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Ivana Domazet
Institute of Economic Sciences
Belgrade

Darko Marjanović
Institute of Economic Sciences
Belgrade

Deniz Ahmetagić
Faculty of Economics in Subotica
Subotica

Milica Bugarčić
Belgrade Banking Academy-Faculty for banking, insurance and finance
Belgrade

THE IMPACT OF INNOVATION INDICATORS ON INCREASING EXPORTS OF HIGH TECHNOLOGY PRODUCTS

Uticaj inovacionih indikatora na povećanje izvoza visoko tehnoloških proizvoda

Abstract

Competitiveness of high-technology products (HTP) is more significant on the world market than products of medium and low quality. Increase in the innovation performance should lead to the growth of high technology application in production consequently rising exports of HTP as an important factor in increasing competitiveness. In this paper we wanted to analyze the correlations and conditionality of exports of HTP (share of exports in total country exports) and selected indicators that influence innovation: GDP, R&D costs (research and development cost in four sectors), degree of education of the population, number of researchers (in four sectors) and global innovation index (GII). The main aim was to identify which indicators contributed to the growth of exports of HTP in the analyzed countries (Serbia, Romania, Bulgaria and Hungary) in the observed period of ten years (2009-2018), in order to give certain recommendations on the measures and procedures Serbia should take to increase the level of innovation index and exports of HTP. In this paper, the exports of HTP was analyzed in Serbia, Romania, Bulgaria and Hungary. The influence of the chosen indicators on export of high technology products was analyzed using the POLS model, the fixed effects model and the random effects model. The results indicate that if analyzed countries do not find resources to intensify investment in education and R&D, they will not reach the average EU innovation indicators for many years. Also, it will seriously harm the competitiveness of the economies of the observed countries in the conditions dictated by the modern business environment and the challenges of the fourth industrial revolution (Industry 4.0).

Keywords: *innovation, high technology products, global innovation index, export*

Sažetak

Konkurentnost visoko-tehnoloških proizvoda (VTP) na svetskom tržištu je značajnija u odnosu na proizvode srednjeg i niskog kvaliteta. Povećanje inovacijskih performansi, kao bazične karakteristike VTP-a, trebalo bi da dovede do usvajanja visokih tehnologija u proizvodnji i, posledično, do povećanog izvoza VTP-a kao jednog od bitnih faktora konkurentnosti privrede. Shodno tome, u ovom radu smo analizirali korelaciju i uslovljenost izvoza VTP (udeo izvoza u ukupnom izvozu zemlje) i odabrane pokazatelje koji utiču na inovacije: BDP, troškovi istraživanja i razvoja (u četiri sektora), stepen obrazovanja stanovništva, broj istraživača (u četiri sektora) i indeks globalnih inovacija. Cilj rada bio je da identifikuje pokazatelje koji su u najvećoj meri doprineli rastu izvoza VTP-a u analiziranim zemljama (Srbija, Rumunija, Bugarska i Mađarska) u posmatranom desetogodišnjem periodu (2009-2018), kako bi se, na osnovu dobijenih rezultata istraživanja, dale određene preporuke o merama i postupcima koje bi Srbija trebalo da preduzme za povećanje nivoa indeksa inovacija i izvoza VTP-a. U okviru rada analiziran je i izvoz VTP-a u Srbiji, Rumuniji, Bugarskoj i Mađarskoj. Uticaj izabranih pokazatelja na izvoz proizvoda visoke tehnologije analiziran je pomoću POLS, modela, modela fiksnih i modela slučajnih efekata. Rezultati istraživanja u ovom radu pokazuju da ukoliko posmatrane zemlje ne pronađu resurse za povećano ulaganja u obrazovanje, istraživanje i razvoj još dugi niz godina neće dostići prosečne pokazatelje inovacija u EU. Takođe, to će ozbiljno narušiti konkurentnost privreda posmatranih zemalja u uslovima koje diktira savremeno poslovno okruženje i izazovi četvrte industrijske revolucije (Industry 4.0).

Ključne reči: *inovacije, visoko tehnološki proizvodi, globalni inovacioni indeks, izvoz.*

Introduction

The development of the European economy has been based on the concept of knowledge for many years now, while the Balkan countries more or less lag behind. In order to accelerate economic growth, countries need to create a set of prerequisites, above all, to increase the competitiveness of its economy. Increasing competitiveness is particularly important in product markets resulting from high technology.

