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## Uvodnik

U drugom broju časopisa Ekonomske teme u 2016. godini prikazani su radovi autora koji se bave temama u oblasti privrednog rasta, fiskalne politike, kvantitativnih metoda, kao i analizom specifičnih pitanja menadžmenta koja se tiču ljudskih resursa i elektronskog bankarstva.

Autori članka pod naslovom *Tehnološke promene u ekonomiji rasta: Neoklasični, endogeni i evolutivno-institucionalni pristup* promovišu tehnološke promene kao ključni generator ekonomskog rasta, ukazujući da ekonomske teorije naglašavaju značaj različitih pokretača tih promena, na primer, ulaganje u naučnoistraživački razvoj, eksternalije ili ekonomsko i socijalno okruženje. U članku *Ulaganje u istraživanje i razvoj kao determinanta međunarodne konkurentnosti i privrednog rasta u EU28 i Srbiji*, autori prihvataju činjenicu da je u savremenom poslovnom okruženju primarni faktor ekonomskog rasta znanje i preporučuju analizu pokazatelja ulaganja u istraživanje i razvoj, a posebno korelacije između tih pokazatelja i ekonomskog rasta. Baveći se procenom veličine ciklične i strukturne komponente fiskalnog deficita, na osnovu metoda Evropske centralne banke, autori članka *Empirijska ocena fiskalne pozicije Republike Srbije* pokazuju da su automatski stabilizatori uglavnom imali izraženiju ulogu nego dosledna kontraciklična diskreciona fiskalna politika.

Predmet članka *Modeliranje i prognoziranje izvoza Republike Srbije primenom sezonskog Holt-Wintersovog i ARIMA metoda* je analiza trendova u izvozu i objašnjenje varijacija u izvoznim trendovima, a zaključak autora je da postoji visok stepen podudarnosti između prognoze dobijene pomoću navedenih metoda. Cilj članka *Utvrđivanje preferencija ekspertske grupe u višekriterijumskom modelu za analizu lokalnog ekonomskog okruženja* je promocija višekriterijumskog odlučivanja u proceni lokalnog ekonomskog razvoja, u ovom konkretnom slučaju kroz određivanje težinskih koeficijenata i primenu metoda Jednostavnih aditivnih težina.

Članak *Uticaj nacionalne kulture na međunarodni menadžment ljudskih resursa* analizira uticaj određenih dimenzija nacionalne kulture na preferirani sadržaj upravljanja ljudskim resursima u organizacijama u pojedinim zemaljama, kako bi se identifikovala ravnoteža između sistema koji se primenjuje u sedištu organizacije i onog koji je poželjan u entitetima inostranstvu. Autori članka *Identifikacija ključnih determinanti satisfakcije korisnika usluga elektronskog bankarstva* ističu da je merenje kvaliteta usluga značajno, te, stoga, analiziraju zadovoljstvo klijenata uslugama elektronskog bankarstva, kako bi identifikovali elemente kvaliteta usluga čiji je uticaj najveći.

Zahvaljujemo se autorima na priložima, a recenzentima na saradnji.

*U ime uređivačkog odbora,*

*Marija Radosavljević*

## Editorial

The second issue of the journal *Economic Themes* for 2016 presents the articles of the authors who deal with issues concerning economic growth, fiscal policy, quantitative methods, as well as with analysis of specific management issues related to human resources and e-banking.

The authors of the article entitled *Technological Changes in Economic Growth Theory: Neoclassical, Endogenous, and Evolutionary-Institutional Approach* promote technological changes as the key generator of economic growth, pointing that economic theories emphasises the importance of different drivers of those changes, for example the funds for scientific and research development, externalities, or economic and social environment. In the article *Research and Development Investment as Determinant of International Competitiveness and Economic Growth in EU28 and Serbia*, the authors accept the fact that in modern business environment the primary factor of economic growth is knowledge and recommend the analysis of indicators of R&D expenditures, especially the correlation between those indicators and economic growth. Dealing with the evaluation of the size of the cyclical and structural components of the fiscal deficit, based on the method of the European Central Bank, the authors of the article *Empirical Evaluation of the Fiscal Position in Serbia* suggest that automatic stabilizers generally played a more prominent role than consistent countercyclical discretionary fiscal policy.

The subject of the paper *Modelling and Prognosis of the Export of the Republic of Serbia by Using Seasonal Holt-Winters and ARIMA Method* is an analysis of trends in export and explanation of variations in the export trends, and the conclusion of authors is that there is a high degree of congruence between forecasts obtained by using two mentioned methods. The aim of the article *Determination of Expert group Preferences in the Multi-Criteria Model for the Analysis of Local Economic Environment* is promotion of multi-criteria decision making in the assessment of local economic development, in this special case through determination of weight coefficients and application of the Simple Additive Weights method.

The article *Impact of National Culture on International Human Resource Management* analyses the impact of certain dimensions of national culture on the preferred content of human resources management in organisations of certain countries, in order to identify the balance between the system that is applied at headquarter and one that is preferred in entities abroad. The authors of the article *Identification of Key Determinants of Satisfaction of Users of Electronic Banking services* point out that measuring the quality of services is significant, so they examine the satisfaction of clients in relation to electronic banking services, in order to discover which elements of service quality have the greatest impact.

We thank the authors for their contributions and reviewers for cooperation.

*On behalf of the Editorial Board,  
Marija Radosavljević*

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## TECHNOLOGICAL CHANGES IN ECONOMIC GROWTH THEORY: NEOCLASSICAL, ENDOGENOUS, AND EVOLUTIONARY-INSTITUTIONAL APPROACH

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Review

paper

**Abstract:** The aim of the research in this paper is to analyse the issue of the treatment of the category of technological changes within the main aspects of economic growth theory. The analysis of the key positions of neoclassical theory (Solow), endogenous approach (Romer), and evolutionary growth theory (Freeman) advocates has pointed to the conclusion that these approaches agree on the fact that the category of technological changes is a key generator of economic growth. Neoclassicists were the first to explicitly analyse the category of technological changes in growth theory. They exerted a strong influence on a large number of governments to allocate significant funds for scientific and research development, to stimulate the creation and diffusion of innovation. Supporters of endogenous theory also see the category of technological changes as a key driver of economic growth. Unlike neoclassicists, they emphasise the importance of externalities, in the form of technological spillover and research and development activities, for the creation and diffusion of innovation. Finally, evolutionary and institutional economists explore the category of technological changes inseparably from the economic and social environment in which they are created and diffused. Recommendations of this research can be of particular use to economic growth and development policy makers in the knowledge economy, whose basic and substantial feature is the so-called fourth industrial revolution.

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## 1. Introduction

The most important part of macroeconomic theory and policy is dedicated to the study of the category of economic growth, i.e. research of quantitative relations between the value of the final output and the quantum of production factors at the national level. Economic growth theory deals with the problems of dynamic equilibrium, and attempts to reach an acceptable answer to the question as to what kind of use of available production factors can provide for a sustainable increase in real gross domestic product per capita in the long run. The maximum economic growth rate is achieved with the greatest possible increase of production factors used and/or their most efficient use (Cvetanović, 1997, p. 11).

There are opinions that economic growth theory, in the true sense of the word, emerged in the mid-twentieth century, identifying the category of technological change as a key factor of economic growth of countries (Solow, 1956, 1957). Neoclassicists were the first to unambiguously recognise and analyse the category of technological changes as the driver of economic growth, and, after a number of empirical studies, concluded that this was by far the most important driver of economic dynamics.

The biggest drawback of neoclassical growth theory is a failure to respond to the question of how technological changes occur. As if they were “falling from the sky”, making human labour more productive (Petit, 1995). However, despite these shortcomings, it is undeniable that it paved the way for the acknowledgement of knowledge as a generator of economic growth in modern economic conditions. Among other things, neoclassicists’ attitudes during the nineteen-sixties made a large number of governments invest significant funds in research and development activities, in order to support technological progress.

Since the technological changes in the neoclassical growth model are of exogenous character, it appears that the model does not explain the most important determinant of growth rate. This situation has led a large number of researchers to try to “endogenise” the category of technological changes, as a result of economic and other processes.

Theoretical approaches that try to break with the neoclassical orthodoxy in order to explain the origin of technological changes appeared in the nineteen-eighties. Although this is a very heterogeneous group of explanations, they can be divided into endogenous theories and evolutionary-institutional theories of economic growth (Greenhalgh, Rogers, 2010, pp. 213-214).

During the ninth and the tenth decades of the twentieth century, there was an affirmation of endogenous and institutional-evolutionary explanations of the phenomenon of economic growth. The prevailing opinion was that knowledge, which leads to technological changes (innovation), was an elementary driver of

economic progress of countries. Endogenous growth theories developed approaches where the key growth factors are technological spillover, research and development activities, and international technology transfer.

On the basis of criticism of neoclassical attitudes, institutional and evolutionary explanations of the growth phenomenon promote the concept of national innovation system. The underlying assumption of the national innovation system concept is that the economic growth of the country is possible with technological progress, and that it is not predominantly affected by the quantity of research and development resources, but the quality of the organisation and efficiency of management of these resources at the microeconomic and national levels (Blanchard, 2005, p. 258). Such a starting point can be of particular importance for small countries and countries at lower levels of economic development, which do not have significant innovation potential. The ability to manage technological changes is primarily an endogenous social process. Creating innovation system in small countries with limited resources is a valuable alternative to conceiving their own technological development. The difference between innovation systems in developing countries and developed countries is the result of the fact that the former are characterised by scarcity of resources, and that they are in the catching up process with economically advanced countries.

The subject of this paper is the identification of the role of the category of technological changes in the most important theoretical approaches to economic growth. The aim is to employ descriptive analysis of the essence of main growth theory approaches in the last sixty years to come to the answer to the question as to what are the similarities and differences in the treatment of the category of technological changes in traditional (neoclassical) and in modern theories. This is seen as important for the simple fact that economics lacks the necessary unified opinion regarding the classification of the most important growth and development theories, on the one hand, and the treatment of the key drivers of technological changes, on the other hand. In doing so, we are fully aware of the fact that each growth theory has a certain value in respect of a specific time and place. Therefore, "they are unsustainable as a universal explanation of economic development" (Samuelson, Nordhaus, 2009, p. 584).

The above observations regarding the subject and goal of the research determine the corresponding structure of the work. After the introductory remarks, the first section focuses on identifying the role of technological changes in the neoclassical economic growth theory. The second section considers the role of technological changes in endogenous growth models, and the third focuses on the treatment of the category of technological changes in the institutional-evolutionary economic thoughts. The final part, given separately, provides the concluding remarks.

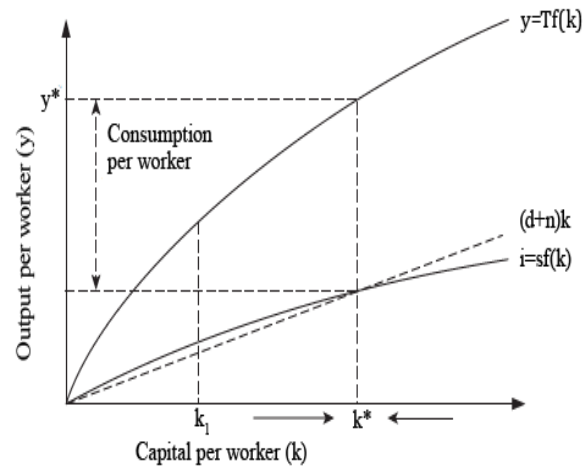
## **2. Neoclassical Growth Theory: Recognition of Technological Changes as a Key Factor of Economic Dynamics of Countries in the Long Run**

The economic growth theory has, in the true sense of the word, emerged with the publications of the American economist, Robert Solow (Solow, 1956, 1957). The analytical starting point of Solow's model is the production function, in the form  $Y = TF(K, L)$ , where  $Y$  is production (gross domestic product),  $T$  is technology,  $K$  is physical capital, and  $L$  amount of work. By dividing the left and right side of the function  $Y = TF(K, L)$  by  $L$ ,  $y = Tf(k)$  is obtained, where  $y$  denotes gross domestic product per capita and  $k$  capital to labour ratio (Dragutinović et al., 2015, pp. 91-96). Diminishing returns of production factors are the basic assumption of the model, based on which all the main conclusions are derived. The economy in which different variables, such as production, capital, employment, and consumption, grow in the long run at equal rates is in a state of stable equilibrium.

