

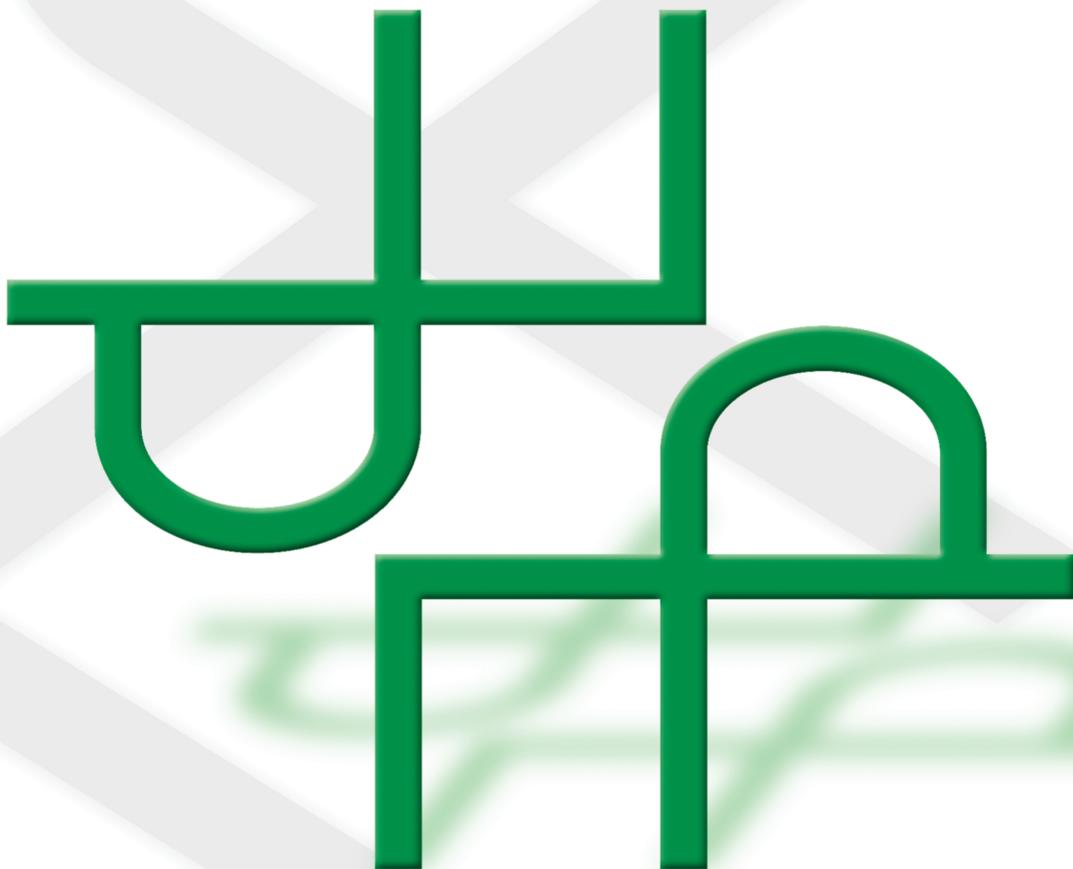
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МЕЂУНАРОДНИ ЧАСОПИС
ЗА ЕКОНОМСКУ ТЕОРИЈУ И ПРАКСУ И ДРУШТВЕНА ПИТАЊА



ЕКОНОМИКА

Часопис излази четири пута годишње

Година LXIV, I-III 2018, број 1

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2. Часопис су покренули Друштво економиста Ниша и Друштво инжењера и техничара Ниша (остало као издавач до краја 1964. године). Удружење књиговођа постаје издавач почев од броја 6-7/1958. године. Економски факултет у Нишу на основу своје одлуке броја 04-2021 од 26.12.1991. године постао је суиздавач “Економике”. Такође и Економски факултет у Приштини постао је суиздавач од 1992. године. Почев од 1992. године суиздавач “Економике” је и Друштво за маркетинг региона Ниш. Као суиздавач “Економике” фигурирали су у току 1990-1996. године и Фонд за научни рад општине Ниш, Завод за просторно и урбанистичко планирање Ниш и Корпорација Винер Брокер Ниш.

3. Републички секретариат за информације СР Србије својим Решењем бр. 651-126/73-02 од 27. новембра 1974. године усвојио је захтев “Економике” за упис у Регистар новина. Скупштина Друштва економиста Ниша на седници од 24. априла 1990. године статутарном одлуком потврдила је да “Економика” има статус правног лица. На седници Скупштине Друштва економиста Ниш од 11. новембра 1999. године донета је одлука да “Економика” отвори посебан жиро-рачун.

4. Према Мишљењу Републичког секретариата за културу СР Србије бр. 413-516/73-02 од 10. јула 1973. године и Министарства за науку и технологију Републике Србије бр. 541-03-363/94-02 од 30. јуна 1994. године “Економика” има статус научног и ранг националног часописа “Економика” је поћев од 1995. добила статус међународног економског часописа.

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1. The journal EKONOMIKA was initiated in July 1954. It was published as "Nis Economic Messenger" till June, 1957 and as "The Economic Messenger" till the end of 1969. The title "Science and Practice" it had till the issue 1/1973 when it changed its name into EKONOMIKA as it entitled today.

2. The Journal was initiated by the Society of Economists of Nis and the Society of Engineers and Technicians of Nis (the latter remained as the publisher till the end of 1964). The Society of Accountants became its publisher starting from the issue no. 6-7/1958. The Faculty of Economics, Nis, on the basis of its Resolution No. 04-2021 from December 26, 1991, became the co-publisher of EKONOMIKA. Likewise, the Faculty of Economics of Pristina became the co-publisher since in 1992. Starting from 1992, the co-publisher of EKONOMIKA has been the Society for Marketing of the Region of Nis. Other co-publishers of EKONOMIKA included, in the period 1990-1996, the Foundation for Scientific Work of the Municipality of Nis, the Institute for Spatial and Urban Planning of Nis and the Corporation Winner Broker, Nis.

3. The Republic Secretariat for Information of the Socialist Republic of Serbia, by its Resolution No. 651-126/73-02 from November, 27, 1974, approved of EKONOMIKA's requirement to be introduced into the Press Register. The Assembly of the Society of Economists of Nis, at its session on April 24, 1990, by its statutory resolution, confirmed the legal status of EKONOMIKA. At the session of the Assembly of the Society of Economists, Nis, on November 11, 1999, the resolution was adopted the EKONOMIKA was to open its own bank account.

4. According to the Opinion of the Republic Secretariat for Culture of the Socialist Republic of Serbia No. 413-516/73-02 from July 10, 1973 and the Ministry for Science and Technology of the Republic of Serbia No. 541-03-363/94-02 from June 30, 1994, EKONOMIKA has the status of a scientific and national journal. Starting from 1995, EKONOMIKA has been having the status of international economic journal.

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INFORMATION AND COMMUNICATION TECHNOLOGIES PRODUCT MARKET AND PROTECTION OF COMPETITION IN THE REPUBLIC OF SERBIA

Abstract

Starting from the fact that the importance of information and communication technologies (ICT) for the development of a national economy is high, it has been examined how this sector and the situation in individual markets in the sector affect competition policy. All the most important markets of the ICT sector of Serbia are characterized by a high level of concentration measured using the Herfindahl-Hirschman Index (HHI) with a tendency of decrease. In such circumstances, there are three directions of changing approach to competition policy: (1) changing the angle of observation and estimation of the relevant market boundaries; (2) balancing between good and bad parties related to joining in research and development (R&D), and (3) a more attentive attitude towards patents and licenses, as a basis for the protection of intellectual property, but also barriers to entry into new market. What is required of contemporary competition policy is a dichotomous view of the boundaries of relevant product market. One which is focused on the services of one market from the ICT sector and the second one focused on integral observation of linked services from the ICT sector. Moreover, national competition bodies are required to mutually cooperate at a higher level through the formalization of the information exchange protocol. In the segment related to cooperation in the field of research and development and affirmation of intellectual property protection, through patents and licenses, special attention is required from competition policy so as not to impair the welfare of these institutions, while at the same time preventing uncompetitive behavior.

Keywords: *information and communication technology (ICT), concentration, competition policy, cooperation between national competition authorities.*

JEL Classification: *D43, L41, L82, L86*

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ТРЖИШТЕ ПРОИЗВОДА ИНФОРМАЦИОНО-КОМУНИКАЦИОНИХ ТЕХНОЛОГИЈА И ЗАШТИТА КОНКУРЕНЦИЈЕ У РЕПУБЛИЦИ СРБИЈИ

Анстракт

Полазећи од тога да је значај информационо-комуникационих технологија (ИКТ) за развој једне националне економије веома велики у раду је испитивано како овај сектор и стање на појединачним тржиштима из овог сектора утичу на политику заштите конкуренције. Сва најзначајнија тржишта ИКТ сектора Србије карактерише висок ниво концентрације мерене Херфиндал-Хиршмановим индексом (ХХИ) са тенденцијом смањења. У таквим околностима три су правца промене приступа политици заштите конкуренције и то: (1) промена угла посматрања и процене граница релевантног тржишта; (2) балансирање између добрих и лоших страна везаних за повезивање у сфери истраживања и развоја (И&Р) и (3) обазривији однос према патентима и лиценцама, као основама заштите интелектуалне својине, али и баријерама уласка на ново тржиште. Оно што се од савремене политике заштите конкуренције захтева је дихотоми поглед на границе релевантног тржишта производа. Један усмерен на услуге једног тржиште из ИКТ сектора и други усмерен на интегрално посматрање везаних услуга из ИКТ сектора. Такође, од националних тела за заштиту конкуренције се захтева и виши ниво међусобне сарадње кроз формализовање протокола о размени информација. У сегменту који се тиче сарадње у сфери истраживања и развоја и афирмације заштите интелектуалне својине, кроз патенте и лиценце захтева се посебна обазривост политике заштите конкуренције, како се не би нарушила добробит поменутих института, а истовремено спречило неконкурентно понашање.

Кључне речи: информационо-комуникациона технологија (ИКТ), концентрација, политика заштите конкуренције, сарадња између националних ауторитета за заштиту конкуренције.

Introduction

The importance of information and communication technologies (ICT) and their products, or services, for the accelerated development of a national economy is high. However, like other economic sectors, this one is also not immune to various market anomalies. Most often it is the need of big participants to impair free competition and achieve better financial result. A good example is the media content distributor, Serbia Broadband - Serbian Cable Network Ltd. Belgrade (SBB), where the Commission for the Protection of Competition of the Republic of Serbia identified abuse of a dominant position through: (1) leading inappropriate promotional campaigns on the territories of certain municipalities of Belgrade, (2) the conclusion of exclusive contracts for the distribution of foreign channels with foreign production companies, (3) charging unreasonably high monthly fees for the maintenance of the cable network, (4) determining unreasonably high tariffs for broadcasting programs of certain local TV stations, etc. (Kostić, 2010, pp. 145-146). This and similar cases require proactive competition policy.

It implies certain changes, especially in the segment related to cooperation between national competition bodies, since certain economic entities from this activity are parts of some larger transnational companies (TNC), which carry out similar offences in other countries in which they operate.

The subject of the paper is the analysis of the most important markets of information and communication technologies (ICT) of Serbia and the possible responses of competition policy to various attempts to limit free competition in this area. Starting from this defined subject of the research, the paper is structured so that, in addition to the introduction and concluding remarks, it contains three independent and interconnected parts. The first part of the paper presents literature review, which deals with the measurement of market limitation, as well as methodology used in the research. In the second part of the paper, an analysis of the situation in individual ICT markets was carried out, while the third part deals with recommendations on the direction in which competition policy of the Republic of Serbia should be developed, in order to provide an adequate response to events in the ICT sector.

Literature review and methodology

A large number of authors analyzed the conditions of competition in certain activities. Among the important works one can distinguish the work of Vanlonmmel, de Brabander, and Liebaraers (1977), which studies the degree of concentration through the example of 119 sectors of Belgian industry. Also, there is the work of Belobaba and Van Acker (1994), who analyzed the level of concentration in the US airline market, as well as the work of Einarsson (2008) who explored the level of concentration in the retail markets of the Nordic countries. In Serbia, we can highlight the works of Stojanović and Radivojević (2010), which deals with the concentration of non-specialized retail trade of Niš, and the work of Kostić, Maksimović, and Stojanović (2016) which analyzes the trends in the level of concentration in the insurance market of Slovenia, Croatia, and Serbia. Concerning the works related to the ICT sector of Serbia, we highlight two very up to date works. The first one by Maksimović, Radosavljević, and Borisavljević (2011) is related to determining concentration in the market of media distribution. The authors concluded that media distribution market of Serbia is extremely concentrated with the values of the Herfindahl-Hirschman Index (HHI) of 3344 index points for 2008 and 3169 index points for 2009 (Maksimović, Radosavljević & Borisavljević, 2011, p. 37). The second one is related to the level of limitation of the mobile telephony market of Serbia by Kostić, Stojanović, Radukić (2016). In this paper, the authors have shown that the mobile telephony market of Serbia is extremely concentrated, but that there is a trend of decrease in the level of concentration measured using the Herfindahl-Hirschman index (HHI) (Kostić, Stojanović & Radukić, 2016, p. 333). Starting from the above mentioned articles, the research that has been conducted is a qualitative step forward since it provides an integral image of competition conditions in the ICT sector by analyzing all of the most important markets in the sector.

Analysis of the conditions of competition in the ICT sector was conducted using the data of the Regulatory Agency for Electronic Communications and Postal Services of the Republic of Serbia (RATEL). The research was carried out for the period

between 2007 and 2016. In order to determine the limitation, i.e. market concentration, Herfindahl-Hirschman Index (HHI) was used, which is calculated based on the market shares obtained through participants' revenues derived from the analyzed activity. HHI is generally accepted and certainly the only complete indicator of market concentration. It is calculated according to the form (Stojanović & Kostić, 2013, p. 334):

$$HHI = \sum_{i=1}^n (s_i^2)$$

where s_i is the market share of the i -th company.

Herfindahl-Hirschman Index (HHI), theoretically, can have a value between 0 and 10000. In the case of an atomized supply, when each participant's supply tends to 0 the index value also tends to 0. In case of monopoly value of the index is 10000. HHI reference values are given in Table 1.

Table 1. HH Index Reference Values

alue of HH index	Levels of concentration of supply
HHI < 1500	Unconcentrated market
1500 ≤ HHI ≤ 2500	Moderately concentrated market
HHI > 2500	Highly concentrated market

Source: Horizontal Merger Guidelines, 2010, p. 18

For markets where data on the amount of revenue, and therefore the size of market share, were not available only the number of registered participants (operators, distributors, or providers) was specified. It is believed that this indicator can also depict picturesque situation in a market. Data analysis was performed in the MiniTab 15 statistical program.

Analysis of the situation in the information and communication technologies (ICT) markets of Serbia

In contemporary business conditions, the importance of the ICT sector is very high. This may not be perceived by the contribution it has to gross domestic product (GDP), however, as new technologies develop, the significance of this sector will grow. Table 2 lists the share of the ICT sector in the total GDP of the selected countries.

Table 2. The share of the ICT sector in GDP of the selected countries in percentages

	2007	2008	2009	2010	2011	2012	2013	2014
Sweden	6.54	-	6.27	6.40	-	-	-	6.41
Hungary	5.84	5.83	5.75	5.71	5.99	5.82	5.87	5.69
Bulgaria	5.98	5.02	4.86	4.83	4.64	4.58	4.69	4.90
Germany	4.72	3.96	4.12	3.88	4.02	3.98	4.05	4.18
Estonia	4.57	4.40	4.98	4.79	5.04	4.69	4.61	4.91

Slovenia	4.08	3.34		3.51	3.49	3.57	3.62	3.62
Romania	-	3.27	3.27	3.09	3.07	3.17	3.12	3.31
Greece	2.71	2.61	-	2.13	2.06	2.04	1.98	1.84

Source: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tin00074> downloaded on November 08th, 2017

As Table 2 shows, the share of the ICT sector in GDP of the selected countries ranges from 1.84% in Greece to 6.54% in Sweden. Serbia's experience related to ICT share in GDP does not differ from the experience of these countries. In Serbia, the share of revenue from this sector in GDP in the period between 2006 and 2016 ranged between 4.70% and 5.66%. It was the highest in 2011, and at lowest in 2007. Table 3 shows the share of the revenue of the ICT sector in total GDP of Serbia.

Table 3. Share of ICT revenues in the total GDP of Serbia in percentages

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Share	5.60	4.70	4.87	4.76	5.29	5.66	5.52	4.85	4.50	4.72	4.51

Source: RATEL http://www.ratel.rs/market/overviews_of_telecom_market.129.html, downloaded on November 07th, 2017

It is very important to consider the contribution of each individual category of ICT services to the total revenue of the ICT sector, since the contribution of all segments is not identical. The largest contribution to the total revenue of the ICT sector in Serbia is mobile telephony, followed by fixed telephony, fixed broadband Internet, and distribution of media content. These four categories make up 98.4% of total ICT revenue (Table 4).

Table 4 Structure of revenues of the ICT sector by services for 2016

Category of ICT Service	Percentage in 2016
Mobile network	59%
Fixed network	17.9%
Fixed broadband Internet access	11.8%
Distribution of media content	9.7%
VAS	0.5%
VoIP	0.4%
Leased lines	0.4%
Radio diffusion	0.3%
Total	100%

Source: RATEL http://www.ratel.rs/market/overviews_of_telecom_market.129.html, downloaded on November 07th, 2017

In accordance with previously displayed classification of individual categories of revenue and their contribution to the total ICT sector revenue, the analysis of the conditions of competition was conducted in four most important markets of the sector. Wherever possible, HHI was calculated as the most significant indicator of concentration, and where this was not possible only the number of participants was specified (Table 5).

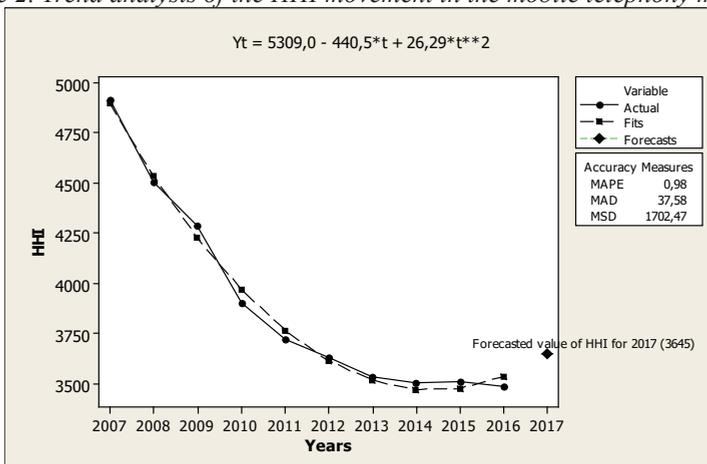
Table 5. Analysis of the level of concentration in the selected markets of the ICT sector of Serbia

Year	HHI mobile telephony	Number of operators fixed telephony	Number of providers (HHI) Internet services	Number of operators (HHI) distribution of media content
2007	4914	1	159	79 (3236)
2008	4506	1	197	79 (3177)
2009	4288	1	199	78 (2932)
2010	3901	4	192	80 (3170)
2011	3717	4	232	82 (3128)
2012	3630	6	222	94 (3495)
2013	3534	10	221	94 (3124)
2014	3503	14	217	98 (3104)
2015	3506	17	212 (2904)	90 (2905)
2016	3486	30	214 (2799)	90 (2993)

Source: Authors' calculation

It can be concluded that the most limited market is fixed telephony market, where the number of registered operators until 2010 was one, when other operators started receiving license. The operator who was the only one licensed by 2010 and up to now is the most important participant in the market is Telekom Serbia. The next one according to the level of limitation is the mobile telephony market with three registered operators and HHI values above 3000 index points. What should be said is that the value of the HHI index for this market has a downward trend but is still expected to be above 3000 index points. Forecasted HHI value for 2017 is 3645 index points (Figure 2).

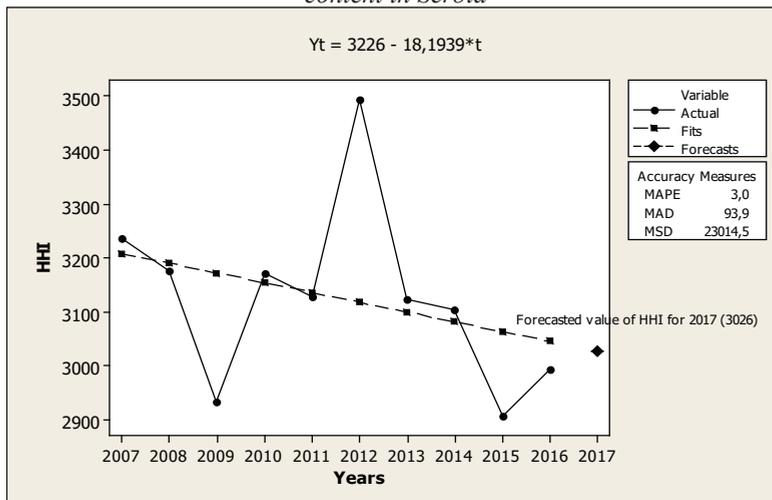
Figure 2. Trend analysis of the HHI movement in the mobile telephony market of Serbia



Source: Authors' calculation

Regardless of the fact that the limitation of this market decreases, HHI value can never be lower than 3333 index points, since the number of participants in this market is always the same i.e. three. Even for the forecasted value of 3645, it can be said that it is close to the lower threshold and as such indicates a relatively uniform distribution of market power between the three existing market participants. Only with the introduction of a new operator the HHI value could drop further, even below 3000 index points. After this market, according to the level of limitation, the market of media distribution is the following, where the value of HHI is about 3000 points with the trend of further decline, regardless of occasional fluctuations of HHI values including both rise and fall (Figure 3).

Figure 3. Trend analysis of the movement of HHI in the market of distribution of media content in Serbia



Source: Authors' calculation

Forecasted HHI value for this market in 2017 was 3026 index points. It is important to note that the number of operators in the market varies from 78 in 2008 to 98 in 2014. The most important operator in the market is SBB, with a market share of over 50% by 2014 and slightly below 50% in 2015 and 2016 (47 and 48% respectively).

The last one according to the level of limitation is the market of broadband Internet access, where the number of participants (providers) in the last six years was constantly above 200 participants and where the value of HHI, for the years for which data were available, is lower compared to the previous two markets. Insufficient data did not allow the definition of the trend of HHI movement and forecast of its value for 2017. This market is dominated by SBB and Telekom Serbia. In 2015, SBB had 47% of the market share, while Telekom Serbia had 45.9% of market share in 2016.

Examples of SBB and Telekom Serbia, as well as other participants in the ICT markets, such as Kopernikus Technology, Radius Vektor, Ikom etc., are showing us that these markets are becoming more and more complex in terms of the type of services they provide. Namely, as a rule, companies from the ICT sector provide a number of linked services, therefore the new way of definition relevant market become main question in

competition policy for ICT sector. The best example is the fact that the market of the distribution of media content, that is cable operators, is supported by Internet and fixed telephony distribution services. This will greatly complicate the analysis of these markets in the future. Furthermore, there is the ownership connection of the entities operating in these markets, which can change the conclusions about the level of market limitations of individual services from the ICT sector. The question arises: what can competition policy in Serbia do under such circumstances?

The role and challenges of competition policy in the ICT sector

In the era of the expansion of the ICT sector, a global view of competition policy is changing. The situation is also similar in Serbia. Under the influence of high concentration and interweaving services from individual markets, there are three basic directions in which competition policy, related to contemporary information and communication technology (ICT) is changing. The directions of change are:

1. Changing the angle of observation and assessment of the relevant market;
2. Balancing between good and bad parties related to joining in the sphere of research and development (R&D) and,
3. Attentive attitude towards patents and licenses, as the basis for the protection of intellectual property, as well as the barriers to entering the new market.

When it comes to the relevant market, it can be said that this is the most important element and the starting point for acting in competition protection segment. Proper assessment of the market share and the indirect market power of economic entities depend on the correct definition of the relevant market. If the boundaries of the market are set too wide, consequently, it could appear that companies have significantly lower market power, contrary to the fact that if narrower boundaries are set, it could appear that companies have higher market power, and in reality this is not the case. The relevant market has two components, one related to products and another related to the territory where these products are offered, therefore there is a relevant product market and a relevant geographic market. Competition protection theory and the legislation of most developed countries understand the relevant product market and the relevant geographic market in an identical way. Thus, the relevant product market is a set of goods or services that consumers and other users consider substitutable in terms of usual purposes, characteristics, and prices, while the relevant geographic market is the territory in which participants participate in supply or demand and where the same or similar conditions of competition exist, which are significantly different from the conditions of competition in neighboring territories (European Commission, 1997, Commission Notice on the Definition of the Relevant Market for the Purposes of Community Competition Law ^{par as 7 and 8}). As such, the phenomenon of the relevant market is narrower than the general concept of the market, which includes the exchange of goods and services in all territories, regardless of the conditions of competition and the existence of substitutability of products (Labus, 2008, p. 50).

Based on the research conducted on the case of individual ICT markets, it can be said that reviewing the approach to setting relevant market boundaries should go in two

directions. The first one is related to the production component and concerns the fact that the market of a certain category of products (services) is no longer individual as a separate entity, but that the services from the supply of individual participants intertwine with each other. In other words, consumers are required to make linked purchases in the sense that the purchase of one product entails the purchase of another product or service. Even when this is not conditioned, consumers themselves often opt for linked purchases for the purpose of reducing transaction costs. In such circumstances, the relevant product market should be observed at two levels, the first with regard to specific services or products, and the second with regard to a number of related services or products.

The second direction of changing the approach to defining the relevant market boundaries is related to geographic component, where the national competition bodies are required to mutually cooperate at a higher level. Cooperation should be more important since the market in which companies from the sector operate is of global character, in a geographical sense. A good basis for better communication and exchange of information is the existence of the International Competition Network (INC), in which procedures for the exchange of information concerning global market participants should be formalized. Moreover, as regards the Commission for the Protection of Competition of the Republic of Serbia, it should be noted that regional cooperation networks should play a significant role in the exchange of information, in particular Regional Center for Competition (RCC), based in Budapest, founded by the OECD and the Hungarian Competition Authority, as well as Sofia Competition Forum (SCF), established by UNCTAD and Bulgarian Competition Authority. However, as in the case of INC, cooperation comes down to informal communication, and less to formal exchange of information. There is space for action in a part that concerns formalization of cooperation. Model for this could be the European Competition Network (ECN) through which the cooperation between individual members of the network is precisely defined, and these are the national competition bodies of the EU Member States.

When analyzing the conditions of competition, special attention should be paid to the research and development cooperation between the companies in the ICT sector. Research and development (R&D) are very important elements for the survival and development of companies in the ICT sector, because the world economy is characterized by a new technological revolution (4.0 industry), which includes new knowledge, capabilities, new production structures, a new way of joining companies in the sphere of research work, etc. (Maksimović & Kostić, 2012, p. 51). In such business conditions, price competition is often replaced by innovation competition. Even in 1942, Schumpeter argued that price, as a privileged variable in large companies' strategic thinking, lost its dominance and now the competition that implies new products and the application of new technologies, through which the survival and development of companies are ensured, takes over the primacy (Schumpeter, 1960, p. 130). This is especially emphasized in the companies of the ICT sector. Companies in this sector make decision to cooperate with other companies to reduce the risk and financial pressure of large research and development investments. Co-ordination of innovative activities is achieved through joint investments and the establishment of joint research centers or through various forms of technical cooperation. Such moves reduce the risk of eventual competitive outpacing, and also reduce technology improvement cost. Companies which do not join together can lead themselves to disadvantage, as their profits will be lower than profits earned

by companies joined with innovative activities. The losses from missed opportunities, which in such conditions grow, are not negligible. Such forms of horizontal joining are subject to criticism, as they lead to market cartelization. However, if they are entirely related to R&D, the benefits they bring, through the reduction of the risk of new products and technology introduction, are greater than the damage caused by market limitation. It follows that such a joining contributes to economic and social progress (Bomol, 2002, pp. 104-105). It can be said that cooperation in this field is acceptable to the extent that the benefits of new investments do not become lower than the social costs incurred due to limitation of competition.

According to the Competition Law of the Republic of Serbia, research and development agreements may be exempted from the prohibition if they contribute to the improvement of production and trade, or incite technical or economic progress, while providing consumers with a fair share of benefits, provided that they do not exclude competition in the relevant market or in its substantial part. (Official Gazette of the Republic of Serbia 51/09, Law on Protection of Competition Article 11). Exemption cannot be longer than eight years (Official Gazette of the Republic of Serbia 51/09, Law on Protection of Competition Article 12). The Regulation of the Government of the Republic of Serbia defines more closely the agreements from the sphere of research and development that are exempted from prohibition; the conditions to be fulfilled by these agreements; elements that agreements which are subject to an exemption must not contain; as well as the precise terms of the validity of the exemption (Official Gazette of the Republic of Serbia 11/10, Regulation on research and development agreements between undertakings operating on the same level of production or distribution chain exempted from prohibition).

One of the major barriers that a new company can encounter is patents and licenses owned by an innovator company, which already operates in a particular market. Patents represent a conceived legal creation aimed at protecting the right to produce and provide certain services. The ownership of the patent provides the company with the possibility of acquiring large profit in a limited period. The intention is to encourage creativity and investment in the development of products and processes by protecting the innovator and his right to exploit the product. Disadvantage of such protection is in the fact that patents limit competition to a great extent through the difficult movement of innovation, and therefore knowledge, between companies. As in the case of cooperation in research and development, here is also required an adequate response from the competition policy, which would not jeopardize the protection of innovation, and at the same time would not prevent the entry of new competitors.

Concluding remarks

The conditions of competition in the ICT sector of Serbia are characterized by a high level of concentration with the trend of its decline. However, regardless of this trend, the future level of concentration in this sector is expected to be high. What is also expected is the interweaving of services offered by companies from the ICT sector. These tendencies pose a challenge to competition policy. Some of the challenges are listed in the paper. The response of the competition policy should be proactive, aimed at changing

the view of defining relevant market and increasing the level of cooperation with other national competition bodies. Market for this category of products is global rather than local, so the national competition bodies are required to mutually cooperate at a higher level in order to prevent potential competition distortions by market participants. As far as cooperation in R&D is concerned, caution is needed, since this segment of activity coordination can contribute to faster technical and economic progress, however, it loses the point if there is no fair benefit from it to customers and if it excludes healthy competition in the market. Contemporary competition policy is here to ensure fairness and competition in the market.

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INNOVATIONS AND DIGITAL TRANSFORMATION AS A COMPETITION CATALYST²

Abstract

The basic aim of the paper is to examine the relationship between innovation and digital transformation, on the one hand, and the conditions of competition on the other hand. The intensive application of advanced technologies leads to a digital transition and companies which operate in a changing environment must pass through it. The market share depends on, among other factors, the speed of digital transformation. One of the implications of this process is the strengthening of competitive pressure among companies. The correlation between exposure to digitalisation and productivity causes the effects that are reflected an increasing gap between the most successful companies and those less successful who are struggling to survive in the market. The question arises what is the role of innovations in modern business conditions and whether they represent substitution for price competition. The results show that efficient enterprises in the static neoclassical sense can not withstand the pressure of their competitors without innovations. Therefore, it can be noted that innovations are crucial for survival of companies in the capitalist economy.

Key words: innovations, digital transformation, competition

JEL classification: D40, O30

ИНОВАЦИЈЕ И ДИГИТАЛНА ТРАНСФОРМАЦИЈА КАО КАТАЛИЗАТОР КОНКУРЕНЦИЈЕ

Анстракт

Основни циљ рада је да сагледа везу између иновација и дигиталне трансформације, с једне стране, и услова конкуренције, с друге стране. Интензивна примена напредних технологија доводи до дигиталне транзиције кроз коју морају проћи предузећа која послују у променљивим условима. Висина тржишног учешћа зависи, између осталог, и од брзине дигиталне трансформације предузећа. Једна од импликација овог процеса је јачање конкурентског притиска међу предузећима. Веза између изложености предузећа дигитализацији и њихове продуктивности проузрокује ефекте који се огледају у повећавају јаза између најуспешнијих предузећа и оних мање успешних који се боре за опстанак на тржишту. Поставља се питање какву улогу имају иновације у савременим

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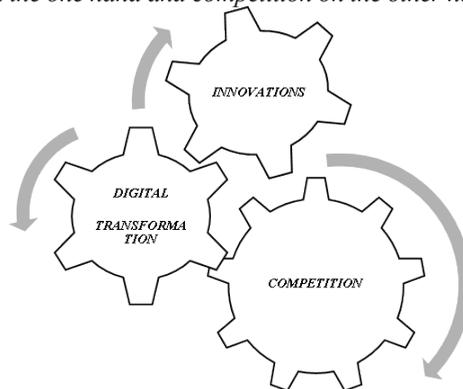
условима пословања предузећа и да ли оне представљу супституцију ценовној конкуренцији. Резултати до којих се дошло током истраживања показују да и ефикасна предузећа у статичком неокласичном смислу не могу издржати притисак својих конкурената без иновација. Стога се може констатовати да су иновације кључне за опстанак предузећа у капиталистичкој економији.

Кључне речи: иновације, дигитална трансформација, конкуренција

Introduction

Adequate understanding of the economic essence of competition in the digital environment emphasizes the company's readiness to innovate and monitor technological progress. The fourth industrial revolution, called Industry 4.0, further enhances the role of information and communication technologies in companies. Although, this revolution has a global character, it does not only influence on large companies, but to all actors in the production chain, which is particularly significant for small and medium-sized enterprises. The latest empirical researches show that modern companies compete with innovations and that productivity growth trends are linked to the adoption rate of advanced technologies. The effects of capital investments in advanced technologies are generally positive, but it should not ignore the fact that investments are basically realized by the most productive companies. An analysis on the micro level shows that the link between the exposure of enterprises to digitization and their productivity is propelling the effects that are reflected in increasing the gap between the most successful companies and those less successful ones which are struggling to survive in the market. The subject of research in the paper is to examine the relationship between innovation and digital transformation, on the one hand, and the conditions of competition, on the other hand. The intensive application of advanced technologies leads to a digital transition, which companies operating in a changing environment, must pass through it. The market share, among other factors, depends on the speed of digital transformation of the company. One of the implications of this process is the strengthening of competitive pressure among companies.

Figure 1: Interplay between innovations and digital transformations on the one hand and competition on the other hand



Source: Author

Adaptation to technological changes in the environment is necessary to compete with competitors. When it comes to digital transformation which have to pass through, it is estimated that the EU's digital market contributes even 375-415 billion euros per year to gross domestic product. Comprehensive use of information-communication tools helps companies to expand their product assortments, to adjust their services, better responding to customer requirements and to reduce inefficiencies in using production factors. On the other hand, the average lifetime of the companies is becoming shorter with a pronounced downward trend. In particular, in 1958, the average lifetime of enterprises in the market was 61 years, in 1980 it was 25 years, and in 2011 it was only 18 years. Digitization has constant pressure on enterprises, so if such trends continue, 75% of present companies will disappear by 2027. This practically means that digital transition management and moving to digitally driven business models is becoming critical for the survival in the market. (Standard & Poor's, 2017) McKinsey estimates that the European Union is working at 12% of its digital potential, with huge differences across sectors and countries, and that there is a positive correlation in all sectors between productivity growth and digital intensity. It is estimated that the European Union could increase gross domestic product by 2.5 billion euros in 2025, if the sectors which lag behind double the digital intensity, and it would additionally result in an annual growth rate of 1% in the next decade. Otherwise, if the companies missed the digital transition period, there would be increasing territorial and social inequality. (McKinsey & Company, 2016)

The structure of the paper consists of four parts. After the introduction, the second part of the paper is dedicated to innovations as one of the key factors that influence on competitive market conditions. Then, in the third part of the paper, the correlation between digital transformation and competition between enterprises is shown. The conclusions carried out on the basis of the review of the relevant literature and the guidelines for further researches on this topic are given in the fourth part of the paper.

