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Оригинални научни рад

Original scientific article

The influence of corporate social responsibility on organizational performance: a research in AP Vojvodina¹

Утицај корпоративне друштвене одговорности на организационе перформансе: истраживање у АП Војводини

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Abstract: The goal of the research was to explore and determine the relationships between CSR related to employees and business and environmental performance. The authors conducted field research on the territory of Autonomous Province of Vojvodina, Republic of Serbia in the period from October 2019 until the end of March 2020 to collect the data from business organizations on their CSR activities and organizational outcomes. The research is conducted as a part of a one-year research project funded by the Provincial Secretariat for Higher Education and Scientific Research of Autonomous Province of Vojvodina for 2019. To explore these relations, there has been performed PLS analysis in the statistical software Smart PLS 3.

Keywords: corporate social responsibility, employees, financial performances, environmental performances

JEL classification: M14, O15

¹ This paper is a part of the research project "Effects of corporate social responsibility in the field of human resources management on the performance and sustainability of organizations" financed by the Provincial Secretariat for Higher Education and Scientific Research of Autonomous Province of Vojvodina, Republic of Serbia. Project Number: 142-451-2482/2019-03.

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Сажетак: Циљ истраживања био је утврђивање релација између КДО праксе која се односи на запослене и пословних перформанси и перформанси које се односе на заштиту животне средине. Аутори су спровели теренско истраживање на територији Аутономне покрајине Војводине, Република Србија, у периоду од октобра 2019. године до марта 2020. године, како би прикупили податке пословних организација о њиховим КДО активностима и организационим резултатима. Истраживање је спроведено у склопу једногодишњег пројекта који је финансиран од стране Покрајинског секретаријата за високо образовање и научноистраживачку делатност Аутономне покрајине Војводине у 2019. години. Како би се истражиле наведене релације, аутори су применили ПЛС анализу у статистичком софтверу Смарт ПЛС верзија 3.

Кључне речи: корпоративна друштвена одговорност, запослени, финансијске перформансе, еколошке перформансе

JEL класификација: M14, O15

Introduction

Modern business is constantly changing due to new challenges and risks related to the wider business environment, such as economic and political instability, strong competitiveness in business, rapid technological innovations, new migration issues, aging as social phenomena, strong environmental concerns, ethical questions, etc. All of the above mentioned direct companies to take into account new ideas and activities that they did not perform earlier.

A business concept that is usually mentioned as a possibility to balance between all-important business issues is corporate social responsibility (CSR). It is widely accepted in modern business and scientific literature as a business concept that “allows the balance between economic, social and environmental goals, it is widely accepted business practice in the developed countries of the world” (Berber et al., 2019, p. 2), and brings benefits to the company and the wider community (Čelić, 2019). CSR is increasingly present as a topic in research worldwide, especially in research on relations between CSR and other business activities or outcomes, such as employees behavior (Collier & Esteban, 2007; Turker, 2009a; Lee et al., 2013; Gao & He, 2017), financial performances (Mishra & Suar, 2010; Saeidi et al., 2015; Cho et al., 2018; Ali et al., 2020), environmental performance of companies (Tang & Tang, 2012; Nazari et al., 2017; Chuang & Huang, 2018), etc. Also, CSR is seen as a very complex construct that can be created from different aspects. For this research the authors chose responsibility for employees as one very important dimension, which is usually present in this type of research (Turker, 2009b; Fatma et al., 2014; Saedi et al., 2015; Ko et al., 2019) to explore business and environmental performances. This is important since Brammer and Millington (2008) and Meier et al. (2019) pointed out that more research needs to focus on specific dimensions of CSR.

For this study, the authors made research into the relations between CSR (dimension related to the employees) and financial and environmental performances. The main goal of the research was to determine the relationships between CSR related to employees and business and environmental performances. The authors conducted

field research on the territory of Autonomous Province of Vojvodina, Republic of Serbia in the period from October 2019 until the end of March 2020 to collect the data from business organizations on their CSR activities and organizational outcomes.

1. Theoretical background

According to Sekulić and Pavlović (2018, p. 61) “socially responsible behavior of companies is reflected in their adoption and realization of discretionary business practice and investments that provide support to the community to improve its well-being and environmental protection”. CSR is usually seen as a formative contract that is created from different dimensions. Those dimensions are derived from past researches, and the most prominent are economic, legal, ethical, and discretionary expectations (philanthropic) (Lee et al., 2013; Saeidi et al., 2015) or customers, employees, shareholders, environment, market, community, etc. (Turker, 2009b; Fatma et al., 2014).

One of the most important parts of social responsibility is environmental responsibility. It is even seen as a part of the green economy (Munitlak-Ivanović et al., 2018). Greening any business sector involves efficiency improvements in energy, water, and waste systems, which saves money and prevents pollution and lead to other benefits, like health, liability as well as a public image (Gavrilović & Maksimović, 2018, p. 37). According to Radivojević et al. (2019) “environmental sustainability as a crucial element of sustainable development occupies a central place in considering the long-term perspective of human survival and progress” (p. 473).

Also, one more important responsibility dimension is related to employees. The human capital of a firm is recognized as one of the most important resources for modern business (Collier & Esteban, 2007; Kordić & Milićević, 2018; Meier et al., 2019; Bogićević-Milikić, 2019). Social responsibility to employees involves different activities inside human resource management (HRM) like communication and information flow, fair and adequate training and development, empowerment of employees, looking after the health and well-being of employees, balance of working and family life and concern for the safety of the workplace (Berber et al., 2014). Slavković & Slavković (2019) pointed that training and development are related to the permanent acquisition of new knowledge and skills, as a necessary basis for the development and survival of the society (p. 116).

A third important dimension of CSR is economic results. Since CSR is seen as a concept that balances economic, social, and environmental performances and goals, it is important to mention this dimension, too. Economic goals in the area of CR research are usually presented as different financial and non-financial results that should be reached every year. The most common are return on assets (ROA), return on equity

(ROE), an increase in business revenue, profit, sales, level of production and productivity, market share, etc. (Saeidi et al., 2015; Blasi et al., 2018).

1.1. Hypotheses development

For this research, the authors chose responsibility for employees as one very important dimension that is usually present in this type of research (Turker, 2009b; Chen and Wang, 2011; Ko et al., 2019) to explore with business and environmental performance.

According to Meier et al. (2019), there is a positive, but nonlinear relation between sustainable HR practices and financial performance. This research was based on 591 European companies and 1405 firm-year observations. Also, Chen and Wang (2011) found that there are positive relations between CSR and financial performance, and especially between CSR dimensions related to employees and performance. They explored 204 employee samples through exploratory factor analysis. Blasi et al. (2018) explored the sample of 988 US-based companies from nine different sectors. They found positive, relations between CSR dimensions that are related to employees and ROA indicators. In a sample of 191 companies listed on the Korean Stock Exchange, Cho, Chung, and Young (2019) investigated the relationship between CSR and profitability and firm value. They found that employees dimension of CSR is also positively correlated with ROA and growth rate in sales revenue. Regarding environmental performance, Berber et al. (2019) pointed out that there are positive correlations between the existence of a human resources strategy and CSR statements with the environmental performance levels of the organization. Walsh and Sulkowski (2010) found that there is a significant positive relationship between employee satisfaction and the level of perceived environmental performance. Also, based on the data from 183 supervisor-subordinate dyads employed in casinos and hotels in Guangdong China and Macau, Tian and Robertson (2019) found that employees' CSR perceptions indirectly affect their engagement in voluntary pro-environmental behavior through organizational identification. Based on the abovementioned, the authors proposed two hypotheses:

H1: CSR to employees is positively related to financial performance.

H2: CSR to employees is positively related to environmental performance.

2. Methodology

The main goal of the research was to explore and determine the relationships between CSR related to employees and business and environmental performance. The authors conducted field research on the territory of Autonomous Province of Vojvodina, Republic of Serbia in the period from October 2019 until the end of March 2020 to collect the data from business organizations on their CSR activities and organizational outcomes. The research was conducted as a part of the one-year research project funded by the Provincial Secretariat for Higher Education and Scientific Research of

Autonomous Province of Vojvodina for 2019. The authors used a questionnaire that was developed based on different previous research (Rettab et al., 2009; Turker, 2009b; Saedi et al., 2015). There are three parts of the questionnaire; the first part is related to the organizational details of the company, the second part contains questions on CSR, and the third part is related to the question about organizational outcomes. For this paper, the authors explored the relation between CSR dimension that is related to employees and two organizational performance indicators, financial and environmental performance. For example, questions regarding employees' dimension were: "Do you treat all employees fairly and respectfully, regardless of gender or ethnicity", "Do you provide all employees with pay according to their workload", "Do you support all employees who want to continue their education and develop their careers", "Do you help all employees coordinate their personal and professional lives", "Do you involve the interests of employees in business decisions". All the questions were defined as closed questions, and responses possibilities were based on the Likert scale from 1 (not at all) to 5 (to a great extent).

According to the data, the sample consists of 53 large companies that operate on the territory of AP Vojvodina, with more than 250 employees, mostly from the processing industry (35,8% of the sample), which are in private ownership, with 66% national companies and 34% foreign companies (subsidiaries). The average number of employees is 773. To explore these relations there has been performed PLS analysis in the statistical software Smart PLS 3.

3. Results

The first parts of the results are data related to the measurement of the reflective constructs in the model. For this type of measurement Grubor et al. (2018) and Hair et al. (2019) suggest analyzing reflective indicator loadings, internal consistency reliability, convergent validity, and discriminant validity. The first table presents the results for reflective factor loadings. In the first step, some variables did not pass this test, since their loadings were below 0.708, and they were extracted from the later analysis (variables Emp1, EnvP1 and EnvP2, and Fin4 and Fin5. In the second step, it is clear from Table 1 that all factors had loadings higher than the thresholds of 0.708 (which is the minimum according to Hair et al., 2019).

Table 1: Indicator reliability and construct reliability and validity

	Employee_CSR	Envi_Perf	Fin_Perf	Cronbach's Alpha	Composite Reliability	AVE
Emp2	0.863			0.912	0.938	0.792
Emp3	0.868					
Emp4	0.922					
Emp5	0.904					
EnvP3		0.947		0.890	0.948	0.901
EnvP4		0.951				

Fin1			0.846	0.866	0.906	0.707
Fin2			0.824			
Fin3			0.838			
Fin6			0.855			

Source: Authors' research

Table 1 also presents internal consistency reliability and convergent validity, measured by Cronbach's Alpha, Composite Reliability, and average variance extracted (AVE). According to the data, internal consistency and convergent validity are satisfied for all three reflective constructs (Cronbach's Alpha between 0.70-0.90, max 0.95; Composite reliability between 0.70 and 0.95; AVE $\geq$ 0.50). In the case of discriminant validity, there were performed Fornell-Larcker criterion and Heterotrait-Monotrait Ratio (HTMT). Discriminant validity means that each construct captures a unique phenomenon not represented by any other construct in the model (Hair et al., 2017). In both tests, all constructs reached suggested thresholds (HTMT < 0.90), from Table 2.

Table2: Discriminant Validity - Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT)

Fornell-Larcker			
	Employee CSR	Envi Perf	Fin Perf
Employee CSR	0.890		
Envi Perf	0.633	0.949	
Fin Perf	0.403	0.572	0.841
HTMT			
	Employee CSR	Envi Perf	Fin Perf
Employee CSR			
Envi Perf	0.701		
Fin Perf	0.425	0.637	

Source: Authors' research

The multicollinearity analysis showed that all variance inflator factors did not surpass the value of 5, which points to the Colinearity issues (Hair et al., 2019). The final part of the analysis was to explore the relations between CSR dimension related to employees, financial performance and environmental performance. The data from Table 3 and Figure 1 show coefficients for PLS-SEM relations, their significance level, and the R2 value. The R2 value is 0.401 for environmental performance and 0.162 for financial performance. This indicates that the independent variable explains 40.1% of the variance in the environmental performance and 16.2% of the variance in the financial performance.

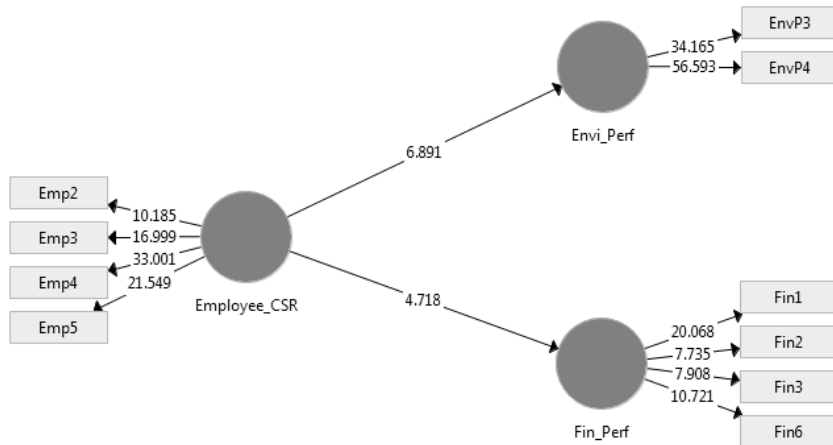
Table 3: Mean, STDEV, T-Values, P-Values

	Original Sample	Sample Mean	SD	R2	T Statistics	P Values
Employee CSR -> Envi Perf	0.633	0.638	0.092	0.401	6.891	0.000
Employee CSR -> Fin Perf	0.403	0.438	0.085	0.162	4.718	0.000

Source: Authors' research

All coefficients representing the relationships between the reflective constructs, independent and dependents are positive and statistically significant with $p < 0.01$ (Table 3). Its values were recorded, 0.633 with environmental performance and 0.403 with financial performance.

Figure1: The path model with bootstrapping results



Source: Authors own research

Conclusion

CSR is becoming increasingly important for business organizations. It is clear that this is going to become a standard in business, having in mind that EU commission created a certain number of directions, there is already presented ISO standard 26000 related to the social responsibility, and also many other benefits that CSR can bring to the business and wider community and environment. Also, the Sustainable Development Goals Report 2018 promoted 17 sustainable goals, where the third goal is to ensure healthy lives and promote well-being for all at all ages (births attended by skilled health personnel increased globally) (Radukić et al., 2019, p. 11).

Based on the results of this research, the authors confirmed both hypotheses, that CSR activities related to employees have positive and significant relations with financial results and environmental performance. The results of this research are in the line with previous, where it has been found positive relations with financial performance (Chen & Wang, 2011; Saedi et al., 2015; Meier et al., 2019) and with environmental financial performance (Chen et al., 2015; Ağan et al., 2016). This means that companies should deeply explore the HRM activities that are recognized as socially responsible, like action programs to improve the participation of marginalized groups in the workforce, flexible time management and job rotation, profit sharing, and

employee share ownership (Berber et al., 2019b), communication and information flow, better-defined training needs, empowerment of employees, looking after the health and well-being of employees, balance of working and family life and concern for the safety of the workplace (Berber et al., 2014). Implementation of such activities inside business strategies can improve employees' wellbeing, their commitment, loyalty to the company, their performance, and on that basis, the overall organizational performance.

Although the authors found statistically significant relations, there are some limitations to the research. The first and most important is a relatively small sample. Also, only one dimension of the CSR was used in the analysis, so it will be interesting to explore the full CSR index and its associations with the outcomes. These two limitations will be improved in the future since the authors are planning to enlarge the sample and to create structural models with different constructs to explore the proposed relations.

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Influence of country of origin image on brand equity of consumers in Bosnia and Herzegovina: the case of smartphone market

Утицај земље порекла на имовинску вредност бренда код потрошача у Босни и Херцеговини: пример тржишта паметних телефона

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Abstract: Consumers pay attention to the country of origin when purchasing imported products and believe that it has a significant impact on the formation of consumer attitude towards branded products. Competition among global smartphone brands is an intense, efficient and effective branding strategy, an important prerequisite for accelerating market growth and gaining a competitive market position. The purpose of this paper is recognized in assessing the impact of country of origin image, perceived quality, brand associations and brand loyalty on the consumer-based brand equity (CBBE) formation process, as exemplified by two global smartphone brands, Samsung and Huawei in Bosnia and Herzegovina. For the purposes of the study, a survey was conducted using a questionnaire on a sample of 315 respondents. The survey results indicate that country of origin image and perceived quality play a more important role in buyers in Bosnia and Herzegovina for Chinese (Huawei) than South Korean (Samsung) smartphones. This suggests that buyers from Bosnia and Herzegovina are paying more attention to the quality of Chinese compared to South Korean smartphones.

Keywords: country of origin, consumer-based brand equity, perceived quality, brand associations, smartphone, Bosnia and Herzegovina

JEL classification: M15, M31

Сажетак: Потрошачи посвећују пажњу земљи порекла код куповине увозних производа те сматрају да она има значајан утицај на формирање потрошачког става према брендирањем производима. Конкуренција међу глобалним брендovima паметних телефона је интензивна, па је ефикасна и ефективна стратегија брендирања важан предуслов за убрзани раст тржишта и стицање конкурентног тржишног положаја. Циљ овог рада препознат је у процени утицаја имиџа земље порекла, перципираног квалитета, асоцијација на бренд и лојалности бренду на процес формирања имовинске вредности бренда засноване на потрошачу, посматрано на примеру два глобална бренда паметних телефона, Самсунг и Хуавеј на подручју Босне и Херцеговине. За потребе рада спроведено је истраживање коришћењем анкетног упитника на узорку од 315 испитаника. Резултати истраживања указују да имиџ земље порекла и перципирани квалитет имају важнију улогу код купаца у Босни и Херцеговини за кинески (Хуавеј) у односу

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на јужнокорејски (Самсунг) паметни телефон. То сугерише да купци из Босне и Херцеговине посвећују више пажње квалитету кинеских у односу на јужнокорејске паметне телефоне.

Кључне речи: земља порекла, имовинска вредност бренда заснована на потрошачу, перципирани квалитет, асоцијације на бренд, паметни телефон, Босна и Херцеговина.

JEL класификација: M15, M31

Introduction

In today's globalized market, consumers face an increasing supply of products, while businesses are under competitive pressure from domestic and global branded products. In such business conditions, it is necessary for companies to create adequate brand equity by forming a basis for enhancing competitive differentiation and gaining competitive advantage in the market. Consumer-Based Brand Equity (CBBE) is critical to managing a product, differentiating a brand, evaluating brand performance and maintaining a recognizable image in the market and in consumer awareness (Gluhović, 2014, p. 57). Consumers are strongly influenced by the brand when it comes to product selection. A strong and clear brand image instills greater confidence when shopping. In addition, the branding strategy should be a connective tissue that intertwines the brand image and reflects the brand value. An effective branding strategy should elicit and create distinctive linkages between the brand and the target consumers, seeking to maintain, enhance and shape, for the interests of the business, appropriate consumer behavior over the long term, ultimately resulting in greater consumer-based brand value (Keller, 2013). When a consumer decides to buy an imported product, they usually consider and evaluate two types of stimuli. Consequently, we can define stimuli as information stimuli that are available to consumers before purchase, distinguishing external and internal. Consumers evaluate internal stimuli (taste, design or components of a product) and / or external stimuli (brand, price, country of origin - COO) as they make their purchasing decisions. In the buying decision process, when consumers are more involved in a particular product category (smartphone purchase), they are likely to be more careful and selective when evaluating purchase stimuli, most of all during the decision making process they will rely on the selected and most importantly stimuli. On the other hand, the country of origin represents one of the most commonly selected external stimuli by consumers (Moradi & Zarei, 2012, p. 402). The country of origin can be an important factor influencing the purchase of imported products or smartphones. In the event that consumers are faced with buying imported brands, the country of origin can crucially affect their pre-purchase behavior as well as their attitude towards a particular brand.

In developing countries, consumers are relatively high in preference to buying imported products, especially in cases of low price or a satisfactory relationship between quality and price of the product. When buying imported products, for which the country of origin is very important, consumers pay due attention to it because it has a significant impact on purchases (Moradi & Zarei, 2012, p. 401-405). Saydan (2013)

considers that consumer perception of the image of the country of origin influences the choice of branded product; on the other hand, the author emphasizes that the country of origin, perceived quality, brand associations and brand loyalty are the basic components of brand equity. Consequently, the "country effect" is a factor critical to realizing the market performance of a brand (or product) in a foreign market. Therefore, we consider the claim that the purchase of branded products is significantly influenced by the image of the country of origin (Kim & Chao, 2018, p.70-73).

We chose the Bosnia and Herzegovina smartphone market to analyze the impact of country of origin image, in our case of imported products (smartphones), on the domestic consumers' purchasing decision, as exemplified by the Samsung and Huawei brands. Accordingly, in the second quarter of 2016, the market research agency GfK BH conducted a survey on the ownership and use of smartphones. Survey results showed that 39.5% of citizens of Bosnia and Herzegovina (BiH) over the age of 15 own a smartphone, an increase of 24% compared to data obtained at the end of 2012. The highest percentage of smartphone users is among the population aged 15-24, as many as 78.9% of the said population owns a smartphone. As expected, the smallest percentage of smartphone owners are among the oldest (65+) in the population - 6.9% (GfK BH, 2018). The best-selling smartphone brands in Bosnia and Herzegovina are Samsung, Huawei and Apple, while competition among these brands is fierce. In order to maintain their position as major players in the mobile phone market in Bosnia and Herzegovina, it would be useful for these brands to have a clear understanding of what determines a consumer's choice of smartphone and what are the sources of consumer-based brand equity. Understanding the brand equity structure involves incorporating determinants such as perceived quality, brand associations, and brand loyalty into the formulation of a branding strategy, enabling more effective and deeper engagement with consumers. Branding strategy plays an integrative role in gaining and maintaining long-term competitive advantage (Moradi & Zarei, 2012; Sudarević & Marić, 2018). In addition, strong brands are leaders in the field of competitive advantage, increase cash flows of businesses, boost liquidity, ensure premium prices, profitability and increase consumer loyalty. The derived objective of this paper is to conduct a comparative analysis of the impact of country of origin image (South Korea vs. China) on the brand equity of two global smartphone brands (Samsung vs. Huawei) among consumers in Bosnia and Herzegovina.

1. Literature review

The country of origin image acts as a "halo effect" and is a concise overview of the branded product in the minds of consumers. The country of origin image acts as a "halo effect" even when the consumer is unfamiliar with the particular product, while acting as a concise overview when consumers have previously known the product and/or the brand. On the other hand, when consumers are unfamiliar with a brand or product, the country of origin serves as a strong external stimulus because many internal stimuli

such as quality and performance are difficult to evaluate properly and objectively. Thus, consumers prefer products or brands made in countries with high image origin.

The country of origin effect is one of the most studied constructs in marketing and consumer behavior, beginning in 1965 when R. Schooler conceptualized the aforementioned construct (Roth & Diamantopoulos, 2009, p. 731). Country of origin is defined as the country in which the product is manufactured. In some studies, the „Made in China” country of origin has become one of the most visible elements of differentiation, conveying both positive and negative meanings about China-made products and the image of China-related products as the country of production (Han & Wang, 2012; Harney, 2008). Recent events involving the withdrawal of harmful children’s toys, the dairy scandal and toxic drugs have compromised the image of Made in China, raising consumer concerns about the purchase of products made in China, which may increase image problems of Chinese products and/or brands, but also for China as a whole. The country of origin image serves as an external information stimulus to create consumer perceptions and product valuations, often acting as a signal of product quality, perceiving consumer risk and likelihood of purchasing (Phau & Chao, 2008, p. 350-352). At the same time, the country of origin image of imported products has a significant impact on consumer perceptions and is an important external construct that influences consumer behavior when choosing branded products (Gluhović, 2019).

In other words, the strength of the brand rests in the mind of the consumer and is identified with the image and quality of the product. Brand equity is recognized as a key indicator of market performance, a source of competitive advantage, and a vital component of business operations (Christodoulides et al., 2015). High brand equity is possible when generating a positive connotation about the brand in the minds of consumers, and it is therefore likely that consumers will prefer to buy that brand over other branded or non-branded products, while creating brand loyalty (Kuhn et al., 2008). The concept of consumer-based brand equity is considered to be the dominant framework, which is used in many marketing studies since it encourages the creation of appropriate brand positioning (Davicik & Sharma, 2015, p.769; Matović et al., 2019). Consumer-based brand value is a set of consumer perceptions, attitudes, knowledge and behavior that results in increased customer service, higher returns or higher margins for businesses than would be possible without a brand (Christodoulides & Chernatory, 2010). Therefore, high-value brands can earn a premium price for their products (Kuhn et al., 2008; Kim & Chao, 2018).

2. Research methodology

The paper assumes that the country of origin has an exogenous effect on the process of creating brand equity based on the consumer, directly affecting the perceived quality and forming brand associations with consumers, which again affect brand loyalty. The image of the country of origin strongly influences the creation of consumers' perceptions of products or brands, including quality assessment (Roth & Romeo, 1992).

Research hypotheses:

H1: The country of origin image of the Samsung (South Korea) and Huawei (China) brands has a positive effect on perceived quality with consumers in Bosnia and Herzegovina.

H2: The country of origin image of the Samsung (South Korea) and Huawei (China) brands positively influences the formation of brand associations with consumers in Bosnia and Herzegovina.

H3: Samsung and Huawei's perceived brand quality has a positive effect on brand loyalty with consumers in Bosnia and Herzegovina.

H4: Samsung and Huawei smartphone brand associations have a positive effect on brand loyalty with consumers in Bosnia and Herzegovina.

As we pointed out earlier, for the purposes of this paper, two countries of origin were selected, South Korea and China, and two brands Samsung and Huawei in the category of smartphones for assessing consumer perception and behavior in Bosnia and Herzegovina. The two brands and relevant countries of origin were selected for the following reasons: (a) smartphones belong to the category of high-involvement shopping products, where consumers spend a lot of time collecting and searching for information, while on the other hand, brand and country of origin represent two important elements in the information search process, (b) Samsung and Huawei are two brands that occupy a significant share of the smartphone market in Bosnia and Herzegovina, indicating a high level of recognition of these products with consumers.

The approach used for measurement was chosen based on previous studies: country-of-origin construct (Moradi & Zarei, 2012; Shirin & Kambiz, 2011), perceived quality (Jalilvand et al., 2011), brand associations, and brand loyalty (Moradi & Zarei, 2012). Measuring consumer attitudes was done using a five-point Likert scale (1 = disagree at all, 2 = disagree, 3 = indifferent, 4 = agree, and 5 = strongly agree). The questionnaire method was used to collect the data. In order to collect the data from the questionnaire, the respondents in Bosnia and Herzegovina were contacted through the social network Facebook, and the questionnaire link was distributed through the online method. All respondents participated in the survey voluntarily. The questionnaire contained sixteen questions pertaining to Samsung and Huawei smartphone research and six general questions (demographics). A total of 335 questionnaires were collected and 315 completed questionnaires were processed. Statistical processing and analysis of the data were performed using the SPSS software package (19.0). Using exploratory and confirmatory factor analysis, the corresponding indices were measured to measure the validity of the proposed model. Following these analyses, the impact of the country of origin image variable on perceived quality and brand associations was analyzed, followed by the analysis of the impact of perceived quality and brand loyalty associations

on the purchase of Samsung and Huawei smartphones by consumers in Bosnia and Herzegovina. The hypotheses were tested in this way.

3. Research results

A preliminary analysis of the data collected showed the participation of approximately 50% of male and 50% of female respondents. The survey mostly refers to respondents aged 21-30 years with a university degree. In terms of smartphone use, 18% of those surveyed stated that they were using Iphone, while 41% and 32% of the market was occupied by Samsung and Huawei respectively, the rest of the market belonged to other brands.

For research purposes we used Exploratory Factor Analysis – EAF for Samsung and Huawei brands. The results show that four factors were investigated (country of origin, perceived quality, brand associations and brand loyalty), and certain dimensions of individual factors for the observed brands were entered. The EAF results show that the dimensions studied had a satisfied requirement, i.e. a value above 0.5. Cronbach's Alpha (α) resulted in 16 items that were statistically acceptable, for both Samsung and Huawei, Composite Reliability (CR) was higher than 0.7, while Average Variance Extracted (AVE) exceeded 0.5 at the same time confirming the existence of convergent validity.

The compliance indicators for the research model are shown in Table 1. Given that the value of the indicator χ^2/df should be less than 3 (Bagozzi & Yi, 1988), it can be observed that this condition is fulfilled. Accordingly, the results of the Confirmatory Factor Analysis (CFA) and statistically χ^2/df for Samsung indicate the correctness of the fitted model (CMIN / DF = 1.402; NFI = 0.98; CFI = 1.00; TLI = 0.99; RMSEA = 0.021). The results of applying χ^2/df for Huawei also show a satisfactory fit to the measurements performed (CMIN / DF = 1.178; NFI = 0.98; CFI = 0.99; TLI = 0.98; RMSEA = 0.045). The result can be justified by the fact that a large sample and a complex research model lead to a low p value and, consequently, to the statistical significance of the Hi-square test (Hair et al., 2010). The NFI, CFI and TLI index values should be above 0.9 (Byrne, 1998), so it can be concluded that the model fulfills these compliance conditions. Finally, the value of the RMSEA should be lower than 0.08 (Hair et al., 2006), which is met in the model.

Table 1: Indicators of conducted measurements for Confirmatory Factor Analysis (CFA)

Indicators	Samsung	Huawei	Recommended value
χ^2/df	1.402	1.178	≤ 3.00
Comparative fit index (CFI)	1.00	0.99	≥ 0.90
Normal Fit Index (NFI)	0.98	0.98	≥ 0.90
Tucker-Lewis Index (TLI)	0.99	0.98	≥ 0.90
The Root Mean Square Error of Approximation (RMSEA)	0.021	0.043	≤ 0.08

Source: Author Survey (SPSS Statistics 19)

The survey results show a statistically significant and positive relationship between country of origin, perceived quality, brand associations and brand loyalty.

Table 2: Indicators of confirmatory factor analysis

Variables and Dimensions for Samsung and Huawei, respectively (AVE, CR)	Factor loading Samsung	Factor loading Huawei	α Samsung	α Huawei
Country of origin (0.651; 0.906); (0.631; 0.895)			0.908	0.901
Is your stance on Samsung or Huawei shaped by their country of origin, South Korea or China, respectively?	0.845	0.767		
The Samsung or Huawei country of origin is a country with a high level of technological advantage.	0.812	0.796		
The Samsung or Huawei country of origin is a design good country.	0.786	0.689		
Samsung or Huawei is the country of origin of high quality products.	0.889	0.789		
Perceived quality (0.756; 0.918); (0.608; 0.889)			0.917	0.897
Samsung or Huawei is a trusted brand.	0.881	0.757		
Samsung or Huawei is a brand that can be bought at an affordable price.	0.837	0.831		
Samsung or Huawei is a brand whose price is in line with quality.	0.889	0.896		
I'm ready to pay a higher price for the Samsung brand or Huawei.	0.834	0.826		
Brand associations (0.617; 0.889); (0.597; 0.873)			0.892	0.878

Samsung or Huawei brand country of origin associations are countries with prestigious manufacturing status.	0.826	0.817		
Samsung or Huawei brand country of origin associations is a country that is innovative in manufacturing.	0.819	0.791		
Samsung or Huawei is a brand that has a good reputation.	0.776	0.801		
Samsung or Huawei is an attractive brand.	0.679	0.654		
Brand loyalty (0.801; 0.957); (0.771; 0.927)			0.951	0.913
Samsung or Huawei is a brand that meets customer expectations.	0.925	0.889		
Samsung or Huawei brand is my first choice when buying smartphones.	0.878	0.861		
I'm ready to recommend a friend buy a Samsung or Huawei smartphone.	0.852	0.863		
Will you buy a Samsung or Huawei smartphone after your first purchase?	0.914	0.895		

Source: the author's calculation

Internal consistency and convergent validity were satisfied for all four reflective constructs, AVEs and composite reliability values are greater than 0.5 and 0.7, respectively (Becker et al., 2012). Consequently, the condition of divergent validity was satisfied by establishing the Fornell – Larcker criterion (Table 3). In addition, analysis of the Cronbach's alpha coefficient revealed that all variables had a corresponding level of internal consistency higher than 0.7 (Nunnally, 1978). In addition to the above results, it should be noted that the highest number of findings has very high values of factor loadings (greater than 0.7).

Table 3: Divergent validity - Fornell - Larcker criterion

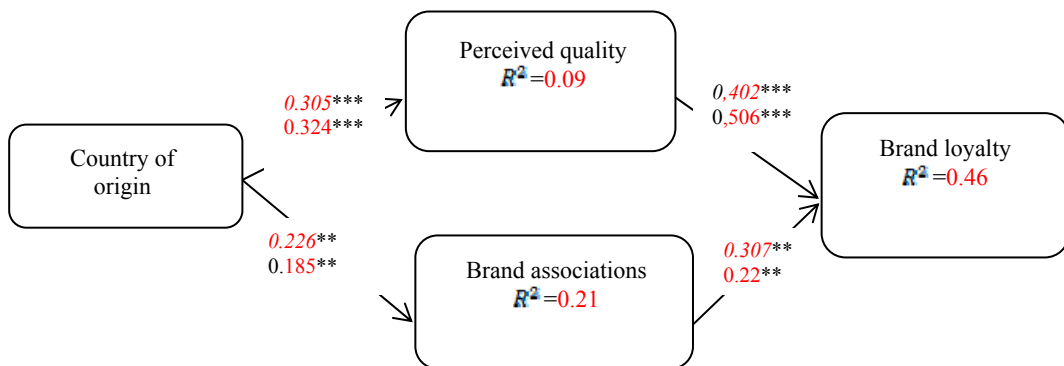
	Country of origin	Perceived quality	Brand associations	Brand loyalty
Country of origin	0.796			
Perceived quality	0.751	0.826		
Brand associations	0.653	0.773	0.801	
Brand loyalty	0.702	0.649	0.514	0.786

Source: Author calculation

After testing the model, it can be concluded that the claim regarding the price/quality ratio of the brand is a significant indicator of perceived quality. The relationships between all reflective constructs are further analyzed in the paper.

Estimated path coefficients between country of origin and perceived quality are statistically significant, for Samsung amounts (path coefficient = 0.305 with positive p value for $p < 0.001$) and for Huawei brand (path coefficient = 0.324, $p < 0.001$) (Figure 1). It is necessary to make statistical adjustments to the two model structures for the Samsung and Huawei brands; the results suggest that the structural models are (CMIN / DF = 1.5; NFI = 0.97; CFI = 0.98; TLI = 0.99; RMSEA = 0.04) for Samsung brand (CMIN / DF = 1.5; NFI = 0.97; CFI = 0.99; TLI = 0.98; RMSEA = 0.041) and for Huawei

Figure 1 Path coefficients of the research model



Note: ** significant $p < 0.01$; *** significant $p < 0.001$. Path coefficients for Samsung in italic numbers.

The image of the country of origin also positively influences brand associations for both Samsung and Huawei smartphones (path coefficient = 0.226; 0.185, respectively; statistical significance for $p < 0.01$; $p < 0.01$). Constructs perceived quality and brand associations directly influence the brand loyalty construct (path coefficient = 0.402; $p < 0.001$; path coefficient = 0.307; $p < 0.01$) for Samsung and Huawei (path coefficient = 0.506; $p < 0.001$; and path coefficients = 0.22; $p < 0.01$, respectively Samsung and Huawei smartphones represent the two leading brands with dominant positions in the market of Bosnia and Herzegovina, and customers have different perceptions of these brands.

4. Discussion

Earlier, we pointed out that the aim of this paper is to recognize the impact of the country of origin on perceived quality and brand associations, and on brand loyalty as a core component of consumer-based brand equity in the case of the smartphone market in

Bosnia and Herzegovina, looking at two dominant foreign countries brands from South Korea (Samsung) and China (Huawei). Given the growing popularity and reputation of these two smartphone brands in Bosnia and Herzegovina (B&H), the overall work contributes to the existing literature in shedding light on the issue. The *online* survey was conducted in Bosnia and Herzegovina on a sample of 315 respondents, with the results of the survey confirming that the image of South Korea and China's country of origin (COO) influences the formation of perceived quality (PQ) and brand associations (BA) among smartphone buyers (Samsung and Huawei) in Bosnia and Herzegovina. Overall, the country of origin construct has a greater impact on perceived quality (PQ) compared to brand associations (BA) for Samsung and Huawei brands (Table 4).

Table 4: Path analysis results for Samsung and Huawei

Path Relationship	Path Coefficient Estimates		P	
	Samsung (S.Korea)	Huawei (China)	Samsung (S.Korea)	Huawei (China)
COO→PQ	.305***	.324***	<0.001	0.01
COO→BA	.226**	.185**	0.012	0.033
PQ→BL	.402 ***	.506***	<0.001	<0.001
BA→BL	.307**	.22**	0.003	0.002

Note: ** significant for $p < 0.01$; *** significant for $p < 0.001$. Source: Author Survey (SPSS Statistics 19)

In other words, perceived quality (PQ) of foreign brands is a key driver in determining the choice of smartphone buyers in Bosnia and Herzegovina. The brand association (BA) construct also influences the decision to buy these smartphones, but the performance is lower compared to perceived quality (PQ). This implies that perceived quality (PQ) is more influenced by branding intention with customers in Bosnia and Herzegovina for Samsung and Huawei smartphone brands than brand associations (BA).