The neoclassical growth model shows that, without technological changes, in a state of long-term stable equilibrium, there is no long-term growth in production per capita. Per capita income levels vary among countries, depending on the preferences of their residents. Because of the law of diminishing returns, in Solow's model, increasing production funds per capita cannot explain the growth of labour productivity in time, or significant differences in the growth rates of gross domestic product per capita in individual countries.

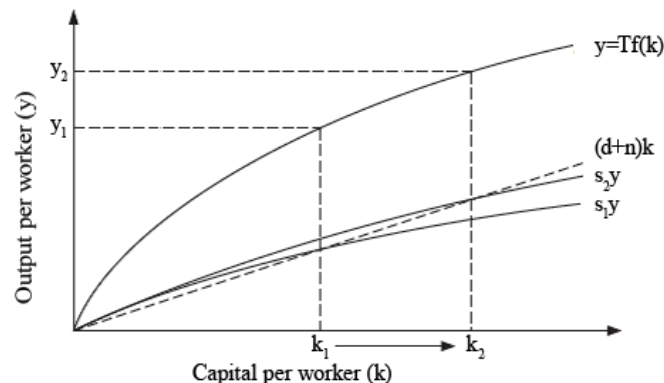
When the marginal labour product falls low enough, net investment falls to zero, so gross investment is sufficient only to maintain the existing stock of physical capital per employee, i.e. sufficient to annul the effect of depreciation of physical capital and growing labour force on decrease in capital to labour ratio. This equilibrium point is associated with the corresponding equilibrium level of production per worker,  $y^*$ , which indicates the so-called steady state (Barro, Sala-i-Martin, 2004, p. 34). When the steady-state level of production per employee is reached, there are no more incentives for manufacturers to increase the level of capital per employee. In other words, economic growth stalls.

Line  $(d+n)k$  illustrates the category of new investment per worker, required to maintain capital to labour ratio at the same level, given that depreciation and growing workforce work towards the reduction of capital per worker in the economy. When  $i > (d + n)k$ , capital to labour ratios growing, as shown in Figure 1. In the opposite case, when  $i < (d + n)k$ , the value of capital to labour ratio decreases. Finally, when  $i = (d + n)k$ , capital to labour ratios constant,  $k^*$ .

**Figure 1** The equilibrium value of capital to labour ratio in Solow's model

Source: Modified according to: Greenhalgh, Ch. & Rogers M. (2010). *Innovation, Intellectual Property and Economic Growth*, Princeton: Princeton University Press. p. 220.

The growth rate of savings from  $s_1$  to  $s_2$  in the model affects increase in investment per employee, from  $s_1 y$  to  $s_2 y$  (Figure 2). The result of the growth rate of savings is the change of the equilibrium value of the capital to labour ratio from  $k_1$  to  $k_2$ , and finally, the growth of production per employee from  $y_1$  to  $y_2$ .

**Figure 2** Investment growth rate

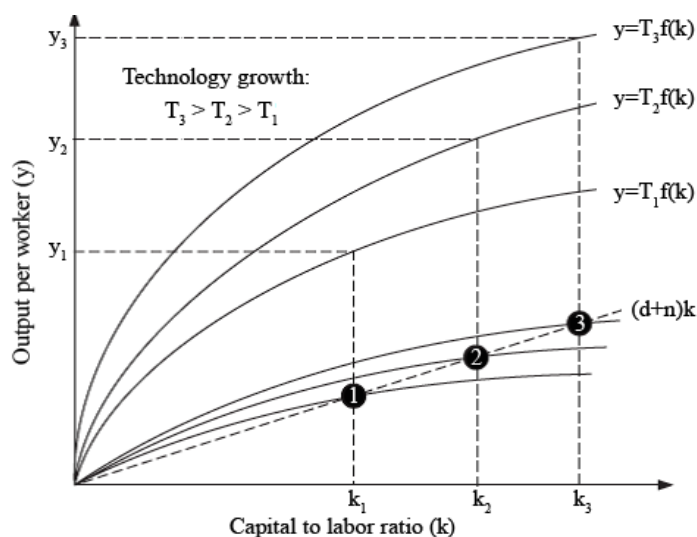
Source: Modified according to: Greenhalgh, Ch. & Rogers M. (2010). *Innovation, Intellectual Property and Economic Growth*, Princeton: Princeton University Press. p. 222.

It follows that the savings rate is a key determinant of the equilibrium value of capital to labour ratio. Thus, high savings rate leads to higher production per employee. However, the growth rate of savings and increased production per

employee on that basis will be temporary, i.e. will continue until the moment the economy reaches a new steady state.

Irrespective of the growth rate of savings and increased investment, growth in production per worker can be the result of technological changes. Figure 3 shows the effect of technological changes on the growth of production per employee. Improving technology  $T_1$ ,  $T_2$ , and  $T_3$  results in a change in the equilibrium value of the capital to labour ratio from  $k_1$  to  $k_2$  and  $k_3$ .

**Figure 3 Technological changes in the growth model of Robert Solow**



Source: Modified according to: Greenhalgh, Ch. & Rogers M. (2010). *Innovation, Intellectual Property and Economic Growth*, Princeton: Princeton University Press. p. 224.

Neoclassical growth models suggest that markets are basically of extremely competitive nature and that they do not aspire to create a monopoly. Due to this fact, market processes, as a rule, lead to optimal allocation of production factors and maximum production. In addition, these models see little opportunity for the state to promote economic growth.

There are at least two conceptual shortcomings of this approach. First, the neoclassical framework makes it impossible to analyse the determinants of technological changes, which depend entirely on the decisions of economic agents. Second, neoclassical theory failed to explain the huge differences in growth rates in countries with similar technological development (Todaro, Smith, 2011). In short, neoclassical growth theory failed to explain the essence of emergence of the broadest diffusion of technological changes, and did not manage to, in an acceptable manner, quantify the contribution of this category to production growth at the national level. Although the technology is a central component of neoclassical theory, it remained unmodelled. Technological

improvements are introduced exogenously, which leaves differences in the level of technology among countries unexplained (Dragutinović et al., 2015, p. 167).

Although neoclassicists identified technological changes as the major source of economic growth and differences in economic development levels of countries, thus permanently indebted macroeconomic theory and policy, they, to tell the truth, did not offer specific practical solutions for achieving technological progress. In particular, they failed to do so bearing in mind the countries at low level of technological and economic development (Švarc, 2009, p.50).

### **3. Endogenous Growth Theory: Emphasis on the Role of Knowledge in the Processes of Creation and Diffusion of Technological Changes**

Endogenous growth theory indicates an attempt to explain the long-term growth of the developed countries (Burda, Viploš, 2012, p. 92). Essentially, an endogenous approach to the research of economic growth is based on econometric analysis, which includes a number of variables and quantifies their impact on economic growth (Sala-I-Martin, 1997, p. 178).

The key postulate of endogenous growth theory is the elimination of the premise of diminishing returns on production factors. This creates the conditions for the growth of production per worker without limitations. "Under this assumption, endogenous growth models do not imply the likelihood of convergence, or reaching the steady-state growth equilibrium, having in mind that endogenous variables are determined within the economic model, and exogenous variables are taken as the given ones in the analysis of the economic model". (Cvetanović et al. 2011, p. 2).

There is a large number of divisions of endogenous growth models. One of them is their classification into: a) endogenous models based on externalities, b) models based on research and development activities, and c) the so-called AK models (Grossman, 1966). The most prominent authors of the models within the framework of the three groups are given in Table 1.

The first row relates to predecessors of a certain group of endogenous growth models.

In light of the defined subject and purpose of the research, it is certain that the most important are a) endogenous growth models based on externalities in the form of technological spillover (Romer, 1986) and b) growth models based on activities of applied research and development (Romer, 1990; Aghion, Howitt, 1992; Grossman, Helpman, 1991). What follows is their elementary explication.

**Table 1 The main groups of endogenous growth model**

<b>Models based on externalities</b>	<b>Models based on research and development</b>	<b>AK models</b>
Arrow (1962); Uzawa (1965); Nelson and Phelps (1966)	Schumpeter (1942); Uzawa (1965); Judd (1985)	King (1935; 1944); von Neumann (1945); Benveniste (1976); Eaton (1981)
Romer (1986; 1987)	Romer (1990); Grossman and Helpman (1990; 1991; 1992)	Becker, Murphy and Tamura (1990); Jones and Manuelli (1990); King and Rebelo (1990)
Lucas (1988)	Ahlgion and Howit (1992)	Rebelo (1991)
Murphy, Shleifer and Vishny (1989)		
Azardis and Drazen (1990)		
Stokey (1991)		
Lucas (1993)		

*Source:* Modified according to: Grossman (1996) and Mervar (2003).

It is believed that Romer's model of 1986 has marked the emergence of endogenous growth theories (Romer, 1986). In this model, the accumulation of knowledge represents a by-product of company decisions to invest in physical capital. The accumulation of capital indirectly affects the increase in the knowledge base of the company due to the process of *learning through work*. Due to the effects of knowledge dissemination, i.e. spillover effect, other companies acquire benefits too, so that knowledge still has the characteristics of a public good. The transfer of knowledge to other companies, in the form of positive technological externalities, results in the increasing returns in these businesses. Taking into account the capital controlled by other companies, Romer assumes that the production function for each company can have a neoclassical form. In this regard, he assumes that the productivity of capital of each company individually can be increased in parallel with the increase in total physical capital which is owned by other companies. In short, investment in physical capital generates externalities, so that all companies, taken together, do not face diminishing return. In this approach, new knowledge that generates externalities is crucial. If one company acquires new knowledge, other companies experience a positive effect on production possibilities, because, in this model, knowledge cannot be kept a secret, i.e. be perfectly protected by a patent. Therefore, production of final products, as a function of the accumulated knowledge and other investment, exhibits increasing returns. Each company generates knowledge in the process of *learning through work*, and it instantly becomes available to all and completely free. In this way, the company's new



knowledge *spills*, but it cannot be said that the company itself does not benefit from this knowledge *spillover* to others (Cvetanović, Mladenović, 2015).

Although Romer managed to endogenise the category of technological changes, the model was not completely satisfactory, since the category of technological changes remained merely a secondary result of the company's economic activities, which is certainly not in line with actual events. Specifically, in this model, businesses, seeking to maximise profits, invest in capital without the explicit intention to do so, mainly due to the manifestation of a knowledge spillover effect, increasing the total fund of knowledge. In reality, it is different. New knowledge is, to a very small extent, incidental result of activities, and to a significantly greater extent, the result of the work of companies and their research and development activities, whereby they do their best to ensure monopoly rent. Thus, the assumption of free and broad diffusion of knowledge in this model, as well as the premise of the existence of perfect competition, are the biggest shortcomings of this model.

Another group of growth models, which stress the importance of the category of technological changes, are the models based on the activities of applied research and development. Building on some Schumpeter's ideas (1961), Romer developed the first model of sustainable growth that can be classified in this model group (Romer, 1990), and was followed by Agion and Howitt (1992), Grossman and Helpman (1994). Endogenous growth models in this group imply the existence of monopolistic structures, power, and the existence of a separate research sector in the economy, which, in a unique way, supplies other sectors with technology. By purchasing the new technology, manufacturers gain the legal right to its use. The price charged is higher than the marginal cost of production, to generate income sufficient to cover the costs caused by large initial investment in creating new technological solutions. Investment in innovation projects, in this regard, is not characterised by diminishing returns. Therefore, the productivity of new investment in innovative activity is not reduced, which is in the function of sustainable economic growth. In these model presentations, the growth rate depends on the amount of funds intended for research and development activities, the degree to which new technology can be used privately (degree of monopoly power), as well as the time horizon of investors.