The role of innovations in creating competitive markets

Innovations, as a strategic variable that companies take into account when competing in the particular market, get increasing importance. In this part of the paper, competition with innovations is analyzed which is an alternative to price competition in the microeconomic theory. The emphasis on studying prices in the modern market conditions is justified, as long as organizational, strategic and innovative activities are reflected on the products/services price. However, the macro dynamics of capitalism has created the need to incorporate innovation into a neoclassical microeconomic framework. It is undoubtedly that the microeconomic theory of firm behavior contains constraints which are reflected in the unrealistic assumptions (the homogeneity of products, duopoly enterprises have the same size and the same demand curves, the enterprise accurately assumes the price of another enterprise, etc.). However, this does not mean that it is unusable in analyzing real business strategies. Given that competition creates value, and that the microeconomic theory of firm behavior is related to understanding the concept of value, it follows that theory is an integral part of the economic flows analysis. Incorporating innovations into the microeconomic theory of firm behavior provides an understanding the business success of the company through the process of changing the market conditions from perfect to monopolistic competition, from monopolistic competition to the oligopoly and from the oligopoly to a pure monopoly. Baumol notes that innovations are

the best peripheral part of the standard firm theory. In the neoclassical firm theory, companies compete with the price, but Baumol claims that in the capitalist economy, innovation is the primary competitiveness factor. Less innovative companies will lose their game with their more innovative competitors. Companies may be ineffective in static neoclassical terms, but they can remain profitable if they continue to innovate. Without innovation, even the most efficient company (in a static sense) will not withstand the pressure of its competitors. Therefore, it can be said that innovation is key for survival in the capitalist economy. Baumol claims that innovations are the core of microeconomics, not its periphery, and suggests a model in which innovations are incorporated into a standard (neoclassical) microeconomic framework. This model should lead to an economic theory that is more in line with the real economy. (Baumol, 2002)

The question arises which refers to the role of innovations in modern business conditions and whether they represent substitution for price competition. Contemporary market structures are characterized by competition through innovations that should be complementary rather than competitive to classical price competition. In addition, the competitive advantage gained by innovations is support to the price advantage and the factor for creating competitive market structures. Innovations are successful only if they lead to increased productivity, cost reduction and on that basis provide the same or higher quality for lower price. Since innovations are in the function of achieving price advantage, it should not be understood as an alternative strategy to price competition, but as a complementary activity. (Maksimović, & Kostić, 2010, p. 39-56)

It is noticeable that innovators are mostly large companies, which are the dominant players on the supply side in the particular market. Large companies can not rely on the unexpected appearance of a new idea, nor leave innovation to coincidence or competitors. The process of creating new or advanced techniques and products is a critical aspect of their everyday business. Such orientation provides continuity in the emergence of innovations and, in the final, survival if the market. Enterprises invest in research and development up to level until the marginal profit becomes zero, i.e. until the marginal revenues and costs of innovation are equalized. Of course, the scope of investment depends on the behavior of other companies. It should be kept in mind that a company which invests less in innovations in the long term, will reduce market share. Researches show that companies which do not invest in innovations in the amount the industry average, will have lower productivity, higher average costs and higher prices for their products. Reducing the risk of increased competition can be achieved by coordinating innovative activities between enterprises through joint ventures, the formation of joint researches, or through various forms of technical cooperation, licenses and patents. In this way, companies reduce the risk of possible competitive overtaking and the cost of improving technology. Companies that do not associate can endanger their market position due to their profits will be less and due to missed chances. Types of horizontal mergers are subject to criticism due to they lead to the creation of noncompetitive markets. However, if research and development is at the core of the merger, the benefits of reducing the risk of introducing new products and technology are greater than the damage caused by market constraints, which implies that such a connection should be approved as it contributes to economic and social progress. (Maksimovic, & Kostic, 2010, p. 39-56)

Innovations occur in the monopolistic competitive markets where companies are aware of the innovative activities of their rivals and are forced to respond to strong competitive pressures. Since innovations are essential to the survival of a company, they

can not be left to chance, but innovations must become part of ongoing business activities. Understanding the competition policy in dynamic and evolving markets in the forefront emphasizes innovation, as one of the most important strategic variables which should be taken into account while performing in the particular market. Many of Baumol's ideas that the market mechanism encourages the transformation of inventions into profitable innovations are based on Schumpeter's work. According to Schumpeter, the success of a modern enterprise is unthinkable without innovations, so that his theory of circular flow starting from balance, emphasizes that innovations bring dynamics into a system that is constantly adapting. (Schumpeter, 1939) However, Chamberlin is talking about innovations as part of a static system, and the price that we have to pay to innovate in the static system is too high. Chamberlin insists on the product as a variable and considers sales efforts so that its static framework was not suitable for analyzing product innovations. Chamberlin drew attention to the product as the most volatile component, so that due to innovations, the range of goods is expanded. (Chamberlin, 1953)³. As in Baumol's theory of contestable markets, potential competition is the one that induces companies to innovate, which is why their monopoly power is significantly reduced. (Baumol, 1982)

Innovations lead to shift in the demand curve, due to consumers prefer the certain products, but also to shift in the supply curve, due to it will be produced with lower costs. The concept of *free-market innovation machine* makes the process of innovation as a routine, and companies must follow the dynamics of their competitors when it comes to investing in innovations. Discussion of the way in which the results of innovations are distributed among competing companies through market mechanism is a convincing argument that the sharing innovations in the modern market economy leads to effective results. The capitalist economy is growing, due to oligopolistic industries use innovations as their main competitive weapon, and the routinization of innovation turns it into a reasonably predictable business activity, not into a series of random events. Competition in the market forces companies to continue to innovate and thus grow. However, the question arises, whether the *free-market innovation machine* will slow down and ultimately cease to generate growth? Research and development are relatively labor-intensive, so that the relative costs of research and development are increasing, companies will allocate less and less amounts, which can lead to slower growth. However, economists believe that the *free-market innovation machine* will continue to produce economic progress. (Baumol, 2002)

Digital transformation and competition between enterprises

Enterprises are facing with great challenges that are reflected in more intense competition in the domestic market, and the development of digital technologies changes the business models and consumer expectations. Confronting with the need for the digital transition is present in all markets, so it is often discussed about the digital gap between

³ See also: Chamberlin, E. H. (1937). Monopolistic or Imperfect Competition? *The Quarterly Journal of Economics*, 51(4), 557-580. Chamberlin, E. H. (1951). The Impact of Recent Monopoly Theory on the Schumpeterian System. *The Review of Economics and Statistics*, 33(2), 133-138. Chamberlin, E. H. (1961). The Origin and Early Development of Monopolistic Competition Theory. *The Quarterly Journal of Economics*, 75(4), 515-543

companies that are quickly follow rapid technological progress and those that maintain a *status quo*. On the other hand, we can also talk about the digital gap between consumer expectations and the ability of companies to respond to their requirements. Only those companies that manage to adapt to digital changes in a relatively short period of time, can survive in the market. Strong competitive pressure forces companies to adapt the process of digital transition to business conditions and consumer preferences.

In an environment where information is a basic resource, and entry barriers to a particular market are low, there are changes in business strategies and models. Business changes led by new technologies, change the potential for growth of revenues and profits. There should not be ignored the fact that large companies can be threatened by new, small, innovative companies or startups that entry the market. It can be noted that digital transformation influences on the change of the market structure and competition between enterprises. Competitive pressure between businesses in the digital environment is becoming stronger: when the elasticity of substitution is expressed, when there is a high degree of products/services interchangeability, and while building relationships with consumers by encouraged purchasing habits, providing consumer services and post-sale maintenance services. (Kostić, & Rađenović, 2017)

Digital transformation has become the central theme of the business strategies and the all size enterprises development. It is a way to achieve bigger business results by using new technologies. In addition, digital transformation is not only the introduction of new technologies and the process of customizing products and services, but also redefining business models, optimizing business processes and managing organizational changes. (Privredna komora Srbije, 2017) Digitization involves using of modern technologies for business in order to transform it into a business model fully oriented to the consumers needs, and model that is currently adapt to market demand. If we look at the structure of the companies around the world, it is noticed that the small and medium-sized enterprises have the majority, so the process of digitization basically affects the most these companies. Current phase of industrial revolution allows that advanced technologies become available to all companies regardless of their size. The distribution of modern business tools is done between micro, small, medium and large enterprises. Digitalized enterprise is the one in which the level of automation of business processes is at the highest level so there is no repetition of jobs, operating costs are minimized and it can be planned and anticipated, business functions are logically connected so that the output is used as input of the other, current insight into the real state is possible, communication with stakeholders (customers, suppliers and others) is automated, the risk for human error is minimized, jobs are performed in a reliable business information system etc. Digitized business enables constant presence in the market and taking advantage of opportunities. The digitization process is often described as an exponential technological advancement that will make consumers more powerful and bring more competition. Through the digitization process, an added value is created, the way from the producer to the buyer is reduced, and the price of the product is decreased. (Cominng Computer Engineering, 2017) In the digital economy only those companies that react to change instinctively and turn them into a strategic advantage will survive. Companies which adapted elemental to changes will miss out opportunities.

Empirical research shows that companies have high expectations from digitization, which are reflected in increasing annual revenues and reducing costs by 5 to 10 percent over a period of three to five years. However, in order to achieve significant results, investments in digital ventures are needed, which only a small number of companies can provide. The

introduction of digitization in enterprises is not only crucial in the fight against competitors, but also for the survival in the market. Adequately adjusting to the digital age and taking advantage of its benefits, highlights six elements that build a high performance digital enterprise, which are: 1) strategy and innovation; 2) decision making of customers; 3) automation of processes; 4) organization; 5) technology; 6) data and analytics. Every type of digitization does not need develop and application all six elements to the same extent. These framework provides an adequate structure for managing big data digital programs. (McKinsey & Company, 2017)

Key changes which digital transformation brings refer to:

a) Consumer experience: Traditional marketing techniques are dramatically expanded to better understand consumer behavior and needs: customer segmentation using advanced tools and information available on the Internet, familiarity with consumer behavior, tastes, needs through social networks, development of predictive marketing, fully customized applications, and digital self-service.

b) Business Processes: Performance improvement, employee networking and job mobility, decision-making based on advanced analytics and data. Consumers and employees communicate more with algorithms, not with other employees in the company.

c) Business models: There is the transformation from the physical into the digital, increasing number of fully digitalized products and services, to a complete transformation of the organizational model and the redefinition of the business boundaries. (Coming Computer Engineering, 2017)

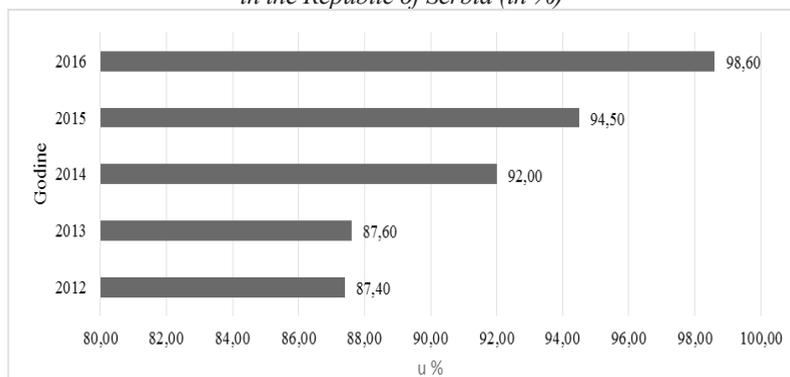
The correlation between investments in information-communication tools and productivity growth in production can be seen more accurately at the micro level. Leading companies are investing heavily in digital transformation in order to increase productivity. But there are those companies that lag behind with productivity growth due to insufficient investments. Over time, these companies will have to increase investments in digital transformation if they want to catch up market leader and to respond to strong competitive pressure, otherwise they will be forced to exit the market. In the meantime, the performance of the industry will also reflect on the performance of the leader and satellites. Empirical research conducted on a representative sample of 644 production companies with more than 10 employees in five major European regions: Lombardy (Italy), Baden-Württemberg and Bavaria (Germany), Catalonia (Spain) and Rhône-Alpes (France) analyzed whether and to what extent enterprises are using advanced technologies (e.g. *ERP*, *CRM*, *virtual marketplace*, etc.) and how it reflects on productivity growth. The analysis showed that most companies in the sample (55.9%) adopted at least one IT instrument, which is a result that indicates that the digital transition is still far from complete. Observed by size of enterprises, it is not surprising that there is a positive link between the size of the enterprises and the degree of digitization. Namely, the percentage of enterprises which deal with digitization, which do research and development and which are internationally active, grow with their size, and in such enterprises, the participation of the family in the management is small. (Veugelers, 2017) In addition, productivity of the company is growing in line with the number of applied information and communication tools, it is noticeable that there is an increasing productivity by every new information communication tool. If we look at the effects on productivity when introducing digital tools by market leaders, we will see that the adoption of a single information and communication instrument generates 3% of productivity growth compared to digitally inactive companies, and the use of additional tools further increases productivity.

This is in line with the conclusion that the process of technological diffusion is uneven and that companies adopt new technologies only when leading companies adapt to the business environment in the country. (Van Ark, 2005; Andrews et al, 2015)

A positive relationship between digitization and productivity can also be shown by a regression model that quantitatively treats this relationship. One of the regressive models regards labor productivity as a function of investing in research and development, internationalization and ownership structures in the enterprise. If digitization is treated in terms of adopting at least one information-communication tool, it can be concluded that there is a positive link between digitization and the level of productivity in the company. When advanced tools are applied by 20% of the most productive enterprises, this leads to higher productivity growth (over 18%), but also to greater gap between leaders and satellites. (Altomonte, Aquilante & Ottaviano, 2012)

In order to monitor the development of digital performance, the composite *Digital Economy and Society Index* (DESI) has been created to combine relevant indicators such as: 1) connectivity (fixed internet access, mobile internet access, internet speed and accessibility); 2) human capital (basic skills and use, advanced skills and development); 3) using internet (content, communication and online transactions); 4) integration of digital technologies (digitalization of business processes and e-commerce); and 5) digital and public services (e-government). (European Commission, 2017) When we talk about digital and public administration, data obtained during the research show that companies in Serbia are increasingly using electronic public services for performing administrative tasks such as obtaining information, downloading and returning forms.

Figure 2: Using of electronic public administration services in companies in the Republic of Serbia (in %)



Source: RATEL, *Pregled tržišta telekomunikacija i poštanskih usluga u Republici Srbiji u 2016. godini*. str. 102.

Based on the data from the Statistical Office of the Republic of Serbia presented in the Figure 2, it can be seen that 98.6% of enterprises used these services in 2016. Accelerated expansion of e-government service in Serbia has caused such a high percentage of companies using these services. Over 80% of the total number of companies in Serbia with an internet connection have their own website, more than one third of the company has used one of the social networks, and about 9% of companies use cloud services for storing data. Comparative

analysis with European Commission data for 2017, shows that two thirds of companies use social networks, while 13% of companies in European union use cloud services.

In order to measure and monitor the digital gap among countries, International Telecommunication Union publishes indicators of the development in information and communication technologies. Value of the index of development in information and communication technologies in Serbia in the period from 2012 to 2016 is: 5.62; 6.03; 6.21; 6.76; 6.87; respectively. Therefore, it is evident that the information society in Serbia has been developing in the previous period. However, the analysis of the index structure shows that there is a satisfactory level of information and communication skills, but also that there is a disproportion between the available capacities based on the existing infrastructure and the utilization of these capacities through using electronic communications services. (International Telecommunication Union, 2017)

Conclusion

Companies are facing with the need for the digital transition in all markets. It often spends out a digital gap between companies that are rapidly following technological progress and those that maintain a *status quo*. Only those companies that manage to adapt to digital changes in a relatively short period of time can survive in the market. The results show that strong competitive pressure forces companies to adapt the process of digital transition to business conditions and consumer preferences. The analysis of the market structures in Serbia and the European Union shows that the business majority consists of small and medium enterprises, and it can be concluded that the process of digitization basically affects these entities. However, it should not ignore large companies that are innovation holders and which dictate the pace of digital transformation.

The paper examines the impact of innovation and digital transformation on the conditions of competition in the market. By reviewing the relevant literature, it has been concluded that the intensive application of advanced technologies leads to the digital transition and the speed of digital transformation significantly influences on the market position of the company. The consequences of this process are: strengthening competitive pressure among companies, but also increasing the gap between the most successful companies and those less successful who are struggling to survive in the market. Innovations are becoming crucial for the survival of companies in the capitalist economy. The effects of innovation and digital transformation on productivity are on average positive, but they are basically led by the most productive companies. Large enterprises, as the bearers of innovation, can not rely on the unexpected appearance of a new idea, nor can leave innovations to competitors or coincidence. Less innovative companies will lose the game with more innovative competitors. Since innovations are in the function of achieving price advantage, it should not be understood as an alternative strategy to price competition, but as a complementary activity. A discussion about the way in which the results of innovations are distributed among companies through market mechanism is a convincing argument that the sharing innovations in a modern market economy leads to effective economic results. All this things considered, it can be concluded that there is a two-way connection between innovations and competition: while on the one hand innovations encourage competition between enterprises, on the other hand, competitive pressure is the primary factor that forces companies to continue innovating.

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GLOBAL COMPETITIVENESS OF THE REPUBLIC OF SERBIA IN TERMS OF INNOVATION PERFORMANCE

Abstract

Innovation is a complex phenomenon and it can be considered from various viewpoints according to affinities of the researcher and aims of observation. Since it is an essentially significant phenomenon, the abundance of literature related to the investigation of various dimensions of innovation is comprehensible. The complexity of this phenomenon often leads to basically different explications of innovation of enterprises and countries. This paper analyses innovation performance of Serbia and its position in relation to other countries of the world and Europe based on the data of The Global Innovation Index and European Innovation Scoreboard. The results of analysis of dynamics of innovation of Serbia according to the Global Innovation Index show its great innovation lagging behind European countries. Regarding the achieved innovation performance the lagging of Serbia behind European countries is also great, according to the latest data of the European Innovation Scoreboard.

Key words: Innovation, Republic of Serbia, Global Innovation Index, European Innovation Scoreboard

JEL classification: O30

ГЛОБАЛНА КОНКУРЕНТНОСТ СРБИЈЕ У ПОГЛЕДУ ИНОВАТИВНИХ ПЕРФОРМАНСИ

Анстракт

Иновативност је сложена појава и може се посматрати са различитих аспеката у складу са афинитетима истраживача и циљевима посматрања. Будући да је реч о есенцијално значајном феномену, разумљиво је постојање врло богате литературе у којој се истражују различите димензије иновативности. Сложеност појаве неретко доводи до суштински различитих објашњења иновативности предузећа и земаља. У овом раду се анализирају иновативне перформансе Републике Србије и њен положај у односу на друге земље света и Европе, на основу података Глобалног индекса иновативности (Гхе Глобал Инноватион Индекс) и Европске

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иновационе бодовне листе (Еуропеан Иноватион Сцоребоард). Резултати анализе кретања иновативности Србије, према Глобалном индексу иновативности показују њено велико иновативно заостајање за европским земљама. Заостајање Србије у погледу достигнутих иновационих перформанси за европским земљама је врло велико и према најновијим подацима Европске иновационе бодовне листе.

Кључне речи: *Иновативност, Република Србија, Глобални индекс иновативности, Европска иновациона бодовна листа*

Introduction

Economic analysts show great interest in the research of innovation of enterprises and countries. Innovations are the basis for economy of knowledge and play a central role in contributing to the growth and development of an enterprise today. Creation, exchange and successful commercialisation of knowledge in innovations is a source of increase of production, value added, rapid economic growth, improvement of competitiveness, creation of new labour positions and stable social welfare. The differences in innovation significantly define possibilities for growth and development of an enterprise (Cvetanović, Mladenović & Petrović, 2015; Moore, 2005), together with the level of development of economy and a society as a whole. Only the economies with a great number of innovation oriented enterprises that efficiently realise their innovation ideas can provide high employment rate and income of the population, thus creating conditions for future sustainable economic growth (Cvetanović, Nikolić & Pokrajac, 2016; Despotović, Cvetanović & Nedić, 2014). The absence and/or insufficient level of innovation leads to lagging in all domains of production and business of enterprises. Therefore, the motto “innovate or disappear” has become generally accepted at the levels of both an enterprise and the economy as a whole (Pokrajac, 2010).

The subject of research in this paper is the latest position of the Republic of Serbia related to the achieved level of innovation in European relations. The aim is to critically identify notified trends in the dynamics of innovations in Serbian economy, primarily related to the proclaimed European pathway of Serbia towards the full membership in the European Union. In analytical sense, the analysis of innovation of our country based on the data in *Global Innovation Index* and *European Innovation Scoreboard* will answer the question whether Serbia follows the proper direction related to the improvement of innovation and whether the process is done sufficiently fast.

The paper includes the following sections: after the introduction, the second section discusses innovation as a key characteristic of economy of knowledge. The third section reviews the innovation of Republic of Serbia based on the data obtained from *The Global Innovation Index*, while in the fourth, the innovation of Republic of Serbia is discussed according to *European Innovation Scoreboard* data. Finally, the most significant conclusions provided by the research are presented in the last section.

Improvement of innovations in the economy of knowledge

Innovation is a phenomenon that significantly determines the development of knowledge based economy. The improvement of innovation is the most important factor of

survival and development of an enterprise and is the best response to global challenges of contemporary society (Cvetanović, 2017). The growth of innovations of an enterprise and a country is in the function of continuous adaptation of market subjects to dynamic changes in the environment and is a basic assumption of more complete satisfaction of the existing and new needs of people (Cvetanović, 2011). Innovation is often defined as the capability of an economy, an enterprise or an individual to transform new business ideas into new products, services, technologies and markets. Its basic concept is designing new and more efficient products and services (Dess, Lumpkin & Eisner, 2007; Crespell & Hansen, 2008). Commercialisation of innovation is a risky activity for an enterprise, since it does not always lead to success on the market. To succeed in the market it is not enough to introduce innovation only, but it should provide improvement of business performance (Amidon, 2003; Likar, et al., 2006; Yoo, et al., 2012; Cvetanovic, Nedic & Eric, 2014)

In order to manage innovation activities more efficiently and effectively, the basic principles of innovations are defined as follows

- Innovation has to take place basically into the enterprise.
- The existence of economic freedom that is formed in the market surroundings is necessary as a result of competition which forces economic subjects to improve and advance business factors.
- Innovation is an obligation for all employees, not for certain parts of the enterprise or part of employees.
- Innovation integrates several aims such as developmental, unilateral, aesthetic, ecological etc.
- Innovation need not necessarily be absolutely original, since there is a so-called ‘creative imitation’, which may also be a significant step in the innovation behaviour of a single company.
- Innovation behaviour includes taking risks.
- An innovator is more concentrated on the possibility than on a risk
- Efficient innovation has to be simple and well promoted on the market.
- Aspiration towards leadership in this domain is a decisive assumption of a successful innovation and its sustainability in the market (Pokrajac, 2001).

Measuring innovativeness is significant since the obtained results create a basis for defining developmental policy and are a necessary element of its practical realisation. Numerous investigations, studies and analyses of innovations are conducted and published at international and national levels. The contribution of innovations in the improvement of business performance of an enterprise is most often quantified, as well as economy as a whole. The traditional approach is increasingly abandoned, based on a small number of individual indicators (e.g. number of patents) in favour of contemporary approach, based on the use of the so-called composite indicators which include a greater number of single parameters of innovation (Cvetanović & Novaković, 2014; Grupp & Schubert, 2010). The development of composite indicators significantly improved follow-up of innovations. A composite indicator is an aggregate index of single indicators as well as pondered coefficients which represent the relative significance of each separate indicator. Best-known indicators that measure innovations include *The Global Innovation Index*, *The Global Innovation Policy Index*, *European Innovation Scoreboard*, *The Global Cleantech Innovation Index*, *The Atlantic Century Benchmarking EU and US Innovation and competitiveness*, *The BCG Report - The Innovation Imperative in Manufacturing* and many others.

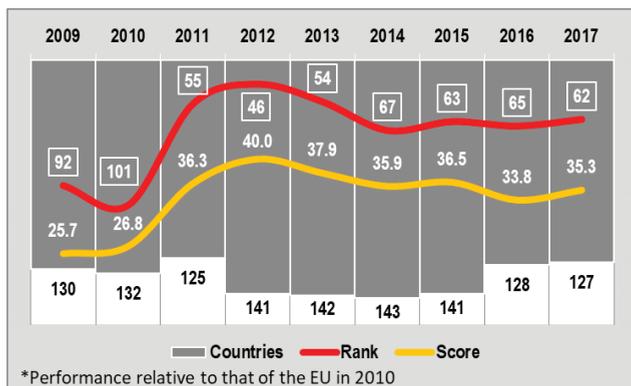
In continuation, innovation performance of Serbia together with its position in relation to other countries of the world and Europe is analysed by using *Global Innovation Index* and *European Innovation Scoreboard*.

The innovation of Republic of Serbia considered according to Global innovation index

Global Innovation Index (GII), as a complex indicator of innovation that includes a great number of single indicators of innovation surpasses traditional methods of measuring of innovation based on single indicators of innovation (e.g. development of research and growth, number of patents, number of new products etc.). This index provides clear, comparable and comprehensive method for identification of the position of Serbia in relation to other European and world countries. In addition, GII enables the identification of domains which have to be significantly upgraded in order to improve innovation of the observed countries (especially Serbia) to a great extent, together with the domains that are already developed and should be further developed, in order to decrease the lagging of Serbia in innovation development in relation to other EU countries, especially the surrounding countries. The methodology of obtaining GII enables comparison and ranking of various countries by their innovation development, i.e. innovation capacity. This indicator is designed to measure innovation in the countries of various economic and innovation levels, which is especially beneficial for the developing countries that want to rapidly improve their innovation and total development.

In 2017, according to GII, five most developed countries in the world were Switzerland, Sweden, Holland, the USA and Great Britain. With the value of *Global Innovation Index* amounting 35.3 points (on the scale from 1 to 100), Serbia took 62nd position out of 127 observed countries related to innovation (Figure 1), i.e. the very bottom of Europe, significantly lagging behind the most developed European countries, as well as after the neighbouring countries of South East Europe (Table 1, Figure 2).

Figure 1: Innovation values and ranking of Serbia according to Global Innovation Index by years



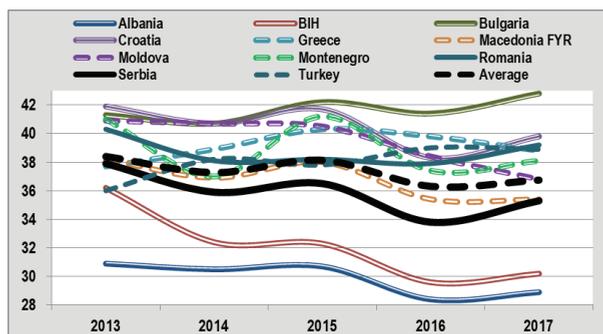
Source: Authors according to data from *The Global Innovation Index 2017: Innovation Feeding the World, 2017*

Although the ranking of Serbia improved by three places in 2017 in comparison to the previous year, the ranking of Serbia in the global innovation map was significantly under the level achieved in 2012, when Serbia was at the 46th position out of 141 observed countries. Low ranking of Serbia during the whole observed period points to great innovation lagging and low level of competitiveness of the Serbian economy.

Table 1: Score of South East European countries according to Global Innovation Index by years

Score (0-100)	2013	2014	2015	2016	2017
Albania	30.9	30.5	30.7	28.4	28.9
BIH	36.2	32.4	32.3	29.6	30.2
Bulgaria	41.3	40.7	42.2	41.4	42.8
Croatia	41.9	40.7	41.7	38.3	39.8
Greece	37.7	38.9	40.3	39.8	38.8
Macedonia FYR	38.2	36.9	38	35.4	35.4
Moldova	40.9	40.7	40.5	38.4	36.8
Montenegro	41	37	41.2	37.4	38.1
Romania	40.3	38.1	38.2	37.9	39.2
Serbia	37.9	35.9	36.5	33.8	35.3
Turkey	36	38.2	37.8	39	38.9

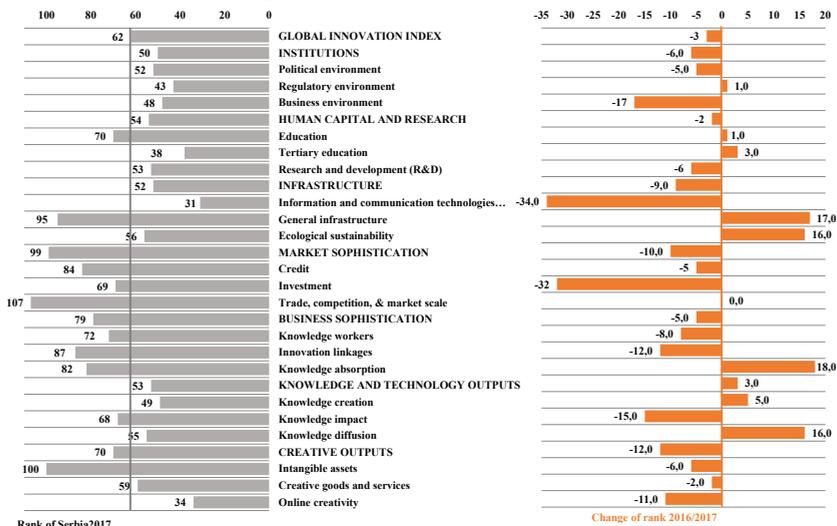
Figure 2: Dynamics of values of Global Innovation Index of Serbia and other South East European countries during the period 2013-2017



Source: Authors according to data from *The Global Innovation Index 2017: Innovation Feeding the World, 2017*

In comparison to 2016, Serbia improved its global position in 2017 related to innovation performance in six out of seven pillars included in *Global Innovation Index* (Figure 3). The greatest rise of 12 places in the list of global invention was recorded in the pillar which measured *Creative outputs* (rise from 82th in 2016 to 70th ranking in 2017). Significant improvement of Serbian innovation position was also noted in the pillar *Market sophistication* (rise from 109th to 99th ranking), together with the pillars which measured development: *Infrastructure* (rise from 61th to 52nd), *Institutions* (rise from 56th to 50th ranking), *Business sophistication* (rise from 84th to 79th ranking) and *Human capital and research* (rise from 56th to 54th ranking). The decline of position of Serbia in the promotion of innovation was noted only in the pillar which measured *Knowledge and technology outputs* (fall from 50th to 53rd ranking)

Figure 3: Innovation ranking of Serbia according to Global Innovation Index in 2017 and change of innovation in relation to 2016



Source: Authors according to data from *The Global Innovation Index 2017: Innovation Feeding the World, 2017*

Out of 21 domains on the global innovation scale in 2017, Serbia showed the best achievements in the domain of *ICTs* (with 41st ranking out of 128 countries), *Online creativity* (34th ranking) and *Tertiary education* (38th ranking), while out of 81 single indicators of innovation, Serbia was best ranked in four indicators of invention: *Cost of redundancy dismissal* (Ranking 1), *Wikipedia yearly edits* (with maximum 100 points Serbia was ranked among leading countries – Rank 1) *ISO 14001 environmental certificates* (4th ranking) and *Scientific and technical publications* (8th ranking).

The greatest lag in innovation development of Serbia was in the pillar which measured *Market sophistication*, and in the domains *General infrastructure* (95th ranking), *Trade, competition, & market scale* (107th ranking) and *Intangible assets* (100th ranking). In relation to single indicators, the worst position of Serbia was in the indicators which measured *GDP per unit of energy use* (119th ranking), *Intensity of local competition* (118th ranking), *Total computer software spending* (103rd ranking), *ICTs and organizational model creation* (103rd ranking), *State of cluster development* (102nd ranking) and *ICTs and business model creation* (101st ranking).

The basic conclusion of the analysis of Serbian innovation development according to the *Global Innovation Index*, in comparison to other countries in the world, and primarily to other countries of South East Europe, is that innovation development of Serbia is at European bottom and among the lowest ranked countries of South East Europe.

Comparison and dynamics of single indicators of innovation in the recent years point to presence of innovation potential in Serbia, but it is insufficiently utilised, and the innovation factors of development are inefficiently managed (Kutlača & Semenčenko, 2015). Therefore, it is necessary to change the former policy of total and innovation development and take more effort and provide means (primarily human and financial) in order to improve

the innovation of the economy as a base of future dynamic and sustainable development, increase of employment, and the rise of life standard and quality in Serbia (Despotovic, Cvetanović & Nedic, 2016).

The innovation of Republic of Serbia considered according to European innovation scoreboard

European Innovation Scoreboard is a system for follow-up of results of the innovation process and provides data on innovation of European Union enterprises and countries. It is an instrument used by the European Commission for the follow-up and comparative analysis of innovation performance, key strength and weakness of EU countries and other joined countries (Serbia, Macedonia, Croatia, Iceland, Turkey, Norway and Switzerland). The report also includes comparisons based on the selected set of indicators between EU28 and 10 globally competitive countries: the USA, Japan, Australia, Canada, South Korea and BRICS countries (Brazil, Russia, India, China and South Africa).

Innovation scoreboard includes *three basic groups of indicators* of innovation classified in eight dimensions with the total of 25 different indicators. It is a set of connected indicators of innovation performance that are grouped in three blocks of pondered composite indices.

The first group of indicators includes input factors which enable innovations but are not related to any enterprise and cover three dimensions of innovation:

- 1) *Human resources* (three indicators that measure availability of highly qualified and educated labour)
- 2) *Research systems* (three indicators that measure openness, quality and attractiveness of research system, i.e. international competitiveness of scientific base of a country) and,
- 3) *Finance and support* (two indicators that measure availability of finances of innovation projects and support of a state for performance of innovation activity).

The second group of indicators serves for evaluation of innovation at the level of an enterprise and includes three dimensions of innovation:

- 1) *Firm investments* (two indicators that follow the investments of an enterprise in IR and other investments which enterprises undertake to achieve innovation)
- 2) *Linkages & entrepreneurship* (three indicators that follow the innovation activity within an enterprise and capability and readiness of an enterprise to be connected to other organisations and institutions) and
- 3) *Intellectual assets* (three indicators that show a degree of intellectual copyright protection and possibilities of financing the activities in research and development)

The third group of indicators includes results of innovation activities of an enterprise through two dimensions:

- 1) *Innovators* (three indicators that follow small and medium enterprises which introduce innovations to the market or within an enterprise, either related to a product or a process and fast-developing innovation enterprises)
- 2) *Economic effects* (five indicators by which it is possible to evaluate the effects of innovations on employment, as well as export and sale that are a result of innovation activities (Mroczkowski, 2012).

According to the information obtained in the scoreboard it is possible to determine *Summary Innovation Index* aimed to help countries to improve their innovation performance and successfully realise Europe 2020 Strategy. The *Summary Innovation Index* is a complex indicator of innovation which is calculated by using aggregate indices of national innovation performance, as a composite index that contains 25 single indicators, thus providing consideration of an overall pattern of innovation performance of countries.

According to the data of the *Summary Innovation Index* the lagging of Serbia in terms of innovation is very pronounced. The fact that innovation gap is getting closer is an encouraging fact, although not sufficiently fast. For example, in 2009, general level of innovation in Serbian economy was 41.8 % of EU innovation, while that percentage was 63.2% in 2016 (Table 2). In relation to the neighbouring countries, Slovenia and Hungary had better innovation performance in 2016, while Serbia was better than Croatia, Bulgaria, Romania and Macedonia.