Table 4 lists the different path coefficients between the two (perceived quality and brand associations) selected constructs (Samsung and Huawei) of the Consumer-Based Brand Equity (CBBE) model. Huawei's perceived quality (PQ) is more influenced by the country of origin (COO) image than is the case with Samsung, implying that the Chinese country of origin (COO) image has a significantly greater impact on the perceived quality (PQ) of the Chinese smartphone in Bosnia and Herzegovina. On the other hand, the South Korean image of the country of origin (COO) is more strongly influenced by the formation of positive brand associations (BA) with Samsung compared to the Huawei brand. The South Korean country of origin (COO) image is closely linked to the formation of brand associations (BA) by Samsung, leading to increased brand loyalty (BL) among customers in Bosnia and Herzegovina. Consequently, Samsung has a relatively larger market share than Huawei and implements more promotional and branding activities in Bosnia and Herzegovina, which creates a potentially

greater number of sources of information from which customers generate stimuli when associating Samsung brand with their country of origin (South Korea). The country of origin image (South Korea) is strongly associated with positive associations with the Samsung brand. The Samsung brand actively uses and exerts positive value in its advertising and branding campaigns, which is a positive aspect of the South Korean image of the country of origin. Therefore, Samsung's advertising and branding campaign effectively increases brand affiliation, resulting in greater customer loyalty to its products. In general, Samsung brand associations (BA) are relatively more pronounced than those of the Huawei brand, while the country of origin image has a more positive effect on Samsung's CBBE brand equity.

Table 5: Verification the relationship between variables in the structural model

Hypothesis	Assessment		Conclusion	
	Samsung (S.Korea)	Huawei (China)	Samsung (S.Korea)	Huawei (China)
H1: Country of origin image → perceived quality	.305***	.324***	accepted	accepted
H2: Image of country of origin → brand associations	.226**	.185**	accepted	accepted
H3: Perceived quality → brand loyalty	.402 ***	.506***	accepted	accepted
H4: Brand associations → brand loyalty	.307**	.22**	accepted	accepted

Note: ** significant for $p < 0.01$; *** significant for $p < 0.001$. Source: Author Survey (SPSS Statistics 19)

The country of origin image (COO) is influential in shaping the consumer attitude towards foreign brands. This particularly affects consumers' perceptions of product quality, which ultimately affects their choice of a particular brand. Regarding the impact of the country of origin image (COO) on the property value of the brand based on the consumer, the research findings obtained in this paper are supported by previous research (Murtiasih & Siringoringo, 2013; Mostafa, 2015). Various studies confirm the relationship between the country of origin image (COO) and the value of the brand based on the consumer. Pappu et al. (2007, p. 730) have demonstrated and demonstrated that the image of the US country of origin has a positive effect on consumer-based brand equity for IBM and Apple brands in the Australian market. The aforementioned study clearly shows that the country of origin image influences key dimensions of brand equity such as perceived quality, brand associations and brand loyalty.

Conclusion

The research findings support a positive relationship between the construct country of origin image and the main components of a consumer-based brand value, perceived quality, brand associations, and brand loyalty. Previous research has offered similar results for the brand property structure, viewing consumer-based brand value as a multidimensional concept with causal relationships among its components. Han & Wang

(2012) proved that perceived quality has a greater impact on brand loyalty compared to brand associations. These research findings suggest the importance of ensuring high quality in consumer awareness as a necessary activity to establish consumer loyalty. Our research results have unequivocally shown that perceived quality has the biggest impact on Samsung and Huawei brand loyalty. For Samsung, country of origin and brand associations are equally important for brand loyalty, on the other hand, country of origin has a much greater effect on the Huawei brand than brand associations. This suggests that consumers in Bosnia and Herzegovina pay far more attention to the quality of "Chinese" smartphones than to "South Korean" products. Furthermore, the perceived quality of Chinese products has a stronger effect on consumer preferences compared to South Korean products.

South Korea has improved the country of origin image in recent decades, primarily by increasing the number of foreign tourists who have visited it. In 2010, the number of foreign visitors to South Korea amounted to 8.8 million people (an increase of 12.5% compared to 2009) (Yu et al., 2012). Some authors attribute the influence of South Korean popularity to South Korean drama and pop music, which are reportedly contributing to the rise in popularity of South Korean products. In the case of China, „Made in China” products dominate the world market. Despite China's rapid economic growth as a leading manufacturer in the world, the quality of “Made in China” products is still considered negative. The “Made in China” effect has been known to have a negative impact on consumers over the last ten years (Ahmed et al., 2014). As the second largest economy, after the US, China has embarked on the development and production of many products to compete with foreign products. With its competitive rise, China seeks to enhance the country of origin's image in order to improve its position in the international market (Kim & Chao, 2018).

China's rapid economic growth is expected to drive investment in the country of origin image while improving the products image made in China, while some authors believe that China will soon be more competitive in its country of origin image (Yunus & Rashid, 2016). In short, the success of Chinese brands will largely depend on promoting product quality to make consumers more loyal. Finally, both South Korean and Chinese smartphone brands need to recognize and understand the significant role that the country of origin plays in creating consumer preferences, specifically in Bosnia and Herzegovina and beyond, and should develop effective market communication strategies, emphasizing and promoting product quality in order to gaining competitive advantage in the market.

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Leadership, LMX and teaching process quality in primary schools

Лидерство, LMX и квалитет наставног процеса у
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Abstract: The aim of the research in this paper is to examine the direction and intensity of the influence of leadership in schools and the LMX relationship on the teaching process, and the personal and ethical development of pupils. The survey was conducted by means of a questionnaire, and the respondents were teachers in elementary schools in Serbia. A total of 406 valid questionnaires were collected. The average scores of leadership, LMX relationships, the teaching process and pupils' development are high. Transformational leadership is more pronounced than transactional leadership. All the dimensions of leadership, as well as all the aspects of the LMX relationship, have a statistically significant and positive influence on the teaching process, as well as the ethical and personal development of pupils. The strongest influence of leadership and the LMX relation on the dimensions of the teaching process occurs for those dimensions which include activities outside the classroom, while the weakest impact on the teaching process dimensions exists for those dimensions directly related to teaching activities over time. Principals should be more interested in the work of individual teachers and provide them with appropriate feedback. In general, principals should work continuously to improve leadership and LMX relationships.

Keywords: Leadership, The LMX Relationship, The Teaching Process, Elementary Schools, Serbia.

JEL classification I21, M12

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Сажетак: Циљ истраживања у овом раду је испитивање смера и интензитета утицаја лидерства у школама и односа LMX на наставни процес, као и на лични и етички развој ученика. Истраживање је спроведено путем упитника, а испитаници су били наставници у основним школама у Србији. Прикупљено је 406 упитника. Просечне оцене вођства, LMX односа, наставног процеса и развоја ученика су високе. Трансформационо вођство је израженије од трансакционог. Све димензије лидерства, као и сви аспекти LMX односа, имају статистички значајан и позитиван утицај на наставни процес, као и на етички и лични развој ученика. Најјачи утицај вођства и односа LMX на димензије наставног процеса јавља се за оне димензије које укључују активности изван учионице, док најслабији утицај на димензије наставног процеса постоји за оне димензије директно повезане са наставним активностима током времена. Директори школа би требали бити више заинтересовани за рад појединих наставника и пружити им одговарајуће повратне информације. Генерално, директори школа би требали континуирано да раде на побољшању лидерства и LMX односа.

Кључне речи: Лидерство, LMX однос, наставни процес, основне школе, Србија.

JEL класификација: I21, M12

Introduction

Leadership in schools, its significance and impact, is the subject of numerous research studies, for example Aubrey et al., 2013; Pashiardis et al., 2011; Hallinger & Heck, 2010). The reference (Dragojlović et al., 2018) emphasizes the role of school management, which should strive to develop a marketing culture in schools. Such school management and such (marketing) school culture would enable solving current problems in schools, faster response to changes in the environment, offering new services, successful market business, as well as performing activities in accordance with the needs and expectations of internal and external users of services.

When it comes to transformational and transactional leadership in schools, it has been shown that both teachers and students are more accepting of transformational leadership, i.e. leadership that prefers a strategic approach, intellectual stimulation, support for followers, and common multiple goals. For example, according to Bogler et al. (2013), transformational leadership is more appropriate for pupils than passive leadership, and the style of teacher leadership reflects on students' satisfaction. In Jordan, transformational leadership significantly and positively influences teachers' organizational commitment (Khasawneh et al., 2012). Hallinger and Heck (2010) found that transformational leadership directly affects academic capacities, and indirectly affects students' achievements.

In addition to business organizations, LMX theory is also important in educational organizations. However, the impression is that, with regard to educational institutions, this topic has not been given due attention in previous studies. Some references explore LMX theory in the field of education. Thus, for example, according to (Ross et al., 2017), in educating managers, it is important to study LMX theory because it has an impact on fair relations within organizations. In the reference (Brimecombe et al., 2014), the importance of LMX theory and the influence of LMX

on the performance of employees in the education of athletes and managers in sports are pointed out. A survey conducted in secondary schools in Turkey showed that a quality LMX relationship may compensate for teachers' possible dissatisfaction with their work and careers (Erdogan et al., 2004). According to the research (Somech, 2003), where the respondents were teachers, LMX theory has been shown to significantly explain the relationship between the participatory behaviour of the leaders and the personal variables of the leaders (gender, age, years of service, education).

The aim of the research in this paper is to examine the direction and intensity of the influence of leadership in schools (transformational and transactional) and the LMX relation on the teaching process, and the personal and ethical development of pupils. The survey is conducted by means of a questionnaire, and the respondents are teachers in elementary schools in Serbia. Such research certainly has its significance stemming from the fact that teachers in elementary schools in Serbia are often not satisfied with their work, and their income in particular. Under conditions where significant improvements in the salaries in the education sector are unlikely to occur in the short term, additional ways of increasing teacher satisfaction should be found, as well as their motivation to improve the teaching process. Attention must be focused on school leadership, its improvement, and the improvement of LMX relationships.

1. Theory and hypotheses

1.2. Leadership

The difference between transformational and transactional leadership was first noticed and defined by Burns (1978). Burns notes that transformational leadership is based on the motivation of the follower to achieve organizational goals, and that transactional leadership is based on the motivation of followers by means of rewards and punishments.

Transformational leaders focus their attention on the relationships and relations with their followers (Cannella & Monroe, 1997). Transformational leaders strive to raise the level of consciousness of their followers by promoting moral values and "more" emotions and goals, which include freedom, justice, equality, peace and others.

Transactional leaders act completely differently. They motivate followers by pointing them towards their own interests. If the followers work at the required level, the transactional leader tends to provide them with appropriate rewards (Burns, 1978). Otherwise, if they do not achieve the required performance, then the transactional leader applies penalties for such followers. Bryman (1992) confirms that the behaviour of a transactional leader involves two behaviours: behaviour through rewards and behaviour through punishment.

Most authors (for example Howell et al., 2005; MacKenzie et al., 2001; Ling et al., 2008), agree that transformational leadership has a greater impact on organizational performance, with this impact being positive. The dominance of transformational leadership over transactional leadership is indirectly indicated by recent research by other authors. For example, in their work, Erić Nielsen, Stojanović-Aleksić and Zlatanović (2019, p. 95) conclude that “competitive potential of an organization can be fully exploited only under appropriate circumstances, in a friendly and nurturing internal environment.” Similarly, Sokolov et al. (2019, p. 62) note that “the effectiveness of leadership comes from the ability of the leader to inspire, communicate and coordinate within the group, solve problems and learn. Leadership is motivation.”

There is a continuing need to improve existing and develop new leadership styles that will meet the increasingly complex requirements of contemporary business. Thus, according to Stojanović and Marić (2018), contemporary organizations, especially knowledge-based organizations, require a greater number of adequate leadership styles, for example: (a) involving all employees in leadership processes, in order to ensure responsible self-leadership and effectively shared -leadership; (b) Complexity Leadership Theory; (c) Complex Adaptive Systems; (d) Adaptive leadership, and other.

1.2. LMX theory of leadership

It has long been known that human resources are the bearers of working potential, and as such, can certainly be used to achieve the organizational goals (Đorđević et al., 2019). Strukan, Terek and Nikolić (2019) believe that the work of leaders, in essence, involves working with people, and that the key of good leadership is in relation to people. As a result, leaders are strongly focused on developing quality interpersonal relationships in the leader-member relationship (LMX leadership).

LMX theory (Leader Member Exchange theory) measures and studies the quality of relationships, support, and trust between the leaders and members of an organization (Seabright et al., 1992). According to (Dansereau et al., 1975), LMX theory deals with relationships and relations between leaders (superiors) and followers (subordinates).

In the case of a high-quality LMX relationship, there is mutual support between the leader and followers, with the exchange of formal and informal rewards (Dienesch & Liden, 1986). Similarly, Graen and Uhl-Bien (1995) emphasize mutual trust, respect, mutual influence, loyalty, connection and a sense of commitment towards their superiors in the case of a high quality LMX relationship. According to a number of references, for example, (Ferris et al., 1991; Pellegrini & Scandura, 2006; Erdogan & Enders, 2007), a high quality LMX relationship has a positive impact on various factors of organizational performance.

Based on previous exposure, one basic and eight specific hypotheses can be set in this research. The basic hypothesis:

H0: Leadership and the LMX relationship have a statistically significant impact on the quality of the teaching process and the personal and ethical development of pupils in elementary schools in Serbia.

Specific hypotheses:

H1a: The leadership dimensions have statistically significant correlations with the dimensions of the quality of the teaching process.

H1b: The leadership dimensions have statistically significant correlations with the dimensions of the personal and ethical development of pupils.

H1c: The leadership dimensions have a statistically significant predictive effect on the quality of the teaching process.

H1d: The leadership dimensions have a statistically significant predictive effect on the dimensions of the personal and ethical development of pupils.

H2a: The relationship between the principal and teachers (LMX relationship) has statistically significant correlations with the dimensions of the quality of the teaching process.

H2b: LMX relationship has statistically significant correlations with the dimensions of the personal and ethical development of pupils.

H2c: LMX relationship has a statistically significant predictive effect on the quality of the teaching process.

H2d: LMX relationship has a statistically significant predictive effect on the dimensions of the personal and ethical development of pupils.

2. Research methodology

2.1. Research instruments

Transformational leadership. The Transformational Leadership Behavior Inventory (TLI) questionnaire was used to measure transformational leadership (Podsakoff et al., 1990). The questionnaire comprises 14 items arranged in four dimensions. The respondents evaluated each item with scores ranging from 1 to 7.

Transactional leadership. For the measurement of transactional leadership, a questionnaire developed in the following references was used (Podsakoff et al. 1984; MacKenzie et al., 2001). The questionnaire consists of seven items distributed in two dimensions. All of the items were rated on a seven point Likert scale.

Leader-member exchange (LMX). The LMX-7 questionnaire (Graen & Uhl-Bien, 1995) was used to measure the LMX relationship. This is a questionnaire comprising seven items, which make up one dimension (a one-dimensional LMX questionnaire). All of the items were rated by a five-point Likert scale.

The teaching process, the personal and ethical development of pupils. In order to measure the quality of the teaching process and the personal and ethical development of the pupils, the Manual for the Evaluation and Self-Evaluation of School Work questionnaire, developed by the Ministry of Education and Sports of the Republic of Serbia in cooperation with the British Council Serbia and Montenegro (Bojanić et al., 2005) was used. The questionnaire for measuring the quality of the teaching process consists of 80 items distributed in ten dimensions. The questionnaire for measuring the personal and ethical development of pupils includes 30 items distributed in two dimensions. All of the items were rated on a four-point Likert scale.

2.2. Data on the procedure and survey sample

The research was conducted in elementary schools in Serbia. In doing so, interviews were conducted with the respondents. The respondents were teachers. A total of 406 valid questionnaires were collected from 62 elementary schools.

3. Research results

3.1. Results of the descriptive statistics

The results of the descriptive statistics are given in Table 1.

Table 1: The results of descriptive statistics

Dimensions and items	Abbr.	N	Min	Max	Mean	Std. Dev.	α
The basic transformational behavior of the leader	L1	406	1.00	7.00	5.577	1.428	.954
Expecting high performance	L2	406	1.00	7.00	5.674	1.238	.897
Incentive Behavior of a Leader (Understanding, Feeling)	L3	406	1.00	7.00	5.362	1.598	.972
Intellectual stimulation	L4	406	1.00	7.00	5.380	1.488	.965
Part of the incentive behavior (rewards)	L5	406	1.00	7.00	5.165	1.660	.946
Part of punishing behavior (punishment)	L6	406	1.00	7.00	5.239	1.436	.903
LMX	LMX	406	1	5	3.87	.926	.943
To what extent have you been informed that your principal is happy or dissatisfied with your work?	LMX1	406	1	5	3.70	1.080	
To what extent does your principal understand your work problems and needs?	LMX2	406	1	5	3.84	1.102	
To what extent do you feel your principal	LMX3	406	1	5	3.88	1.074	

recognizes your potentials?

To what extent is your principal ready to use the acquired power to help you solve workplace problems? LMX4 406 1 5 **3.90** 1.070

To what extent is your principal ready to "back you up" even at his own risk, if you really need it? LMX5 406 1 5 **3.73** 1.189

To what extent do you have confidence in the decisions of the principal to defend them? LMX6 406 1 5 **4.00** .989

How would you characterize the effectiveness of your working relationships with the principal? LMX7 406 1 5 **4.09** .999

Lesson planning	TP1	406	1.00	4.00	3.54	.419	.820
Preparing classes	TP2	406	1.62	4.00	3.60	.400	.888
Communication and cooperation	TP3	406	2.13	4.00	3.86	.279	.875
Rationality and organization	TP4	406	2.25	4.00	3.69	.351	.856
Encouraging pupils	TP5	406	2.00	4.00	3.77	.322	.880
Correlation and application of knowledge	TP6	406	2.20	4.00	3.65	.406	.739
Responsibility of pupils	TP7	406	2.00	4.00	3.63	.415	.800
The way of learning	TP8	406	2.29	4.00	3.74	.351	.857
Monitoring and evaluation	TP9	406	2.36	4.00	3.77	.316	.885
Reporting	TP10	406	1.60	4.00	3.64	.468	.862
Personal development of pupils	SPD	406	2.13	4.00	3.731	.322	.882
Ethical development of pupils	SED	406	2.33	4.00	3.652	.372	.888

Source: Authors' own research

3.2. Results of the leadership influence

The correlation analysis between the dimensions of leadership and the quality of the teaching process is given in Table 2 (* $p < 0.05$; ** $p < 0.01$), and the correlation analysis between the dimensions of leadership and the personal and ethical development of the pupils is given in Table 3 (* $p < 0.05$; ** $p < 0.01$).

Table 2. The correlations between leadership and the teaching process

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10
L1	.458**	.352**	.214**	.287**	.268**	.226**	.279**	.209**	.318**	.356**
L2	.403**	.332**	.223**	.261**	.249**	.194**	.252**	.224**	.307**	.185**
L3	.342**	.223**	.134**	.166**	.185**	.127*	.166**	.129**	.185**	.285**
L4	.444**	.405**	.217**	.287**	.299**	.257**	.251**	.251**	.313**	.325**
L5	.444**	.301**	.177**	.260**	.255**	.173**	.231**	.156**	.233**	.333**
L6	.356**	.246**	.112*	.164**	.142**	.137**	.162**	.103*	.179**	.120*

Source: Authors' own research

Table 3. The correlations between leadership and the personal and ethical development of the pupils

	SPD	SED
L1	.364**	.485**
L2	.279**	.327**
L3	.273**	.390**
L4	.371**	.454**
L5	.335**	.430**
L6	.232**	.272**

Source: Authors' own research

Linear regression analysis was applied in order to examine the predictive effect of leadership on the quality of the teaching process and the personal and ethical development of students. The results are shown in Tables 4 and 5.

Table 4. The results of the regression analysis: the predictive effect of leadership on the teaching process

Dep.	Independent β						R ²	F	Sig.
	L1	L2	L3	L4	L5	L6			
TP1	.261**	.196**	.248**	.026	.300**	.063	.275	25.196	.000
TP2	.148	.104	.363**	.420**	.125	-.042	.203	16.922	.000
TP3	.139	.170*	.213*	.101	.125	-.081	.073	5.261	.000
TP4	.202*	.155*	.362**	.145	.255**	-.091	.132	10.088	.000
TP5	.094	.127	.283**	.253**	.209*	.113	.117	8.843	.000
TP6	.132	.032	.253**	.325**	.038	-.044	.087	6.331	.000
TP7	.257**	.166*	.258**	.014	.177	-.052	.107	7.959	.000
TP8	.081	.125	.229**	.315**	.027	-.109	.087	.6369	.000
TP9	.267**	.186*	.290**	.169	.079	-.076	.146	11.357	.000
TP10	.258**	-.040	.140	.146	.208*	-.108	.149	11.603	.000

Source: Authors' own research

Table 5. The results of the regression analysis: the predictive effect of leadership on the personal and ethical development of the pupils

Dep.	Independent β						R ²	F	Sig.
	L1	L2	L3	L4	L5	L6			
SPD	.199*	.041	.201*	.208*	.168	-.007	.161	12.742	.000
SED	.334**	.013	.099	.132	.144	.044	.250	22.200	.000

Source: Authors' own research

3.3. Results of the impact of the LMX relationships

The correlation analysis between the LMX relationship and the dimension of the teaching process is given in Table 6 (* $p < 0.05$; ** $p < 0.01$), and the correlation analysis between the LMX relationship and the dimensions of the pupils' personal and ethical development is given in Table 7 (* $p < 0.05$; ** $p < 0.01$).

Table 6. The correlations between the LMX relationship and the quality of the teaching process

	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10
LMX1	.365**	.314**	.184**	.240**	.209**	.190**	.216**	.184**	.203**	.357**
LMX2	.310**	.221**	.138**	.147**	.169**	.148**	.163**	.131**	.130**	.269**
LMX3	.347**	.241**	.123*	.210**	.214**	.176**	.218**	.199**	.207**	.331**
LMX4	.368**	.260**	.107*	.169**	.186**	.152**	.226**	.160**	.181**	.322**
LMX5	.290**	.197**	.091	.142**	.147**	.170**	.161**	.128**	.133**	.264**
LMX6	.349**	.251**	.183**	.202**	.233**	.165**	.196**	.177**	.253**	.273**
LMX7	.321**	.244**	.126*	.206**	.195**	.175**	.207**	.129**	.187**	.364**

Source: Authors' own research

Table 7. The correlations between the LMX relationship and the personal and ethical development of the pupils

	SPD	SED
LMX1	.298**	.356**
LMX2	.253**	.339**
LMX3	.295**	.411**
LMX4	.291**	.408**
LMX5	.247**	.382**
LMX6	.324**	.437**
LMX7	.319**	.396**

Source: Authors' own research

Linear regression analysis was applied to test the predictive effect of the LMX relationship on the quality of the teaching process and the personal and ethical development of the pupils. The results are shown in Tables 8 and 9.

Table 8: The results of regression analysis: the predictive effect of the LMX relationship on the teaching process

Dep.	LMX1	LMX2	LMX3	Indep. LMX4 β	LMX5	LMX6	LMX7	R ²	F	Sig.
TP1	.232**	-.068	.076	.188	-.051	.187*	-.092	.179	12.394	.000
TP2	.281	-0.68	-.013	.127	-.064	.139	-0.48	.114	7.311	.000
TP3	.200**	.062	-.024	-.088	-.087	.254**	-.107	.058	3.504	.001
TP4	.195**	-.137	.129	-0.17	-.078	.141	.033	.075	4.605	.000
TP5	.122	-.067	.135	.002	-.104	.221**	-.040	.072	4.409	.000
TP6	.126	-.047	.053	-.031	.068	.054	.014	.044	2.647	.011
TP7	.117	-.140	.103	.160	-.067	.064	.029	.069	4.230	.001
TP8	.144	-.101	.216*	.023	-.053	.165*	-.167	.060	3.659	.001
TP9	.139	-.130	.207*	.023	-.137	.304*	-.053	.092	5.768	.000
TP10	.194*	-.158	.087	.134	-.039	-.025	.226**	.163	11.091	.000

Source: Authors' own research

Table 9. The results of the regression analysis: the predictive effect of LMX on the personal and ethical development of the pupils

Dep.	LMX1	LMX2	LMX3	Indep. LMX4 β	LMX5	LMX6	LMX7	R ²	F	Sig.
SPD	.139*	-.100	.064	.065	-.066	.198*	.095	.132	8.682	.000
SED	.103	-.144	.162	.115	.043	.252**	.001	.228	16.800	.000

Source: Authors' own research

4. Discussion of the results

4.1. Discussion of the results of the influence of leadership

Table 2 shows the results of the correlation analysis between the dimensions of leadership and the teaching process dimensions. It can be seen that all the correlations are statistically significant and positive. On this basis, hypothesis H1a was confirmed. From the leadership dimensions, the most significant positive impact on the teaching process dimensions was achieved by L4 - intellectual stimulation, and then L1 - the leader's core transformational behaviour. Teachers respond to intellectual stimulation from the principal and this in turn encourages them to achieve better results in their work, which is clearly seen in the quality of the teaching process. Also, good school leadership is a factor that provides teachers with security and brings the school to the desired future, which gives them the stability necessary to concentrate on their work, which is teaching.

From the leadership dimensions, the weakest influence on the dimensions of the teaching process was exerted by dimension L6 - punishing behaviour (punishment), followed by dimension L3 - the stimulating behaviour of the leader. It should be borne in mind that although these dimensions have a positive impact on the teaching process, this impact is lower than that of the other leadership dimensions. Therefore, punishments can have some effects, but their use is the least powerful tool school principals can use in their endeavours to improve the quality of the teaching process. The demonstration of understanding and feeling in the correlation analysis has slightly less influence on the teaching process. However, dimension L3 - the stimulating behaviour of the leader shows a significant predictive effect on the teaching process, as can be seen in the results of the regression analysis (Table 4).

From the teaching process dimensions, dimensions TP1 - lesson planning, TP2 - preparing classes and TP10 - reporting are under the strongest influence of the leadership dimensions. These are, therefore, the dimensions that relate to activities that are beyond the immediate teaching in class, so the influence of the leader is the greatest. It is the leader who can encourage the achievement of prescribed goals and tasks, communication among teachers, the harmonization of materials across different

subjects, the use of professional literature, etc. What is interesting is that the dimensions TP1 - lesson planning and TP2 - preparing classes have the weakest average values from all the dimensions of the teaching process (descriptive statistics, Table 1). This result points to the importance of leadership in this segment, i.e. it is precisely by engaging the leaders (principals) that the weakest dimensions of the teaching process can be improved.

The leadership dimensions have the smallest influence on the dimensions TP8 - learning methods, TP3 - communication and cooperation and TP6 - correlation and application of knowledge. These dimensions relate to the teachers' direct work with pupils. These dimensions may be said to be more dependent on the teachers' professional competences than on any other dimensions, making the principal's ability to influence them significantly lower.

Table 3 shows the results of the correlation analysis between the leadership dimensions and the dimensions of the pupils' personal and ethical development. It can be seen that all the correlations are statistically significant and positive. On this basis, hypothesis H1b was confirmed. From the leadership dimensions, the dimensions of the pupils' personal and ethical development are most influenced by L1 - the leader's core transformational behaviour and L4 - intellectual stimulation. These dimensions of leadership behaviour most favour the creation of an atmosphere in the school which contributes to the personal and ethical development of pupils. The smallest impact is again achieved by dimension L6 - punishing behaviour (punishment), followed by L2 - high performance expectation. It is obvious that these are the dimensions which can exert a certain degree of pressure on teachers, which is in turn transferred to the overall atmosphere in the school's collective, and then to the reduced effects on the pupils' development. Leadership influences the dimensions of SED – pupils' ethical development, rather than the SPD dimensions – pupils' personal development.

Based on these results from Table 4, it can be noted that the leadership dimensions have a predictive effect on the dimensions of the teaching process, i.e. hypothesis H1c is confirmed. The highest R^2 values occur for the dimensions TP1 - lesson planning, TP2 - preparing classes and TP10 - reporting, while the lowest are recorded for dimensions TP3 - communication and cooperation, TP8 - learning methods and TP6 - correlation and application of knowledge. These results are completely consistent with the results of the correlation analysis. The strongest effect is achieved by dimension L3 - the incentive behaviour of the leader, which is contrary to the results of the correlation analysis. It is obvious that in the overall effect of leadership behaviour, the support and understanding of the leader appears as a significant predictor of the dimensions of the teaching process. It follows from this that the effect of dimension L3 - the incentive behaviour of the leader must not be neglected in efforts to improve the teaching process. It should also be noted that dimension L6 - punishing behaviour (punishment) does not have a predictive effect at all, even it is

slightly negative. This result is consistent with the results of the correlation analysis. The same can be said for the predictive effects of the other leadership dimensions. According to Table 5, it can be concluded that there is a predictive effect of the leadership dimensions on the dimensions of the pupils' personal and ethical development, thus confirming hypothesis H1d. It is easily noticed that the SED dimensions – pupils' ethical development have a higher R^2 determination index than the SPD dimensions – pupils' personal development, which is a result consistent with the results of the correlation analysis.

Overall, the results related to the influence of leadership are consistent with those gained in a large number of existing studies, for example (Donaldson Jr., 2007; Odhiambo & Hii, 2012; Aubrey et al., 2013; Vilkinas & Ladyshevsky, 2012).

4.2. Discussion of the results of the impact of the LMX relationship

The results of the correlation analysis between the LMX relationship and the dimensions of the teaching process are given in Table 6. It can be seen that almost all the correlations are statistically significant and positive. Therefore, it can be concluded that hypothesis H2a is confirmed. From the LMX relationship items, items LMX1 - the degree of information that the principal is satisfied with your work, and then LMX6 - the degree of confidence in the principal's decisions have the most powerful positive influence on the dimensions of the teaching process. Teachers want to obtain feedback on their work, and it is important for them to gain recognition for their work and effort, to receive appropriate praise and to enhance their reputation in the collective. Also, the teaching process is influenced by the level of trust in the principal's decisions, i.e. the good strategic and operational management of the school. Here, there is a noticeable similarity and analogy with the results of the influence of leadership on the teaching process: from the leadership dimensions, the most powerful positive influence on the dimensions of the teaching process is achieved by dimensions L4 - intellectual stimulation, and then L1 - the leader's core transformational behaviour.

From the LMX relationship, item LMX5 - the degree to which the principal is ready to "back you up", even at his own risk, followed by LMX2 - the degree to which the principal understands your work problems and needs, have the lowest impact on the dimensions of the teaching process. Although these items have a positive impact on the teaching process, this effect is somewhat weaker than in other aspects of the LMX relationship. The teachers do not expect a great deal of support or understanding from their principals, and their primary concern is a certificate for their work and security regarding school management. Based on this, it can be said that the teachers have shown a high degree of maturity and confidence in their work and their own abilities. In this part, there is also a significant similarity with the results of the influence of

leadership on the teaching process. From the leadership dimensions, in addition to dimension L6 - punishing behaviour (punishment), as a very unpopular form of leadership, dimension L3- the incentive behaviour of the leader also has a very weak influence on the dimensions of the teaching process.

From the dimensions of the teaching process, dimensions TP1 - lesson planning, TP10 - reporting and TP2 - preparing classes are under the strongest impact of the LMX relationship. A quality LMX relationship creates the conditions where it is both natural and normal to have good relationships and communication not only with the principal, but also with colleagues and teaching staff, as well as with pupils and their parents. It is especially important that the dimensions TP1 - lesson planning and TP2 - preparing classes have the lowest average values of all the teaching process dimensions (descriptive statistics, Table 1), proving that raising the quality of the LMX relationship can be used as an effective tool to improve lesson planning and preparing classes. The results of the study of the influence of leadership on the teaching process have proved practically the same result, and it can be concluded that the improvement of the teaching process can be effectively achieved by a broader approach to the overall improvement of leadership behaviour and the LMX relationship.

Like the influence of the leadership dimensions, the LMX relationship items also have the smallest influence on the dimensions of the teaching process TP3 - communication and cooperation, TP8 - learning methods and TP6 - correlation and application of knowledge. The explanation is similar to the previous discussion: these dimensions, perhaps to the greatest extent, include the immediate work of teachers with pupils. Thus, these dimensions largely depend on the teachers themselves, their engagement, their competence and their abilities: the teachers cannot be assisted by the principal in classes and a good relationship with the principal cannot help them.

The results of the correlation analysis between the LMX relationship and the dimensions of the students' personal and ethical development are given in Table 7. All the correlations are statistically significant and positive, and it can be concluded that all the aspects of the LMX relationship affect the personal and ethical development of students. This confirms hypothesis H2b. From the LMX relationship items, LMX6 - the degree of confidence in managerial decisions and LMX7 - efficiency of working relationships with the principal are the most influential on the dimensions of the pupils' personal and ethical development. The existence of confidence in the principal's work and decisions, as well as the efficiency of relations between the principal and teachers, creates stable conditions for the development and progress of the school, as well as a stable internal environment and a system of interpersonal relations. All this contributes to the creation of a school climate which favours the personal and ethical development of pupils. The LMX relationship items which have the smallest influence on the dimensions of pupils' personal and ethical development are LMX2 - the degree to which the principal understands your work problems and needs, followed by LMX5 -

the degree to which the principal is ready to "back you up", even at his own risk. These items are strictly directed at the relationship between principals and teachers, and such details are often not known to pupils. Similar to the case of the influence of the leadership dimensions, the LMX relationships items also have a greater impact on the dimensions of SED – pupils' ethical development rather than on the SPD dimensions – pupils' personal development.

According to Table 8, it can be concluded that the LMX relationship items have a predictive effect on the teaching process dimensions, thus confirming hypothesis H2c. The highest R^2 values occur for dimensions TP1 - lesson planning, TP10 - reporting and TP2 - preparing classes, and the lowest for dimensions TP6 - correlation and application of knowledge, TP3 - communication and cooperation and TP8 - learning methods. These results are almost completely consistent with the results of the correlation analysis. It should also be noted that these results are very close to the results of the regression analysis in which the leadership dimensions are the independent variables, and the dimensions of the teaching process the dependent variables (Table 4). Obviously, the teaching process dimensions are similarly dependent on leadership and the LMX relationships.

The results from Table 9 show that there is a predictive effect of the LMX relationship on the dimensions of pupils' personal and ethical development, so H2d hypothesis is confirmed. It should be noted that the SED dimensions – pupils' ethical development have a higher R^2 determination index compared to the SPD dimensions – pupils' personal development, and that this value is at its highest when the values of this index are observed through the dimensions of the teaching process (Table 8). The conclusion in this part is that the SED dimensions – pupils' ethical development are under the most predictive effect and the strongest impact of the LMX relationship items. This result is consistent with the results of the correlation analysis. The results related to the impact of the LMX relationships are consistent with those gained in some previous research studies (Brimecombe et al., 2014; Erdogan et al., 2004; Somech, 2003).

Conclusion

The study confirmed all eight specific hypotheses. Hence, the basic hypothesis of the research was confirmed: leadership and the LMX relationship have a statistically significant influence on the quality of the teaching process and the personal and ethical development of pupils in elementary schools in Serbia.

All the leadership dimensions are statistically significant and positively influence the teaching process positively. From the leadership dimensions, the most significant positive impact on the dimensions of the teaching process is achieved by dimensions L4 - intellectual stimulation, and then L1 - the leader's core

transformational behaviour. It should also be emphasized that dimension L3 – the leader's incentive behaviour shows a significant predictive effect on the teaching process. All the LMX relationship items are statistically significantly and positively influence the teaching process. The strongest positive impact on the teaching process dimensions is exerted by items LMX1 - the degree of information that the principal is satisfied with your work, followed by LMX6 - the degree of confidence in the principal's decision making. Three dimensions of the teaching process are under the greatest influence of leadership and LMX relationship: TP1 - lesson planning, TP2 - preparing classes and TP10 – reporting. Given that the dimensions TP1 - lesson planning and TP2 - preparing classes have the least average grades from all dimensions of the teaching process (descriptive statistics, Table 1), it is clear that leadership and LMX relationship can significantly contribute to raising the level of quality of these, important dimensions of the teaching process.

Generally, the strongest influence of leadership and the LMX relation on the teaching process dimensions occurs with dimensions that include activities outside the classroom, while the weakest impact exists for those dimensions which are directly related to teaching activities in class. It should be emphasized that both the leadership dimensions and the features of the LMX relationship have a greater impact on the SED dimensions - pupils' ethical development, rather than the SPD dimensions – pupils' personal development. Primary school principals should develop an awareness of their important and key roles in improving the various aspects of organizational behaviour in schools, and then enhancing the quality of the teaching process, and the personal and ethical development of pupils. The research has clearly shown (a few results suggest) that teachers do not receive sufficient feedback on their work. The proposal for principals is to pay more attention to these issues. In general, principals should continuously work on improving leadership and LMX relationships. The application of such defined proposals would contribute to the improvement of the quality of the teaching process as well as the personal and ethical development of pupils. It should be emphasized that these proposals do not require any special financial investments, or too much engagement on the part of principals.

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The effect of the exchange rate system on the economic growth of Bosnia and Herzegovina

Утицај система девизног курса на економски раст Босне и Херцеговине

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Abstract: The subject of the research refers to the analysis of the influence of the exchange rate system in Bosnia and Herzegovina (BiH) on the macroeconomic indicators of economic growth. The goal of the research is to provide a theoretical and analytical overview of the mechanism of functioning and influence of the exchange rate system on inclusive economic growth in the long run. The research was conducted by applying the analysis of relevant literature, method of deduction and econometric calculations of the influence of the exchange rate system on macroeconomic indicators, that is, on gross domestic product, employment and trade balance. The research will offer an answer to the research question: Does the exchange rate system have an influence on the economic growth of Bosnia and Herzegovina in the long run? The results of the research will show the existence of the relation and influence of the exchange rate system on targeted macroeconomic parameters. Conclusions of the research relate to the confirmation of the basic hypothesis that the exchange rate of the convertible mark has bounded affect the growth of gross domestic product, employment and trade balance of Bosnia and Herzegovina in the long run. The contribution of the research is to present to the scientific and professional public the results of the analysis of the influence of the exchange rate system on economic growth, as well as possible alternatives and changes in the system that will enable faster and more stable economic growth in the long run.