Nowadays, it is believed that innovation is one of the main factors of economic growth of the country. Innovative businesses have a positive effect on the economic growth of the country and on the living standard of people [1] and innovations are created through process design. People are using new knowledge to produce new products and new skills are created within the company. Companies through the so-called inter-industry innovation collaborate and combine their knowledge as potential sources for innovation. In their innovation activities high-tech industries depend more on scientific research and development compared with low-tech industries [18].

Market demands and competition compel companies to innovate and explosion of knowledge in the globalized IT world is evident which changes the behavior of companies and their innovation processes [14]. Higher exports of HTP would increase Serbia's competitiveness in the world market, thereby achieving higher economic growth of the country and higher living standard of the population.

It can be considered that the higher exports of HTP is conditioned by the level of innovation of the country, that is, the Global Innovation Index (GII) will be increased by the higher investment of GDP in R&D. Despite qualitative development data, the inevitable factor that defines the quality of R&D and research and development innovation (RDI) and activities of the country is the National innovation system (NIS), which represents a set of all state and private entities involved in innovation activities, that is RDI activities of the country. The global economy and the development of science and technology have entered a new era characterized by intensive development and innovation of high technologies with numerous important discoveries world over [34].

Literature review

The beginning of the 21st century is characterized by complex processes of world development, in which multinational corporations and modern technology dominate, both in economic, and other industries [9]. Globalization has triggered trade liberalization, while competitiveness is constantly increasing and companies are forced to find new markets and thereby increase their effectiveness [8]. From the perspective of economic development, technology, knowledge, innovation, and related concepts are important primarily because technologically more advanced products or production processes increase the value added, which is the primary goal of economic development as it allows for the improvement of the living standard [25]. Serbia invests in research and development less than EU countries which follow the level prescribed by the Lisbon convention. This is especially true due to low private investment. However, these figures are expected to improve due to newly introduced tax incentives for companies that invest in research and innovation [10].

It is necessary to increase the national innovation capacity (NIC) of the state, it should strengthen innovative activities, primarily in product innovation, which will be able to expand existing and conquer new markets [4], for which it is necessary to acquire new knowledge and to create an efficient national innovation system. The technological revolution, based on a wide range of relatively independent innovations, is unconditionally linked to innovation generators, namely research institutes and universities [31].

The main results of a company's R&D processes are precisely innovations, but also improvement of business operations and creating value based thereon [13]. Innovation readiness is the ability to create and generate new ideas, but also their applications in practice, which is an important prerequisite for enterprise efficiency, permanent development and survival on the world market. The efficiency of the company is reflected in the development of new products (NPDs), which includes new functions in the company and their mutual coordination is a presumption of success. Nowadays large-scale innovations are changing the economic landscape. In the evolving technologies, new trends and possibilities emerge so quickly that it is sometimes difficult for businesses to keep up [12]. In addition to automation and Artificial Intelligence (AI), another notable technology that is perceived as an enabler of progressive innovation is blockchain or distributed ledger technology which is perceived as one of the catalysts of the Fourth Industrial Revolution [33].

Many studies examined innovation and the relationship of innovation on the manufacturing industry from many aspects, such as the influencing factors, transformation and upgrading of the manufacturing industry, national innovation system, and impact of innovation on economic development [19]. For the success of innovative products on the HTP production depends on the possession of technology, skilled workers (employees) and quality resources. In order to become competitive, firms round out only the basic processes in creating HTP while leaving other processes in cooperative relationships with other companies that have advantages in lower costs, equipment or technology [6]. Research and attempts are being made to explain the complexity of the creation of new technologies and ways of their emergence as a factor of progress and progress itself [29].

The uncertainty of such outcome of the R&D process and the transformation process of the "laboratory product" into the "market product" is eliminated by the constant "Feed Back" link technology innovation - market demands [3]. Innovative technologies require specialist, i.e. expert knowledge. The main prerequisite its proper networking. These networks, for example between two potential partners, require intensive cooperation in research and development as well as at all stages of project implementation [2]. Competence in this complex process of cooperation in R&D between the two companies determine the levels [22], scope and scenarios of the specialized activities of each individual company in the development of several products [23], [28]. Information and knowledge can be exchanged with customers to co-create superior service delivery, which can promote new ideas and innovation capability to match customers' needs [30]. Creative industry is a skill-based industry, so knowledge and skill sharing activity becomes very important to be developed. Creative industries need innovation for their products [17]. The contribution of creative goods and services is recognized as an important path to economic development [26].