In Romer's model, based on research and development, growth is driven by technological progress, resulting from investment decisions of companies that seek to maximise profits (Romer, 1990). In this regard, Romer prioritises technology over other goods, since it is non-competitive and only partly exclusive good. The degree of competitiveness of a good is solely its technological property.

The following endogenous growth models established direct mechanisms of creation and accumulation of knowledge in relation to the initial Romer's model. Although the models differ, all start from the position that the overall accumulation of knowledge is the result of the planned decisions of companies to invest in research and development activities. The implications of this approach are that knowledge ceases to be completely a public good. Specifically, in order for companies to be stimulated to invest, knowledge must be, at least to some extent, exclusive. By disabling other companies to copy their inventions and innovation, innovative companies gain a certain type of temporary monopoly power. Mechanisms that ensure a temporary monopoly are related to patent protection. At the same time, competitive companies can rely on available public knowledge, as an input in the production of new goods, or on employment of workers from companies that are innovation-leaders. The level of economic growth is then directly related to the strength of knowledge spillover, since knowledge spillover leads to innovation and growth (Romer, 1990).

The endogenous theory points to the importance of the institutional framework for stimulating innovation, as motivation for innovation depends on the ability of innovators to commercialise innovation. In recent decades, due to the popularity of endogenous growth theory, economists increasingly believe that differences in innovation capacity are largely responsible for large differences in development levels of individual economies (Grossman, Helpman 1991, pp. 46-51).

In endogenous growth models, the adequately defined higher level of investment does not only increase the per capita income, but may sustain high and rising growth rates in the future. This means that it is possible that countries continue to grow rapidly for a long period, even when they have already achieved a relatively high income per capita. There is no targeted equilibrium income level determined by the factors of production used. What is more, there is no predetermined maximum level of income that can be achieved on the basis of savings rates and limits of diminishing returns.

In endogenous growth theory, high economic growth rates can be maintained without increasing the savings rate. Growth is not just a development phase which ends when an equilibrium income per capita is reached. In contrast, continuous economic growth can become a feature of the functioning of the economy in the long run.

In a strictly empirical context, the problem Romer dealt with was that growth accelerated for more than a century instead of slowing down, as expected from the neoclassical growth model. He claims that it had something to do with the internal dynamics of science: the more you learn, the faster you learn. If knowledge is a source of increasing returns, then its higher

accumulation should mean faster growth – which really happened in the years of the last two centuries (Warsh, 2006, p. 207). The conclusion that the category of knowledge is of cumulative and dynamic character is essential for the understanding of endogenous growth.

What seemed new in endogenous growth models already existed in Smith's vision of economic growth mechanisms, especially in his concept of specialisation and division of labour. Endogenous growth models actually incorporate theories and concepts of rich past economic literature on decreasing costs and increasing returns, which, although not entirely ignored, is not fully understood in terms of importance in explaining the mechanisms of economic growth.

Although these models have some superficial similarities with neoclassical growth models concentrated on capital and savings, they do not provide for convergence of income levels, even among countries that have the same rates of savings, investment, and population growth rates. They also treat research and development activities, as well as creating new knowledge, as purposeful economic activities, to which, in the real world, profit companies and individuals who operate within specific institutional contexts aspire. The development of new technology and new products is an internally driven process, which is endogenous in each economy. The purposeful tendency of companies to realise large profit within a certain institutional context helps to understand the existence of economic growth in the long term, as well as the causes of the differences in the levels of per capita income and economic growth rates of countries in the real world.

Endogenous growth models also place quite different emphasis on factors and conditions necessary to intensify the economic development of countries, focusing on the creation of knowledge, education, and technology transfer. These theories deeply influenced the thought of a large number of economists in the policy of growth and recognition of the most serious obstacles to development.

The key document that signals a change of focus among the development economists has been the study of the World Bank, *East Asian Miracle* (World Bank, 1993). This critical examination of economic growth factors in the most successful Asian economies (Japan, Hong Kong, South Korea, Singapore, Taiwan, Indonesia, Malaysia, and Thailand) is based on endogenous growth theory methodology for identifying the crucial variables in growth policy. Endogenous growth models help to explain the strength of influence of the growth rate, and why growth can be cumulative. Thus, endogenous growth models can relatively easy explain the increase in the income gap between poorer and richer countries, since they break the link between economic growth and the law of diminishing returns. This effectively removes the upper limit of

income per capita with any particular rate of savings and investment. Countries that are already developed can continue to grow for a long time and relatively quickly in the future. They can also suggest what is needed if countries want to progress from the lower to the higher growth path. In other words, endogenous growth models can explain why some countries grow rapidly, reaching more equilibrium levels of income, while others remain permanently stuck in the poverty trap.

Endogenous growth models have determined the character of both technology and human capital, as basic and complementary determinants of economic growth rate and the level of per capita income. They show that the ability to apply technological knowledge drastically varies among economies, depending on the behaviour of economic agents and economic policy of the government (Beg et al., 2010, p. 525). Seeing the category of technological changes as something that requires social investment in specific human and organisational input that must be fully exploited indicates that there may be a technological gap among economies, and that every economy is developing its own technological base. Technology is the specific knowledge, not general knowledge that can be applied anywhere in the same way. Each country has to support investment in social and human resources if it is to create technological capacities. Endogenous growth models justify an active policy of the state in promoting growth through direct and indirect investment in the improvement of human capital and the support of foreign investors to invest in the development of the information and communication sector and the software industry (Todaro, Smith, 2011, p. 134).

#### **4. Evolutionary-Institutional Theory of Technological Changes**

The evolutionary approach tries to identify the determinants of the dynamics of technological changes, as well as the innovation level of society as a whole. Evolutionary theory is based on Schumpeter's theory on innovation, as a key factor of economic growth, and technological change, as a driver of innovation (Švarc, 2009, p. 56).

Representatives of this approach are Nelson, Winter (1982), and Dosi (1982). Their common feature is the analysis of the emergence and diffusion of technological changes at the company level.

Nelson and Winter criticise the two key premises of the neoclassical approach: market equilibrium and perfect rationality of companies in the implementation of their key objectives – profit maximisation. The authors are of the opinion that the profit realised on the basis of technological changes (innovation) is the phenomenon characteristic of a state of absence of

equilibrium. Innovation is, in fact, the phenomenon opposite to routine, and it, in the true sense, means the emergence of the new and unpredictable, which is why it is impossible to predict its results with certainty. Therefore, Nelson and Winter believe that the business skills of the company are of primary importance for the functioning of the organisation. The company and its business skills are adapted to the market through continuous innovation. Market rivalry is analogous to the process of natural selection in biology. Innovation in the economy is a mechanism that is identical to genetic mutation in biological world that leads to evolution. According to evolutionists, the business world is characterised by uncertainty, which means that it is impossible to anticipate all possible alternatives to some action. The only thing that is known in the business world is what is done, so with the introduction of new technology, one can only have an idea where this technology can bring them. The more fundamental the technology – the more different it is than the existing business structures – the higher the risk of failure, given that it is necessary to have more elements of new knowledge and more structural changes (Nelson, Winter, 1982).

Dosi (1982) gave his view of the category of technological changes in interaction with the social environment and the scientific system of the country. Evolutionary models point to the view that great scientific discoveries are the result of co-evolution of scientific and technological knowledge and their practical application, on which the market has a strong, directing, and selective effect.

A particularly important aspect of evolutionary growth theories refers to the concept of a national innovation system. The concept of national innovation systems has particularly gained in importance in the late nineteen-eighties (Freeman, 1987). National innovation system is a network of public and private institutions, whose activities and interaction determine the origin, import, transformation, and diffusion of new technology (Freeman, 1987, p. 4). National innovation system is the totality of interconnections and relationships of organisations working on the creation and diffusion of scientific knowledge and technology within national borders (Cvetanović et al., 2011).

A significant contribution to the subject of national innovation systems was given a few years later by Lundvall (1992, 2003) and Nelson (1993). Since that time until the present day, the concept of a national innovation system has triggered a lot of interest for two reasons: it has proven to be very powerful and flexible, and, in the era of globalisation, has made a significant insight into different contexts in the process of innovation.

The concept of national innovation systems stresses the fact that companies do not innovate in isolation, but in constant interaction with other organisations at the regional, sectoral, national, and supranational levels. It shifts the research

focus from the level of the individual and the isolated units within the economy (companies, consumers) to collective activities that stimulate technological changes. It looks at the entire knowledge and diffusion system, rather than its individual components. Technological changes are seen as outcomes of evolutionary processes within these systems.

The formation of the national innovation system is influenced by a multitude of factors, which vary among different countries, ranging from territorial size, abundance of natural resources, quality of human resources, historical development of the country, to the form of entrepreneurial activity. Their structure determines the speed of innovation evolution. Besides, any national innovation system has a unique structure and level of organisation, providing for sufficient stability of institutional connections (in fact, every country has the matching national configuration of institutional elements). Proponents of this theory argue that, at national level, there is a complex interaction of various processes, which have only a formal reflection in research and development activities in laboratories. This interaction is the result of the effect of educational institutions, links between producers and consumers through interactive learning, knowledge accumulation, acceptance of the imported technology and adapting to it, and the role of the state in the spheres concerning innovation. All these influences reveal the framework that determines the innovation capacity of the economy (Cvetanović, Sredojević, 2012).

## **5. Conclusion**

The traditional (neoclassical) and contemporary (endogenous and evolutionary-institutional) theories have the almost identical position on the importance of technological changes for economic growth. In fact, both theoretical standpoints argue that the category of technological changes is a key driver of economic growth in the long term.

The neoclassical theory conceptualises growth as a deterministic process in which causality is clear, while policies can be conceived based on the understanding of the temporally invariant determinants of growth models. Endogenous and evolutionary-institutional explanations, in contrast, argue that different historical circumstances play an important role in the development process, which is why cause-and-effect mechanisms that prevail in one do not necessarily have a significant effect and importance in another period.

What all theories of endogenous economic growth have in common is the existence of various external effects and manifestation of non-diminishing returns on production factors at the aggregate level. In this way, endogenous growth models conceptually managed to overcome a stagnant neoclassical

economic theory, according to which economic growth, in the absence of technological changes, is a time-limited phenomenon.

The key drivers of technological changes in endogenous explanations are knowledge, research and development, and education. These factors, just like standard production factors, labour and capital, create new value. They rely on the expression of external effects, i.e. allow for non-diminishing returns on production factors at the aggregate level. In this way, endogenous models conceptually removed the key shortcoming of neoclassical theories, according to which economic growth, in the absence of technology shocks, tends towards zero growth.

Evolutionary-institutional theories attempt to overcome simplification of neoclassical growth models, especially in terms of their treatment of technological changes as a category outside the production function. According to evolutionary growth theorists, there are internal forces that drive the category of technological changes, and, more importantly, which can be stimulated through conscious control activity of the state.

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## **TEHNOLOŠKE PROMENE U EKONOMIJI RASTA: NEOKLASIČNI, ENDOGENI I EVOLUTIVNO- INSTITUCIONALNI PRISTUP**

**Apstrakt:** Cilj istraživanja u ovom radu je dolaženje do odgovora na pitanje tretmana kategorije tehnoloških promena u magistralnim pravcima teorije privrednog rasta. Analizom ključnih stavova najznačajnijih reprezentata neoklasične teorije rasta (Solow), endogene teorije rasta (Romer) i evolutivne teorije rasta (Freeman), došlo se do zaključka da su ovi pristupi jedinstveni u tome da kategorija tehnoloških promena predstavlja ključni generator privrednog rasta. Neoklasičari su prvi eksplicitno analizirali kategoriju tehnoloških promena u teoriji rasta. Izvršili su jak uticaj na vlade mnogih zemalja da usmere značajna finansijska sredstva u naučna razvojna istraživanja, kako bi stimulisale nastanak i difuziju novacija. Pristalice endogenih objašnjenja, takođe, u kategoriji tehnoloških promena vide ključni pokretač privrednog rasta. Za razliku od neoklasičara, oni apostrofiraju važnost eksternalija u obliku tehnoloških prelivanja i aktivnosti istraživanja i razvoja za nastanak i difuziju inovacija. Konačno, teoretičari evolutivno-institucionalnog pravca u ekonomskoj nauci, kategoriju tehnoloških promena istražuju neodvojivo od privrednog i društvenog ambijenta u kome one nastaju i rasprostiru se. Poruke ovog istraživanja mogu biti od posebne koristi kreatorima politika privrednog rasta i razvoja u ekonomiji znanja, čije je osnovno materijalno obeležje tzv. četvrta industrijska revolucija.