Keywords: exchange rate system, gross domestic product, employment, trade balance, economic growth.

JEL classification: F31, F43

Сажетак: Предмет истраживања односи се на анализу утицаја система девизног курса у Босни и Херцеговини на макроекономске показатеље економског раста. Циљ истраживања је да се омогући теоријски и аналитички преглед механизма функционисања и утицаја система девизног курса на инклузиван и одржив економски раст у дугом року. Истраживање је спроведено применом анализе релевантне литературе, методе дедукције и економетријским израчунима утицаја система девизног курса на макроекономске показатеље, односно, на бруто домаћи производ, запосленост и трговински биланс. Истраживање ће понудити и одговор на истраживачко питање: Да ли систем девизног курса има утицај на економски раст Босне и Херцеговине у дугом року? Резултати истраживања показује постојање релације и утицаја система девизног курса на таргетиране макроекономске параметре. Закључци истраживања односе се на потврђивање основне хипотезе да девизни курс конвертибилне марке има утицај на раст бруто домаћег производа, запосленост и трговински биланс Босне и Херцеговине у дугом року. Допринос истраживања је да се научној и стручној јавности представе резултати анализе утицаја система девизног курса на економски раст као и могуће алтернативе и промене система који ће омогућити бржи и стабилнији

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економски раст у дугом року.

Кључне речи: систем девизног курса, бруто домаћи производ, запосленост, трговински биланс, економски раст

ЈЕЛ класификација: F31, F43

Introduction

The choice of the exchange rate system is one of the most complex and most discussed macroeconomic issues. Determining the appropriate exchange rate system for a country is a prerequisite for the success of economic policy measures in terms of increasing production, employment, demand, exports and GDP. Therefore, the choice of the exchange rate, in accordance with the comprehensive characteristics of one country, is an extremely important issue that has long-term implications for economic growth.

The currency board system represents an institution whose role is the money issue that is convertible into foreign currency at a fixed exchange rate determined by law. Its primary role refers to maintaining the stability of the economic system and prices.

After the breakup of the SFRY, the economy of Bosnia and Herzegovina was at an extremely low level of productivity and technological development, and order in the monetary system had to be introduced in order to create conditions for economic growth. Therefore, there was a need for the introduction of a currency board that proved to be effective in the short and medium term for a large number of countries that have found themselves in financial and structural economic crises.

The system in Bosnia and Herzegovina has remained functional until today without any major pressures for its abolition. The currency board system enabled the functioning of a stable economic system without major turbulence and inflationary shocks, but with limited results in terms of economic growth.

The basic problem of the research is sublimated in the question whether the exchange rate system has an influence on the economic growth of Bosnia and Herzegovina in the long run. Using the analytical procedures and the deduction method, the basic hypothesis of the research will be proved: The exchange rate of the convertible mark has affect the growth of gross domestic product, employment and trade balance of Bosnia and Herzegovina in the long run.

The first part of the research refers to the processing of literary materials with relevant data and opinions of the author from the previous research related to the subject of the research. The second part describes the basic characteristics of the currency board system and the experience of the countries that applied it. The third part of the paper is a research chapter where, on the basis of the relevant data available at the time of the research, the basic hypothesis of the paper will be proved using econometric methods. The fourth part contains results of analysis and opinions and estimates related to the

choice of the second, optimal exchange rate system. The fifth part refers to the discussion and conclusion regarding the obtained results of the research.

1. An overview of previous research

The price at which one currency is exchanged for another is called the exchange rate. Unlike the nominal exchange rate, the real exchange rate represents the rate at which one person can exchange goods and services of one country for the goods and services of another country (Mankiw & Taylor, 2006, p. 648). The central issue among many macroeconomists, since abandoning the Bretton Woods system of gold-dollar parity, is the choice of the appropriate exchange rate system. There are three basic exchange rate systems. Fixed exchange rate is the rate defined by the decision of the central bank and does not depend on variations in the foreign exchange market. The fluctuating exchange rate is formed on the foreign exchange market, based on the supply and demand for foreign currency. Allowing the free formation of the exchange rate has never existed, although it has been mentioned in the literature, because the exchange rate is an overly significant instrument to be left to free formation in foreign exchange markets and speculative mechanisms. A managed fluctuating exchange rate is a fluctuating exchange rate with a defined fluctuation range. The task of the central bank, as a monetary authority, is to select the most compatible exchange rate system, in accordance with the economic and other characteristics of the country.

The initial research in the field of the exchange rate system relates to the work of many authors (Mundell, 1961; McKinnon, 1963; Kenen, 1969), who focused on the choice of the exchange rate system, the ability of countries to tackle demand shocks and the benefits of monetary policies. Based on research by Barro and Gordon (1983) into the credibility of monetary policy, literature in the 1980s, according to von Hagen and Zhou (2005), developed the idea that the fixing of the exchange rate significantly helps to create the credibility of inflation policy.

Another general problem in macroeconomic theory, according to Hefeker (1997), is the inability to provide a theoretical or empirical assessment of the cost and usefulness of a particular exchange rate. That is, the problem directly extends to measuring the profit from a stable exchange rate, in terms of the sensitivity of the variability and the inability to isolate the effects of the uncertainty of the exchange rate.

Rusydi and Islam (2005), based on empirical studies, argued that increasing of the exchange rate variability led to a reduction in the volume of international trade. Their hypothesis is based on the assumption that, in the case of international transactions, goods and services are delivered in a time gap between the moment of contracting and delivery, in which the variation of exchange rates significantly affects the volume of trade.

Krugman (1991), Krugman and Miller (1992) and Svensson (1992) agree with the above assertions, but with the modification of the aforementioned theory. Their recommendation for countries when choosing a foreign exchange rate is to opt for the area between fixed and fluctuating exchange rates, known as the target zone system. The main advantage of this system is the limitation of fluctuations in the exchange rate, but that it still allows its minimal oscillations in credible target zones.

On the other hand, Husain, Mody and Rogoff (2005) believe that for countries, and especially for the poor and developing countries that have little access to the international capital market, it is better to fix the value of their currencies. But, when countries become richer and financially more developed, they benefit from shifting more towards fluctuating exchange rate systems.

The key issue of choosing a foreign exchange rate is a trade-off between price stability and economic growth/external competitiveness. Many authors, (Sachs, 1996, Halpern & Wyplosz, 1997; Szapáry & Jakab 1998), dealt with a "conflict" between price stability and an increase in external competitiveness in a short period of time. Halpern and Wyplosz (1997) emphasized the inevitability, for developing countries, of the appreciation of the exchange rate due to the application of a stable price policy. Sachs (1996) strongly believed that the fixed exchange rate was the basis for the commitment of central banks to price stability. After levelling off a high inflation rate, in order to eliminate structural weaknesses and external shocks, the central bank's commitment should go towards the system of fluctuating exchange rates.

After measuring the effects of the exchange rate system on inflation and economic growth, one of the fundamental decisions, according to De Grauwe and Schnabl (2008), is to determine the appropriate exchange rate system that provides economic stability. The choice of the exchange rate should go towards increasing production, employment, income, demand, exports, and thus GDP, while ensuring the inflation rate that does not undermine real economic growth.

The choice of the exchange rate system is a complex macroeconomic issue and is the subject of numerous debates. There is no identical or similar formula for the success of the application of a particular system, but the corresponding economic laws must be taken into account when choosing a foreign exchange rate system. Thus, it is more efficient for the poor and transition countries to adopt a fixed exchange rate system in the short and somewhat medium term in order to suppress inflation and create conditions for economic growth. After reaching the targeted goals, the tendency should be to leave the system of fixed exchange rates allowing the fluctuation of exchange rates, with the possibility of a fluctuation range, in accordance with the goals of monetary policy.

2. Basic characteristics of the currency board system

According to Burda and Wyplosz (2004), Krugman and Obstfeld (2009), Baldwin and Wyplosz (2010), Blanchard (2009), Kovačević (2016), the currency board system represents the institution that issues banknotes and coins, completely convertible into foreign currency that in this case has the character of the reserve currency, and it is fixed at a fixed rate, which is as a rule defined by law. So, its role is, primarily, to maintain a stable economic system of a country, price stability, i.e. low inflation rate.

The currency board proved to be an effective system in lowering the high rate of inflation in the short term, but also the limiting factor in financing the budget deficit by the monetary authorities. However, the inability to finance budget deficits has also its good sides, in terms of controlling the issuing of money, especially without coverage that could be used for the budget deficit, which may have negative implications on the amount of money in circulation and economic development.

The most common reasons why currency boards are introduced relate to problems of macroeconomic equilibrium, transitional reforms, the opening of economies and war conflicts. The system is characterized by simplicity, transparency and precisely defined rules. The currency board, according to Kozarić (2007), is characterized by several important elements, which are:

- automation system,
- credibility,
- fixed exchange rate and convertibility,
- total coverage of the domestic currency with a reserve currency,
- political independence and trust,
- legal regulation.

The currency board system seeks to ensure the convertibility of the domestic currency, macroeconomic discipline, price and monetary stability, stimulation of foreign trade and foreign direct investments, development of financial markets and the banking sector. The method of creating a money supply in the currency board system is similar to the gold standard system. This means that countries can issue as much national money as they have coverage in the currency they are tied to.

However, one of the most important reasons for its introduction in transition countries is the high degree of susceptibility of central monetary authorities to political influences in terms of financing budget deficits and the purchase of social peace which lead to a high inflation rate and, in combination with a low rate of economic activity, have long-term consequences on economic growth and development.

The success of the currency board system depends on other aspects of economic policy, such as the level of initial reserves, flexibility of fiscal policy instruments, interest rate variations, and labor market flexibility. In addition to the emphasized advantages, the currency board also has its disadvantages that negatively affect economic activity. The biggest disadvantages are:

- limitations and the possibility of banning the granting of loans, which may have negative implications for the banking sector;
- disabling the implementation of autonomous and active monetary policy;
- limited protection against speculations on the market.

Criticism of the system mainly relates to the automatism of the system and the lack of freedom of monetary authorities. The Central Bank does not have the ability to implement discretionary monetary policy, so the currency board actually serves as a stabilizer of the foreign exchange rate and prices. Adapting the economy to negative developments in the markets refers to the adapting of economic activity, money supply, level of domestic prices, employment and salaries. What is particularly emphasized in criticisms is the inefficiency of holding reserves, in the sense of disabling the use of available resources that would be available, primarily to the economy.

3. Influence of the exchange rate system on the economic growth of Bosnia and Herzegovina

In order to understand the reasons for the introduction of the currency board in BiH, it is necessary to look at the economic and, first of all, political aspects, which resulted in its introduction. After the breakup of the SFRY, Bosnia and Herzegovina dinar (BHD) was introduced in BiH, as a means of payment in the payment system of BiH. The conversion of the Yugoslav dinar (JUD) to BHD was made at the rate of 1 BHD for 10 JUD. Deposit money was replaced by conversion at a given exchange rate through the Department of Public Auditing. In that period, three currencies were circulating in the territory of BiH. Since there were problems in securing the BHD and its pegging to neighboring currencies, the German mark (DEM) began to be used as a means of payment since the second half of 1994. At the exchange rate, BHD was pegged to DEM, where 350 BHD should be paid for 1 DEM. Under conditions of economic collapse and hyperinflation, there was a need for additional cash, which was not possible to be printed in such amount, so DEM was increasingly used as a means of payment.

After signing the Dayton Agreement, the issues of constituting and functioning of central monetary authorities in BiH were defined. The currency board in BiH and other issues related to the Central Bank of BiH (CBBH) were defined in Annex IV of the Dayton Agreement. Article VII of the Constitution defines the competence of BiH institutions in terms of the implementation of monetary policy. The currency board, as a

model of monetary policy management, has been applied since the founding of the CBBH in 1997.

The currency used in BiH, the Convertible Mark (BAM), was fixedly pegged to the then DEM, and after the introduction of the single European currency, to the Euro (EUR), at the defined exchange rate of 1 BAM for 0.51 EUR. During the years of implementation, the currency board system has to a greater extent successfully achieved the following goals:

- monetary stability,
- strengthening financial stability and discipline,
- low inflation rate,
- attracting foreign investments,
- continuous growth of foreign reserves,
- development of the financial market,
- servicing of the external debt of the country.

The currency board in the conditions of BiH is defined as a rule that anyone who wants to have BAM must buy that money for a foreign convertible currency. When domestic money is bought for some foreign currency, these transactions are executed at the market exchange rate. This means that the monetary liabilities of the CBBH cannot be higher than the CBBH's foreign exchange assets. Taking into account the balance of payments of BiH, that is, foreign trade, the CBBH can issue the amount of domestic money that is proportional to the export. This means that if the BiH economy exports products and services worth 100 EUR, the CBBH can issue 195,583 BAM. The aforementioned money issuing mechanism, in the conditions in which BiH was and still is, represents the most efficient mechanism in terms of controlling the money supply and the inflation rate.

3.1. Influence of the exchange rate system on the gross domestic product of BiH

The subject of the research analysis refers to the determination of the relation and the strength of a relationship between the exchange rate system and the targeted macroeconomic parameters. Foreign exchange rate of BiH, i.e. the effective exchange rate is calculated in accordance with the methodology of the European Central Bank. The calculation of nominal effective exchange rate (NEER) and real effective exchange rate (REER) is performed according to the above methodology.

The nominal effective exchange rate represents the weighted average of the bilateral exchange rates of the convertible mark in relation to the currencies of the most important foreign trade partners. The method of calculating the nominal effective exchange rate, according to the Central Bank of BiH (2018) is:

$$NEER^t = \prod_{i=1}^N (e_{KM,i}^t)^{w_i}$$

where:

- N - the number of countries in the reference group of trading partners,
- $e_{KM,i}^t$ - index of the average exchange rate of the KM currency vis-à-vis the partner country i in the period t (expressed in the number of units of the domestic currency in relation to the foreign currency),
- w_i - weight assigned to the currency of the trading partner i .

Table 1: Nominal and real effective exchange rate of BiH

	NEER	REER
2006	99,28	98,25
2007	98,70	97,07
2008	98,84	99,07
2009	101,95	99,80
2010	101,41	99,01
2011	102,05	99,54
2012	102,65	98,75
2013	103,55	97,02
2014	104,99	96,32
2015	103,92	93,71
2016	105,22	93,15
2017	106,04	93,05

Source: Central Bank of Bosnia and Herzegovina

According to the given methodology, the weightings for the calculation of the effective KM exchange rates are based on the structure of imports and exports of the goods of the processing industry. The usual, i.e. more precise methodology used to calculate the trade weight is the share of imports and exports related to that country in relation to imports and exports to all countries that enter the calculation. However, this methodology is not the subject of calculation because it is not used by the CBBH. The weights, according to the CBBH methodology, reflect direct import competition, direct export competition and export competition in third markets. The selection of countries entering the basket is determined on the basis of the participation of each partner country

in the total external trade of the processing industry of BiH. According to the above criterion, the group of countries for establishing the effective exchange rate index of the KM consists of 21 most important trading partners. These countries make up about 90% of total external trade in BiH's processing products.

The real effective exchange rate is defined as the nominal effective exchange rate that is deflated by the relative prices, i.e. by the Consumer Price Index (CPI) and the Producer Price Index (PPI), in the domestic economy and trading partners' economies denominated in the single currency. The method of calculating the real effective exchange rate, according to the Central Bank of BiH (2018), is:

$$REER^t = \prod_{i=1}^N \left(\frac{d_{KM}^t e_{i,KM}^t}{d_i^t} \right)^{w_i}$$

where:

- N - the number of countries in the reference group of trading partners,
- $e_{KM,i}^t$ - index of the average exchange rate of the KM currency vis-à-vis the partner country i in the period t ,
- t , d_{KM}^t and d_i^t represents deflators vis-à-vis the partner country i
- w_i - represents the weight assigned to the trading partner's currency i .

Calculating effect and influence the effective exchange rate on the targeted macroeconomic indicators of BiH is based on linear regression model. The regression model will analyze the relation and the influence of the independent variable (nominal effective exchange rate) on dependent variables (nominal gross domestic product). The regression model for calculating the influence of an independent variable on a dependent variable is presented in the following way:

$$Y = A_0 + A_1 X_1 + \varepsilon$$

where:

- Y = dependent variable (nominal GDP)
- X_j = independent variable (NEER)
- A_0 = Constant
- A_1 = unknown parameter alongside the independent variable

- ε = an error that reflects all influences on the dependent variable (GDP) that do not stem from an independent variable

The targeted macroeconomic indicators of BiH, based on the available relevant statistical indicators, are presented in Table 2. The author's calculations also included the rate of real GDP growth and the inflation rate in order to compare the obtained results with the stated macroeconomic indicators and to provide more precise results of the overall influence of the exchange rate on the movement of the given macroeconomic indicators.

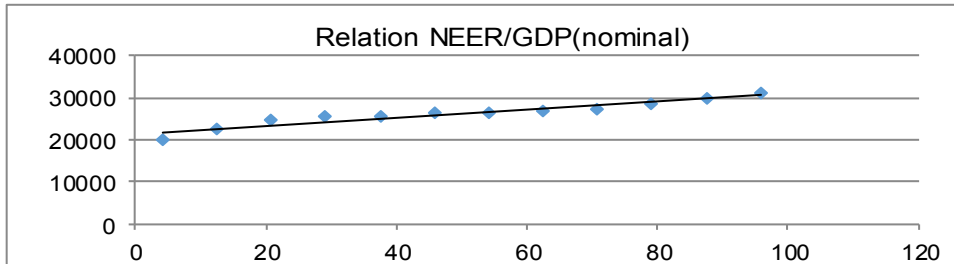
Table 2: BiH macroeconomic indicators

	GDP (nominal)	Current account	Unemployment rate	Rate of real GDP growth	Inflation rate	CPI Index
2006	20.052	-2.041	31.1	5.3	6.1	106.1
2007	22.541	-2.236	28.9	5.7	1.5	101.5
2008	25.511	-4.532	23.3	5.4	7.4	107.4
2009	24.792	-1.945	24.0	-3.0	-0.4	99.6
2010	25.357	-1.787	27.2	0.9	2.1	102.1
2011	26.223	-3.060	27.6	1.0	3.7	103.7
2012	26.215	-2.563	28.0	-0.8	2.1	102.1
2013	26.771	-1.666	27.4	2.4	-0.1	99.9
2014	27.351	-2.362	27.5	1.2	-0.9	99.1
2015	28.577	-1.521	27.6	3.1	-1.0	99.0
2016	29.891	-1.511	25.0	3.1	-1.1	98.9
2017	31.250	-1.499	25.5	2.7	1.2	101.2

Source: Central Bank of Bosnia and Herzegovina

By econometric calculation, based on the determined model, the values of the correlation coefficient and the coefficient of determination were obtained. The value of the correlation coefficient is 0.871. The stated value of the correlation coefficient, of 87.1%, shows a high correlation between the variations of the independent and the dependent variable, i.e. NEER and GDP. In order to obtain a more reliable and more accurate indicator of the influence of variations of dependent on an independent variable, the determination coefficient is calculated.

Chart 1: Scatter plot NEER/GDP



Source: Author's calculation

The value of the determination coefficient of 0.759 shows a high degree of influence of the variation of the independent variable on the dependent variable. This means that 75.9% of the variability of the dependent variable can be explained by the influence of an independent variable. The remaining 24.1% of the variation of the dependent variable is influenced by other macroeconomic and other factors. The scatter plot shown in Chart 1 shows a positive linear relationship between the dependent and independent variables, i.e. NEER and GDP.

3.2. Influence of the exchange rate system on employment

The same model will analyze the degree of a relationship and the influence of an independent variable (nominal effective exchange rate) on the second targeted macroeconomic variable, i.e. the dependent variable (unemployment rate). The regression model for calculating the influence of an independent variable on a dependent variable is presented in the following way:

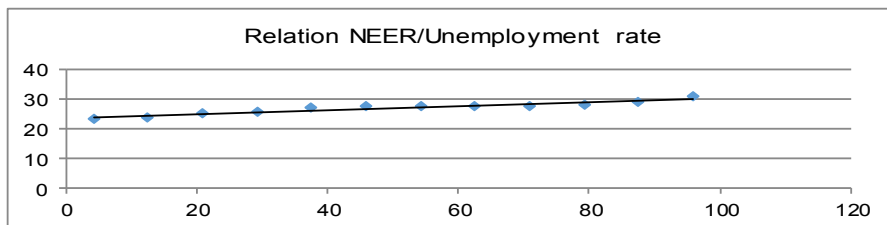
$$Y = A_0 + A_1 X_1 + \varepsilon$$

where:

- Y = dependent variable (unemployment rate)
- X_j = independent variable (NEER)
- A_0 = Constant
- A_1 = unknown parameter alongside the independent variable

- ε = an error that reflects all influences on the dependent variable (unemployment rate) that do not stem from an independent variable

Chart 2: Scatter plot NEER/unemployment rate



Source: Author's calculation

Calculation of the coefficient of correlation and determination determines the strength of a relationship and the influence of the independent on the dependent variable. The value of the correlation coefficient of 0.233 shows the existence of a relationship, but not the strong relationship between the nominal effective exchange rate and the unemployment rate. The value of the determination coefficient of 0.544 was obtained by squaring the correlation coefficient.

The value of the coefficient of determination shows that 54.4% of the variability of the dependent variable can be explained by the influence of an independent variable. This means that the nominal effective exchange rate has an influence, but not a high percentage, on the movement of the unemployment rate. The scatter plot graphically depicts the relationship between an independent and dependent variable.

3.3. Influence of the exchange rate system on the trade balance

The econometric model used in the analysis of the previous macroeconomic indicators will analyze the degree of a relationship and the influence of an independent variable (nominal effective exchange rate) on the dependent variable (trade balance). The regression model for calculating the influence of an independent variable on a dependent variable is shown as follows:

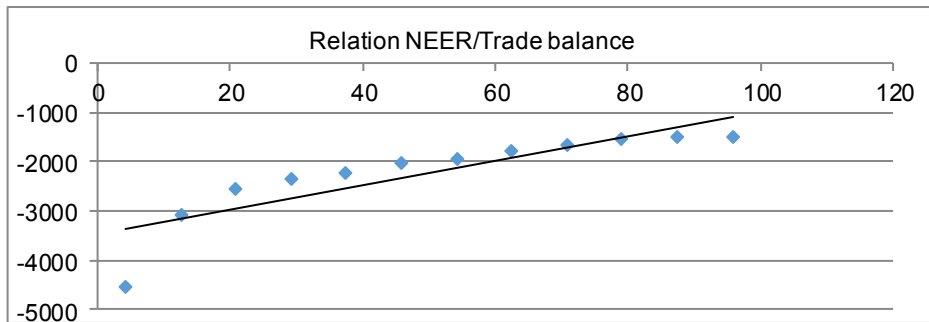
$$Y = A_0 + A_1 X_1 + \varepsilon$$

where:

- Y = dependent variable (trade balance)
- X_j = independent variable (NEER)

- A_0 = Constant
- A_1 = unknown parameter alongside the independent variable,
- $\mathcal{E}$ = an error that reflects all influences on the dependent variable (trade balance) that do not stem from an independent variable

Chart 3: Scatter plot NEER/trade balance



Source: Author's calculation

Econometric calculations have obtained the values of the correlation and determination coefficient, and thus the strength of a relationship and the influence of the dependent on the independent variable are determined. The value of the correlation coefficient of 0.557 shows the relationship between variations in the nominal effective exchange rate and the trade balance. Statistically, the value of 55.7% is close to the limit of 60%, which is considered to be a high correlation between an independent and dependent variable.

The value of the determination coefficient of 0.310 indicates that 31% of the trade balance variation can be explained by the effect of the nominal effective exchange rate. The scatter plot shows the relationship between the variations of the independent and the dependent variable.

Calculations from the model showed the existence of a functional relationship between exchange rate variations and macroeconomic indicators that are the subject of the analysis. The stronger relation and determination of the exchange rate-GDP ratio in relation to the exchange rate-unemployment rate/trade balance ratio does not necessarily indicate a lower degree of relationship of the exchange rate influence on the two listed variables. Other economic as well as other variables considerably influence the variation of these variables, but the significant influence of the exchange rate cannot be excluded.

The analysis of the data from Table 2 on the rate of real GDP growth shows that the growth in the mentioned period was modest with an average growth rate of 2.25%

over a period of 12 years. The value of the correlation coefficient of 62.8% between the real GDP growth and the real effective exchange rate provide an argument of impact of the currency board on narrow sustainable and inclusive economic growth. Although targeted macroeconomic indicators tend to increase their value, which is logical, given the catch-up effect, the analysis in the model proves the influence of the exchange rate on bounded sustainable economic growth in BiH in the long run.

4. Results of analysis and possible alternatives of another exchange rate system

The currency board system in Bosnia and Herzegovina fulfilled the goals it was created for. First of all, it prevented inflation, created macroeconomic stability and created the prerequisites for sustainable economic growth. However, its long-term influence has a destimulating effect on economic trends. First of all, by linking the national currency to the currency of a more developed country, the effects of monetary policy instruments are disabled. Spending foreign exchange reserves in times of crisis and the inability to stimulate the economy is in favor of the claim that a fixed exchange rate is a limiting factor of economic growth. The ability to conduct monetary policy is particularly important in the period of external shocks, when the mechanism of free movement of the exchange rate results in the depreciation of the national currency and thus stimulates exports and increases the import.

Devaluation of the national currency represents a powerful instrument in stimulating and improving the internal and international competitiveness of the national economy. The question is whether, in the present economic and political conditions, devaluation would be an effective stimulator of economic growth. Devaluation depends primarily on the quality of products and the ability of the national economy to provide sufficient export surpluses in line with the price elasticity of demand.

Taking into account the experience of the countries that have passed the currency board period, the next phase in the exchange rate policy should be abandoning the currency board system and moving to a managed-fluctuating exchange rate. Although macroeconomic models and theories explain the mechanism of freely fluctuating exchange rates, such exchange rates are not applied in real economic models. The exchange rate is a sensitive and important issue in the national economy for the countries to leave it to uncontrolled fluctuations and speculative movements in the foreign exchange market.

Therefore, the choice of the appropriate exchange rate should go in the direction of the fluctuating exchange rate but with the fluctuation range. Targeted goal zone of fluctuations should be defined in accordance with the strength of the national economy and its competitive position in relation to the main foreign trade partners. The current exchange rate system, which, as a result of strengthening of EUR, results in the appreciation of the domestic currency in relation to most foreign trade partners, adversely affects the manufacturing sector and the trade balance. Therefore, models of transition into a

fluctuating exchange rate system with a determined fluctuation range must be defined. The assumptions for an effective change in the exchange rate system are the complete political and economic independence of the Central Bank of BiH and its full credibility and confidence in economic entities in the implementation of monetary policy.

Discussion and conclusion

The choice of the exchange rate system is one of the most important economic issues that significantly influences macroeconomic stability and economic growth. The experiences of countries, especially underdeveloped and transition countries, show that the choice of a fixed exchange rate system, in the period of transition to a market economy and macroeconomic instabilities, is the best solution. The fixed exchange rate in the given period enables macroeconomic stability and transaction security. Also, the experience of the countries is to switch from the fixed exchange rate system to the fluctuating exchange rate system in the period after the stabilization of macroeconomic parameters and economic growth.

Bosnia and Herzegovina represents a transitional country in which the currency board system is implemented, as a form of a rigid fixed exchange rate. The currency board system fulfilled the tasks for which it was created. Its action can be divided into two phases. In the first phase, the currency board system provided strong preconditions for macroeconomic stability and economic growth. The stability of prices and the exchange rate and the security of international payments are just some of the goals that have been achieved and which enabled economic growth. However, macroeconomic models and experiences of countries prove that the system has limited results on economic growth in the long run. The currency board system has been implemented for too long in BiH and thus affects the economic growth. By using the econometric calculations in the research, the hypothesis has been proven: The exchange rate of the convertible mark affects the growth of gross domestic product, employment and trade balance of Bosnia and Herzegovina.

The system of the currency board has enabled the movement of inflation rate in targeted frameworks, in line with the ECB's policy, as well as stability and security in relation to exchange rate movements and international transactions, thus creating the preconditions for the arrival of foreign direct investments and economic growth. But the long-term use of the currency board system had a destimulating effect on faster economic growth. Gross domestic product increased significantly, the unemployment rate decreased, as well as the trade balance deficit, but, taking into account the effect of catching up, the results are not impressive. The rate of real GDP growth is rather modest, and this was significantly contributed by the current exchange rate system. In the time of the global economic crisis and other external and internal imbalances, the impossibility to implement monetary policy instruments has significantly affected economic stability and growth. The appreciation of the domestic currency in relation to the main foreign trade

partners in recent years, despite the low rates of economic growth, adversely affects the macroeconomic parameters.

Taking into account all the above stated facts, the conclusion is that the current exchange rate system is one of the factors that significantly hampers economic growth and should be replaced by another system. The system of managed-fluctuating exchange rate should be the next choice of the exchange rate. This system, with narrow limits of exchange rate fluctuations, represents a good precondition for faster economic growth and the possibility of implementing the autonomous monetary policy of the CBBH. Of course, the CBBH must have a high degree of political and economic independence in order to prevent possible abuse, first of all, in the field of money-creating policy. But there is no alternative to a change in the exchange rate if a faster economic growth is desired.

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Influence of digital banking channels on the number of branches in European Union countries and Serbia

Утицај дигиталних банкарских канала на број филијала у земљама Европске уније и Србије

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Abstract: This study analyses the use of digital banking channels in the European Union and Serbia and the effect of their use on the number of branches. The aim of the study is to identify the banking channels, which explain the differences between these countries and to examine the existence of digital channels effect on the variation in the number of branches. The paper applied several statistical methods of multivariate analysis. Using factor analysis, the main factors were identified in the light of clarifying differences between countries, and the multiple linear regression method examined the influence of two independent variables-digital channels, representative for identified factors, on the dependent variable – number of branches. The research results show that there are significant differences between the examined countries in terms of credit card and direct debit services use. The variable that has a significant effect on reducing the number of branches is direct debit services usage.

Keywords: number of branches, digital banking channels, multivariate analysis, European Union, Serbia

JEL classification: G21, M31

Сажетак: У овом раду анализирана је употреба дигиталних банкарских канала у земљама Европске уније и Србији и ефекат те употребе на број филијала. Циљ студије је да се идентификују банкарски канали који објашњавају разлике између поменутих земаља као и да се испита постојање ефеката одређених дигиталних канала на варијације у броју филијала. У раду је примењено неколико статистичких метода мултиваријационе анализе. Уз помоћ факторске анализе идентификовани су главни фактори у светлу појашњења разлика између земаља, а методом вишеструке линеарне регресије испитан је утицај две независне варијабле – дигитални канали, репрезентативне за идентификоване факторе, на зависну варијаблу – број филијала. Резултати истраживања показују да постоје значајне разлике између испитиваних земаља по питању употребе кредитних картица и директ дебит услуга. Варијабла која има значајан утицај на смањење броја филијала је употреба директ дебит сервиса.

Кључне речи: број филијала, дигитални банкарски канали, мултиваријациона анализа, Европска унија, Србија

JEL класификација: G21, M31

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Introduction

With the digitalization of banking channels, there are changes in the expectations of users of banking products and services, and consequently a transition process, from business focused on achieving the profitability of branches to business, whose primary goal is the satisfaction of the end user of banking products and services. According to Bergendahl and Lindblom (2007), the transition process reduces the cost of business, so that the traditional, so-called offline transactions performed within the banks, are largely replaced by electronic transactions, while the communication with clients is shifted from the branches to electronic banking channels. The transition process from traditional to electronic banking channels began in the 1970s. This was particularly influenced by the online offers of products and services by the new entities in the market, such as service providers and virtual banks, resulting in the gradual loss of importance in the physical presence of banks (Byers & Lederer, 2001; dos Santos & Kvanraven, 2017; Jagtiani & Lemieux, 2018; Holland et al., 1998).

The influence of digitalization of banking channels to the transformation of banking network operations was addressed by many authors, whose research focus was on a different form of branch business, changed relationships between employees and clients, new external and internal appearance of branches and optimal number of employees in them (Yakhlef, 2001; King, 2010; Nătescu, 2015; Moutinho et al., 1997). The role of branches is gradually changing from basic transactional business to advisory banking, giving banks the opportunity to get to know clients and their habits, which adds to the complexity of business processes (Nătescu, 2015).

In practice, there are different theories as to what factors determine the type of banking channel customers will use.

Sousa et al. (2015) and Howcroft and Beckett (1996) point to the fact that the complexity of the banking product and the volume of transactions may influence the user's preference for a particular banking channel. Thus, they claim that more complex banking activities including activities performed by users on a larger scale cause a greater intensity in using the traditional distribution channel, while medium volume and medium complex activities are most often done through digital channels, as cheaper substitutes. There are also some who view the use of banking channels from other aspects; for instance, Amromin and Chakravorti (2009) argue that the use of electronic forms of payment will only dominate traditional payment methods in the cases of small-value cash transactions. If the transactions are of higher value, then the substitution effect is not expressed.

Morris and Simoff (2013) claim that the number of cash transactions in branches is annually reduced by 10%. In contrast, the number of electronic transactions in the EU in 2017 increased by 7.9% compared to the previous year, or by 77.86% compared

to 2007. In the same year, payment cards represent the most used banking channel with a share of 52% in the total number of all transactions. (European Central Bank, 2018).

When it comes to the use of electronic banking channels in Serbia, according to the data available to the National Bank of Serbia, there is an increase in banking channels usage of 5.5% in 2017 (National Bank of Serbia, 2018). In model defined by Knežević & Šapić (2018), the impact of legal regulative to the use of electronic trade in Republic of Serbia was examined. Results of conducted research demonstrate that legal framework has positive and significant impact over safety and privacy during the use of e-trade, and that safety and privacy have positive impact on the intensity of e-trade use. Safety, however, has no statistically significant impact on the intensity of e-trade use. In the context of electronic transactions development as well as digital banking channels usage, they propose mutual interaction of state authorities and e-merchants, better information of citizens, as well as better acknowledgement of possibility of online sale by small and medium enterprises.

The goals of this document correlates with the applied research methods and set up hypotheses:

- to determine the difference between the countries of the European Union and Serbia in terms of using the banking channels as measured by the number of transactions completed;
- to identify the major component with the greatest impact on the number of banking branches.

The paper is structured as follows: the introductory part of the paper is followed by a section with a review of the scientific literature, which presents the views and research on the relationship between traditional and digital banking channels. The section Data lists the data sources and the section Methodology describes the scientific methods used in the analysis. This is then followed by the presentation and discussion of the research results, for each multivariate analysis technique respectively applied in the paper. Conclusions are presented at the end of the paper.

1. Literature review

Some empirical studies are based on the fact that the traditional banking channel and the digital channel are two independent banking channels, so accordingly, the theoreticians are concerned with their complement-substitute relationship. Researchers that share the opinion that banking channels have complementary relationship support a multi-channel banking trend.

In this regard, the review of the prevailing literature is structured to show studies that have explored (1) the complementary effect between digital and traditional channels (Campbell & Frei, 2010; Rakita, 2016; Calisir & Gumussoy, 2008), (2) the substitution

effect examined through the increased use of electronic transaction devices (Martikainen et al., 2015; Columba, 2009; Drehmann et al., 2002; Hasan et al., 2011; Humphrey et al., 1996).

Applying the statistical analyses of propensity score matching (PSM) over a sample of 80,054 online banking users, Campbell and Frei (2010) concluded that the use of this banking channel has led to an increased number of transactions that occur in the branches. Thus, they concluded that the importance of branches for the users of banking products and services does not decline as a result of digitization, whether there are active, inactive or even passive users, in question. In findings from Rakita (2016), it is mentioned that the positive ratio in using traditional and digital banking channels is present only with active users of products and services, where she states that there is a 60% probability that the customers using some of the digital banking channels will, at least once a week, use some form of traditional banking service (such as going to the bank counter), more often than the clients who do not use these services at all. Calisir and Gumussoy (2008) focus on internet banking and compare it with other banking channels (phone banking, ATMs, wireless application protocol (WAP), branches, EFT POS terminals and bank branches in stores). The results of their cluster analysis indicate a high level of complementarity between internet banking and branches.

Alternatively, those authors who have dealt with digital technologies are advocating the views on reducing the number of branches as a result of digitalization. The banks in those states directly control the use of digital banking channels through the availability of terminals, and thus indirectly affect the number of branches.

Some authors (Humphrey et al., 1996; Drehmann et al., 2002; Martikainen et al., 2015; Columba, 2009) argue that countries with higher POS availability also have the higher use of electronic payment methods, including payment card transactions. On the other hand, the greater availability of ATMs encourages the use of electronic forms of payment but also influences the increased use of cash, which we associate with the branches. Then again, Hasan et al. (2011) testify to the impact of ATMs on greater success in the bank's operations but also of the reduction in the number of branches.

Taking into account the research conducted regarding the relationship and the impact of digital banking channels on the number of branches, presented in the previous section, it is noted that the banking network is changing its role due to changes in customer preferences over time, as well as due to the modernization of the banking system in the light of the digitalization of the channels for distribution of its services. Accordingly, the hypotheses that will be tested in this research were derived:

H1: The independent variable with the highest factor score from factor 1 (credit card transactions) has the effect of reducing the number of branches.

H2: The independent variable with the highest factor score from factor 2 (direct debit transactions) has the effect of reducing the number of branches.

H3: In countries where factor 1 is high (POS terminal availability and payment card usage), smaller number of branches is obvious.

