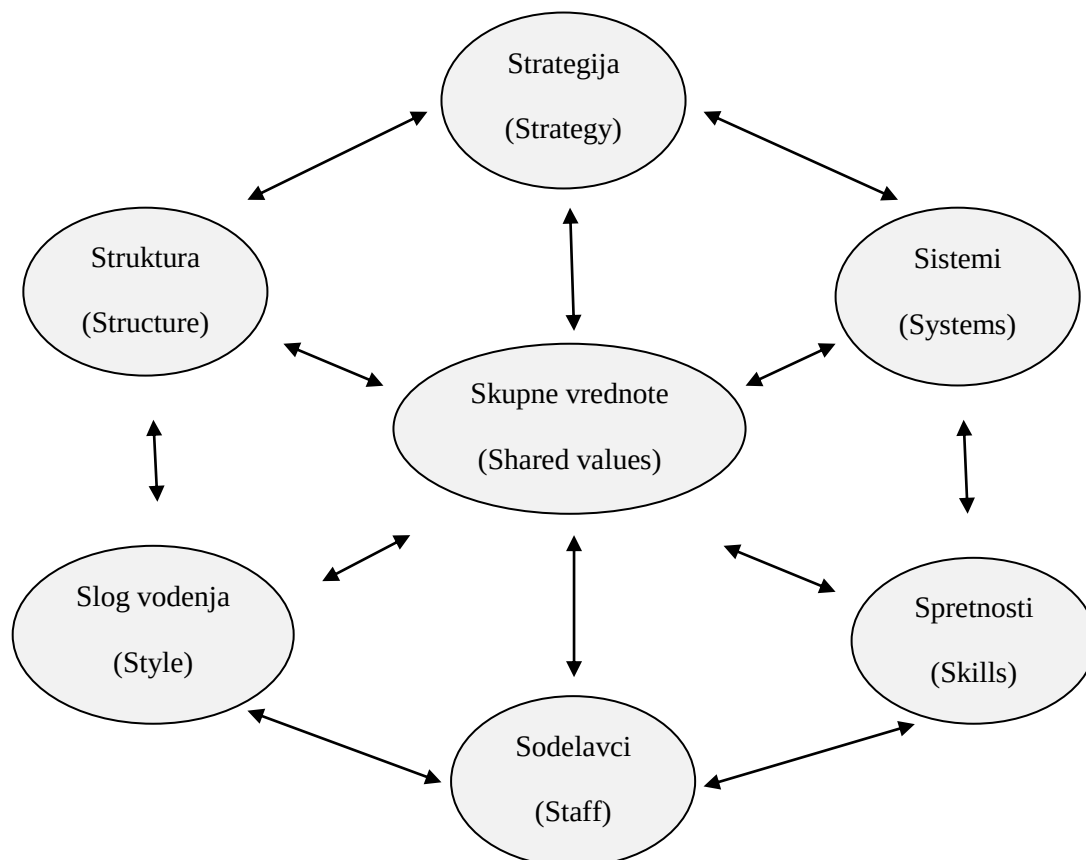
V nadaljevanju navajamo teoretična izhodišča in pregled literature.

Model McKinsey 7S, ki ga je ustvarila svetovalna družba McKinsey and Company, je bil ocenjen kot preprost poslovni model, saj se je vseh sedem spremenljivk začelo na črko s. Te spremenljivke so: struktura, strategija, sistemi, skupne vrednote, spretnosti, sodelavci in slog vodenja. Organizacije se običajno osredotočajo le na tiste spremenljivke, za katere čutijo, da jih lahko spremenijo (struktura, strategija in sistemi), medtem ko zanemarjajo druge spremenljivke. Te druge spremenljivke (skupne vrednote, spretnosti, sodelavci in slog vodenja) se štejejo za »mehke« spremenljivke (Singh 2013, str. 39; Palatková 2011, str. 44–54). Avtorji modela so zaključili, da sprememba vrednosti ene ali dveh spremenljivk ne more spremeniti uspešnosti organizacije, je pa lahko dobra popotnica na poti k odličnosti. Za dolgoročno korist je treba spremeniti vse vrednosti spremenljivke, da te v celoti delujejo kot sistem. Se pa nekateri avtorji nagibajo tudi k spremembi modela z novimi spremenljivkami, s čimer spreminjajo njegove parametre, vključujejo nove in izključujejo stare spremenljivke, ne glede na to, kakšne vrednosti dosegajo (Bhatti 2011, str. 52–59; Parker et al. 2013, str. 407–419).

Model zajema sedem spremenljivk, v prav vse spremenljivke pa je možno vključiti element inovativnosti, kar ga dela še posebej aktualnega (Taran, Boer & Lindgren 2015, str. 301–331).