**Ključne reči:** tehnološke promene, privredni rast, teorija privrednog rasta, neoklasična teorija, endogena teorija rasta, evolutivna teorija rasta.

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## RESEARCH AND DEVELOPMENT INVESTMENT AS DETERMINANT OF INTERNATIONAL COMPETITIVENESS AND ECONOMIC GROWTH IN EU28 AND SERBIA

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**Abstract:** R&D expenditures (R&D) are an important precondition for the economic growth and development, as well as for the improvement of export performances and competitiveness of national economies. Knowledge has been increasingly identified as the primary factor of economic growth in the modern business environment. In order to outline appropriate policy on R&D expenditures, it is necessary to analyse indicators of the dynamics and quality of R&D expenditures as well as indicators regarding growth and development of national economies. In this paper, we present R&D expenditures of old and new EU Member States as well as Serbia. Based on the correlation intensity of indicators of R&D expenditures and economic growth and export, it's been analysed if R&D intensity has an impact on competitiveness and growth in mentioned countries since 2000. Although Serbia has implemented significant economic reforms since 2000 and there has been an overall awareness of the need on higher R&D, the R&D sector still lags behind developed countries of the EU. Therefore, this paper directs attention to the importance of identifying and implementing a national policy on R&D expenditures, with special focus on necessity for improved R&D funding of the business sector and growth of R&D funding from abroad.

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## 1. Introduction

Knowledge, in the broadest sense, is recognised as the key factor of growth and prosperity during the process of globalisation and increasingly keen knowledge competition. At the European Council meeting in March 2000, in Lisbon, the EU established a strategic objective for the first decade of 21<sup>st</sup> century: “to become the most competitive and dynamic economy in the world, based on knowledge and capable of sustainable economic growth with more and better quality jobs and stronger social cohesion” (European Parliament, 2000). Two years later, at the Council meeting in Barcelona, the specified aim was the pursuit of achieving the participation of spending on R&D of 3% of GDP by 2010, two thirds of which should be provided by the private sector.

The current EU strategy, Europe 2020, also highlights the importance of R&D, through the redefinition of investments at the level of the 3% of EUs GDP, as a target for public and private R&D investments. *Smart* EU growth should also be enabled by the *Innovation Union*, one of the seven Unions’ initiatives, whose implementation will meet the objectives defined in the document Europe 2020.

In 2007, the USA brought the Act *America competes*<sup>1</sup> for investments in innovations through R&D and improvement of the USA competitiveness (downloaded on January 9, 2016 from: <https://www.govtrack.us/congress/bills/110/hr2272/text>), which has subsequently been amended several times, and adjusted in order to better respond to changing circumstances.

The R&D importance was recognised in Serbia, by the adoption of the Strategy of Scientific and Technological Development of the Republic of Serbia for the period 2010-2015, which provided that “the allocations for science, besides the infrastructure, reach 1% of GDP, by 2015” (link: <http://www.gs.gov.rs/lat/strategije-vs.html>). Draft of the Strategy of Scientific and Technological Development of the Republic of Serbia for the period 2016-2020 - “Research for Development” sets as aim the level of investments at 1.5% of GDP by 2020 (<http://www.mpn.gov.rs/wp-content/uploads/2015/08/Strategija-nauka-za-inovacije-17-NOVO.pdf>).

OECD has published two manuals, in order to better facilitate observations and analyses of the R&D and innovation activities (Frascati Manual and Oslo Manual), and established definitions of these terms, which are now widely accepted in the world. “Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.” (OECD, 2015, p. 44).

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<sup>1</sup> “America competes” as the acronym of “*America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act*.”

R&D investments are an important prerequisite for economic growth and development in the world, as well as improving the export performance of national economies. Gross fixed capital formations, which represent a comprehensive aggregate investment at the national economy level, are much more volatile than GDP trends. Their movement is more volatile, compared to other macroeconomic aggregates, considering that in the recession period they are reduced and during economic growth increased, at higher rates. At the global level, gross investment amounted to about 23% of GDP, in the period 2000-2013 (UNCTADstat, 2016). Serbia achieved an average of 13.9% of GDP in the period 2000-2013, with average annual growth of 6.4%. Serbian Gross investments in intellectual property, during the aforementioned period, recorded the annual growth of 8.1%, with realised average share in GDP of 1.9%, which was the lowest in 2000 (1.06%), and highest in 2008 (2.09%).<sup>2</sup>

R&D investments in Serbia, in 2014 amounted to EUR 256.0 million, according to Eurostat, while the average investment per country in the new EU member states (EU13) amounted to EUR 935.0 million and in the old EU member states (EU15) amounted to EUR 18.1 billion. This research paper focuses on the old (EU15) and new (EU13) EU member states and Serbia. All EU28 member states are, in this research paper, divided in two groups: (1) EU15 – old EU28 member countries (Austria, Belgium, Greece, Denmark, Ireland, Italy, Luxembourg, Germany, Portugal, United Kingdom, Finland, France, the Netherlands, Sweden and Spain); (2) EU13 – new EU28 member countries which joined EU in the period after 2004 (Bulgaria, Estonia, Cyprus, Lithuania, Latvia, Malta, Hungary, Poland, Romania, Slovakia, Slovenia, Croatia and Czech Republic). R&D investments in Serbia, during six-year period 2009-2014, ranged from 0.71% GDP (2011) to 0.91% GDP (2012), while the average share reached 0.79% GDP, for the same period (Eurostat database for Serbia covers annual data for period from 2009). According to that indicator, Serbia is lagging behind compared to the EU28 average (1.99%).<sup>3</sup> Besides the unfinished transition process, the global economic crisis has further limited allocations for R&D that have slowed down after 2009. However, R&D expenditures at the EU28 level were significantly lower than the 3% of GDP target. In Serbia, the country with transition period longer than twenty years and whose completion is expected by entering into the EU, there is awareness of the necessity of increasing R&D expenditures. In addition, there is a need for more efficient involvement of all sectors in the R&D investment, at the level of the national economy. Also, it emphasises the need of larger Business enterprise R&D expenditures and boosting R&D expenditures from abroad. These

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<sup>2</sup> Authors' calculations based on data Statical Office of the Republic of Serbia (SORC)  
Link: <http://webzrs.stat.gov.rs/WebSite/public/ReportView.aspx>.

<sup>3</sup> R&D investments in old EU15 member countries amounted to 2.08% of GDP, and in these new EU13 member countries to about 1.0% of GDP, in the period 2009-2014.

guidelines were the research paper basis, with aim to find answers to the question whether the intensity of R&D investment has had an impact on competitiveness and economic growth in the transition period since 2000. The analysis covers the period until 2014, with regard to available indicators in the international base data for the Republic of Serbia. However, some indicators have been available since 2009. The aim of the research is to point out the particularity of R&D investments and focusing on the necessary models of further increasing and productive sectoral guidance of R&D expenditure allocations in Serbia.

## **2. A Literature Review on the Impact of R&D Investments on the Selected Macroeconomic Variables Development**

The theoretical and empirical literature has shown that R&D investments are crucial for economic growth and export increase, and that the connection is bidirectional. The literature on growth theory can be divided into three categories, according to which growth factors highlights. The Harrod-Domar growth model stresses the importance of savings and investments, neo-classical models of economic growth point to technical progress as the leading factor of growth and new growth theories (endogenous growth theories) indicate the importance of the R&D, the accumulation of knowledge and externalities (Lykogianni et al., 2008). At the beginning of the twentieth century, Joseph Schumpeter pointed out that innovations were the most important feature of the capitalist economy. By the 1950s Robert Solow developed methods to quantify the sources of growth. It was noted that technological changes accounted for more than half of the registered growth, increasing labour productivity and national income. The neoclassical growth model of the Nobel laureate Robert Solow (Solow, 1956, pp. 65-94) is one of exogenous growth models, given that technological progress is exogenously determined factor of economic growth. On the other hand, all models which contained technological advances as the explanatory variable of economic growth are called endogenous growth models. Leading researches in this group of models are works of Romero (1986, 1990) and Lucas (1988, pp. 3-42) that formulate models of growth with technological progress, which is not an exogenous variable.

Empirical data have shown that there are significant differences in the level of living standards between developed and developing countries, as well as that the stable economic growth rates are realised only in developed countries, while developing countries are faced with significantly uneven interannual economic growth (with periods of economic stagnation and recession). Endogenous growth models, developed in 1980s, were faced with numerous problems that made it impossible to test the connection between R&D investments and economic growth. However, a number of studies have shown that stable

economic growth associated with savings and investments (in capital and labour force), as well as educated workforce can provide bridging of the technological gap with respect to countries that are in the technological lead. Studies have shown that the export oriented economies and stable business conditions are associated with economic growth.

Theoretical models have shown that R&D investments initiate economic growth, which is the reason for the active role of government in achieving the optimal level of these investments. Empirical research (Grilicher, 1992) stressed the importance of R&D investments and positive impact on more than half of the growth of output per capita, while Jones and Williams (Jones and Williams, 1998) pointed out that necessary optimal R&D investment level was at least four times higher than the invested amount in 1998 for that purpose. In addition, R&D investments provide significant social contribution (positive externalities), and therefore are the key component of economic growth and development.

Interdependence of R&D investments and export have been the research focus of numerous studies. The two leading theoretical models, study the relationship between R&D and exports, but in the direction of the R&D investments impact on export growth. All studies are based on the view that the R&D inputs create new products and production processes. At the same time, the process of specialisation and competitive advantage creating are based on production factors input (labour force, materials, capital and technology). The authors from University of Nottingham (Grima et al., 2007) have studied two-way connection between exports and innovations of Ireland and the United Kingdom. They have noted that previous export experience strengthens the companies' innovation capacity, which was reflected in the increased R&D activities, in the case of Ireland. The influence of the export markets' development level is particularly emphasised, since sustaining of the competitiveness in developed markets, and survival in the markets that have sophisticated requirements, additionally stimulate export companies to invest in R&D in order to improve the quality of its processes, products and services. The study which also explored the same interdependence for companies from Taiwan (B. Yan Aw et al, 2008) also points to the positive impact of exports and R&D investments to the increase of productivity.

The Ex-Post Evaluation of the effects of the 7<sup>th</sup> EU Framework Programme for R&D<sup>4</sup> (High Level Expert Group, 2015), estimated that during the course of

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<sup>4</sup> The 7<sup>th</sup> EU Framework Programme for R&D (FP7) in the period 2007-2013. represented the main EU instrument for R&D funding and the establishment the European Research Area. The EU has a long tradition of framework programs for research, which has lasted for over 30 years. With a total budget of almost EUR 56 billion, FP7 has provided the funds required for the implementation of about 25,000 projects.

this program, the investments in R&D were worth a total of EUR 90 billion (of which the EU grants amounted to EUR 50 billion, while own resources of program participants to additional EUR 40 billion). The indirect effects on the business enterprise sector were estimated at a total of additional EUR 500 billion, over the next 25 years. In the field of newly opened jobs, FP7 directly provided opening of 130,000 new jobs in the R&D sector, during the 10 years of the projects' implementation, respectively, an additional 160,000 indirect jobs over the next 25 years. Small and medium-sized enterprises, participants of the "Cooperation" segment FP7, showed an average turnover increase of 22%, growth of number of employees of 25% and export growth of 28%.