2. Data

The analysis of the impact of digital banking channels on the presence of branches was carried out for the European Union Member States and Serbia, which makes a total of 29 cases. The data for the European Union, for analysis purposes, were taken from the European Central Bank's database presented in the Payment Transaction Report for 2017 (European Central Bank, 2019). Data for Serbia were collected on the website of the National Bank of Serbia (The National Bank of Serbia, 2018) and those data related to the number of electronic transactions were downloaded from the section Payment system, Statistics part, while data on the number of branches were taken from the quarterly report for the banking sector in Serbia, also for 2017 (IV quarter).

A total of seven variables were used in the study. The first six variables represent independent variables, whose usage is represented over volume of transactions on annually level. The last variable is dependent variable. The overview of the variables is given in Table 1 below.

Table 1. Observed characteristics

Variable name	Description
(1) Electronic credit transfers	Submissions by telefax or other means, such as automated telephone banking transformed into electronic payments, standing orders submitted in paper-based form but executed electronically, credit transfers initiated on ATM, online transactions performed using banking applications.
(2) Debit/delayed debit card payments*	Payment transactions performed with cards with a debit or delayed debit function at a physical terminal or via other channels. Number of card payments with cards issued by resident PSPs
(3) Credit card payments*	Payment transactions performed with cards with a credit function at a physical terminal or via other channels. Number of card payments with cards issued by resident PSPs
(4) Direct debit payments	Payment service, which perform debit on the current account based on the written consent given by the account holder to the payer. Number of domestic and cross-border payments
(5) POS transactions	Number of card payments at POS terminals: at terminals provided by resident PSPs with cards issued by resident PSPs / issued by non-resident PSPs
(6) ATM transactions	Number of ATM cash withdrawals and cash deposits: at terminals provided by resident PSPs with cards issued by resident PSPs / issued by non-resident PSPs
(7) Number of business units-branches	Number of credit institution's offices legally incorporated in the reporting country. Number of branches, exposed counters etc.

* Except cards with an e-money function only.

Source: the author's overview

The European Central Bank's Payment Transaction Report lacks a value for the specific variable. Those are:

- Variable 2, missing for Portugal.
- Variable 3, missing for Spain, Italy, Netherlands and Portugal.
- Variable 4, missing for Denmark, Latvia, Lithuania, Estonia, Malta and Finland.
- Variable 5, missing for Malta.
- Variable 6, missing for Finland.
- Variable 7, missing for the United Kingdom.

In such cases, an average value for that variable was calculated and used.

Data processing was done via statistical program.

In order to examine the relationship between variables and differences between countries regarding the use of electronic channels and branches, several methods of multivariate statistical analysis have been used.

3. Methodology

In this paper, the first method to be applied onto the data set is an exploratory factor analysis in order to identify the main factors which explain as much variation among the data as possible. The first step in factor analysis is determining the sample size. According to Costello and Osborne (2005), there is a large percentage of researchers (almost one-sixth) applying factor analyses using relatively small samples where ratios are only 2:1 or less. They also found that 62.9% of the researchers performed analyses with subject to item ratios of 10:1 or less, which is still-prevalent rule-of-thumb.

For measuring sampling adequacy, as precondition for factor analysis, the author used standardized Kaiser–Meyer–Olkin (KMO) and Bartlett's test. According to Hair et al. (2010); Pallant (2007); Tabachnick and Fidell (2007), if KMO is greater than 0.6 and the Bartlett's Test of Sphericity (BTS) is significant at $\alpha < .05$, then factorability of the correlation matrix is assumed.

Factor analysis is based on the correlation matrix of the variables involved, the calculation of which is the next step in the paper. This field is also very discussed among the authors. When talking about minimum level of correlation, the coefficient r must be .30 or greater (Tabachnick & Fidell, 2007). Authors Hair et al. (1995) use different rule-of-thumb for variable categorizing, where ± 0.30 is minimal, ± 0.40 is important and ± 0.50 is practically significant.

Also, decision on the number of factors can be made considering different criteria. The most used is latent root method, which includes factors that have eigenvalue greater than 1 (Kaiser's criterion, 1960) (find in Yong & Pearce, 2013; Braeken & Van

Assen, 2016). According to authors Velicer & Jackson (1990) and Hayton et al. (2004), there are alternative and more reliable methods such as Cattell's (1966) scree test, Velicer's MAP criteria and parallel analysis (PA). Considering the goals of this research, the author decided to base the decision regarding number of factors on Kaiser's criterion.

The extraction of the common factors was done using the Principal Component Analysis method within Factor analysis. It is a simple technique used for variable reduction by creating combinations that retain as much of the original measures' variance as possible (Conway & Huffcutt, 2003; Schmitt, 2011). In order to make the implication of each factor clearer, they must be rotated. In theory and praxis exist several models, and they fall in two categories: orthogonal and oblique. In this paper, the author decided to apply Obligue method – Direct Oblimin, bearing in mind that between different kinds of digital channels, is always some kind of correlation, even low.

Factor analysis is calculated to reduce the number of variables which are then subject to multiple linear regression method. The multiple regression analysis was used in the study to describe the relationship between one dependent variable and multiple independent variables. Independent variables with the highest impact factor (factor loading) were previously extracted from each identified factor.

Before setting the equation and applying the regression analysis in this paper, it is necessary to examine the presence of multicollinearity between variables of the model. Multicollinearity occurs between the independent variables that are used to predict the dependent variable in the analysis results. In that sense, the author performed Variance Inflation Factor (VIF) test, as well as Tolerance (TOL) test on Factor 1 and Factor 2. The variables whose VIF values are greater than 10 should not be included in the model. Also, the value of TOL should be higher than 0.1 (Lin, 2008; Račić & Barjaktarović, 2016; Salmerón Gómez et al., 2016).

Another element that was checked is autocorrelation between independent variables. Durbin-Watson test is used for this purpose. If condition of $1.60 < d < 2$, the first order autocorrelation is not present. For a small sample, some authors suggest the rule-of-thumb $1 < d < 2.25$ (Wang & Jain, 2003).

By obtaining the regression coefficients, it will be possible to deduce in which independent variables the regression is present when it comes to affecting the number of branches.

4. Results and discussion about the results

In the following section, the author presents findings from the survey according to the methodology in the previous section, respectively.

Factor analysis is applied on 6 independent variables using 29 items, which is nearly a proportion of 6:1. It can be concluded that the sample size in this analysis is acceptable.

Calculated KMO is .735. Bartlett's test shows value of 262.497, with $df=15$ and Sig .000. These results confirm that the sample is adequate and provide minimum standards for performing factor analysis (Hair et al., 2010; Pallant, 2007; Tabachnick & Fidell, 2007).

Correlation matrix showed that the minimum level of correlation condition between all variables included in the model is satisfied (Tabachnick & Fidell, 2007). Bearing this fact in mind, the author kept all variables in the model. They are shown in Table 2 below.

Table 2. Correlation matrix

<i>Fornell-Larcker</i>			
	Employee CSR	Envi Perf	Fin Perf
Employee CSR	0.890		
Envi Perf	0.633	0.949	
Fin Perf	0.403	0.572	0.841
<i>HTMT</i>			
	Employee CSR	Envi Perf	Fin Perf
Employee CSR			
Envi Perf	0.701		
Fin Perf	0.425	0.637	

Source: Author's calculation

After all prerequisites for applying factor analysis had been fulfilled met, the author performed calculation of the model.

Factor analysis identified two factors, of which the eigenvalues and percentage of data variations are shown in Table 3. For both factors, the eigenvalues are bigger than 1 (Kaiser's criterion, 1960). For factor 1, the eigenvalue is 4.54, while for factor 2 it is 1.146, implying that factor 1 has a more significant effect on differences between countries.

The factors cumulatively explain 94.77% of the variation in the data in comparison to the raw data. In other words, a total of 94.77% of variations used in the banking channels (the number of transactions on different banking channels) in the countries of the European Union and Serbia will be explained by two factors. Considering that the share of the first major component in the total variance is 75.67%, it follows that majority of the variations in data are explained with factor 1. Factor 2 explains only 19.10% of data variations. For the purposes of this paper, the author kept both factors.

Table 3. Eigenvalues and percentage of data variations

Factor	Initial Eigenvalues			
	Total	% of Variance	Eigenvalue Cumulative	Cumulative %
1	4.540	75.665	4.540	75.665
2	1.146	19.101	5.686	94.766

Source: Author's calculation

From the two extracted factors, it is necessary to identify the variables with the highest impact factor. Factor loadings are shown in Table 4 below. The presented values are sorted by size and higher than 0.5.

Table 4. Pattern Matrix^a

	Component	
	1	2
Credit card payments	1.055	
POS transactions	0.905	
Debit/delayed debit card payments	0.896	
Direct debit payments		0.977
Electronic credit transfers		0.963
ATM transactions		0.616

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.^a

a. Rotation converged in 6 iterations.

Source: Author's calculation

Factor 1 has a high positive loading on the following variables: credit card transactions (1.055), debit/delayed debit card transactions (.896) and POS transactions (.905). Loading for variable credit card transactions exceeds 1, which is a typical situation when using Direct oblimin and Pattern matrix. This is also a variable with highest impact factor within factor 1.

Factor 2 has high loading on the following variables: direct debit transactions (.977), electronic credit transfers (.963) and ATM transactions (.616). The one that has the highest factor loading is direct debit transactions.

Factor analysis findings have shown that factor 1 has a high load of POS transactions and payment card variables, on the basis of which these three banking instruments are brought into complementary relationship. These findings support Hypothesis 3, which is consistent with the findings of Humphrey et al. (1996); Drehmann et al. (2002); Martikainen et al. (2015) and Columba (2009).

This shows that the biggest differences in countries are primarily the result of different use of credit cards and subsequently differences in debit direct transactions.

An overview of factor scores by countries is given in Table 5 below.

Table 5. Factor scores by countries

	Factor Scores	
	Factor 1	Factor 2
Belgium		
Bulgaria	-0.4805	-0.5981
Czech Republic	-0.3078	-0.3314
Denmark		
Germany		4.1874
Estonia	-0.4772	-0.3640
Ireland		-0.4831
Greece	-0.3434	-0.4739
Spain		0.5019
France	1.6506	1.9810
Croatia	-0.4513	-0.5236
Italy		
Cyprus	-0.4921	-0.6354
Latvia	-0.4990	-0.3549
Lithuania	-0.4840	-0.3516
Luxembourg	-0.4352	-0.6310
Hungary	-0.3528	-0.4923
Malta	-0.3600	-0.4136
The Netherlands		0.4440
Austria	-0.3355	
Poland	0.3654	0.3378
Portugal		-0.3651
Romania	-0.3635	-0.4995
Slovenia	-0.4761	-0.5754
Slovakia	-0.4326	-0.4883
Finland		
Sweden		
United Kingdom	4.6715	1.3024
Serbia	-0.4627	-0.5722

Source: Author's calculation

The signs of the loadings show the direction of the correlation and do not affect the interpretation of the magnitude of the factor loading or the number of factors to retain (Kline, 1994). Values with sign (-) show opposite direction from the factor they belong to.

For some countries in Table 5, there are no values. Tabachnick and Fidell (2001) cite .32 as a good rule of thumb for the minimum loading of an item, which equates to approximately 10% overlapping variance with the other items in that factor. Countries with loadings lower than .32 are excluded from the table.

Based on the analysis of country-by-country factor scores, it is noted that the loading for factor 1 is very strong for the United Kingdom (4.67), which means that this country bestows importance on credit card transactions. The UK Banking Practice Report for 2018 (UK Finance, 2018) states that credit card use has exceeded the cash use (which has been attributed to the branches) for the first time. In France, credit card usage is also high (1.6506). For other countries, loadings go from -0.30 to -0.57 based on which it can be concluded that the number of transactions on digital channels is a on much lower level and that is why loadings have opposite direction for this factor.

Germany certainly stands out for its significant number of direct debit payments. It should therefore come as no surprise that factor 2 is much more loaded in Germany than in other countries. Also, France and United Kingdom have slightly lower factor scores than Germany, but these scores are at a much higher level in comparison to other countries. France stands out from other countries because of its relatively equal level of loadings for both factors. However, United Kingdom differs because of its high loading for factor 1 and smaller loading for factor 2.

Looking at the factor loadings for Serbia, it is a fact that both are with negative signs (-0.4627 and -0.5722). Loadings are similar for factor 1 and factor 2 in countries of the former member state of the Socialist Federal Republic of Yugoslavia (SFRJ) which are Croatia (-0.4513 and -0.5236) and Slovenia (-0.4761 and -0.5754).

Bearing in mind that the increasing preference of users towards digital channels reflects in a sense the decline in the influence and importance of branches in the banking market, and consequently the decline in their prevalence, in this part of the document, the emphasis is placed on examining the existence and strength of this connection. For this purpose, the multiple linear regression method was used. Two independent variables (credit card use and direct debit usage) were taken into the model, on the basis of factor analysis, while the number of branches remained the dependent variable. The aim of the analysis process is to omit the influence of variables that are not so dominant in the group, that is, to focus on those variables that best reflect the differences of the countries surveyed in the banking market.

The factor analysis reduced the total of 7 characteristics to only 2 major variables (factors) that will be used for additional data analysis, through regression analysis. In that sense, the author examined the existence of multicollinearity between those variables. This was done using VIF and TOL analysis.

The results are shown in Table 6 below.

Table 6. Checking the existence of multicollinearity in the model

Model		Tolerance	VIF
1	Credit card payments	0.890	1.123
2	Direct debit payments	0.890	1.123

a. Dependent Variable: Number of branches

Source: Author's calculation

We conclude that VIF and TOL values for both Factors are in defined ranges, which means that there is no existence of multicollinearity and that Factors can be included in the model. These results are already confirmed in the papers of authors Lin (2008), Račić and Barjaktarović (2016), Salmerón Gómez et al. (2016).

Also, Durbin-Watson test shows that there is no autocorrelation between factors. Its value is 1.452. Considering the fact that this is a small sample, the result is in the limits (Wang & Jain, 2003). The result is shown in Table 7 below.

Table 7. Checking the existence of autocorrelation in the model^b

Model	Durbin-Watson
1	1.452 ^a

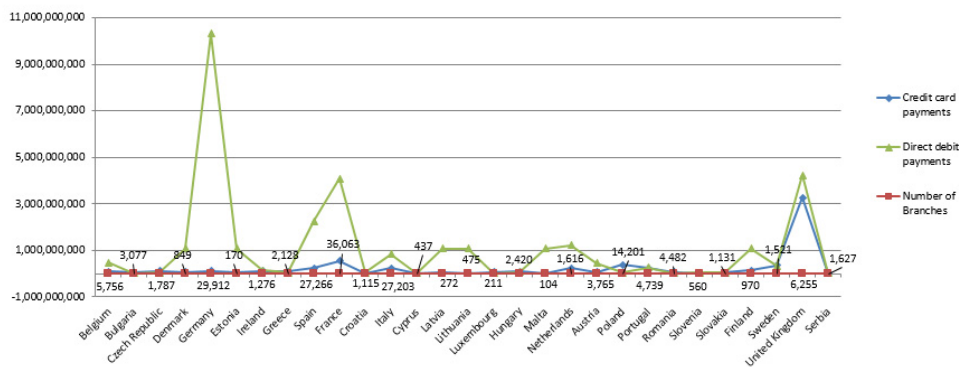
a. Predictors: (Constant), Credit card payments, Direct debit payments

b. Dependent Variable: Number of branches

Source: Author's calculation

Before exploring the digital channels influence on branches, in the chart is shown usage trend of these three variables, namely, two independent variables representing the factors with influence, and the dependent variable.

Chart 1. Comparative overview of the use of banking channels by country



Source: Author's calculation

In Chart 1 above, a comparative overview of the use of two digital channels versus number of branches, observed in the countries of the European Union and Serbia. The first independent variable – number of credit card transactions - is highlighted in blue on the chart, while the second independent variable – number of direct debit transactions - is highlighted in green. The number of branches is shown in red and they are right next to the abscissa, due to very low values compared to the number of credit card transactions and direct debit. This is why the branch number information is visible in the chart itself.

Looking at the relationship between the first independent variable with the highest factor loadings within the factor 1 and the number of branches, we note the following in the chart: countries with high level of credit card payments are also countries with an average number of branches. All other countries have middle or lower level of credit card payments but above-average number of branches. United Kingdom has a higher number of credit card transactions than other European Union countries or Serbia, and an average number of branches. This country has the highest factor score for factor 1. On the contrary, France, Spain and Italy have middle level of credit card payments, but among the highest number of branches in European Union.

Looking at the relationship between the second independent variable and the number of branches, we note the following in the chart. Countries with high level of direct debit channel usage are also countries with a large number of branches. All other countries have middle or lower level of direct debit usage and only a couple of thousands of branches or less. For example, Germany, France, Spain and United Kingdom belong to the first group-group with high level of direct debit transactions and number of branches. These were the countries that had the highest factor score for factor 2. These countries are the most developed in European Union.

Serbia has small values for both independent variables in relation to other European Union countries. When comparing credit card channel usage in Serbia, there are Croatia, Malta and Slovenia with lower level of transactions, which is confirmed by their similar loadings. Bulgaria is only country with lower level of direct debit channel usage comparing to Serbia.

Results of regression analysis are presented in Table 8 below.

Table 8. Regression model ^{a, b}

R= .646 ^a / R Square=0,417 / Adjusted R Square=0,372 Std. Error of the Estimate=8079.447					
	B	Std. Error	Beta	t	Sig.
(Constant)	3041.990	1730.682		1.758	0.091
Credit card payments	-1.378E-06	0.000	-0.081	-0.508	0.615
Direct debit payments	3.268E-06	0.000	0.668	4.210	0.000

a. Predictors: (Constant), Direct debit payments, Credit card payments

b. Dependent variable: Number of branches

Source: Author's calculation

The regression model can also be represented by the equation number 1 (Hosmer et al., 2000):

$$y = b_0 + b_1 * X_1 \quad (1)$$

from which were derived equations 2 and 3 with two independent variables:

$$y = b_0 + b_{i1} * X_1 + b_{i2} * X_2 \quad (2)$$

$$y = 3041.990 + (-0.000001378179) * X_1 + 0.000003267580 * X_2 \quad (3)$$

The X_1 parameter used in this model is the first factor and it is credit card payments and the X_2 parameter in this model is another factor, namely, direct debit payments.

Free member B_0 (Intercept) shows the expected value of the dependent variable if the independent variables are 0. In this case, the free member is 3041.990, so it can be concluded that the number of branches would be 3.041 if the number of credit card transactions and the number of direct debit transactions fell to 0, that is, if the banks would stop to use these banking channels.

The correlation coefficient (R), which shows the level of linear connection between the dependent and independent variables, has a value of 64.6%, indicating a medium-strength relationship between these variables. This is confirmed by the beta indicators from Table 8 (B_1 and B_2), with values 0.000001378179 for the first variable and 0.000003267580 for the second variable, respectively. The results show that 41.7% of the variations in the number of branches R^2 are explained by a linear relationship between the dependent variable and the two independent variables.

Parameter testing is performed by comparing the p-value from the last column for each independent variable with level of risk ($\alpha = 0.05$).

Variable X_1 has a p-value of 0.615, that is, a value greater than the defined level of risk, implying that the use of credit cards has no significant effect on the number of branches. *Hypothesis 1* is declined.

Variable X_2 has a p-value of 0.000, and is a statistically significant variable because the level of risk is less than 0.05. Direct debit transactions have been found to have an impact on the number of branches. *Hypothesis 2* is confirmed.

Conclusion

Based on the results of the conducted research, it can be concluded that all the goals defined at the beginning of the paper were achieved.

The methods used in the document clearly illustrate the state and level of development of the European Union member states and Serbia regarding the use of banking channels. Also, the relationship between banking channels in the mentioned countries was identified, and the influence of the two most significant digital channels (two factors) on the number of traditional banking channel-branches, was examined.

(1) The results of factor analysis show that two factors reflect 94.766% of the variation in the use of banking channels. The variable that explains the majority of dif-

ferences between countries is representative for factor 1 and it is credit card transactions. Variable from the second factor is direct debit transactions. Further analysis revealed that factor 1 was expressed primarily in the United Kingdom and then in France. Factor 2 dominates in France, Germany, Spain and United Kingdom.

Countries with above average POS terminal availability and payment card usage have average or smaller number of branches, which coincide with results in other empirical studies shown in this paper. Countries with high level of direct debit channel usage are also countries with a large number of branches. All other countries have middle or lower level of direct debit usage and only a couple of thousands of branches or less.

(2) The multiple regression method demonstrated the presence of a strong correlation between the independent variable from the factor 2, which is usage of the direct debit banking channel, and the number of branches, considering that this independent variable explains a significant percentage of variations in the number of branches. The relationship between factor 1 and the dependent variable is negative and strong, which leads to a smaller effect of factor 1 on branch variability. The result shows correlation with studies regarding substitutive relationship between channels.

Although there is a downward trend in the number of branches in Europe, as a result of the digitalization of banking channels and the ongoing review of bank efficiency, they will not disappear. The DBR Media LLC research results show that, despite these trends, branches continue to be built. In fact, in this year's survey, 41% of financial executives responding indicated that they will be increasing their branch network in 2017, which is 6% higher than in 2016. When it comes to the branches in Serbia, banks should expect change in the way that branches work with clients, as well as a reorientation of their business to products sales. Transaction services will increasingly move to digital banking channels. As a result of the merger of banks, which has been active in the last few years in the banking market in Serbia, branches are being closed; however, there is still insufficient use of digital banking channels to attribute branch closure to the consequence of their use.

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A multi-criteria approach to the selection of the optimal investment alternative with software support¹

Вишекритеријумски приступ избору оптималне инвестиционе алтернативе уз софтверску подршку

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Abstract: This paper proposes some possibilities of implementing information technology in investment management. The paper deals with the choice of the optimal investment alternative out of a series of alternatives compared, evaluated in the system of different and heterogeneous criteria with different requirements for the extremization with different relative significance. The analysis of the criteria was performed from the aspect of production capacities, investment value, the required number of employees, the internal rate of return, investment maintenance, as well as the logistical and technological levels. The choice of the optimal alternative was made by the multicriteria decision-making methods with developed software support for this purpose. The results indicate the agreement of the optimal alternative, i.e. the rank of the compared alternatives, through the parallel application of the two multicriteria decision methods. The compromise programming method and a modified approach to the Promethee multicriteria decision-making method that allows the analysis of an unlimited number of different preferential functions are applied in the paper. The application of certain preferential functions is analyzed from the point of view of individual criteria applied in this paper. The paper presents the general options for choosing investment alternatives from several most significant aspects, with an analysis of the preferences of the individual criteria. The application of the presented methodology enables a sophisticated approach to criteria analysis. On the other hand, the software solution developed for this purpose enables simplicity and applicability in practical conditions of use.

Keywords: investment management, information technology, decision support systems, decision-making and optimization, compromise programming

JEL classification: C61, D25, G11

Сажетак: У овом раду су приказане неке могућности примене информационих технологија у управљању инвестицијама. Рад се односи на избор оптималне инвестиционе алтернативе од низа упоређиваних,

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оцењених у систему различитих и разнородних критеријума са различитим захтевима за екстремизацијом са различитим релативним значајем. Анализа критеријума је извршена са аспекта производних капацитета, вредности инвестиције, потребног броја ангажованих радника, интерне стопе рентабилности, инвестиционог одржавања као и логистичког и технолошког нивоа. Избор оптималне алтернативе је извршен методама вишекритеријумског одлучивања уз развијену софтверску подршку за ту намену. Резултати указују на сагласност оптималне алтернативе, односно ранга упоређиваних алтернатива упоредном применом две методе вишекритеријумског одлучивања. У раду је примењена метода компромисног програмирања и примењен је модификован приступ Promethee методе вишекритеријумског одлучивања која омогућава анализу неограниченог броја различитих преференцијских функција. Примена појединих преференцијских функција је анализирана са аспекта појединих примењених критеријума у овом раду. Рад приказује опште могућности избора инвестиционих алтернатива са више најзначајнијих аспекта, уз анализу преференција појединих критеријума. Применом приказане методологије омогућава се софистицирани приступ анализи критеријума. Са друге стране, за ту намену развијено софтверско решење омогућава једноставност и применљивост у практичним условима коришћења.

Кључне речи: управљање улагањима, информационе технологије, системи за подршку одлучивању, доношење одлука и оптимизација, компромисно програмирање

ЈЕЛ класификација: C61, D25, G11

Introduction

Investment is one of the most important factors in managing the development process of manufacturing company. Investment management decisions have a long-term effect on the business, involve a large volume of financial investments and have a high risk for the entire business. It can rightly be considered that financial investment is one of the biggest decisions in order to modernize and expand production capacities. Therefore, special attention should be paid to this issue.

The analysis of the production process from an economic point of view is a key factor in considering the required financial investments (Locke & Wellhausen, 2014). Many authors rightly attach great importance to this issue, starting from the regional aspect (Winden, Berg, Carvalho & Tuijl, 2010) to analyzing the dynamics of the economic component of production (Landesmann & Scazzieri, 2009).

Paul van Loon (2012) emphasizes the connection between production, finance and investment as an indispensable and comprehensive activity of production management. In this regard, many authors highlight various aspects of investment, starting with production development (Bellgran & Säfsten, 2009), the role of foreign investment in the economy (Kowalewski & Weresa Herausgeber, 2008) macro and international economic (Piros & Pinto, 2013).

When analyzing investments, it is crucial to find the optimal investment alternative. The application of operational research methodologies in this regard is of particular importance (Piros & Pinto, 2013; Ravi Ravindran, 2016; Ravi Ravindran, 2008; Tomlinson & Kiss, 2013; Bell, Warwick & Galbraith, 2013). Sodhi and Tang (2010) emphasize the necessity of applying operations research in the whole of management science by analyzing various approximation theories and mathematical methods.

Making business decisions for the purpose of making investments is the choice of the optimal alternative based on a number of possible ones. Also, the optimal alternative needs to be determined on the basis of a number of criteria, basically opposed, expressed in different units, with different requirements for maximization and minimization. The problem is further compounded by the different meanings of certain criteria that need to be considered. It is practically possible to make such business decisions only by applying multi-criteria optimization and various scientifically based decision making methodologies (Shapira, 2002; Crozier, Ranyard & Svenson, 2002; Adair & Adair, 1999; Cook, Noyes & Masakowski, 2007; Roth & Mullen, 2002; Streifer & Goens, 2004). Al-Shammari and Masri (2015) point out the importance of modern methodologies for decision making in finance as well as the analysis of their theoretical and methodological achievements.

In choosing the optimal alternative, this paper used multi-criteria decision-making methodologies Compromise Ranking (Opricovic, 1992) and PROMETHEE (Brans & Vincke, 1985). Due to the distinctive methodology of preference expression according to individual criteria, the emphasis was placed on the PROMETHEE method, which enables visual display of preference expression through graphical preference functions. In contrast to the original methodology, developed by Brans and Vincke, which allows for the application of six generalized preference functions, a modified PROMETHEE method was applied in the paper using the Universal preference function (Radojicic, Zizovic, Nesic & Vesic Vasovic, 2013). With this approach it is possible to generate an unlimited number of functions, which can express the preference of the decision maker in a much more sophisticated way.

Contemporary requirements of decision-makers, on the one hand, relate to the application of increasingly complex multi-criteria decision-making methodologies, while, on the other hand, the requirements relate to their simpler application, aligned with practical needs. In this respect, decision support systems (Burstein & Holsapple, 2008; Power, 2002; Frederic, 2008; Ravindranath, 2003; Herasymowych & Senko, 2008; Janakiraman & Sarukesi, 2008) and the use of information technology are inevitable.

Numerous authors emphasize the importance of applying multi-criteria optimization when choosing the best investment alternative, confirming the need to take into account a number of different relevant criteria (Puska, Beganovic, & Sadic, 2018). Suganthi (2018) emphasizes the practical importance of applying the integrated fuzzy AHP, VIKOR / DEA methodology in the broader field of investment decision making. One of the proposals for improving the application of multi-criteria optimization that affects the calculation of economic efficiency of investments refers to the research of its application under uncertainty (Shvetsova, Rodionova, & Epstein, 2018). Research shows the successful application of multi-criteria optimization in choosing the best investment alternative using different methodologies such as

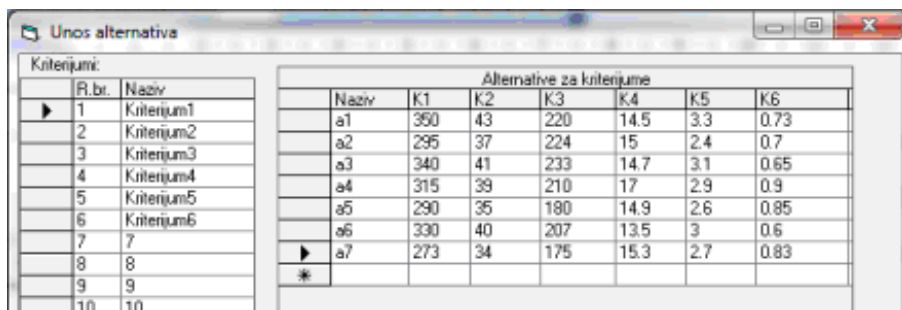
ELECTRA (Kozik, 2017), fuzzy approach (Sudharsan, & Ezhilmaran, 2016; Rebiasz, & Maciol, 2015) to a systemic approach using graphic interpretation of results (Szafranko, 2017). The application of this methodology can also refer to certain segments - stocks, bonds, mutual funds, which individually influence the choice of the best investment alternative (Chen, Wang, & Yu, 2014). One of the interesting approaches includes a psychological approach in the application of multi-criteria decision-making methods, which refers to the risk profile (Looney, & Hardin, 2015). This paper emphasizes the importance of the application of information technology in support of multi-criteria decision-making, which is confirmed by numerous authors proving the connection between information quality and investment efficiency (Moradi, Jafari, Ehteshamnejad, & Asaadi, 2019).

1. Selection of the optimal investment alternative

The first and most important step in the implementation of the multi-criteria decision-making methodology is the choice of the alternatives and criteria to be considered. This paper presents an example of choosing the optimal alternative over the seven compared. The criteria for choosing the optimal alternative are of diverse character, with different requirements for minimization and maximization.

Criterion analysis was performed in terms of production capacity, value of investment, required number of engaged employees, internal profitability, investment maintenance as well as logistical and technological level. Figure 1 shows the form of a software solution for entering individual alternatives and their values in relation to individual criteria.

Figure 1: The values of alternatives in relation to certain criteria



Kriterijumi:		Alternative za kriterijume						
R.br.	Naziv	Naziv	K1	K2	K3	K4	K5	K6
1	Kriterijum1	a1	360	43	220	14.5	3.3	0.73
2	Kriterijum2	a2	295	37	224	15	2.4	0.7
3	Kriterijum3	a3	340	41	233	14.7	3.1	0.65
4	Kriterijum4	a4	315	39	210	17	2.9	0.9
5	Kriterijum5	a5	290	35	180	14.9	2.6	0.85
6	Kriterijum6	a6	330	40	207	13.5	3	0.6
7	7	a7	273	34	175	15.3	2.7	0.83
8	8	*						
9	9							
10	10							

In addition to the selection of particular alternatives and criteria, criteria analysis is the second most important step in the application of the multicriteria analysis method. The application of the modified PROMETHEE method of multicriteria decision making enables a graphical analysis of an unlimited number of preference functions and sophisticated expression of the importance of certain criteria. The parameters for expressing and analyzing preferences are as follows:

- - Request (Max/Min)
- - α and β - preference intensity parameters
- - p – the limit of change in preference intensity,
- - q – the limit of preference
- - m – parameter
- - Relative importance

Figure 2 shows the analysis of production capacity criteria (Request = MAX, $m = 0.5$, $\alpha = 3$, $\beta = 0.8$, $p = 40$, $q = 60$, Rel. imp. = 0.2) Figure 3 shows the analysis of investment value criteria (Request = MIN, $m = 1$, $\alpha = 1$, $\beta = 1$, $p = 15$, $q = 15$, Rel. imp. = 0.2).

Figure 2: Analysis of production capacity criteria

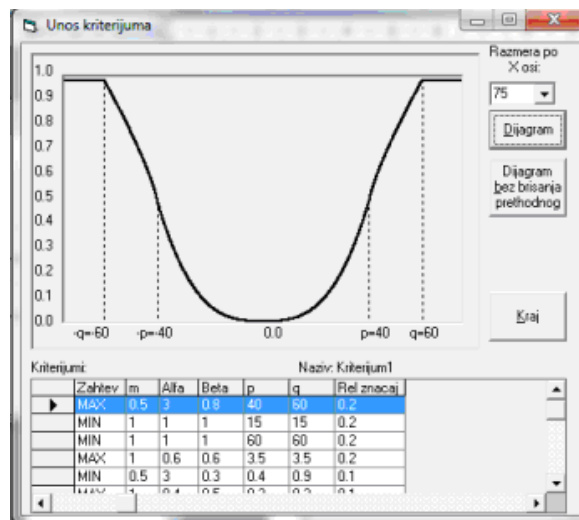


Figure 3: Analysis of investment value criteria

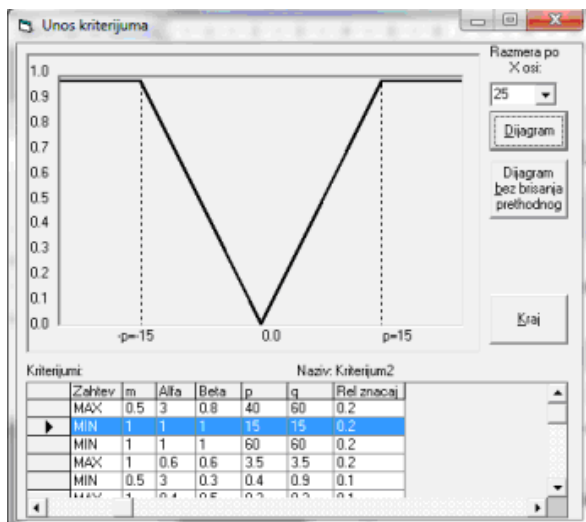


Figure 4 shows the criterion analysis of the number of employees required (Request = MIN, $m = 1$, $\alpha = 1$, $\beta = 1$, $p = 60$, $q = 60$, Rel. imp. = 0.2) Figure 5 shows the analysis of internal criteria profitability rates (Request = MAX, $m = 1$, $\alpha = 0.6$, $\beta = 0.6$, $p = 3.5$, $q = 3.5$, Rel. imp. = 0.2)

Figure 4: Criteria analysis of required number of employees

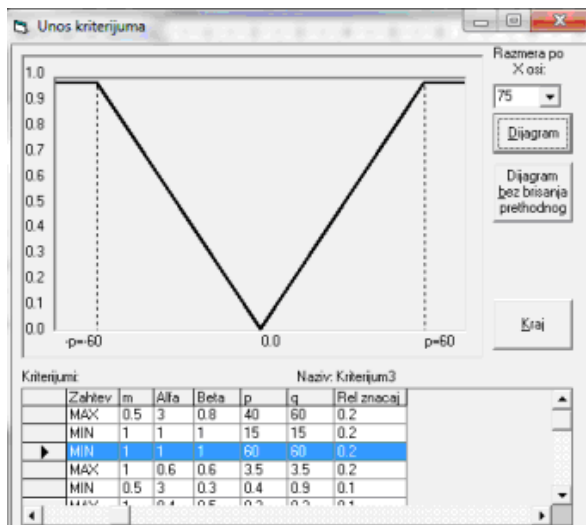


Figure 5: Analysis of the criteria of internal rate of return

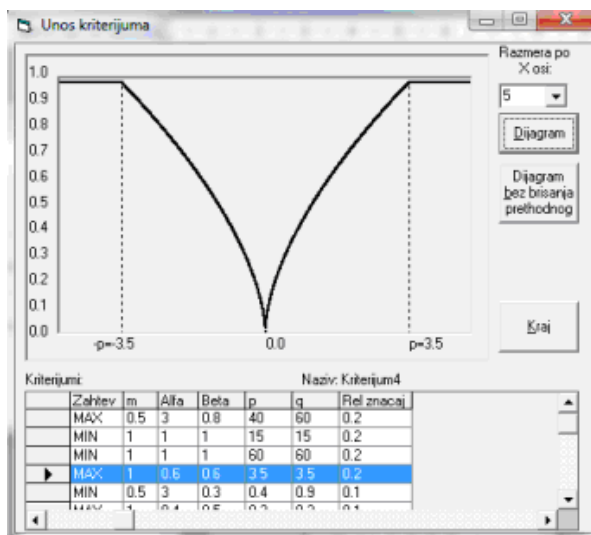


Figure 6 shows the analysis of the investment maintenance criterion (Request = MIN, $m = 0.5$, $\alpha = 3$, $\beta = 0.3$, $p = 0.4$, $q = 0.9$, Rel. imp. = 0.1) Figure 7 shows the analysis of the logistic and technological level criterion (Request = MAX, $m = 1$, $\alpha = 0.4$, $\beta = 0.5$, $p = 0.3$, $q = 0.3$, Rel. imp. = 0.1)

Figure 6: Analysis of the criteria of investment maintenance

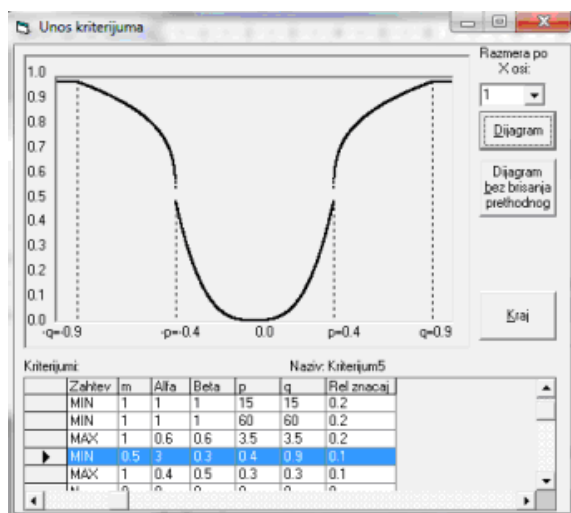
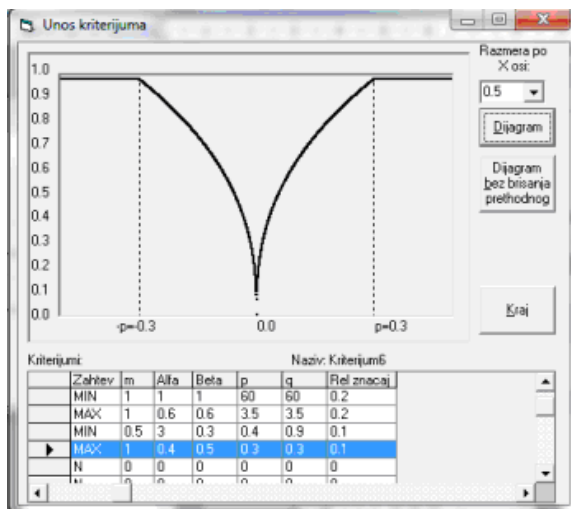


Figure 7: Logistic and technological level criteria analysis



The production capacity criterion is one of the most important criteria that needs to be analyzed with great care. Its importance is reflected in large investment funds. Therefore, the preference function is expressed in higher values - faster growth of the preference function is expressed between the boundaries of change of preference intensity and the preference boundary. Higher values of financial investments in production capacities require a much higher level of preference in this area.