One approach presumes innovation capacity through the results of fundamental and applied research where researchers market valorizes discoveries and new knowledge by generating profit by creating new products through new technologies [27], [7]. Technology is the main driver of economic growth and social prosperity. In addition, it influences the growth model, economic policy platform and behavior (business model and strategy) of basic economic entities. Technology is an ambivalent phenomenon, a factor shaping opportunities (inclusive innovations) and threats (disruptive innovations), or both (structural changes) [11]. The most concrete link between innovation and competitiveness is found in Porter [24] that innovation is actually the basis for starting a competitive game on the market. High-tech products are the result of radical innovations that cost more and not all countries are able to invest enough in fundamental research [16]. There are also different potentials of countries in terms of innovation [21], [35]. The growth of the innovation potential of a country depends above all on its innovative performance measured by the intensity of research and development, the absorption capacity of enterprises, the breadth of cooperation on innovation, etc. [15].

Research methodology

The survey was conducted using the EUROSTAT database and the World Bank for four selected countries: Romania, Bulgaria, Hungary and Serbia for the period 2009-2018. The database on high-tech exports, research and development expenditures, education index were taken from the EUROSTAT database, GDP per capita from the World Bank database, while the Global Innovation Index was taken from the Global Innovation Index database.

The central part of the empirical research focuses on the impact of GDP (per capita) and the education index, which is calculated as a geometric average of two indicators: average years of schooling and expected years of schooling. The Education Index is one of the three components of the Human Development Index. The Global Innovation Index consists of two sub-indices - innovation inputs and innovation outputs. R&D expenditures (as a share of GDP) on high-tech exports (as a share of total exports) were measured by panel regression.

The Human Development Index was omitted from the model due to the problem of multicollinearity that occurs due to the high degree of positive correlation with the Education Index. The problem of high positive correlation was also discovered between the variables Research and development expenditure (% of GDP) and Total R&D personnel, which is why the variable Total R&D personnel was omitted from the model, so that the final model looks like:

$$y_{i,t} = \alpha + \beta_1 \log x_{1\ i,t} + \beta_2 x_{2\ i,t} + \beta_3 x_{3\ i,t} + \beta_4 x_{4\ i,t} + u_{i,t}$$
$$i=1,\ldots,N;\ t=1,\ldots,T$$

where:

- $y_{i,t}$ is High-tech exports (Exports of high technology products as a share of total exports)
- $x_{1\ i,t}$ is GDP per capita (current USD)
- $x_{2\ i,t}$ is Education index
- $x_{3\ i,t}$ is Global Innovation Index
- $x_{4\ i,t}$ is Research and development expenditure (% of GDP)
- $u_{i,t}$ is Error term
- N is Number of observation units (countries) in the sample
- T is Time period covered by observations in the sample

The paper first examines the basic assumptions related to the characteristics of random error behavior $u_{i,t}$, and then tests were performed to select an adequate assessment method.

The model parameters were estimated first using the Pooled Ordinary Least Squared (POLS) model which implies that the random error $u_{i,t}$ has a normal distribution with mean zero and constant variance and that it is not correlated with explanatory variables in the model, i.e. that there is no endogeneity in the model. If any of the above assumptions are not conformed, the estimated parameters of model can be biased and unreliable. The consequence of endogeneity in the model, in addition to the bias and unreliability of the estimated parameters, is an unnoticed heterogeneity that has a significant systematic impact on the dependent variable High-tech exports.

To eliminate the consequences of unobserved heterogeneity, the assumption was made that the omitted variable does not vary with respect to the comparative dimension. If it is assumed that the omitted variable does not vary from year to year, then the disturbance term in the model can be decomposed into:

$$u_{i,t} = \mu_i + v_{i,t}$$

where μ_i is individual specific effect and $v_{i,t}$ remainder disturbance that varies over time and countries.

In the analysis, the Fixed effects model and the Random effects model were used as adequate to incorporate unobserved heterogeneity depending on individual specific effect μ_i. The Hausman test was used to assess the adequacy of the Random effects model.