With regard to single domains *Firm investments* and *Employment impacts* (Table 2) made the greatest contribution to the innovation growth of Serbia during the observed period of time.

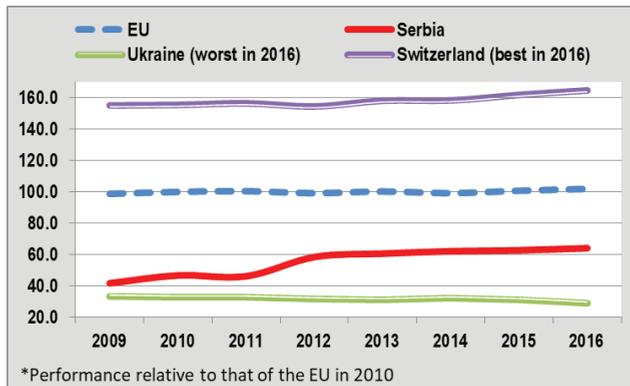
Table 2: Dynamics of innovation of Republic of Serbia in single domains during the period 2009-2016.

Serbia	2009	2010	2011	2012	2013	2014	2015	2016
Summary Innovation Index	41.8	46.8	46.3	58.5	60.7	62.2	62.8	64.2
Human resources	25.6	28.1	31.4	37.2	48.7	53.7	77.7	76.8
Research systems	30.3	30.5	32.8	39.9	36.0	34.4	36.1	44.1
Innovation-friendly environment	34.8	39.2	37.0	37.0	37.0	37.0	37.0	37.0
Finance and support	25.5	66.9	58.5	56.2	58.6	46.9	37.9	43.9
Firm investments	76.1	78.5	77.3	58.4	63.4	124.4	128.6	130.2
Innovators	46.8	46.8	46.8	109.0	109.0	84.0	84.0	81.2
Linkages	30.5	31.0	34.2	52.1	48.4	43.4	43.4	42.6
Intellectual assets	25.2	24.1	17.8	13.0	14.2	16.6	19.5	22.7
Employment impacts	62.9	71.6	77.3	94.0	94.0	94.0	94.0	94.0
Sales impacts	46.7	45.4	45.9	56.0	66.1	66.6	65.3	65.3

Source: European Innovation Scoreboard 2017, 2017.

The innovation growth of Serbia by the average rate of 22.3% during the period 2009-2016 enabled partial closing of the innovation gap between Serbia and EU, which can be seen in Figure 4. However, this gap was even deeper in comparison to Switzerland, as the leading innovation country. Figure 4 also reveals the innovation fall in Ukraine, as the lowest ranked country in this list.

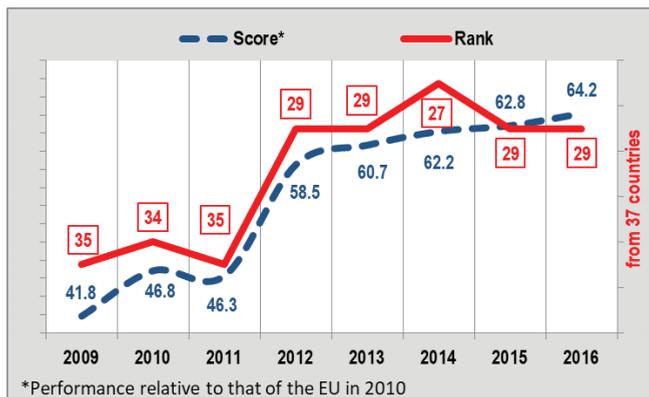
Figure 4: Dynamics of innovation of EU, Serbia, Ukraine and Switzerland in the period 2009-2016



Source: Authors according to data from European Innovation Scoreboard 2017, 2017.

Thanks to the continuous increase of the innovation level in the period 2009-2016, Serbia managed to increase its ranking in the observed group of 37 European countries (from nearly lowest position in 2009 to 29th ranking in 2016 (Figure 5).

Figure 5: Ranking and score: Summary Innovation Index for the period 2009-2016.



Source: Authors according to data from European Innovation Scoreboard 2017, 2017.

The improvement of ranking position for 6 places is not a spectacular result, but it can be positively assessed on the whole, especially bearing in mind that improvement of innovation is basically a slow and long-term process.

Conclusion

In 2017, with its value of global innovation index of 35.3 points (on the scale from 1 to 100) Serbia was at 62nd position out of 127 observed countries with respect to innovation, i.e. it was at the very bottom of Europe, significantly lagging behind the most developed

European countries, as well as the neighbouring countries of South East Europe. The lagging of Serbia regarding innovation was also highly pronounced according to the data of the *Summary Innovation Index*. However, the positive trend of values in the *Summary Innovation Index* since 2012 is encouraging. As an example, in 2009, global level of innovation in Serbian economy was 41.8% of EU innovation, while in 2016 it was 64.2%. Due to its permanent improvement in the level of innovation in the observed period (2009-2016), Serbia upgraded its position within the group of 37 European countries for 6 places, thus rising from nearly lowest to the 29th ranking in 2016. This ranking position is not a breathtaking result, but it reveals the tendency of improvement of innovation, especially bearing in mind that it is a slow and long-term process.

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IMPLICATIONS OF MODERN TECHNOLOGY DEVELOPMENT FOR THE TOURISM SECTOR OF THE REPUBLIC OF SERBIA

Abstract

Tourism is often defined as an economic sector that deals with innovation and production of tourism products and services. It is a very complex economic sector, since tourism products and stakeholders are constantly changing due to changing external forces. Therefore, development and progress of information and communication technology have had an enormous impact on tourism as well as on other sectors of the economy associated with it. Over the years, the use of modern technology in tourism has been expanded to provide a wider range of products and services to tourists all over the world, and is a key determinant of competitiveness in this sector. The subject of this paper is a look at the implications of modern technology for the tourism sector of the Republic of Serbia and the ways in which it contributes to increasing competitiveness. The analysis relies on the World Economic Forum methodology for the presentation of competitiveness of the travel and tourism sector, namely the Travel and Tourism Competitiveness Index. The aim of the paper is to examine the degree of contribution of ICT readiness pillar to the competitiveness of the tourism sector in the Republic of Serbia.

Keywords: *tourism, information and communication technology, competitiveness*

JEL classification: *Z32, D83, L86*

ИМПЛИКАЦИЈЕ РАЗВОЈА САВРЕМЕНИХ ТЕХНОЛОГИЈА НА СЕКТОР ТУРИЗМА РЕПУБЛИКЕ СРБИЈЕ

Анстракт

Туризам се често дефинише као сектор привреде који се бави иновирањем и производњом туристичких производа и услуга. Изузетно је сложен сектор привреде с обзиром на то да се туристички производи и актери стално мењају због промена спољашњих снага. Стога је развој и напредак информационо комуникационе технологије имао огроман утицај на туризам као и на остале секторе привреде повезане са њим. Током година, употреба савремених технологија у туризму је унапређи-

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вана за прижање што ширег дијапазона производа и услуга туристима широм света и кључна је детерминанта конкурентности у овом сектору. Предмет овог рада јесте сагледавање импликација које савремене технологије оставрују н асектор туризма Републике Србије и начина на који доприносе повећању конкурентности. За анализу у раду коришћена је методологија Светског економског форума за приказивање конкурентности сектора путовања и туризма тачније Индекс конкурентности путовања и туризма .Циљ рада је испитати степен доприноса пилара спремност информационо комуникационе технологије (ИЦТ спремност) на конкурентност сектора туризма у Републици Србији.

Кључне речи: туризам, информационокомуникационе технологије, конкурентност

Introduction

Tourism industry has for decades recorded continuous expansion and growth. The next two decades can expect further positive growth. According to World Tourism Organization (UNWTO) estimates, tourism is the second largest industry in the world, which has for many years recorded constant positive growth, and participates in world GDP with 9.8% (7.2 billion USD). The share of tourism in world exports of goods and services amounts to 7% (1.5 trillion USD), while in many developing countries tourism is ranked as the main export sector. At the same time, it employs about 284 million people, i.e. 1 out of 11 jobs is in the tourism sector. That tourism is on the rise around the world is seen in the change from 25 million tourists in 1950 to 1186 million tourists in 2015 (UNWTO, 2016)

Tourism sector will grow by 3.3% annually in the future (2010-2030), and the average annual growth rate of tourism consumption will be around 11%. This projected growth rate for the period of 2010-2030 represents an increase of about 43 million international tourist arrivals on average annually. By comparison, to indicate that this is a positive growth trend, it should be emphasized that the average increase in international tourist arrivals amounted to about 28 million annually in the period 1995-2010. Europe, one of the most visited regions in the world, in the future will represent the most important place in the world tourism with a share of 41% in the total number of arrivals of international tourists (UNWTO, 2011). Serbia, although in the center of the growing tourism market, according to the Travel and Tourism Competitiveness Index (TTCI), is ranked 95th out of 136 countries in the world in 2017., while in Europe it is in an unenviable 35th place, pointing to the low level of competitiveness of our country for tourists worldwide (WEF,2017).

Competitiveness of the tourism sector of the Republic of Serbia and its recognizability among foreign tourists on the world destination map is closely related to the development and application of modern technology in tourism. There is a need to follow the trends in the constantly changing tourism industry, and to better and clearer understand tourists' demands. Innovation and application of advanced technology are not only a factor of competitiveness, but also a factor of survival, growth, and development on an extremely turbulent tourism market. The subject of this paper is a look at the implications of contemporary technology for the tourism sector of the Republic of Serbia and the ways in which it contributes to increasing competitiveness. Using the

methodology of the World Economic Forum, i.e. Travel and Tourism Competitiveness Index, the aim of the paper is to examine the degree of contribution of ICT readiness pillar to the competitiveness of the tourism sector in the Republic of Serbia.

Review of literature

In order to highlight the essence of competitiveness in the field of tourism, the concept of tourism should first be taken into consideration, taking into account the fact that, as a phenomenon, it depends on a very wide range of factors and significantly influences the direction of the overall development of space and society in general. Tourism is a very complex economic sector, whose development has a crucial impact on the progress and prosperity of a national economy. Tourism, as an economic sector, is seen as an alternative form of economic activity, and should be viewed as a component of a large series of development initiatives within each economic system. In addition, this does not strictly mean that tourism cannot be the main source of income and jobs in a society, but that its influence and role over time vary (Chou, 2013,p.227).

Over the past years, tourism has given significant dynamics to the economy at the global level, as it is traditionally a very innovative industry (Hjalager, 2010,p.3). Tourism is a global growth industry, but for more than five decades it has been spurred by the influence of many factors. Factors that stimulate this growth are related to the level of income and wealth, changes in lifestyles and tourist values, increased leisure time, education, information and communication technology, improvement of general and tourist infrastructure, as well as destination marketing and promotion (Matias et al., 2007,p.4). Tourism is an important stimulus for economic development, especially for less developed countries like ours. Therefore, it has become one of the largest economic sectors in the world (Jovanović, Ilić, 2017,p.540).

With the increasing information in the present, information and communication technology has found a role in a large number of industries, including tourism. Since tourism is one of the most dominant industries with a large amount of money, information transfer, as well as tools and mechanisms for managing information, need to be of very high standard and quality (Ubavić, 2015, p.164). The development of modern information technology, especially during the last decades, has caused a revolutionary turn in all segments of promotion and functioning of the tourism sector. Over the years, tourism industry has developed significantly along with the development of new technology. The information revolution that permeates all sectors of the economy in terms of business has quickly entered the tourism sector, which sees this process as the best opportunity for maintaining or improving competitive position, as the condition for survival on the market (Brdar, 2015).

At a global level, the application of modern information and communication technology (ICT) has changed the way of doing business in tourism and the realization of its activities. ICT has globally transformed tourism and offered a range of new development opportunities. Products related to tourism can increase the globalization of the tourism industry in areas such as hotels, restaurants, travel agencies, or tour operators. Therefore, the use of ICT has the potential to turn markets from local to global, while in times of crisis it can contribute to better positioning on the tourism market where the number of competitors increases

daily (Aramendia-Muneta, Olló-Lopez, 2013). The role of information and communication technology will be increasingly significant in terms of overcoming differences in time and space, which exist among different and widely distributed stakeholders in the process of creating and delivering tourism products and services.

The spread of ICT has a major impact on ensuring sustainable and globally oriented tourism development, primarily in less developed areas (UNCTAD, 2004). In addition, ICT and social media give special opportunities to developing countries to catch up with contemporary trends and act more efficiently on the market, without large financial resources, as well as a chance for inaccessible destinations to communicate with the tourism market (Tourism Development Strategy of the Republic of Serbia for the period 2016-2025, p.20). With the help of ICT, many tourism related activities are performed, such as: direct contact with clients and partners (booking, check-in/check-out, payment), office work (accounting, payroll, staff management, marketing), entertainment and services for clients, communication with customers and partners, market research, crisis response and management, flexible and dynamic pricing through revenue management, product differentiation and personalization, control of performance indicators, construction of feedback mechanisms, business process and staff management, and others.

The dynamic development of information technology has significantly changed communication in tourism; it being the key determinant of competitiveness, while a wide range of technological achievements are driving the evolution (Milićević et al., 2013,p.2). Communication in tourism used to come down only to personal contacts between tourists and service providers. Much has changed until today, so services are available 24 hours a day for 7 days a week all year round and are not limited to working hours only. The creation of tourism online portals has completely transformed all activities related to the provision of services to tourists, since these portals are successful in effectively organizing and distributing all tourists' demands and tourism industry offers (Wahab, 2017).

Along with the change of tourism communication using ICT, computerized reservation systems were developed in the nineteen-seventies, global distribution systems in the eighties, and the Internet in the nineties, which completely changed the practice of doing business in tourism. Apart from the implications for changing the structure of business in the tourism sector, the development of ICT has also affected the perception of tourists through the strengthening of interaction links, whereby ICT has a leading role in the exchange of information, knowledge, products, and services (Marković, 2008,p.136). At the same time, ICT has become a support to many critical functions in tourism, contributing to significant innovation in this sector.

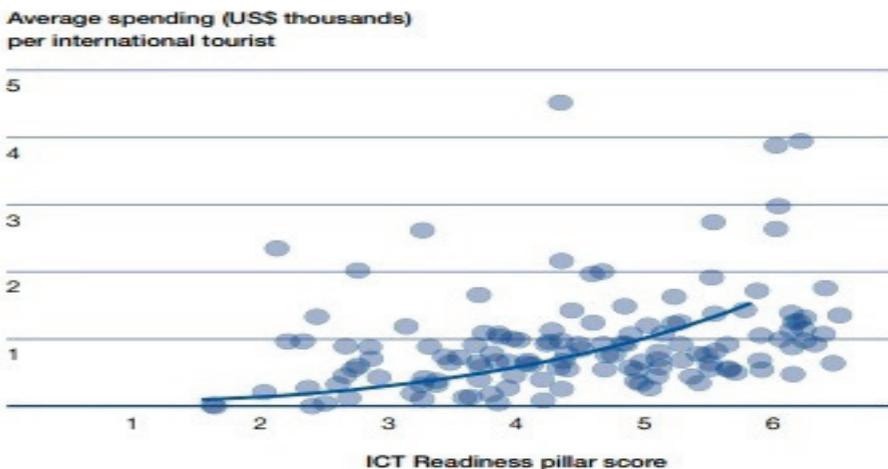
A computerized reservation system first appeared in airline companies. CRS (Computer Reservation System) is a computerized system, used to store and manage information as well as to manage travel-related transactions. Although it originated in airline companies, CRS later expanded to hotel industry, rent-a-car, and other tourism branches. Large CRS operations that book and sell tickets for multiple airline companies are within GDS (Global Distribution System), a network where companies perform operations in terms of automatic transactions between the third party (service provider) and booking agents (travel agencies) with the aim of providing tourist services. The hotel business uses exclusively CRS, whose main functionalities are: reservations – individual, group, business, free rooms, price, deposit handling, blocking of rooms, change/cancellation of reservations, possibility of booking transportation, restaurants, activities, and the like (Njeguš, 2007, p.132).

More and more services provided to tourists are based on the use of the Internet as the main communication channel, which allows simultaneous reduction in operating costs and increased number of clients. In practice, this means that tourists have the opportunity to communicate directly with the ultimate tourism service providers, and are able to identify, satisfy, and even change the requirements for tourism products and services, and, on the other hand, the service provider can more effectively meet the increasingly complex demands of their clients (tourists) (Spasić, 2007, p.45). Tourism and travel, in a large number of studies, fall into the main categories of products/services that are purchased online (Kim et al., 2011, p.259).

In 2008, around 24% of Internet users around the world used the Internet to book airline tickets (Nielsen, 2008). A survey conducted in 2013 found that in 2012 over 88% of Americans used the Internet to plan and book their travel (Choe, Fesenmaier, 2014, p.428). According to a survey conducted by Google in 2014, for 56% of tourists, the Internet is the source of travel ideas, and as many as 74% of tourists travelling for private purposes use the Internet to organize travel (Google, 2014). In addition, 85% of tourists search the Internet for a potential destination, and average tourists make even 55 online searches before choosing a place to book (UK Essays, 2015).

Fast ICT growth makes it easy for tourists to access valuable information and at the same time improve the experience of tourists (Buhalis, Law, 2008; Neuhofer, Buhalis, 2012). Because of this, modern business environment in tourism, but also in other branches of the economy, must be in line with the potentials provided by new ICT (Van Limburg, 2012). Information and communication technology is considered a powerful driver for the development of the tourism sector of any economy, and has the potential to build a yield-based tourism industry (Deuchar, 2012). It has been proven that ICT greatly affects the reduction of operating costs and allows small enterprises to compete internationally (Arker, 2010). It should be noted that the application of ICT in tourism encourages innovation in this sector and creates a constant avalanche of novelties for both businesses and tourists.

Figure 1 A display of the connection between ICT readiness and tourism revenues



Source: WEF (2017) The Travel and tourism competitiveness report 2017, http://www3.weforum.org/docs/WEF_TTCR_2017_web_0401.pdf

Considering the impact of ICT on the competitiveness of the tourism sector, some authors consider ICT as the key factor of competitiveness, as it reduces transactions and operating costs (Buhalis, Kaldis, 2008). On the other hand, there is a view that there is no direct positive link between the application of ICT and competitiveness (Mihalič et al., 2015). What is more, some researchers claim that competitiveness will improve only with new innovation, accompanied by widespread use of technology (Blake et al., 2006). In addition, ICT readiness directly correlates with the amount of value that tourism can generate (Figure 1) (WEF, 2017). ICT is becoming a key determinant of competitiveness and productivity in tourism, enabling it to more easily increase its market share and increase its capacity to launch innovation.

Tourism that integrates ICT into different aspects of its functioning can be called e-tourism and its trends can be tracked in Table 1 (Buhalis, O'Connor, 2005). Buhalis defines e-tourism as an application of ICT in tourism, and states that e-tourism combines three separate disciplines: business management, information systems and information management, and tourism (Buhalis, 2011). Specific e-tourism activities presuppose the existence of a larger number of participants interested in performing tourism activities in a virtual space through a specialized portal. E-tourism determines the competitiveness of tourism companies using the advantages of the intranet to reorganize internal processes within a tourism company, extranet to conduct transactions with reliable business partners, and the Internet for interaction with all interested clients.

Table 1. ICT enabled eTourism trends

eTourism TRENDS			
Consumer –customer centric	Company – profitability driven		Distribution– partnership enabled
<ul style="list-style-type: none"> • Personalization • Location/context/ mood aware • Proactive/anticipatory • Reactive/adaptive to consumer needs • System integrated • Satisfaction driven 	<p>Revenue</p> <ul style="list-style-type: none"> • Expansion of markets and operations • Marketing and promotion • Direct distribution • Yield management • Extensive distribution strategy 	<p>Cost</p> <ul style="list-style-type: none"> • Internal integration • Reduction of intermediation • Intelligent procurement 	<ul style="list-style-type: none"> • Virtual organizations • Interoperability • Developing a value system

Source: Buhalis, O'Connor (2006) Tourism management dynamics: Trends, management and tools

ICT has a profound impact on e-tourism, which is reflected in the digitization of all processes and value chain in travel and tourism, hospitality, and hotel management. Tactically, e-tourism allows all companies to manage their business and do e-commerce. Strategically, e-tourism revolutionizes business processes, the entire value chain, as well as strategic relationships among the interested parties. Tourism companies need to increasingly use ICT in the development of a customer (tourist)-oriented strategy, for profitability and possible partnerships that ultimately lead to a better competitive position.

Thus, electronic mediators have had a great role in the application of modern information technology, and, through the influence of technology, linked tourism industry and clients (tourists) at the global level, thus facilitating distribution. In recent decades, tourist activity has been increasingly shaped by comparing prices and combining technology. New mobile applications continuously develop, offering a wide range of opportunities, social networks get consolidated within a more transparent market, while changes in the value chain concept create new business models. In short, changes are becoming more and more apparent and constant, just like the opportunities created by the application of new information and communication technology in the tourism sector.

Application of modern technology in tourism in the Republic of Serbia

Like most European countries, Serbia has great potential for the development of tourism, which is the driving force for some other industries, such as transport, food and processing industry, construction and consumer goods industries. The improvement of the tourism sector in the Republic of Serbia is considered one of the development priorities. The Republic of Serbia has adopted a tourism development strategy for the period until 2025, which aims to approach tourism in a systemic way, striving towards sustainable economic, ecological, and social development of tourism, strengthening the competitiveness of the tourism economy and related activities, increasing direct and total share of the tourism sector in GDP and the number of employees, and improving the overall image of the Republic of Serbia in the region, Europe, and the world (Tourism Development Strategy of the Republic of Serbia for the period 2016-2025, p.2).

According to the 2015 data, the total share of the tourism sector in GDP of the Republic of Serbia is 6.4%, while direct share is 2.2%. Tourism and hospitality together count about 30,000 direct employees, and there are about 157,000 newly employed in tourism and related activities. The total number of tourists in 2015 was 2,437,000. Of this number, there were 1,305,000 domestic tourists, which is by 12.2% more than in 2014, while the number of foreign tourists who visited our country was 1,132,000, and was higher by 10.1% compared to 2014 (Statistical Yearbook of the Republic of Serbia, 2016).

The application of information and communication technology has significantly changed the structure and principles of doing business in the tourism sector of Serbia. Wisely using ICT can be an innovative strategic tool for tourism companies in our country, which will help them, become more competitive and improve their business and market position both domestically and internationally. Modern ICT accelerates the process of linking tourist offer and tourist demand on the market, giving a completely new dimension to the distribution of package holidays and better recognition and visibility of Serbian tourist offer on the global market. With the increased level of tourist information and more detailed presentation of Serbia's tourist potential through electronic channels that become available by implementing ICT, it is to be expected that the number of tourists as well as revenues from tourism will increase. Modern ICT services and applications, which make it easier for tourism companies to sell their products and services on the Internet, open the possibility for a more expansive development of e-tourism, which is an integral part of the electronic trade in Serbia.

The problem that has arisen in the Serbian tourism sector is the poor political and economic situation, which caused a delay in adopting ICT, which proved to be a very significant aspect of the development of this sector of the economy. Over time, as the problem disappeared, the Internet became more and more accessible to all participants in the business world, as well as to the tourist companies in Serbia, which used it to develop presentations of tourist destinations, representing the whole country, certain regions, and certain sites. The web portal is used to present the tourist potential of Serbia, attract domestic and foreign tourists, and provide useful information. The most famous domestic web portals are Srbija.travel, Visit Serbia.org, Serbia TouristGuide.com, Serbia.com, and BelGuest.rs.

Tourism Development Strategy of the Republic of Serbia for the period 2016-2025 presents SWOT analysis, which, as a weakness of the tourism sector, identifies the inadequacy of domestic Internet platforms and ICT applications for the promotion of tourist destinations, virtual guides, and applications. In order to overcome these weaknesses and make the vision of tourism development come true, one of the main growth drivers in the future is the improvement of ICT system of promotion and booking and raise the efficiency of capacity commercialization. The fact that only 5% of Serbian citizens use the Internet to reserve a trip, while most do it alone or through a travel agency, confirms the necessity of focusing efforts on this. In order to successfully implement the strategy vision, as well as for the desired market positioning, there should be changes in the functioning of the tourist organization of Serbia, in terms of providing a unique information and communication system in tourism and the application of modern ICT tools. The European Union supports and finances numerous activities and programs in the tourism sector of Serbia, in order to facilitate strategy implementation, and one of the priority activities is the development of tourism-related ICT products.

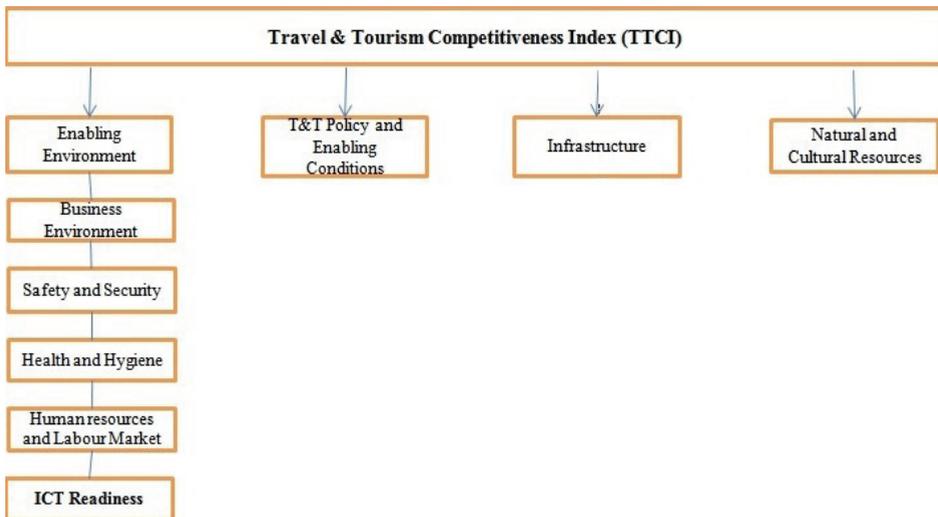
Results and discussion

Tourism is a complex industry, so destination competitiveness is the result of many factors (Vanhove 2006). Competitiveness of the destination is usually analyzed using the relevant models. The most frequently used model was developed by the World Economic Forum under the Travel and Tourism Competitiveness Index. The Travel and Tourism Competitiveness index (TTCI –Travel and Tourism Competitiveness Index) was developed to measure the global competitiveness of the travel and tourism sector among different countries. This index aims to measure the attractive factors and policies for the development of the travel and tourism sector in various countries. In the past, the TTCI structure consisted of three main subindices with 13 pillars analyzing about 75 indicators. Since 2015, the TTCI methodology has changed, in terms of the number of indicators analysed, in order to present a more realistic picture of the travel and tourism competitiveness. The new 90 indicators are classified into 4 main subindices (1. Enabling environment; 2.Travel and tourism policy and enabling conditions; 3.Infrastructure; and 4.Natural and cultural resources) and 14 pillars (WEF, 2015).

The *Enabling environments* subindex includes factors that are directly related to economic growth and are important for business development, including but not limited to travel and tourism sector. Within this subindex there are the following pillars: 1. Business environment; 2. Safety and security; 3. Health and hygiene; 4. Human resources

and the labor market, and 5. ICT readiness. The new subindex, *Travel and tourism policy and enabling conditions*, is made of pillars that are more specific for the tourism and travel sector. These are: 1. Prioritization of the tourism and travel sector; 2. International openness; 3. Price competitiveness; and 4. Environmental sustainability. More precisely, pillars refer to direct measures for the realization of tourism and travel policy, factors that directly affect the decisions of tourists to choose a destination, and natural capital on which a large part of the tourism industry is based, and which needs to be preserved. The separation of infrastructure as a separate subindex points to its driving force for the tourism sector. The pillars in this subindex are: 1. Air traffic infrastructure; 2. Road and port infrastructure; and 3. Infrastructure for the provision of tourist services necessary for the smooth development of tourism and better competitiveness. The role of the last subindex, Natural and cultural resources, is particularly emphasized, whose structure is precisely composed of two pillars 1. Natural resources, and 2. Cultural resources and tourism business. In addition to business and personal reasons, cultural and natural resources are probably the main reason for visiting a destination. There is a tendency to give national importance to these two pillars, and develop policies for their protection and promotion (WEF, 2015).

Figure 2 Subindices of the Travel and Tourism Competitiveness Index



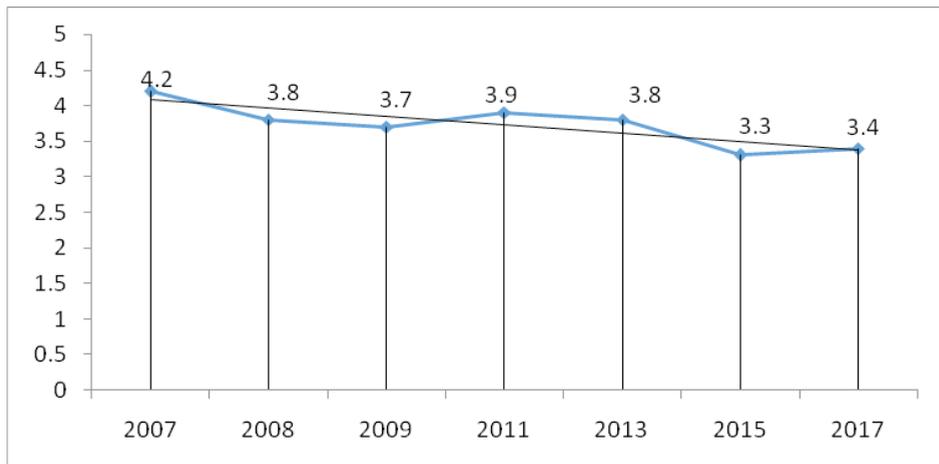
Source: World Economic Forum (2015) The Travel and Tourism Competitiveness Report 2015, Geneva, Switzerland.

The focus of this paper is on ICT readiness pillar (formerly referred to as ICT infrastructure), which is extremely important for all sectors of the economy and is considered part of the general environment for the development of tourism and travel. Internet services and business operations are increasingly important for travel and tourism, while the Internet is used for travel planning and accommodation booking. This pillar measures the rate of ICT penetration (Internet and telephone lines), which reflects social networking activities and the use of the Internet by companies in their business

transactions (WEF, 2017). Therefore, the eight components of this pillar measure not only the existence of modern infrastructure (mobile network coverage, quality of electricity supply), but also the ability of companies and individuals to use and provide online services. The inclusion of ICT readiness in TTCI is the result of years of research that has shown that the key to the success of tourism is precisely in connectivity, both social and technological. Social cohesion is closely intertwined with technology in terms of the Internet that connects people all over the world and has enabled their constant contact.

In accordance with the subject of this paper, to examine the implications of modern technology for the tourism sector of the Republic of Serbia and the way in which it contributes to increasing competitiveness, the travel and tourism competitiveness index (TTCI) is analyzed more precisely, i.e. the pillar which closely assesses the competitiveness of ICT readiness (infrastructure) in our country. The focus is on all available World Economic Forum reports on TTCI covering the time interval from 2007 to 2017, following the trend of ICT readiness pillar for the Republic of Serbia. According to the latest report of the World Economic Forum for 2017 on the travel and tourism sector competitiveness in countries around the world, Serbia is ranked 95th of 136 analyzed countries. The total value of the travel and tourism competitiveness index is 3.4, increasing by 0.1 compared to the previous year, but not resulting in moving forward in the rankings. In the previous year, Serbia held the same 95th position in the list. Observing the index as a whole, one can note a slight increase in almost all pillars of travel and tourism competitiveness included in the index structure.

Graph 1 Trends in the value of the Competitiveness Index for Serbia in the period 2007 – 2017



Source: WEF (2007, 2008, 2009, 2011, 2013, 2015, 2017)

Graph 1 shows the trend of TTCI values in the period from 2007 to 2017 and a declining trend, but with great instability in terms of significant oscillations in a short period of time. Major oscillations are mentioned because a change of only 0.01 can result in a significant move in the rankings, especially in the part of the list where Serbia is. There is a big difference in the value of TTCI in 2007, when Serbia and Montenegro were analyzed as one country, and in 2017, when the value slightly increased compared

to the previous year (2015), when TTCI was the lowest since it started being calculated. When it comes to the best ranked economy by the TTCI value, in this year's report Spain for the second time in a row occupies the first place with the highest TTCI value (5.43), while Yemen is in the last position in the list with the lowest TTCI (2.44). The second most competitive economy in terms of travel and tourism is France, while Germany is in the third position as in the previous report (WEF, 2017).

Table 2 Rank and value of TTCI and ICT readiness pillar for Serbia in the period 2007-2017

Serbia	Year	2007	2008	2009	2011	2013	2015	2017
	Number of country	124	130	133	139	140	141	136
TTCI	Rank	61	78	88	82	89	95	95
	Score	4.2	3.8	3.7	3.9	3.8	3.3	3.4
ICT readiness	Rank	46	57	63	62	49	56	57
	Score	3.3	2.8	2.9	3.3	3.9	4.45	4.8

Source: WEF (2007, 2008, 2009, 2011, 2013, 2015, 2017)

Unlike the value of TTCI, which gradually declines over time, and, thus, the ranking of Serbia in the world list, the value of ICT readiness pillar has been steadily increasing over the years. The value itself increased by more than one point, but, depending on the number of countries analyzed, the ranking oscillated from 46th to 63rd position in the list (Table 2). The increasing penetration of modern technology and its implementation into companies' operations, as well as everyday application by individuals, made Serbia more competitive with ICT readiness and thus recognizable for tourists around the world. In this respect, the Tourism Development Strategy of the Republic of Serbia for the period 2016-2025 gives priority to the development of ICT tools in tourism. Hong Kong is the most competitive economy by TTCI in terms of ICT readiness in 2017. Germany and Switzerland follow it, while the lowest level of application of modern technology is present in Burundi.

Table 3 Value of ICT readiness pillar components for Serbia in the period 2013-2017

Structure of ICT readiness	2013		Change	2015		Change	2017	
	Rank	Score		Rank	Score		Rank	Score
ICT use for biz-to-biz transactions	117	4.2	↗	88	4.5	↘	95	4.4
Internet use for biz-to-consumer transactions	122	3.5	↗	95	4	↗	89	4.1
Internet users % population	67	42.2	↗	65	51.5	↗	56	65.3
Fixed-broadband Internet subscriptions /100 pop.	30	37.3	↘	50	14.2	↗	51	17.4
Mobile-cellular telephone subscriptions /100 pop.	37	125.4	↘	56	119.4	↗	60	120.5
Mobile-broadband subscriptions /100 pop.	37	34.5	↗	39	53.7	↗	40	71.8
Mobile network coverage % pop.				53	99.7	↗	50	99.8
Quality of electricity supply				75	4.3	↗	70	4.8

Source: WEF (2013,2015,2017)

ICT readiness pillar is composed of eight components: ICT use for B2B transactions, Internet use for B2C transactions, number of Internet users, number of fixed broadband Internet subscribers, number of mobile phone subscribers, number of mobile broadband network subscribers, mobile network coverage, and quality of electricity supply (WEF, 2017). Based on the three-year period shown in Table 3, changes in the value of ICT readiness pillar point to a constant growth trend in most of its components. The highest percentage change in growth was achieved with the Internet use for B2C transactions and the quality of electricity supply, followed by the number of Internet users and the number of mobile broadband subscribers, in relation to their values in 2013 and 2017. Oscillatory trend with a slight decrease in value in this period was characteristic for components of ICT use for B2B transactions, number of fixed broadband Internet subscribers, and number of mobile phone subscribers. In addition to the value of the components, the ranking of Serbia in the world list also changed. According to the ranking of ICT readiness pillar components, Serbia is in terms of the number of Internet users, number of fixed broadband Internet subscribers, number of mobile broadband subscribers, mobile network coverage, and number of mobile subscribers in the first half of the world list for 2017.