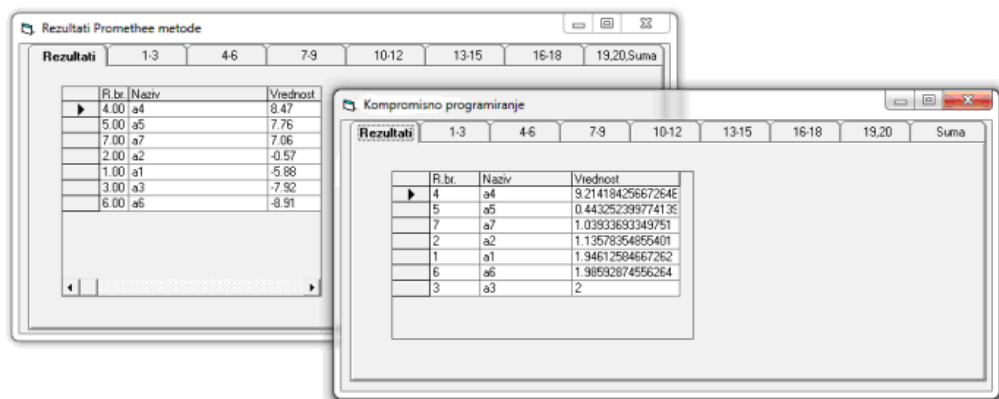
The investment value criterion is expressed as a linear function with no boundaries of preference intensity change. Equal growth of a preference function signifies an equal importance of preference throughout the preference space.

Similar to the previous one, the criterion of the required number of employees hired is expressed by a linear function of preference with equal growth and significance throughout the preference space. The criterion of internal rate of return and the criterion of logistical technological level is expressed by a function that emphasizes faster growth and importance for the smallest values in the preference space.

Figure 8 shows the rank results of the alternatives of the two multicriteria decision-making methods used, with the results indicating significant agreement of the rank of compared alternatives:

- - PROMETHEE (a4, a5, a7, a2, a1, a3, a6)
- - Compromise Programming (a4, a5, a7, a2, a1, a6, a3)

Figure 8: Results of the ranking of alternative



The importance of applying the presented multicriteria decision-making methodology is demonstrated because of the need to determine the best or optimal alternative based on a large number of possible as well as on a number of different criteria. Mathematical models play a significant role in this regard as the only way to select them. However, the significant role of information technology as their support should also be emphasized. The presented software solution enables the use of complex mathematical models, graphical or visual representation of the expression of preferences through preference functions. On the other hand, the decision-maker is enabled to use it simply, speed, eliminates the possibility of error.

It is indisputable that software support, as well as the application of information technology in a broad sense, is an indispensable element in the practical use of multicriteria decision-making methodology. The application of information technology in the broad sense is especially important in obtaining a wide range of relevant information from internal and external sources that enable the decision maker to select potential alternatives and criteria themselves and then obtain the value of alternatives according to individual criteria, and more.

The application of the presented software solution enables many practical applications in the analysis of the evaluation of particular criteria, the comparative presentation of preference functions and the analysis of their different alternative values.

Conclusion

This paper presents an approach in choosing the optimal investment alternative in industrial production. Consideration is based on the application of multi-criteria decision-making methodology with appropriate software support. The paper presents a practical methodological approach to selecting the optimal investment alternative from

a series of comparisons. The alternatives were considered in a system of different and heterogeneous criteria with different requirements for extremization of different relative importance.

The paper illustrates the most important investment decision criteria that can be applied to various real-world problems. Also, some possibilities of modern multicriteria decision-making methodology and a specific approach to expressing preferences of particular criteria were highlighted. The results indicate the agreement of the optimal alternative, that is, the rank of the compared alternatives, by the comparative application of two multicriteria decision-making methods. The software solution developed for this purpose enables simplicity and applicability in practical conditions of use.

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Прегледни рад
Review article

Marketing channels in value creation and delivery of cheese in the Republic of Serbia

Канали маркетинга у креирању вредности и испоруци сира у Републици Србији

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Abstract: Although the use of various forms of marketing channels is increasing within agricultural marketing, there have been only a limited number of research efforts exploring the influencing factors on the structure of agricultural marketing channels and the decisions to select individual intermediaries. Due to the specific nature of agricultural production and its products, complex transportation and storage problems require a greater number of intermediaries in their movement from producers to consumers. Management of sales channels is an important factor for the success of farmers, so it is necessary to evaluate the impact of changes in the environment on them. In order to adapt sales to the demands of the contemporary market, cheese producers are faced with the dilemma of expanding existing sales channels, adding modern channels to existing traditional channels, or making more radical changes to the market access. This paper defines the distribution methods and key players in cheese delivery that should point to strengthening the competitiveness of producers in the global market.

Key words: cheese, marketing channels, agriculture, marketing, commerce

JEL classification: Q13, M31

Сажетак: Иако се употреба различитих облика маркетиншких канала повећава у пољопривреди, постојао је само ограничен број истраживачких напора усмерених ка откривању фактора који утичу на структуру пољопривредних маркетиншких канала и на одлуке о одабиру појединачних посредника. Због специфичности пољопривредне производње и њених производа, комплексни проблеми транспорта и складиштења захтевају већи број посредника у њиховом кретању од произвођача до потрошача. Управљање каналима продаје битан је фактор успешности пољопривредних произвођача, тако да је неопходно оценити утицај промена у окружењу на исте. Како би прилагодили продају захтевима савременог тржишта, произвођачи сира се налазе пред дилемом да ли само да прошире постојеће канале продаје додавањем савремених канала већ постојећим традиционалним каналима, или да размишљају о радикалнијим променама тржишног наступа. У овом раду дефинишу се начини дистрибуције и кључни играчи у испоруци сира који би требали да укажу на јачање конкурентности произвођача на глобалном тржишту.

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Кључне речи: сир, канали маркетинга, пољопривреда, маркетинг, трговина
JEL класификација: Q13, M31

Introduction

Marketing channel management encompasses all the activities of the company involved in making the product available to targeted consumers. The most common marketing channels include wholesale, retail, various service providers and direct consumers. Many small manufacturers-entrepreneurs mistakenly believe that introducing a new product to the market involves only finding a retailer who will be selling it or a distributor that can handle market dissemination. Finding a market for a new product is not so easy. A marketing channel is a complex system based on selection of the number and types of markets, regulating the intensity of coverage of different market areas, managing product types and quantities for different markets, and managing inventory, transportation and logistics. Finally, point-of-sale management involves making the product suitable for targeted customers and their purchase (Center Food Processing, 2001; Đokić, 2018). The first step in learning about the marketing and distribution system is to learn about the process by which a product reaches consumers.

Food distribution is a specific system of shifting goods from producers to consumers (Lovreta et al., 2019). It contains unique elements such as different storage and transportation including numerous players, from manufacturers and processors to brokers, distributors and sales representatives to consumers. Marketing channels are also defined as sets of interdependent organizations involved in the process of making a product or service available for use or consumption. Channels represent a set of pathways by which a product or service moves after production, culminating in end-user purchase and use (Kotler & Keller, 2006).

Manufacturers, trade companies and end users perform their function in the channels. Marketing channels include the total flows of goods, money, and information flowing among institutions. The functions of exchange, physical supply and service are inherent in the marketing and commerce system (Lovreta et al., 2019). Due to the globalization of trade, competition among businesses has intensified. Therefore, in addition to high quality products, effective promotion and competitive pricing, product distribution is also an important segment of differentiation. Thus, delivering products to the end consumer faster and more efficiently than competitors becomes a key success factor (Mehta et al., 2003). Successful global marketing channels require the alignment of product quality, the diligence of market researchers to determine the validity of product sales in a particular area, the selection and development of marketing channels and representatives, and the appropriate motivational and leadership skills necessary to succeed (Palombo, 2009). Marketing channels are becoming more important because, thanks to this element of the marketing mix, products become available in the form, place and time preferred by consumers (Szopa & Pekala, 2012). Therefore, one of the key roles of marketing channels is to turn potential customers into profitable customers

(Kotler & Keller, 2016). Revzan (1961) was among the first to appreciate the specificities of agricultural products, identifying channels of distribution of agricultural products, either processed (industrial processing, final consumption) or unprocessed products, directly distributed to final consumers. Through market research, management of channels identifies not only the needs and desires of consumers, their motives and behaviors, but also the behavior of other key market players (Stanković, 2014). Therefore, in the further analysis we are focusing on the distribution channels of agricultural products, that is, even more focused, on the marketing of cheeses, which are significantly different from the sales channels of other products. The subject of this research is cheese production by small producers, oriented to production and marketing.

The aim of the research is to present the structure of distribution channels as well as their role in the value creation and delivery of cheese by small producers and to find out the answer to the key question: which distribution channel will be selected by the cheese manufacturer when entering the market.

1. Research project and methodology

During the period June- November 2017, the project “Contemporary Trends on the Wine Market” took place in Serbia. The focus was on analyzing consumer behavior related to wine consumption. Methods of data collection were desk research, in-depth interviews and interviewing of 200 respondents in Serbia. Based on this research, a new project entitled “Study of consumers' attitudes of cheese consumption” has been granted.

The research will cover a sample of 500 respondents in Vojvodina and Hungary. This research is directed to explain and predict the beliefs influencing consumer needs and the motivations behind their purchase decisions, when cheese is in question. The main aim of the research is to understand the consumer preferences regarding the purchase and consumption of cheese, as well as the main factors that largely determine the behavior of cheese consumers in Vojvodina and Hungary.

This paper is a desk-based research effort on a narrower segment of this project that addresses marketing channels. The consumption of each product, including cheese, depends significantly on how the product is made available to the market: where it is available, at what prices, in what packaging, etc. Consumer desires are often shaped by the work of participants in marketing channels. That is why, when it comes to selling more value-added products, the right choice of marketing channels significantly affects the prices achieved and the competitive advantage of the product in the market. Before examining the final consumers, through this research of adequate literature, a basis was prepared for forming a questionnaire and generating basic research questions. A key research question in this segment of cheese marketing is whether to sell through direct or indirect marketing channels.

2. Research results

2.1. Characteristics of agricultural distribution channels

When it comes to marketing agricultural products, the most complex problem is a proper and adequate distribution system, and in particular a physical distribution system (Milisavljević, 2019).

Much specificity is present in the marketing of agricultural products. First of all, there is a time gap between production and consumption: production is seasonal and consumption has its continuity (Lovreta et al., 2019). Second, there is no possibility of changing the quantity of products during the production process, which is conditioned by variations in yields that generate the need to reduce the risk through different degrees of vertical cooperation and channel integration (Zwart & McLeay, 1997). Although technical and technological progress allows for a certain shortening of the production process, it is not possible to adjust the volume and quality of supply of final products to changes in demand during the production cycle in agriculture. The third specificity is reflected in the fact that there is a geographical separation of producers and consumers, and that producers are most often located, i.e. concentrated in several locations, while consumers dispersed in a large number of locations (Nikolić & Popović, 2016). Also, transportation and storage problems are very complex, requiring a large number of intermediaries in the movement of products from producer to consumer. Many agents and service providers result in high distribution costs for agricultural products, which are included in the price paid by consumers (Miljković & Alčaković, 2015). Not all commodities can be produced on all agricultural land due to variations in agro-climatic conditions. Therefore, there is a need to transport some products from remote manufacturers to consumers. In addition, there are a large number of small producers in Serbia with low market share, which requires the presence of adequate marketing channels. In this sense, their task is to buy smaller quantities of products from small producers, concentrate stock and only then distribute goods in the quantities demanded to a larger number of consumer sites (Nikolić & Popović, 2016).

Channels where the manufacturer is in direct contact with customers are called direct distribution channels (Fernie & Sparks, 2009). The second direction that agricultural products reach consumers involves intermediaries, so that in the marketing of agricultural products we distinguish:

- (i) Direct channel: In this case, intermediaries are completely absent. This type of sales has a very small market share. Examples of direct marketing when it comes to agricultural products are green markets, farm sales, roadside stands, etc. Advantages of direct marketing are reflected in: absence of special requirements for sales volume, flexibility in product packaging, product promotion in the form of demonstrations, billboards, etc., direct access to market information such as consumer preferences,

willingness to pay, etc. (Coughlan et al., 2006). The advantage of selling on the farm is reflected in the absence of transportation costs and customer loyalty to the products. Also, the direct markets are suitable for the emergence of new, inexperienced manufacturers with smaller quantities offered.

- (ii) Indirect channel: Agricultural goods generally move from producers to consumers through intermediaries. The number of intermediaries can vary from one to many. Indirect marketing channels through intermediaries allow manufacturers maximum specialization in performing their primary business, then producing larger quantities of products and realizing the effects of economies of scale (Nikolić & Popović, 2016). The modern specialized economy implies increased horizontal and vertical distance between producers and consumers, which has resulted in a decrease in direct sales (Zakić et al., 2018). The role of market intermediaries has increased recently, as a significant proportion of products pass through them.

Most agricultural products move towards consumers through several intermediaries and channels whose role is essential as they carry out important marketing functions and help to expand the agricultural market. A very small share of agricultural products is directly moving from farmers to consumers (Miljković & Alčaković, 2015). Nevertheless, direct marketing channels in agricultural product sales are, to some extent; constantly present (Nikolić & Popović, 2016). Green markets are a big part of the turnover of some agricultural products, where the farmer produces, prepares and distributes the products physically (Stanković, 2018). The prices at which producers sell at the green market are far above the prices paid by dairies, and are slightly lower than the retail prices. According to the research by Miljković and Alčaković (2015), the green market is very important in vegetable trade (average for 2009-2013 - 76, 32%), dairy products (19, 01%), and fruit and grapes (39, 01%) while negligible in other product groups. The much higher prices of products achieved by farmers at the green market compared to the purchase prices by retail stores are the reason why they turn to this channel. Farmers need to consider the implications of each channel or consider using multiple options and traditional and complex sales channels for their products (Radosavljević, 2017).

- Marketing channels reflect the goals of the businessmen and indicate the quality and desired way of positioning the product, which is why it is necessary to consider the following factors before choosing specific marketing channels (Marušić, 2006):
- The distribution channel should match the image of the product and the perception of the product features that customers have;

- Signals from monitoring market changes and adjustment of the distribution to changes that have occurred;
- Control of product handling in the selected channel, relating to sales staff and their product knowledge, as well as shelf merchandising of the products;
- Number of competing products offered by a particular distributor, etc.

An important factor is also the analysis of consumer behavior that helps to understand what kind of channel structure is needed to meet the target market segments.

2.2. Cheese distribution channels

In the cheese making process, the exchange transaction, as a significant link in the chain and the delivery of value to customers and consumers, occurs repeatedly in the reproduction cycle: through the acquisition of production inputs for milk production, then in the process of physical transformation of the raw material, the emergence of the finished product, up to the point of sale cheese to final consumers (Figure 1).

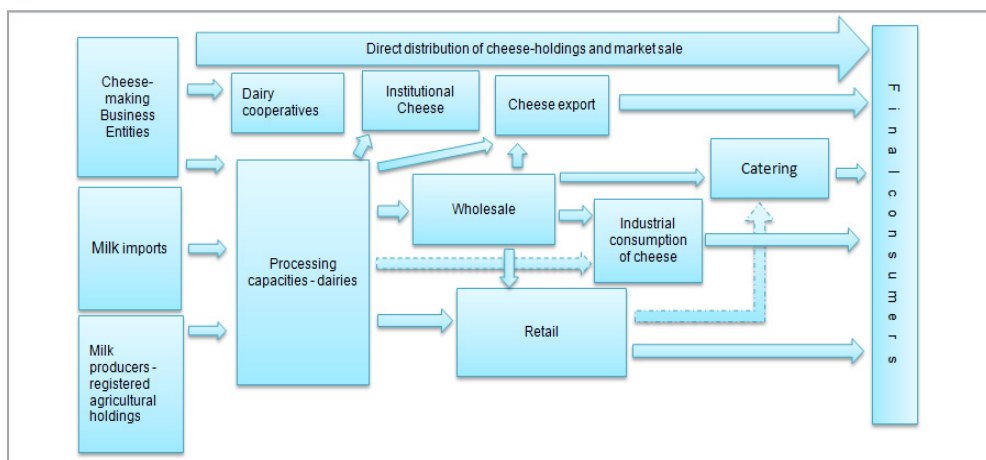
Exchange is products values creation phase in which consumers evaluate a product and thus determine its position in the market. A market-oriented producer looks for a way to secure the market placement of manufactured goods and finally complete the reproduction cycle through the sale and collection of receivables for sold products, or through the market acceptance of finished products (Tihi et al., 2006). Market distribution is an important element in the value chain of cheese, especially due to the fact that it is a food item whose production requires milk of proven quality, under controlled conditions, should reach processors as soon as possible. It is also necessary to deliver the cheese as a finished product, at minimal cost, to consumers at the right place and time, in the right quantities and at the right price.

An effective marketing channel management strategy begins with consumer segmentation. In the first place, it is necessary to identify behavior, needs, lifestyle, loyalty level and the way end consumers use the product, as well as to specify belonging to a particular social class, to understand their opinions, activities and attitudes (Rolnicki, 1998). In making marketing channel decisions for the purposes of cheese marketing, it is necessary to distinguish marketing channel design activities from marketing channel participants' selection activities.

Channel design refers to decisions that involve developing new marketing channels or modifying existing ones (Rosenbloom, 2013). Selection decisions relate to new entrants, the numerical and weight distribution of the product (Berman, 1996) whereby the channel structure, depending on the length and type of entrant, may remain the same. What needs to be taken into account when deciding which marketing channel to choose is the goal of the business, the procedures used to achieve those goals, and how to meet customer needs (Pelton et al., 2016).

When deciding on the choice of participants in the marketing channel we want to create, we need to consider (Vasiljev & Sudarevic, 2014): the financial and credit-worthiness of the potential distributor; bandwidth, i.e. the volume of sales that the distributor can generate; sales capacities, in terms of sales space, storage area, available transport equipment, etc.; the width of the range covered by the distributor; degree of "market coverage"; the human capacity of the distributor human factor; reputation enjoyed by the distributor among business people and the like.

Figure 1: Cheese marketing channels



Source: the authors' research

In economically developed countries, dairy cooperatives have a strategic importance. In the Republic of Serbia, unlike in developed countries, there is no functional cooperative network (Chroneos-Krasavac & Petković, 2015). This is why, among other things, producers of cheese and other dairy products are increasingly focusing on milk imports. In the final outcome, this leads to a decline in the milk cap stock, as well as a decline in the number of milk producers (Lončar & Ristić, 2011). The absence of cooperatives, as significant business entities in cheese marketing channels and value chains, also leads to a decline in the quality of cheese offered by domestic producers and increasing import dependencies, to meet market demand for this final product.

One aspect of the modernization of food marketing channels is the growth in the market share of large retail chains selling through supermarkets and hypermarkets (Minot & Roy, 2007). According to a survey conducted in 2011 by the research agencies Nielsen and GfK (www.progressivemagazin.rs), the most important cheese distribution channels in Serbia are hypermarkets and supermarkets, but the share of small shops in sales is very significant and shows growth tendency. So, while the share of supermarkets and hypermarkets is dominant, many consumers are loyal to smaller

stores and even specialty dairy stores to sell cheese. One reason is the fact that, according to the experience of large domestic retailers, just over 50% of the turnover is generated by soft white cheese, unlike in Western countries where semi-durable, semi-hard and hard cheeses are extremely prevalent.

When it comes to marketing channels from a manufacturer's perspective, their transformation is still ongoing and raises concerns. According to a study by Mugoša (2018) in the selection of distribution channels, with the possibility of multiple choice of different channels, 78% of agricultural producers (farms with domestic milk processing facilities) opt for **direct channel**, i.e. green market sales, which indicates the predominant traditional distribution method. The share of catering establishments (16%) and pastry workshops (6%) that farms sell cheese to is significantly lower. The current legislation of the Republic of Serbia, except for the markets, does not clearly define whether and where the registered agricultural producers of primary products or products can sell (Kovács-Sárkány & Kovács, 2015). The choice of marketing channels from the offer of individual agricultural households owning their own dairy processing facilities in the Republic of Serbia is subject to legal restrictions which prescribe only two ways of sale: from home and at the market (Veterinary Law, Official Gazette 93/2012). This fact is a limitation for cheese-makers, but also an argument in support of the statement of the need for their association.

Although in accordance with the Law on Trade (Official Gazette RS No. 52/2019, Art. 25), the agricultural producer has the status of trader, laws and by-laws regulating the field of trade in milk products from the production of registered agricultural households do not recognize this the way of sale or distribution. The legal framework governing the processing and marketing of milk and milk products offered by the registered agricultural households of the Republic of Hungary, as a member of the European Union, as well as its practice, may be the basis for the improvement of this area in the Republic of Serbia. Small producers sometimes open a retail outlet, which has an assortment of cheeses and other dairy products from its own production. In these retail stores, manufacturers have the ability, through a certain way of exposing cheese, sometimes with an insight into part of the final production operations, tasting opportunities, specific service, promotional and other marketing activities, to offer consumers a characteristic retail experience other than competition. In this way, the producer creates stronger ties with the consumer, adds value to the cheese and creates the ability to set the desired standard for the sale of cheese, both in his own and in the facilities of other retailers. The limiting factor for the placement of cheese through its own retail establishments is the insufficient breadth and depth of the assortment, that is, the narrowed choice in terms of variety, type and characteristics of cheese.

When it comes to indirect distribution channels, small and medium-sized cheese-making businesses mainly rely on channels that include wholesale, retail, catering and hotels. In addition to these indirect channels, informal flows are also taking place, within which the practice of direct delivery of cheese to schools, pastry makers,

etc. by cheese producers on registered agricultural households is ongoing (Mugoša, 2018). Distribution channels are diversified, but they are mostly informal because the legal framework limits distribution to sales from home or green markets. In this respect, the presence of certain cheese in distribution channels depends largely on the economic power of producers and their ability to respond to the requirements for granting high rebates and paying other fees necessary to enter retail chains. In order to achieve cost-effectiveness and higher sales volumes, manufacturers are focusing on an undifferentiated supply of a modest range of cheese, which, although often of better quality than foreign competitors, comes to the market without focusing on any market segment and the value that cheese has for that segment. Other indirect distribution channels in most cases are dairy shops, home sales for well-known customers, small retail shops, etc. Bakery workshops buy low quality cheese and are not prepared to pay the price for the right quality cheese.

A significant player in marketing channels is wholesale, whose position as intermediaries is largely influenced by the growing power of retail chains. In fact, growing retailers are increasingly making direct business arrangements with manufacturers. The sale of farmers through wholesale brokers can be explained by the following factors: the need for specialized knowledge and contacts in specific markets, the exemption from stockpiling finished products, the ability to provide more information about products from different manufacturers, the possibility of faster delivery at a lower price, etc. What is in the common interest of cheese producers and wholesalers is their business cooperation, whereby wholesalers need to provide top quality services, continually adjusting to changes, and have timely information on demand and other market changes.

- The ability to enter the market through large retail chains is significantly determined primarily by the business goals of both parties, as well as contractual terms relating to quality, prices and various fees that smaller manufacturers often cannot meet. The prominent role of large retail chains in the growth and development of manufacturing businesses requires cheese producers to have a high level of information on trends within modern marketing channels. Also, it is necessary to consider sometimes blurred facts about structural and functional changes within the channels that are constantly occurring (Lovreta et al., 2019):
- declining producer and conversely growing retailer strength in marketing channels;
- development of an active role of retailers in collecting consumer data and in the overall implementation of marketing activities;
- speeding up the flow of all consumer - store - retail company - wholesaler - manufacturer data and deriving from these data needed information to replace traditional stock holding with timely ordering;

- integration of a total product supply chain that focuses on retailers capable of accurately assessing future sales funnels.

Domestic market saturation, the growth and development of large retail chains can also lead to their entry into foreign markets, which is one way to market more domestic producers to a foreign market. The presence of retailer brands, which often occupy the best positions on the shelves, is a danger and puts the cheese producers at a disadvantage. For some smaller manufacturers, on the other hand, it will be a chance to sell their products and, leaving retailers with marketing problems, focus their efforts on production and quality.

The existence and increase of competitiveness of cheese producers vis-à-vis large retail chains requires their integration and association, quality improvement and development of cheese brands alongside the formation of a joint offering. By acting together, it is possible to provide a more comprehensive range of offers tailored to consumer requirements, better market position and coverage, and even greater bargaining power.

The process of transforming production inputs into cheese as a final product, and delivering it to the final consumer, may involve different participants who add value and thus form marketing channels. The final, delivered value depends on the internal performance of each individual participant as well as the type and quality of their interconnections. The value chain represents the full range of activities needed to bring a product or service, from conception, through different stages of production (including different combinations of physical transformation as well as participation of different services) to the end consumer, with final disposal and removal after use (Kaplinsky et al., 2001). When it comes to cheeses, value-adding takes place in production (milk quality, recipes, maturing), during the logistics process (packaging, delivery accuracy), but also during the sale itself (offered store assortment, brand selection, display, optimal pricing, etc.).

Milk-producing households may choose to sell raw materials to local dairies or to produce cheese as value-added products. They may further, as individuals or associated in cooperatives or other type of associations, produce cheese whose production, in addition to specific knowledge, production technology, location, etc., requires special storage and ripening conditions, transport services, etc. This high value production further increases the value of cheese but also enhance the image of the region.

Cheese with protected geographical indications (GI), organic cheese, cheese ripening and specific cheeses, have added value. Their market valuation and placement are conditioned by the identification and selection of market segments. It is necessary to identify segments of consumers who want such value. Furthermore, market valorization is also conditioned by the choice of functional marketing channels, which will make these products available to consumers, at the required time and place, quantities required and preferred form. Due to their unique properties resulting from the condi-

tions and technology of production, limited territories of origin, etc., these cheeses have a distinct image in relation to industrial cheeses. Differentiation contributes to a better competitive position of producers and stronger bargaining power in marketing channels.

2.3. The geographical indication of origin and tourism as a new channel for selling cheese

The association of the geographical origin (GI) of a particular product with specific quality characteristics has been known throughout history. The protection of the geographical origin of agricultural products is now legally regulated, but there is extensive literature discussing the economic effects of this activity. The 2018 FAO report discusses several key impacts (Vandecandelaere et al., 2018).

Selling at higher prices is the most commonly discussed effect of geographical identification (GI) of a product. Through case studies of numerous agricultural products, prices of geographically specified products, which are more than average in the range of 10-50%, are stated. Achieving additional external effects through the protection of the natural environment, the protection of certain plant and animal varieties, traditional practices and intangible cultural heritage is also a frequently discussed positive effect of these legal activities.

Finally, a significant part of the professional literature deals with the positive effects of protecting the geographical origin of agricultural products on tourism. Particularly cited are examples of famous cheeses, including buffalo mozzarella from Campania, camembert from Normandy, Brie de Melun, the first of many Brie cheeses originating in the Seine and Marne valleys, etc. Those who have traveled through southern Italy, especially the province of Salento, could spot numerous examples of agro-tourism with small mozzarella workshops where you can learn something about production, taste cheese and buy freshly made produce. There are almost no tourists in Sardinia who have not tried the famous Sardi Pecorino. Likewise, most visitors to France go home with a small collection of high-flavored vacuum-packed cheeses. Similar is the case with visitors to the Netherlands, who have prepared many packages of standard and aged ripe hard cheeses in tourist shops, along with collections of bulb tulips.

The preceding examples show the parallel existence of direct and indirect channels of placement of these products in tourist destinations. If cheese producers apply direct marketing, they sell the cheese directly to the end consumer on the farm, in a permanent or mobile green market, within the package of rural and wine tourism, through retail establishments of associated producers. The strong reputation of these products indicates a relationship of trust and a built image of the local product. The

ability to taste and evaluate the taste and quality at the point of sale ensures that feedback is received, which improves experience and visitor satisfaction.

Producer association provides the opportunity to use indirect marketing channels, i.e. to involve intermediaries between producers and end consumers and to enter into a more complex channel system in the domestic and international markets. These intermediaries may be distributors, entities that deal with the ripening and distribution of cheese, specialized stores for the sale of cheese, organic food stores, etc. However, the most important indirect channel in tourist destinations is HoReCa sector. Decisions about marketing channels are of strategic importance for businesses, which is why the choice of participants and their structure should be in line with other marketing mix instruments, in a way that allows the market value of the cheese to be marketed.

3. Conclusion

Delivering a product to a place and time when there is a solvency demand for it is one of the essential functions of a marketing channel. Which marketing channel a small producer will opt for in the first place depends on the target consumer segment, but also on the set goals of the farm, then on the size of production capacities, the type and characteristics of the cheeses themselves and other conditions.

Direct marketing channels provide a more direct link between the farm household and consumers and create long-term relationships based on trust, which enables a better understanding of consumer needs, wants, requirements and preferences. When it comes to indirect channels with many intermediaries involved, this link is much looser. On the other hand, the specialization of participants in the marketing channel allows reducing costs but only in conditions of large production. Indirect sales in the context of small quantities of artisanal products result in high costs for the sale of agricultural products, which are included in the price and are paid by consumers. Within the basic division of consumer distribution channels into direct and indirect, cheese producers generally rely on indirect channels, which include wholesale, retail, restaurants and hotels. However, a large number of small producers are committed to direct sales through the green market, which indicates the predominant traditional way of distribution.

Which distribution channel the cheese maker will choose depends primarily on the economic power of the producer and their ability to respond to the payment requirements required before entering retail chains, as well as their ability to meet the needs of the target market segment.

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After the first 32 years - new deal in Hungarian income taxation

Након прве 32 године - нови приступ у опорезивању
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Abstract: Nowadays, few experts or politicians look back to the 80s, the post-communist countries present their results after the transition to a market economy. But, in the 1980s, Hungary was the first of the socialist countries to launch major reforms, and within that, the financial system was reformed. The conversion of the banking and the insurance system started at that time, parallel with the Németh government fundamentally overturned the tax system and laid the foundations of today's modern tax system in both of direct and indirect taxation. Our study reviews the period that has been passed from 1988 till the present time. One of the main aims of this work is to highlight some basic features in the Hungarian tax system, which differs from that of the OECD countries. The theoretical correlations deriving from the differences, however, reflect on the restrictions of the Hungarian system. We emphasize only one question, what is the link between government tax policy implemented in tax legislation and the behavior of taxpayers.

Keywords: economic policy, reform, taxation, social system

JEL classification: H5, H11, H21, H55

Сажетак: У данашње време, мало стручњака или политичара осврће се на осамдесете године прошлог века, а посткомунистичке земље представљају своје резултате након преласка на тржишну економију. Мађарска је осамдесетих година прошлог века прва од социјалистичких земаља покренула велике реформе, а у оквиру њих покренута је и реформа финансијског система. Тада је започета конверзија банкарског и система осигурања, паралелно са Неметовом владом, која је у основи поставила темеље данашњег модерног пореског система, како у директном тако и у индиректном опорезивању. Наша студија анализира период од 1988. до данас. Један од главних циљева овог рада је истицање неких основних карактеристика пореског система у Мађарској, који се разликује од оног у земљама ОЕЦД-а. Теоријски, корелације које произилазе из разлика одражавају се на ограничења мађарског система. У раду је истакнуто само једно питање које се односи на истраживање везе између државне пореске политике која се спроводи у пореском законодавству и понашања пореских обвезника.

Кључне речи: економска политика, реформа, опорезивање, социјални систем

ЈЕЛ класификација: H5, H11, H21, H55

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Introduction

The aim of the study is to present what steps Hungarian economic policy has taken to change the tax system, what goals it has set, which ones have been met, and where the shortcomings of the current system have been revealed. Tax policy as an instrument of economic policy has played an important role primarily in guaranteeing revenues: it can hardly be interpreted in itself; it always appears as part of fiscal policy, subordinate to it. That is why tax laws are always linked to the fulfilment of certain economic policy objectives, but it is not entirely clear how the behavior of taxpayers and their response to individual changes can or should be taken into account.

Although the theory of taxation discusses each type of tax extremely extensively, analyzing the different tax instruments, there is no clear answer as to when which type of tax system can be considered optimal. The 1988 Hungarian tax reform is one of the large-scale experiments. It was clear already at the end of the 1980s that opening the economy required a transparent internal price system, an income policy that can be measured and influenced through indirect instruments and definitely a value added type taxation system that is used in the EU. In addition, it was also time to reform the whole tax administration procedure. Once the necessary political decisions had been made, the tax reform was worked out in order to introduce a unified, legally regulated and normative taxation system as well as to implement public burden sharing that is more just in social terms and that makes the income transparent and taxes it at its very source. In return, however, it promised a bigger say in the re-distribution of public funds. The analysis of the changes in the past 30 years is deficient; the emphasis was generally laid only on the size of tax revenues, on analyzing the current situation of the state budget and the impacts of tax allowances.

1. Theoretical background

The current tax policy of a country is always one of the elements of the fulfilment of short-term and long-term priorities defined in the economic policy, which plays an extremely important role in guaranteeing revenues. The tax system is part of the current fiscal policy, which must serve the designated goals of the given period, mainly by generating revenues. After World War II, after a major change in economic policy, including the role of the state budget after the 1929 world crisis, the budget took on counter-cyclical, demand-stimulating tasks. In market economies, the role of the state in achieving community goals has become more and more important, such as raising general welfare, stimulating economic growth, reducing unemployment, creating social security, and introducing a general pension insurance system. (Stiglitz, 2002) These tasks could only be achieved by steadily increasing the share of centralized income in GDP (Oates, 1985) and (Estevez, 2020).

In developed states, expenditures and subsidies financing the growing role of the state, including those related to social security, necessarily multiplied, and this was, of

course, covered by tax revenues (Kalaš et al., 2018a; Kalaš et al., 2018b). This was covered by GDP during the period of sustained economic activity until the 1980s, when world GDP growth averaged around 2% per year between the Napoleonic Wars and World War II, but has grown steadily by an average of 4% over the last half century. Thus, the value of the gross domestic product produced year by year increased to a previously unimaginable size (Kádár, 2000). The budget centralized and redistributed an increasing share of the generated income, creating the institutional system necessary for social security. From the 1980s onwards, however, economic policy was logically strongly imbued with elements of fiscal policy, where the emphasis also changed, as the growing role of the state also created a persistent budget deficit.

Therefore, ensuring a balance in state budget, and finding a way to do so, has become a fundamental issue. These exogenous constraints have also played a role in the generalization of taxation and, at the same time, have provided a strong incentive to examine more closely the mechanism of action of taxation at both the macro and micro levels.

Thus, the development of taxation was also shaped by the external factors determining economic policy:

- growing demand for social benefits
- the growing need for funding due to the extension, generalization and continuous expansion of benefits

the need to finance the budget deficit due to public overspending.

(Although the budget is not a general feature of the finances of advanced economies, they are a problem to be solved from time to time. Even without a deficit, the constant demand for revenue means a demand for tax increases.)

In this system, there is an increasingly urgent need for the state to increase revenues, which has prioritized taxation as a tool. As a natural consequence of this, it was not possible to define an independent tax policy, as the given economic policy expectations always determined the revenue needs, and the applied tax system was designed and modified accordingly (Hetényi, 2004).

While one of the tasks of the tax system is strongly linked to fiscal policy, it has to perform other important functions, including the allocation of produced goods, which is a matter of free market competition and competitiveness, and the redistribution of produced goods, which makes tax and social policy links (Atkinson, 2015).

However, the traditional roles of the state and state power have been questioned since the 1990s: through global companies, the former nation-state borders are blurred, economic policy and, within this, fiscal and tax policy find themselves facing a strong determination. Economic policy, and in particular tax policy, should serve a new kind of

growth model and, accordingly, a different economic model, of which, however, only empirical facts are available for the time being (Veress, 2004). At the same time, globalization, which means the re-emergence of economic liberalization at the economic policy level, combined with a completely new phenomenon, the merger of financial management and computer-telecommunications, has accelerated economic and decision-making processes unimaginably, making tax databases accessible - and linked the economic and management processes and regulatory mechanisms of each country (Kramer et., 2016). Globalization has thus given a new field to tax policy, which previously traditionally remained within the framework of the nation-state (Urban et al., 2019).