Research results

Based on descriptive indicators for each individual country, the result was obtained that the share of exports of high-tech products in total exports in the analyzed period was highest in Hungary (17.59%), followed by Romania with 7.70%, while the lowest share was recorded in Serbia (2.25). In addition to being a country in sample with the lowest share of high-tech products in total exports compared to other countries included in the sample, Serbia also had the biggest decline in share of 32% in the analyzed period, while the highest growth was achieved by Bulgaria (28%). Romania remained at almost the same level. The share of exports of high-tech products in total exports varied in Hungary from 14.5 (2014) to 22.2 (2019), in Romania from 5.60 (2013) to 9.80 (2010), in Bulgaria from 3.70 (2011) to 5.90 (2018), and in Serbia from 1.90 (2018) to 2.80 (2009).

As it could be expected, the lowest GDP per capita was in Serbia and amounted to \$ 6298, unlike Hungary, which has 2.2 times higher GDP per capita, Bulgaria, which has 1.2 times higher GDP per capita than Serbia and Romania, whose GDP per capita is 1.5 times larger than the Serbian. The highest GDP per capita growth was recorded in Romania (45%), and the lowest in Serbia (18%).

As we could expect when it comes to the level of education of the population, based on the value of the Education Index, Serbia is ranked the lowest in relation to Hungary, Romania and Bulgaria. The average value of the Education Index in the analyzed period was 0.82 in Hungary, 0.78 in Bulgaria, 0.77 in Romania and 0.75 in Serbia. Approximately the same result was obtained on the basis of Human Development Index.

Ranking of the countries surveyed, according to which Hungary is ranked best compared to comparable countries in all ten years, Serbia permanently occupies the fourth place. From the point of view of the average rank of Global Innovation Index, Hungary has a ranking of 45.05; Bulgaria 41.26; Romania 38.24; and Serbia 36.40.

In the analyzed period, the largest share of R&D expenditures was in Hungary 1.28%, followed by Serbia 0.79%, Bulgaria 0.68% and the least Romania 0.44%. When we look at the growth rate of the share of R&D expenditures in relation to the country's GDP, we conclude that the highest growth was achieved in Hungary of 0.38 percentage points, and the lowest in Romania of 0.06 percentage points, while in Serbia the achieved growth was of 0.10 percentage points. Investments in research and development costs in the business enterprising sector show a lot of fluctuations as per individual both in the countries and in the observed years. Average values are highest for Hungary with 1.28%, Bulgaria 0.43%, Romania 0.21% and Serbia 0.20%. Serbia invests in this sector more than two times less than Bulgaria and more than six times less than Hungary.

Research and development spending in the state sector ranges from 0.15% to 0.27%. The average investments of Serbia are about 0.23% while for the three comparing countries they range from 0.18% to 0.20%. Expenditure on R&D in higher education shows drastic differences. Serbia has the most significant allocations, and average allocations are as follows: Serbia 0.35%; Bulgaria 0.05%; Romania 0.08%; and Hungary 0.20%. The costs of this sector are 1.5 times higher in Serbia than in Hungary, and significantly higher than in Romania and Bulgaria.

Table 1: Descriptive analysis of indicators by countries in the period 2009-2018.

Country	Variable	Mean	St. dev.	Min	Max
Bulgaria	High-tech exports	4.49	.75	3.70	5.90
Romania		7.70	1.29	5.60	9.80
Serbia		2.25	.30	1.90	2.80
Hungary		17.59	2.90	14.5	22.2
Bulgaria	GDP per capita (current US$)	7690	764.20	6812	9427
Romania		9568	1263.19	8214	12399
Serbia		6298	544.83	5588	7252
Hungary		13817	1116.59	12706	16410
Bulgaria	Education index	.78	.01	.75	.79
Romania		.77	.01	.76	.79
Serbia		.75	.02	.72	.78
Hungary		.82	.01	.81	.83
Bulgaria	Human Development Index (HDI)	.80	.01	.77	.81
Romania		.80	.01	.80	.82
Serbia		.78	.01	.76	.80
Hungary		.83	.01	.82	.85
Bulgaria	Global Innovation Index	41.26	1.40	38.42	42.8
Romania		38.24	1.06	36.83	40.3
Serbia		36.40	1.86	33.80	40.00
Hungary		45.05	2.09	41.70	48.12
Bulgaria	R&D expenditure (% of GDP)	.68	.14	.49	.95
Romania		.46	.05	.38	.50
Serbia		.79	.09	.68	.92
Hungary		1.28	.12	1.13	1.51
Bulgaria	Total R&D personnel	26080	5339.07	20810	34610
Romania		43023	1661.26	39065	44801
Serbia		21464	1702.68	19341	23629
Hungary		58499	7701.81	52522	79387

Source: authors` calculations

Research and development costs in the private non-profit sector are negligible and the data are incomplete.