Struktura je opredeljena kot ogrodje organizacije ali organizacijska shema. Avtorji opisujejo strategijo kot načrt ali potek dejavnosti pri dodeljevanju sredstev za doseganje opredeljenih ciljev v daljšem časovnem obdobju (Tice 2011, str. 24). Sistemi so celota medsebojno povezanih sestavin, ki omogočajo poslovni proces in pri tem v večji ali manjši meri vplivajo druga na drugo (Hanafizadeh & Ravasan 2011, str. 5–20). Istočasno je to tudi enota, ki je obdana z okoljem, s katerim jo prav tako v večji ali manjši meri povezujejo medsebojni vplivi. Skupne vrednote so spremenljivka, ki ima več pomenov in se nanaša na vse deležnike v organizaciji. Slog vodenja se nanaša na način obnašanja ključnih menedžerjev pri doseganju ciljev organizacije, torej na njihovo kulturo. Sodelavci so opisani kot posamezne kategorije v organizaciji (npr. vodstveni delavci). Spretnosti pa se nanašajo na znanje in sposobnosti zaposlenih v organizaciji kot celoti. Oblika modela, kot je prikazana v nalogi, je oblikovana

za ponazoritev medsebojnih odvisnosti spremenljivk. Model lahko imenujemo tudi »poslovodska molekula« (Hage et al. 2011, str. 448-454, Zmееv et al. 2013, str. 207-213). Nekateri strokovnjaki so sicer mnenja, da obstajajo še druge spremenljivke, ki bi morale biti ključnega pomena za upravljalce organizacij in njihove strokovne sodelavce, vendar pa avtorji modela menijo, da je prav vse možno zajeti v teh sedmih spremenljivkah (Peters, Waterman & Jones 1982, str. 53–56).



Slika 1. Model McKinsey 7S (Diniz, Katsioloudes & Fortunas 2006, str. 29).

Model sam pravzaprav predstavlja nam bolj znano merjenje organizacijske klime v podjetju. Zanj smo se, med drugim, odločili tudi zato, ker menimo, da so zadovoljni zaposleni ključni dejavnik, ki pripelje do zadovoljitve preostalih deležnikov v procesu poslovanja.

V nadaljevanju smo proučili različne avtorje, ki so v svojih raziskavah uporabili model McKinsey 7S.

Ena od spremenljivk, ki jo je možno dodati, je zunanje okolje (Kaplan 2005, str. 41–46). Ta spremenljivka v modelu McKinsey 7S ni zajeta, čeprav avtorji modela priznavajo, da to ne sme biti zanemarljivo, in trdijo, da v modelu pač nastopajo le najpomembnejše spremenljivke. Nekaj kritik modela se nanaša tudi na neupravičen izpad spremenljivke, ki meri zmogljivost oziroma učinkovitost organizacije, in ker ta v modelu ni samostojno izražena (Pascale & Athos 1981; Peters, Waterman & Jones 1982, str. 53–56). Namen raziskave je ugotoviti in

izpostaviti nasprotujoče si zaključke, do katerih smo prišli na osnovi proučevanja člankov različnih avtorjev, katerih raziskave so potekale na modelu McKinsey 7S.

V nadaljevanju navajamo pregled sedmih posameznih člankov, pri katerih smo proučevali značilnosti, ki se nanašajo na določeno populacijo oziroma vzorec. Velikost vzorca ob posamezni raziskavi je bila zelo različna: ena raziskava je zajemala vzorec 13 sistemov naročanja (Chong & Preece 2014, str. 5–20), ena raziskava je potekala v majhnem svetovalnem podjetju (Zhao & Choma 2012, str. 5–10), tri raziskave so bile narejene na vzorcu približno 50 anketirancev (Schroeder, Sorensen & Yaeger 2014, str. 335–364; Mithwani 2015, str. 185–200; Chiloane - Tsoka 2013, 15–24), ena na vzorcu 272 anketirancev (Kalan 2014, str. 67–70) in ena na vzorcu, večjem od 1000 anketirancev (Katz & Safranski 2003, str. 323–340).

V tem delu proučevanja smo pozornost usmerili v namen študije ter raziskovalna vprašanja, ki so jih avtorji navedli v svojih člankih.