Study conducted for the purpose of making of the Western Balkans Regional Strategy on R&D for Innovation (World Bank, 2013), found that reaching the R&D investment level of 3% GDP in Croatia would ensure GDP growth of 6% and increase in exports of 13%.

### **3. The Transition Process and the Global Economic Crisis Impact on R&D Funding**

R&D investment at the national economy level largely depends on economic development. Although in Serbia, since 2000, comprehensive social and economic reforms have been implemented in order to create a favourable business environment, the R&D sector still lags behind EU member states. Transitional business conditions limit the optimal R&D investment level, which determines economic growth to be based on technological processes on the lower level of development. As a consequence, Serbian export is dominated by lower phase processing products and raw materials. Comparison with the benchmark Central and Eastern European countries shows that there is slower progress in the transformation of domestic production and export structure towards products that require innovative technologies as well as specialized and highly qualified workforce. The Global economic crisis has further had a negative impact on business conditions and investment research and development activities in the country.

Within the EU statistical system, a wide range of technological development indicators and measurements of R&D investments<sup>5</sup> have been developed. The most commonly used indicator is the share of R&D expenditures in GDP, as well as R&D expenditures expressed in purchasing power standards, abr. PPS.<sup>6</sup>

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<sup>5</sup> Detailed overview of all indicators in the Eurostat database can be downloaded at the following link: <http://ec.europa.eu/eurostat/data/database>.

<sup>6</sup> Gross R&D expenditures are expressed in purchasing power standards, in million units (Million PPS - purchasing power standard). PPS are a fictive *currency* unit that eliminates differences in purchasing power i.e. different price levels, between countries.



R&D intensity is expressed through Gross R&D expenditures as a share of GDP, in percentages. These data cover the period since 2000, for EU member countries. Data for Serbia are available for the period 2009-2013. Besides R&D intensity, as the measurement of R&D investment the structure of R&D expenditures by funding sectors is used, as well as by sectors which realise R&D process.

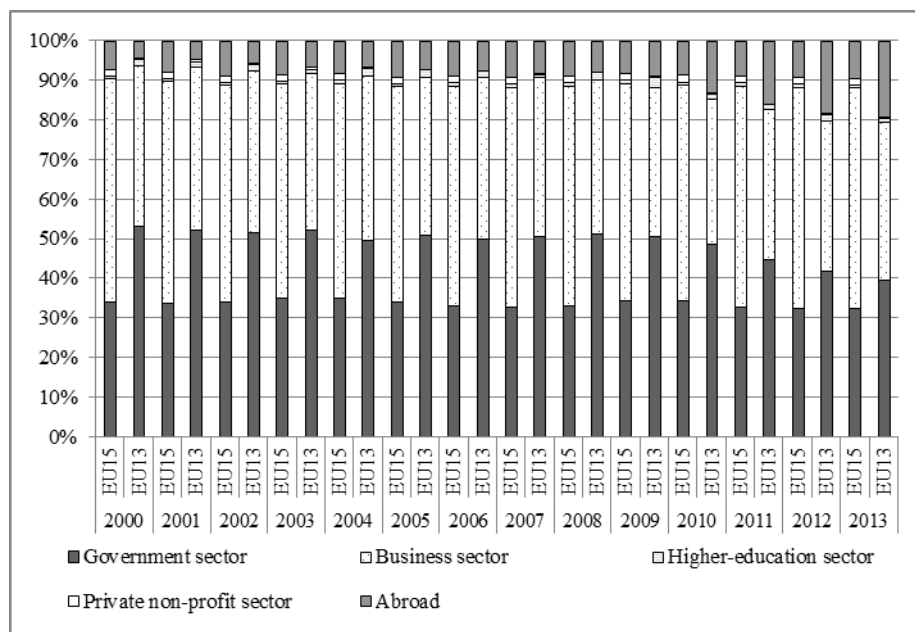
Total R&D investments at the EU28 level were increased by 65%, in the period 2000-2014, from EUR 171.2 billion to EUR 283.0 billion. Despite the growth in total R&D investments presented in absolute terms, the new EU member states (EU13) continue to have a negligible share in total expenditure at the EU28 level: from the initial 2% in 2000, this participation increased to 4.3% of total EU28 level investments in 2014.

The old EU member states (EU15) have a stable R&D investment structure, dominated by Business enterprise sector investments. During the 2000-2013 period, the business enterprise sector financed about 55% of R&D investments, while the Government sector share has declined slightly from 34% to 32%. The higher education sector's share and private non-profit sector's share are negligible, while a slight increase in the abroad sector participation has been recorded, from 7% in 2000 to 10% in 2013.

Contrary to the old member EU states, the structure of R&D funded sectors in the new EU member states (EU13) has undergone significant changes in the period after 2000. Namely, the Government sector share gradually decreased, from 53% in 2000 to 39% in 2014. On the other hand, a significant growth was recorded of the abroad sector participation, which increased almost five times, from 4% in 2000 to 19% in 2013. The share of the other three sectors remained unchanged. It could be better seen on the following chart, which presents the movements of the structure of R&D investments by sector funding, in the period 2000-2013.

Comparing the developed economies of Japan and the USA, the following graph shows that the highest R&D intensity has Japan (average share amounts to 3.28% of GDP in the period 2000-2012), then the next largest share has been realised in the USA (average share of 2.65% GDP in the period 2000-2012). Average realises the share of Gross R&D investment in GDP at the EU28 level stood at 1.87% GDP. The average share of Gross R&D investment in GDP at the EU15 level, amounted to 1.95% GDP, and at EU13 level 0.8% GDP, in the same period. The average realised share of Gross R&D investments in Serbia, according to the available data for the six-year period 2009-2014, amounts to 0.79% of GDP.

**Figure 1 The structure of total intramural R&D expenditure, by source of funds, EU13 and EU15, for period 2000-2013**



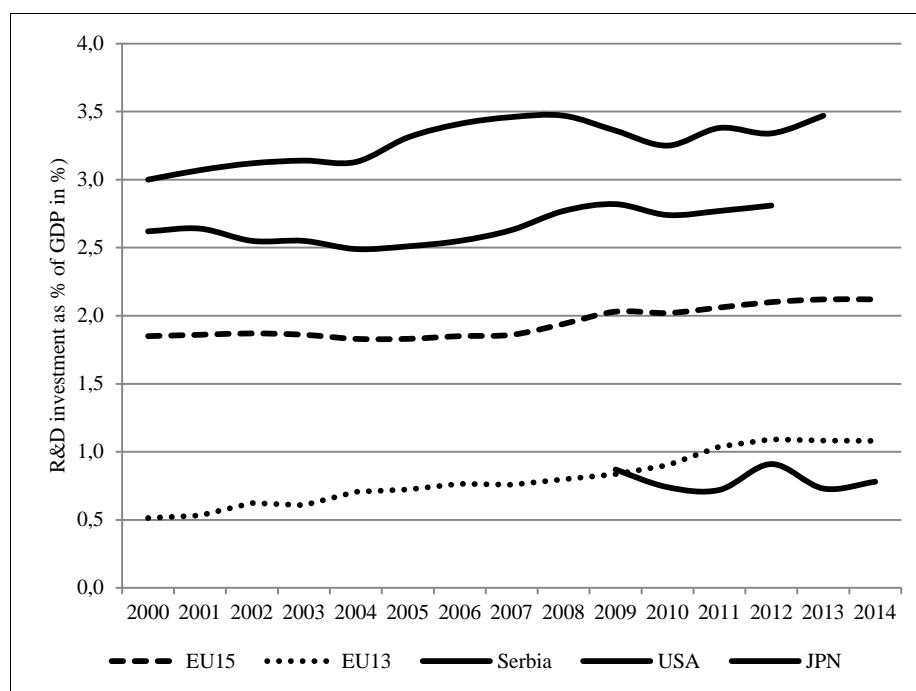
Source: Authors' calculations based on Eurostat data.

Havas et al. (2015, p. 10) pointed out that the R&D systems in ten Central and Eastern Europe countries, EU members,<sup>7</sup> were characterised by „highly centralised, politically controlled academic sector, with a limited (or hardly any) autonomy in certain fields of investigations, especially in social sciences and humanities, and a rigid division of labour between universities, focussing mainly on teaching, on the one hand, and institutes of the Academies of Sciences, almost exclusively performing research, on the other.“

The process of transformation of the R&D in former socialistic countries, now EU members, and their approach to the frame defined by the model of the Western European countries show a different pace of reforms. According to Lepori et. al (2009), the abandonment of the communist R&D policy, common to all Eastern block countries, is only the first step of reforms while the next transition phase vary due to the specifics of each country.

<sup>7</sup> The included countries are: Bulgaria, Estonia, Lithuania, Latvia, Hungary, Poland, Romania, Slovakia, Slovenia and Czech Republic.

**Figure 2 R&D intensity (Gross R&D investments, as % of GDP), in EU15, EU13, USA, Japan and Serbia, the period 2000-2014**



Source: Authors' calculations based on Eurostat data.

That conclusion is confirmed by the analysis of the structure of R&D investments during the period 2000-2014, for the selected countries.<sup>8</sup>

In the old EU member states, the abroad sector recorded a significant growth in the R&D investments structure in Finland, where the insignificant 2% in 2000 increased to more than 17% in 2014, which allowed a proportional reduction of the business enterprise sector's share. On the other hand, the participation of the abroad sector in R&D funding in Austria slightly decreased in the reported period, whereas previously equal participation of the Government sector and the business enterprises sector was changed in favour of the enterprise sector.

Both observed southern EU old member states, which are facing the devastating effects of the global economic crisis, characterised by a dominant Government sector's funding share in R&D investments. Unlike Greece, where

<sup>8</sup> Different criteria for selection of countries were implemented: a similar number of inhabitants compared to Serbia (Austria, Finland, Slovakia, Bulgaria), heritage of once uniform former R&D system (Slovenia, Croatia) and southern old EU member countries affected by Global economic crisis (Greece i Portugal).

the Government sector's share even increases over time, in Portugal there is a decrease of Government sector's share and a significant increase in Business sector enterprises' share. During 2007-2008, Portugese companies financed almost half of the total R&D expenditures.

Bulgaria and Slovakia, ex-Eastern Block countries, which are new EU member states with similar population as Serbia, record very dynamic R&D Abroad funded investment growth. The share of the abroad sector, in these countries, with a few insignificant percent in 2000 rose until the end of the review period to a quarter of all R&D investments in Slovakia, or half of all R&D expenditures in Bulgaria. However, the transformation of R&D systems of these countries developed in different directions: during the first decade of XXI century Bulgaria had an unchanged financing structure of R&D, which was dominated by the Government sector's funding. The reversal occurred in 2010, when the share of the abroad sector's recorded growth from 10% in the former year to 40% of all R&D investments. The abroad sector's funding growth was accompanied by a decrease in participation of the Government sector, but also a decrease in the business enterprise sector. On the other hand, in Slovakia, the business enterprise sector's funding accounted for 55% of total R&D investment funds in 2000 and dropped to 32% in 2014. Government sector's funding growth, which rose to 41% offset it.

Slovenia and Croatia are two countries that emerged on the foundations of Yugoslavia, represent an example, bearing in mind the legacy of the identical R&D system. Croatia is characterised by a very similar level of R&D investment funds of the Government and business enterprise sectors, if compared 2002 and 2014, given that at the start of this period, both sectors accounted for 46% of total R&D investments, but at the end of this period their share dropped to 43% and 42%, respectively. The biggest difference was recorded in the abroad sector, which increased from negligible 1.5% in 2002 to almost 13% of total R&D investment in 2014.