The average number of researchers during the observed period was as follows: Hungary 58499; Romania 43023; Bulgaria 26080; and Serbia 21464. The number of researchers in Serbia engaged in the business sector increased significantly from year to year from 517 in 2011 to 3849 in 2016, but also Serbia significantly lagged behind the countries of the CEE that were compared. A significant shift in the number of researchers in Serbia still shows that this is still insufficient (2255 average number of researchers in the analyzed period), unlike Bulgaria, which has an average of 7873 researchers in the observed sector, Romania 11552, and Hungary as many as 24145.

In public sector, the number of researchers is about twice as high in Romania (11818), Bulgaria (9153) and Hungary (10035) compared to Serbia (5436). When it comes to the number of researchers in the higher education sector, the situation is somewhat different. The average number of researchers in the analyzed period was 8884 in Bulgaria, 19431 in Romania, 13757 in Serbia, and 24319 in Hungary. The number of researchers in Serbia in the private non-profit sector is small and the average in this period is 17 while in Hungary our database does not record the situation. Bulgaria and Romania have an average of 170 or 222 researchers.

In accordance with the research methodology, the model was first estimated with a Pooled ordinary least squares (POLS) estimator, then with a fixed effects model, time-fixed effects and a random effects model.

Table 2 shows the estimation results together with standard errors, number of observations, coefficient of determination, values of F-statistics and probability.

From Table 2, it can be seen that all four regression models are statistically significant: Pooled Ordinary Regression model (Prob = 0.000), Fixed effects model (Prob = 0.006), Time-fixed effects model (Prob = 0.000) and Random effects model (Prob = 0.000). Based on the numerical value of Adj. R-Squared we can conclude that in almost all models the exploratory power is at an extremely high level (over 90%) except for models with fixed effects (46%).

Given the explanatory power of the model with random effects, the high degree of coefficient of determination and the statistical significance of each individual variable in the model, Hausman's test of the adequacy of the model with random effects in relation to the Time-fixed effects model was performed. Based on the numerical value of Chi2 statistics (-4.02), the null hypothesis cannot be rejected that the difference in coefficients is not systematic, which is why we can no longer use the model with random effects, so we opt for the Time-fixed effects model as appropriate.

Table 2: Comparative presentation of estimated parameters POLS, Fixed effects model, Time-fixed effects model and Random effects model

Independent's variables	POLS model	Fixed effects model	Time-fixed effects model	Random effects model
GDP per capita	14.01*** (1.517)	4.12 (2.712)	15.91*** (1.357)	14.01*** (1.517)
Education index	47.29** (18.806)	36.45** (17.898)	35.37** (15.147)	47.29** (18.806)
Global Innovation Index	-.11*** (.020)	-.06** (.018)	-.16 (.106)	-.11*** (.020)
R&D expenditure (share of GDP)	3.09** (1.340)	-4.00 (2.677)	3.66*** (2.677)	3.09** (1.340)
_cons	-155.35*** (11.461)	-52.91* (29.684)	-162.08*** (8.938)	-155.35*** (11.461)
No. of obs.	40	40	40	40
Adj. R-Squared	0.91	0.46	0.95	0.92
F-test	98.75	4.37	181.42	394.98
Prob>F	0.000	0.006	0.000	0.000

Note: *Significance level - 10%, ** Significance level - 5%, *** Significance level - 1% (standard errors are shown in parentheses)

Based on the level of significance of the variables in the Time-fixed effects model, a positive statistically significant impact of GDP per capita, Education index and R&D expenditure on High-tech exports was identified, and it was determined that the Global Innovation Index has no statistically significant impact on the share of high-tech. In other words, an increase in GDP per capita, the level of education of the population and the share of R&D expenditures in GDP leads to an increase in the share of high-tech products in total exports.