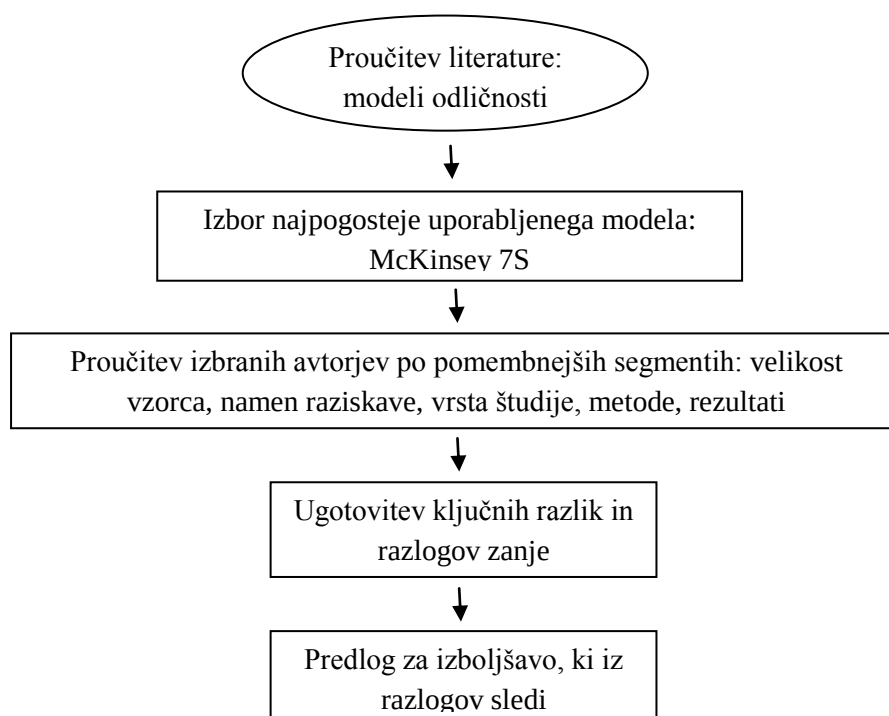
Avtorji so imeli različne namene, ki so bili osnova za njihovo raziskovanje.

Razmerja med organizacijsko kulturo in spreminjanjem organizacije je v svojem članku raziskovala Chiloane - Tsoka (2013, str. 15–24). Zhao in Choma (2012, str. 5–10) sta v članku želela prikazati nujnost razširitve proučevanega modela McKinsey 7S z zunanjo spremenljivko. Poleg modela McKinsey 7S je Mithwani (2015, str. 185–200) v svojo raziskavo vključil še dva druga modela, to sta Nortonov uravnotežen sistem meril in teorija nepredvidljivih dogodkov. Chong in Preece (2014, str. 5–20) sta v članku predstavila dopolnitve predhodnih študij, ki se niso usmerjale na različne prilagoditve modela. Identifikacijo strukturnih sprememb modela, ki izhajajo iz interakcije med podjetji in tehnologijo, sta v članku izvedla Katz in Safranski (2003, 323–340). Schroeder, Sorensen & Yaeger (2014, str. 335–364) so v študiji proučevali elemente modela McKinsey 7S in dodatne spremenljivke "Global Team Interaction". Najznačilnejše dejavnike modela McKinsey 7S, ki vplivajo na odličnost organizacije, pa je v raziskavi ugotavljala Kalanova (2014, str. 67–70).

V tem delu raziskave smo že prišli do ugotovitve, da so raziskave po proučevanem modelu potekale na izrazito različnih velikostih vzorcev (od 13 do 1055) in da so bili različni tudi nameni raziskovanja ter posledično raziskovalna vprašanja, ki so se na te namene nanašala. Iz navedenega lahko sklepamo, da so avtorji na zadostnost modela gledali iz različnih zornih kotov.

3 Metoda

Naša raziskava je temeljila na triangulaciji teorij različnih avtorjev, ki so proučevali model McKinsey 7S. Ta teoretični model v nadaljevanju prikazujemo tudi grafično.



Slika 2. Model triangulacije teorij poslovnega modela McKinsey 7S. (Vir: lastni)

V tem delu smo ugotovili, da so avtorji (Chiloane - Tsoka 2013, str. 15–24; Mithwani 2015, str. 185–200; Kalan 2014 str. 67–70) za pridobitev podatkov, na katerih so temeljile njihove raziskave, večinoma (trikrat) delali kvantitativne raziskave z anketno metodologijo, dvakrat so avtorji (Zhao & Choma 2012, str. 5–10; Chong & Preece 2014, str. 5–20) naredili kvalitativno raziskavo z intervjuji, enkrat je bila uporabljena mešana metoda, ki je v prvi fazi zajemala kvalitativno raziskavo, v drugi kvantitativno in v tretji še enkrat kvalitativno raziskavo (Schroeder, Sorensen & Yaeger 2014, str. 335–364), enkrat pa je raziskava temeljila na sekundarni analizi že zbranih podatkov (Katz & Safranski 2003, 323–340).