In this situation, taxation is not merely an instrument of national economic policy, but an element of the functioning of the international economic community, which must guarantee competitive neutrality above national levels while maintaining its allocation and distributional functions within the nation state, writes Alan Peacock in his study of tax competition (Peacock 1997) and (Forte & Peacock 1981). Andreas Haufler, who argues that small, open economies are forced to keep corporate tax rates low, otherwise they will not be able to compete with large economies (Haufler, 2001).

2. Methodology

In our research, we used the tax acts published since 1988, which show the annual changes in personal income, corporate taxation.

The source of the statistical data was on the one hand also the data series accepted in the financial statements, and on the other hand we analyzed the processed data of the tax returns compiled by the National Tax and Customs Administration from 1994 onwards. For the period before 1994, we reviewed the internal statistics of the Ministry of Finance, in 1994 indicating the limitations of the comparison. The data series for each year also may differ depending on when they were published, but the differences modified the previous ones by a tenth of a percent, so where possible, we indicated the time of publication of the data series.

3. Tax reform from 1988

3.1. The first period - tax reform in 1988

The regulations before 1988 treated the incomes of the population deriving from various sources and acquired under various titles in a very different manner, therefore, it could not provide for public burden sharing proportionate with the size of income. Apart from this, the rate of taxes payable by the private persons was disproportionately lower than that of companies, which made it necessary to replace the wage-proportionate corporate taxes with a uniform income tax system (Antal, 2004).

Basically, the personal income tax system merged the income categories that were earlier differentiated under various legal titles, and also extended the scope of the tax to the - formerly tax-free - interest on savings that people held at financial institutions as well as to the interest on bonds traded on the securities market at that

time; however, the fragmentation that prevailed during the period before introducing the personal income tax also remained to stay after the reform of 1988. The personal income tax launched from 1988 had the following features (Ékes, 1997).

Obligatory consolidation was ordered for most income sources, and the tax obligation had to be assessed according to a progressive tax scale. However, separately taxed incomes did not pertain to the 11-class progressive tax scale but linear tax - withholding tax was paid, e.g. interest, dividend incomes.

Private entrepreneurs were subject to a special “two-channel” taxation system. The point was that private entrepreneurs and partnerships paid 25% entrepreneurial tax on their business profit, while the amount of profit used for personal purposes was subject to personal income tax. As can be seen, the population became the main carrier of burdens already in this early stage (Magyar Közlöny, 1986).

Table 1: Revenues of the state budget according to main sources (in %)

Year	1987	1988	1989	1990	1991	1992	1993
Business organizations	63.2	55.5	48.2	40.6	30.9	26.3	22.9
Population	25.0	32.2	34.8	36.9	38.9	39.3	38.8
Other	11.8	13.3	17.0	30.2	32.3	34.4	38.3
Total:	100	100	100	100	100	100	100

Source: Authors research based on Ministry of Finance Data 1994

The direct tax burdens of the population went up from 9% (in 1988) to 17% in the percentage of taxable incomes, while the average tax on incomes moved between 5 and 15%. The indirect tax burdens on the population were not assessed in that period by referring to the fact that small ventures and private entrepreneurs not subject to VAT were also considered as final consumers, but the three-rate VAT increased the tax burden on the population by 10% on average- said the Ministry of Finance in its inner report in 2001 (Ministry of Finance, 2001).

In a single year, the state budget gained a new income source at a rate that was inconceivable before, even if the state budget refunded to the companies a certain part of the grossed up wages (companies extended the wages in order to protect employees from losses). As is shown by the statistics reflecting the revenues of the first six years and the year preceding the year of introduction, the highest growth of revenues came from personal income tax (also at net present value), while the VAT increased at a rate falling behind the inflation, and the amount received from corporate taxation became lower.

The primary targets were met at the level of the state budget. The following general conclusions can be drawn from the figures:

- the business organizations paid an amount that kept decreasing both at nominal value and at its rate compared to the revenues of the state budget (growth was only recorded with customs and import payments);
- personal income tax payments by the population showed a dynamic increase, the rate of personal income tax in the state budget revenues exceeded 10% (from the 1990s);
- within the key tax types, there was a shift towards consumption-type taxes;
- the rate of state budget centralization did not decrease despite the original concepts, thus the state budget basically determined the use of more than half of the GDP and it maintained its role in redistributing the revenues.
- However, the introduced tax system had certain features that needed correction almost immediately.

Applying many brackets in personal income taxation made a superfluously detailed difference between various population groups and the upper 60% proved to be extreme progression.

- Even at that time, tax collection and control was narrowed down only to processing about 4 million personal income tax declarations and to ventures declaring the highest income.
- Therefore, the reported cost statement deductions became impossible to control (this led to the special Hungarian new verb, (term) “elköltségelés”, (over-expensed) i.e. collecting cost invoices) and revenue control was also reduced to the obligatory data submission that was ordered for companies.

Thus, the introduced tax system clearly deteriorated the situation of the population, which moderated the burden on companies in absolute terms and the revenues of the state budget went up to an unprecedented extent. The size of income from personal income tax induced the government to reduce the 100% share promised to municipalities first to 50% within a year, and this decision brought the newly shaping local municipalities and the whole municipality system into a tough position. Analyzing the situation of municipalities, Gábor Gulácsi (1993) concluded that - as a secondary impact - re-transferring personal income tax to municipalities on a territorial basis further increased the disadvantage of poor regions with little, or quickly dissolving industrial and agricultural production structure.

However, the personal income tax structure integrated further inequalities into the system. Public burden sharing was not proportionate with the incomes as different taxes (according to source) were assigned to consolidated and unconsolidated incomes.

Despite this, the personal income tax system is one of the success stories of the economic policy of the Németh government, as it created a basic condition for European integration, provided the opportunity to calculate labour price according to the real market relations and, parallel with this, it restored the obligation of the citizens

to share the public burden. On the other hand, it placed a significant part of the state budget incomes onto a stable base.

In the next part of our study we are only analyzing the changes in the personal income tax system from the above introduced starting point.

Table 2. Tax changes 1989-2015

Main tax elements	1988	1989-1994	1995-1998	1998-2002	2002-2010	2011-2015
Tax rates	0-60%	0-56%	the 0% rate was terminated, 20-48%, then 20-42%	20-40%	2002-2006: 18-38% 2004-2010 18-36%	16, then 15%
Tax scale	11 brackets	6 brackets	6 brackets	3 brackets	3 brackets until 2004, then two brackets	1 bracket
Tax free limit	48,000	110,000 forints	tax credit for employees	none	minimum wage is tax free with tax credit	none
Allowance	allowance for employees, allowance for children, tax exemption for meal contribution at work. tax allowance for intellectual work	same	the former allowances were terminated	allowance for children, allowance for paying interest on mortgage credit, allowance for tuition	the former allowances were reduced between 2002 and 2006 and totally terminated from 2006	family allowance, family contribution allowance, allowance for married couples, allowance for handicapped people Cafeteria - the groups receiving allowance

						keep narrowing, its charges near the wage charges
Movable - immovable property	income to be combined	same	ranked as income to be taxed separately	same	same	same
Income taxed separately	20%	0/10/20%	20%, tax credit for stock exchange investments (tax exemption), initially without limitation.	20%	20%	16, then 15%
Employee contribution	reduced the tax base	reduced the tax base	did not reduce the tax base. The group of incomes subject to social insurance contribution was extended, also covering activities already subject to copyright protection.	it once again partially reduced the tax base. The employer contribution was reduced by 10%. (from 39 to 29%.)	it once again did not reduce the tax base. Solidarity contribution above a gross annual wage of HUF 6,748,850	cannot be deducted from the tax base, its rate is 17+1.5%
Investments	20%	returns on state securities	the tax on returns on state securities	the 20% tax on exchange gains also covered the	the returns on stock exchange investments	16, then 15% 0% on amounts kept

		0% stock exchange gain 10% other 20%	investments is 0%, the tax on stock exchange gains decreased to 10%	exchange gains on securities kept on capital accounts, thus the exemption granted to the shares of stock exchange companies was terminated. However, the rate of write- off was extended.	became tax free.	on long term investment accounts for 5 years
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Source: the authors' research from the Hungarian Personal Income Tax Act

3.2. The second period - changes 1989–1994

The two years remaining until the change of regime and the next four years produced no major changes, only minor corrections in terms of taxation policy. By 1994, however, the state budget deficit - where state debts represented an especially high rate - could no longer be managed due to the complex effect of the earlier inconceivable rate of economic transformation, due to the reorganization of the total production chain and, of course, due to the transformation crisis caused by the loss of the traditional markets.

The picture is even more sophisticated if we look at the transformation from the viewpoint of the trend in the number of potential tax-payers. Between 1989 and 1995, the restriction on the market entry by private businesses ceased to exist when the transformation act, the company act and the cooperative act were modified and adopted as well as companies and ventures could be founded and launched on a subjective right. However, an unprecedented wave of liquidation swept all over the whole economy. As a result of these two impacts the former employee data went down from 4.8 million to 3.7 million, while the number of entrepreneurial organizations increased from 400,000 to almost 1 million. This means that 25% of the former wage-earners disappeared and were on the unemployment benefit, while the number of enterprises increased by 2.5 times. It was evident already at that time that the number of

entrepreneurs grew out of constraint, the legal obligations of contracting were selected for protection against unemployment, but the question was whether they could satisfy any of their obligations.

The Personal Income Tax Act merely followed the changes, e.g. the tax class limits were increased to counterbalance the above-30% inflation rate but this could not prevent the higher burden as a result of the inflation.

As it can be seen, the characteristic features of the current situation evolved during this period. Accordingly, in the surveyed period:

- the Hungarian taxpayers did not pay significantly more than the taxpayers in Western Europe:
- the division of incomes remained to stay but separately taxed incomes started to grow and they paid less and less tax:
- taxpayers are divided to employees, who cannot avoid taxes so they take a higher share in the burden, and to private entrepreneurs who adapt to the tax changes extremely flexibly, they form the biggest group and their behaviour basically determines the tax revenues.

3.3. The impact of the Bokros package on the tax system

The change in a taxation policy is not determined primarily by the increase or the moderation of the tax brackets, by the change of the tax rate or even by the restructured allowances. The changes can be classified according to the change of the legal regulatory environment termed by Brennan and Buchanan (1980) as the tax constitution, how the tax constitution guarantees the former allowances either in a more moderate form or even by granting them to other groups, or - on the contrary - what acquired rights are withdrawn or granted (Brennan, 1993). From this viewpoint, basic importance was carried by the programme hallmarked with the name of Lajos Bokros that the government launched on 12 March 1995. This study covers only and exclusively the aspects of the programme related to taxation policy and personal income tax together with the related revenue figures as evaluating this programme is not the task of this study. The economic policy goal of narrowing the demand, reducing state expenditure and increasing revenues was planned to be achieved by modifying the next tax act, which otherwise played a subordinate role in the changes.

Although the Constitutional Court decided in 1995 to repeal a significant part of the Bokros package, no change was made to the modification of the tax laws, except for accident contribution payment, as the constitutional rights were not affected (Complex CD Jogtár, 2006). The Hungarian constitution specifies tax payment as a contribution to the public burden and a unilateral obligation of the citizens without any counter-service, and the spirit of this provision was not violated by the Bokros package. The austerity measures were enacted through two years after the forced break,

and the then government regarded it as a success that they managed to reduce the deficit of the balance of payments quickly and at a high rate also in an international comparison. This, in itself, restored the confidence of the international money markets and it was possible to finance the deficit that remained to stay and was soon reproduced in an unchanged form. Some reshuffle could be observed in the second half of the 4-year political cycle, primarily in the modification of the allowances, tax credits and tax brackets, but basically this did not change the nature of the tax system.

Analyzing the listed changes, it is evident that primarily pensioners, employees and families with children got into a worse situation. If we do not look at the issue from a social political aspect but from the viewpoint of almost 400,000 private entrepreneurs and almost one million businesses in total, we can spot the following differences between the two types of tax system:

The deductibility of social insurance contribution was cancelled, which raised the costs both for private businesses and partnerships. The termination of the 0 rate income class excluded private entrepreneurs and the owner-managers of partnerships (internal members of limited partnerships - managing directors) from the circle of exemption as tax credits were only granted to the employee status. This means that this group was not given exemption even if they earned the minimum wage. The former HUF 100,000 tax base reducing allowance for activities subject to copyright changed for a tax allowance of HUF 50,000, which definitely reduced the real value of the allowance, depending on the income limit. Narrowing the scope of activities subject to copyright and making these incomes subject to contribution payment was disadvantageous for about 170,000 taxpayers.

We can observe a strong preference to the accumulation of wealth and with regard to taxing returns on deposits and state securities investments (0 rate) due to the general interest in increasing investments and with regard to reducing the stock exchange gains to 10% in 1995 and 1996.

As a result of the actions of the Bokros package, a personal income tax system was created - basically differing from the tax reform in 1988 - that focused on efficiency instead of the previously preferred aspects of equity and fairness, last but not least also through the increasing rate of control. This tax system was much more able to increase tax revenues from inflationary tax forints without any further change, as its introduction was accompanied with a higher than expected 12% price increase, which automatically increased payments not only at a nominal but also at a real value, while freezing the tax allowances, namely because the tax-reducing items do not follow the progression, and the impact is totally different if a certain % of the part taxed with the marginal tax rate is deducted from the annual income without any limitation above - which grows together with the inflation - compared to deducting from the payable tax a maximum amount that is limited from above.

As a result, a different personal income tax system was set up, which practically ignored the social aspects, leaving the enforcement of the principles of equity and fairness to social policy; it was strongly differentiated according to the sources of incomes and expressly preferred capital incomes while it connected income tax with social insurance deductions also over and above wages. This feature was further strengthened not only by the a.m. extension of the contribution base but also by the rule which made it compulsory to pay full social insurance contribution for all other legal relationships in the case of employment below 36 hours a week, i.e. some part-time entrepreneurs paid twice. This means that the obligation to pay taxes and contributions were closely related to each other.

3.4. Changes in the taxation system 1998–2002

The economic policy reorganisation accompanying the governmental change was in favour of growth instead of monetary and fiscal restriction and creating balance, and it had a definite concept on the groups where it intended to strengthen the horizontal and equity aspects and where to create the socially useful family model through indirect interest in taxation.

Family support reached its peak in 2002, while HUF 71 bn was available for tax credit, and the government supported families with children with a tax revenue dropout of HUF 76 bn. We cannot talk either about large-scale change or reform despite the simplified tax scale and re-positioned allowances within the population groups. However, from 1998, the social insurance contribution paid by employers was reduced radically, by 10 percentage points. The rate of deduction went down from the former 39% to 29%, claiming that no new jobs were created due to high contributions. The 10% reduction was counterbalanced by the increasing health contributions only partially, raising the effective rate of health insurance contribution by 1.06–1.91% on average (Szigeti, 2007).

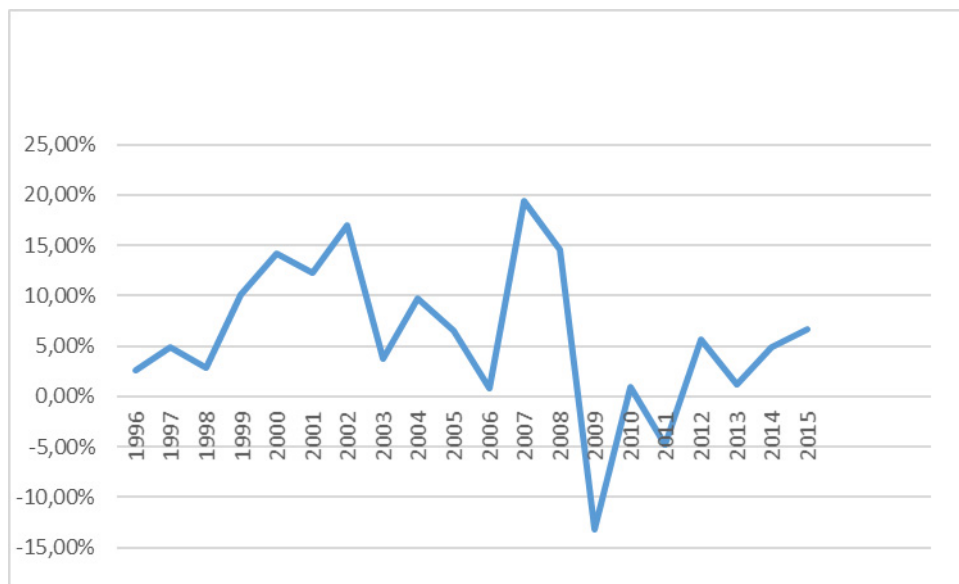
The minimum wage went up from HUF 25,000 to HUF 40,000, which was mainly disadvantageous for entrepreneurs. Interestingly enough, the increase was not accompanied with higher unemployment, which is a relationship accepted in the professional literature. Moreover, the unemployment rate reduced under the conditions of the general boom. (Varian, 2014) Increasing the minimum wage also meant a higher contribution base, finally the amount received from social insurance contributions did not reduce because growth remained the joint impact of lower employer deduction and the parallel minimum wage increase. Therefore, the Orbán government basically reorganized the allowances, which did not change on the whole; the emphasis was laid on large, middle class families with children and with earning capacity rather than supporting those who were most in need in social terms. (What is more, family allowances and family support could only be received for children who had a school attendance certificate.) However, the government strongly reduced the contributions but did not touch the benefits that were financed from contributions.

During the four years, the personal income tax revenues significantly increased, by HUF 155.7 bn, i.e. 24% on average, the amounts from social insurance contributions also went up, though slightly, but no major change was recorded either in VAT or in corporate tax revenues. At the same time, there were much more private entrepreneurs who did not only declare but also paid taxes and this growth can partly be explained by the impact of high tax exemptions as well.

The number of taxpayer employees also showed an increasing trend - another partial impact was the number of those who found work due to the reducing unemployment rate and the minimum wage increase in 2001, which was not followed by tax credit growth, therefore tax also had to be paid on income in the lowest class. The effective personal income tax rate was the highest in this period. At the same time, the growth of revenues was much higher than in the former years, which implies a change in the taxpayer behaviour, they voluntarily stepped back to the legal taxpayer circle. Changes at a similar rate but with a different sign took place over the next four years although the tax burden was lowered in all the three tax types, but in different years.

3.5. Changes in the taxation system 2002–2010

After the government reorganization, the 100-day programme implemented the partially tax political actions promised at the elections, and the resignation of Péter Medgyessy was followed by another austerity package. However, it became evident from the middle of the period that the number of taxpayers dramatically decreased due to the financial crisis, therefore, not only the framework of personal income tax was burst by the increasing budgetary deficit - which was counter-balanced by introducing a special solidarity contribution - but the VAT on basic consumer articles also increased. The allowances kept reducing, the benefits introduced until 2002 were finally terminated, the Sulinet programme - meant to help integration with the digital world - disappeared and the tax exemption of tuition was also terminated. Both the nominal value of personal income tax revenues and the number of taxpayers kept decreasing in this period.

Figure 1 Growth of personal income tax revenues calculated at current price, 1995-2015

Source: Hungarian Tax Authority statistic 1995-2015, archives

4. Switch to a single rate tax system - 2010

The figures already showed in 2010 that the Hungarian personal income tax system could not stay within the former framework: neither the number of taxpayers nor the increasing tax burden paid by them reached the minimum level required for financing the state budget, and in the meantime there were no incentives or social sensitivity either (György, 2016).

Although the idea of the linear tax system - based on the single rate (19%) Slovakian system - was mentioned several times during the former years, this was manifested at the level of the official taxation policy in the summer of 2010 in the form of the first economic action plan, whereby the government promised to introduce the single-key income tax, eased with family elements, within two years and to terminate tax credits (MSZOSZ, 2012). Accordingly, the personal income tax system was basically transformed, the two rates were terminated and replaced first by the 16%, then the 15% flat rate.

The former system of allowances, which was strongly divided earlier and mainly preferred consumption, was also terminated and replaced by the family tax allowance mainly preferring families with two or more children and from 2014 by the family contribution allowance that extended the family tax allowance and also covered the

poorest families. In addition, allowance is/was granted to young couples and to people living with handicap, while the tax allowance on insurance was practically terminated and the tax policy does not give preference to IT consumption, either. The minimum wage was raised significantly - and once its tax exemption was terminated - the number of actual taxpayers and the per capita tax revenues considerably increased and, of course, the state budget could also expect higher revenues from the population. In the meantime, however, there was a basic reshuffle on the labour market, the former 10% unemployment rate went down below 4%, which further increased the number of taxpayers and the size of per capita tax, which still failed to reach the level of 2004 at nominal value.

Table 3: Number of taxpayers and per capita tax in 2002-2015 (nominal value)

Year	2002	2003	2004	2005	2006	2011	2012	2013	2014	2015
Number of taxpayers	3,860,279	3,220,438	3,079,517	3,025,639	3,452,148	3,343,260	4,000,162	4,009,937	4,111,444	4,165,995
Per capita tax	304	372	400	441	431	323	339	329	349	373

Source: Authors research

Conclusion

As it can be seen, extremely large changes took place every four years on average, in harmony with the political cycles, but the impact of various tax changes should mainly be measured through the reactions of the citizens. An appropriate indicator is the trend in the number of taxpayers as the taxpayers typically pay or do not pay or dodge taxes if they feel that the give and take is not fair and they pay a too high price for the public goods in return for the “service” they receive.

Table 3 also shows that the taxpayer behaviour is not necessarily determined by the size of the effective, per capita tax.

The trend in the number of taxpayers is not full, as the figures of annual tax declarations are no longer available. At the same time, from 1995, statistical data were supplied in the Eurostat database in the spirit of joining the European Union, the former statements were made on the basis of another methodology. For this reason, the change in tax revenues shows the change in annual payments by the population calculated at current price, thus reflecting the joint impact of the changes that took place and the “responses” given by the population.

The optimal tax policy is always the result of a compromise, where the taxpayers accept that they have to pay but the tax price paid for the public goods does not exceed the equitable and fair level. The progressive tax scale may not fully conform to the principle of solvency, as the collected tax largely depends on the payment willingness of certain

taxpayer groups. This means that the selected tax system is basically qualified by the final result.

The periods following the change of the regime are separated from one another by the repeatedly dissolving financial balance and the related shifts of emphases, sometimes even within the same political cycles. The tax policy was given a subordinated role here, and sometimes vertical and sometimes horizontal equity was enforced, but only in a restricted way. For the most part, the main objectives focused on increasing tax revenues besides funds narrowing due to the grave deficit as well as - parallel with this and as a contrary effort - on guaranteeing an advantageous situation for foreign investors. The strengthening balance aspects after 1994 did not allow for a large scale reform of the tax system, the minor and larger adjustments guaranteed the fulfilment of the revenue plans in the short run, but the deadline for decisions strongly narrowed down due to the political rotation and the decisions always focused on the next year's tax revenues rather than on a tax base to be formed four years later.

During the first seven years after the tax reform, the system - including all the three main tax types - kept its original features reflecting certain social policy elements, laying a lower tax burden on groups with low income in terms of both personal income tax and VAT. These features gradually disappeared after the correction in 1995, the allowances and benefits promoting the enforcement of social policy were removed from the personal income tax system and then from the VAT system. The tax burden was gradually transferred onto people with average wage. The increasing budgetary deficit followed by the financial crisis in 2008 also buried the former personal income tax system, and the system had fewer taxpayers and an increasing average tax burden until 2010. From 2010, the personal income tax system was basically restructured, as against the former years, fewer people avoided taxes due to the lower tax rates and lower social insurance burdens and due to the family-child support (which is well above the average wage), so thus they could legally reduce the amount of tax.

The introduction of the single rate tax system did not promise a clear turnaround but if we look at the trend in the number of taxpayers and the number of per capita burdens on the taxpayers, we can see that it fulfilled the expectations that had, in fact, not been anticipated.

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Loss of privacy in electronic payment systems¹

Губитак приватности података у електронским системима плаћања

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Abstract: The emergence of new information technologies, such as the Internet of Things, the fifth generation of mobile Internet, artificial intelligence, Big Data, machine learning and blockchain, has led to significant changes in the social and business environment. The potential for exponential growth in such conditions is also recognized in the field of electronic payment systems. The development of the Internet of Things, as a global technical infrastructure that connects objects by adding microprocessors and communications software to them, has become an important basis for the further progress of electronic payment systems. In the process of further improvements, the system faces the great challenge of protection against the unauthorized use, modification or destruction of data. An even greater challenge is the potential abuse of users' personal data by business entities or government agencies. The paper focuses on the challenges of protecting the privacy of users of electronic payment systems in a smart environment.

Keywords: Internet of Things, Big Data, privacy, electronic payments.

JEL classification: E42, L86, O33

Сажетак: Појава нових информационих технологија као што су Интернет ствари, пета генерација мобилног Интернета, вештачка интелигенција, обрада велике количине података, машинско учење и блокчеин, довели су до значајних промена у начину функционисања друштвеног и пословног окружења. Потенцијал за експоненцијални раст у таквим условима препознат је у области електронских система плаћања. Развој Интернет ствари, као глобалне техничке инфраструктуре која додавањем микропроцесора и комуникационих софтвера стварима врши њихово повезивање, постао је важна основа даљег напретка електронских система плаћања. У поступку даљег унапређења, систем се нашао пред великим изазовом заштите од неовлашћеног коришћења, модификације или уништења података. Још већи изазов представља потенцијална злоупотреба приватности личних података корисника, од стране пословних ентитета или државних органа. Решења се траже у проналажењу компромиса између приватности (платилац) и сигурности (прималац) различитих страна. Рад се фокусира на изазове очувања приватности података корисника електронских система плаћања у паметном окружењу.

Кључне речи: Интернет ствари, велики подаци, приватност, електронско плаћање

JEL класификација: E42, L86, O33

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Introduction

The new technological transformation brings about the need for change in the approach to basic business principles. The tremendous advances in the deployment of wireless communications systems in recent years have increased the usage of mobile devices and the concept of customer service delivery anywhere, at any time. In this context, connecting users to the Internet is no longer the highest form of information and communication technologies (ICT) application, as the efforts are made towards connecting the physical and virtual worlds. There are tendencies to connect all aspects of the human environment, which can be used to monitor processes or automate activities into a virtual whole, with the aim of providing services via Internet (Tsiatsis et al., 2019, p. 9).

The Internet of Things (IoT) concept was created as a product of the global connection of people with devices and objects from the environment. It has created new opportunities for the development of electronic payment systems. Connecting devices, machines and objects through the installation of microprocessors and forming a permanent communication link will allow automatic execution of routine transactions. The large amounts of data generated by smart devices provide the basis for a new approach to data processing and management, known as Big Data. At the same time, the question of storage, protection and possible misuse of the obtained data arises. The subject of paper is the key challenges in ensuring the privacy and security for data created by electronic payment systems customers. The aim of the paper is to advance the theoretical understanding of privacy of electronic payment systems customers in a modern information environment.

The first part of the paper will explain in more detail the concepts of the Internet of Things and the Internet of Values, along with the key features and risks they carry. The huge amount of data created by the interaction of people and devices leads to the need for their analysis by the Big Data method, which will be the focus of the second part of the paper. The impact of these concepts on privacy of electronic payment systems customers, as well as possible future implications, will be analyzed in the third part of the paper.

Internet of Things

The Internet of Things starts with the formation of intelligent infrastructure, which connects objects and people through a computer network. It enables both humans and machines to universally coordinate resources through remote monitoring and control (Brock, 2001, p. 5). It is a virtual world made up of elements capable of making decisions, which are constantly interacting. Adding processors to some of the objects in the human environment transforms them into "smart objects". Developments in this field are largely due to the advancement of Machine-to-Machine (M2M) communication, which has made it possible to connect devices with autonomous

communication capability without human intervention (Kimani et al., 2019, p. 36). These devices have the ability, not only to collect information from users but also to further exchange information (Borgia, 2014, p. 1).

Numerous industries, from healthcare, through manufacturing, commerce and transportation, have transformed their services based on the use of smart devices. More than 46 billion devices are expected to be connected worldwide by 2021 (Tsiatsis et al., 2019, p. 31). According to the authors' forecasts, by the year 2020, returns of \$ 7.1 billion are expected worldwide from the use of the IoT (Lund et al., 2014). At the same time, with the expansion of IoT devices, the world faces numerous challenges in maintaining data security and privacy.

Unlike traditional networks that are provided with complex, multiple factors of security protocols, IoT systems require the use of lightweight security algorithms to maintain a balance between security and resource consumption such as - battery life, memory status, or processor load (Makhdoom et al. 2018, p. 253). Therefore, the overall architecture of the IoT environment is comprised of devices characterized by unique recognition, low processing power and memory capacity, which further leads to a limited ability to process data (Khan & Salah, 2018, p. 396). Despite these features, connecting devices through gateways that link one protocol to another creates the ability to transfer large amounts of data. Data creation can occur in any part of the IoT environment, whether it is a "smart" device, the Internet, or any of the online spaces (such as Cloud). Hou, Qu, & Shi (2018) point out that over the past two years, 90% of the world's data has been generated at a rate of 250,000 gigabytes per second, which is roughly equivalent to 150 million books. Information security is largely focused on finding specific solutions for the virtual space where data moves from IoT devices to the border of Internet.

With the increasing technical and technological progress there is a suppression of the risk of system malfunctioning and an increase in the risk of fraud. Within the IoT, the risk of fraud originates from the application of non-standardized technology that increases the vulnerability of the entire system. Attacks that may occur are directed to the privacy and confidentiality of the user's data. In order to provide greater information security, Weber (2010) outlines the following requirements:

- Attack Resistance - The system should avoid single points of failure and adapt to the key nodes where failure occurs;
- Data authentication - The downloaded addresses and object information must be authenticated;
- Access control - information providers must be able to implement control of access to databases;
- Client privacy - steps should be taken to ensure that only the information provider is able to draw conclusions by observing a customer-specific search system.

The IoT concept is the basis of future business communication. However, adequate utilization of the payment infrastructure is required to fully exploit the potential that will be created through the networking of people and devices. Integrating payments into the IoT will provide a higher form of communication connectivity, called Internet of Value (IoV). The key idea within the IoV is to build an adequate technical and technological basis for safe and fast transfer of value. This is not just about monetary value, but also about the transfer of dematerialized securities, contracts or intellectual property. The transfer should take place without the need for a third party, at no additional cost in comparison to those that would have incurred the transfer of ordinary information.

Building an adequate infrastructure involves striking a balance between high security requirements and acceptable costs. It is thought that blockchain technology could satisfy both requirements. A blockchain technology creates databases made up of a series of blocks such that each new block is cryptographically linked to the previous one (Minoli & Occhiogrosso, 2018, p. 255). The transmitted information are parts of the chains of blocks, with each block storing a set of transactions at a specified time. Reliability is enhanced by the possibility of verification, audit and monitoring from the first transaction that occurs in the system (Reyna et al., 2018, p. 176). This also achieves a high level of transparency that helps in building trust with clients.

The blockchain mechanism was originally intended for transfer of financial values. This is also supported by key features such as speed, low cost and reliable transaction transfer. Blockchain is increasingly mentioned in the literature as a tool for addressing security and privacy issues of the IoT, owing to its decentralized architecture, fault tolerance, and cryptographic security features, such as pseudonym, data integrity, and authentication, (Minoli & Occhiogrosso, 2018, p. 251). Therefore, embedding blockchain in applications is considered a good way to form a secure payment system. The challenge that arises is the daily growth of such databases. Consequently, formation of too big databases can have adverse effects on performance (e.g., increasing synchronization time for new users) (Reyna et al., 2018, p. 175).

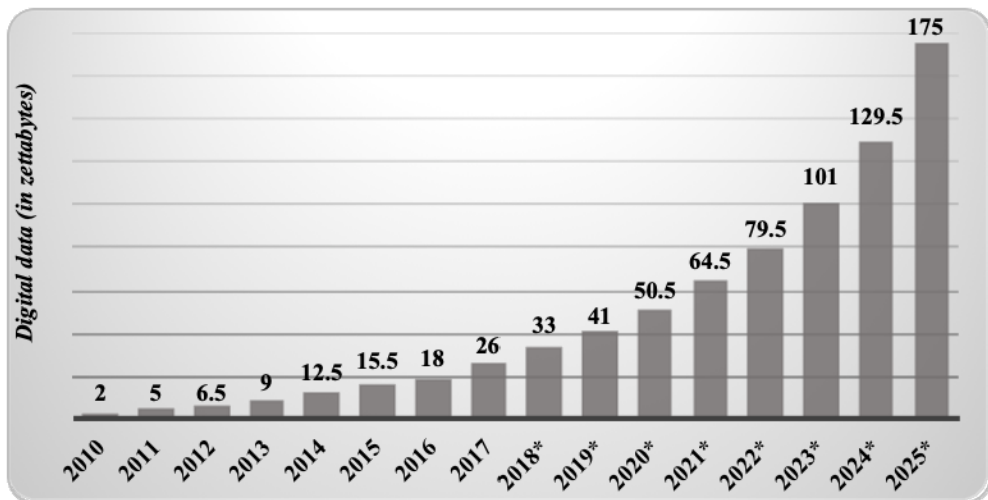
2. Electronic payment systems in a Big Data world

The vast amount of data generated by IoT devices and social networks can be used to create the information needed to make decisions. However, standard data management tools cannot adequately and quickly analyze received inputs (Alam et al., 2014, pp. 446). There is a mass of data, the use of which makes sense only with very short time delay, which practically requires real-time analysis. This means that business entities are facing an increasing volume of data whose heterogeneity and dynamics of emergence create additional problems (Lukić, 2014, p. 227). The revised approach to data management is referred to as Big Data in the literature (Ghani et al., 2019). By using new software solutions for processing, storing and connecting data, companies can find hidden schemes and patterns. Based on new information, it is possible to

personalize the offer not only to groups but also to each customer individually. Torrecilla & Romo (2018) highlight two major advantages of the Big Data concept. The first one relates to the fact that businesses collect potentially valuable customer information at low cost. The second one relates to the adoption of more successful and better decisions by governing bodies, since such decisions are made in accordance with research based on the collected data.

There are estimates that the total amount of digital data created globally will increase from about 30 zettabytes, as estimated for 2018, to 175 zettabytes by the end of 2025 (Chart 1). The rapid growth has also been attributed to the continued growth in the number of Internet connections and social networks users, the migration from analogue to digital television and the spread of information-sensitive technologies, such as surveillance cameras, microphones, radio frequency identification readers and wireless communications networks (Gantz & Reinsel, 2013).

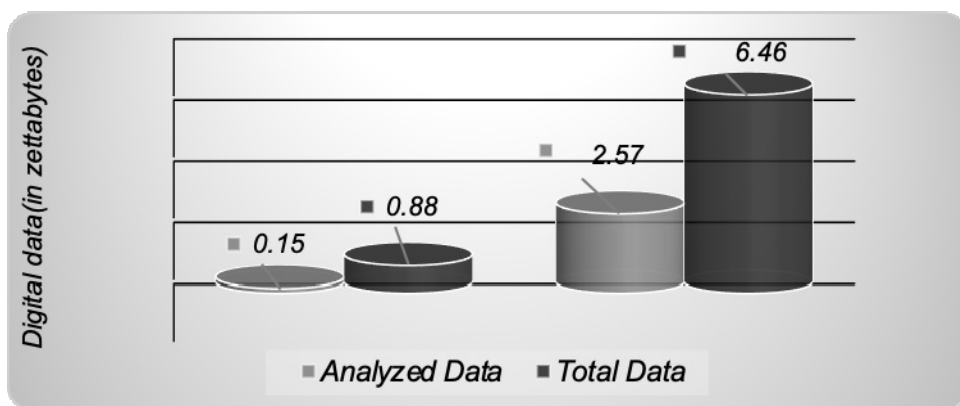
Chart 1: Trend of global creation of digital data



Source: <https://www.statista.com/statistics/949144/worldwide-global-datasphere-real-time-data-annual-size/>

The same authors showed that in 2013, monitoring and analyzing of only 18% of the United States' total amount of digital data produced some benefit in creating information. It is predicted that this percentage would be much higher in the future, as much as 40% of total data - see Chart 2.

Chart 2: Share of analyzed data in total data



Source: Gantz, J., & Reinsel, D. (2013). *The digital universe in 2020: Big data, bigger digital shadows, and biggest growth in the Far East* (IDC iView)

Electronic payments provide the basis for the application of modern data management tools. With the exception of the electronic money, transactions with all other electronic payment systems are finalized through the standard payment infrastructure. This means that all transactions via credit cards, mobile digital wallets or some other system, such as PayPal, are made by transferring funds from a current account or a credit card account in a bank. Companies that manage payment systems can collect a large amount of customer information which they can use to profile them. A customer's digital identity in addition to various online information such as usernames, passwords, PINs and access codes includes a wide range of offline features that can be tracked (e.g. age, residence, income) (Eastin et al., 2016, p. 215).

Data management requires some knowledge, storage space, and software solutions. Many companies either cannot meet these requirements or do not have a direct relationship with customers, so they cannot collect data. Therefore, monetization of the collected data is a very important aspect of ICT companies' business. The best example is Facebook, which makes money based on data users willingly share. In addition to demographic data, the interests of users are of great importance, both those that are explicitly listed and those that social network algorithms perceive from interacting with other users. In this way, Facebook creates a psychological profile of every user, which is the basis for offering new content. Companies looking to leverage the powerful tools that Facebook has at disposal pay to distribute their content to users.