Table 4 TTCI and ICT readiness pillar correlation matrix for Serbia in the period 2007 – 2017

		TTCI	ICT readiness
TTCI	Pearson Correlation	1	.434
	Sig. (2-tailed)		.033
	N	7	7
ICT readiness	Pearson Correlation	.434	1
	Sig. (2-tailed)	.033	
	N	7	7

Source: Authors' own calculation based on WEF data

Using the statistical method of correlation analysis, the relationship between TTCI and ICT readiness pillar from 2007 to 2017 was examined. By calculating the Pearson coefficient for the two variables in the analyzed time period, it is concluded that there is a direct medium strong correlation between them. The Pearson coefficient value is 0.43, with a statistically significant level of 0.03, indicating that there is a direct quantitative agreement between the variables. It should be noted that the change in the value of ICT readiness pillar can contribute to changing the values of the travel and tourism competitiveness index, but it does not play a key role in the formation of the total value of the index.

The use of ICT is a relevant opportunity for the growth and strengthening of the local tourism industry, as well as for the development of the destination economy as a whole. In particular, ICT has the potential to increase the revenues of a particular destination and thus affect the financing of economic and social development (UNCTAD, 2005). ICT power is primarily reflected in the development and strengthening of local tourism and entrepreneurial activities related to tourism, the development of the right tourist offer relying on the exploitation of local production and tradition, and facilitating

direct promotion and commercialization of local tourism offer on international markets, with reduction of dependence on large foreign intermediaries (Petti, Passiante, 2009, p.50). Serbia has recognized all the benefits of ICT application in tourism and has made a number of efforts to implement it efficiently and in as many activities as possible in order to achieve better competitiveness of this sector, and, thus, higher tourism revenues. Although the quality of ICT readiness in Serbia is below the level of EU countries, it has been impressively improving over the past several years. In addition, the quality of ICT infrastructure itself does not represent a significant obstacle for the business of tourism companies in our country, since most of them are concentrated in urban areas where quality meets the high standards that enable smooth electronic business.

Conclusion

Modern technology has in many ways influenced growth and development in the tourism sector. This is confirmed by the fact that the expectations of tourists have increased significantly in terms of expecting better and well-designed services. The expectations are that in the coming years ICT will play an increasingly important role and will further develop, which will be an opportunity for the tourism industry to deal with the newly emerging changes in the environment. For tourists, the use of ICT means better-defined services that are continually improving in order to increase the level of satisfaction. The main goal of introducing ICT into the tourism sector is certainly an improvement in the provision of services that give tourists greater value for money invested in travel and tourism.

For companies in the tourism sector, it is very important to realize that, through modern information and communication technology, they can secure their existence on the market, improve communication with tourists, improve the position of their facilities, sell their tourist products/services, cooperate with other companies and sell their arrangements, increase their productivity and efficiency as well as revenue, reduce costs and improve their business. Finally, the ICT revolution has brought about significant changes in governance and business in the tourism sector, as well as the development of the electronic form of tourism – e-tourism.

The Republic of Serbia has recognized the need for more intensive implementation and exploitation of ICT in the tourism sector. The Tourism Development Strategy of the Republic of Serbia in the period up to 2025 gives one of the key priorities to investment in ICT development, improvement of ICT promotion and reservations, and raising the efficiency of commercialization of capacities. According to ICT readiness pillar, Serbia is listed in the first half of the world list of countries analyzed in 2017, and aims to continuously increase competitiveness of the tourism sector. The value of this pillar during all the analyzed years has been steadily increasing, which indicates an increasing degree of application and distribution of modern technology in the business of the Serbian tourism sector. In addition to solid ICT readiness compared to neighboring countries, Serbia has room to improve it.

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DIGITAL TRENDS AND ITS IMPLICATIONS ON THE HEALTH INFORMATION SYSTEMS FUNCTIONS DIVERSIFICATION²

Abstract

Improving the interoperability of healthcare organizations as the imperative of digitizing health services leads to the strengthening of an initiative for electronic health functions diversification. The focus is on the long-term economic, and above all the health benefits of using technologically advanced tools of health information systems. Digital trends tend to strive for high personalization, customization and patient-oriented information technology solutions when implementing them in the health information system of a particular health organization. In view of this, the paper will monitor the evolution of digital trends in electronic healthcare and their impact on the functionality of health information systems, especially in terms of efficiency.

Keyword: *electronic health, information systems, trends, diversification*

JEL classification: *C8, I15, O3*

ДИГИТАЛНИ ТРЕНДОВИ И ЊИХОВЕ ИМПЛИКАЦИЈЕ НА ДИВЕРСИФИКАЦИЈУ ФУНКЦИЈА ЗДРАВСТВЕНОГ ИНФОРМАЦИОНОГ СИСТЕМА

Анстракт

Унапређење интероперабилности здравствених организација као императив дигитализације здравствених услуга, доводи до јачања иницијативе за диверсификацијом функција електронског здравства. У фокус се ставља дугорочни економски, а пре свега здравствени бенефит коришћења технолошки напредних алата здравствених информациононих система. Дигитални трендови електронског здравства теже ка високој персонализацији, кастумизацији и пацијент - оријентацији информационо- технолошких решења приликом њихове имплементације у здравствени информациони систем одређене здравствене организације. С обзиром на то, у раду ће бити праћена еволуција дигиталних трендова електронског здравства и њихов утицај на функционалност здравствених информациононих система нарочито по питању ефикасности.

Кључне речи: *електронско здравство, информациони системи, трендови, диверсификација*

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Introduction

Health information systems are information intensive, so their conceptual framework of functioning should be harmonized with the needs of consumeristic health care. The only way is to overcome the gap between technology and health and create a favorable atmosphere for the development of electronic health and the diversification of its functions. In order to integrate the technological development tendency with the needs of health, while respecting market trends in medical branches, health information systems must go through four dimensions of integration. The first dimension refers to the creation of information intensive health messages, their distribution through the communication channel, as well as the determination of the destination and the recipients of those messages. This dimension involves targeting stakeholders with important information about the patient's health status and the way they are transmitted through certain media.

In a broader context, the second dimension relates to the consumeristic perception of health information systems and familiarity with their wide range of functions, which provide information about health condition in real time. The third dimension refers to the ability of healthcare stakeholders to adapt to a new, virtual perspective of providing health care services with unchanged or improved efficiency and interoperability. The fourth dimension emphasizes the importance of an efficient allocation of medical resources, even by virtual ways, so that the economic effects of using health care information systems can be felt at the macro level.

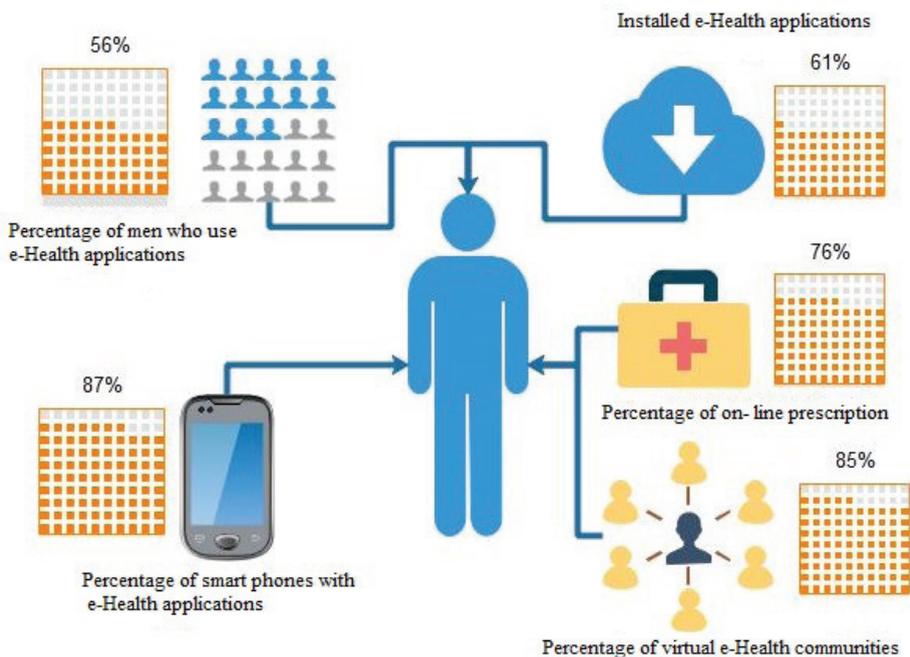
One of the growing trends within health care information systems is ability to work on the web. Namely, the Internet creates numerous opportunities for interaction between medical staff and patients. Telemedicine services can give a certain diagnosis regardless of geographical and temporal distance. Also, through e-mail you can get direct and quality advice from professional staff for current medical care, while by electronically filling in the form for taking medicine from the pharmacy, the waiting time in rows is reduced, as well as transport and administrative costs. Networking more than one medical institution, through a virtual medium, enables the creation of a consultative dimension of the health information system and a new trend in disease diagnosing. This way, information from the electronic health card can be exchanged, as well as the accompanying documents and analyzes, which informed staff about the patient health care condition. Thus, at no additional cost, a particular healthcare facility prepares for the reception of patients with an already known diagnosis, given therapy and general condition.

Applicative trends and interoperability tendencies in e- Health

Trends in the health information system sector are mutually conditioned and according to the aforementioned development possibilities, through electronic health, virtual communities of medical staff and patients are formed. This trend emerged as a reaction to virtual groups of patients who supported each other in cases of long-term treatment. Thus, electronic health creates an on-line community, which greatly facilitates the monitoring and analysis of the health care status of patients with the constant exchange of medical information. (Keselman et al., 2008)

The horizontal flow of medical information exchange, through electronic healthcare technology, has led to a fundamental change in the way of communication and interaction of the healthcare organizations stakeholders. This implies the diversification of electronic health care software functions across a range of applications that not only complement this information exchange, but contribute to the creation of trends in the medical virtual analysis of the patients health care status. Such a trend in the development of an applicative part of electronic health will lead to the emergence of m-Health.³ Data show that in 2017 there was a significant increase in using of these e-health applications, particular through social networks, 85% (Figure 1).

Figure 1: Percentage of installed e- Health applications and e- Health users



Source: author, based on data from <https://i.pinimg.com/736x/fa/a9/6c/faa96cb5542d674806213bc724c8c7a7--mobile-marketing-digital-marketing.jpg>

The application trend in upgrading electronic health functions contributes to the digitization of the consultative aspect of medical services by forming the concept of “medicine from home”. Namely, for information of the current state of health, scheduling examinations and mitigation of symptoms, patients can get from medical staff precisely through applications that reduce the costs of creating a “bottleneck” in the patients

³ For example, through these applications, an increase in blood sugar may be monitored on a daily basis with the prognosis of the same for a shorter or longer period of time, whereby the obtained results can be directly entered into an electronic health record.

flow and speeds up the realization of emergency cases that are actually transported to a health institution. In other words, the creation of artificial crowds and waiting in queues reduces and gives priority to emergencies. Also, the information asymmetry about health condition on the patient-doctor relationship decreases with adequate management and redirection of information, at the patient's request. The application aspect of electronic health also allows the connection of patients with similar medical conditions and thus leads to an exchange of experiences. A telemedicine health service through a videoconferencing option provides direct, in real time, information to medical staff about the health care parameters of a given patient. That is, the patient can communicate their medical results in person, and may also have a virtual reminder of taking medication. (Esterle & Mathieu- Fritz, 2013)

Tendencies in further diversification of the functions of health information systems relate on improving the communication of users of electronic health services. It seeks to improve the communication part of the state of health in terms of a timely and realistic description of the current state of health by patients. In this way, standardized virtual communication between medical personnel and patients, can easily identify the symptoms of a potential illness and respond adequately to the situation. This reduces unnecessary administrative and operational costs, and improves the quality of services by more efficient communication. Given the heterogeneous character of the group of patients, standardization is essential in order for communication to be clear. Therefore, there is a trend of creating a template in the description of the health status through a specific application that is directly entered into the system and in an electronic health card where a computer prediction of the future situation is given, as well as a proposal for the care of patients. (Alahmadi et al., 2014)

Stakeholder value added information exchange in virtual health care services

Trends in electronic health go towards cost optimization and improvement of the organization's interoperability through the formation of the so-called Unified Medical Language System (UMLS). This systemic language has the task of unifying established medical service delivery schemes so that healthcare stakeholders can carry out the transmission of medical information in a uniform manner. The result of the formation of this type of system language is a better evaluation of health parameters introduced by patients electronically and preventive action without additional "steps" in transporting the patient to the institution if there is no need for it. This reduces "bottlenecks" in patients' flow and gives priority to emergencies with more effective monitoring. The multidisciplinary character of interactions between e-healthcare stakeholders in health organizations has influenced the emergence of new tendencies in the development of e-health software. These tendencies primarily concern the creation of additional value for certain stakeholders in the provision of healthcare through electronic health, which for the ultimate goal has the diversification of the functions of health information systems (Table 1).

Table 1: Stakeholder groups and their contribution to additional value of virtual health care services

Stakeholder group	Value added
Patient	<ul style="list-style-type: none"> -Virtual prescriptions. - Information portals for interactive communications. - Virtual patient triage. - Information availability. - Time reduction of waiting in a queue.
Medical stuff	<ul style="list-style-type: none"> - Decision support systems. - Virtual consultations. - Clinical databases. - Tools for analyzing healthcare indicators.
Managers	<ul style="list-style-type: none"> - Benchmarking -Brainstorming. - Budget planning. - Workflow planning.

Source: Keselman, A., Logan, R., Arnett-Smith, C., Leroy, G. & Zeng-Treitler, Q. (2008) Developing Informatics Tools and Strategies for Consumer- centered Health Communication, Journal of the American Medical Informatics Association, Vol.15, No.4., 473-483 str.

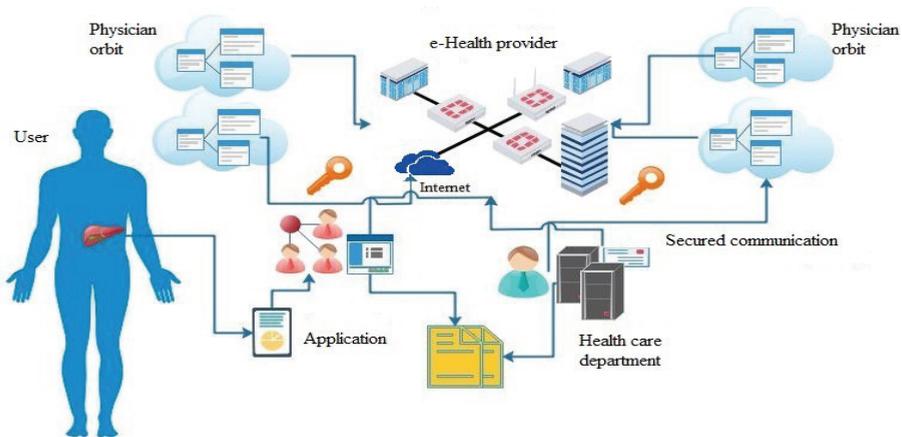
Stakeholder interactions within the health organization are not only related to the provision of health services, but also contain a large number of modalities, ranging from administrative exchange of information to business transactions. Therefore, in the digital health environment, it seeks to create such a user interface that will reduce the cost of complex interactions between users and providers of health services. On-line electronic healthcare services should, with their functions and a “user-friendly” atmosphere, reduce the level of complexity when it comes to healthcare stakeholder relationships, with the growth of interoperability and the connection of all departments of the health organization. The interface should be intuitive enough to provide information on health status or health parameters in real time.

Therefore, in the digital market of health information systems, there are initiatives to create such systems that will enable the balance between quality and cost efficiency in providing virtual health services. This implies full profitability of an investment in electronic healthcare, where, in order to achieve this, there must be a systematic and at the same time a holistic approach to the development and diversification of electronic health functions. Only this can be achieved one of the leading imperatives in the digital world, which is the self-evolving aspect of the information systems. This involves upgrading the existing information systems within each organization in accordance with

its characteristics and specific business characteristics, since each organization, including health, should be regarded as a kind of organism. It is clear that the aforementioned concept of self-upgrading of the organization's functions, according to its own needs, leads to the reengineering of business processes, in this case, the reengineering of the process of providing e-health services.

This new tendency in health information systems leads to the targeting of those phases in the process of providing health services that should be upgraded or eliminated, so as not to create a standstill in generating additional value by using e-Health functions. This refers primarily to the reengineering of certain clinical procedures in order to obtain these procedures in digital form, as well as to reengineering of certain phases in the health supply chain on the principle of “just-in-time”, while respecting the principles of e-commerce.

Figure 2: Stakeholder communication channel and information exchange in e-Health network



Source: Author, based on available literature

As it has already been established, electronic healthcare services are an important component of the modern provision of health services. The medical profession emphasizes that in terms of service efficiency and cost reduction, the time of doctors is more important than the time of patients. It is therefore necessary to optimize the time for which a certain health service is provided and the waiting time for its execution. This is because the effective and effective use of medical resources leads to timely provision of health services and prevents the emergence of possible unwanted outcomes when it comes to patient health.

Waiting theory and its impact on e- Health service efficiency

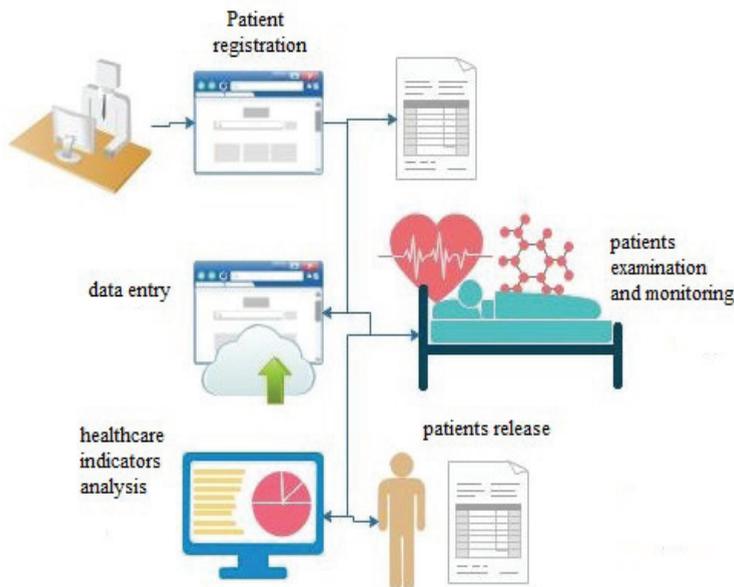
It is clear that health information systems have led health organizations to a higher evolutionary level, which primarily increases the dynamism and complexity of this type of service. The availability of diversification in the health sector, both scientifically and technologically, enables electronic healthcare to make a significant contribution when it

comes to maneuvers to which the organization is serving, to reduce costs to a reasonable level. The operational strategy of health organizations is therefore patient oriented and designed to ensure saving time for patients who wait for health care services by interacting with the following elements (Singh, 2006):

- Management of medical equipment and materials.
- Movement of medical and non-medical staff according to established “routines” within the health organization.
- Planning the capacity of a health organization, especially when it comes to emergency situations.
- Software monitoring for scheduling reviews, availability of capacity, availability of medical staff, equipment and medicines, as well as the collection, analysis and archiving of patient health information.

One of the best strategies for improving the provision of public health services is based on a waiting theory that ensures that waiting times are reduced by applying a one-channel multifaceted system model for waiting in healthcare institutions. This model is for increasing the efficiency of the operation of healthcare organizations provided by health information systems. Solving this problem is based on electronic tracking of patient flow through a regional healthcare organization and an electronic analysis of staffing capacities. This could reduce patient waiting and optimized the provision of health services with as much efficiency as possible.

Figure 3: Process of patient virtual registration and further medical treatment



Source: Author, based on available literature

An adequate screening system and regular electronic analytics of limited medical resources by the existing health care information system, in a specific health organization, helps to answer the following questions (Mardiah & Basri, 2013):

- How to optimally allocate medical supplies and staff to the current capacity and patient flow?
- How many hospital beds should be prepared at a given moment?
- How long should the average provision of health care for a given category of patients last, without compromising the health or financial aspect of the service?
- What factors cause a delay in providing health services?
- Is the provision of health services electronically fulfilled the minimum value of the norm, at the daily level, in terms of the number of scheduled examinations and the processed history of the disease from the electronic health card?
- Is there a potential for improving the use of medical equipment and materials, based on the software analysis carried out, the health information system?

When it comes to healthcare services supported by the health information system, the waiting time depends on the number of units or patients in the system and the order of their registration through the server of the health institution. Waiting in line is cost-priced both from the aspect of patients and from the aspect of a health institution, which uses certain medical resources for timely provision of services. Usually, each health care organization focuses on the first in-out concept of receiving and providing health services as the “safest” way for timely and continuous provision of health services registered through a systemic access to the health information system. Electronic health, accordingly, allows the organization to be cost-competitive by continuously monitoring patient flows, both clinical and operational.

Control and monitoring of patient flow as well as the balance of patient arrivals and provision of services is realized through a health information system that after a certain period of time forms the most frequent trajectories of patient movement through the process of medical care for a given health institution. All this is supported by the most commonly used indicators of the theory of waiting (Singh, 2006):

- Patient arrival rates (λ) - arrival of patients per hour during working hours taking into account the average number of visits per doctor on a daily basis.
- Service rate (μ) - the ratio between patient arrival rates and the average number of patients per doctor on a daily basis.
- Average server usage (P) - Average time for using a patient registration server and servicing their service.
- Average number of patients in line (L_s) - the average number of patients waiting for the health service after registration.
- Average number of patients in the system (L_q) - the average number of patients who are processed and registered in the system, as well as those who are still “on hold”.
- Average waiting time in line. (W_s)
- The average time in the system (W_q) - the time spent on waiting for the registration and processing of the health information system users.

- Percentage of time for which the server is empty (P_0) - the so-called “idle time” of the server, or the time for which the server does not register users or participates in the process of providing a health service.

Below (Table 2) are presented indicators of the theory of waiting on the example of the regional health center of the Republic of Serbia, which uses the health information system Heliant Health. Namely, the working hours of one change of medical and non-medical staff within a given health center is eight hours (t), with an average number of patients or a visit by a doctor 36 (δ) for the mentioned working time of one shift.

Table 2: Waiting theory and its indicators based on health information system Heliant Health

	Value
Patients arrival rate $\lambda = \frac{t - 1}{\delta} \times 100$	19
Service rate $\mu = \frac{t}{\delta}$	22
Average server usage $P = \frac{\lambda}{\mu}$	0,86 (86%)
Average number of patients in line $L_s = \frac{\lambda}{\mu - \lambda}$	5,46
Average number of patients in a system $L_q = \frac{\lambda^2}{\mu(\mu - \lambda)}$	6,37
Average waiting time in line $W_s = \frac{1}{\mu - \lambda}$	0,33
Average time in a system $W_q = \frac{\lambda}{\mu(\mu - \lambda)}$	0,28
Percentage of time when the server is empty $P_0 = 1 - P$	0,14 (14%)

Source: Author, based on available data during research in regional health organizations in Republic of Serbia

From the previous table, it can be seen that the capacity of using server in providing health care services on the example of the regional health center is almost 90%, which shows only how much the health information system is important for patient flow monitoring. The average time for providing health care services with the help of the health information system is 22 minutes, while the waiting time is 0,33 hours or 19,8 minutes. From here, it can be concluded that there is significant efficiency in the work of a health center supported by electronic health, since the provision of services is less than 30 minutes per patient. This all supports the rapid systemic treatment of patients and the monitoring of his health condition, which is kept in the system for 16.8 minutes.

Conclusion

The benefits of electronic health are progressively increasing at the global level. New medical discoveries along with high quality medical services, supported by advanced technologies, lead to a significant improvement in people's health and prolonging life expectancy. In this way, the health condition of a certain population and in the genetic code improves in the long run. Modern technologies with their innovative medical analyzes and procedures have contributed to faster diagnosis and timely treatment. Software forecasting and health forecasting based on the collected data from the history of disease significantly reduces the costs of the health organization and optimizes the provision of health services with a high degree of interoperability. Reduction of administrative costs is also obtained at a time when it concerns the patient's health status and enables timely provision of health services

Virtual provision of health services through electronic health leads to the networking of all stakeholders of the health organization, which realizes the exchange of information about the patient's health status. In this way, virtual virtual medical orbits are formed, which create an effective interactive medical communication channel by the unique language of electronic health, the concept of electronic health record and application-based information gathering. This leads to early detection of signs of illness and better treatment of the patient, as well as optimal allocation of medical resources to urgent cases, leading to a significant reduction in operational, administrative and logistical costs. Timely making medical decisions based on software data processing about patient, collected through electronic health, priority is given to the most vulnerable group of patients and reduce unnecessary costs of transportation and use of medical equipment for other purposes. The benefits of e-health are increasingly reflected in the personalization of virtual medical tools to define in a more precise way the health condition of the patient and provide adequate medical services at no cost, with the continued growth of the added value of medical services.

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INNOVATION OF SERBIA IN RELATION TO NEIGHBORING COUNTRIES AS A DETERMINANT OF COMPETITIVENESS

Abstract

In a knowledge-based economy, innovation plays a key role in strengthening competitiveness, both on micro and macro-level. Modern countries compete on the basis of technological innovations and allocate significant resources for research and development. The aim of this paper is to point out the key limitations of Serbia's innovation as a determinant of national competitiveness, applying the methodology of the World Economic Forum. The comparative analysis will show which countries in the region are positive examples from the aspect of innovation and in relation to which indicators of innovation Serbia has the worst position, considering a seven-year period. A special emphasis is put on the possibilities of overcoming the weaknesses of Serbia's innovation.

Key words: innovations, competitiveness, Global Competitiveness Index, Serbia, neighboring countries

JEL classification: O30

ИНОВАТИВНОСТ СРБИЈЕ У ОДНОСУ НА ЗЕМЉЕ У ОКРУЖЕЊУ КАО ДЕТЕРМИНАНТА КОНКУРЕНТНОСТИ

Анстракт

У економији заснованој на знању, иновације имају кључну улогу у јачању конкурентности, на микро и на макро нивоу. Савремене земље конкуришу на бази технолошких иновација и издвајају значајна средства за истраживање и развој. Циљ рада је указати на кључна ограничења иновативности Србије као детерминанте националне конкурентности, примењујући методологију Светског економског форума. Компаративна анализа ће показати које се земље из окружења издвајају као позитивни примери са аспекта иновативности и у односу на које индикаторе иновативности имамо најлошију позицију, посматрајући седмогодишњи период. Посебан нагласак се ставља на могућности за превазилажење слабости домаће иновативности.

Кључне речи: иновације, конкурентност, Индекс глобалне конкурентности, Србија, земље у окружењу

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Introduction

In the new era, the era of knowledge-based economy, innovations are becoming imperative, and the main goal is to turn ideas into innovations. With the change in the environment in which modern companies operate, traditional sources of growth are losing importance and are being replaced by education, knowledge, innovations and entrepreneurship. As early as the 1930s, Joseph Schumpeter (1934) recognized the importance of innovations, which represent a primary driver of dynamic economic development. Modern developed countries are becoming more competitive in terms of increased resource allocations for research and development and in terms of the development of technological innovations. With the aim of sustaining the achieved competitive advantage, the most developed countries in the world are inventing new technological products and are the leaders in that field. They are characterized by a close cooperation between universities and industry, high quality scientific research institutions, significant resource allocations for research and development given by the private sector, a large number of patents and a strict regulation for the protection of intellectual property, which are the key indicators of innovation of national economy, as well as important factors of competitiveness.

The main problems of the business environment in Serbia are related to the massive brain drain, insufficient investment in research and development by the state and by the private sector as well, slow adoption of new technologies, inadequate cooperation between universities and industry, unavailability of research services, inefficient protection of intellectual property. These are the basic restrictions on domestic innovation, which can seriously jeopardize national competitiveness, especially at higher levels of development. Yet, compared to the neighboring countries, when it comes to innovation, our country has significantly improved its position in the past couple of years. According to the latest results, certain indicators of innovation such as the quality of scientific research institutions and patent application show that Serbia has attained a favorable position, which sets it apart from other neighboring countries, while the innovation capacity is seen as the biggest limitation of domestic innovation.

The aim of this paper is to indicate the fundamental weaknesses and problems of domestic innovation, as important determinants of national competitiveness, using the comparative method. The analysis includes Serbia and other countries in the region: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Macedonia, Montenegro, Romania and Slovenia, over a seven-year period. The goal is to indicate possibilities for the improvement of national competitiveness by stressing the importance of certain indicators that represent the basis of the methodology of the World Economic Forum for the analysis of national competitiveness- The Global Competitiveness Index. By closely observing the indicators that represent the base of the twelfth pillar of competitiveness, we can understand the reasons for Serbia's position improvement in the field of innovations, which are becoming the key factor for achieving competitive advantage in modern economies.

Innovation as a pillar of the Global Competitiveness Index

”The World Economic Forum defines competitiveness as the set of institutions, policies, and other factors that determine the level of productivity of a country. The indicator of the level of competitiveness is called the Global Competitiveness Index (GCI) and it deals with determining the average value of several microeconomic and macroeconomic components, which are individually measured on a scale from 1 to 7. All of the measured indicators are grouped into twelve pillars and reflect different aspects of the complex economic reality” (Despotović, 2016, p. 82). The methodology of the World Economic Forum for the assessment of national competitiveness is based on more than 110 indicators, or factors of competitiveness that are divided into 12 categories, the so-called pillars of competitiveness, and the analysis includes around 140 countries in the world. The data obtained are based on the attitudes of the leading managers (primary data) in the analyzed countries, or on the reports of other international organizations such as the World Bank, the IMF, the International Trade Organization, United Nations (solid data). The importance of individual groups of pillars of competitiveness for a specific country depends on the stage of development of that country. The criterion used for grouping countries according to their stage of development is the realized level of GDP per capita. Countries are divided into three main and two transitional stages of economic development. The stage of development in which a country is determines the value of weights attributed to groups of pillars which form the Global Competitiveness Index². Moreover, some analyses (Schuller & Lidbom, 2009) have shown that high-ranking countries in the Global Competitiveness Index Report are ranked high according their GDP per capita, or their standard of living.

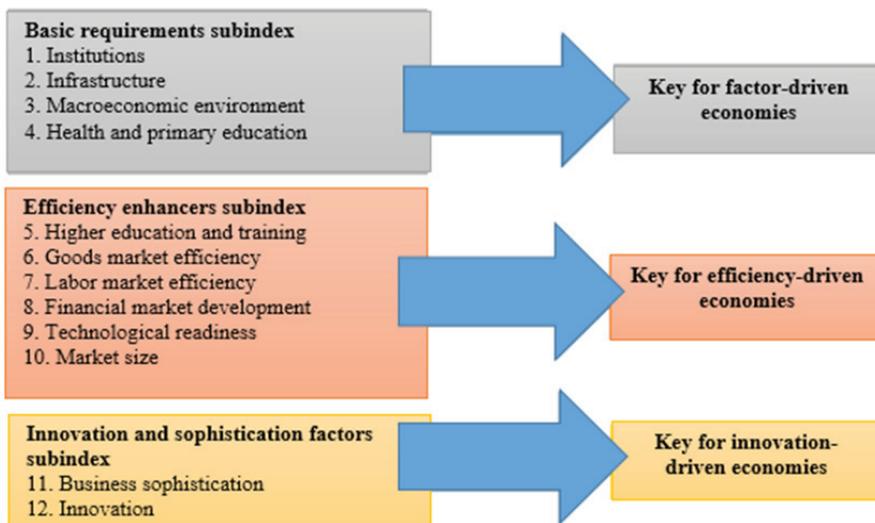
Although all of the mentioned pillars are to a certain extent important for all economies, the Global Competitiveness Index stresses the fact that they will affect different economies in different ways. Perez-Moreno, Rodriguez and Luque (2016, p. 399) pointed out that in the first stage of development the economy is factor-driven and countries compete on the basis of unskilled labor force and natural resources. Competitiveness in this stage of development depends on: well-functioning public and private institutions (pillar 1), a well-developed infrastructure (pillar 2), a stable macroeconomic environment (pillar 3) and a healthy workforce that has at least a basic education (pillar 4). When a country becomes more competitive (with a higher level of productivity and higher salaries), it moves into the efficiency-driven stage of development. At that point, competitiveness depends on higher education and training (pillar 5), efficient goods and labor markets (pillars 6 and 7), developed financial markets (pillar 8), the ability to make a good use of existing technologies (pillar 9), and a large domestic or foreign market (pillar 10). And finally, as a country moves into the innovation-driven stage, companies compete by producing new and unique

² Serbia is in the middle stage of development according to its GDP per capita, whose main driver of competitiveness is the group of pillars “Efficiency enhancers”. The measurement of GCI shows that basic requirements participate by 40%, efficiency enhancers by 50% and innovation and sophistication factors participate by 10%. This means that the values of pillars from the group “Efficiency enhancers” have the greatest impact on forming the value of Serbia’s GCI (Tanasković & Ristić, 2017, p. 9).

products, using sophisticated production processes (pillar 11) and by innovating (pillar 12). This means that the growth of productivity and competitiveness for countries in the highest stage of development (innovation-driven stage) is determined by innovation and sophistication factors, as shown in the Figure 1. In knowledge-based economies, the main driver of economic development is productivity growth, which is determined by technological and organizational innovations.

„With the development of global economy, higher education has obtained a new strategic role as a central resource of competitiveness, a measure of capacity for attracting and retaining highly qualified workforce and investments. Knowledge is perceived as goods“ (Kovacevic & Pavlovic, 2016, pp. 97). In the knowledge economy, education and knowledge, play a key role in creating innovations as the basis for acquiring competitive advantage, at the enterprise level and at the level of national economies. Competitiveness strategy, which is based on innovations, can enable Serbia to gain and sustain competitive advantage through entrepreneurship and innovation of companies by improving technological development, in which reformed scientific and educational systems will play a vital role. In the time of growing technological innovations and strong competitive pressures in the open market, companies, as the key drivers of development, must use technological development for improving quality and other performances of their products and services and for strengthening their cost and technological competitiveness on domestic and foreign markets (Bošnjak, 2005, pp. 131-132).

Figure 1: The Global Competitiveness Index framework



Source: Račić, Ž., Pavlović, N. (2011): *The analysis of the Global Competitiveness Index of the Republic of Serbia. Selected papers from the scientific conference ‘Contemporary trends in European economy-implications for Serbia’*, Novi Sad, Business School

“Technological innovations are essential for economic competitiveness. They are the main factor for improving a company’s competitiveness, the significance of which is increasing in modern economy, and which is characterized by the concept of knowledge-based development. In innovating countries and countries that are leaders in technological development, in accordance with the demand of competitiveness of real economies, the technology component is assigned a higher weight- 50%” (Mitrović & Mitrović, 2015, p. 701). Cortes and Navarro (2011, p. 31) stated that technological innovations have a two-fold effect on the development. On one hand, they directly improve people’s skills through their contributions in various areas, such as healthcare and education. On the other hand, technological innovations represent a means for achieving development because of their positive impact on economic growth. Moreover, some authors (Dani, 2007) have pointed out that a long-term ability of a country to produce and compete on the global market is primarily determined by the ability and speed of adopting technological innovations.