Tudi tukaj vidimo precej različne pristope ob raziskavah pri posameznih avtorjih. Različnost pa se je pokazala tudi v raziskovalnih metodah.

Chiloane - Tsoka (2013, str. 15–24) je najprej naredila pilotno raziskavo, na osnovi katere so bili narejeni popravki vprašalnika, sledila je kvantitativna raziskava zbranih podatkov, spremenljivke so bile merjene z uporabo petstopenjske Likertove lestvice. Podatke sta iz različnih virov zbrala Zhao in Choma (2012, str. 5–10). Z uporabo triangulacije metod in zbiranja podatkov (kvalitativna analiza je bila narejena na osnovi šestletnega opazovanja, polstrukturiranih intervjujev, ostali podatki pa so bili zbrani z neformalnimi pogovori in z mnenji, ki so jih podali opazovalci raziskave) sta se izognila pomanjkljivostim uporabe le ene metode ali le enega vira. Kvantitativno analizo je Mithwani (2015, str. 185–200) naredil v programu SPSS 22, opisni statistiki je sledila multivariantna linearna regresijska analiza, ki je preverjala zastavljen teoretski model. Vključitev podatkov na osnovi pregleda literature sta izvedla Chong in Preece (2014, str. 5–20), ki preučuje temeljne značilnosti raznovrstnih

organizacijskih oblik naročanja. Na teoretični ravni sta Katz in Safranski (2003, str. 323–340) predlagala prilagoditev McKinseyjevega modela 7S modelu 5S. Predlagani novi dejavniki so bili: standardi, velikost, hitrost, stanje in prodaja. Z metodologijo študije, ki predstavlja mešane metode (uporaba triangulacije metod), so Schroeder, Sorensen & Yaeger (2014, str. 335–364) poskušali doseči konvergenco okoli bistvenih elementov, ki pospešujejo ali zavirajo globalno učinkovitost hibridnih timov. Test zanesljivosti vprašalnika na izbranem vzorcu je avtorica (Kalan 2014, str. 67–70) naredila v prvi fazi, sledili so metoda glavnih komponent (veljavnost konstrukta), regresijska analiza in t-test. Empirični del je temeljil na kvantitativni raziskavi, v okviru katere je bila uporabljena statistična analiza primarnega vira pridobivanja podatkov – anketnega vprašalnika.

4 Rezultati

V naši raziskavi smo pričakovano prišli do različnih interpretacij avtorjev glede uporabnosti modela McKinsey 7S. Nekateri avtorji ugotavljajo, da v modelu manjkajo pomembne spremenljivke, drugi ugotavljajo, da je model zadosten, vse do zaključkov nekaterih, da je model McKinsey 7S celo preobširen.

V nadaljevanju navajamo najpomembnejše ugotovitve, do katerih so v svojih raziskavah prišli proučevani avtorji.

Chiloane - Tsoka je v članku (2013, str. 15–24) navedla, da je raziskava potekala na modelu McKinsey 7S. Njegovih sedem elementov je bilo neodvisnih spremenljivk, odvisna spremenljivka pa so bile organizacijske spremembe. Identifikacijo pomanjkljivosti McKinseyjevega modela in prilagoditev modela (Business Excellence and Sustainability Model) novemu modelu, ki je namesto iz sedmih notranjih vidikov ali elementov sestavljen iz štirih notranjih (namen, kultura, ljudje, sistemi in procesi) in enega zunanega vidika (odnosi z deležniki), ki je povezan z notranjimi, sta izvedla Zhao in Choma (2012, str. 5–10). Mithwani (2015, str. 185–200) je raziskavo izvedel na treh modelih, to so uravnotežen sistem kazalnikov, McKinsey 7S ter teorija nepredvidljivih dogodkov. Namen raziskave je bil proučiti izvajanje strategije kot odvisne spremenljivke v odnosu do treh neodvisnih spremenljivk, in sicer: komunikacije, sodelovanja vodilnih ter organiziranosti. V svojem zaključku raziskave pa sta Chong in Preece (2014, str. 5–20) poudarjala stopnjo skladnosti posamezne organizacijske oblike projektnega vodenja in sistema naročanja (povprečnina in tradicionalni način kot neodvisni spremenljivki), ki se ga organizacija poslužuje. Stopnjo skladnosti sta določila za vse trde vidike (strategija, struktura, sistemi) McKinseyjevega modela 7S, kot odvisne spremenljivke. Prilagoditev McKinseyjevega modela 7S in aplikacijo na e-poslovanje v članku sta zagovarjala Katz in Safranski (2003, str. 323–340), pri čemer sta predlagala nove elemente, kot so standardi, velikost, hitrost, stanje in prodaja. Schroeder, Sorensen & Yaeger (2014, str. 335–364) so v članku kot rezultat študije pokazali, da pogoji delovanja globalnega hibridnega tima (neodvisna spremenljivka) nakazujejo, kako globalno delovno vedenje vpliva na pospeševanje globalne učinkovitosti na vsakem od sedmih področij