On the other hand, Slovenia could be presented as an example of a country, which rapidly transformed its R&D system and has become closer to highly developed countries according to the investment in science. Namely, during 2000, Slovenian companies financed more than half of the total R&D expenditures, more precisely 53%, while the Government sector share was 40%. Over the time, the share of the private non-profit sector slightly increased as well as the higher education sector, while the most significant changes were observed in the participation of the Government and Business enterprises sectors in 2014 (the Slovenian business enterprise sector has secured 68% of the R&D funds, while the Government sector's share fell to 22%).

The R&D investment structure in Serbia has a specificity that has not been observed in the other countries: the higher education sector is normally

negligible as a source of R&D funds, but in Serbia it contributes as much as 34% of the total R&D investments (according to the data for 2012). During the observed six-year period 2009-2014, the share of the Business-enterprise sector didn't exceed 9%, while the share of the abroad sector increased from 7.2% to 12%. The dominant source of funding for Serbian science in all observed years was the Government sector, which decreased during time, but still retained more than a half share. If we assume that High education sector R&D is largely implemented at state colleges and institutes, we can conclude that the public sector (government sector and higher education in state ownership) accounted for about 80% of the overall allocations for R&D in Serbia. Starting from the objective defined in Barcelona in 2002 at a meeting of the Council, according to which the private sector should provide two thirds of the funds needed for R&D, it can be considered that the structure of R&D financing funds in Serbia is unfavourable and that, as such, certainly does not encourage the growth of GDP and doesn't contribute to dinamisation of exports.

The share of five R&D funded sectors has been shown at the following chart. According to Eurostat data, those sectors are Business enterprise sectors, Government sector, High education sector, Private non-profit sector, and abroad activities. The participation of the private and government sectors is dominant, with growth of the abroad sector activities in recent years in the EU13.

**Table 1 Share of the total intramural R&D expenditure, by source of funds: 2000, 2009 and 2013**

Territory:	EU15	EU13	SR	EU15	EU13	SR
	Business enterprise sector (%)			Government sector (%)		
2000	56%	40%	8%	34%	53%	63%
2009	55%	38%	9%	34%	51%	63%
2013	56%	40%	8%	32%	39%	60%
	Higher-education sector (%)			Private non-profit sector (%)		
2000	1%	1%	21%	2%	0,4%	1%
2009	1%	3%	22%	2%	0,3%	0,1%
2013	1%	1%	25%	2%	0,2%	0%
	Abroad sector (%)					
2000	7%	4%	7%			
2009	8%	9%	5,5%			
2013	10%	19%	7,8%			

Source: Authors' calculations based on Eurostat data.

The competitiveness of a national economy is presented by assessment of the results achieved in the field of innovation. Serbia's position is enhanced by the SII indicator (Summary Innovation Index), which in 2014 reached 69% of the EU average (PRO-INNO Europe Innovation Index, 2015). By that, Serbia on the list of European non-EU28 member countries, held a position after Norway, as a country that is modest innovative (PRO-INNO Europe Innovation Index, 2015). According to this indicator, Serbia has a higher position than Hungary, Greece, Slovakia, Croatia, Poland, Lithuania, Latvia, Turkey, Bulgaria, the Republic of Macedonia and Romania. The assessment is that the performance of Serbia is positive in the field of youth education, investment in innovations that are not only R&D and employment in Knowledge-intensive activities. Serbian innovation performances were significantly improved in the period 2007-2014, at an annual growth rate of 6.3% (PRO-INNO Europe Innovation Index, 2015, p. 31).

The following table shows the contribution of the leading sectors' allocations for R&D and gap in comparison to two leading economies in the world, Japan and the USA. The business-enterprise sector has the greatest contribution in Japan (2.5% of GDP). In Serbia, the business-enterprise sector's contribution amounted to 0.14% of GDP.<sup>9</sup> On the other hand, the contribution of the Government sector is the largest in the USA, reaching 0.32% of GDP, while the lowest in the EU13 (0.18% of GDP). The largest gap was achieved at the level of overall R&D intensity between Japan and the EU13, the business-enterprise sector funding between Japan and Serbia and the Government sector funded between USA and EU13.

**Table 2 Contribution of the leading sectors (business sectors and government) to R&D investments allocations and the gap with the USA and Japan (Average for 2000-2014)**

Sectors:	R&D intensity	Business enterprise sector R&D intensity	Government sector R&D intensity
	(R&D intensity, as % of GDP)		
EU15	1,95	1,24	0,24
EU13	0,80	0,39	0,18
SR <sup>*</sup>	0,79	0,14	0,25
SAD <sup>**</sup>	2,65	1,85	0,32
JPN <sup>***</sup>	3,28	2,49	0,29
SAD/EU15, gap	0,70	0,61	0,08
SAD/EU13, gap	1,87	1,46	0,14

<sup>9</sup> Note: Average share for Japan was calculated based on data for period 2000-2013, and for Serbia: 2009-2014.

Sectors:	R&D intensity	Business enterprise sector R&D intensity	Government sector R&D intensity
	(R&D intensity, as % of GDP)		
SAD/SR, gap	1,86	1,71	0,06
JPN/EU15, gap	1,33	1,25	0,05
JPN/EU13, gap	2,50	2,10	0,11
JPN/SR, gap	2,49	2,35	0,03
EU15/SR, gap	1,16	1,10	-0,02
EU13/SR, gap	-0,01	0,25	-0,08

Notes: The gap represents the difference between the R&D intensity by these territories and sectors.

\*Data for Serbia covered period 2009-2014.

\*\*Without data for 2013 and 2014.

\*\*\* Without data for 2014.

Source: Authors' calculations based on Eurostat data.

Table 3 shows the values of real Gross R&D expenditures, GDP and the R&D intensity in 2000 and 2014. At the EU15 level, the R&D expenditures doubled in Portugal, Ireland, Austria, Spain and Denmark. The highest annual GDP growth in the same period was realised in Ireland, Luxemburg and Sweden.

Among the 13 new EU member states, according to the amount of R&D funding, Slovenia, the Czech Republic, Estonia and Lithuania stand out. In Estonia (four times) and Lithuania (three times) there was the highest growth of R&D investments. In Estonia, R&D allocation was nearly five times higher in 2014, and in Lithuania four times higher compared to 2000. The R&D intensity in these countries recorded extremely high dynamics during these years with relatively high growth rates. An indicator of the R&D intensity is obtained by dividing the R&D investment amount and GDP, expressed in absolute values. It means that in the period when GDP grows faster than R&D investment R&D intensity may be slightly reduced. Finland, Austria, Sweden and Denmark are EU countries that have achieved the target set in the Lisbon Strategy. These countries have achieved the highest growth of R&D investment during the reported period, with the total turnover and GDP growth above the EU15 average. Among the EU13 member states, the intensity of investment is the largest in Slovenia, the Czech Republic and Hungary. Gross R&D funding was doubled in the reported period, with above average GDP growth compared to the EU13. Comparing the data for Serbia, it was noted that a smaller amount of R&D in 2014 was set aside compared to 2009, with the GDP growth of 1.7%. The intensity of R&D investments declined in Serbia, while in the same period (2009-2014) it was reduced also in only two EU13 countries, Croatia and

Romania. The largest increase in the R&D intensity during the period 2000-2014, was achieved in Estonia and Cyprus.

**Table 3 Gross R&D expenditures, real GDP and R&D intensities: 2000 and 2014**

Countries:	Gross R&D expenditures (GERD) <sup>1</sup> (in mill PPS)			GDP <sup>2</sup> (in EUR mill)			GERD/GDP ratio <sup>3</sup> (in %)		
	2000	2014	Growth (in %)	2000	2014	Growth (in %) <sup>4</sup>	2000	2014	% change
<b>EU15 (average)</b>	153.628,175	250.315,151	62,9	10.409.495	12.071.669	16,0	1.9	2.1	14.6
Austria	3.888,302	8.897,105	128,8	253.713	307.257	21,1	1.9	3.0	58.2
Belgium	4.840,517	8.896,819	83,8	311.463	377.305	21,1	1.9	2.5	27.5
Greece		1.787,263	-	189.901	185.511	-2,3		0.8	25.8
Denmark	2.997,293	5.902,085	96,9	225.405	246.598	9,4	2.2	3.1	40.6
Ireland	1.062,144	2.579,874	142,9	123.609	182.167	47,4	1.1	1.6	42.2
Italy	13.248,591	20.691,672	56,2	1.556.221	1.535.331	-1,3	1.0	1.3	27.7
Luxembourg	336,415	515,231	53,2	30.248	43.650	44,3	1.6	1.2	-21.0
Germany	45.483,871	79.525,912	74,8	2.358.691	2.736.412	16,0	2.4	2.8	18.8
Portugal	1.150,615	2.865,579	149,0	167.145	169.129	1,2	0.7	1.3	79.2
UK	24.204,918	32.947,952	36,1	1.547.773	1.965.835	27,0	1.7	1.7	-0.6
Spain	6.768,837	14.226,112	110,2	867.918	1.038.582	19,7	0.9	1.2	34.8
France	28.639,526	43.822,008	53,0	1.771.701	2.060.872	16,3	2.1	2.3	8.7
Finland	3.862,204	5.236,491	35,6	158.091	186.295	17,8	3.3	3.2	-2.5
Netherlands	7.875,012	11.969,124	52,0	554.727	638.476	15,1	1.8	2.0	8.8
Sweden		10.451,925		299.664	391.187	30,5		3.2	-9.7
<b>EU13 (average)</b>	6.861,830	19.907,640	190,1	743.633,9	1.092.533,3	46,9	0.5	1.1	37.5
Bulgaria	224,621	711,446	216,7	24.427	39.507	61,7	0.5	0.8	63.3
Czech Rep.	1.619,24	4.821,319	197,8	114.387	160.284	40,1	1.1	2.0	78.6
Estonia	70,682	382,937	441,8	10.642	17.408	63,6	0.6	1.5	143.3
Croatia		536,386		23.611,0	43.045,0	82,3		0.8	-10.2
Latvia	73,237	237,387	224,1	12.260	20.703		0.4	0.7	54.5
Lithuania	154,592	600,365	288,4	18.321	32.925	79,7		1.0	29.1
Poland	2.263,379	6.678,591	195,1	246.652	403.699	63,7	0.6	0.9	46.9
Hungary	848,743	2.523,843	197,4	80.425	103.769	29,0	0.8	1.4	74.7
Malta		84,018		5.392	7.497	39,1	:	0.9	60.4
Cyprus	28,514	94,084	230,0	14.174	17.173	21,2	0.2	0.5	104.3
Romania	406,875	1.118,5	174,9	86.401	138.984	60,9	0.4	0.4	5.6



Countries:	Gross R&D expenditures (GERD) <sup>1</sup> (in mill PPS)			GDP <sup>2</sup> (in EUR mill)			GERD/GDP ratio <sup>3</sup> (in %)		
	2000	2014	Growth (in %)	2000	2014	Growth (in %) <sup>4</sup>	2000	2014	% change
Slovenia	418,902	1.113,764	165,9	27.888	36.191	29,8	1.4	2.4	75.7
Slovakia	333,914	1.005,001	201,0	41.895	73.162	74,6	0.6	0.9	39.1
<b>Years:</b>	<b>2009</b>	<b>2014</b>		<b>2009</b>	<b>2014</b>		<b>2009</b>	<b>2014</b>	
Serbia	563.073	528.827	-6.1	29,593.3	30,084.2	1,7	0.87	0.78	-10.3

Notes: Annual GDP growth is calculated on the basis of data on the GDP in market prices, Chain linked volumes (the reference year 2010).

1) Gross R&D expenditures expressed by Purchasing Power Standards, in million PPS. PPS are fictive "currency" unit which eliminates differences in purchasing power between countries.

2) GDP expressed in EUR million, in market prices, Chain linked volumes (the reference year 2010).

3) R&D intensity.

4) The annual GDP growth in period 2000-2014, except for countries without available data series. National statistic data used for Croatia.

Data for Serbia are presented for period 2009-2014, according to availability in Eurostat database, and calculations were made for that period.

Source: Authors' calculations based on Eurostat data and national statistics of individual countries.