Innovations represent a special pillar of the GCI, which is particularly important for the countries in the higher stages of development, which rely on innovations in their development. The results of empirical researches show that 50-60 % of economic growth can be attributed to technological innovations (Milisavljević, 1993, p. 18). Moreover, the position of companies on the international market is primarily determined by the level and intensity of technological development, and then by the differences in price, quality of products and other aspects of business (Ivanović-Đukić & Lazić, 2014, p. 52). The final pillar of competitiveness focuses on technological innovations. In countries in the highest stage of development, firms need to design and develop cutting-edge products and processes to maintain a competitive edge. This progression requires an environment that is conducive to innovative activity which is supported by both the public and the private sectors. More precisely, it implies sufficient investment in research and development (R&D), especially by the private sector, the presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies, extensive collaboration in research and technological development between universities and industry, and the protection of intellectual property.

A society based on knowledge influences business environment making it more complex, dynamic and competitive. Moreover, that complexity and dynamics will increase the growth rate. Under these conditions, the success of business depends on: the proper interpretation of the threats and possibilities in the business environment, efficiency in decision making, adoption and application of knowledge and innovations (Huber, 2003, p. 5). The only way to sustain competitive advantage is to achieve continuity in creating new ideas and the application of innovations.

Innovation of Serbia compared to other countries in the region

Other problems that hinder the development of innovation of companies in Serbia are inadequate business orientation, organizational culture and the consciousness of managers. Namely, a lack of market orientation and the consciousness of managers that the permanent competitive advantage can be achieved by connecting and cooperating with the key stakeholders (consumers, suppliers, intermediaries, competitors, research

institutions, universities) are critical factors for the improvement of innovation capacities and business performance of companies. Creating and transferring knowledge through various types of business networks can achieve a high level of specific, and very often, specialized competencies needed for increasing innovation capacity (Stanković, Đukić & Popović, 2014, p. 279). Creating business networks which integrate various types of companies accelerates economic growth and combines knowledge. The motive for forming associations is the access to complementary knowledge (Krstić & Vukadinović, 2008, p. 87). The so-called “smart growth” is based on wider application of modern technologies, development of innovations, transfer of knowledge, expanding research capacities, recruiting creative staff and applying their ideas to products and processes, whereby this kind of growth must create conditions for a new growth that implies a higher level of productivity and competitiveness.

From the aspect of innovation, according to the latest data, Serbia is ranked 95th in a list of 137 countries, with the best score in the past 7 years, according to the methodology of the World Economic Forum (Table 1). Compared to its surrounding countries, Serbia holds a more favorable position than Bosnia and Herzegovina, Romania and Croatia, a country which has suffered a serious rankings drop, while over the seven-year period of analysis Serbia has improved its ranking by moving two positions higher, compared to the results from 2011. Moreover, Serbia had the worst ranking in 2015 (taking into account the last seven years) when it was ranked 113th in a list of 140 analyzed countries, while it achieved its best ranking and the highest score in the last analyzed year (2017). Nevertheless, a very unfortunate fact reveals that our country’s ranking has always been lower than the average ranking of the neighboring countries, whereby in 2013 and 2015 the unfavorable difference between Serbia and the surrounding countries was at its highest point (35 positions), while in the last analyzed year, that difference was significantly reduced (12 positions). When it comes to the average ranking of the seven-year period of analysis, Serbia has a much lower average ranking compared to the average ranking of its surrounding countries- 27 positions. Serbia is lagging behind its surrounding countries because of the lack of infrastructure for encouraging creativity, the lack of innovation of companies and because it needs a stronger entrepreneurship. Other problems that occur are the mismatch between the education and the demands of competitive economy, as well as the inability of the job market to attract and preserve talented workforce (Balšić, 2016, p. 92).

Table 1: Comparative representation of the Global Competitiveness Index of Serbia and the countries in the region

Year	2011/2012		2012/2013		2013/2014		2014/2015		2015/2016		2016/2017		2017/2018		The average scores and ranks of the analyzed period*	
Number of analyzed countries	142		144		148		144		140		138		137			
Country	score	rank	score	rank												
Serbia	2.9	97	2.8	111	2.9	112	2.9	108	2.9	113	3.0	108	3.1	95	2.9	106
Albania	2.6	123	2.6	123	2.8	119	2.7	120	2.8	118	3.0	109	3.2	87	2.8	114
Bosnia and Herzegovina	2.8	104	3.1	80	3.3	63	-	-	2.8	115	2.7	125	2.7	123	2.9	102
Bulgaria	2.9	93	3.0	92	3.0	105	2.9	105	3.1	94	3.4	65	3.3	68	3.1	89

Croatia	3.1	76	3.1	74	3.1	79	3.1	93	3.1	92	3.1	103	2.9	106	3.1	89
Hungary	3.6	34	3.6	37	3.5	47	3.5	50	3.4	51	3.2	80	3.4	62	3.5	52
Macedonia	2.8	105	2.8	110	3.1	86	3.3	68	3.4	58	3.4	51	-	-	3.1	80
Montenegro	3.4	50	3.3	60	3.4	54	3.4	58	3.3	69	3.1	94	3.2	91	3.3	68
Romania	2.9	95	2.9	102	3.0	97	3.3	66	3.2	75	3.1	93	3.1	96	3.1	89
Slovenia	3.6	40	3.9	32	3.6	40	3.6	42	3.8	33	3.9	33	4.0	35	3.8	36
The average score of the region (without Serbia)**	3.1	80	3.1	79	3.2	77	3.2	75	3.2	78	3.2	84	3.2	83	3.2	79

Source: WEF (2011, 2012, 2013, 2014, 2015, 2016, 2017)

*The average score of the analyzed period (2011-2017) was obtained by calculating the arithmetic mean.

** The average score of the region (without Serbia) was obtained by calculating the arithmetic mean.

According to the latest data, from the aspect of innovation, Slovenia has the best ranking among all countries in the region, while Bosnia and Herzegovina is ranked the lowest. During the whole period of analysis, Slovenia had the best ranking compared to other countries in the region, except in 2011 when Hungary was the highest ranked country among the countries in our region. Montenegro had the greatest ratings drop in the field of innovations (from rank 50 in 2011 to rank 91 in 2017), while Macedonia³ achieved the greatest improvement (from rank 105 to rank 51). Slovenia had the highest average ranking during the analyzed period, followed by Hungary and Montenegro, while the lowest average ranking during the seven-year period belonged to Albania (rank 114), followed by Serbia (rank 106) and Bosnia and Herzegovina (rank 104). This statistics shows that Serbia had the worst average ranking in the seven-year period among all its neighboring countries, except from Albania.

Although Serbia is characterized by a low level of government investments in advanced technology that would support innovation and high-tech capacities, in order to reach a higher stage of development it is not enough to just increase total investment in research and development. Serbia is facing various limitations that need to be overcome: inadequate number of researchers, human capital flight, obsolete structure of R&D sector with the public sector being dominant over the business sector, poor scientific and research cooperation between the academic and business sector, inadequate and unplanned use of the available national resources and the available EU funds (Jakopin, 2013, p. 9). These obstacles are jeopardizing the future development of innovation of our country, which is an important determinant of competitiveness.

The main weaknesses of domestic innovation-the analysis of indicators

The last pillar of competitiveness within the GCI - innovation, involves the following indicators: 1. capacity for innovation, 2. quality of scientific research

³ Macedonia was not included in the last report of the World Economic Forum, this data refers to the year 2016.

institutions, 3. companies spending on R&D, 4. university-industry collaboration in R&D, 5. government procurement of advanced technology products, 6. availability of scientists and engineers and 7. PCT patent applications. By analyzing the scores and the rankings of countries with regard to these indicators, we can determine the main weaknesses and limitations of the national innovation.

Our country has an unfavorable ranking (Table 2) when it comes to innovative capacity (ranked 117th in the list of 137 countries in 2017) and when it comes to companies investing in R&D (ranked 107th). Nevertheless, Serbia has a favorable ranking in terms of quality of scientific research institutions (ranked 47th) and PCT patent application, or the number of patent applications per million population (ranked 50th).

Capacity for innovation, generally speaking, refers to a country's potential to produce using new knowledge and skills. Business risk is reduced by strengthening capacity for innovation of the economy and companies. In order to increase capacity for innovation, it is important to become part of various kinds of innovation networks, internal or external, i.e. to connect all parts of the organization, as well as to connect with other subjects in order to gain knowledge, which is the key innovation resource. These kinds of networks stimulate innovations, efficient development, transfer of knowledge and technology, globalization of business, new business models and market approaches. Bosnia and Herzegovina and Croatia are our only neighboring countries that have lower rankings than Serbia from the aspect of capacity for innovation (ranked 117th in the list of 137 countries), whereby Croatia's ranking has drastically dropped in the past years (from rank 64 in 2011 to rank 120 in 2017). Moreover, Albania has made a noticeable improvement, from being ranked 119th in the first year of the analysis to being ranked 46th according to the latest data. Although our country has improved its ranking by moving up 13 positions from the last year, this indicator is the main weakness of domestic innovation and a restriction on the improvement of competitiveness. The structure of the capacity for innovation of an economy is determined by the innovation infrastructure of the economy, innovative environment in national industrial clusters and the relationships between the joint innovation infrastructure and specific clusters (Ristić, Vukajlović & Brazaković, 2016, p. 20).

Table 2: Representation of the Global Competitiveness Index by factors for Serbia (2011-2017)

Year	2011/2012		2012/2013		2013/2014		2014/2015		2015/2016		2016/2017		2017/2018	
	score	rank	rank	score										
1. Capacity for innovation	2.5	110	2.5	120	2.8	133	3.0	130	3.1	132	3.2	130	3.5	117
2. Quality of scientific research institutions	3.8	61	3.6	67	3.7	66	3.7	69	3.8	67	4.0	60	4.2	47
3. Company spending on R&D	2.4	130	2.3	132	2.5	127	2.5	125	2.4	129	2.7	121	2.9	107
4. University-industry collaboration in R&D	3.4	81	3.2	99	3.2	104	3.2	95	3.2	95	3.2	96	3.2	95
5. Gov't procurement of advanced tech. products	3.4	92	3.1	115	2.8	123	2.9	122	2.8	110	2.8	108	2.8	105
6. Availability of scientists and engineers	3.9	83	3.9	78	3.9	85	3.9	82	3.8	82	3.7	90	3.9	68
7. PCT patent applications applications/million pop.	0.4	67	0.0	119	2.8	53	2.3	55	3.0	53	3.8	50	4.1	50

Source: WEF (2011, 2012, 2013, 2014, 2015, 2016, 2017)

By performing a comparative analysis of Serbia and the countries in the same region, we can conclude that Serbia has a better competitive position in the fields of PCT patent application compared to four countries: Albania, Bosnia and Herzegovina, Montenegro and Romania, whereby Macedonia was not included in the analysis in 2017, but according to the data from the previous year, its ranking was lower than Serbia's ranking with regard to this indicator. In 2012 Serbia had its lowest ranking with regard to this indicator in the seven-year period, which was the second lowest ranking of all the countries in the region (Albania had the lowest ranking then), but Serbia improved its ranking in 2017 when it moved from the 117th position to the 50th position in the list of 137 countries in the world.

From the aspect of availability of scientists and engineers, Serbia has made a significant improvement in the last years and according to the data from 2017, it has the best ranking compared to all other countries in the region, whereby Slovenia is ranked one position lower. This is the only indicator within the twelve pillars of competitiveness, in relation to which Serbia has the best ranking compared to its neighboring countries. Our country has made an improvement when it comes to this indicator by moving 22 positions up the list compared to the year 2017. On the other hand, according to the latest data, Albania has the lowest ranking, followed by Bosnia and Herzegovina.

With regard to the quality of our scientific research institutions, Serbia has also made a significant improvement in the last years and is now ranked 47th, which is a remarkable improvement compared to the previous year (ranked 60th). In relation to this indicator, Serbia has the best ranking among other countries in the region, except for Slovenia (ranked 29th) and Hungary (ranked 34th), while Albania has been characterized by a far poorer quality of scientific research institutions compared to other countries in the region in all years of analysis, according to the GCI report. Hungary had long been a country with the highest quality of scientific research institutions compared to other countries in the region, but in the previous two years Slovenia outscored it.

Table 3: Comparative representation of the Global Competitiveness Index by factors for the countries in the region (2011-2017)

	Year	Albania	Bosnia and Herzegovina	Bulgaria	Croatia	Hungary	Macedonia	Montenegro	Romania	Slovenia
		score/rank	score/rank	score/rank	score/rank	score/rank	score/rank	score/rank	score/rank	score/rank
1. Capacity for innovation	2011	2.4/119	2.4/124	2.9/82	3.1/64	3.4/41	2.8/86	3.2/53	2.9/78	3.9/28
	2012	2.4/128	2.8/101	3.2/64	3.1/72	3.5/45	2.8/99	3.3/53	3.1/77	3.9/31
	2013	3.0/121	3.1/108	3.2/103	3.1/110	3.2/97	3.2/94	3.6/59	3.4/90	3.7/54
	2014	3.2/115	-	3.3/108	3.1/124	3.0/127	3.5/91	3.6/84	3.7/68	3.7/75
	2015	3.6/103	3.0/134	3.8/79	3.3/122	3.1/131	3.7/91	3.6/100	4.0/63	4.4/41
	2016	4.2/62	3.1/134	4.3/59	3.5/122	3.8/101	4.0/82	3.8/98	4.0/80	4.8/31
	2017	4.4/46	3.2/132	4.2/56	3.4/120	3.8/96	-	3.9/87	3.7/109	4.8/32
2. Quality of scientific research institutions	2011	2.2/134	3.2/98	3.4/78	4.1/48	5.2/20	3.3/86	4.1/45	3.2/91	4.6/33
	2012	2.4/132	3.6/72	3.5/75	4.1/48	5.1/20	3.2/100	3.9/54	3.4/84	4.8/29
	2013	2.8/121	3.9/59	3.6/68	4.0/52	5.2/21	3.4/86	4.0/56	3.7/64	4.9/29
	2014	2.6/130	-	3.5/81	4.0/53	5.1/23	3.7/71	3.9/60	4.0/55	4.7/33
	2015	2.3/137	3.1/106	3.7/72	4.0/52	4.8/28	3.9/59	3.8/65	3.7/70	4.8/31
	2016	2.5/130	3.2/106	3.9/64	4.0/61	4.5/39	4.1/53	3.6/83	3.8/71	4.9/28
	2017	2.8/118	3.2/106	3.9/59	3.8/66	4.7/34	-	3.7/76	4.0/57	4.9/29

3. Company spending on R&D	2011	3.2/51	2.8/96	2.7/98	3.0/71	2.9/81	2.6/109	3.3/44	2.9/87	3.4/39
	2012	3.0/83	2.9/90	2.9/92	3.0/76	2.7/103	2.5/123	3.2/63	2.9/87	3.4/47
	2013	3.0/82	3.0/86	2.8/107	3.1/65	2.8/108	2.9/91	3.3/54	2.8/104	3.2/62
	2014	3.1/73	-	2.8/100	3.1/75	2.9/96	3.1/67	3.2/61	3.1/65	3.1/72
	2015	2.9/106	2.5/124	3.1/78	3.1/85	2.9/97	3.3/62	3.1/77	2.9/94	3.7/39
	2016	2.9/104	2.7/120	3.5/50	3.2/79	3.0/98	3.4/58	3.1/82	2.8/111	4.1/33
	2017	3.4/57	2.6/126	3.6/44	3.0/97	3.1/85	-	3.2/83	2.8/110	4.2/33
4. University-industry collaboration in R&D	2011	2.1/139	3.4/84	3.0/116	3.5/77	4.4/33	3.3/92	3.7/63	3.0/115	4.0/46
	2012	2.3/138	3.9/48	3.0/117	3.5/80	4.3/37	3.2/105	3.7/60	3.1/113	3.9/49
	2013	2.6/135	4.3/37	3.0/117	3.5/76	4.3/41	3.4/81	4.0/46	3.3/88	3.8/56
	2014	2.3/135	-	3.0/113	3.4/81	4.3/35	3.7/60	3.9/47	3.6/71	4.0/45
	2015	2.3/134	4.3/35	3.0/112	3.4/81	4.3/36	3.7/60	3.9/46	3.6/71	4.0/44
	2016	3.0/104	2.8/117	3.4/74	2.9/114	2.9/109	3.4/70	3.2/94	3.3/80	3.8/42
	2017	3.4/69	2.8/111	3.4/74	2.7/118	3.4/68	-	3.2/91	3.1/97	3.8/44
5. Gov't procurement of advanced tech. products	2011	3.8/58	3.2/109	3.5/77	2.9/122	3.4/90	3.1/110	4.1/33	3.1/111	3.4/84
	2012	3.9/46	3.3/94	3.4/81	2.7/129	3.1/110	3.2/102	3.9/40	3.1/114	3.1/106
	2013	3.7/52	3.4/89	3.3/90	2.6/136	3.0/114	3.4/81	3.9/32	3.2/99	2.9/121
	2014	3.5/70	-	3.2/97	2.7/129	3.2/95	3.6/56	3.6/57	3.4/75	3.0/108
	2015	3.8/31	2.4/138	3.1/86	2.7/125	2.9/104	3.9/22	3.2/77	2.9/105	2.7/120
	2016	3.9/22	2.5/126	3.3/64	2.5/129	2.7/114	4.1/15	3.1/77	2.3/134	2.5/128
	2017	3.9/25	2.6/123	3.3/66	2.3/134	2.8/109	-	3.3/74	2.3/133	2.6/121
6. Availability of scientists and engineers	2011	3.2/126	4.1/68	3.7/92	3.8/88	4.5/38	3.4/114	4.1/70	4.2/59	3.8/89
	2012	3.3/123	4.4/48	3.6/98	3.8/86	4.4/50	3.5/106	3.9/76	3.8/82	3.8/84
	2013	3.5/106	4.7/27	3.7/96	4.0/76	4.3/60	3.8/92	4.0/78	3.6/99	3.8/89
	2014	3.4/110	-	3.6/96	3.9/79	4.2/56	3.9/81	4.1/69	4.0/72	3.9/80
	2015	3.2/118	3.1/125	3.7/90	3.9/78	4.2/51	3.8/86	4.0/65	4.1/57	4.1/62
	2016	3.1/126	3.2/119	3.9/71	3.7/91	3.8/83	3.8/82	3.8/87	4.1/60	4.1/61
	2017	3.3/113	3.4/107	3.6/93	3.6/95	3.6/91	-	3.7/85	3.8/80	3.9/69
7. PCT patent applications/million pop.	2011	0.0/90	0.0/90	7.7/30	2.0/45	9.1/29	0.0/90	0.0/90	0.8/62	12.0/26
	2012	0.0/119	2.1/50	3.6/47	10.0/33	22.1/27	1.5/59	0.0/119	1.9/56	66.0/23
	2013	0.2/91	2.0/54	3.7/47	10.2/33	23.3/28	0.7/73	3.2/49	2.0/55	63.1/23
	2014	0.4/84	-	5.1/48	10.0/36	25.0/29	0.2/91	3.2/51	2.2/56	63.0/23
	2015	0.2/93	2.4/55	6.9/45	10.3/37	24.8/26	0.6/79	0.8/71	2.7/54	62.3/23
	2016	0.2/90	1.9/62	7.0/45	9.7/41	23.7/27	1.5/68	3.2/54	3.4/52	67.8/23
	2017	0.8/74	1.7/65	7.4/47	9.5/42	24.7/28	-	2.8/55	3.9/51	71.9/23

Source: WEF (2011, 2012, 2013, 2014, 2015, 2016, 2017)

There is a direct correlation between the quality of national innovation system and the competitiveness of economy according to the methodology of the World Economic Forum (Cvetanović & Sredojević, 2012, p. 182). The innovation of companies is significantly determined by the collaboration with scientific research institutions. The risk can be reduced or made certain if companies connect and cooperate with scientific research institutions and realize joint projects (Stanković, Đukić, Mladenović & Popović, 2011, p. 576). In Serbia, only one in four companies develops their own innovations, and only one in eight companies has a long-term cooperation with scientific research institutions. If we observe the relation between the size of companies and the presence of innovations, we can conclude that innovations in smaller companies are present by 29.10%, while in medium companies they are present by 40.32% (Ivanović-Đukić & Lazić, 2014, p. 58). Only Bosnia and Herzegovina, Croatia and Romania have a poorer cooperation between industry and universities in R&D than our country (ranked 95th in the list of 137 countries), which, in addition to capacity for innovation, imposes a severe restriction on improving domestic innovation and competitiveness. In relation

to this indicator, Slovenia also has the highest ranking of all the countries in our region according to the data from 2017, and it is followed by Hungary and Albania. A very weak connection that exists between the companies and scientific research institutes in Serbia has greatly contributed to the technological backwardness, the inertness of companies and their reluctance to accept new solutions, as well as to the lack of competitiveness of companies and the whole economy (Kokeza, 2015, p. 64).

Serbia has a worse rating in terms of government procurement of advanced technological products (ranked 105th) only compared to Albania (ranked 25th), Bulgaria (ranked 66th) and Montenegro (ranked 74th), according to the data from 2017, while governments of other countries in the region allocate lower amounts of resources for these purposes, which implies that private sectors in these countries are much more significant in this area. Slovenia has an unfavorable ranking only in relation to this indicator, of all the indicators within the twelve pillars of competitiveness, and is ranked 122nd, while Albania has the best ranking (ranked 25th) according to the latest report of the World Economic Forum. In domestic economy, it is necessary to change the attitude towards knowledge, science and R&D and it is also important that innovation gains more importance both within the activities of companies and the country as a whole, since without the support from the government there will be no significant achievements in this area. This is the only way to treat resource allocations for R&D not as expenditure, but as a highly profitable investment in the future (Kokeza & Urošević, 2012).

In addition to capacity for innovation, as one of the indicators within the twelve pillars of competitiveness, in relation to which Serbia has the worst rating, another poor rating is related to the indicator- companies spending on R&D (ranked 107th in the list of 137 countries). Although our country has significantly improved its rating in relation to this indicator, from being ranked 130th in 2011 to being ranked 107th in 2017, only Bosnia and Herzegovina (ranked 126th) and Romania (ranked 110th) have lower ratings compared to other countries in the region, according to the latest data. By far the best ranked country is Slovenia, when it comes to companies spending on R&D, followed by Bulgaria. Macedonia and Bulgaria are countries that have made the greatest improvement in the report of the World Economic Forum when it comes to this indicator, compared to the year 2011, while Montenegro has suffered a serious rankings drop, compared to the countries in the region. Tassej (2017, p. 85) pointed out that R&D intensity, i.e. the expenditure on R&D as a proportion of GDP, is the main indicator of the future potential economic growth, because it represents a part of economy's output invested in technology in order to increase future productivity.

According to one analysis performed by the OECD in 2004, it is estimated that increasing expenditure on R&D in the business sector by 1% increases productivity by 0.13%, while increasing these investments in the public sector increases productivity by 0.17%. According to another research, increasing R&D expenditure by 1% in the business sector (as a % of GDP) increases the exports of medium and high-technology products by 9% (as a percentage of total exports) in the same year. Moreover, increasing expenditure in the public sector increases the exports of these products by 8% in the next two years (Ciocanel & Pavelescu, 2015, p. 730). When allocating resources for R&D, it is important to remember that the main goal is to develop innovations. On the other hand, sustainable economic development, the growth of standard of living, better and efficient customer satisfaction and the overall improvement of competitiveness can be achieved only by developing innovations (Sredojević, 2016, p. 161).

Conclusion

In the era of globalization, there is a growing interest in new ways for sustaining and improving competitiveness both at macro and micro-level, i.e. at the level of companies and at the level of national economy. There are new demands, imposed by the world market, on which only those who are improving efficiency, productivity and competitiveness are protected. On the global market, the key requirements for strengthening competitiveness of companies, as well as national economy, are new processes, products, methods and procedures, i.e. various kinds of innovations. Under these conditions, the key success factors of modern economies are quality workforce and capacity for innovation.

By analyzing innovation indicators for Serbia and the countries in the region, we have concluded that the main weaknesses of domestic competitiveness stem from the capacity for innovation, insufficient spending of companies on R&D, insufficient government resource allocation for the procurement of advanced technological products and inadequate collaboration of industry and universities. In order to overcome these restrictions imposed on domestic innovation, it is crucial to respond to the demands of economy in order to make a stronger cooperation with universities. It is also essential that the government increases the procurement of advanced technological products and that the private sector gets more encouraged, especially through a more efficient protection of intellectual property. It is also very important to enable domestic innovators to make a profit from their work and thereby achieve competitive advantage, through the protection of intellectual property. The companies play an important role in this by abandoning traditional, hierarchical organizational structures, thus improving their flexibility and strengthening communication. This encourages the creation of new ideas, which is a precondition for innovation at micro and macro-level. Launching innovative activities must begin at micro level, with the support from government.

By performing comparative analysis, we have come to the conclusion that Slovenia is the only country of all the countries in our region which has an exceptional ranking with regard to innovation, since it constantly maintains high scores on all the indicators of the twelfth pillar of the Global Competitiveness Index. On the other hand, Albania is distinguished by the worst ranking, while Serbia has the second least favorable ranking, right after Albania, with regard to innovation. The position of Serbia can be explained by economy's limited innovation capacity, which is primarily determined by the quality of students, researchers, workers and managers. One efficient way for overcoming this limitation is networking, or encouraging innovation networking that enables the transfer of knowledge and technologies and the development of new products and methods, which is highly beneficial for all the parties involved.

In order to encourage innovation, it is necessary to increase spending on R&D and new technologies, both by the government and the private sector, to stimulate private sector investment, to group research facilities into larger scientific centers that would be able to implement strategic projects, to support scientific talents and experts, to strengthen the link between science and industry through tax and other incentives, to subsidize the procurement of equipment for technological development and patenting and to improve efficiency of the protection of intellectual property.

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THE ROLE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY IN INTERNATIONAL TRADE

Abstract

Many previous studies have proved that revolutionary progress and breakthrough of information and communications technology (ICT) has had a tremendous significance for the development of international trade. The purpose of this paper is to present some of the major channels through which new information technologies impact international trade flows. In addition to various benefits of e-business for the exchange of information, products and services, some of the key challenges are also indicated. Unauthorized access to confidential information, misuse of users' personal data, insufficient availability of broadband connection and restricted access to it are just some of the problems that need to be overcome in order to maximize the benefits of technology in international trade.

Key words: international trade, information and communications technology, e-commerce, Internet transactions, electronic payment system, data protection

JEL Classification: F1, O3

УЛОГА ИНФОРМАЦИОНО-КОМУНИКАЦИОНИХ ТЕХНОЛОГИЈА У МЕЂУНАРОДНОЈ ТРГОВИНИ

Апстракт

Бројне досадашње студије су доказале да је револуционарни напредак и продор информационо-комуникационих технологија био од огромног значаја за развој међународне трговине. Сврха рада јесте да прикаже неке од основних канала преко којих се утицај савремених информационих технологија испољава на међународне трговинске токове. Осим бројних предности у размени информација, производа и услуга, указује се и на кључне изазове које дигитално пословање доноси. Неовлашћени приступ поверљивим информацијама, злоупотреба личних података корисника, још увек недовољна распрострањеност брзе, стабилне интернет мреже, као и слаб приступ, само су неки од проблема које треба превазићи како би се максимално искористио сав потенцијал технологија у међународној трговини.

Кључне речи: међународна трговина, информационо-комуникационе технологије, е-трговина, интернет трансакције, електронски системи плаћања, заштита података

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Introduction

New technologies have significantly changed the way people communicate, work, live... There is almost no area unaffected by them. The significance of information technologies for business development and economic growth is tremendous. New technologies have provided organizations with many possibilities and benefits, such as highly automated business processes, lower costs, new products and services, and new ways for making transactions and interacting with clients.

In a modern globalized business environment, trade is under the dominant influence of information and communications technology. Familiarizing with the foreign environment has never been easier, and entering new markets has never been cheaper or faster. Communication and connection with international business partners have been made significantly easier and the role of global supply chains in international business is getting more and more important. Innovative technological solutions have enabled organizations to overcome physical barriers and gain access to a large number of markets, expand their consumer base, improve communication with them and realize high profits in much shorter periods of time. This has created a much stronger competition in the global market and caused the need for a constant improvement.

Conducting commercial transactions online is becoming highly common, both in the business of companies and in everyday lives of people. The expansion of mobile devices and wireless Internet access have enabled the exchange of data, products and services at any time, from any location, while the development of electronic payment methods has enabled fund transfer and efficient completion of transactions.

In addition to many advantages, the development and the increasing use of modern technologies in trade have also caused many new problems that need to be overcome. Mass digitalization of data, the expansion of global networks and the increasing Internet speed have enabled unauthorized access to large amounts of data and systems. There is a growing need for privacy protection of Internet users and for safer methods of payment. Despite the expanding use of the Internet, the difference in the level of technological progress between developed and developing countries is still enormous, which represents a significant obstacle for further stimulation of international trade and their participation in it.

The impact of information and communications technologies on the formation of international trade flows

In the modern society the most important resource is information, and the application of new technologies is often a necessity in performing everyday activities. This kind of society, in which information and communications technology plays a key role, is often called information society. It is a society characterized by a very high intensity of information in the everyday life of the majority of people and in most organizations, or business systems; a society characterized by the use of general, or compatible technologies for an easy and efficient realization of a wide range of personal, social, educational and business activities; a society characterized by exceptional possibilities

of quick reception, sending and sharing of digital data, whereby geographical locations and distances don't matter at all (Đorđević, 2012). The breakthrough of information technologies and the wider availability of the Internet have made a lasting impact on the economies of countries around the world and on international trade. More and more transactions are conducted electronically and new, innovative business models are constantly evolving.

During the past two decades, the progress of information and communications technologies and the development of new logistics solutions have considerably contributed to the shaping of the global economy. Methods for the production and distribution of products have significantly changed, and global supply chains have been given a leading role. This trend has been followed by an increasingly diversified service sector, whose share in the world output has become much larger. All these activities have occurred internationally, their implementation has been greatly dependent on available information and they have been relying heavily on innovative means of communication. The Internet brought about the most notable revolution, completely changing the methods for the production, distribution and use of products and services. It has made a lasting impact on all spheres of society.

Many studies dealing with the assessment of the impact of new technologies on international trade in goods and services have clearly shown that open access to the Internet, good technological infrastructure and intensive use of information and communications technology have had a positive influence on export of individual countries, as well as an enormous impact on the overall volume of world trade (Freund, Weinhold, 2004; Clarke, Wallsten, 2006; Vemuri, Siddiqi, 2009; Choi, 2010). Considering its undoubted contribution to exports, the use of information and communications technology has proved to be of great importance to emerging market economies and developing countries that are trying to promote international trade (Lui, Nath, 2013).

Most recent researches only confirm the previous results. One of the studies that included 51 countries, 30 OECD member countries and 21 medium and low-income countries indicated that better access to modern information and communications technologies and e-commerce applications boost bilateral trade flows among different groups of countries (Xing, 2017). Results implied that the Internet penetration and adoption, number of broadband subscriptions and secured servers greatly affected the trade among the observed groups, the so-called Southern and Northern economies. Moreover, it was found that having a reliable and stable internet connectivity, as well as encouraging the wider use of digital technologies are preconditions for the inclusion of a group of African countries into global trade flows. The results of the study also highlighted the great potential of e-commerce in least developed countries and developing countries. Nevertheless, in order to fulfill that potential, many of them primarily have to improve their technological and transport infrastructures, to establish effective procedures for conducting electronic transactions, and to work on educating and training their citizens for the use of modern technologies and digital business. One of the studies dealing with the impact of new technologies on international trade investigated whether international trade is more influenced by the number of subscriptions (quantity) or data flow speed (quality). The analysis included developed and developing countries. The results showed a positive correlation between exports with both ICT quality and quantity, as well as that in developing countries the bandwidth speed quality is more important than the number

of subscriptions (Abeliansky, Hilbert, 2017). This can be explained by the fact that, although an increasing share of the population is using the Internet, the data flow speed in these countries is still not stable, and the inability to communicate and exchange data at the speed required by the global environment can hamper or prevent the participation of these countries in international trade. Regarding imports, the impact of the ICT quantity and quality is larger in developed countries than in developing countries, whereby the rise in the number of subscribers leads to a higher level of imports. Such a result indicates that the existence of a reliable and stable Internet connection allows access to an incomparably wider range of products and services, giving consumers much more choice, which ultimately leads to a higher demand for foreign products.

The significance of technological development for international trade

High costs are one of the main characteristics of international trade and often represent a greater obstacle to exporters than certain trade measures. Entering new markets has always been a big challenge for companies, both because of the unknown environment and high entry costs. Undertaking any business activity in a foreign environment always involves a great degree of uncertainty, which additionally complicates the planning process. Such uncertainty is often caused by having insufficient information and by the late obtainment of necessary information. Collecting all relative data on the new market and its specificities, and adjusting means of advertising and distribution methods to the given conditions represented a formidable, and for many business entities, an insurmountable obstacle. The development of modern information and communications technologies, especially the global Internet network, has facilitated the process of acquiring relevant information about new markets and enabled access to an enormous number of consumers, with much less money and time spent. Finding appropriate suppliers, determining the price, promoting products, arranging deliveries and many other activities can now be carried out without the need for a buyer and seller to meet personally. Considering that technology reduces the costs of entering new markets, Internet expansion has unambiguously contributed to the growth of exports (Freund, Weinhold, 2004). In addition, the role of modern technologies in international trade of services has become increasingly important over the years, especially with those services that are based on the creation, processing and transmission of information.

Increasing diffusion and use of information and communications technologies has led to higher volume of the world trade through various channels. The novelties in distribution methods have significantly reduced transport costs, while the use of radio waves, identification tags and the Internet has enabled product movement tracking at any time. This has significantly improved logistics and contributed to the development of a more efficient multimodal transport system. The costs of obtaining and exchanging information and communicating have been further reduced. With the development of the telecommunications and Internet networks, all participants in the international trade have been given the opportunity to obtain information in a much simpler and cheaper way. The Internet has taken the lead in communication at the global level, and the appearance of wireless networks and mobile devices has significantly contributed to that. This has

allowed a large number of smaller companies, whose business had been limited to local markets by then, to engage in international trade. The Internet provided the opportunity for companies of all sizes to access the world market in a completely new way and involve in international trade, which was once possible only for powerful multinational companies. Since some branches of trade are more dependent on information than others, the benefits derived from lower costs are not always the same. It is not surprising that higher savings were made in the sectors of technologically advanced products than in agricultural sectors, for example. Besides that, a large number of products that once existed in physical form and demanded physical delivery can nowadays be found in digital form. Various texts, from the most famous works of world literature, to scientific articles, popular magazines and the latest publications, are now only a few clicks away, without the need to go to a library, a bookstore or a newsstand. Music, movies and computer programs are just some of the examples of goods that are now much more easily delivered digitally. With such products, the development of e-commerce has led to a significant increase in the volume of transactions. On the other hand, when it comes to products that do not exist in digital form, shipping costs still play a major role. In these cases, it is possible to obtain all relevant information about product characteristics on the Internet, to get familiar with user experience, and even make payments, but due to physical delivery, its final price largely depends on the costs of transport and customs duty.

Besides the trade of final goods, new technologies have also contributed to the rapid growth in the international trade of raw materials, parts and components, with the fast development of global supply chains. Cross-border coordination of different entities in global supply chains has become considerably more efficient because of the quick exchange of information without delay and easier communication. Therefore, it is not surprising that products, especially products of higher degree of complexity, are rarely produced entirely in one country. High quality raw materials can be acquired in the regions where they are sold at the best price, the production of parts can be done in factories with the most advanced technology, even if they are in another continent, and the product assembly process can be performed in countries with the lowest labor costs. All these activities can be easily organized and conducted with modern information systems, although they are often performed in different parts of the world, which was once almost unimaginable. However, in some sectors, the technology progress, and especially the development of e-commerce, has led to the elimination of certain participants in supply chains. Producers very often get in direct contact with consumers, skipping some of the intermediaries such as distributors and retailers. Manufacturers can independently sell their products, without the need to use retail or distribution channels, by providing consumers with all the necessary product information and by enabling direct ordering. On the other hand, there are branches of trade in which the intensive use of technology has contributed to the emergence of completely new professions that did not exist before. Thus, new types of intermediaries have been created, specializing in providing help to the Internet users in gathering the desired information, locating products, etc.