McKinseyjevega modela 7S (neodvisne spremenljivke). V svoji raziskavi je avtorica (Kalan, 2014, str. 67–70) ugotovila, da povečanje vrednosti odvisne spremenljivke (skupne vrednote), ki je ena izmed sedmih spremenljivk modela, lahko povzročijo le neodvisne tri mehke spremenljivke modela (spretnosti, sodelavci in slog vodenja). Analiza je pokazala, da so vplivi vseh preostalih šestih spremenljivk (tri mehke in tri trde spremenljivke) modela pozitivni, skupne vrednote pa se povečujejo izključno zaradi vpliva treh mehkih spremenljivk.

V raziskavi smo se še posebno osredotočali na avtorjev izbor posameznih spremenljivk oziroma parametrov modela ter prišli do naslednjih ugotovitev:

- nekateri avtorji (Chiloane - Tsoka 2013, str. 15–24; Chong & Preece 2014, str. 5–20; Kalan 2014, str. 67–70) so v svojih raziskavah ugotovili popolno zadostnost modela McKinsey 7S; menijo, da tak, kot je, zadostuje za kakovostno raziskovanje;
- drugi avtorji (Zhao & Choma 2012, str. 5–10; Katz & Safranski 2003, str. 323–340; Schroeder, Sorensen & Yaeger 2014, str. 335–364; Mithwani 2015, str. 185–200) so v svojih raziskavah poudarjali, da je model McKinsey 7S nujno treba na novo opredeliti z drugimi spremenljivkami, oziroma ga kombinirati z drugimi modeli.

V nadaljevanju podrobneje navajamo ugotovitve ob proučevanju posameznih člankov. Najprej predstavimo avtorje, ki izhajajo iz vprašalnika ali posameznega segmenta vprašalnika McKinsey 7S, pri čemer sestavijo lasten model, ki je konflikten s predlaganim McKinseyjevim modelom 7S, saj so sestavni del modelov drugi elementi (Zhao & Choma 2012, str. 5–10; Katz & Safranski 2003, str. 323–340; Mithwani, 2015, str. 185–200).

Zhao in Choma (2012, str. 5–10) sta menila, da je v nasprotju s splošno sprejetim modelom McKinsey 7S struktura indeksov v modelu različna. Predvidevala sta namreč, da je v nasprotju s sedmimi dejavniki, ki se osredotočajo na kulturo znotraj organizacije. Identificirala sta pomanjkljivosti McKinseyjevega modela in predlagala prilagoditev modela (Business Excellence and Sustainability Model) novemu modelu, ki je namesto iz sedmih notranjih vidikov ali elementov sestavljen iz štirih notranjih (kultura, ljudje, sistemi in procesi) in enega zunanjskega vidika (odnosi z deležniki), ki je povezan z notranjimi. Enoto raziskovanja je predstavljalo malo svetovalno podjetje.

Internetna tehnologija je v razmahu in hitrem vzponu, kar sta zagovarjala tudi Katz in Safranski (2003, str. 323–340). Tej se je treba hitro prilagajati, zato sta predlagala aplikacijo prilagojenega modela 5S, ki vsebuje nekoliko drugačne elemente, prilagojene internetni ekonomiji (standardi, velikost, hitrost, stanje in prodaja). Avtorja nista izhajala iz lastne raziskave, temveč sta poskušala na teoretični ravni in s sekundarnimi podatki pokazati, da je za uspeh podjetja pomembno sledenje in hitra prilagoditev spreminjajoči se tehnologiji ter specifična organizacija podjetja, skladna s standardi in sodobnimi načini prodaje.

Schroeder, Sorensen & Yaeger (2014, str. 335–364) so preučevali možnost adaptacije modela 7S delovanju globalnih timov v multinacionalkah. Predlagali so načine delovanja, ki izhajajo iz modela 7S, kjer je dodana še komponenta globalnega sodelovanja. Izhajajoč iz modela 7S

so izluščili načine delovanja, ki so značilni za globalne hibridne time: strategija – globalna usklajenost, struktura – globalna podpora, sistemi – učinkovite rešitve za neglobalne sisteme, skupne vrednote – zavezanost k rezultatom, učinkovit način vodenja tima, jasen namen in spretnosti članov tima, raznovrstni profil zaposlenih in jasnost delovnih nalog, učinkovitost globalnega tima in ritem sestankov. Naloga tima je izvrševanje temeljnih delovnih procesov, ki so ključnega pomena za uspeh organizacije ter trajnostni obstoj. Članek je metodološko zelo razvejan, saj je zbiranje podatkov potekalo v treh fazah in temeljilo pretežno na poglobljenih kvalitativnih analizah. Avtorji so soglašali z ustreznostjo modela 7S, ki so ga aplicirali tudi na način delovanja organizacije in v tem so našli vzporednice.