#### 4. The Analysis of the Link between R&D Investments and Competitiveness, EU28 and the Case of Serbia

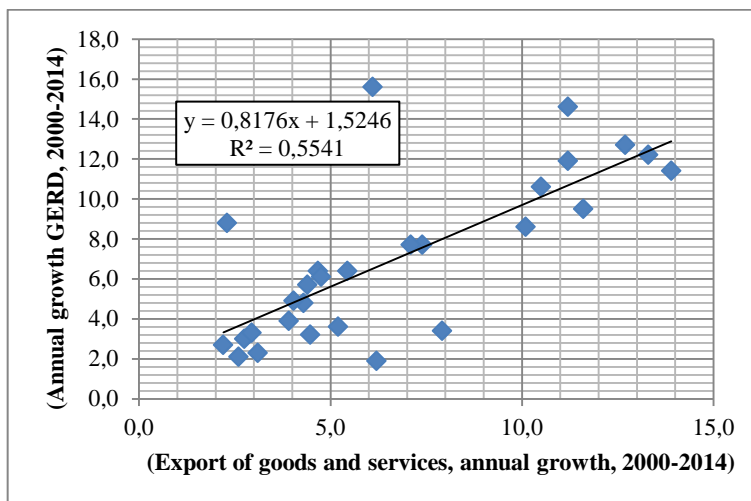
According to this working paper, the competitiveness implies better position in international trade and export growth. A number of studies that have examined the link between R&D and export, refer only to one causality direction (companies which invest in R&D have a higher probability of successful export). According to the survey realised in SERC<sup>10</sup> (Harris R. et al, 2011) R&D investments in the manufacturing sector have a significantly greater impact on the probability of new products and services export, and improvement of knowledge, which helps to overcome more easily the existing barriers in doing business in the international market. In other business activities, which do not belong to the manufacturing industry, R&D investments increase the likelihood of innovation, but without significant impact on export.

The following chart presents annual growth in R&D investments and export of goods and services, in the period 2000-2014. The positive relationship between these two parameters, at the EU28 states level is confirmed by a positive correlation (0.74). The highest annual export growth, was realised by

<sup>10</sup> Spatial Economic Research Centre, University of Glasgow.

Lithuania, Slovakia and Bulgaria, while at the same time they realised double digit R&D investment growth rates.

**Figure 3 Exports and R&D expenditures growth, the period 2000-2014**



*Notes:* Annual growth in exports of goods and services is calculated based on the value in EUR million, 2000-2014.

*Source:* Authors' calculations based on Eurostat data.

## 5. The Analysis of the Link between R&D Expenditures and Economic Growth (EU28 and Serbia case)

The R&D intensity, at the example of the EU and Serbia, can be presented by observing the R&D investment value in relation to GDP. Regression results in OECD research paper (Cheng Si, 2011), have shown that R&D investment contributes to increasing economic wealth, expressed by GDP value. According to the UN data, in 2013 developed countries invested 69.3% of the total world's gross R&D spending, while upper middle-income countries invested 25.8%.<sup>11</sup> The minimal investments were realised by low-income countries (0.3% of total R&D expenditures in the World). Since 2000, the share of upper middle-income countries has significantly increased from level of 9.7% in 2000.<sup>12</sup> According to the UNESCO report, G20 member countries invested even 91.9% of the global R&D expenditures in 2013, while OECD countries invested

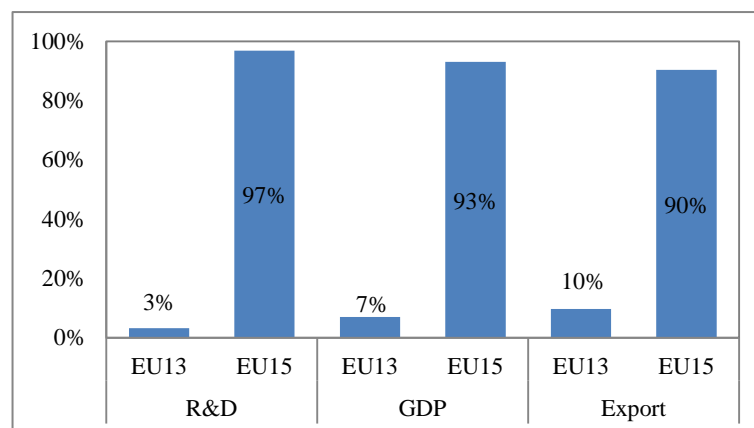
<sup>11</sup> According to the World Bank classification of countries depending on the level of development. Serbia belongs to the group of Upper-middle-income economies.

<sup>12</sup> Southeast European countries have invested 0.1% of global R&D expenditures and Central and Eastern Europe countries 4%.

66%. Observed by GERD allocations per capita, developed countries invested about 782.1 PPP in R&D investments in 2013,<sup>13</sup> while South-East European countries invested 42.4 PPP. These data indicate that developed countries invest more in R&D.

Within the EU28, the old member states (EU15) which allocate a larger amounts for R&D investments, achieve significantly higher GDP. The following graph shows the participation of EU28 new and old member states, in total EU28 allocations for R&D. There is also presented the contribution of EU28 new and old member states, within total GDP and EU28 export. New member states achieve the largest share in EU28 export, with only 7% of the total EU28 GDP, and only 3% of total R&D investments at EU28 level.

**Figure 4. Old and New EU member states: The share in total R&D expenditures, GDP and EU28 exports (average for 2000-2014)**



Notes: Share is calculated based on the data: R&D investments in EUR million, GDP value at current market prices, EUR million, and export in EUR million (at current prices).

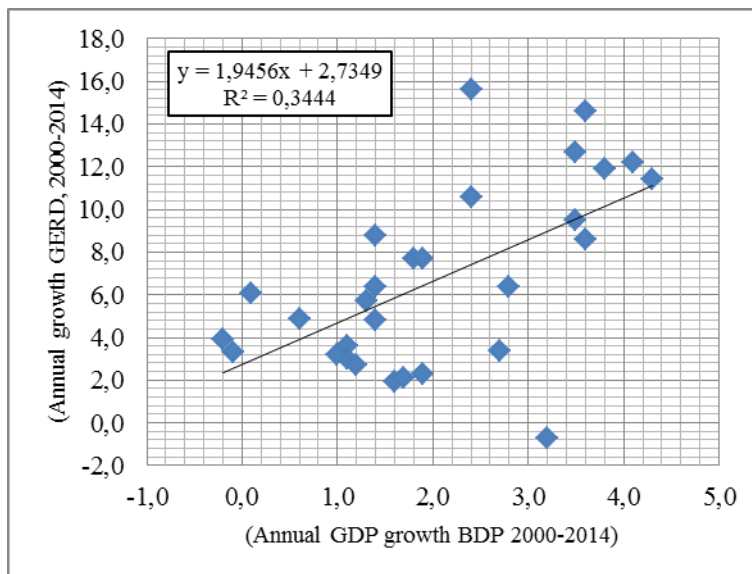
Source: Authors' calculations based on Eurostat data.

The following chart presents an annual R&D investment growth and annual GDP growth in the EU and Serbia, for the period 2000-2014. Each point represents one country. The annual GDP growth, in all countries, was lower compared to the annual R&D investment growth. Positive relationship between these two indicators, was confirmed in EU countries by the positive correlation (0.7). Within the EU countries, there is a different level of R&D intensity. Within the old EU member states (EU15), the highest achieved annual R&D investment growth was recorded in Ireland, Austria and Portugal. Within the

<sup>13</sup> Expressed in purchasing power standards, in 2013 the largest level were invested mostly by developed countries of North America about 1,201.8 PPP, while Central and Eastern Europe countries amounted to 145.8 PPP.

new member states (EU13) much higher R&D expenditures were recorded, particularly in Malta, Estonia, Bulgaria and Slovakia. According to a survey conducted in 2008 (Verbeek et al., 2008), for the average annual R&D investment growth and GDP growth similar trends were observed, during period 1995-2005.

**Figure 5 GDP growth and R&D expenditure, 2000-2014**



*Notes:* Annual GDP growth is based on the GDP value, in EUR, market prices, chain linked volumes (2010). Annual GERD growth has been calculated on the basis of data reported in GERD PPP.

Data for Serbia according Eurostat database covering.

*Source:* Authors' calculations based on Eurostat data.

## 6. Conclusion

R&D investment is an important determinant of progress for each national economy. Although, EU in 2002 set target level of R&D investment to 3% GDP, in the EU28 the average level of investment of only 2% GDP was reached. However, EU countries have shown significant differences, not only in the amount of national R&D investment level, but also in the its structure. A dominant share of the business sector in R&D financing activities characterises highly developed old member states of EU. On the other hand, the former socialist countries – new member states of the EU, implement at different speed the transition of its R&D systems, which in time leads to the government sector's share reduction in total R&D investments. Unlike all observed

countries, a high share of the higher education sector in the total R&D expenditures characterises Serbia.

Indicators analysis of the EU and Serbia, in this study has showed that there is positive correlation between the annual growth rate of R&D investments and annual GDP growth. In addition, research paper has identified the positive correlation between the annual growth rate in R&D investments and the annual growth rate of exports of goods and services. Serbia lagged the global average share of gross investment in GDP, in the period 2000-2013, while products of lower processing phase and raw materials dominated the export structure. By the results of this work about positively correlated R&D investments, GDP growth and export growth, one of the key ways of improving the Serbian economy performances is certainly more dynamic R&D funding financial activities.

The current Strategy to support the development of small and medium-sized enterprises, entrepreneurship and competitiveness recognised the need for more intensive cooperation between science and business in the period 2015-2020, under the Pillar IV – Strengthening the sustainability and competitiveness of SMEs.

The Strategy of Scientific and Technological Development of Republic of Serbia for the period 2010-2015, also encourages partnerships of the Academy with private sector, putting the focus on the protection of intellectual property rights, as well as, special tax incentives for companies investing in R&D.

The draft of the new Strategy of Scientific and Technological Development of Republic of Serbia for the period 2016-2020 – Research for Innovation through the proposed strategic goals, the need for ensuring the relevance of science for economic development is once again highlighted, and then encouragement of the business sector to invest in R&D.

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### ULAGANJE U ISTRAŽIVANJE I RAZVOJ KAO DETERMINANTA MEĐUNARODNE KONKURENTNOSTI I PRIVREDNOG RASTA U EU28 I SRBIJI

Apstrakt: Izdvajanje za istraživanje i razvoj (I&R) predstavlja važan preduslov povećanja konkurentnosti, izvoznih performansi, a samim tim i ekonomskog rasta nacionalnim privredama. Kao primarni faktor privrednog napretka, u savremenim uslovima poslovanja, sve više se nameće znanje, što je prepoznato na globalnom nivou. Jedan od najvažnijih faktora savremenog razvoja je tehnološki razvoj. Profilisanje adekvatne politike izdvajanja za I&R zahteva analizu odgovarajućih indikatora kojima se ocenjuje dinamika i kvalitet ovih ulaganja kao i pokazatelja koji prate rast i razvoj nacionalnih privreda. U ovom radu je predstavljeno ulaganje u I&R starih i novih članica EU, kao i u Srbiji, uz sagledavanje jačine korelacije ovog indikatora i privrednog rasta i izvoza. Posebna pažnja je posvećena analizi strukture učešća sektora koji finansiraju I&R u novim članicama EU, imajući u vidu uticaj intenziteta ulaganja u I&R na konkurentnost i privredni rast u periodu njihove tranzicije od 2000. godine. Iako su u Srbiji, u periodu od 2000. godine realizovane značajne reforme privrednog ambijenta, sektor I&R zaostaje za razvijenim zemljama EU. Stoga se ukazuje na značaj profilisanja i realizacije nacionalne politike usmeravanja izdvajanja za I&R.