Most companies nowadays rely on virtual space as a key platform for promotion. The Internet has become a very powerful tool in international marketing because it provides a rich source of information about the desires, needs, habits and behavior of consumers that can vary significantly depending on age, geographical location, customs,

religion, and many other factors. Such information is a valuable resource that merchants can use to adapt all elements of marketing mix to the target market and achieve a significant advantage over competitors. For example, Chinese consumers apparently pay much attention to video content, therefore, this type of promotion is recommended for succeeding on the Chinese market. It is difficult to conduct market segmentation by using traditional means of advertising, such as billboards, newspapers and television (Spulber, 2010). The Internet enables companies to obtain a wide range of information about the interests, needs, and expectations of different groups of their customers, therefore marketing activities can be targeted in a more efficient way at smaller market segments, and even at individuals. And when the content of promotional activities is specifically tailored to the preferences of individual customers, it is more likely that each of them will get exactly what they are most interested in, and therefore the chances of making a purchase are much higher. For these reasons, a large number of companies use personalization technologies on their websites to create web pages with content and banner ads focused on the specific needs of a particular visitor (Jovanović, Milovanović, 2008). Moreover, many companies allow their customers to design products themselves, according to their needs. Product customization is becoming a common method that companies use in order to achieve a competitive advantage. By providing a basic platform of products that can be modified with desired additions, or designed in a special way, companies are enabling customers to buy unique products. In this way, manufacturers are able to respond more effectively to the needs of each consumer individually, thus possibilities of selling are significantly higher.

E-commerce

The power of the Internet is reflected in its huge number of users. Namely, by mid-2017, the number of people who have a permanent access to the Internet has exceeded half of the world's population and amounts to just over 3.8 billion². They all make up a huge base of potential consumers whom manufacturers and vendors had never been able to reach easily in the past. Therefore, spatial constraints no longer exist, almost every company has the entire global market at their disposal. This provides many opportunities and chances for realizing higher profits, but at the same time it significantly increases the competitive pressure. While individuals and firms used to be mainly connected with the nearest markets and stores, in the Internet era everything is different. Merchants can offer their products to all Internet users, regardless of where they are, whether they are nearby or at the other side of the world. On the other hand, customers are no longer confined to the offer of local producers, but they also get access to the products of regional and world companies, so the choice is incomparably greater.

There are many definitions of e-commerce, but the base of each of them is that e-commerce is carried out with the help of information and communications technologies. It can be said that it represents the usage of global Internet for purchase and sale of products and services, including after-sales services and support (Treese, Stewart, 1998) or that it represents the delivery of information, products/services and payment via

² <http://www.internetworldstats.com/stats.htm>

telephone lines, computer networks or any other means (Kalakota, Whinston, 1996). The Organization for Economic Cooperation and Development (OECD) defines e-commerce transactions as the purchase or sale of goods or services that are conducted through computer networks using methods designed specifically for the purpose of receiving and making orders. Goods and services are ordered by these methods, but payment and delivery do not have to be done online (OECD, 2011). Nowadays, e-commerce is an integral part of everyday life, especially in urban areas. In this way, people can buy almost everything, from foodstuffs, clothing and footwear, to securities. By examining the structure of online shopping, we can see that the most popular categories are electric appliances, clothes, books, music, video games, as well as beauty and personal care products.

According to the latest Ecommerce Foundation report, which is based on the data for the first quarter of 2017 and includes 22 countries, global B2C e-commerce sales are expected to reach 1.84 trillion US dollars this year. The largest turnover in e-commerce was recorded in China, amounting to more than \$ 681 billion, followed by the United States with a turnover of \$ 438 billion and the United Kingdom with \$ 196 billion³. Although online shopping is becoming increasingly popular in Serbia, our country is lagging far behind other countries in Europe and in the rest of the world. Consumers in Serbia use the Internet more often to search for and collect the necessary information about products, to compare prices and find store locations, while the process of purchasing is performed exactly in brick-and-mortar stores. Nevertheless, surveys show that there is an increasing number of customers who are willing to spend more money on online shopping in the future. One research conducted by the company Gemius on e-commerce in Serbia has shown that goods which are mostly purchased online in our country are clothes and accessories, technical equipment, sports equipment, books, films, music, computers and other computer equipment. Respondents stated that some of the reasons why they prefer this type of shopping are home delivery, large product assortments, the possibility to compare products of different manufacturers, working hours of online shops that are open 24 hours a day, as well as buying from the comfort of their home, without the need to go to the store. On the other hand, the major problems that domestic customers faced in online shopping were high delivery costs, incorrect product information, products not meeting the expectations of customers and long delivery time. The most common reasons why many consumers still do not want to shop online were the need to see the product before making a purchase, skepticism towards product warranty, and skepticism towards payment methods.

The development of the Internet and e-commerce has influenced the emergence of new business models, and new forms of organizing the offer of goods and services are appearing. In addition to the virtual stores of manufacturers, which are no longer a matter of prestige but a necessary segment of business, in recent years there has been an increasing number of Internet portals and intermediaries providing information, connecting sellers and customers and selling or purchasing products/services. Some online shopping sites offer various product categories of different manufacturers (e.g. Amazon), while there are also specialized online stores that offer only a specific group of products, then there are also online auction sites (eBay) where both companies and

³ Global B2C Ecommerce Report Light 2017

individuals can buy and sell products and many other. At the beginning of the 21st century, the significant growth of e-commerce was primarily a result of its high share in developed countries, while in recent years, the highest growth rates in this type of trade have been achieved by developing countries.

In recent years, new trends in e-commerce have emerged. While online shopping was a real revolution, allowing customers to make purchases on their desktop computers without having to go to stores, now making transactions in this way is not enough and greater mobility is required. For this reason, buying and selling via wireless devices such as phones, tablets and laptops has taken a dominant role over the past years. Such a trend is primarily the result of the rapid expansion of smartphones, as well as other mobile devices that have wireless Internet connection, which enable individuals to make transactions at anytime, anywhere. In the past, mobile phones were mainly used for searching for and gathering information about products, finding nearby stores, and learning about the experiences and ratings of other users, but today they are more often being used for making purchases. Thanks to certain mobile applications, this process can now be performed in a very simple way, with just a few clicks. Moreover, many retailers use QR codes in their brick-and-mortar stores in order to inform their customers about the store, brand and products. Some watchmakers like Omega place QR codes on storefront windows and provide the opportunity for all interested passers-by to scan the code for a particular product and thus get detailed information about it or order it. M-commerce creates new ways for manufacturers and sellers to reach customers, provides an opportunity to achieve constant interaction and a chance for personalization. The development of mobile banking, which allows the transfer of funds and payments from the user's wireless device, has further contributed to the growth of this type of trade. Japan, one of the technology leaders in the world, stands out as a country where about half of the total number of electronic transactions is conducted via mobile phones and tablets, while in Brazil, this type of e-commerce has a share of more than 50%.

Social media are becoming increasingly important online shopping channels. According to the results of the research on the current trends in online shopping, conducted by the company PwC, as much as 78% of customers admitted that social media influence their buying decisions in certain way (PwC, 2016). Interaction with favorite brands on social networks and other websites has a positive impact on a large part of consumers, who show greater respect for the brand and appreciate the brand even more. Ratings, comments and experiences of other buyers, as well as promotional offers and advertisements have the greatest influence on customers. Nevertheless, the number of consumers subject to these influences varies considerably from country to country. In developing countries this percentage is significantly higher than in developed economies. For example, in Denmark and Belgium, only 22% to 23% of respondents paid attention to the opinions and ratings of other customers while online shopping, whereas in countries such as China, India and Malaysia, this figure exceeded 60%. The age of consumers is also an important factor, according to this research. Namely, the influence of social media on the behavior of younger generations is much stronger and weakens significantly after the age of 45. From that point on, consumers also interact much less with their favorite brands on social media. Customer reviews and comments not only affect the behavior of other online customers, but can also be of great importance to retailers. In this way, they can obtain much relevant information about the experiences of their customers,

which can help them improve their business. By considering the comments, praises and observations of their customers, they can identify the shortcomings of their offer more effectively and find the best solutions for satisfying the needs of their customers.

The development of e-commerce has caused the increase in service trade. While the sale/purchase of products on the Internet usually involves physical delivery (except for digital products), geographical location has no impact on trade in services and the entire process can be completed in a virtual space. Services trade has previously been largely limited, since the provision of most services required physical contact between the service provider and the customer, which represented a huge obstacle to international trade. With the development of new technologies, especially the Internet, such obstacles have been successfully overcome.

Depending on the place and role of information and communications technologies, services can be broadly divided into two categories (Nath, Liu, 2017). The first category refers to services that directly involve the use of new technologies and are often referred to as services enabled by information and communications technologies. Unlike them, there are also services in which information and communications technologies have only an indirect or secondary role. In the first group of services, information and communications technology has affected trade in many ways. The expansion and development of technologies has allowed companies to provide services to consumers at any time, no matter where they are currently located. The exchange of information from different locations around the globe, unlimited communication with business partners and the ability to provide services at any time, without delay, have led to significant changes in global supply chains, which are becoming continuously more fragmented, with activities and processes that are sometimes performed in places on the opposite sides of the world. In this way, the whole production process becomes much more efficient, and significant cost savings can be achieved. There is an increasing number of companies specializing in the provision of particular services, so outsourcing certain tasks in international business is more frequent than ever since it provides a cheaper and faster performance of those activities than completing it internally. In addition, due to the constant development of technology, there is a need for new types of services that haven't existed before, which results in the emergence of completely new service sectors that are becoming involved in international flows. The technological boom hasn't bypassed the traditional services sectors either. Therefore, major changes have occurred in the way of providing transportation, travel and many other services, especially in international environment.

One of the first studies dealing with the role of the Internet in international service trade has proven that the impact of the Internet has been positive and significant. (Freund, Weinhold, 2002). This research has shown that the development of information technology has stimulated the services trade of the United States with countries overseas, especially when it comes to services based on the processing and transmission of information. The results of recent studies have only confirmed the importance of information and communications technologies for the service sector. By analyzing data on imports and exports of 49 countries for the period from 2000 to 2013, which included ten most important service items⁴, it has been concluded that the development of information

⁴ Audio-visual services, computer services, construction services, financial services, insurance services, other business services, royalties and licence fees, communication services, transportation and tourism.

and communications technologies has significantly contributed to the international trade of seven (out of ten) types of services (Nath, Liu, 2017). It has been confirmed that technology has a considerable impact on imports, exports and the total volume of trade in the financial services sector and in the sector of other business services. It may be surprising that in the field of audio-visual services and computer services, the impact of technology has been considerably weaker, although these services belong to the group of services enabled by information and communications technologies. In contrast, transportation and tourism are traditional sectors in which new technologies have only a secondary role, but they have significantly influenced the volume of trade in services, primarily by reducing transaction costs and facilitating entry into foreign markets. From all the analyzed indicators of technological development (use, access, skills), the use of information and communications technologies has had the greatest impact on imports, exports and the total volume of trade in service sectors. Therefore, the results of this study indicate that strategies and measures used for introducing new technological solutions and for stimulating their use will contribute to the growth of trade in services in most sectors, while easier access to the Internet and the development of necessary skills will primarily affect those services that are more dependent on new technologies.

Electronic payment systems on the Internet

One of the key segments of every trade transaction is payment. Changes in business and international trade and new ways of buying that have resulted from technology development have created a need for different payment methods. Making transactions online, between partners located at different locations, would be difficult without the electronic transfer of funds. Because of this, modern online payment methods are expected to ensure a fast and secure money transfer. When shopping online, payment can be made in several ways. When it comes to products that are physically delivered, even though they are purchased in a virtual store, there is still the option of paying by cash on delivery. Nevertheless, the majority of transactions on the Internet are made by online payment, and various electronic payment systems have been developed over time.

The most common way of electronic payment is payment by credit and debit cards. Since they are very easy to use, they are widely accepted as the most common method of payment. In order to enable the payment of their products in this way, companies must open a bank account and implement an appropriate information system that will connect them with a financial institution or provider of this type of service. If a customer opts for this payment method when shopping online, after they enter the requested information, the data gets exchanged, the system checks the balance of available funds, approves or denies transfer and informs the customer about the final outcome. All this happens in just a few seconds. In recent years, there has been a slight decline in the use of credit cards, due to the development of other methods that are becoming increasingly popular. Prepaid cards are another category of cards that can be used for paying online. They are mostly used by costumers who do not have open bank accounts and, unlike with credit cards, funds must be added to the card in advance. Payment vouchers are another type of these cards that consumers buy before the transaction.

E-wallet can be seen as a digital equivalent of a physical one (Lupu, Mual, van Stiphout, 2016). It stores all necessary information about the owner and his financial

funds. It enables an efficient online payment since the user is not required to enter their personal data, credit/debit card information, delivery address, etc. for each transaction. Once the data is entered, electronic wallet transfers them automatically every time a customer makes a purchase. The fact that they can also be used on mobile devices makes them even more convenient. These mobile wallets function like cards, enabling payment in stores. According to some surveys, this method of payment is the most common among Chinese consumers, and it is estimated that in a few years it could take over the dominant position in other parts of the world.

Online banking e-payments, or bank transfers, are considered to be one of the safest methods of payment. At the moment when the customer starts the process, the financial institution immediately checks their identity and the availability of funds and if the transaction can be approved, the merchant immediately receives a guarantee that the funds will be transferred. With the advancement of technology, by adopting new standards and solutions, it has become possible to transfer funds in real-time, without any delay, therefore the risk for the merchant in this case is reduced to a minimum. In addition to instant payments, when necessary, users have the opportunity to ask their banks to initiate payments on a customized schedule, by instructing them when and how much funds to transfer from their accounts to the accounts of others.

One of the most popular online payment methods that is widely used today is PayPal. PayPal is a payment service that allows e-mail money transfer and requires only the user's email and one active current account or payment card for registration and usage (Vuksanović, Tomić, 2014). This service operates as an online payment intermediary for which it charges a fee. The advantage of using PayPal is reflected in its simplicity, since users have to enter account number or payment card information only during registration and they make all further payments using only their passwords, without the need to re-enter all the information again. When making payments, funds are transferred from the payer's account to the PayPal account of the recipient, who can withdraw the funds from there to their bank account or use them for some future payment directly from their PayPal account. Different laws regulate this payment system in different ways, therefore, it is important to reduce regulatory diversity in order to make this payment system available to as many users in countries all over the world.

Micropayment systems can be used for small transaction values. Micropayment systems have been developed for transactions of less than \$ 10, which are too small for conventional credit card payments (Jovanović, Milovanović, 2008). Digital or electronic cash is most often used for these purposes. It represents money in electronic form that can be exchanged on the Internet between the users themselves, and the users and those companies who accept it as a means of payment. In addition to digital cash, new types of systems for “small” purchases have been introduced. These systems record all “small” values of the transactions incurred during a certain period of time, most often within a month, and charge this amount to a customer's credit card.

Besides these payment methods, there are many more ways to pay online, and as technology continues to develop, there is no doubt that they will be more numerous and more efficient. Since the use of mobile devices for making online transactions is increasing, the latest trends in the development of electronic payment systems are moving towards the development of payment applications for mobile phones and tablets. When it comes to methods of electronic payment, it is necessary that they are safe, so the

users can rest assured that their funds will not fall into the wrong hands. Data privacy is also very important because confidential information related to account numbers, credit cards, conducted transactions, and personal data should not be accessible to everyone and abused in any way.

Challenges and problems of international trade in digital space

The development of new technologies has enabled access to a wide range of information, positively influenced the economic development of many countries and completely changed the way international trade functions. For a relatively short period of time, the Internet has turned from the media into a multidimensional market that connects an enormous number of participants. Nevertheless, in addition to numerous benefits, technological revolution has brought new challenges and difficulties at the same time. Violation of privacy, confidential data theft, fraudulent websites and unauthorized access to private accounts are just some of the current threats that users need to be wary of, therefore the authorities are trying to provide certain security measures in order to protect Internet users. However, since such measures can often limit the access of individuals and companies to the Internet and prevent the free exchange of information, the freedom of use that the Internet provides is brought into question.

Since the Internet has become a widely used business platform, many business-related legal issues have to be regulated in the digital space as well. In such cases, the interference of the authorities is completely legitimate, and even desirable, because Internet users need to be guaranteed security when making transactions. Nevertheless, the governments often block Internet access and data flow, filter information, and prohibit the display of certain content for political and many other unjustified reasons. Such measures of governments very often consciously promote domestic companies, at the same time causing damage to foreign business entities, denying them free access to the local market and customers. These issues need to be tackled globally, precisely because of the controversial interventions of state authorities, which restrict access to the Internet, and the impact of such measures on international trade. This way it would be possible to define specific cases in which government interventions are justified and to what extent. Such measures would improve trust in the Internet as a business environment and in its role as a driver of international trade.

One of the main concerns of the authorities is to ensure the adequate protection of electronic data of individuals. Nevertheless, countries may take different approaches to protecting customer privacy and cross-border data transfer. Most often, they design certain regulations that create a framework of behavior for companies that collect and use personal information of the consumers. The European Union, by the laws on data protection, prevents the transfer of consumer data to countries that don't provide an adequate level of data protection⁵. Such a solution has led to the necessary harmonization of laws in all Member States and has significantly affected the exchange of data with third

⁵ Directive (EC) 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the Protection of individuals with regard to the processing of personal data and on the free movement of such data

countries. This can have a major impact on the operations of companies from non-EU countries, especially in the service sector where it is impossible to provide certain types of services that require personal data of consumers from the European Union. Moreover, the attitude of consumers towards their privacy can also substantially vary from country to country. For example, Germany has much stricter regulation than many other countries when it comes to email marketing and other online activities that companies often use, and most German consumers do not want to get promotional content unless they consent to it first.

Apart from the privacy and user protection issues, many other problems present in the global environment hinder the growth of international trade. Despite the significant and rapid advancement of e-commerce, there are still many difficulties that represent an obstacle to further development, especially in some less developed parts of the world. Although one of the biggest advantages of new technologies is that they're constantly becoming cheaper and more available, and the costs of implementing and using them are getting lower as the time is passing by, it seems that undeveloped countries still cannot afford the latest technology solutions and cannot catch up with the leading forces. The differences in the level of digitization and technological advancement between developed and developing countries are still significant. Although the Internet is a widespread and its use is growing day by day, a large number of people, as well as smaller companies, still do not have a stable Internet connection.

As recent years have witnessed the increasing use of wireless devices for accessing the Internet, the availability of mobile phones and the diffusion of mobile networks have become a prerequisite for the further expansion of the Internet user base (Meltzer, 2014). This particularly applies to developing countries where there is plenty of room for improvement of these conditions, given that the prices of smartphones are still high for the local population, and mobile telecommunication networks are underdeveloped. Broadband Internet access, which implies a stable connection and high data flow rate, is required for companies that want to engage in global supply chains and international trade over the Internet. In many developing countries, the use of this kind of connection is extremely low, usually because of the high costs, especially in those countries where the telecommunications market is monopolized.

In addition, a large proportion of consumers, primarily the elderly, remain skeptical about conducting transactions over the Internet, particularly when it comes to e-payments. Whether they'll decide to shop online or not depends on whether they are willing to accept the risk involved. Some of the main reasons for avoiding this method of buying are the inability to inspect the product and determine its quality, distrusting the seller, and the lack of guarantee that customers can return products if they do not meet their expectations. Moreover, since customers need to give their personal data and information related to their financials in order to make a payment, the willingness to carry out such an action decreases.

The lack of digital literacy and basic knowledge for conducting transactions online represents an obstacle for many consumers and sellers to get involved in this type of trade. A large number of people, especially in undeveloped countries, still lack the opportunity to acquire the appropriate digital education, and remain focused on traditional forms of trade. Similarly, many traders, insufficiently informed and prepared to adopt new technologies, stick to traditional business models without the possibility to

reap all the benefits that e-commerce provides. For these reasons, besides the widespread access to the Internet and stable connections, in order to exploit the full potential of technology in international trade, it is very important to enable the population to get adequately trained and acquire knowledge and skills necessary for digital business. This primarily implies skill in handling computer equipment, knowledge of basic software programs, but also selecting the appropriate business model in the virtual space, integrating all logistical processes, managing the network of business partners and many other activities. Manufacturers and vendors wishing to engage in international online trade flows need to know how to get all relevant information about the foreign market they are entering, get familiar with administrative procedures and requirements, decide how to present their products and services and learn how to reach the potential customers in the most efficient way.

Inadequate logistics systems represent another obstacle to greater involvement in international trade, especially for undeveloped and developing countries. Trade logistics refers to all the processes and services that are necessary to transfer goods from one country to another. It includes transportation system such as ports, roads and airports, technological infrastructure and logistics services such as express delivery services, freight forwarding and traditional postal services (Meltzer, 2014). Most online transactions involve physical delivery of goods, which requires a developed transportation system, a widespread distribution network and well-functioning customs procedures. Inefficient and costly transport, high administrative costs and delivery delays are some of the major problems that many developing countries are facing, which make it difficult for them to enter global supply chains and engage in international trade.

Conclusion

The impact of technology on today's society as a whole is enormous. There is almost no segment in the life of an individual or in business operations which is not affected by modern technologies, at least indirectly, if not directly. Innovation in the field of information and communications technologies has a dominant role in the shaping of the global economy and international trade relations. Since physical barriers and distance problems can be overcome successfully, communication can be achieved without difficulty and data can be collected and processed easily, with significantly lower costs, the world market has become available to almost everyone, and getting involved in international trade flows much faster and less complicated.

The Internet is becoming the primary platform for conducting international transactions. Companies can easily reach a large number of potential customers, more than they could ever before, and access to new, far-off markets is practically unlimited. Entering an unknown market once demanded significant financial resources, implied complicated procedures, and was a long process. However, today this can be done remarkably faster, with much lower costs and in a more successful way. This has created an opportunity for small and medium-sized companies to engage in international trade, which was once possible only for powerful multinational companies. The development of information and communications technologies has significantly improved communication, enabled better connectivity and more efficient coordination of business

entities located in different locations. Moreover, the process of production is becoming extremely fragmented, and supply chains are gaining global dimensions. The ability to interact with website and online store visitors has provided manufacturers and vendors with the opportunity to get to know the needs, preferences and habits of their customers in the most efficient way and to successfully respond to their demands. Personalized content, which matches the interests of a particular customer, increases the likelihood of sales, and allowing customers to design products the way they want improves their satisfaction.

The increasing importance of data exchange in international environment and the significant impact of the Internet on international trade require the adoption of common measures and the introduction of appropriate regulations to support further penetration of technology into the global economy. In order to maximize the benefits of technology in international trade, problems related to the wider diffusion and easier access to a fast and stable Internet connection must be solved, users' privacy and a safe use of their personal data must be guaranteed and adequate logistics systems must be constructed. E-commerce is particularly significant for underdeveloped countries, which in this way can successfully engage in international trade flows. However, in order to achieve this, they must improve their infrastructure, enable uninterrupted Internet access, encourage the population to acquire knowledge in the field of technology and establish efficient procedures for conducting electronic transactions.

Finally, the further development and expansion of information and communications technologies will significantly affect international trade in the following period. Not only can we expect a further reduction in the cost of data collection, data processing and communication, which will facilitate trade in the global environment to the greater extent, but it also seems inevitable that further changes will occur in the trade process and its structure as well. Online transactions will be even more numerous, the share of e-commerce considerably greater and the engagement of small and medium-sized enterprises in international trade increased.

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THE APPLICATION OF ADVANCED TECHNOLOGIES IN THE FIELD OF INTERNATIONAL FINANCES: BITCOIN PHENOMENON²

Abstract

During the history there have been different examples of incorporating technology into economics. Some of them include SWIFT, e-banking, mobile payments, and many more. Technology had to be commercialized and put into service of facilitating economic processes. International finances underwent the process of development too. With the globalization process national economies became more interconnected and dependent from each other. Individuals demanded a faster and more convenient way to make international payments. Internet trade is on the rise, social media rule the contemporary world, and then appears the inception of so-called crypto currencies. The most famous is Bitcoin. Where lays its place in the economic science? It looks like that Bitcoin is going towards decentralization of the monetary system known by now. The goal of this paper is to raise the awareness of the changes happening in economy and in economic science.

Key words: means of payment, crypto currency, Bitcoin, international finance

JEL classification: E 40, F 30, G 10

ПРИМЕНА НАПРЕДНИХ ТЕХНОЛОГИЈА У ОБЛАСТИ МЕЂУНАРОДНИХ ФИНАНСИЈА: ФЕНОМЕН БИТКОИНА

Анстракт

Током историје постојало је много примера инкорпорирања технологије у економију. Неки од њих укључују СВИФТ, е-банкарство, мобилна плаћања и многе друге. Морало је доћи до комерцијализације технологије и њеног стављања у службу олакшања економских процеса. Међународне финансије такође су прошле кроз процес развоја. Са процесом глобализације националне економије постале су повезаније међусобно и зависне једне од других. Појединци су захтевали бржи и прикладнији начин извршавања међународних плаћања. Интернет трговина је у порасту, друштвени медији владају савременим светом, и ту се појављује настанак тзв. криптовалута. Најпознатија је биткоин. Где се налази његово место у економској науци? Изгледа да биткоин воид ка децентрализацији монетарног система који нам је познат до сада. Циљ овог

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рада је да подигне свест о променама које се дешавају у привреди као и у економској науци.

Кључне речи: *средства плаћања, крипто валуте, Биткоин, међународне финансије*

Introduction

The main characteristic of the 21st century is certainly a dominance of information technology. After three industrial revolutions and a fourth upcoming, technology becomes an integral part of our daily lives. The fourth revolution is going a step further as it mentions the integration of technology and humans and embedding technology into human beings. In addition to technology the culture of individualism is highlighted, speed of execution of work, as well as the primary goal of making profit. The end of the 20th and beginning of the 21st century is also colored with the process of globalization. In short it is the demolition of all barriers, free movement of people, goods, services and capital. Globalization sets in all aspects of social and economic development. Removing the barriers that existed in the communication, promotion of English as a foreign language, the emergence of the Internet, social networks, personal computers, smartphones, all of which contribute to absolute connection and communication between people regardless of their location in the world.

In the previous century, international finance recorded a rapid development. National financial markets are losing the basic attributes and becoming a part of the global financial market. As a result, economic growth and the development of a single economic entity did not depend only on the actions taken by policy makers in national financial markets. New, more complex relationships in the international finances are being established as a result of continuous development of financial globalization and financial integration of national economies. The international monetary system has also seen significant changes. Changing economic mechanisms, rules, rapid development of the world economy causes changes in the functioning of the international monetary system.

There is an analogy between computers and the method of communication on one side and the international payments on the other. Exclusivity and monopoly that once possessed the global television companies or large companies that used computers, global financial institutions currently enjoy in the performance of international payments. But also in this field appeared a tendency towards the individualization and the overtaking the role of the banks. The desire of end-users to take on the role of emission of money from central banks and the control over payments with significantly reduced fees is becoming stronger and stronger. It can be said that the technological revolution, the availability of modern technology, the popularity of the Internet and global communication are necessary prerequisites for the creation of a new phenomenon. Just like this arises the idea of a currency which would be completely independent of the central and commercial banks, monetary authorities, various rules and regulations of the countries. The birth of the idea of crypto currencies can be characterized as a kind of globalization of the international payment system, where perhaps it is more accurately to use the term individualization and privatization instead of globalization. Does, however, this phenomenon of crypto currency carry a new latent form of domination of world powers with the aim of achieving virtual colonization? Are crypto currencies only seemingly exempt from national characteristics? Do we move toward individualization and

privatization of the currency? The main objective of this paper is to raise the awareness of the existence of crypto currencies, to give a more detailed explanation of their creation and functioning, to identify them in the international monetary and financial system with the help of the most famous and the first virtual currency - Bitcoin. As some call it the gold of 21. century it will also be compared to real gold.

Defining and functioning of the Bitcoin

Bitcoin is what is known as a virtual currency. A virtual currency is a mean of payment id est units of the virtual currency represent a value. It is intended for use in payments within a specific virtual community, such as a particular website, or in a network of users with special software for managing the virtual currency and making payments. This type of virtual community can thus be said to resemble a voluntary agreement to use a specific item as a means of payment.

There are a large number of virtual currency schemes that have been built up, and function, in different ways. They can be broken down into different categories depending on the extent to which it is possible to buy and sell the virtual currency. Here, we divide them into virtual currency schemes that are closed, with unidirectional flow and bidirectional flows. In closed virtual currency schemes, the virtual currency can be neither bought nor sold, but only earned and used on certain websites. If the virtual currency can be bought for national currency but not exchanged back, the scheme has a unidirectional flow such as Amazon coins. When the virtual currency can both be bought and sold and used outside of a certain website, the scheme has bidirectional flows. Bitcoin is an example of a scheme with bidirectional flows. However, these categories can overlap (Segendorf, 2014). A further distinction that can be made is whether the virtual currency is centralized or decentralized. As with banknotes and coins, payments with virtual currency units are made by them changing ownership. The ownership structure must therefore be registered somewhere, otherwise it might be tempting for a virtual currency unit holder to duplicate it and use it multiple times. A centralized virtual currency scheme has a centralized ledger to keep track of the changes, and a decentralized means that ledger is distributed to more than one place. Bitcoin is a bidirectional, decentralized virtual currency and can be called crypto-currency.

Bitcoin was created with the appearance of the original article on the 30. october in 2008. issued by the pseudonym Satoshi Nakamoto. It was never found out who exactly that person or those people who created Bitcoin were. There are doubts about the coherence of the global financial crisis that took place in 2007. and in 2008 spilled over to the real sector and turned into a global economic crisis. However it is unlikely that such a complex system of codes could be created in such a short period of time. It is more likely that this system was created and was waiting for adequate time to appear on the world stage and that the crisis created such an environment. Due to the uncertainty and mistrust in the banking and financial system, an electronic crypto currency appeared that according to the original published article is not controled by any institution but only by the users themselves. This seemed tempting for the investment of capital.

First and foremost Bitcoin is an open source code that is always available to everyone. It is designed as an electronic crypto currency that has a final offer of 21 million units. There is a complex system of creating these currencies, the term used

is „mining“ the currency. During a period of 10 minutes a block of 25 Bitcoins can be formed. The block size is reduced with the increase of amount already “dug” (mined), and retrieving data for the new Bitcoin is more difficult. Emissions of Bitcoin are fully planned and programmed, and its management is assigned to the network itself, i.e. those computers that perform verification transactions. This algorithm was chosen because it largely approximates the growth rate of extraction of certain minerals such as gold, having a limited amount of Bitcoin that at some point may exist in the system and the maximum amount that can be “excavated”. It is assumed that Bitcoin should evolve like gold. At the moment when the excavation is very difficult, its value will be determined by the amount of transactions, as well as the demand for the currency. Bitcoin as a currency is independent of the central banks, the governments and the financial establishment. Some believe that this is an important financial innovation in recent years, and what most definitely attracts attention is the spiraling price of Bitcoin. It’s ultimate goal is to become the alternative to existing payment systems as it enables cross-border transactions without interference from the state or central banks and commercial banks and without a fee. There are two ways to become the owner of Bitcoin, the foregoing one is the mining, while the other is to purchases already created (excavated) Bitcoins on many stock markets that operate around the world and trade Bitcoins.

International payments and Bitcoin

It is very difficult to classify Bitcoin into a certain economic area. There are indications that it can be marked as international payment given that it is being exchanged between residents of different countries. Foreign payments or international payments include all payments and collections between individual persons and legal entities of a country with the persons and entities who are in other countries, regardless of the basis on which the payment is made. In the international payment operations, as opposed to the payment transactions that take place within one country, there is no universal legal tender that is accepted in all countries. Given that there is a large number of currencies, there is a need of conversion, interference of a large number of banks and financial intermediaries, each of them requiring a certain commission. Taking into account the basic characteristics of international payments, which are (Todorović, Marković, 2014, p. 121):

- they represent the counteract of real economic flows;
- they are performed between residents and non-residents;
- they are performed with means of international liquidity and
- they cause a change in the balance of payments.

If the order goes on to consider which of these characteristics Bitcoin has we will see the following. Considering the first characteristic in exchange for Bitcoin it is possible to obtain certain real economic goods or services subject to the restriction that accepting Bitcoin as a substitute for money is still at an early stage and there are still relatively small number of companies that accept payment with this “currency”. The fact is that Bitcoin works at the international level and that payments can be made and that they are executed between residents and non-residents, this is also one of the reasons

of its inception. In the third characteristic there appears to be a certain overlap of terms regarding that a system in which Bitcoin works does the payment using this “currency”, but that just shows that Bitcoin itself represents the means of international liquidity. If it is considered that it is used for settling international obligations and it can be said that the means of international liquidity must be accepted by the participants in international trade, or by an international financial institution then it fulfils the third condition. It remains an open question whether the exchange of Bitcoin between residents of the two countries leads to changes in the balance of payments and is that in some way recorded or would it be recorded in the future. From the analysis of the Bitcoin system it cannot be classified with certainty as a system for carrying out international payments.

Bitcoin as a Currency

The main economic debate surrounding Bitcoin is whether it is a currency or not. The definition of currency is straightforward: a system of money in general use. In order for tender to be considered a currency, it must meet three criteria (Kiyotaki, Wright, 1989):

- (1) it must be able to be used for transactions,
- (2) it must be able to be used as a unit of account, and
- (3) it must be able to store value

The first requirement of a currency is that it can be used for transactions. There are thousands of websites that accept Bitcoin: in December of 2015, there were approximately 200,000 daily Bitcoin transactions per day (Carrick, 2016), but this volume is tiny compared to other currencies. However, there are still many smaller recognized currencies that have far less daily volume. Furthermore, the number of Bitcoins being used for transactions has been increasing for the last 3 years. There is no generally accepted volume or value of a currency that has to be used in transactions for it to be considered a currency. For example, Cambodia, Lao, and Uganda’s currencies are less active than Bitcoin, but they are still considered currencies – they are weak currencies, but currencies nevertheless. Although the daily volume of Bitcoin is relatively small, it is still being used on a consistent basis and has seen a drastic increase in use. Overall, it is unclear whether Bitcoin meets the transactional requirement of a currency – it depends on the interpretation of this requirement.

The second requirement of a currency is that it can be used as a unit of account. This is also debatable for Bitcoin. It clearly has unit of account characteristics. First, it is divisible. A Bitcoin can be divided into an infinite number of pieces, and these can be put back together to form a full Bitcoin. Rogojanu and Badea (2014) noted that one of the challenges with Bitcoin is that the number of Bitcoins is limited to 21 million, but Van Alstyne (2014) pointed out that fractional ownership of a Bitcoin is possible; therefore, the 21 million is not a limiting number. Second, Bitcoin is fungible. All Bitcoins are created equally, and they can all be interchanged. Third, it is countable and subject to mathematical operations. Although Bitcoin seems to clearly meet the unit of account requirements, there is still debate on this. The debate primarily revolves around

Bitcoin's ability to value goods and services; because of its volatility, it has trouble consistently valuing goods and services. Bitcoin displayed substantial volatility from 2008 to 2017. However, many currencies incur extreme volatility and are still considered currencies (Dornbusch et al. 1995).