Namen raziskave, ki jo je izvedel Mithwani (2015, str. 185–200), je bila proučitev izvajanja strategije kot odvisne spremenljivke v odnosu do treh neodvisnih spremenljivk, in sicer: komunikacije, sodelovanja vodilnih ter organiziranosti. S pomočjo regresijske analize je preverjal ustreznost predlaganega teoretskega modela. Raziskavo je zaključil z ugotovitvijo, da pripadnost menedžmenta in organizacijska struktura igrata ključno vlogo v procesu implementacije strategije. Avtor je menil, da en sam model (McKinsey 7S) ni zadosten, zato je raziskavo izvedel na treh modelih: uravnotežen sistem kazalnikov, McKinsey 7S ter teorija nepredvidljivih dogodkov.

V nadaljevanju sta predstavljena dva članka, ki soglašata z avtorji modela McKinsey 7S in ga uporabita kot izhodišče za potrjevanje lastnih domnev in dognanj.

Hierarhično kulturo kot prevladujočo organizacijsko kulturo v obravnavani organizaciji je v članku raziskovala Chiloane - Tsoka (2013, str. 15–24). Hierarhična kultura je zato manj dovzetna do sprememb v organizaciji. Organizacijska kultura igra pomembno vlogo pri spremembah v organizaciji. Od organizacijske kulture je namreč odvisno, kako dojemljivi so delavci do sprememb, zato lahko potrdimo povezanost med organizacijsko kulturo in spremembami v organizaciji. Raziskava je potekala na modelu McKinsey 7S, katerega elementi so bile neodvisne spremenljivke ter organizacijske spremembe, ki je bila odvisna spremenljivka. Študija je pokazala tudi, da imajo različne organizacijske strukture različne ravni dojemanja organizacijskih sprememb. Avtorja je bil mnenja, da je bil model McKinsey 7S primeren model za navedeno raziskavo, katere vzorec je bil $n=50$, narejena pa je bila kvantitativna raziskava z anketno metodologijo.

Na stopnjo skladnosti posamezne organizacijske oblike projektnega vodenja in sistema naročanja (povprečnina, tradicionalni način), ki se ga organizacija poslužuje, sta opozarjala Chong in Preece (2014, str. 5–20). Stopnjo skladnosti sta določila za vse trde vidike (strategija, struktura, sistemi) McKinseyjevega modela 7S in za skupne vrednote. Ugotovila sta, da ima sistem naročanja višjo stopnjo skladnosti pri nehierarhičnem načinu projektnega vodenja, medtem ko ima tradicionalni sistem naročanja višjo stopnjo skladnosti pri hierarhičnem načinu projektnega vodenja. Avtorja sta v svoji raziskavi primerjala 13 sistemov naročanja v različnih podjetjih. Narejena je bila kvalitativna študija (implikacije za menedžerje) na ravni teorije.

Članku dodajamo rezultate lastne raziskave, ki smo jo prav tako naredili na modelu McKinsey 7S.

Avtorica (Kalan 2014, str. 67–70) je v lastni raziskavi ugotovila, da so vse spremenljivke v modelu McKinsey 7S potrebne. Za vsak sklop vprašanj (struktura, strategija, sistemi, spretnosti, sodelavci, stil vodenja, skupne vrednote) je bila izvedena analiza zanesljivosti (Cronbachov koeficient alfa) in veljavnosti konstrukta (faktorska analiza) ter na tako dobljenih konstruktih še regresijska analiza z metodo »Backward«. Vsi rezultati so kazali na visoko veljavnost in zanesljivost konceptov v modelu. Regresijska analiza je pokazala, da imajo največjo težo pri pojasnjevanju skupnih vrednot ravno mehki vidiki organizacije, kot so spretnosti ($\beta=0,281$, $p=0,000$), sodelavci ($\beta=0,227$, $p=0,006$) in stil vodenja ($\beta=0,213$, $p=0,005$). Kakovost modela se z izključitvijo ostalih dejavnikov bistveno ne izboljša, kar nakazuje na dejstvo, da so vsi členi v modelu McKinsey 7S potrebni. S šestimi neodvisnimi spremenljivkami pojasnimo 37,2 odstotka variiranja skupnih vrednot. Populacija so bili vsi zaposleni v RS, vzorčni okvir je znašal 700 anketirancev, vzorec je zajel 272 v celoti izpolnjenih vprašalnikov. Kvantitativna študija je bila izvedena z anketno metodologijo.