A significant problem in ensuring digital security at present is legal uncertainty regarding the regulatory definition of the concept and disclosure of the content of such an objective phenomenon as "the digital form of existence of information, the exchange and operation of it" (Aryamov et al., 2019, p. 2). The concern for the information privacy is enhanced by examples of personal data leaks from databases of

ICT companies, financial institutions and the public sector. Eastin et al. (2016) identify the following determinants that influence the raising awareness of data privacy - data collection settings, data control, unauthorized secondary use, improper access, location monitoring. Greater concern also leads to the strengthening of the individual's interest in protecting personal information. The conflict of interest that arises between privacy protection and public benefit makes it difficult to collect personal information, even when government agencies appear as data collectors (Lee et al., 2019, p. 294). Although it seems difficult, a clear line can be drawn between privacy and data protection. While data protection is one of the segments of privacy within which the collection, use and dissemination of private information occurs, privacy as a broader term also includes various forms of intrusive behavior (wiretapping, concealment, physical surveillance, interception of mail, etc.) (Anić et al. 2018, p. 17).

3. Concept of privacy in electronic payment systems

Today, much of the communication takes place on the Internet, leaving traces that reveal the interests, traits, intentions and beliefs of individuals (Acquisti et al., 2015, p. 509). Electronic communication has enabled the collection and non-transparent management of personal data by other individuals, businesses and governments. Therefore, individuals are often unaware who has access to their data and what he or she can do with them. Defining the concept of privacy, Buchanan et al. (2006) have pointed to some of the following dimensions:

- *Informational privacy* - the right of an individual to determine how, when and how much information he or she will share with others;
- *Privacy accessibility* – it overlaps with informational privacy in cases when taking over or the intention to retrieve information involves accessing to an individual. It also applies to cases where physical access is compromised (e.g. intrusion by spam or computer viruses);
- *The physical dimension of privacy* - the degree to which a person is physically accessible to others;
- *Expressive privacy* – one's ability to protect the area for expressing identity and personality through speech or activity while enhancing the intrinsic ability to build interpersonal relationships;
- *The social-communication dimension of privacy* - an individual's ability to control social contacts.

Informational privacy has been at the center of academic interest for more than two decades. At the very beginning of electronic business, the focus was on e-commerce and building an adequate e-payment infrastructure. Over time, customers became aware that their personal information are being used, which influenced the development of strategies regarding the protection of informational privacy. However,

despite concerns, not only that personal data sharing have not ceased, but the volume and variety of shared data have increased over time. The distinction between attitudes and behavior in the literature has been characterized as a privacy paradox (Acquisti, et al., 2015; Anić et al., 2018). The authors explain the emergence of this phenomenon in the volatility of individuals' attitudes toward privacy, where change is influenced by the prevailing costs and benefits of a particular situation (Acquisti, 2004; Acquisti, et al., 2015; Eastin et al., 2016). Smith, Dinev and Xu (2011) state that when assessing such a situation, customers consider three types of benefits they can gain by disclosing personal information: financial rewards, personalization, and the benefits of social adjustment. Cost-benefit calculation, in services that are loaded with compromising informational privacy, has been referred to in the literature as the privacy calculation (Anić et al., 2018, p. 31).

On one hand, the problem is that customers often do not realize the value of privacy until they lose it. On the other hand, they are often suggested that privacy is a brake on the development of safer and more efficient systems. For example, it is stated that the system would be more resistant to identity theft if customers were willing to share more personal information. If a customer logs on to a network from a geographical location where he has never been present before, or sends a payment to a recipient on another continent, the system could recognize the illogicality and respond by asking for additional confirmations, sending an email alert or blocking an account. Although at first glance it seems like an ideal solution, it implies that the system would need to monitor customer's physical movement and analyze the amounts of payments and identities of recipients.

The question is what a company that poses so much data wants or can do with it. One option is to create personalized payment services in the form of microcredit for individual participants. Selling data to internet marketers is another option, as these companies could prepare personalized offers based on the experience of previous payments. Finally, a company with a large amount of payment information would probably be under a lot of pressure from the authorities to make the data available. After the terrorist attacks in the early 21st century, the Western states repeatedly passed laws that gave their governments the power to usurp citizens' privacy in order to maintain public security.

However, an essential problem is the interpretation of public safety. While citizens believe that the goal is to find financiers and participants in terrorist acts, states actually have a basis to follow anyone who is labelled suspicious. In practice, just because terrorists buy large quantities of artificial fertilizer to make explosives, anyone who buys artificial fertilizer and is not a farmer can be labelled suspicious. In addition to further data collection, such individuals may face account blocking or asset forfeiture. The problem comes from the large amount of processed data, in which some facts can coincidentally match with predefined patterns of dangerous behavior. Instead

of raising public safety, sacrificing privacy can actually reduce the security of individuals and expose them to problems, as in the example above.

It is often stated that cash is suitable for the informal economy and terrorist financing and should therefore be withdrawn. While this is true, the fact is that criminals and terrorists have been able to find ways to fund their activities without cash. An example is the continuous existence of the Islamic State, a terrorist organization that has operated in multiple countries in the Middle East and gathered tens of thousands of followers from around the world. The organization has always been well-armed and equipped, often with the newest off-road vehicles from the world's largest manufacturers, but its financial flows have never been revealed (Engel, 2015). In preparation for the 2015 terrorist attack in Paris, attackers used pre-paid payment cards to pay for logistics material (Guarascio, 2015). Such cards are anonymous and do not require customer's name when issued. In other words, criminals and terrorists find a way to stay out of reach of authorities despite the strictness of regulations, while in fact conscientious citizens lose some of their personal freedoms.

The electronic payment system starts from decentralized structure, which contrasts with the existing hierarchically ordered and a centralized structure, which has an inherent reliance on credible payment intermediaries (Lukić & Živković, 2018, p.164). Therefore, withdrawing cash will not reduce the ability to perform undesirable actions. On the contrary, the disappearance of cash can only destabilize economies (Tomić & Todorović, 2018, p. 316). On one hand, a fully electronic payment system would enable states to fully control economic life, creating an unprecedented space for abuse and corruption. Funds could be blocked or confiscated to both individuals and companies that appear to be ineligible for any reason. The power to make decisions with such far-reaching consequences quickly and easily would inevitably lead to abuses. On the other hand, a large number of customers would be unprepared for absence of cash and switching to fully electronic payments. The readiness of the system itself and technical perfection would also be an issue.

In addition to withdrawing cash, there are some other tendencies that can further compromise customers' privacy. On June 18, Facebook released a white paper on intentions to develop its own cryptocurrency, Libra, with a consortium of financial and technological companies. The document states that transaction accounts will not be associated with a user's personal identity (libra.org). However, the fact that the digital wallet - called Calibra - will be integrated into Facebook Messenger and WhatsApp applications suggests that the company plans to integrate its users' financial and personal information. Users can be offered to separate digital wallets from social networks accounts, with promises that integration prevents unauthorized access to funds. One should not expect that Facebook would miss the opportunity to integrate those data. An insight into the history of transactions would create an incomparably greater potential for monetization of users' privacy. It is known that Facebook have sold collected data to third parties in the past, as well as having ceded them to state

intelligence agencies. Therefore, integrating social networks data with personal transaction history would be a great danger for each individual.

The Shazam mobile application is a good example of machine learning. Based on the sounds collected by the mobile phone's microphone, the application is able to recognize the song the user is listening and to provide basic information about it. The internet is the largest megastore of today - Amazon - has announced it will start using an application that will identify photographed pieces of clothes and provide a buyer with a link (Hanbury, 2019). It should be expected that the algorithm remembers what kind of clothes users are searching for, and then start to independently suggest similar items to them. However, this is not the biggest problem with machine learning. In the case of withdrawal of cash, governments could theoretically have an insight into all performed transactions, as they would all be initiated electronically. If part of the transactions were to be carried out anonymously using pre-paid cards or electronic money, participants would not be able to be identified. However, machine learning based software could consider the origin, time of day, day of the week, transaction amount and content of the purchase, and compare them to known patterns of identified users. In case the software works perfectly, no transaction would be anonymous. In the case of imperfections, users would be at risk of being misidentified and classified as suspicious.

Another problem is the lack of awareness of the information volume shared with others. Cellary and Rykowski (2015) distinguish financial transactions occurring within the Visible versus the Invisible Internet. Substantial differences in the functioning and sharing information influenced this of classification. Visible Internet connects individuals who, on their own initiative, initiate certain actions (opening an application, prompting for a specific action, etc.) using computers and software to access the network. Users are aware what information about them can be collected and who collects them, although even then they cannot know for what purpose they will be used. In the Invisible Internet, procedures are being unconsciously initiated using IoT connections, whereby users cannot detect how many devices are connected and what information is collected. When it comes to financial transactions, the differences are also obvious. While services are paid directly or indirectly in the Visible Internet, requiring payment participants to be identified, services in the Invisible Internet are offered at random, most often by geographical location (Cellary & Rykowski, 2015, p. 3).

The presentation so far was about the possibility of deliberate and planned misuse of users' personal data. Equally dangerous is the inadvertent data management, or their poor protection in storage. Databases that have no cryptographic security, located on servers connected to the Internet, have a great chance of being usurped. Attacks on databases can occur from outside, by hacking groups, or from the inside, by malicious employees. If the payment authentication information is usurped, users could

lose financial resources in addition to privacy. Some examples of usurping large amounts of data are (Johnson et al., 2018):

- Target Corporation – in 2008 and 2013, payment information of over 100 million users leaked to the public;
- Sony Online Entertainment – the intrusion on private networks in 2014 resulted in 102 million compromised user accounts;
- JP Morgan Chase – In 2014, hackers gained access to personal information related to 76 million personal accounts and 7 million small business accounts;
- Home Depot - compromised data of more than 56 million credit and debit card users.

The potential violation of privacy by using IoT could be far greater than in the current conditions of Internet communication (Tomić & Todorović, 2017, p. 102). In order to provide personalized services that fully meet the needs of an individual, it is necessary to collect a large amount of private information. In an effort to reach a compromise between personalization and privacy, Cellary and Rykowski (2015) propose a license-plate approach. Similar to the vehicle authentication in a smart environment, the license - plate approach assumes that a trusted third-party issues digital tags, as public administration offices do in the real world. With the help of a digital tag, the smart environment operator obtains the information needed to personalize the service under client-defined conditions. In each iteration, a different identifier would be used, avoiding thus the usage of previously collected information.

Conclusion

Maintaining data privacy in the modern digital age is a real challenge. The following dilemma arises: smart devices or security, that is, how much can people trust a service provider if one considers the potential risk of fraud? This type of risk is especially pronounced with electronic payment systems. Although all payment systems experience security issues, the specific features of electronic payment systems in the IoT environment have increased the risk of user's data abuse. The risk of fraud comes from the use of non-standardized technology, which increases the vulnerability of the entire system. The vast amount of data that goes through payment systems can provide insight into consumer spending patterns, as well as a potential mechanism to identify and prevent fraud.

The digital age is erasing the boundaries of information privacy slowly. Creating a secure electronic payment system in a smart environment requires protection against unauthorized access to the network and user data. Expectations for IoT in the future are high, especially with regard to micro and pico payments, whose expansion is becoming more certain. But it must also be remembered that these expectations can remain unfulfilled unless the way for overcoming challenges is provided. It is important that

the biggest turning point in the field of data protection is expected from the integration of IoT with blockchain technology, which can provide a reliable channel for transmitting information. The inclusion of blockchain technology in the electronic payment systems architecture in the IoT environment is a recommendation for all future research.

Theoretical analysis in the paper provides an opportunity to fully understand the threat to privacy in contemporary conditions. The results show that it is crucial for electronic payment systems to improve the level of financial transaction security as new technology evolves. Regulatory changes in the domain of privacy are necessary, not only for the area of unauthorized downloading data, but also for their further processing. The world needs a global consensus on what data should be considered as private and what rules should be applied to collecting, storing, distributing and processing it. The question is no longer what the best way for protecting privacy is, but when privacy does not need to be protected, and when protection is imperative at all costs.

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Стручни рад
Professional article

Multi-criteria ranking of available forms of promotional activities: a case analysis

Вишекритеријумско рангирање расположивих облика промотивних активности: анализа случаја

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Abstract: This paper presents an analysis of the case of multicriteria choice of promotion form for a product group, in one large retail chain. The following forms of promotion were available: commercial propaganda, personal selling, sales promotion, publicity, public relations and direct marketing. The selection was made on the basis of five criteria: the effects of a given form of promotion, the costs of a given form of promotion, the compliance of a given form of promotion with consumer preferences, the appropriateness of a given form of promotion in relation to the promotion of competition and the engagement of human resources for a given form of promotion. The problem of multicriteria analysis was solved with the VIKOR method. The initial decision table and criteria weights were determined using the expert method, in which the opinions of ten experts from the observed company were taken. In this way, subjectivity in these initial procedures is reduced. The final conclusion is that in the promotion of the analyzed product group, publicity should be used to the fullest extent possible, economic propaganda should be applied in accordance with financial possibilities, and most attention and energy should be directed towards sales promotion activities.

Keywords: Promotion forms, Multi-criteria analysis, Expert method, VIKOR method, Case analysis.

JEL classification: M37, C81.

Сажетак: У овом раду приказана је анализа случаја вишекритеријумског избора облика промоције за групу производа, у једном великом трговинском ланцу. На располагању су били следећи облици промоције: привредна пропаганда, лична продаја, унапређење продаје, публицитет, односи с јавношћу и директни маркетинг. Избор је вршен на бази пет критеријума: ефекти датог облика промоције, трошкови датог облика промоције, усаглашеност датог облика промоције са преференцијама потрошача, примереност датог облика промоције, у односу на промотивно деловање конкуренције и ангажованост

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људских ресурса за дати облик промоције. Постављени проблем вишекритеријумске анализе решавањем је помоћу методе ВИКОР. Почетна табела одлучивања и тежине критеријума одређени су помоћу експертне методе у којој су узета мишљења десет експерата из посматраног предузећа. На овај начин, смањена је субјективност у овим почетним поступцима. Коначни закључак гласи: у промоцији анализиране групе производа, публицитет треба максимално користити уколико постоји, привредну пропаганду треба примењивати у складу са финансијским могућностима, а највише пажње и енергије треба усмерити ка активностима унапређења продаје.

Кључне речи: Облици промоције, вишекритеријумска анализа, експертна метода, метода ВИКОР, анализа случаја.

JEL класификација: M37, C81.

Introduction

In today's business environment, businesses need to be more flexible and have to adapt their structures and brands faster to changing social, market and technological trends while maintaining the true nature of their company. Authenticity is the biggest capital in a situation of increasing transparency of information on the web (Kotler, Kartajaya, & Setiawan, 2017). In the sphere of marketing, innovative marketing plays a particular role and importance (Son, Sadachar, Manchiraju, Fiore, & Niehm, 2012; Prahalad & Ramaswamy, 2004; Muangkhrot & Ussahawanitchakit, 2015). The key effects of innovative marketing are: increasing labor productivity, the emergence of new business models, the creation of "new" jobs, new communication systems, higher protection at work, higher competitiveness, promotion of PR and brand (Schlechtendahl, Keinert, Kretschmer, Lechler, & Verl, 2015; Hall & Trivin, 2018; Müller & Däschle, 2018; Wollschlaeger, Sauter, & Jasperneite, 2017).

However, regardless of current marketing trends, some basic dilemmas and activities in practical terms always remain. One such activity is the implementation of appropriate forms of promotion for a particular product/service or product/service group. Prior to the implementation of particular forms of promotion, it is necessary to define and consider them, and this practically means making a decision on the choice of promotion forms, which are best suited to the case.

In this paper, the problem of multicriteria analysis of available forms of promotion is solved, for the purpose of ranking and defining the most favorable actions for promotion of a certain group of products, in one domestic company. Here, because of the confidentiality of the data, it is not stated which company it is, but it can be said that it is a large retail chain. What is important is the presentation of possibilities for solving this specific, as well as other similar problems in the process of selecting and defining promotional activities in business organizations.

At the beginning, the available actions were defined, namely the following forms of promotion: 1. Commercial propaganda, 2. Personal sales, 3. Sales promotion, 4. Publicity, 5. Public relations, 6. Direct marketing (Đorđević & Čočkalović, 2004; Nikolić, 2012b). Then, the criteria based on which choices are made are defined: (1) Effects of a given form of promotion, (2) Costs of a given form of promotion, (3)

Consistency of a given form of promotion with consumer preferences, (4) Suitability of a given form of promotion, in relation to the promotional activities of competitors and (5) Human resources engagement for a given form of promotion. When defining the criteria, experts from the observed company (employed in marketing function) were consulted. They have knowledge and experience in marketing, promotional activities and public relations.

The first part of solving this practical problem is to apply the expert method. Ten experts from the observed company expressed their opinion on the decision problem. Specifically, the experts gave ratings of each available action against each criterion, and also provided their own assessment of the weights of the criteria in the model. When defining attributes in the initial decision matrix, the experts took into account some general principles of ranking of particular forms of promotion (Kotler & Armstrong, 1996; Milisavljević, 2001; Đorđević & Čočkalović, 2004), as well as their experience and the specifics of the case.

Then, the average values of each stock according to each criterion were determined as well as the average values of the criterion weights. This approach can also be understood as group decision making in parallel form (Dufner, Hiltz, Johnson, & Czech, 1995; according to Čupić, Tummala, & Suknović, 2001). This form of group decision-making involves the quantitative determination of the result of individual opinions, which can be done at the end of application of the method (each group member performs the procedure until the end, and then finds the resultant of these final solutions) or partially, after individual steps in the applied method (each group member do a certain phase of the method, and then find the resultant, which goes with the further calculation) (Nikolić, 2012a). The second case was used in this paper: the experts expressed opinions at the beginning, the result of these opinions (average values) was immediately found, and the further calculation was continued with the initial values thus obtained, without additional subjectivity until the end of the procedure.

The problem of multicriteria analysis was solved using the VIKOR method (Opricović, 1986; Opricović & Tzeng, 2004). This method was chosen to solve a given case, for two reasons. First, the VIKOR method can very well take advantage of the fact that the values in the initial decision table are obtained by the expert method: it enables accurate and objective calculation with the average values thus obtained. In essence, in the VIKOR method, subjectivity exists when forming an initial decision matrix, as well as when assigning weights to criteria. These two phases are made more objective precisely by the expert method, and the further procedure contains no subjectivity. Second, the VIKOR method, as a solution, provides a set of compromise solutions. This is appropriate in this case, because it is not necessary to choose only one form of promotion: applying one form of promotion does not exclude the possibility of using other forms of promotion. It is possible that the solution involves

several actions in the set of compromise solutions, which can be a significant guideline for reaching a final decision.

1. Multicriteria analysis

1.1. Introduction to multicriteria analysis

The complexity and complexity of business decision-making often requires a multi-criteria model, that is, a multi-criteria base, as a prerequisite for objective selection and choice of alternative solutions (Radojičić & Žižović, 1998). It is clear that the area in which strategic and other decisions are made in an enterprise generally requires the application of multicriteria decision-making methods (Nikolić, 2012a). Multi-criteria decision-making (MCDM) refers to decision-making situations when there are a number of, most often conflicting, criteria (Čupić, Tummala & Suknović, 2001). Ranking alternatives by multiple criteria at the same time contributes to the reality of dealing with such situations.

Multicriteria analysis has been used successfully in various fields of human activity. This is evidenced by numerous references related to the diverse application of multicriteria analysis, for example: evaluating the economic performance of fishing systems (Romeo & Marcianò, 2019), evaluating a portfolio of projects in state-owned energy companies (Hernandez-Perdomo, Mun, & Rocco, 2017), assessment of likely future scenarios under different drivers of land use change (Martínez-Sastre, Ravera, González, López Santiago, Bidegain, & Munda, 2017), testing the differences between Integrated Pest Management (IPM) strategies in pome fruit across Europe (Caffi, Helsen, Rossi, Holb, Strassemeyer, Buurma, Capowicz, Simon, & Alaphilippe, 2017), identifying the highest and best use for historic buildings (Ribera, Nesticò, Cucco, & Maselli, 2020), evaluating the sustainability of conservation agriculture (Craheix, Angevin, Doré, & de Tourdonnet, 2016), analysis of barriers to the adoption of autonomous vehicles (Raj, Kumar, & Bansal, 2020). It can be noted that the references are more recent, which indicates that multicriteria analysis does not in the least lose its relevance, application and importance.

1.2. The VIKOR method

The VIKOR (Multiple Criteria Ranking) method is a very commonly used multi-criterion ranking method, suitable for solving various decision problems. In writing this point, reference has been significantly used (Nikolić, 2012a). The VIKOR method was developed based on elements from compromise programming. The method starts from the “boundary” forms of the L_p metric (Opricović, 1986). Looking for the solution closest to the ideal. The following metric is used as a measure of the distance from the ideal point:

$$L_p(F^*, F) = \left\{ \sum_{j=1}^n [f_j^* - f_j(x)]^p \right\}^{\frac{1}{p}}, \quad 1 \leq p \leq \infty$$

This metric represents the distance between the ideal point F^* and the point $F(x)$ in the space of criterion functions (Opricović, 1986). Minimizing this metric determines the compromise solution. The following tags are used in the VIKOR method:

m - number of actions,
 i - the ordinal number of the action, $i = 1, 2, \dots, m$,
 n - number of criteria,
 j - ordinal number of criteria, $j = 1, 2, \dots, n$,
 f_{ij} - the value that the i th action realizes for the j th criterion function,
 w_j - weight of the j th criterion function,
 v - the weight of the strategies to satisfy most criteria,
 Q_i - a measure for multi-criteria ranking of the i^{th} action.

For each action there is a value of Q_i , and then an action is selected at which this value is the smallest (the least distance from the “ideal” point). The measure for multicriteria ranking of the i th action (Q_i) is calculated by the expression:

$$Q_i = v \cdot QS_i + (1 - v) \cdot QR_i,$$

where is:

$$QS_i = \frac{S_i - S^*}{S^- - S^*}; \quad QR_i = \frac{R_i - R^*}{R^- - R^*}$$

By calculating QS_i , QR_i , and Q_i sizes for each action, three independent rankings can be formed. Q_i size represents the establishment of a compromise ranking list combining QS_i and QR_i sizes. By choosing a smaller or larger value for v , the decision maker can favor the influence of QS_i size or QR_i size in the compromise rankings. The labels used have the following meaning:

$$S_i = \sum_{j=1}^n w_j \cdot \frac{f_j^* - f_{ij}}{f_j^* - f_j^-} = \sum_{j=1}^n w_j \cdot d_{ij}, \quad i = 1, 2, \dots, m$$

$$R_i = \max_j w_j \cdot \frac{f_j^* - f_{ij}}{f_j^* - f_j^-} = \max_j w_j \cdot d_{ij}, \quad i = 1, 2, \dots, m$$

$$S^* = \min_i S_i; \quad S^- = \max_i S_i; \quad R^* = \min_i R_i; \quad R^- = \max_i R_i$$

$$f_j^* = \max_i f_{ij}, \quad j = 1, 2, \dots, n$$

$$f_j^- = \min_i f_{ij}, \quad j = 1, 2, \dots, n.$$

Action a_i is better than action a_k , by the j^{th} criterion, if:

- $f_{ij} > f_{kj}$ (for $\max f_j$, or when the criterion has a maximum requirement),
- $f_{ij} < f_{kj}$ (for $\min f_j$, or when the criterion has a minimum requirement)

The action a_i is better than the action a_k (in total, according to all criteria), if: $Q_i < Q_k$. The relevant ranking list by VIKOR method is the compromise rank list for the value $v = 0,5$. In order for an action to be adopted as the best, according to the VIKOR method, it must be first on the compromise rank list and meet two conditions (U1 and U2).

2. Multicriteria analysis of promotional activities by example

2.1. The problem of multicriteria analysis

Defining the problem of multicriteria analysis involves identifying and adopting a list of available actions, as well as the criteria on which to make a choice. In this section, experts from the observed company were also consulted, as well as existing literature, for example (Đorđević & Čočalo, 2004; Nikolić, 2012b). The experts are employed in the marketing function of the observed company.

For the promotion of the observed product group, in the observed company, the following forms of promotion are available (these are also actions in this multicriteria analysis problem):

a_1 - Commercial propaganda. Advertising is also called economic or commercial propaganda. Propaganda is a paid means of mass communication with consumers. Economic propaganda has three main goals: to inform, persuade and remind. The key strength of propaganda is that it addresses a wide audience. According to Gordon (2011), The Institute of Practitioners in Advertising (IPA), as a professional institute for leading UK advertising agencies, defines advertising as follows: Advertising presents the most persuasive sales messages for products or services at the lowest possible cost.

a_2 - Personal sale. Personal selling is a form of promotion that involves direct contact between businesses and customers. This is where the personal contact of the seller and the buyer occurs. Under such conditions, sales talk is being held and the chances of a sale being increased. The goal is to increase sales volume.

a_3 - Sales promotion. Sales promotion covers all activities (except propaganda, personal selling and publicity) that further stimulate sales. These include: various

exhibitions, presentations, exhibitions, demonstrations, sweepstakes, sales campaigns and more.

a₄ - Publicity. Publicity is the publication of positive (but also negative) information about an organization, which is not funded by the company. The emphasis is on information, not persuasion. It is used to create or increase affection for the company. The main advantages of publicity (especially in relation to economic propaganda) are the following: the placement of information in the most important media, in the hit points, at the time of impact and not paid (although there are costs of preparing the material for publication).

a₅ - Public relations. Generally, there are the following similarities between marketing and public relations. They: (a) deal with the organization's connections and use similar communication tools in addressing the public; (b) have the primary task of ensuring the success of the organization and its economic survival (Wilcox & Cameron, 2009). According to the same authors, the main difference between marketing and public relations is that marketing is focused on customers and sales of products and services, and public relations takes care of building relationships and creating goodwill in public for the organization (Wilcox & Cameron, 2009). Similarly, Grunig (1992) states a clear distinction between marketing and PR: marketing should communicate with markets related to an organization's products and services, and PR should care for all the organization's publics.

a₆ - Direct marketing. Direct marketing is the direct communication with the target segments. Communication is done through various media, but the most commonly used are email, telephone and online communication over the Internet. He interacts directly with the consumer, the individual, so that he or she can talk directly through the conversation through answering questions.

The criteria on the basis of which the above actions are ranked (for promotion of the observed product group, in the observed company) are as follows:

- f₁ - Effects of a given promotion form,
- f₂ - Cost of a given promotion (minimum requirement),
- f₃ - Consistency of a given form of promotion with consumer preferences,
- f₄ - The suitability of a given form of promotion in relation to the promotional activities of competitors and
- f₅ - Human resources engagement for a given form of promotion (minimum requirement).

2.2. Defining Initial Decision Conditions - Expert Method

The next step is to define the initial decision conditions. Initial decision conditions involve evaluating each action against each criterion in the model. For the given case (promotion of the observed product group, in the observed enterprise), defining the

initial decision conditions was made by the expert test method, by having the experts express their opinions on the values of the available shares for each set criterion. The procedure involved ten experts. Qualitative assessments of the first expert (Expert 1) are given as an example in Table 1.

Table 1: Initial Decision Matrix (Expert 1)

Actions (promotion forms)	Criteria				
	f ₁ - Effects	f ₂ - Costs	f ₃ - Consumers	f ₄ - Competition	f ₅ - Hum. resources
	Request for max / min criteria				
	max	min (-)	max	max	min (-)
a ₁ - Economic propaganda	Very High	Very High	Very High	High	Average
a ₂ - Personal sales	Average	Average	Low	Average	Very High
a ₃ - Sales promotion	High	Low	Average	Low	High
a ₄ - Publicity	Average	very low	High	Average	Low
a ₅ - Public relations	Average	High	Average	High	Average
a ₆ - Direct marketing	Low	Low	Low	High	High

Source: the authors' research

As in Table 1, all actions are rated with qualitative ratings, it is necessary to quantify the qualitative attributes. This is done here via the interval scale (Table 2). Consideration should be given to whether there are requirements for maximization or minimization for particular criteria. In the observed case, the requirement for minimization exists on two criteria (f₂ and f₅). In the VIKOR method, the translation of a minimum into a maximum is performed in the next step, so quantification is performed as if all criteria had a requirement for the maximum. The initial decision matrix with such quantified attributes, for Expert 1, is given in Table 3. The initial decision matrix with quantified attributes, individually for all ten experts, is given in Table 4. The initial decision matrix with average values of quantified attributes, for all ten experts, is given in Table 5. The average values in Table 5 are divided by 10 so that the scores are in the interval [0; 1], used in the VIKOR method.

Table 2: Interval scales for quantification of qualitative attributes

Qualitative rating	Very Bad	Poor	Average	Very Good	Excellent	Criteria type
Quantitative rating	1	3	5	7	9	max
	9	7	5	3	1	min

Source: (Nikolić, 2012a)

Table 3: Initial decision matrix with quantified attributes (Expert 1)

Actions (promotion forms)	Criteria				
	f ₁ - Effects	f ₂ - Costs	f ₃ - Consumers	f ₄ - Competition	f ₅ - Hum. resources
	Request for max / min criteria				
	max	min (-)	max	max	min (-)

a ₁ - Economic propaganda	9	9	9	7	5
a ₂ - Personal sales	5	5	3	5	9
a ₃ - Sales promotion	7	3	5	3	7
a ₄ - Publicity	5	1	7	5	3
a ₅ - Public relations	5	7	5	7	5
a ₆ - Direct marketing	3	3	3	7	7

Source: the authors' research

Table 4: Initial decision matrix with quantified attributes (all experts individually)

Actions (promotion forms)	Criteria				
	f ₁ - Effects	f ₂ - Costs	f ₃ - Consumers	f ₄ - Competition	f ₅ - Hum. resources
	Request for max / min criteria				
	max	min (-)	max	max	min (-)
a ₁ - Economic propaganda	9; 9; 7; 9; 7 9; 9; 9; 9; 9	9; 7; 7; 9; 7 9; 7; 7; 9; 9	9; 9; 7; 9; 7 9; 9; 9; 9; 9	7; 5; 7; 7; 9 7; 7; 9; 7; 7	5; 5; 7; 5; 5 7; 3; 5; 5; 5
a ₂ - Personal sales	5; 7; 5; 5; 3 3; 5; 7; 5; 3	5; 7; 7; 5; 5 5; 5; 7; 5; 7	3; 7; 7; 3; 3 5; 3; 3; 1; 3	5; 7; 5; 5; 7 3; 3; 5; 3; 7	9; 7; 7; 9; 7 5; 7; 9; 7; 9
a ₃ - Sales promotion	7; 7; 5; 7; 7 5; 7; 7; 5; 5	3; 5; 3; 5; 5 5; 5; 3; 1; 3	5; 7; 7; 5; 3 5; 5; 5; 3; 3	3; 5; 3; 3; 3 5; 3; 1; 3; 5	7; 7; 7; 9; 7 5; 9; 7; 5; 7
a ₄ - Publicity	5; 5; 5; 5; 5 5; 3; 7; 7; 5	1; 3; 1; 5; 3 3; 3; 3; 3; 3	7; 7; 5; 5; 9 5; 9; 7; 7; 5	5; 3; 5; 5; 7 7; 5; 3; 7; 7	3; 3; 3; 5; 3 1; 5; 3; 3; 3
a ₅ - Public relations	5; 3; 5; 5; 7 3; 5; 5; 3; 5	7; 5; 7; 7; 9 5; 7; 5; 7; 5	5; 5; 5; 3; 7 3; 5; 5; 3; 5	7; 7; 3; 7; 7 5; 7; 5; 7; 7	5; 5; 3; 5; 5 7; 3; 1; 5; 5
a ₆ - Direct marketing	3; 1; 3; 3; 3 5; 3; 1; 3; 1	3; 3; 5; 3; 7 5; 3; 3; 1; 3	3; 1; 5; 3; 5 1; 3; 5; 1; 3	7; 7; 5; 7; 7 9; 7; 5; 7; 5	7; 5; 5; 7; 7 5; 3; 7; 5; 7

Source: the authors' research

Table 5: Initial decision matrix with average values of quantified attributes (all experts together)

Actions (promotion forms)	Criteria				
	f ₁ - Effects	f ₂ - Costs	f ₃ - Consumers	f ₄ - Competition	f ₅ - Hum. resources
	Request for max / min criteria				
	max	min (-)	max	max	min (-)
a ₁ - Economic propaganda	0.86	0.80	0.86	0.72	0.52
a ₂ - Personal sales	0.48	0.58	0.38	0.50	0.76
a ₃ - Sales promotion	0.62	0.38	0.48	0.34	0.70
a ₄ - Publicity	0.52	0.28	0.66	0.54	0.32
a ₅ - Public relations	0.46	0.64	0.46	0.62	0.44
a ₆ - Direct marketing	0.26	0.36	0.30	0.66	0.58

Source: the authors' research

2.3. Defining criteria weights in the model - Expert method

The weight of the criteria in the model was also determined by the expert method. The same ten experts gave an estimate of the weights of the defined criteria. The weights of the criteria, as estimated by each expert individually, are presented in Table 6. In the

last row of Table 6, the average weights of each criterion were calculated according to the pattern Σ / n_E , where: $n_E = 10$ - number of experts. Thus, the final weights of the individual criteria are: $w_1 = 0.330$; $w_2 = 0.295$; $w_3 = 0.135$; $w_4 = 0.135$; $w_5 = 0.105$. Here: $w_j = 1$, where: j is the ordinal number of criteria, $j = 1, 2, \dots, n$. It is noted that the experts appreciated the first two criteria more, which was expected.

Table 6: Criteria weights (all experts individually and average)

Experts	Criteria				
	f_1 - Effects	f_2 - Costs	f_3 - Consumers	f_4 - Competition	f_5 - Hum. resources
Expert 1	0.3	0.3	0.15	0.15	0.1
Expert 2	0.4	0.3	0.1	0.1	0.1
Expert 3	0.3	0.3	0.2	0.1	0.1
Expert 4	0.35	0.35	0.1	0.1	0.1
Expert 5	0.3	0.4	0.1	0.1	0.1
Expert 6	0.4	0.2	0.1	0.2	0.1
Expert 7	0.3	0.25	0.2	0.2	0.05
Expert 8	0.25	0.25	0.2	0.2	0.1
Expert 9	0.3	0.3	0.1	0.1	0.2
Expert 10	0.4	0.3	0.1	0.1	0.1
Σ / n_E	0.330	0.295	0.135	0.135	0.105

Source: the authors' research

2.4. Multicriteria analysis problem solving - VIKOR method

Each column of Table 5 (within each criterion) contains the maximum and minimum values, which are given in Table 7. For the criteria with the minimum requirement (f_2 and f_5), the smallest value is the best and the lowest is the highest value. In this way, the criteria with the minimum requirement are translated into the criteria with the maximum requirement, in the VIKOR method.