Discussion

Governments of many European countries are directly or indirectly encouraging development of innovation activities [32]. These incentives in the EU primarily relate directly to, or through fiscal incentives, subsidizing research activities. One of the prerequisites for successfully delivering new products and services to the market is the cooperation at different levels: between researchers, inventors, companies, R&D (research and development) support institutions, within parts of the subsystem, ranging from team levels: enterprises to sectors such as R&D and universities.

Based on the percentage of GDP that is allocated for research and development, EU countries can be divided into four groups. The first, which includes countries that spend less than 1% of GDP on research and development, includes Bulgaria, Croatia, Cyprus, Latvia, Lithuania, Malta, Romania and Slovakia. The second group of countries whose allocations for research and development amount to between 1 and 2% of GDP are the Czech Republic, Estonia, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Poland, Portugal, Slovenia and Spain, while Belgium, Finland, France and the United Kingdom are in the group of countries that allocate more than 2 to 3% of GDP for research and development. Only Austria, Germany, Denmark and Sweden allocate more than 3% of GDP for research and development.

Serbia as a candidate country for admission to the European Union should have a functioning market economy and be competitive in market competitions with other economies within the European Union. For these reasons, Serbia should make a strategy to overcome technological lag and secure faster and sustainable growth.

High-tech products and their exports can only bring better competitiveness and improve the balance of payments situation in Serbia. For these reasons, we agree with the view that the development strategy of Serbia in the next decade should be export oriented according to the concept of "export or die". Although it seems too strict, we consider this view to be an imperative that the country's policy is focused on the production and export, primarily of the HTP, and on the strengthening of all the country's production resources. We are especially referring to the support of such production and export orientation by the political elites of the country. These production and export-oriented companies in Serbia have a great need for innovation [5].

Conclusions

The key goal of the Lisbon Strategy (2010) is to accelerate the transition of countries towards knowledge-based economy. This strategy implies that education, research, training and innovation effectively contribute to the country's economic and overall growth.

In addition to the fact that Serbia is the country in the sample with the lowest share of high-tech products in total exports, compared to other countries included in the sample, Serbia had the largest decline in the share of exports of high-tech products in the analyzed period. The lowest GDP per capita was in Serbia, unlike Hungary, which has 2.2 times higher GDP per capita. The highest GDP growth per capita was recorded in Romania, and the lowest in Serbia. When it comes to the level of education of the population, based on the value of the education index, Serbia is ranked the lowest in relation to Hungary, Romania and Bulgaria. In the analyzed period, the largest share of expenditures for research and development was notable in Hungary, followed by Serbia, Bulgaria and the least in Romania. Investments in research and development in the business-entrepreneurial sector show a lot of fluctuations, both in some countries and in the observed years. The average values are the highest in Hungary and the lowest in Serbia. The number of researchers in Serbia engaged in the entrepreneurship sector increased significantly from year to year from 517 in 2011 to 3849 in 2016, but Serbia also lagged significantly behind the countries compared in this analysis. A significant growth in the number of researchers in Serbia continues, but still, it is insufficient.

HTP exports are exports of high technology products as a share of total exports [20]. Research on innovation and other indicators and their impact on export of HTP (percentage of total exports) shows that exports of HTP Serbia are quite low compared to CEE countries: Hungary, Romania and Bulgaria, and all three countries, our research shows, are dissatisfied with the level of HTP exports and level of competitiveness in relation to the EU average. In addition, the European Commission's assessment (which periodically monitors the progress of member states and candidate countries) shows the lagging behind of these countries, especially Romania and Bulgaria, in most innovation indicators. Exports of HTP is the highest in Hungary, during the entire observed period, on average 17.59% of the total exports of that country, in Romania it's 7.70%, in Bulgaria 4.49% and in Serbia only 2.25%.

In order to speed its pace in comparison with ERA and increase exports, HTP Serbia needs to increase the percentage of GDP allocation for R & I and find ways to reach as high as 3% as soon as possible. This is a hard-hitting goal, but positive developments in the economy of recent years give place to a moderate optimism.