The third requirement of a currency is that it be able to be used as a store value of account. Glasser and other researchers from the empirical analysis of Bitcoin users suggest that Bitcoin is more demanded as an asset than as a currency(2014); they found that users are keeping the coins to store up value for future use. This was further substantiated by Wu and Pandey (2014); they found that Bitcoin is a good investment asset to use for portfolio diversification. This has also been substantiated by several other studies and is in line with the reason that Bitcoin was originally created-which was to offer an alternative currency that would not lose value because of actions taken by government (Nakamoto 2008). Some have argued that Bitcoin's volatility marginalizes its store value. To that point, many investors gauge the credibility of a currency by its stability and ability to be a safe haven when other financial assets are experiencing volatility (Ranaldo and Söderlind 2010).

The state of Bitcoin as a legitimate currency is unclear. It demonstrates the hallmarks of a currency, but its volatility brings into question whether it clearly meets the requirements of a currency. The volatility has been its largest source of criticism, but this is to be expected of a young currency. Many currencies have suffered from high levels of volatility, but the main difference between these currencies and Bitcoin is that Bitcoin is not backed by a government. It is clear that the legitimacy of Bitcoin as a currency will remain ambiguous for the foreseeable future. In order to gain wide acceptance as a currency, it is going to have to continue to grow in use for several more years and not have any more security issues. Bitcoin has also been used for some illegal activities, such as buying guns and drugs, since it is untraceable. Further the whole scheme of cryptocurrency resemble the story of Nigerian fraud where it is expected that you will earn a lot of money for a small investment(Miladinović Bogavac, 2017.). In the meantime, there is evidence that Bitcoin is a useful economic instrument.

Gold and Bitcoin

Even the creators of the idea of Bitcoin are all the time alluding to its resemblance to gold, ranging from gold-colored coins to be used as a logo of the virtual currency, then to the limited supply, and up to some details such as terms used which include the process of Bitcoin mining, the excavation of currencies, some of the users are called miners and so on...

Figure 1: Trends in the price of gold last 30 years

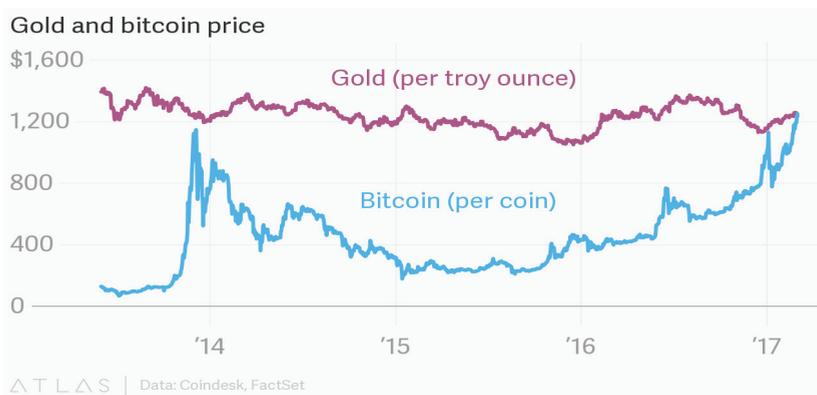
Source: <http://goldprice.org/gold-price-history.html>

It can be seen that since 2008 there has been a rise in the gold price. This points to a general loss of confidence in the cross-national currency after the financial crisis that occurred this year and the transfer of funds into gold. In many ways, gold is the precious metal counterpart to the Bitcoin. Like the Bitcoin, gold must be obtained through mining. But, while gold is obtained through physical mining, Bitcoins must be “mined” virtually through the deciphering of special computer encryptions. Another similarity is that both gold and Bitcoins are only available in limited quantities. It is estimated that there is approximately 171,000 metric tons of gold in the world, while the Bitcoin system will only be able to generate and support a maximum of 21,000,000 bitcoins until further technological advances are made. Given such similarities and their individual market activity over the past few years, it is understandable why many believe that Bitcoin could ultimately replace gold in terms of value. However, in spite of this evidence, there are a number of reasons why this shift is unlikely to occur. The first reason that the bitcoin will never replace gold is because it still poses a great deal of financial risk. Despite its recent peaks in market value, the bitcoin continues to experience significant price fluctuation that often results in substantial losses. Furthermore, both the future and the viability of the bitcoin have yet to be determined, leaving many customers wary over the the security of their virtual savings in the event that the system becomes terminated or obsolete. With such instability and uncertainty surrounding the bitcoin, it is unlikely that it will generate the customer base to match, much less surpass, gold as an investment asset. Another reason that the bitcoin is unlikely to replace gold as an investment asset is that the system has yet to achieve full status as a truly “universal” and legitimate form of currency. Many countries, including Germany, Norway, Russia, France, Thailand and Korea, refuse to use the bitcoin for fear of potential loss. In fact, several have gone as far as making it illegal in their country. In contrast, there isn’t a country in the world that would ignore the value of gold, much less prohibit its use. Therefore, until the bitcoin can reach the same worldwide level of legitimacy and approval that gold has, it will never be able to replace gold as a valuable commodity. The final reason that the bitcoin is unlikely to surpass gold as an investment commodity is that gold has consistently demonstrated signs of recovery since it plummeted by 28% in 2013. Many people presumed that the sudden drop in gold’s market

value was an indication that it had lost its status as a safe investment choice. However, a number of signs, such as the increase in debt-to-GDP ratio and the increase in the price of mining, suggest that gold will not only recover from its drop, but it will continue to thrive as a popular investment commodity. Consequently, as long as investors believe that gold can generate profits, they will continue to forgo any other potential replacements.

If we look at comparative price movements of Bitcoin and gold (Figure 4) it shows that the price of Bitcoin at the end of 2013 almost reached the price of one ounce of gold in the market and then launches headlong to mid-2015. After a significant decline and periods of depression Bitcoin price has recorded constant growth and in April 2017, is equated with the price of gold at the end of the month to outpace the price of gold on the market, marking further growth.

Figure 2: Gold and Bitcoin prices



Source: <https://www.theatlans.com/charts/B1At3pS9l>

The figure clearly shows how the price of Bitcoin is less stable compared to the price of gold, but also clearly we see the moment when first the price of Bitcoin almost caught up with the price of gold, and then after the fall and re-growth caught up with and surpassed the price of gold at the end of this graph. Now the value of Bitcoin is currently over 7.000 dollars with a rising trend in sight.

Conclusion

Technology is inevitably changing the world we live in. The effects are visible through each aspect of people's lives and economy is not left aside either. The breach of technology into international finance was made a long time ago and is now evolving with the emergence of crypto currencies.

Bitcoin is the most famous and the first crypto currency in the world. This scheme is decentralized virtual currency with two-way flow. It is designed to be independent of the governments, banks and other institutions. Essentially Bitcoin functions as a sort of electronic cash. Emissions of Bitcoin are fully planned and programmed, and its management is assigned to the network and to the end-users.

There are certain characteristics out of which some stand out: the anonymity of users, non-payment of fees for the transfer of funds, lack of national legislation on this issue, the risk of loss of value due to volatility. Among these characteristics there is no strict division of the advantages and disadvantages as an item can belong to both categories. Certainly it is necessary to mention the abuse of this virtual currency, which was associated with trafficking in illegal goods, financing of terrorist movements, money laundering, tax evasion, but we hope that it will find ways in the future to minimize and eradicate this type of usage.

In the context of the international monetary and financial system Bitcoin can be classified within the scope of international payments as well as the performance of certain functions of money. However specific positioning is not yet possible to perform due to the many uncertainties that are related to this phenomenon. With regard to its status in the national regulations differing from one country to another and moving in the range from full legal invisibility through acceptance as some forms of property, to complete acceptance as proper currency. National Bank of Serbia for example does not recognize Bitcoin as legal tender and warns citizens that they are using this currency on their own responsibility in case of fraud or loss on investment.

The price of this currency shows considerable volatility and steep ups and downs, until the last quarter of consistent growth, catching up and even overtaking the price of gold on the market. It is considered to be the gold of XXI century but it has a long road to conquer the trust of end users that gold has already done. Due to its volatility derivatives of Bitcoin are created to surpass this drawback. It remains unclear, however, what is the future of Bitcoin?

Many questions remain shrouded in mystery: who is behind the Bitcoin phenomenon, who profits from this scheme, and whether it will come to collapse or success... Is this one of the levers of creating “virtual” colonialism mentioned at the beginning? No one can say the last word here, although many things depend on state authorities and financial institutions, as well as on end-users who will decide on the fate of Bitcoin.

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CRYPTOCURRENCY

Abstract

The digital revolution is a change from analog and electronic technology to digital technology and is currently at its peak. Since we live in the digital era, it is logical that the digital form of money, that is, the cryptocurrency, had to appear. The cryptocurrency as a digital form of money functions with the help of a technique called cryptography. Cryptography is a process that translates legible information into codes that cannot be broken at all. The cryptocurrency is based on the digitized so-called. the main book of all crypto watch transactions called blockchain. Blockchain records individual transactions and ownership of all cryptocurrencies that are in circulation, and this system is managed by the so-called blockchain "miners" who have to update all transactions that have occurred and ensure the accuracy of the information. In this way, the security of the transaction is confirmed. This paper will address the theme of the cryptocurrency and their role in economic growth. Types of Cryptocurrencies will also be shown as well as their expansion in countries in transition. Among other things, we will see the market of the currency in Serbia and Switzerland.

Keywords: *cryptocurrency, economic growth, market, Serbia, Switzerland*

JELClassification: E42, M41, G35.

КРИПТО ВАЛУТЕ

Анстракт

Дигитална револуција представља промену из аналогне и електронске технологије у дигиталну технологију и тренутно је на врхунцу. С обзиром на то да живимо у дигиталној ери, сходно томе морао је да се појави и дигитални облик новца, односно, крипто валуте. Крипто валуте као дигитални облик новца функционишу уз помоћ технике под називом криптографија. Криптографија представља процесе који претварају читљиве информације у кодове, који се никако не могу разбити. Крипто валуте се базирају на дигитализованој тзв. главној књизи свих трансакција крипто валута под називом блокчејн. У блокчејн-у се бележе појединачне трансакције и власништво над свим крипто валутама које су у оптицају, а овим системом управљају тзв. блокчејн „рудари“ који морају да ажурирају све настале трансакције и обезбеде тачност информација. На тај начин се потврђује сигурност трансакције. Овај рад обрадиће тему крипто валута и њихову улогу на привредни раст. Биће приказане и врсте крипто валута, али и њихова експанзија у земљама у транзицији. Између осталог видећемо какво је тржиште крипто валута у Србији и Швајцарској.

Кључне речи: *крипто валуте, привредни раст, тржиште, Србија, Швајцарска*

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Introduction

We live in a fast world, wild world that is developing at tremendous speed. Every day is an opportunity for something new to see and learn and just when you think that that's it, more comes. Initially, we were all amazed by the fact that we don't have to go to the bank to pay our bills, that we can do that with just one click on the phone. As soon as we got used to it, a new phenomenon appeared and now we have to advance and understand the appearance of the new digital currency.

Cryptocurrency represents digital money that you can't feel, you can't hold it in your hands which can be confusing for a lot of people, especially those who are not able to follow all the changes that technology brought to us. The first and most popular cryptocurrency that emerged was Bitcoin in 2009. It didn't get the attention that it deserved back then, but now it is impossible to get around it. Some people sold their houses and properties just to buy Bitcoins with the expectation to wake up rich the next morning. Some of them did it, some of them are still working on it. Others have the opinion that there is no easy money without hard work which is pretty normal when you compare the way our ancestry used to live. Technology has developed to a very high level, but we have many educated people that are willing to share their knowledge and interesting facts about this new occurrence. Many questions appeared along with the new digital money, but the primary is what is it. In this paper, I tried to explain what is cryptocurrency, how does it function, what types can be found on the market, how did different countries around the world accept it. One thing is sure, a lot of noise and confusion was brought in when the cryptocurrencies became popular. Things are still not clarified, both sides have good arguments, those that accepted the cryptocurrencies and those that are afraid that it might all be just one big scam and bubble. One thing is sure, significant changes were made which can affect the economy in many different ways, and that is also mentioned in this paper.

The literature about this subject is endless, it could be studied for years and still find different opinions and understandings about this subject, but in this paper I presented the most important and most abundant ones.

Cryptocurrencies and their significance

One of the biggest inventions of technology in the modern world, that has attracted a lot of public attention, is the phenomenon of cryptocurrencies. According to some opinions, this is the biggest technology invention in the last ten years. So cryptocurrencies became very popular through a very short period of time.

Cryptocurrency represents a digital asset, whose main purpose is to be a medium in exchange, and while doing that, it uses the cryptography so that all the transactions are secured, everything new that appears is controlled by its own system. It is possible to say that cryptocurrency is a subset of digital currencies. The first cryptocurrency ever made was the Bitcoin, in 2009. After that, a lot of other cryptocurrencies appeared on the market, but they were called the altcoins, as they represented the mix of Bitcoin alternatives. Bitcoin does not have a centralized system, no one can control it entirely, like in electronic banking systems. In banking systems, we have an institution that

can issue currencies and print money. But things are different with cryptocurrencies. They use cryptography to gather all the information and data, and it all passes through blockchains, which represent the distributed ledger. The government has no power to produce new units it is all controlled through a virtual digital ledger. It is still unknown who made the Bitcoin, the only thing that is known to the public is that a person or maybe a group of people that go under the name of Satoshi Nakamoto made it happen.

Up until this year, a lot of other cryptocurrencies appeared, but most of the scientists and researchers think that they are similar to Bitcoin and that they are just a subproduct of Bitcoin. For this system to function, there are a lot of people from the general public that are called miners (Nakamoto, 2008). Their job is to use their computers for validation and timestamp transactions, as they add them to the ledger while using a special timestamping scheme. And also they get a big incentive for these actions.

Figure 1. The current value of the cryptocurrency on the market

^#	Name	Market Cap	Price	Volume (24h)	Circulating Supply	Change (24h)	Price Graph (7d)
1	 Bitcoin	\$168,058,713,240	\$10059.30	\$5,994,810,000	16,706,800 BTC	4.40%	
2	 Ethereum	\$45,378,658,465	\$472.65	\$1,255,020,000	96,009,619 ETH	-0.76%	
3	 Bitcoin Cash	\$26,237,823,946	\$1559.26	\$1,303,260,000	16,827,100 BCH	-5.17%	
4	 Ripple	\$10,892,190,176	\$0.282014	\$566,001,000	38,622,870,411 XRP *	11.89%	
5	 Bitcoin Gold	\$5,493,125,189	\$329.39	\$99,534,300	16,676,711 BTG	-9.05%	
6	 Litecoin	\$5,054,491,011	\$93.54	\$342,408,000	54,036,708 LTC	4.03%	
7	 Dash	\$4,815,010,460	\$624.04	\$142,199,000	7,715,881 DASH	-0.90%	
8	 Ethereum Classic	\$3,325,399,399	\$33.97	\$1,652,010,000	97,884,172 ETC	33.06%	

Source: CoinMarketCap. (2017). *Crypto-Currency Market Capitalizations*, Retrieved on November 20, 2017, <https://coinmarketcap.com>. - screenshot -

The fact about these cryptocurrencies is that it is very difficult for the government and the law enforcement to control them. They cannot affect them in any way, they have no power in making decisions, they can only accept it as a legitimate way of trading, or not. The idea itself is brilliant, no one can control the flow of this currency, no government, no state, it belongs to nobody, but also it belongs to all the people who have decided to risk and buy their part of Bitcoin.

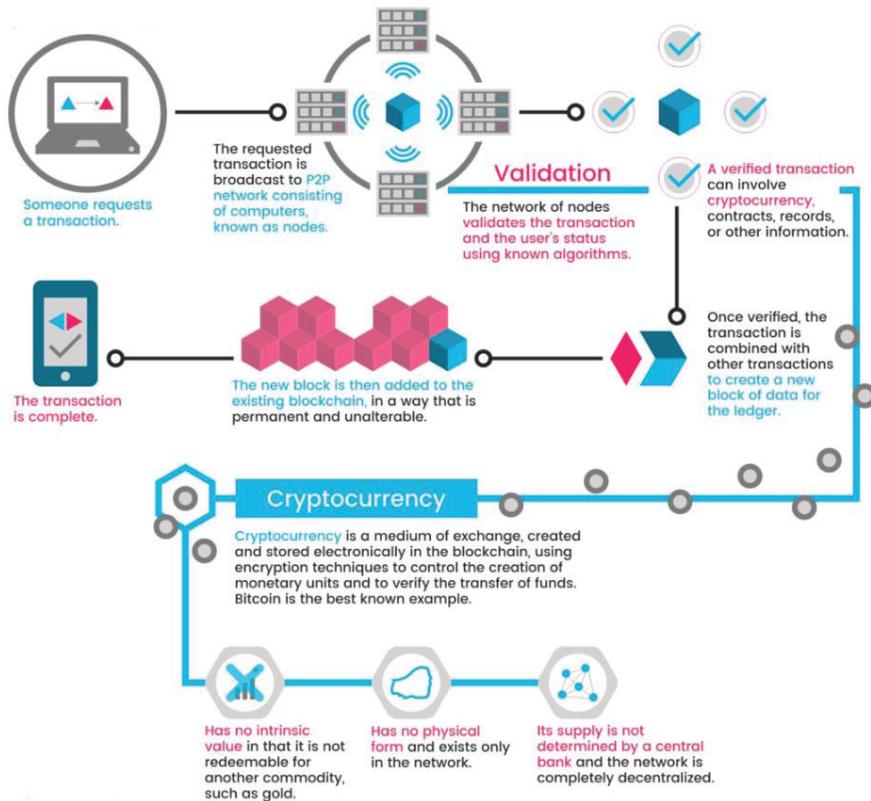
The first time that something similar to cryptocurrency and this way of trading was mentioned was in 1998 when Wei Dai tried to describe the “b-money”, that represented an electronic cash system that was anonymous. And after that, Nick Szabo invented the “bit gold”. It is considered to be the direct precursor for making of the Bitcoin. The “bit gold” represented a mechanism which was used for a decentralized digital currency, but it was never fully accepted and implemented. The idea was for participants to solve

cryptographic puzzles with their computers, and through this network, all the puzzles that were solved would be sent to a public registry called the Byzantine-fault-tolerant and they assigned the solver a public key. So every solution just becomes a part of the next challenge, but if the majority of the parties doesn't agree to accept new solutions, next puzzle couldn't be started. In 2008, a proposal for Bitcoin was released, and many people suspected that it was Szabo who made it, but this time under the name of Satoshi Nakamoto. He categorically denied it, but there were many studies and researchers that tried to prove that it is actually him. When Ethereum appeared in 2015, they named one of their subunit value tokens the “Szabo”.

Since nobody could control what happens with the cryptocurrencies, the UK government assigned the Treasury homework. They were supposed to do a study on cryptocurrencies, to see what is their role, significance and can they change anything, or affect in any way on UK economy. And also, this way they would see if there is a need to regulate this type of exchange. The first appearance of Bitcoin ATMs was in Austin, Texas, in 2014. It was installed by the founder of Robcoin, Jordan Kelley, and it had scanners that could recognize documents that were issued by the government, like a drivers license or a passport. By 2017 a big amount of Bitcoin ATMs was installed everywhere around the world.

The most important thing about cryptocurrencies, and especially the Bitcoin is that it can't be controlled by no server or any authority, it is completely safe and there is a bigger chance for the humanity to be wiped from the face of the Earth, than for a transaction or a user on this platform can be revealed.

The idea was to create a digital cash system, that will work on the principle of peer-to-peer network and files would be shared like this. And that is how it became the cryptocurrency. So, there is no server that controls this platform, but every peer has to own a list that has all the transactions so it can see if some transactions in the future are valid. It is possible to simplify the definition of cryptocurrencies as *limited entries in a database no one can change without fulfilling specific conditions*.

Figure 2. How miners create coins and confirm transactions

Source: Multiple Authors (2017). *What is cryptocurrency*. Retrieved November 21, 2017, <https://blockgeeks.com/guides/what-is-cryptocurrency>. - screenshot –

The mechanism works on a simple principle that can be called a p2p-technology. Every peer has a record that consists of the whole history of every transaction that was made. When someone gives a number of Bitcoins to another person, that file gets signed by a private key, and after the key is signed, the transaction broadcasts in the network, and it is sent from one peer to all the other peers. There is a certain period of time that needs to elapse for some amount to be confirmed. Confirmation is a critical concept in cryptocurrencies because they are all about confirmation. A transaction can be forged while pending, but when it's confirmed, it is set in a stone, and it becomes a part of historical transactions, in the blockchain. Miners are the only one who can confirm these transactions, they take them, mark them as legit and let them spread through the network. Miners get paid in Bitcoins for their work.

According to the opinion of central bank representatives, adopting a cryptocurrency such as Bitcoin would be a very big challenge for the government, because they cannot control it or influence it in any way, and it would be impossible to steer the economy, because the statistical agencies won't be able to collect data that they need about economic activity. People are becoming bigger fans of cryptocurrencies than the normal

currencies that are issued by the government (Athey, Catalini, Tucker, 2013). The whole monetary and exchange rate policy could change because the banks won't be able to control their very important functions. There are many questions directed to the legality of the Bitcoin. In some countries, it is completely legal, and their use and trade are possible, while some countries decided to ban them, like China for example. And in Russia, even though they are legal, it is not allowed to purchase goods with some other currency that is not a Russian ruble.

Dr. Garrick Hileman and the Centre for Alternative Finance (June 2017) have done a research about the significance of cryptocurrencies, and as they state in their report more than 3 million people are using cryptocurrencies as an alternative payment system for goods and services. The study shows that there are more than 1 800 people across the globe that have full-time jobs in the cryptocurrency industry since the companies started massively to engage across different sectors. As he says, at that time the market value of all cryptocurrencies was nearly \$40 billion, which can compare to the sizes and values of many big companies.

The cryptocurrencies, especially the Bitcoin have become so popular, and people everywhere in the world started buying them, hoping that someday they will wake up rich. People have started taking lessons and lectures about investments in Bitcoin and other cryptocurrencies, there are some who sold their houses to buy Bitcoins. In Holland, a thirty-eight-year-old man sold his house and went to live with his wife and three daughters in a trailer. He sold the house for some cash and the rest of it for Bitcoins (Chu, Nadarajah, Chan, 2015). They are waiting for 2020 when they expect a big growth of the Bitcoin when they will finally be rich. The cryptocurrencies have dramatically changed people's lives. Some of them woke up rich the next morning!

Cryptocurrencies in the role of economic growth

Cryptocurrencies represent digital gold it is money that cannot be influenced on by political regimes. It is digital money which will maintain its value and increase it over the time. It is very variable, but it is a fast and comfortable means of payment. The trade on the cryptocurrency market has become insane. Even though they are used for payments, it is also used for speculation and for value storage, which just minimizes the payment aspects. The market for investors and speculators has rapidly grown and it is very dynamic. There are certain exchanges like Okcoin, poloniex or shapeshift that make possible the trade of hundreds of cryptocurrencies. Their daily trade volume is bigger than on the major European stock exchanges.

According to newspaper article “5 Impacts of Bitcoin on the economy” (2017), there are five ways Bitcoin impacts banking, finance, and economics:

1. **Power to the Dark Web.** Dark Web represents a section on the web that you can not access to using your search engine. We only have access to web surface, which is not even a half of what internet exists of. There is special software that allows you to enter the Dark Web, like Tor Browser. It is a place where you can find lots of illegal stuff. The same way you can make illegal transactions, and you don't have to give any information about yourself. Such transactions are empowered by cryptocurrencies such as Bitcoin, so the cyber crime has recently increased when these transactions became popular all over the world.

2. Speculations. In January 2015 Bitcoin's value was \$170 and in July 2017 it was \$2772, now it is more than \$8000. The value of the Bitcoin changes all the time, it falls and it rises and there is a possibility that this will continue to happen. One day, you can buy a Bitcoin for a hundred dollars, the next day you got ten times more, or you lost a certain percentage of it. These so-called ups and downs of the value are a very big possibility for speculation. Trading in Bitcoins is very massive and it will probably just grow even more. This is also because of increasing the costs of investing in the stock markets. One share in Apple or Facebook could probably cost about \$150, but in Bitcoins, it can be bought in fractions, and for a very small price. So it becomes an easy target for speculative gains (Briere, Oosterlinck, Szafarz, 2015).

3. Politicization of money. The phenomenon of cryptocurrencies is a revolutionary change in the handling of transactions. And this change has the power to change the economic structure. Before them, all the monetary transactions were controlled and enabled through central banks, but now everything has changed. Instead of the government and central banks, the power of controlling these transactions is in the hands of the masses. Banks and financial institutions kept track of all the transactions that ever happened, but now with the digital money, this economic power can be challenged by people. This means that a new autonomous body was created to facilitate transactions. Bitcoins could easily lead to the politicization of money.

4. Apprehension among the Central Banks. Cryptocurrencies can't be controlled by banks and financial institutions, and they are a very unpredictable form of currency. It gives the possibility to launder money outside the country. It makes a lot of gaps and loopholes in monitoring and collecting the data about money transactions, which can just lead to an inability to track all the transactions and economic activities. They are becoming a big problem for the government which cannot affect it in any way or controls it, so they stay helpless.

5. The emergence of new markets. With the emergence of cryptocurrencies, a lot of new markets appeared. These new cryptocurrencies made it easy for the new kind of market to enter, where no one controls the money market. These forms of transactions have become superior to the traditional money that everybody uses, because the transactions are free and it has a lot of different advantages, like sending money in a couple of hours. So it brings the concern that maybe this is just the beginning and that in the near future we might use a different currency which will not be anything like the one we have now.

According to John Cryan (Nikolić, 2017), a British businessman and chief executive of Deutsche Bank, money is very expensive and inefficient, so he thinks that it will be replaced in certain ways with some other more effective assets. By that, he means that there will be a combination of finance and technology, which actually means that there will appear digital money so the transactions flow will be much faster (Nakamoto, 2008). Many banks have already started to use blockchain technology and cryptocurrencies in order to speed up the transactions and clearings in finances. There are many different opinions on this subject, many people think that the cryptocurrency will become the only way of payment and that it will take over the regular system that is known to all of us. But there are also those who think that this will not happen soon and that cash will never be replaced with digital money, but it will just become another option for payments, sending and receiving money and market trades.

Types of cryptocurrencies

There are many reasons to invest in cryptocurrencies, but making a profit is by far most important. All the digital values are very unstable, so that is a big opportunity to make some big profits, but also it can be a big risk for the investment. A lot of websites offer users a simple way of buying, holding or selling cryptocurrencies like Coinbase, Bitstamp, Cryptsy, and BitPanda.

There are a few different online wallets, some of them allow you to keep only one type of digital currency and there are some of them where you can keep different kinds. Each of these websites offers you a wallet that you can download, and every wallet has a unique address that you use for receiving digital currencies from other people. The best way to buy or sell these cryptocurrencies is to go to a website which is used for exchange. All you have to do is open an account and download your wallet, and then you choose a way of payment. After that, you can buy any currency you want. Their price can vary depending on the website. Buying of a cryptocurrency can sometimes last a few seconds, minutes or sometimes a few hours, depending on the offered price and the type of cryptocurrency you wish to buy. After the system for exchange finds a seller that wants to sell at the price you offer, cryptocurrency is sent to your wallet, and the money goes to the seller. That is one way to buy them. The other way is to buy cryptocurrency at online communities (Luther, 2013). The price is very similar or even lower than the price on the websites. After you find and make an arrangement with the seller, you need to exchange your wallet's addresses so you can receive the currency and the seller gets the money. This is a risky way of buying because sometimes it can happen that the seller decides not to send the cryptocurrency to your wallet.

Cryptocurrencies can be divided into those that belong to a decentralized system, or those that belong to a centralized blockchain system. When it comes to decentralized systems, that means that every computer is a working unit for itself, there is no institution that authorizes it. One of the main characteristics of this system is that it is anonymous in transactions, and everybody controls it, but nobody has the power over it. And in centralized systems, there is usually a group of people that manage the currency and they guarantee the success of the currency. They go by the rule – know your customer. In that way, they are trying to stop money abuse because it is possible to check the currency and pay taxes for it (Investopedia, 2017). Both systems have their advantages and disadvantages. It all depends on the market, whether the investor will earn or lose money. But, the most important things to pay attention to when buying a cryptocurrency are the final number of coins that will be circulation, the value of its market price, stability in certain periods of time, safety, number of users and traders that have said yes to that cryptocurrency, public support and legal regulative if some countries accepted them (Investopedia 2017). There are more than thousand different cryptocurrencies that can be bought, but here are some of the most valuable that have the biggest capital on the market.

1. **Bitcoin** – It appeared on the market in 2008, but it didn't attract much attention back then. It was represented by a person, or a group of people, it is still unknown that uses the pseudonym Satoshi Nakamoto in a scientific study called *Bitcoin: A Peer-to-Peer Electronic Cash System*. The greatest interest for this platform was in 2013. A lot of companies from all over the

world, South Korea, India, Australia and Japan started to question the Bitcoin as a reserve currency in the future, but also as an alternative monetary and financial system. They have an opinion that if it keeps growing like this it could become a reserve currency instead of the American dollar. First, everybody thought that Bitcoin is just a powerful asset that helps criminal do their money laundering, but that image changed when everybody started investing their money in this cryptocurrency. And now, everybody wants a part of it, because it is anonymous and the transactions cannot be tracked. When it comes to adopting this way of trade, Japan has become the leader. It is possible to pay some services or buy certain products with a digital currency, called the Bitcoin.

2. **Ethereum** – It is a decentralized platform that appeared in the middle of 2015. Its market value is €28,6 billion. The creator of this cryptocurrency is Vitalik Buterin, a young crypto-genius. There are similarities between Bitcoin and Ethereum because they both use the blockchain technology, a decentralized public track about every transaction. But, they are completely different when comparing their design and the usage itself. The primary function of Bitcoin is payment currency, but Ethereum blockchain is designed to allow much more functions that could be useful to the business world. Many corporations were interested in buying this cryptocurrency because of the smart contracts. Smart contracts are computer algorithms that automatically fulfill the terms of the contracts as soon as the conditions are met. Ethereum has a goal to decentralize the Internet and so far, it has good chances to become the new internet. But it can't be considered as a single currency because of the Hack of the DAO – an Ethereum based smart contract. The developers agreed to a hard work with no consensus which only brought to the emerge of Ethereum Classic. And also Ethereum is a host of several Tokens like DigixDAO and Augur, which just makes it more a family of cryptocurrencies.
3. **Ripple** – It was introduced in 2012 by Authur Britto, Ryan Fugger, and David Schwartz. Ripple Transaction Protocol (RTXP) was built on distributive open-source Internet protocol and the native cryptocurrency called the XRP (ripples). Banks are rapidly adopting this system because its primary function is to enable secure global financial transactions of any size, without any fees and very quickly. Its market value is €10,3 billion.
4. **Litecoin** – A former employee of Google company, Charles Lee, presented Litecoin in 2011. It is a P2P internet currency that allows very quick payments and it is almost free for everybody in the world. Litecoin is completely decentralized global payment network. Technically it is very similar to Bitcoin, but it has some improvements such as the greater amount of transactions that can be done at the same time. But Litecoin is like a younger brother of Bitcoin which hasn't found its real use, so now it is just a backup just in case if Bitcoin fails.
5. **Monero** – It was created in 2014 and it was focused on privacy and it is a decentralized system. It is the best example of the kryptonite algorithm. It was invented with the aim to add those privacy features that Bitcoin didn't have. Every transaction made in Bitcoin is documented in the blockchain and the

track can't be traceable. When they introduced the concept of ring-signatures, this algorithm was able to cut the trails. The first time this cryptonite called the Bytecoin was implemented, it was rejected by everyone. It achieved great popularity in 2016 when some darknet markets accepted it as a currency but its price still remains very low. Many other currencies are a clone of the native Bitcoin code, but Monero uses CryptoNote protocol which is an evolution of ideas behind Bitcoin. The main difference is that it is very difficult to follow digital currencies that are based on CryptoNote protocol, and also the inner algorithms are different.

6. **Ethereum Classic** – It is just like Ethereum, but it is used only for smart contracts, it has applications that work just the way they are programmed. There is no room for any sort of delay, censure, fraud or involvement of the third party. This is just a sequel to the original Ethereum, in which there is history that didn't change, there are no external interference and subjective changes that represent a consequence of the transactions. Its market value is €1,7 billion.
7. **NEM** – This is a Peer-to-Peer cryptocurrency and it has a blockchain platform that was started in 2015. It is a platform that entered some new functions in the blockchain technology. It has an algorithm of proof-of-importance, coded messages, and a different reputation system. Its value is almost €1,6 billion.
8. **Dash** – It was presented in 2014 and it was known by the name of Darkcoin and Xcoin. Its market value is €1,2 billion.
9. **IOTA** – It is the first cryptocurrency that didn't use the blockchain technology, but instead, it uses Tangle, which is based on directed acyclic graph technology (DAC). The transactions are done without any fees, no matter how big is the transaction, and the system can easily scale. It was founded by David Sonstebo, Sergey Ivancheglo, Dominik Scheiner, and Dr. Serguei Popov, but it is run by the IOTA Foundation. With Tangle technology, every transaction creates a new chain that confirms itself. Its market value is more than €1 billion.
10. **Waves** – It enables making custom tokens so it is possible to make your own cryptocurrencies. It is also used for trading and crowdfunding and it integrates fiat currency gateways in your wallet.
11. **Augur** – It is a decentralized market platform that is built on the Ethereum, as a set of smart contracts that exist on the Ethereum blockchain. It was created in 2014 by Jack Peterson and Joey Krug.

Cryptocurrencies in countries in transition

Since the beginning of cryptocurrencies, many ups and downs have happened, the value varied. At one point you could be a billionaire in the next one you could lose everything you got. Even though some opinions were that the cryptocurrencies might be just a temporary attraction, they proved the opposite. They are taking over the modern world and Bitcoins are being bought every day regardless the price that's been higher and higher every day. In just two days the value of Bitcoin increased for \$2 000. The question

remains, how long will this craze for cryptocurrencies last, will it replace the current traditional currency or just become another way of trading and exchanging currencies and contracts.

The total crypto industry today is in the hundreds of billions. Many developed countries have already accepted cryptocurrencies, especially Bitcoin, as a legal method of payment, but there are those with a weak economy that are still afraid to embrace all the benefits that these cryptocurrencies offer. Some of the countries even tried to develop and make their own cryptocurrencies that they will use. China completely banned the use of cryptocurrencies and trading them is now only allowed in offshore businesses. The main reason why countries decide not to use them is to reduce criminal activities and to include tax. Fear of not being able to follow any transactions happening on the internet keeps them from allowing this progressive digital currency to be a part of their economy. Russia is working on their own cryptocurrency that will be called the cryptoruble. There is not much information about it, but it is known that it will not be mined and that only government can issue it and keep track of all the transactions, just like the traditional currency.