Ob zadnjih treh člankih je treba poudariti, da se raziskave ključno razlikujejo v velikosti vzorca (Chiloane - Tsoka 2013, str. 15–24: $n=50$ in Chong & Preece 2014, str. 5–20: $n=13$; Kalan 2014, 67–70: $n=272$), delno pa tudi v načinu raziskovanja (Chiloane - Tsoka 2013, str. 15–24: kvantitativna raziskava z anketno metodologijo; Chong & Preece 2014, str. 5–20: kvalitativna študija na ravni teorije; Kalan 2014, str. 67–70: kvantitativna raziskava z anketno metodologijo).

V spodnji tabeli so tabelarično prikazani velikost vzorca, metoda in rezultat za posamezne članke, ki so bili izbrani za raziskavo.

Tabela 1. Prikaz velikosti vzorca in izbrane metode

Avtor	Vzorec	Metoda	Rezultati
Chiloane - Tsoka (2013)	$n=50$	kvantitativna študija	popolna zadostnost modela
Zhao & Choma (2012)	malo svetovalno podjetje	študija primera	redefiniraje z drugimi spremenljivkami oziroma kombinacija z drugimi modeli
Mithwani (2015)	$n=40$	kvantitativna študija	redefiniraje z drugimi spremenljivkami oziroma kombinacija z drugimi modeli
Chong & Preece (2014)	$n=13$	kvalitativna študija	popolna zadostnost modela
Katz & Safranski (2003)	$N=1055$	sekundarna analiza sumarnih podatkov	redefiniraje z drugimi spremenljivkami oziroma kombinacija z drugimi modeli
Schroeder, Sorensen & Yaeger (2014)	$n=51$	triangulacija metod: kvalitativna, kvantitativna, kvalitativna	redefiniraje z drugimi spremenljivkami oziroma kombinacija z drugimi modeli
Kalan (2014)	$n=272$	kvantitativna študija	popolna zadostnost modela

5 Razprava

Nekateri avtorji dokazujejo, da model ni ustrezen, zato ga dopolnjujejo z dodatnimi spremenljivkami ali modeli, menjajo spremenljivke z drugimi, ki se jim zdijo ustreznejše. Spet drugi avtorji ugotavljajo, da je ta model ustrezen in z izbranimi spremenljivkami zagotavlja zanesljivost in veljavnost izvedenega konstrukta. Slednje smo potrdili tudi z lastno raziskavo.

Splošni namen članka je raziskati možnost napredka sodobne organizacije, ki za doseg svojih ciljev uporablja različna sredstva in prijeme. V mnogih organizacijah prav zaradi formalne moči menedžmenta, lastnikov, delničarjev in ustanoviteljev v ospredje postavljajo »trde dejavnike« (struktura, strategija in sistemi). Na drugi strani pa je uspešnost organizacije v veliki meri odvisna od tradicionalno manj vključenih zaposlenih, potrošnikov in partnerjev v neposredno odločanje, na katere pa lahko vplivamo le z »mehkimi dejavniki« (skupne vrednote, spretnosti, sodelavci in slog vodenja).

Razlike med članki so prisotne v preučevanju različnih ciljnih populacij, v velikosti vzorca, v načinih reševanja problematike, v metodah zbiranja in metodologiji obdelave podatkov (nekateri avtorji v raziskavah in poročilih uporabljajo intervjuje, drugi statistične baze, ankete, arhive itd.). V člankih so uporabljeni različni vidiki obravnave problematike, od širokega pregleda teorije do podrobnega pregleda posamezne specifikke, ki jo lahko pripisujemo tudi lokaciji izvedbe raziskave. Do razlik med članki prihaja zaradi različnih metodologij obravnave problema, posledično so raziskovalci naredili različne izpeljave osnovnega modela McKinsey 7S v različne aplikacije zaradi različnih vzorcev ter dodajali relevantne gradnike modela. Na osnovi primerjave člankov smo dobili pregled nad pestrim raziskovalnim področjem, kar smo predstavili v poglavju material in metode. Rezultate omenjenih raziskav smo nadalje primerjali. Raziskave se večinoma nanašajo na tri ločene segmente: razširitve modela, alteracijo (spremembo, menjavo) modela in kritiko trenutnega modela. Razširitve v glavnem narekujejo dodajanje novih gradnikov ali delov modela ali kombinacijo z drugimi modeli. Glede na delno zastaranje omenjenega modela (1980) avtorji narekujejo potrebo po posodobitvi in aplikaciji na sodobne oblike uporabe internetne tehnologije poslovanja. Med drugim opozarjajo, da kulturne razlike lahko pripeljejo do različnih zaključkov. Predvsem se podjetja v razvitejših področjih razvijajo z drugačnim tempom in dinamiko kot periferija, kar prispeva k razvoju heterogenih modelov poslovanja.