One of the ways to increase investment in Serbia's innovative activities can be found in the EU Access Fund. Possible directions of additional investments are our diaspora and the participation of scientists of our origin in research. To help Serbia ease the export of HTP, the total innovational, cultural and social frameworks for entrepreneurship and innovation should be increased. It will be conditionally possible, based on our research, to provide some feasible directions for the development of Serbia and improve its innovative performance on the road to EU membership. The EU membership and open access chapters oblige Serbia to fulfill certain criteria in the field of R&D and, if it does not have to enter into its laws, join the ERA. The increase of innovation performance in Serbia should lead to greater application of high technologies in production and increased exports of HTP as an important factor in increasing competitiveness. From this increased competitiveness, opportunities for higher living standard of Serbian citizens will be created. In particular, the mandatory foreign evaluation of R&D and R&I activities of all entities in Serbia should be carried out. Existing financial resources are directed towards the business sector and strengthening of private investments in R&D and projects between the economy and the researchers. Since the largest number of researchers is concentrated in universities, it is necessary to allow them to be partners and direct contract partners for projects that support the creation of high technology and HTP. A public - private partnership should be an incentive for greater investment in R&D. It is necessary to introduce stimulant fiscal incentives and subsidies to domestic and foreign investors in R&D, along with the support given to foreign investors in Serbia. According to the results of some research that dealt with the new, Eastern European EU member states, each corporate investment in research and development of 1% on average increases the innovative output of companies by 0.6%.

These sources are "redistribution" of investments in high-tech companies, strengthening the participation of foreign funds, call to the investors and diaspora scientists, etc. Preferably, researchers from Serbia should be involved in the EU projects, to use better EU pre-accession funds and to help the positive practices of countries in the region and developed EU countries. Serbia needs to be given stronger support.

The development of research and development would make the R&D sector more attractive in Serbia and cooperation with big foreign companies operating in Serbia may result in strengthening the research innovation potential of Serbia. Serbia is a country that is still in transition, especially in the field of R&D, and involvement in the ERA requires a lot of effort, political will, long-term vision and patience.

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Ivana Domazet

is Principal Research Fellow at the Institute of Economic Sciences and Associate Professor at the Faculty for Banking, Insurance and Finance, Union University. She teaches Marketing (undergraduate studies), Marketing Management, Marketing Strategy and Integrated Communications (postgraduate studies). Her scientific interests refer to: competitiveness, marketing research and strategy, communications, CRM and strategic management. She published a book in the field of competitiveness, market research, integrated marketing communications, as well as numerous papers related to the foregoing topics. She is Vice President and Board member of the Institute of Economics Sciences; Board member of the Institute of Social Sciences; member of the Scientific Society of Economists in Serbia (NDES); member of the Serbian Marketing Association. She was (2014-2019) President of the Scientific Council at the Institute of Economic Sciences.

Darko Marjanović

is Research Fellow at the Institute of Economic Sciences. He completed his graduate, master and doctoral studies at the Faculty of Economics in Subotica, University of Novi Sad. He served (2015-2018) as a financial director (CFO) in a large trading company BB Trade. His current areas of professional interest are: public finance, competitiveness, foreign direct investment. He has published, as author of co-author more than 50 scientific papers. He has participated in a few research and scientific projects, financed by the Ministry of Education, Science, and Technological Development of the Republic of Serbia and Provincial Secretariat for Science and Technological Development of the Autonomous Province of Vojvodina. He is member of the Scientific Society of Economists of Serbia and Editor of the international scientific publication SEE-6 Economic Outlook.

Deniz Ahmetagić

works at the Faculty of Economics in Subotica, in the position of an Expert Associate in Science. He is enrolled in a doctoral Study at the Faculty of Economics in Subotica study program Management and Business. He has participated in the development of the project proposals and project management activity for projects funded by the programs of the European Commission, TEMPUS, SEE IPA and others. He also participated in the management of national projects funded by the Provincial Secretariat for Science and Technological Development, Republic of Serbia, Ministry of Education Science and Technological Development, and others. He has published as author or co-author more than 30 articles in management and finance.

Milica Bugarčić

is Assistant professor at Belgrade banking academy - Faculty for banking, insurance and finance. She teaches Microeconomics, Financial Statistics and Data Analysis at undergraduate studies, Marketing Research, Economic Analysis and Advanced Data Analysis at postgraduate studies. Her scientific interests refer to: demand analysis and marketing research. She published as author or co-author more than 15 articles. From 2020 she has been engaged as an external associate of the Institute of Economic Sciences, and is an active member of the Serbian Marketing Association.