Table 7: Best and worst stock values for all criteria

	f_1	f_2	f_3	f_4	f_5
f_j^*	0.86	0.28	0.86	0.72	0.32
f_j^-	0.26	0.80	0.30	0.34	0.76

Source: the authors' research

For simpler calculation, the size d is introduced:

$$d_{ij} = \frac{f_j^* - f_{ij}}{f_j^* - f_j^-}$$

Table 8 gives the calculated values for d_{ij} , $w_j \cdot d_{ij}$, S_i i R_i . Examples of calculating some values in Table 8:

$$\begin{aligned}
 d_{11} &= \frac{0,86-0,86}{0,86-0,26} = 0 & ; & \quad d_{12} = \frac{0,28-0,80}{0,28-0,80} = 1 \\
 d_{21} &= \frac{0,86-0,48}{0,86-0,26} = 0,6333 & ; & \quad d_{22} = \frac{0,28-0,58}{0,28-0,80} = 0,5769 \\
 w_1 \cdot d_{11} &= 0,330 \cdot 0 = 0 & ; & \quad w_2 \cdot d_{12} = 0,295 \cdot 1 = 0,2950 \\
 w_1 \cdot d_{21} &= 0,330 \cdot 0,6333 = 0,2090 & ; & \quad w_2 \cdot d_{22} = 0,295 \cdot 0,5769 = 0,1702 \\
 S_1 &= \sum_{j=1}^n w_j \cdot d_{1j} = 0 + 0,2950 + 0 + 0 + 0,0477 = 0,3427 \\
 S_2 &= \sum_{j=1}^n w_j \cdot d_{2j} = 0,2090 + 0,1702 + 0,1157 + 0,0782 + 0,1050 = 0,6781 \\
 R_1 &= \max_j w_j \cdot d_{1j} = \max (0; 0,2950; 0; 0; 0,0477) = 0,2950 \\
 R_2 &= \max_j w_j \cdot d_{2j} = \max (0,2090; 0,1702; 0,1157; 0,0782; 0,1050) = 0,2090
 \end{aligned}$$

Table 8: Calculated values for d_{ij} , $w_j \times d_{ij}$, S_i and R_i

Actions a_i	d_{ij}					$w_j \cdot d_{ij}$					S_i	R_i
	f_1	f_2	f_3	f_4	f_5	f_1	f_2	f_3	f_4	f_5		
a_1	0	1	0	0	0.4545	0	0.2950	0	0	0.0477	0.3427	0.2950
a_2	0.6333	0.5769	0.8571	0.5789	1	0.2090	0.1702	0.1157	0.0782	0.1050	0.6781	0.2090
a_3	0.4000	0.1923	0.6786	1	0.8636	0.1320	0.0567	0.0916	0.1350	0.0907	0.5060	0.1350
a_4	0.5667	0	0.3571	0.4737	0	0.1870	0	0.0482	0.0639	0	0.2991	0.1870
a_5	0.6667	0.6923	0.7143	0.2632	0.2727	0.2200	0.2042	0.0964	0.0355	0.0286	0.5847	0.2200
a_6	1	0.1538	1	0.1579	0.5909	0.3300	0.0454	0.1350	0.0213	0.0620	0.5937	0.3300

Source: the authors' research

From the last two columns of Table 8, the values required for the further budget are read: $S^* = 0.2991$; $S^- = 0.6781$; $R^* = 0.1350$; $R^- = 0.3300$. Table 9 gives the calculated values for QS_i , QR_i , $Q_i(v = 0.5)$, $Q_i(v = 0.25)$ and $Q_i(v = 0.75)$. Examples of calculating some values in Table 9:

$$\begin{aligned}
 QS_1 &= \frac{S_1 - S^*}{S^- - S^*} = \frac{0.3427 - 0.2991}{0.6781 - 0.2991} = 0.1150 \\
 QS_2 &= \frac{S_2 - S^*}{S^- - S^*} = \frac{0.6781 - 0.2991}{0.6781 - 0.2991} = 1 \\
 QR_1 &= \frac{R_1 - R^*}{R^- - R^*} = \frac{0.2950 - 0.1350}{0.3300 - 0.1350} = 0.8205
 \end{aligned}$$

$$QR_2 = \frac{R_2 - R^*}{R^- - R^*} = \frac{0.2090 - 0.1350}{0.3300 - 0.1350} = 0.3795$$

$$Q_{1(v=0.5)} = v \cdot QS_1 + (1 - v) \cdot QR_1 = 0.5 \cdot 0.1150 + (1 - 0.5) \cdot 0.8205 = 0.4678$$

$$Q_{2(v=0.5)} = v \cdot QS_2 + (1 - v) \cdot QR_2 = 0.5 \cdot 1 + (1 - 0.5) \cdot 0.3795 = 0.6897$$

$$Q_{1(v=0.25)} = v \cdot QS_1 + (1 - v) \cdot QR_1 = 0.25 \cdot 0.1150 + (1 - 0.25) \cdot 0.8205 = 0.6475$$

$$Q_{2(v=0.25)} = v \cdot QS_2 + (1 - v) \cdot QR_2 = 0.25 \cdot 1 + (1 - 0.25) \cdot 0.3795 = 0.5346$$

$$Q_{1(v=0.75)} = v \cdot QS_1 + (1 - v) \cdot QR_1 = 0.75 \cdot 0.1150 + (1 - 0.75) \cdot 0.8205 = 0.2914$$

$$Q_{2(v=0.75)} = v \cdot QS_2 + (1 - v) \cdot QR_2 = 0.75 \cdot 1 + (1 - 0.75) \cdot 0.3795 = 0.8449$$

Table 9: Calculated values for QSi , QRi , $Qi(v=0.5)$, $Qi(v=0.25)$ and $Qi(v=0.75)$

a_i	QSi	QRi	$Qi(v=0.5)$	$Qi(v=0.25)$	$Qi(v=0.75)$
a_1	0.1150	0.8205	0.4678	0.6475	0.2914
a_2	1	0.3795	0.6898	0.5346	0.8449
a_3	0.5459	0	0.2730	0.1364	0.4094
a_4	0	0.2667	0.1333	0.2000	0.0667
a_5	0.7536	0.4359	0.5948	0.5153	0.6742
a_6	0.7773	1	0.8886	0.9444	0.8330

Source: Authors research

The results from Table 9 can be presented graphically (Figure 1). In this figure, the ranking of individual actions can be visually observed, depending on the weight v . According to the obtained QSi , QRi and Qi sizes for each action (Table 9 and Figure 1), three independent rank lists can be formed (Table 10). The QSi criterion is the best action a_4 , and the QRi criterion the best action a_3 . Overall, according to $Qi(v=0.5)$, the best action is a_4 .

Testing conditions U1:

The threshold of “sufficient advantage” in a given case, for the number of actions $m=6$:

$$DQ = \min(0.25; \frac{1}{m-1}) = \min(0.25; \frac{1}{6-1}) = 0.2$$

Analysis of the next action (second in rank - action a_3):

$$Q(a_3) - Q(a_4) = 0.2730 - 0.1333 = 0.1397 < DQ = 0.2$$

Condition U1 is not fulfilled here. Action a_3 enters a set of compromise solutions, since the first action a_4 does not have a “sufficient advantage” over the second ranked action a_3 . Next action analysis (3rd in rank - action a_1):

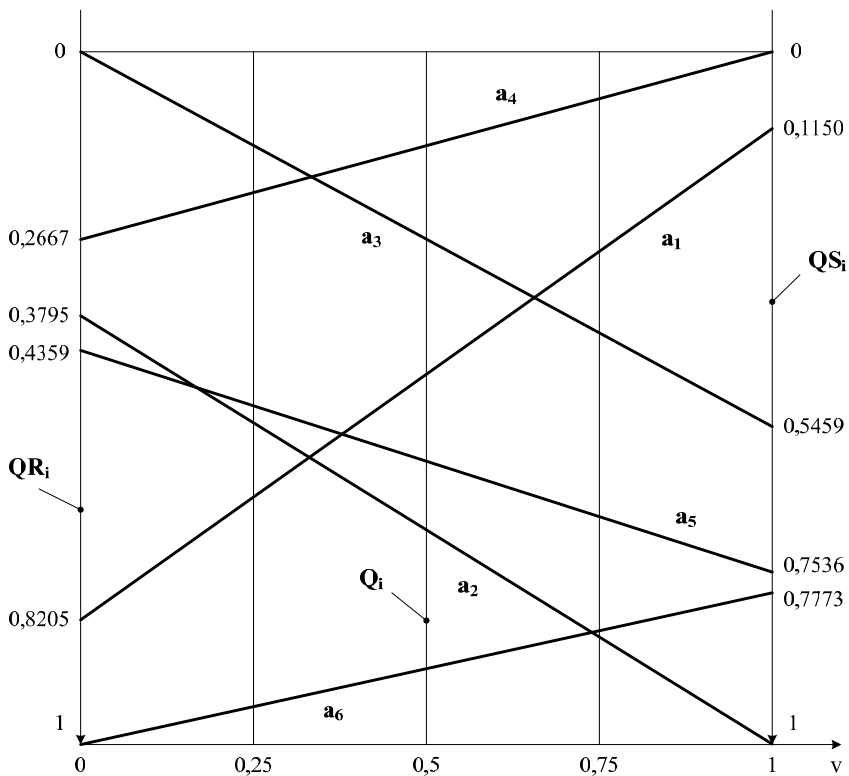
$$Q(a_1) - Q(a_4) = 0.4678 - 0.1333 = 0.3345 > DQ = 0.2$$

Here condition U1 is fulfilled. Action a_1 does not fall into the set of compromise solutions, since the first action a_4 has a “sufficient advantage” over the third ranked action a_1 . Other actions need not be further tested under this condition.

Testing conditions U2:

Condition U2 is fulfilled since action a_4 has the first position in the ranking list and according to the QS criterion. Thus, under condition U2, action a_4 has a “stable enough” first place.

Figure 1: Rank of individual actions depending on weight v



Source: Authors research

Table 10: Rank list based on sizes QS_i , QR_i i Q_i

a_i	QS_i	QR_i	$Q_i (v = 0.5)$
a_1	2	5	3
a_2	6	3	5
a_3	3	1	2
a_4	1	2	1
a_5	4	4	4
a_6	5	6	6

Source: Authors research

The final solution is defined by a set of compromise solutions that include actions a_4 and a_3 .

3. Discussion of results

Using the VIKOR method, a set of compromise solutions was defined for a given problem of multicriteria analysis: the choice of the form of promotion of a particular product group. This set included the following actions: a_4 - Publicity and a_3 - Sales promotion. In general, publicity has come first, owing in large part to the low costs it requires, but also to the very good potential effects. The problem is that publicity is not such a reliable form of promotion: it sometimes exists and then it should certainly be exploited to the maximum, but sometimes it simply is not sufficiently present.

This makes it a significant second in the stock rankings, which is Sales promotion. If Publicity is accepted as the best action, if any, then Sales promotion, in this case, can be conditionally regarded as a first-rate action. Then the importance of the next rank of actions, which is a_1 - Economic propaganda, becomes important. For these reasons, it is useful to check condition U1 between actions a_3 - Sales promotion and a_1 - Commercial propaganda:

$$Q(a_1) - Q(a_3) = 0.4678 - 0.2730 = 0.1948 < DQ = 0.2$$

Condition U1 is not met because action a_3 does not have a “sufficient advantage” over action a_1 . So, action a_1 - Economic propaganda can be found in a set of compromise solutions. Practically, in a given situation, where the presence of the first ranked action is often uncertain, the set of compromise solutions is adjusted in the direction of expansion. Undoubtedly, economic propaganda brings significant effects, but also the greatest costs.

A limitation of the research is that the example presented is unique, that is, it is valid for the analyzed situation of choosing a form of promotion. In some other conditions (another company, another product/service group, and environmental conditions), the results may be the same, similar, but quite different.

Conclusion

The application of the expert method contributed to the increased objectivity in the process of forming the initial decision matrix (Table 5), as well as in the procedure for determining the weights of criteria in the model (Table 6). Also, the VIKOR method proved to be very suitable for solving the analyzed problem. First, because it maximally respected the initial data obtained by the expert method: it was these data that went directly into the further calculation, which from that point was precise and completely objective. Another advantage of the VIKOR method is the ability to form a set of compromise solutions, which proved to be very useful in this case. The final conclusion and recommendation for the marketing department of the observed company is the following: in the promotion of the analyzed products group, publicity should be maximized if it exists, economic propaganda should be applied in accordance with financial possibilities, and most attention and energy should be directed towards sales promotion activities.

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Списак рецензената часописа Анали Економског факултета у Суботици

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Техничко упутство за форматирање радова

Цитати и библиографија

Рад треба да садржи следеће:

Наслов рада (не више од 10 речи) на енглеском језику.

Поднослов (опционо) на енглеском језику.

Подаци о ауторима: име, презиме, звање и институција на енглеском језику.

Апстракт рада максималне дужине 200 речи на енглеском језику.

Кључне речи (не више од 10) на енглеском језику.

Текст рада на енглеском, максималног обима 12 страница.

Листу референци.

Формат странице: Б5.

Маргина: 2 цм свака.

Фонт: TimesNewRoman, величине 10.5 (важи и за наслове, поднасловe, називе слика, називе табела, апстракт, кључне речи итд).

Апстракт и кључне речи позиционирати одмах на почетку текста. Наслови, поднаслови, називи табела, илустрација, слика итд. треба да су нумерисани арапским бројевима.

Слике, илустрације, схеме је потребно приложити у .jpg формату (резолуције 300*300 DPI), или у векторском облику (.wmf или .cdr) са приложеним фонтовима или фонтовима претвореним у криве.

Слике, илустрације и схеме треба да су GRAYSCALE. За текст у сликама, илустрацијама и схемама је пожељно користити фонт Arial, величине 9pt.

Литературу треба навести абecedним редом.

1. Листа референци

У референцама се извори (нпр. књига, чланак у стручном часопису или интернет страница) наводе довољно детаљно да читаоци могу да их идентификују и консултују. Референце се стављају на крај рада, а извори се наводе абecedно (а) по презименима аутора или (б) по насловима извора (ако аутор није познат). Више извора од истог аутора се наводи хронолошки, почев од најранијег, нпр.

Љубојевић, Т.К. (1998).

Љубојевић, Т.К. (2000a).

Љубојевић, Т.К. (2000b).

Љубојевић, Т.К., & Димитријевић, Н.Н. (1994).

Референце иностраних аутора и иностраних институција (самом тексту и у литератури) се наводе латиничним писмом. Референце домаћих аутора се наводе ћириличним писмом, изузев наслова радова на енглеском језику или евентуално назива часописа (уколико је реч о часопису који се публикује на енглеском језику).

А. Часописи и остале периодичне публикације

Аутори се наводе по презимену, уз прво слово имена. Година објављивања се пише у заградама, иза којих се ставља тачка. Наслов чланка на енглеском језику пише се у *Sentence case*, односно велико слово се користи само на почетку наслова и код личних именица. Наслов часописа на енглеском језику пише се у *Title case*, односно све променљиве врсте речи се пишу великим почетним словом. Иза наслова часописа ставља се број годишта, који се пише курзивом:

Аутор, А., Аутор, Б. и Аутор, Ц. (година). Наслов чланка. *Наслов часописа*, број годишта(број свеске), странице.

☞ Чланак једног аутора, из стручног часописа пагинираног по свескама

Часописи који се пагинирају по свескама почињу страном 1 у свакој свесци, тако да се број свеске наводи у заградама након броја годишта. Заграде и број свеске се не пишу курзивом:

Танасијевић, В. (2007). A PHP project test-driven end to end. *Management Information Systems*, 5 (1), 26-35.

Begg, D. (2007). A PHP project test-driven end to end. *Management Information Systems*, 5 (1), 26-35.

☞ Чланак једног аутора, из стручног часописа пагинираног по годиштима

Часописи који се пагинирају по годиштима почињу страном 1 у свесци 1, а бројеви страница се настављају у свесци 2 тамо где се свеска 1 завршила, нпр.

Перић, О. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management*, 14, 654-668.

Begg, D. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management*, 14, 654-668.

➤ **Чланак два аутора, из стручног часописа пагинираног по свескама**

Стракић, Ф., и Мирковић, Д. (2006). The role of the user in the software development life cycle. *Management Information Systems*, 4 (2), 60-72.

Begg, D., и Burda, M. (2006). The role of the user in the software development life cycle. *Management Information Systems*, 4 (2), 60-72.

➤ **Чланак два аутора, из стручног часописа пагинираног по годиштима**

Љубојевић, К., и Димитријевић, М. (2007). Choosing your CRM strategy. *Strategic Management*, 15, 333-349.

➤ **Чланак три до шест аутора, из стручног часописа пагинираног по свескама**

Јованов, Н., Бошков, Т., и Стракић, Ф. (2007). Data warehouse architecture. *Management Information Systems*, 5 (2), 41-49.

➤ **Чланак три до шест аутора, из стручног часописа пагинираног по годиштима**

Бошков, Т., Љубојевић, К., и Танасијевић, В. (2005). A new approach to CRM. *Strategic Management*, 13, 300-310.

➤ **Чланак више од шест аутора, из стручног часописа пагинираног по свескама**

Љубојевић, К., Димитријевић, М., Мирковић, Д., Танасијевић, В., Перић, О., Јованов, Н., et al. (2005). Putting the user at the center of software testing activity. *Management Information Systems*, 3 (1), 99-106.

➤ **Чланак више од шест аутора, из стручног часописа пагинираног по годиштима**

Стракић, Ф., Мирковић, Д., Бошков, Т., Љубојевић, К., Танасијевић, В., Димитријевић, М., et al. (2003). Metadata in data warehouse. *Strategic Management*, 11, 122-132.

➤ **Чланак из часописа**

Стракић, Ф. (2005, October 15). Remembering users with cookies. *IT Review*, 130, 20-21.

➤ **Ауторизовани чланак из билтена**

Димитријевић, М. (2009, September). MySQL server, writing library files. *Computing News*, 57, 10-12.

➤ **Неауторизовани чланак из билтена**

VBScript with active server pages. (2009, Septembar). *Computing News*, 57, 21-22.

Б. Књиге, брошуре, поглавља из књига, енциклопедијске одреднице, критике и рецензије

Основни формат за књиге

Аутор, А. А. (Година издања). *Наслов дела: Велико почетно слово и у поднаслову*. Место: Издавач.

Напомена: Реч „место” увек означава град, али треба навести и земљу уколико град истог имена постоји у више држава.

➤ Књига једног аутора

Љубојевић, К. (2005). *Prototyping the interface design*. Суботица: Економски факултет.

➤ Књига једног аутора, ново издање

Димитријевић, М. (2007). *Customer relationship management* (6. izd.). Суботица: Економски факултет.

➤ Књига два аутора

Љубојевић, К., Димитријевић, М. (2007). *The enterprise knowledge portal and its architecture*. Суботица: Економски факултет.

➤ Књига три до шест аутора

Љубојевић, К., Димитријевић, М., Мирковић, Д., Танасијевић, В., и Перић, О. (2006). *Importance of software testing*. Суботица: Економски факултет.

➤ Књига више од шест аутора

Мирковић, Д., Танасијевић, В., Перић, О., Јованов, Н., Бошков, Т., Стракић, Ф., et al. (2007). *Supply chain management*. Суботица: Економски факултет.

➤ Књига без аутора и уредника

Web user interface (10. izd.). (2003). Суботица: Економски факултет.

➤ Група аутора, предузеће, организација или државни орган као аутор

Статистички завод Републике Србије. (1978). *Статистички годишњак Републике Србије*. Београд: Министарство за комуналне и социјалне службе.

➤ Збирка

Димитријевић, М., & Танасијевић, В. (ur.). (2004). *Data warehouse architecture*. Суботица: Економски факултет.

➤ Поглавље у збирци

Бошков, Т., и Стракић, Ф. (2008). Bridging the gap: Complex adaptive knowledge management. U T. Boškov i V. Tanasijević (ur.), *The enterprise knowledge portal and its architecture* (str. 55-89). Суботица: Економски факултет.

В. Необјављени радови

➤ Реферат са научног скупа

Љубојевић, К., Танасијевић, В., Димитријевић, М. (2003). *Designing a web form without tables*. Реферат саопштен на годишњем скупу Српског компјутерског савеза, Београд.

➤ Необјављени рад или рукопис

Бошков, Т., Стракић, Ф., Љубојевић, К., Димитријевић, М., и Перић, О. (2007. мај). *First steps in C++*. Необјављен рад, Економски факултет, Суботица.

➤ Докторска дисертација

Стракић, Ф. (2000). *Managing network services: Managing DNS servers*. Необјављена докторска дисертација, Економски факултет Суботица, Суботица.

➤ Магистарски рад

Димитријевић, М. (2003). *Structural modeling: Class and object diagrams*. Необјављен магистарски рад, Економски факултет, Суботица.

Г. Електронски медији

За чланке објављене на интернету важе иста упутства као за радове објављене у штампи. Наводе се сви подаци наведени у интернет извору, укључујући и број часописа у заградама.

Аутор, А., & Аутор, Б. (Датум објављивања). Наслов чланка. *Наслов интернет часописа, број годишња* (број часописа ако је назначен). Преузето са сајта <http://www.anyaddress.com/full/url/>

➤ Чланак у интернет часопису

Танасијевић, В. (март 2003.). Putting the user at the center of software testing activity. *Strategic Management*, 8 (4). Преузето 7. октобра 2004. са сајта www.ef.uns.ac.rs/sm2003

➤ Документ организације

Економски факултет Суботица. (5. март 2008.). *A new approach to CRM*. Преузето 25. јула 2008. са сајта <http://www.ef.uns.ac.rs/papers/acrm.html>

➤ Чланак из интернет часописа са додељеним DOI

За чланке у интернет часопису без DOI (идентификатора дигиталног објекта) навести URL.

Аутор, А., и Аутор, Б. Б. (Датум објављивања). Наслов чланка. *Назив часописа, број годишња*. Преузето са сајта <http://www.anyaddress.com/full/url/>

Јованов, Н., и Бошков, Т. (4. фебруар 2007.) A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. Преузето са сајта <http://www.ef.uns.ac.rs/mis/TestDriven.html>.

2. Цитати из извора у тексту рада

➤ Цитати

Уколико се извор цитира дословце, наводи се име аутора, година издања и страница са које је цитат преузет (са знаком “стр.”). Цитат се уводи фразом која садржи ауторово презиме, а иза њега се ставља година објављивања у заградама.

По Мирковићу (2001), „Примена складишта података може да буде ограниченог карактера, нарочито ако иста садрже поверљиве податке” (стр. 201).

Мирковић (2001) сматра да „примена складишта података може да буде ограниченог карактера” (стр. 201). Какве неочекиване последице то има по обим доступности?

Уколико се у уводној фрази не именује аутор, на крај цитата се ставља ауторово презиме, година издања и број странице у заградама, нпр.

Он сматра да „примена складишта података може да буде ограниченог карактера”, али не објашњава могуће последице (Мирковић, 2001, стр. 201).

➤ Резиме или парафраза

По Мирковићу (1991), ограничења у погледу употребе базе података могу бити вањског или софтверског карактера, или пак привремена или чак произвољна (стр. 201).

Ограничења у погледу употребе базе података могу бити вањског или софтверског карактера, или пак привремена или чак произвољна (Мирковић, 1991, стр. 201).

➤ Један аутор

Бошков (2005) упоређује обим приступа...

Begg (2005) упоређује обим приступа...

У једном раном истраживању обима приступа (Бошков, 2005), установљено је...

➤ У случају да има **два аутора**, увек се наводе оба имена:

У једном другом истраживању (Мирковић и Бошков, 2006) закључује се да...

➤ У случају да има **три до пет аутора**, први пут се наводи свих пет аутора. Код наредних навода, наводи се име првог аутора, иза кога се ставља „и сар.”.

(Јованов, Бошков, Перић, Бошков, и Стракић, 2004).

Када се исти аутори наводе следећи пут, користи се име само првог аутора, иза кога се ставља „и сар.” у уводној фрази или заградама:

По Јованову и сар. (2004), када се такав феномен јави поново, медији му обично посвећују далеко више пажње.

Када се такав феномен јави поново, медији му обично посвећују далеко више пажње (Јованов и сар., 2004).

У енглеском тексту, иза „et” у „et al.” не ставља се тачка.

➤ Шест или више аутора

У уводној фрази се презиме првог аутора наводи у уводној фрази или у заградама:

Yossarian и сар. (2004) тврде да...

...није релевантно (Yossarian i сар., 2001).

➤ Неименован аутор

Уколико дело није ауторизовано, извор се наводи по наслову у уводној фрази, или се прве 1-2 речи ставе у заграде. Наслови књига и извештаја се пишу курзивом, док се наслови чланака и поглавља стављају у наводнике:

Слична анкета је спроведена у једном броју организације које имају стално запослене менаџере базе података (“Limiting database access”, 2005).

Уколико неко дело (нпр. реч уредника у новинама) нема аутора, наводи се првих неколико речи наслова, уз годину објављивања:

(“The Objectives of Access Delegation,” 2007)

Напомена: У ретким случајевима кад је аутор потписан речју „Anonymous”, иста се сматра именом аутора (Anonymous, 2008). У том случају се у списку извора на крају рада као име аутора користи реч „Anonymous”.

➤ Организација или државни орган као аутор

Уколико је аутор нека организација или државни орган, назив организације се ставља у уводну фразу или заграде први пут кад се извор наводи:

По подацима Статистичког завода Републике Србије (1978), ...

Исто тако, код првог навођења се исписује пуни назив колективног аутора, уз скраћеницу у угластим заградама. Затим се код следећих навода користи скраћени назив:

Преглед је ограничен на градове од 10.000 становника навише (Статистички завод Републике Србије [СОРС], 1978).

Списак не садржи школе које су у претходном статистичком прегледу наведене као затворене (СОРС, 1978).

➤ Када се наводи више од једног дела истог аутора:

(Безјак, 1999, 2002)

- ☞ Када је **више од једног дела истог аутора објављено исте године**, наводе се са словима а, б, ц, итд. иза године издања:

(Griffith, 2002a, 2002b, 2004)

- ☞ **Два или више дела истог аутора објављена исте године**

Уколико су два или више извора кориштена у достављеном раду објављена од стране истог аутора исте године, ставке у списку референци се означавају малим словом (а, б, ц...) иза године. Мало слово се користи и код навођења извора унутар текста:

Резултати анкете објављени код Theissena (2004a) показују да...

- ☞ Уколико нисте прочитали оригинално дело, наводи се аутор који Вас је упутио на исто:

Бергсоново истраживање (поменуто код Мирковића и Бошкова, 2006)...

Овде се у списку извора наводе Мирковић и Бошков (2006), а Бергсон не.

- ☞ Кад се наводи **више од једног аутора**, аутори се наводе абecedним редом:

(Britten, 2001; Styrlasson, 2002; Wasserwandt, 1997)

- ☞ Кад нема **датума или године објављивања**:

(Hessenberg, n.d.)

- ☞ **Код цитата се увек наводе странице:**

(Мирковић и Бошков, 2006, стр. 12)

(Begg i Burda, 2006, стр. 12)

Мирковић и Бошков (2006, стр. 12) предлажу приступ по коме “почетно гледиште...”

- ☞ **Навођење појединих делова дела:**

(Theissen, 2004a, pogl. 3)

(Keaton, 1997, str. 85-94)

- ☞ **Лична комуникација, и то интервјуи, писма, интерне поруке, е-маилови и телефонски разговори**, наводе се на следећи начин. (Не уносе се у списак извора.)

(К. Љубојевић, лична комуникација, 5. мај 2008.).

3. Фусноте

Понекад се неко питање покренуто у тексту мора додатно обрадити у фуснотама, у којима се додаје нешто што је индиректној вези са темом, или дају додатне техничке информације. Фусноте се нумеришу експонентом, арапским бројевима на крају реченице, овако.¹ Фусноте на крају текста (*endnote*) се започињу на посебној страни, иза текста. Међутим, Уређивачки одбор часописа **не препоручује коришћење фуснота и завршних напомена.**

Technical instructions for paper formatting

Citations and Bibliography

The paper should consist of:

Title of the paper (no more than 10 words) in English.

Subtitle (optional) in English.

Personal data of authors/coauthors: name, surname, title and Institution in English.

Abstract of 200 words or less, giving the factual essence of the article, should be written in English.

Key words (no more than 10) in English.

Text of the paper, in English, cannot exceed 12 pages.

Bibliography.

Guidelines for the paper format

Type your work in a common Word Processor (e.g. MS Word).

Page format: B5.

Margin: 2 cm every

Font: Times New Roman, size 11 (use it for title, subtitle, figures, tables, abstract, key words, and so on).

Titles, subtitles, names of the tables, illustrations, figures, etc should be written in Arabic numerals.

Figures, illustrations and schemes should be enclosed in the .jpg format (resolution 300*300 dpi) or in the vector form (.wmf or cdr) with enclosed fonts or fonts transformed in curves. Figures, illustrations and schemes should be black-and-white (gray-scale). For the texts included in figures, illustrations and schemes font Arial, size 9 pt is preferred.

1. Referencing Guide

The references should specify the source (such as book, journal article or a web page) in sufficient detail to enable the readers to identify and consult it. The references are placed at the end of the work, with sources listed alphabetically (a) by authors' surnames or (b) by the titles of the sources (if the author is unknown). Multiple entries by the same author(s) must be sequenced chronologically, starting from the earliest, e.g.:

Ljubojević, T.K. (1998).
Ljubojević, T.K. (2000a).
Ljubojević, T.K. (2000b).
Ljubojević, T.K., & Dimitrijević, N.N. (1994).

Here is a list of the most common reference types:

A. Periodicals

Authors must be listed by their last names, followed by initials. Publication year must be written in parentheses, followed by a full stop. Title of the article must be in sentence case: only the first word and proper nouns in the title are capitalized. The periodical title must be in title case, followed by the volume number, which is also italicized:

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical, volume number*(issue number), pages.

➡ Journal article, one author, paginated by issue

Journals paginated by issue begin with page 1 in every issue, so that the issue number is indicated in parentheses after the volume. The parentheses and issue numbers are not italicized, e.g.

Tanasijević, V. (2007). A PHP project test-driven end to end. *Management Information Systems*, 5 (1), 26-35.

➡ Journal article, one author, paginated by volume

Journals paginated by volume begin with page 1 in issue 1, and continue page numbering in issue 2 where issue 1 ended, e.g.

Perić, O. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management*, 14, 654-668.

➡ Journal article, two authors, paginated by issue

Strakić, F., & Mirković, D. (2006). The role of the user in the software development life cycle. *Management Information Systems*, 4 (2), 60-72.

➡ Journal article, two authors, paginated by volume

Ljubojević, K., & Dimitrijević, M. (2007). Choosing your CRM strategy. *Strategic Management*, 15, 333-349.

➡ **Journal article, three to six authors, paginated by issue**

Jovanov, N., Boškov, T., & Strakić, F. (2007). Data warehouse architecture. *Management Information Systems*, 5 (2), 41-49.

➡ **Journal article, three to six authors, paginated by volume**

Boškov, T., Ljubojević, K., & Tanasijević, V. (2005). A new approach to CRM. *Strategic Management*, 13, 300-310.

➡ **Journal article, more than six authors, paginated by issue**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., et al. (2005). Putting the user at the center of software testing activity. *Management Information Systems*, 3 (1), 99-106.

➡ **Journal article, more than six authors, paginated by volume**

Strakić, F., Mirković, D., Boškov, T., Ljubojević, K., Tanasijević, V., Dimitrijević, M., et al. (2003). Metadata in data warehouse. *Strategic Management*, 11, 122-132.

➡ **Magazine article**

Strakić, F. (2005, October 15). Remembering users with cookies. *IT Review*, 130, 20-21.

➡ **Newsletter article with author**

Dimitrijević, M. (2009, September). MySQL server, writing library files. *Computing News*, 57, 10-12.

➡ **Newsletter article without author**

VBScript with active server pages. (2009, September). *Computing News*, 57, 21-22.

B. Books, Brochures, Book Chapters, Encyclopedia Entries, And Book Reviews

Basic format for books

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle.*
Location: Publisher.

Note: "Location" always refers to the town/city, but you should also include the state/country if the town/city could be mistaken for one in another country.

➡ **Book, one author**

Ljubojević, K. (2005). *Prototyping the interface design*. Subotica: Faculty of Economics.

➔ **Book, one author, new edition**

Dimitrijević, M. (2007). *Customer relationship management* (6th ed.). Subotica: Faculty of Economics.

➔ **Book, two authors**

Ljubojević, K., Dimitrijević, M. (2007). *The enterprise knowledge portal and its architecture*. Subotica: Faculty of Economics.

➔ **Book, three to six authors**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., & Perić, O. (2006). *Importance of software testing*. Subotica: Faculty of Economics.

➔ **Book, more than six authors**

Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., Boškov, T., Strakić, F., et al. (2007). *Supply chain management*. Subotica: Faculty of Economics.

➔ **Book, no author or editor**

Web user interface (10th ed.). (2003). Subotica: Faculty of Economics.

➔ **Group, corporate, or government author**

Statistical office of the Republic of Serbia. (1978). *Statistical abstract of the Republic of Serbia*. Belgrade: Ministry of community and social services.

➔ **Edited book**

Dimitrijević, M., & Tanasijević, V. (Eds.). (2004). *Data warehouse architecture*. Subotica: Faculty of Economics.

➔ **Chapter in an edited book**

Boškov, T., & Strakić, F. (2008). Bridging the gap: Complex adaptive knowledge management. In T. Boškov & V. Tanasijević (Eds.), *The enterprise knowledge portal and its architecture* (pp. 55-89). Subotica: Faculty of Economics.

➔ **Encyclopedia entry**

Mirković, D. (2006). History and the world of mathematicians. In *The new mathematics encyclopedia* (Vol. 56, pp. 23-45). Subotica: Faculty of Economics.

C. Unpublished Works

➔ **Paper presented at a meeting or a conference**

Ljubojević, K., Tanasijević, V., Dimitrijević, M. (2003). *Designing a web form without tables*. Paper presented at the annual meeting of the Serbian computer alliance, Beograd.

➤ Paper or manuscript

Boškov, T., Strakić, F., Ljubojević, K., Dimitrijević, M., & Perić, O. (2007. May). *First steps in visual basic for applications*. Unpublished paper, Faculty of Economics Subotica, Subotica.

➤ Doctoral dissertation

Strakić, F. (2000). *Managing network services: Managing DNS servers*. Unpublished doctoral dissertation, Faculty of Economics Subotica, Subotica.

➤ Master's thesis

Dimitrijević, M. (2003). *Structural modeling: Class and object diagrams*. Unpublished master's thesis, Faculty of Economics Subotica, Subotica.

D. Electronic Media

The same guidelines apply for online articles as for printed articles. All the information that the online host makes available must be listed, including an issue number in parentheses:

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Online Periodical, volume number*(issue number if available). Retrieved from <http://www.anyaddress.com/full/url/>

➤ Article in an internet-only journal

Tanasijević, V. (2003, March). Putting the user at the center of software testing activity. *Strategic Management*, 8 (4). Retrieved October 7, 2004, from www.ef.uns.ac.rs/sm2003

➤ Document from an organization

Faculty of Economics. (2008, March 5). *A new approach to CRM*. Retrieved July 25, 2008, from <http://www.ef.uns.ac.rs/papers/acrm.html>

➤ Article from an online periodical with DOI assigned

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. doi: 10.1108/06070565717821898.

➤ Article from an online periodical without DOI assigned

Online journal articles without a DOI require a URL.

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Journal, volume number*. Retrieved from <http://www.anyaddress.com/full/url/>

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. Retrieved from <http://www.ef.uns.ac.rs/mis/TestDriven.html>.

2. Reference Quotations in the Text

➤ Quotations

If a work is directly quoted from, then the author, year of publication and the page reference (preceded by “p.”) must be included. The quotation is introduced with an introductory phrase including the author’s last name followed by publication date in parentheses.

According to Mirković (2001), “The use of data warehouses may be limited, especially if they contain confidential data” (p. 201).

Mirković (2001), found that “the use of data warehouses may be limited” (p. 201). What unexpected impact does this have on the range of availability?

If the author is not named in the introductory phrase, the author's last name, publication year, and the page number in parentheses must be placed at the end of the quotation, e.g.

He stated, “The use of data warehouses may be limited,” but he did not fully explain the possible impact (Mirković, 2001, p. 201).

➤ Summary or paraphrase

According to Mirković (1991), limitations on the use of databases can be external and software-based, or temporary and even discretion-based. (p.201)

Limitations on the use of databases can be external and software-based, or temporary and even discretion-based (Mirković, 1991, p. 201).

➤ One author

Boškov (2005) compared the access range...

In an early study of access range (Boškov, 2005), it was found...

➤ When there are **two authors**, both names are always cited:

Another study (Mirković & Boškov, 2006) concluded that...

➤ If there are **three to five authors**, all authors must be cited the first time. For subsequent references, the first author’s name will cited, followed by “et al.”.

(Jovanov, Boškov, Perić, Boškov, & Strakić, 2004).

In subsequent citations, only the first author’s name is used, followed by “et al.” in the introductory phrase or in parentheses:

According to Jovanov et al. (2004), further occurrences of the phenomenon tend to receive a much wider media coverage.

Further occurrences of the phenomenon tend to receive a much wider media coverage (Jovanov et al., 2004).

In “et al.”, “et” is not followed by a full stop.

➡ Six or more authors

The first author's last name followed by "et al." is used in the introductory phrase or in parentheses:

Yossarian et al. (2004) argued that...

... not relevant (Yossarian et al., 2001).

➡ Unknown author

If the work does not have an author, the source is cited by its title in the introductory phrase, or the first 1-2 words are placed in the parentheses. Book and report titles must be italicized or underlined, while titles of articles and chapters are placed in quotation marks:

A similar survey was conducted on a number of organizations employing database managers ("Limiting database access", 2005).

If work (such as a newspaper editorial) has no author, the first few words of the title are cited, followed by the year:

("The Objectives of Access Delegation," 2007)

Note: In the rare cases when the word "Anonymous" is used for the author, it is treated as the author's name (Anonymous, 2008). The name Anonymous must then be used as the author in the reference list.

➡ Organization as an Author

If the author is an organization or a government agency, the organization must be mentioned in the introductory phrase or in the parenthetical citation the first time the source is cited:

According to the Statistical Office of the Republic of Serbia (1978), ...

Also, the full name of corporate authors must be listed in the first reference, with an abbreviation in brackets. The abbreviated name will then be used for subsequent references:

The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS], 1978).

The list does not include schools that were listed as closed down in the previous statistical overview (SORS, 1978).

➡ When citing **more than one reference from the same author**:

(Bezjak, 1999, 2002)

➡ When several **used works by the same author were published in the same year**, they must be cited adding a, b, c, and so on, to the publication date:

(Griffith, 2002a, 2002b, 2004)

➡ **Two or more works in the same parentheses**

When two or more works are cited parenthetically, they must be cited in the same order as they appear in the reference list, separated by a semicolon.

(Bezjak, 1999; Griffith, 2004)

➡ Two or more works by the same author in the same year

If two or more sources used in the submission were published by the same author in the same year, the entries in the reference list must be ordered using lower-case letters (a, b, c...) with the year. Lower-case letters will also be used with the year in the in-text citation as well:

Survey results published in Theissen (2004a) show that...

➡ To credit an author for discovering a work, when you have not read the original:

Bergson's research (as cited in Mirković & Boškov, 2006)...

Here, Mirković & Boškov (2006) will appear in the reference list, while Bergson will not.

➡ When citing more than one author, the authors must be listed alphabetically:

(Britten, 2001; Sturlasson, 2002; Wasserwandt, 1997)

➡ When there is no publication date:

(Hessenberg, n.d.)

➡ Page numbers must always be given for quotations:

(Mirković & Boškov, 2006, p.12)

Mirković & Boškov (2006, p. 12) propose the approach by which "the initial viewpoint...

➡ Referring to a specific part of a work:

(Theissen, 2004a, chap. 3)

(Keaton, 1997, pp. 85-94)

➡ Personal communications, including interviews, letters, memos, e-mails, and telephone conversations, are cited as below. (These are *not* included in the reference list.)

(K. Ljubojević, personal communication, May 5, 2008).

3. Footnotes and Endnotes

A few footnotes may be necessary when elaborating on an issue raised in the text, adding something that is in indirect connection, or providing supplementary technical information. Footnotes and endnotes are numbered with superscript Arabic numerals at the end of the sentence, like this.¹ Endnotes begin on a separate page, after the end of the text. However, journal **does not recommend the use of footnotes or endnotes**.

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330

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/ glavni i odgovorni urednik Nemanja Berber. – 1965, 1 – 1976, 6 ; 1981, 7 ; 1996, 1 – . – Subotica
: Ekonomski fakultet, 1965-1976; 1981; 1996–. – 24 cm

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