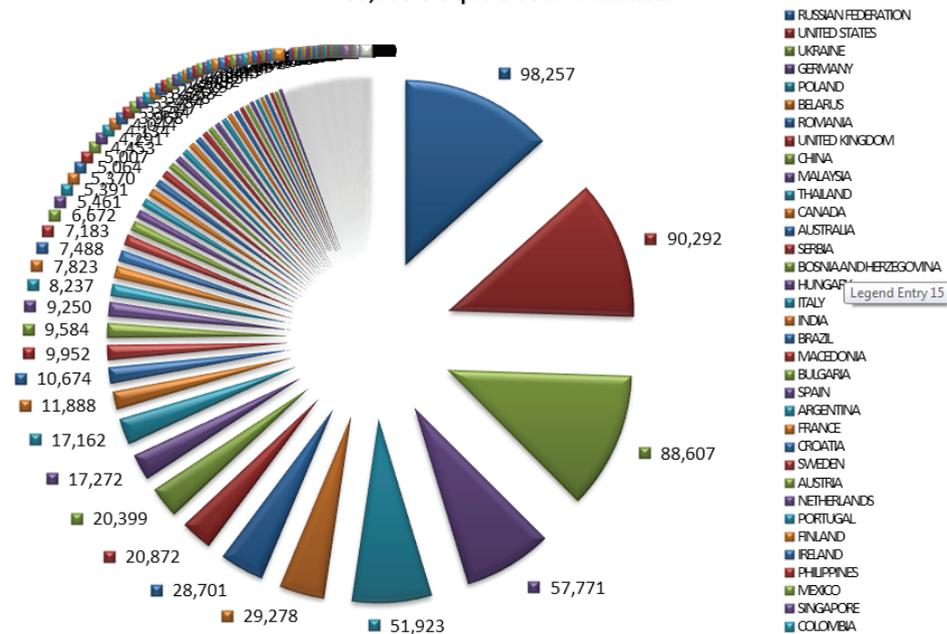
The market of cryptocurrencies itself is developing very fast. Every cryptocurrency that appears on the market has some new promises and a big story waiting to be told. They all have positive and negative effects or can have different outcomes. Fear is present, people buy digital money to secure themselves if the traditional currency devaluates. It is a normal state that in most of the countries, especially in those in transition, digital money is used for cyber crime, for selling and buying forbidden things, so there is no doubt that some illegal things are going on on this market.

Bulgaria made its own cryptocurrency and she called it OneCoin. It had a private blockchain and was promoted by offshore companies OneCoin Ltd from Dubai and OneLife Network Ltd from Belize, and the owner of both of these companies is Ruja Ignatova. But this was proved to be a scam in many different countries through various investigations. Bosnia and Herzegovina don't have any options to pay any products or services using these cryptocurrencies. Even if somebody has a presentation about cryptocurrencies in Bosnia it is probably some sort of scam or a trick because there is no reason for someone to try to convince you, it is just a very easy way to earn a large amount of money by investing a certain amount. In June 2017 in Astana, the capital of Kazakhstan, the President suggested a proposition on how to save the world economy from the currency war by creating a global cryptocurrency. As he announced, the time has come to think about introducing an international monetary payment unit which will save the world from wars, currencies, and decrease the instability on the market. His opinion is that the new currency should be based on the simple understanding of the emission mechanism which will be controlled by its users. The University of Macedonia conducted a survey about acceptance and adoption of digital currencies. This is a controversial issue because the legal framework still hasn't been made. It is not widely accepted everywhere, but every country has an opinion of its own and made a different decision.

Cryptocurrencies in Serbia

Cryptocurrencies are widely distributed all over the world, they are taking over the markets and people from all over the world are trading them. The fear of the unknown is very common and people are afraid of losing their money somewhere on the internet. Some people have the opinion that if you can't touch it and hold it in your hands it doesn't exist. There are even some examples of people saying that if you can't buy bread and milk in the store with a bitcoin, it is no good then.

**Figure 3. According to a research done by William Fleurant, Serbia takes 14th place in the world by the usage of Bitcoin
739,033 Unique BitCoin Instances**



Source: <http://files.campus.edublogs.org/blogs.umb.edu/dist/2/123/files/2012/01/countries-v5q30e.png>

The only legal way of payment of Serbia is with the native currency – dinar, unless if you want to buy an apartment, for example, which is defined by legislative. The National Bank of Serbia doesn't accept this currency as a legal way of payment, it doesn't guarantee anything that has to do with cryptocurrencies. It is not possible to go to a bank and just ask for one Bitcoin or any other cryptocurrency. They don't trade and do exchanges. Regardless of that, there are some organizations in Serbia that are trying to introduce this new technology to people and make it a regular part of our everyday lives (Minović, 2013).

In 2013 in Novi Sad, an E-High School announced that the tuition fee for the next school year could be paid in Bitcoins and therefore became the first school in that region that accepted payments in virtual currency.

The first time a Bitcoin ATM appeared in Serbia was in 2014 when a group of three young men, owners of the company Bitcoin365 set it up in a restaurant in Belgrade, Appetite. This is the first restaurant in this region that allows payment in Bitcoins. This project, Bitcoin 365, was created as a mutual project of some individuals that entered the world of this digital virtual currency in 2011, at the very beginning. So they decided to try and create an exchange that could operate on a global level. This ATM could only accept euros, and at that point, they were working hard to empower the machine to also accept native currency – dinar. Since the law does not allow Bitcoins as a legal way of payment, the main goal was to raise awareness about Bitcoins. Later in 2015, one of the co-founders of Bitcoin Association, Mladjen Merdovic presented a new Bitcoin ATM at the same restaurant, only now it is possible to buy this cryptocurrency by using the native currency, dinar. As he implies, they didn't wait for the National Bank of Serbia to give their permission when they let this ATM work, but they did follow all the rules and regulations related to this matter.

One of their main goals is for Bitcoin to be accepted as a legal method of payment, not to be overwhelmed with unneeded regulations, but to exist some kind of order in doing business with cryptocurrencies and to stop misuse. In their opinion, it should be regulated by law, but in a certain way that will respect how specific this new trend is. In February this year, there were only three ATMs where you can buy Bitcoins in Serbia, one in Novi Sad and two in Belgrade. Aleksandar Matanovic, also a member of Bitcoin Association Serbia says that the transactions are very fast, cheap and that once that you send a transaction you can't bring it back (Matanović.Petrović, 2017). There are big oscillations in the value of this currency, but in his opinion, there is no need to rush and sell it, a better solution is to wait and invest in some other cryptocurrency. The next and so far the last Bitcoin ATM in Serbia was installed in June this year, in ICT Hub Space Playground and it can be used by those who already have accounts, but also those who want to create a new one. Serbia is the first country in the region, after Slovenia, that installed the Bitcoin ATM. This ATM is connected to the Bitcoin system and it refreshes every ten seconds and displays the current value of Bitcoin. Nikola Cvijovic, another member of Bitcoin Association Serbia, said that people should not be worried about the safety of this cryptocurrency and that it only loses its value when people get scared and decide to sell it, so they sell it for a very low price, and that is how the value of Bitcoin drops. The only way that Bitcoin platform could crash is if the whole internet crashed, or if the Bitcoin protocol stops working, which would be a miracle.

Switzerland and Cryptocurrencies

Switzerland is one of the countries that fought for people's privacy and freedom, but after a long time, this country has started to limit these rights. Since most of the European countries have fallen into an economic crisis, they had no other option but to fill their budgets by increasing the tax rates. When Bundestag adopted the new law that gave power to the Federal Police to control any data sent over the internet, like address, password, PIN codes, and when that was also done in Great Britain and other countries in Europe, many of their citizens had to find their safe place, which was Switzerland. However, the country that represented the symbol of safety in wartime or in peace,

started to act just like her neighbors and destroyed everything that she had built for centuries. In May 2015, Swiss Senate brought in a resolution that allows the exchange of information about everyone who has an estate in that country. New agencies were created that had the authority to follow, tap and collect private and personal data about any individual on their territory (Clancy, 2017). As a consequence of this new practice, people started to withdraw their funds from their accounts, because of very high fees. The most popular banknote in the world is the Switzerland's thousand francs bill. Almost 50 billion francs in cash are kept out of banks and out of reach for tax collectors. That is why Switzerland decided to stop the hiding of personal assets. So most of the payments now in Switzerland have to be done online, the tax must not be avoided (Jaag, Bach, 2013).

A fintech expert Rino Borini is a co-initiator of Finance 2.0, Switzerland's largest fintech and crypto event platform (Swiss Financial Center, 2017). He emphasizes the importance of crypto finance and how relevant it is that people understand it because it is becoming a very common subject. He tries to explain the difference between digital currencies such as Bitcoin, for example, and the blockchain technology that powers them. Cryptocurrencies are a faster, cheaper and much safer way of exchanging funds and information. According to him, the Crypto Valley represents a huge step ahead for Swiss technology and financial system.

Giracoin was founded in 2016 in Switzerland by the Gira Financial Group. It strives for a revolution in global currency and merchandise trading. They have launched a new cryptocurrency on the market which allows access to every person in the world through the mining process. It is independent of the state banking system and it works on a local level. It also uses the universal blockchain technology just like every other cryptocurrency. It was accepted by the Switzerland authorities and it has permission to perform its services.

Last year Switzerland was only considering the blockchain technology, and now she has become a part of it. There is even a city, Crypto Valley, which is the center for companies that work with cryptocurrencies. Crypto Valley is a nickname for Zug, a town in Switzerland which was established in January 2017. The government supported the building of this independent association to be a leading blockchain and cryptographic technology ecosystem in the world. The creation of Crypto Valley was initiated by Johann Gevers who was inspired by all the advantages that global industry offers. His opinion is that Switzerland is a perfect country for building the new generation of decentralized technologies since it is decentralized, citizens control the political system, it is stable, neutral, and open for all sorts of businesses. He helped to promote all the cryptocurrencies and the new technology that is based on blockchains by letting people give presentations, making good relationship with the authorities and developing an ecosystem of professional service providers.

In May this year, a computer virus by the name WannaCry attacked the systems of carmakers, hospitals and train operators and the hackers demanded the users pay so they can get back their data. The payment had to be done in the digital currency Bitcoin. Some of the users paid and when the hackers wanted to transfer the digital money, they used the platform of ShapeShift, which is a digital currency based in Zug. They didn't get to launder all the money, only a part of it before the authorities spotted the transactions and shut them down (Jaag, Bach, 2013). ShapeShift was in an awkward situation but they

denied to give any statements about this event, they only announce that they are working with law enforcement to prevent such things from happening again. Switzerland's approach has helped Zug to attract many managers and brokers that do business with the digital currencies. It is a home of the Ethereum Foundation (Luther, 2013). The city looks are not very innovative, but it proved how ready it is for new and revolutionary ideas. Zug Mayer Dolfi Mueller had a conversation with councilors in order to discuss what could be the role of the city. He accepted the idea that the city should start accepting bill payments in Bitcoin. It was a way of showing how open-minded the city is.

The headquarters of Bitcoin Suisse has more than 20 employees. In 2015 the company was doing 13 million Swiss francs in trading volume for one year, and now it is close to 300 million francs a month. If you want to buy a Bitcoin you can do it without using banks, and the transfers are recorded by blockchain technology (Briere, Oosterlinck, Szafarz, 2015). But if you want to buy or sell, you can ask the middleman to help you, and that is where Bitcoin Suisse enters the game. Most of Bitcoin Suisse's business is in trading currencies and it has 12 Bitcoin ATMs in Switzerland. They offer help to banks in Switzerland that want to start their business with cryptocurrencies and give opportunities to those who had some mistakes in the past. Bitcoin Suisse can screen prospective clients with accuracy and it can rely on the past transactions that were recorded on the blockchains. This way they can check their client's background and see if someone has a tendency to become the next Silk Road.² Bitcoin Suisse is also a member of the Financial Services Standards Association which is in charge of checking if everybody complies with the rules against money-laundering. The operators can choose to be self-regulated or Finma³ can regulate them. But still, there is a lot of skepticism about moving Bitcoins, since the incident that happened with WannaCry. According to Candid Wueest, nobody can guarantee that the same thing will not happen again (Miller, 2017). He sees the infrastructure as a very dangerous place because the only reason they stopped WannaCry was that they made a mistake and returned to the same generic address while trying to exchange their Bitcoin. In September, Finma shut down unauthorized cryptocurrency provider called E-Coin. This company accepted millions of francs in public deposits and it did not have a banking license (Chu, Nadarajah, Chan, 2015). There were also some suspicions about the Ethereum, that it was being used by cybercriminals, but the Ethereum did not respond to this. The president of Crypto Valley, Oliver Bussmann said that they can't allow citizens in Switzerland to go back to letting people hide their financial secrets. They need to regulate this cryptocurrency business because they need to have a clear record what is going on with the cryptocurrencies if someone is moving traditional currency to a digital one (Franklin, 2017).

² Silk Road was an online black market and the first modern darknet market, best known as a platform for selling illegal drugs.

³ The Swiss Financial Market Supervisory Authority (FINMA) is the Swiss government body responsible for financial regulation.

Conclusion

A cryptocurrency is a form of digital money that uses the blockchain technology and cryptography to protect the information about transactions and exchange made on the digital market. The most popular one is Bitcoin, but there are also other cryptocurrencies like Ethereum, Ripple, and many others. They are decentralized which means that no one can control it, no banking system, financial institution or the government itself. It is unknown who created it, and the creator goes by the pseudonym, Satoshi Nakamoto.

The idea was to create a Peer-to-Peer Electronic cash system, which will be decentralized and no one would own it. In the decentralized network, there is no server, so individual entities do all the work by themselves. Every peer in the network has a list of transactions, so it seems like everybody controls it, but nobody owns it. A cryptocurrency like Bitcoin consists of a big network that has many peers working on it and every peer has a record of the whole history that contains all the transactions that ever happened. So if you want to transfer something, one person gives it to another and then the sender signs the transaction with his private key, and after that, the transaction is broadcasted in the network, so that everyone gets the information. It takes some time for the transaction to be confirmed, sometimes it takes seconds, minutes or even hours. But only miners can confirm transactions, mark them as legit and spread them across the network. When the miner finishes his job, every node adds it to its database where it becomes a part of the blockchain. Miners get paid in cryptocurrencies, for example with Bitcoins.

There are a lot of discussions about how it affects the economy of the country, of the whole world actually. Also, many people wonder if it is going to replace the traditional currency, but there is no answer to that question. It just remains to wait and see what will happen, but one thing is sure, cryptocurrencies are here to stay, it is not something that will just disappear in time. Many countries have developed their own cryptocurrencies which are used as a payment asset, in the form of digital money. It could be just a scam which will bring no good, but it could also be an easy way to get rich. We will just have to wait and see. So far, it is accepted as a digital currency and people are massively trading them.

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IMPORTANCE OF COOPERATION BETWEEN UNIVERSITIES AND INDUSTRY AS A FACTOR OF ECONOMIC AND SOCIAL DEVELOPMENT OF THE REPUBLIC OF SERBIA

Abstract

In a very dynamic social environment, which includes a whole range of political, economic, cultural, and social changes, one can notice that, “today”, education is facing new requirements, which primarily result from the needs of the economy and production. The role of university is not only to create and transfer knowledge, but to integrate with the economy for future economic progress and social development. The subject of this paper is to analyze past and current cooperation between university and industry in the Republic of Serbia, based on official national and international statistics. Given that education in a society is assumption of dynamic economic and social development, the aim of this paper is to make a comprehensive analysis of the importance of cooperation between university and industry, and point to the need for continuous and institutionalized cooperation between university and industry, as a key factor for the future strategy of economic and social development of the Republic of Serbia.

Key words: university, industry, higher education, economic development, human capital

JEL Classification: I25, I28, H52, Z13

ЗНАЧАЈ САРАДЊЕ УНИВЕРЗИТЕТА И ПРИВРЕДЕ КАО ФАКТОРА ПРИВРЕДНОГ И СОЦИЈАЛНОГ РАЗВОЈА РЕПУБЛИКЕ СРБИЈЕ

Анстракт

Из врло динамичног друштвеног окружења, које подразумева читав низ политичких, економских, културолошких и социјалних промена, можемо да приметимо да се “данас” пред образовање постављају нови захтеви, који примарно произилазе из потреба привреде и производње. Улога Универзитета није више само да ствара и преноси знање, већ да се Универзитет интегрише са привредом у циљу будућег привредног напредка и социјалног развоја. Предмет овог рада је анализа досадашње и тренутне сарадње Универзитета и привреде у Републици Србији, на основу званичне домаће и међу-

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народне статистике. С обзиром да је образовање једног друштва предпоставка динамичког привредног и социјалног развоја, циљ овог рада је да се кроз свеобухватну анализу значаја који сарадња Универзитета и привреде има укаже на неопходност континуиране и институционализоване сарадње Универзитета и привреде као кључног фактора будуће стратегије привредног и социјалног развоја Републике Србије.

Кључне речи: Универзитет, привреда, високо образовање, привредни развој, људски капитал.

Introduction

*“Learning used to be a luxury for the elite,
now this is a national need, the need for the broad masses,
in the true sense of the word.
He who does not understand these processes,
does not understand the tendency of the time, and falls short.
He who, contrary to this,
understands these changes, for him the future has already begun”.*
Bilandžija, B. (Bilandžija, 2010 , p.240)

Education system of a society is a key determinant of its development. At the same time, education system is inseparable from economic, commercial, political, cultural, and demographic development of the society in which it develops.

The importance that education plays in the growth and development of the national economy has long been accepted, and it no longer strikes the attention of teachers, experts in the field of pedagogy, adult education, sociology, but a growing number of economists and experts in other fields of science believe that development of a society is directly related to investment in education (or as economists point out, in human capital).

Economists usually speak of “knowledge-based economy” or “knowledge-driven economy”. Distinction should be made between the notion of knowledge economy, where knowledge is the product developed through intellectual effort (in the broad sense of the term product) and the concept of knowledge-based economy, where knowledge is classified into production factors (Ješić, 2015, p.25). The terms are, regardless of different interpretations of knowledge, very connected.

It is the concept more than a decade long, and in our country is still used only rhetorically, which actually reflects the attitude we have as a society toward education. If we keep repeating for more than one decade a platitude that knowledge is a capital and an important economic resource, but do nothing to take advantage of knowledge that we invest in, or at least try to create a knowledge-based economy, then we are a very irresponsible country in social terms. This is one of the reasons why investment in education is seen as a cost. When we change our perception of importance of education in a society, we will realize that investing in education is an investment for the future. It is even more irresponsible of us if we know that “the underlying macroeconomic assumptions about economic growth and development of competitiveness of an

economy are based on constant improvement of labor force skills as the basic factor of production. Human capital, especially intellectual capital, is one of the main factors of competitiveness of companies and the economy” (Jovancai, Tošović-Stevanović, 2013, p.87).

The role of university is not only to create and transfer knowledge, but to integrate with the economy for future economic progress. This does not mean that its primary role of transferring knowledge has been lost, but the contrary, that university, driven by the spirit of times in which it survives, only got other, new roles. The sooner we realize that “economy is the one that sets the criteria for classification of professional staff, while education offers an answer to the given requirements and needs”, the better it will be for our society (Gajić, Lungulov, 2012, p.4). How important is cooperation between university and industry is seen in the fact that, today, most developed countries in social terms, or most competitive countries in economic terms, are “knowledge-based economies”. This does not mean that these economies use the latest knowledge; the context is much broader, referring to economies that, in addition to previously said, place emphasis on networking and cooperation between various public institutions, businesses, students, and university.

Given that education is a society’s assumption of dynamic economic and social development, the aim of this paper is to point out the necessity of cooperation between university and industry, as a key factor for the future strategy of economic and social development of the Republic of Serbia.

Key indicators of the economic situation of the Republic of Serbia. Where are we?

If we look, on the one hand, at the key determinants and current and official data on economic and social development of our country, i.e. level of gross domestic product, level of investment, level of competitiveness of the Serbian economy, and level of inflation and employment, we can conclude that economic and social conditions are not favorable in our country and that something should be changed. In such situations, the help of resources that we have as a country should be sought. Knowledge is certainly an economic resource. The truth, underused, but still a resource.

Even greater paradox is that we listen to decades-long praise of the most educated professionals we educate, experts in the fields of economics, industry, agriculture, tourism, management, a large number of highly educated young people who go to other countries. On the one hand, there is a discouraging “diagnosis” of our society, and, on the other, there is a resource in the form of knowledge that is exported or not used, resulting in economic and social situation that is more than worrying. What is it that has stuck Serbia for decades, and does not allow it to move and change what it can with resources available?

Data that is not encouraging, but should certainly initiate not only thinking but also action, tells us the following.

One of the most important economic indicators through which one monitors the development of a country is gross domestic product (GDP), which is the total value of all

goods produced and services rendered in a country during one year. This is the measure by which we monitor total income and expenditure of the economy. Gross domestic product (GDP) per capita in Serbia from 2006 to 2014 ranged from 4896.82 US dollars in 2006 to 5670.71 US dollars in 2013. Judging by the World Bank data, gross domestic product in Serbia was last recorded in 2015, and amounted to 5659.33 dollars, slightly lower compared to 2014, when it stood at 5593.06 US dollars. (World Bank data, gdp-per-capita). According to the latest Chamber of Commerce of the Republic of Serbia data of November 2015, “real GDP growth in the second quarter of 2016 amounted to 2%, driven by strong growth in the construction sector and manufacturing industry, as well as higher private consumption. Current estimates are that the third quarter grew at a higher level, of 2.5%, due to an increase in investment activity and exports”. This is still low level of GDP of the Republic of Serbia.

Based on the data in the 2016 *World Economic Forum report*, the Republic of Serbia is ranked 90th among 138 countries by the value of the Global Competitiveness Index (GCI) of **3.97**. As the Global Competitiveness Index is measured by the average of a large number of indicators, looking individually by the criteria for assessing competitiveness, the Republic of Serbia is 53rd in the world by health care and primary education, while, according to higher education and training, it is 69th, and 74th by infrastructure (Social Inclusion and Poverty Reduction Unit). Place that one country occupies in the list is very important, because it tells us about the overall competitiveness of its economy, on the basis of which productivity of the national economy is determined and its ability to achieve medium-term economic growth. The Republic of Serbia is in a worse position compared to other countries in the region, with the exception of Bosnia and Herzegovina. *The World Economic Forum* ranks the Republic of Serbia in the group of “emerging and developing European economies”. As a country, we lag behind both EU countries and countries in the region by economic and social development.

Unemployment rate is one of the most important indicators of the state of a society. Based on the latest data of the Statistical Office of the Republic of Serbia, unemployment rate for the total population (without Kosovo and Metohija) for the first quarter of 2016 was 19%, while unemployment rate for working-age population of 15-64 years also for the first quarter of 2016 amounted to 19.7% (Statistical Office of the Republic of Serbia-Current indicators-unemployment data). These figures warn and are extremely worrying if one takes into account that the “tolerable unemployment rate is between hypothetical zero percent and 5%. This means that the majority of the working-age population has a job that provides at least the minimum conditions for their existence. Unemployment rate at the level between 5% and 10% is alarming. High unemployment, of over 10%, already indicates a disturbance in respect of labor supply and demand on the labor market, fall in economic activity, slow process of creating new jobs, lack of competitiveness of the economy, and so on. From a sociological point of view, such a high unemployment rate indicates a potential class stratification, escalating social discontent, likelihood of extreme parareligious and parapolitical organizations, and so on. A society with an unemployment rate above 15%, and especially above 20%, is already a severely stratified society, antagonized and socially divided, with a prevalent sense of social injustice, where a great number of people have almost no chance to realize their right to work, or, in other words, to ensure the conditions of their own survival” (Štrbac, 2014).

Public debt of the Republic of Serbia, which is the total amount of state obligations at a given time, was, based on the Ministry of Finance – Public Debt Administration data, on 31 October 2016 24,957,755 EUR (Ministry of Finance – Public Debt Administration, 2016).

The data also shows that the share of public debt to gross domestic product of the Republic of Serbia amounted in October 2016 to as much as 72.1%. This is in comparison to 2015 2.6% lower, but still remains very high percentage.

Data show that, if one looks at the period back from 2010 to the present day, the share of public debt to GDP of the Republic of Serbia grew until 2016, and that it was only in 2016 that it declined by 2.6% compared to previous year.

This official statistical data makes us wonder whether and how we can use resources that we have and the experience that others have to help the country. There is a legal framework given by numerous international documents ratified and documents adopted and approved by the Government of the Republic of Serbia. One such document is the *Strategy on Scientific and Technological Development of Republic of Serbia for the period 2016 to 2020*. It is a strategic document, whose aim is that, within five years, science in the Republic of Serbia be based on competitive system that supports excellence in science and its relevance to the economic development, competitiveness of the economy, and development of society as a whole. The mission of such a strategy is the establishment of effective national research system, integrated into the European Research Area, which, through the development of innovation, contributes to economic growth, social and cultural progress, raising the standard of citizens and quality of life (Ministry of Education, Science, and Technological Development, *Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2016 to 2020*). *Education Development Strategy in Serbia until 2020*, in part related to higher education, states that strategic objectives in higher education, which emphasize the importance of linking university and industry, are:

- Increase in quality
- Harmonization of study programs to the needs of the market
- Increase in study efficiency
- Increase in scope and availability of academic studies
- Increased mobility of students
- Modernizing academic study organization (Education Development Strategy in Serbia until 2020)

In June 2016, the Government of the Republic of Serbia presented the *Program of Cooperation Between Science and Economy*. The purpose of this program is to encourage cooperation between private companies and public research organizations in Serbia, in order to, through joint development projects, create innovative products, services, and technology applicable on the market.

It should be noted that mere existence of a legal framework and reference to international documents and national strategies is not enough; action is needed. Today everything is verifiable and quantifiable, and mere existence of the Education Development Strategy by 2020 means nothing when the data shows that Croatia and Slovenia allocate 1% for science, EU about 1.8% on average, and the US about 3% of GDP, while the Republic of Serbia is in Europe's rear by budget allocation for science –

only 0.3% of GDP. This data was highlighted at the roundtable discussion “Can Serbia exist without science?”, organized by the Center for Democracy. How to expect science to help the economic and social recovery of a country if that country does not invest in science? There are still three years for this strategy to achieve at least the majority of the targets, and it is still at the beginning. What is the worth of the *Education Development Strategy until 2020* if it is a dead letter?

Faculty between theory and practice – experience in cooperation between university and industry in our country

University professors have always used plans and programs to provide students with a sufficient level of theoretical knowledge, believing that this is what makes the students academics. “Hence, in the current social conditions, university is expected to, with other values in a society shaken (ideological, political, religious values), at least provide a clear awareness of what and who threatens them. In fact, people “turn” to university expecting it to scientifically assist them in their value systems, not only to teach them how to work” (Milošević, 2004, p.48). In recent decades, university, i.e. faculties, are under increasing “pressure” to place emphasis in students’ education on practice. In addition to theory, students need sufficient practical training. This particularly highlights the first but not the only type of cooperation between university and industry. However, this cooperation has never had clear, continuous, and decisive support of democratic institutions, i.e. the state, regardless of others insisting on it and documents that emphasize the importance of that cooperation. The fact is that these documents do not highlight mechanisms to achieve it. It should be noted that cooperation has existed so far, and that there are examples of “good practice”, as the society calls them, where cooperation between universities and businesses has been achieved. For example, as regards the University of Belgrade, Faculty of Mathematics has, from 2011 until today, cooperated with IT companies such as Microsoft and its Development Center in Serbia, Oracle, IBM and which together organize academic and vocational courses for students. Such training is important for students because, in addition to theoretical education, they get a chance to practically apply and test knowledge, and maybe identify one of the companies as future employer. It is also important for companies that participate in trainings and courses, because in that way they do not train all students but only those that will know how to work the way a particular company does – the company will save more time by shortening the period of habituation and costs of internal training of new employees.

University of Belgrade and the Science and Technology Park IHIS Zemun made a database named *Science2Business*, in order to connect academic and scientific institutions and industry.

What is certainly worth mentioning when talking about students’ practice is that the University of Belgrade, Faculty of Agriculture, for the purposes of practical training of students, presentation of certain forms of teaching and scientific research, has two experimental estates: “Radmilovac” and greenhouses of the Faculty of Agriculture. Experimental estate “Radmilovac” breeds appropriate species of plants and animals

with important varieties, breeds and genetic resources as gene banks, for carrying out scientific and research work. Within this estate, there are three centers: Center for Fruit Growing, Center for Bee-Keeping, Center for Fishery and Applied Hydrobiology. Faculty of Agriculture experimental estate “Radmilovac” organizes scientific and research work for improving the quality of studies, their development and improvement, as well as development and promotion of the profession as a whole.

Faculty of Agriculture greenhouses are a place for students’ practical work, both at the undergraduate and master, as well as specialist and doctoral studies. Faculty of Agriculture of the University of Novi Sad has established cooperation between university and industry, where the IPA cross-border cooperation project team held over 50 workshops for producers.

Department of Fruit Growing, Viticulture, Horticulture and Landscape Architecture of the University of Novi Sad Faculty of Agriculture formed a cluster “Fruškogorska apple”, with the aim of creating a brand, and people from agribusiness can also daily get all the necessary information and advice, and consult with the teaching staff. In addition to the Department of Fruit Growing, Viticulture, Horticulture and Landscape Architecture, the Department of Animal Husbandry has followed the same principle, and developed cooperation with individual producers in the field of poultry farming, pig farming, dairy farming, and hunting, in the form of giving advice, education, and knowledge transfer.

Cooperation between the University of Kragujevac and the industry is for now reflected in students’ practice. Professional practice is defined in the curriculum and is intended for the acquisition of professional skills. The aim of this practice is to bring students closer to practical work and application of the acquired theoretical knowledge in the field for which they are educated and thus facilitate the transition from academic studies to professional work.

Of the twelve faculties of the University of Kragujevac, professional practice is being implemented in ten faculties: Faculty of Agriculture, Faculty of Engineering, Faculty of Mechanical and Civil Engineering, Faculty of Medical Sciences, Faculty of Education, Faculty of Science, Faculty of Technical Sciences, Teachers Training Faculty, Faculty of Philology and Arts, Faculty of Hotel Management and Tourism.

Center for Career Development and Student Counseling of the University of Kragujevac, in cooperation with companies, implements numerous practical programs, and a list of institutions with which they are implementing the program each year is getting longer.

Excellent initiative started by the Students’ Parliament of the University of Kragujevac and the Center for Career Development and Student Counseling of the University of Kragujevac should be noted. They have over the last three years organized student summer internship in cooperation with the institutions founded by the city of Kragujevac. This is a really big effort to initiate young people studying at the University of Kragujevac and give them an opportunity to gain practice in one of the state institutions and to develop entrepreneurial competence. There are certainly more unlisted examples of cooperation between university and industry, which are always referred to as “examples of good practice”.

However, when it is said that Serbia should change development policy in the field of education, it does not mean partial changing of certain segments in the field of

education, nor referring to good practice examples by some enthusiastic group of people, institutions, or an individual. The focus should be on development policy, economic and educational policy, with emphasis on ongoing cooperation between university and industry and strong state support, which will be institutionalized and binding for all participants in the education system of the Republic of Serbia. Ways of cooperation between university and industry are numerous, as well as the benefits of such linking of theory and practice, whether it is about training programs or practical programs that aim to develop different skills that students will not get during academic studies. This is a form of linking universities and industry. With this type of connection, students are given a chance to apply their knowledge, to supplement it with new skills, to acquire entrepreneurial spirit, etc., and companies or institutions get a chance to recruit human resources.

Another way of connecting universities and industry is through work on projects: “Cooperation is carried out by connecting researchers/universities, developing knowledge and technology, and industry, seeking knowledge and technology” (Polovina, Mijušković, Kikinđanin, Milić, 2011, p.4). It also occurs in the form of consulting, creation of joint incubator centers, science parks, technology parks, and the like.

Nevertheless, it should be noted, particularly because of constant emphasis on benefits for students, universities, or the industry, that the red thread that should lead all the scientists and researchers in any scientific field, is that education must never lose its humanistic dimension, and that, even when connecting academia and industry, profits must not be in the first place, and that the main benefits for the university and the society must be long-term. The main determinants of humanistic education are derived from the understanding of general social values, such as freedom, justice, solidarity, pluralism, cooperation, development (Branković, 2014). Perhaps precisely a doubt of human intentions gives rise to doubt as to the cooperation of university and industry driven by humanistic values. In any other case, education will be bared.

The importance of cooperation between university and industry

Each level of education is very important, but when we talk about the knowledge-based economy, first we think of highly educated population. A key role in building a knowledge-based economy belongs to universities as transmitters of knowledge, the most important segment being to link universities and businesses. There is an opinion that it is a “third mission” of universities, reflected in university’s participation in economic development and in building civil society and democratic values.

The concept of knowledge-based economy seeks intensive convergence of science to market needs, but also a sort of market “interference” in the world of science through the necessity of systemic application and commercialization of knowledge (Penezić, Ađelić, Ješić Andrejević-Panić, Vukadinović, 2015, p.59). This is the “today”’s necessary connection if we want economically and socially developed society.

Nevertheless, it must be recognized that the idea of cooperation between university and industry is not a new one. Back in 1930s, Marshall wrote: “A small group of British

scientists have made revolutionary discoveries in science; but the main fruits of their work were taken by companies from Germany, where industry and science are in close contact with one another” (Marshall 1923, under Ješić, 2015, p.29). There is nothing new in these requirements, so maybe this is where the greatest question lies – why is this so? Why a company that already knows the importance of cooperation between university and industry does not work on continuous improvement of this relationship? But what are the possibilities for cooperation? In societies where there is awareness that education and knowledge are public goods, cooperation between university and industry is strong, with, of course, the support of the state. Contrary to such societies, there are societies in which education and knowledge are seen as something unrewarding. There is no partnership between students and employers, or between university and industry. If there are such cases, they are referred to as examples of good practice or enthusiastic endeavors. Such ventures appear periodically, but not more than that. This is the type of society to which we belong, when it comes to cooperation of university and industry.

The benefits of a partnership of university and industry are multiple and include:

- Development of mutual trust between universities and partners from the business sector
- Improvement of scientific research
- Improving the process of teaching
- Improving student practice
- Identification of potential clients or partners for future research
- Attracting, retaining and motivating high-quality scientists interested in entrepreneurship
- Promotion of socio-economic importance of scientific and research projects.

It is imperative that local governments and institutions and state authorities develop cooperation with business, financial, and other organizations. As in striving to catch up with universities in the region and the world we are still passing through the structural reforms of education and harmonization with international documents, we should not neglect the basic global initiative, i.e. focus on the principles of social responsibility of higher education.

It is especially important to note that Serbia needs a strategy of economic development that will, in line with the development of society, be based on knowledge. “It means abandoning the current development strategy based on ongoing industrialization and the extensive use of energy and raw materials, inefficient investment in physical capital and the use of cheap labor of low- and medium-level qualifications, as well as the abandonment of the current social and institutional system which cannot solve development problems in the context of new technology related to economic growth, structural change, employment, standard of living and environmental protection” (Bošnjak, 2005, p.37).

Conclusion

Carried by the spirit of time, universities got some new roles. Their primary role of transmission of knowledge has not disappeared, but they got new ones. Higher education institutions have expanded their activities with research, especially

through collaboration with industry. There are many aspects of this cooperation, ranging from students' practice, business incubators, joint research projects, to technology parks.

In an effort to provide a more favorable social environment for economic or social development, many countries gave a central role to universities, because they are a productive combination of science and practice. Science is the national priority of each country, and the cooperation of science and economy is a necessary condition for economic and business development of each country, including ours. This is the imperative of time. The sooner we realize this as a priority and the need of society, the more meaningful it will be for society itself.

Finally, we can conclude with one question, but not wanting to end up with this subject. On the contrary, a new debate should be opened, about *what we are doing, or, better, what we have done with our forest wealth, vegetable and fruit farming, agriculture, pasture, tourism, geographical position, and, of course, with our intellectual capital?*

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ШАБЛОН / ТЕМПЛАТЕ ЗА ПИСАЊЕ РАДОВА

Име аутора (Font size 10 Normal) Times New Roman (SR-Cyrilic)
Факултет или институција и Град (Font size 10 Italic)

НАСЛОВ СРПСКИ (Font size 11 Bold)

Апстракт

Текст апстракта на српском ...

Кључне речи:

NASLOV ENGLISKI ili neki drugi jezik (Font size 11 Bold)

Abstract

Tekst apstrakta na engleskom ili na nekom drugom jeziku...

Key words:

НАСЛОВ (Font size 11 Bold)

Текст (Font size 10).....

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