Naše hipoteze v raziskavi torej ne moremo niti potrditi niti zavreči, saj polovica avtorjev meni, da je model zadosten, druga polovica pa, da ga je treba posodobiti.

Iz vsega navedenega smo izoblikovali lastno mnenje, ki govori v prid avtorjem, ki menijo, da je model zadosten. To smo namreč potrdili tudi v lastni raziskavi. Se pa strinjamo tudi z drugo polovico, ki meni, da je v prihodnosti model treba posodobiti, saj je nastal že leta 1980.

6 Zaključek

Namen članka je bil ugotoviti razlike v raziskovanju posameznih avtorjev ter najti vzroke zanje. Avtorji so v svojih raziskavah prišli do različnih ugotovitev glede uporabe modela in njegovih najznačilnejših spremenljivk. Razlike med posameznimi članki je zaznati v vseh segmentih raziskovanja: v velikosti vzorca, namenu raziskave, raziskovalnih vprašanjih, v metodah zbiranja in metodologiji obdelave podatkov.

Znanstveni prispevek tega članka temelji na pripravi zadnjega aktualnega pregleda spoznanj o poslovnem modelu McKinsey 7S, primerjavi med posameznimi članki ter predstavitvi lastne kvantitativne raziskave o vplivnih dejavnikih modela na skupne vrednote zaposlenih v podjetjih v Sloveniji. Članek tudi predstavi model McKinsey 7S na primerno celovit način in v luči, ki je do sedaj ni obravnaval še nihče, kar pomeni, da je bilo v svetovni znanstveni literaturi to še neraziskano področje.

Omejitve raziskave vidimo predvsem v veliki različnosti vhodnih podatkov (velikost vzorca, vrsta študije, namen raziskave), saj se ti nanašajo na potrebe in želje avtorjev.

Z narejeno analizo smo prišli do spoznanja, da je model možno razvijati tudi v prihodnje. Iz vsega navedenega bi želeli poudariti predvsem ključen vpliv mehkih dejavnikov modela, kar se nanaša na socialno odgovornost do vseh deležnikov podjetja ter vključitev gradnikov, ki bi model posodobili v smislu elektronske uporabe, s čimer bi pokazali večjo odgovornost do okolja. To pomeni, da je na tem področju odprtih še veliko možnosti za nova znanstvena dognanja.

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Abstract:

Triangulation of theories on the excellence of the McKinsey 7S business model

Research question / Hypothesis (RQ): The study was based on identifying key differences between individual authors, who used the McKinsey 7S model in their researches.

Purpose: The purpose of this study was to identify and highlight the conflicting conclusions, which we got on the basis of studying articles by various authors, whose studies were carried out with the McKinsey 7S model.

Method: The methodology of our study was based on a triangulation of various authors, whose studies were carried out with the already mentioned business model. We also identified the methodology of studies from individual authors.

Results: In our research, we got the expected different authors' interpretations, concerning the applicability of the McKinsey 7S business model. Some authors note that the model lacks on important variables or that some of them need to be replaced, but then again, other say that the model is sufficient and not to be changed.

Organization: The analysis shows that the effectiveness of the organization largely depends on the traditionally less involved employees, consumers and partners in the direct decision-making, which can only be influenced by »soft indicators«.

Company: The inclusion of the model's soft factors presents the key impact on the company, which relates to the social responsibility to all company's stakeholders, as well as the inclusion of cornerstones, which would update the model in terms of electronic use, in order to show the responsibility towards the environment.

Originality: We prepared the latest overview of the findings, based on the studied literature and resources in the field of the McKinsey 7S business model. The research of theories was substantiated with our own research on the influential factors of the model; we presented the McKinsey 7S model in an appropriate comprehensive manner, in a way that has not been dealt with up till now and which is an unsearched field in the world scientific literature.

Limitations / further research: Limitations in this research present the differences between individual articles, due to the different purposes, methodologies and research questions of their research. Suggestions for further research are related in particular to the update of the relatively outdated model (1980).

Keywords: business model, model of excellence, McKinsey 7S, management's molecule, triangulation of theories.