Ključne reči: izdvajanje za I&R, BDP, konkurentnost, izvoz, zemlje u tranziciji, EU, tehnološki razvoj, Srbija

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**Jelena Vasic** defended her Master's thesis at the Faculty of Economics in Belgrade in 2007. She graduated from the Faculty of Economics in Pristina in June 1999 and during the postgraduate course completed AAEN studies. She received a scholarship from the Ministry of Education, the Foundation for the Development of Scientific and Artistic Youth and the Norwegian Embassy as one of the 1.000 best students. Jelena Vasic speaks English. In the period 2001-2003 she worked at the Institute for Foreign Trade. Since June 2003 she has worked at the Chamber of Commerce of Serbia. In October 2014 she was appointed to the position of Senior Advisor for the financial analysis of the Centre for Support of Investments and Public

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**Nataša Kecman** graduated and obtained MSc degree from the Faculty of Economics in Belgrade, where she is a candidate for doctoral dissertation. At the Faculty of Law in Belgrade she completed postgraduate specialist studies on joint stock companies. She has attended numerous national and international training courses related to small and medium sized-enterprises and is an intern at the Permanent Mission of Austria to the EU.

Since 2001 she has been employed at the Yugoslav Chamber of Commerce, where she held a position dealing with the development of international economic cooperation. She transferred to the Serbian Chamber of Commerce in 2003 where she worked on supporting entrepreneurs in applying for specialised international programmes. In the period from 2009 to 2013 she was a national contact person for SMEs to FP7. Since 2015 she has been the Director of the Centre for Services and Mediation Chamber of Commerce of Serbia.

**Igor Mladenović** is an Associate Professor at the Faculty of Economics. He was elected to the scientific field of Macroeconomics. He is the author of a textbook, two monographs and more than 70 scientific papers. He was involved in 10 international and two national projects. Since 2012 he has been working as an advisor to the President of the Regional Chamber of Commerce Nis and president of the Commercial and Economic Council of the City of Nis





## EMPIRICAL EVALUATION OF THE FISCAL POSITION IN SERBIA

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**Abstract:** The paper evaluates the size of the cyclical and structural components of the fiscal deficit of the Republic of Serbia for the period from the first quarter of 2002 to the second quarter of 2014. The method of the European Central Bank was used, where it is assumed that cyclically sensitive elements of state are budget income tax, profit tax, value added tax on the value, excises, social security contributions and unemployment benefits. Elasticity of cyclically sensitive elements relative to their macroeconomic bases are estimated using the VEC model with error correction. The results suggest that automatic stabilizers generally played a more prominent role than consistent countercyclical discretionary fiscal policy, which means that the discretionary measures were late or were not well targeted.

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**Keywords:** cyclic deficit, structural deficit, GDP.

**JEL classification:** H62, H68

### 1. Introduction

The relevance of topics reflected in the stability of the fiscal deficit in the Republic of Serbia, which ranged from 0.5% of GDP in 2000 to 7.6% of GDP in 2012 and representing the trigger, both internal as well as external imbalances. As indicators for the assessment of fiscal policy in the paper the cyclically adjusted to the deficit and the structural deficit are constituted. Cyclical deficit arises as a result of the changed revenue and expenditure, due to cyclical movements of the economy. Structural fiscal deficit is a negative budget balance (excess of expenditure over income) in the economy, which

operates at the natural rate of unemployment due to revenue shortfalls in the amount planned (Todorović-Đurović & Đorđević, 2010, p. 379). The cyclically-adjusted fiscal deficit or "deficit debt stabilization" measures whether the current fiscal arrangements are sustainable over the long term. The structural deficit as an indicator of the sustainability of the fiscal policy indicates the extent to which budget outcomes are affected by macroeconomic trends, and the impact of fiscal policy on the economy (through the effect on demand and over relative prices and therefore on the allocation of resources). Conceptually, the structural fiscal balance is a superior basis for assessing fiscal position of a country and keeping fiscal policy in relation to the actual fiscal balance. As an indicator of fiscal policy, the structural deficit has two advantages. First, to clean the deficit of the effects of economic cycles, and is actually a better bet for the assessment of fiscal policy rather than the use of the actual deficit. Second, it is easy to stand out in debates and statements by policy makers. These two reasons explain its usefulness and its popularity (Carnot et al., 2011, p. 207). However, the assessment of the fiscal position of the country and the conduct of fiscal policy based on structural fiscal balance is faced with some methodological difficulties, which can provide fertile ground for political manipulation.

The tools of empirical analysis of fiscal policies are mainly developed and applied to the data of the developed countries. Countries in transition differ from developed countries in many aspects, such as the most important structure of the state budget. State budgets in developed countries are higher (as a share of GDP), on the expenditure side more spending on transfers and revenue side is a function of personal and social security. In countries in transition transfers are usually small and the largest part of public spending is spending on goods and services and public sector wages. On the revenue side, indirect taxes are often the largest component. This is certainly true, but there is no reason to believe that the methodology applied for OECD countries should not be applied in other countries. In essence, this methodology in different ways approached the problem of reverse causality in the assessment of the effects of fiscal policy. Conceptually, there is no reason why radically different methodologies or even ignoring the problem of reverse causality should be a better solution for countries in transition. The real question, however, is the availability of data. Countries in transition have a drastic worsening of fiscal data from developed countries and it cannot be an obstacle to empirical assessments (Perotti, 2007, p. 3).

The aim is to analyze the possible methodological approaches to assess the cyclically adjusted and structural fiscal deficit and that, on the basis of methodologies prevailing in the EU countries, to carry out an econometric estimation of their height and dynamics in the Republic of Serbia for the period 2007-2014 (first quarter), based on quarterly macroeconomic data.

## 2. Construction of Cyclical Fiscal Deficit in Serbia

For the purposes of assessing cyclically adjusted deficit in Serbia, the authors shall apply the access to the European Central Bank. The method estimates the cyclically adjusted deficit consists of several steps: (i) identification of the cyclical sensitive elements of public revenues and public expenditures and their macroeconomic bases and calculation of the value of the relevant macroeconomic bases using the filter; (ii) estimate the elasticity of cyclically sensitive elements of the budget in relation to the macroeconomic base using the model with error correction (error-correction model); (iii) calculating the fiscal deficit and the cyclical nature of fiscal policy assessment.

**Table 1** Cyclically sensitive elements of the expenditures and their macroeconomic bases

Cyclically sensitive elements of the budget (in current price)	Source of data	Macroeconomic bases (in current price)	Source of data
Income tax	Ministry of Finance	Wages	Statistical Office
Corporate tax	Ministry of Finance	Gross operating surplus (GOS)	Statistical Office
VAT	Ministry of Finance	Personal consumption	Statistical Office
Excise	Ministry of Finance	Personal consumption	Statistical Office
Social security contributions	Ministry of Finance	Total sum of wages	Statistical Office
Unemployment benefits	Ministry of Finance	Number of unemployed	Statistical Office

*Source:* The authors have created tabular interpretation.

*Identification cyclically sensitive elements of public revenue and expenditure and their macroeconomic bases* are shown in Table 1. As a macroeconomic basis, income tax is taken to earnings. The time series comprises quarterly data on the total amount of salaries in the public sector. The total amount of wages is obtained by multiplying the number of employees with the average wage in the public sector, the private sector and the sector of active farmers. Income tax expense for macroeconomic base has a gross operating surplus. It is calculated as the difference between GDP at constant prices and the mass of paid salaries in constant prices. Macroeconomic basis, the VAT and excise are personal consumption, and social security contributions, total earnings were accrued. The elasticity of unemployment benefits as well as cyclically sensitive components of the budget are calculated in relation to the base number of the unemployed.

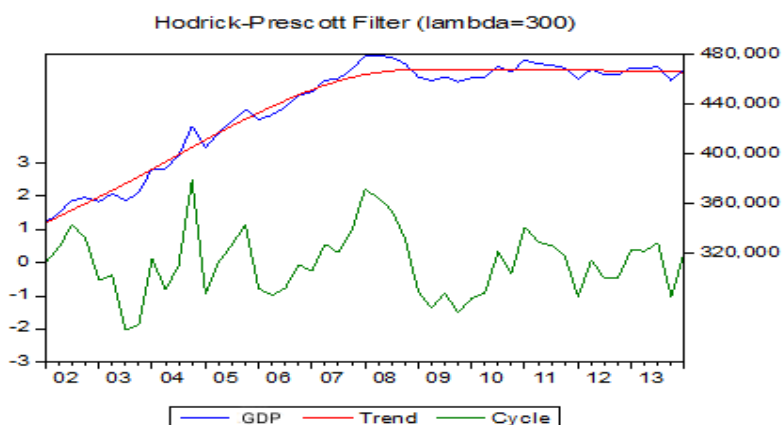
*Calculating the value of the relevant macroeconomic bases* is carried out using a HP (Hodrick-Prescott) filter, which is in line with the case law of the European Central Bank. Hodrick-Prescott (HP) filter is a method that is widely used among macroeconomists to assess the long-term trend component of a series. The method is first used in the working document (issued in 1997) by the Hodrick-Prescott in which he analyzes the postwar American business cycle. Technically, the HP filter is double-sided linear filter that calculates the smoothed series by reducing the variance. The parameter  $\lambda$  controls the smoothing of the series. In applying the HP filter statisticians recommend using the smoothing parameter  $\lambda = 100$  for annual data;  $\lambda = 1,600$  for quarterly data, and  $\lambda = 14,400$  for monthly data. At the same time, the European Central Bank for the purposes of calculating the structural fiscal deficit uses the value of the smoothing parameter  $\lambda = 30$  for annual data, which corresponds to the value of the parameter  $\lambda = 480$  for quarterly data. In the paper was applied smoothing parameter  $\lambda = 300$ , which is consistent with the length of the business cycle of 4 years, which corresponds to the average length of the business cycle in the Republic of Serbia. According to the assertion of the author Fatas & Mihov (2008), it is likely that low-income countries have a shorter and variable business cycle due to less developed financial markets and weak economic institutions.

The advantages of this method are simplicity and transparency of the application. However, it has significant shortcomings. First, the use of the HP filter is based on the assessment of the length of the typical business cycles in individual economies, but that choice is to a large extent arbitrary. In addition, the HP filter can not detect structural breaks in the series. Also, using this filter calculated trend values at the beginning and end of the time series is very close to the values of the original series.

The output gap is a measure of demand, which is defined as the difference between the level of GDP and its equilibrium level, ie. trend. The equilibrium level of GDP is the level that can be achieved with the existing workforce, capital and productivity without upward pressure on prices. In contrast to the trend that has defined long-term factors, the GDP gap is determined by short-term factors such as salary trends, credit activity or character of monetary policy. A positive output gap means that inflationary pressures coming from the demand, and vice versa.

The growth of the GDP gap above trend in 2007 and a high positive output gap in 2008 clearly signaled that the economy was overheated due to high credit growth, real wage growth, and due to the high trade balance of payments deficit. Economic growth in this period was not long-term. In 2009, due to the decline in economic activity deepened the negative output gap that continued in 2010 and 2011.

**Figure 1 The gap in GDP in Serbia - HP approach, the period 2001- 2014 (first quarter)**



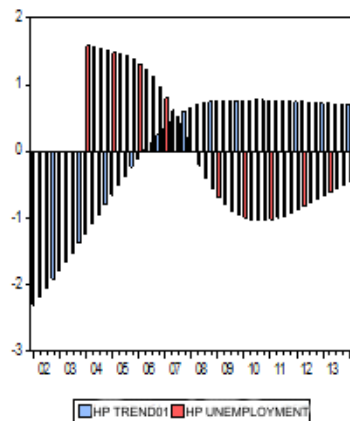
*Source:* For GDP data source is the Statistical Office of the Republic of Serbia. The calculation of the output gap were done by the authors.

Monetary policy has worked in the direction of an increase in inflation in early 2010, while, in contrast, seemed disinflationary negative GDP gap, culminating in the fourth quarter of 2013. Increased negative output gap in 2013 and 2014 is the result of the influence of many factors, but primarily to reduced investment in production capacity, difficulties in financing current production activities of the company and the negative tendencies in the labor market.

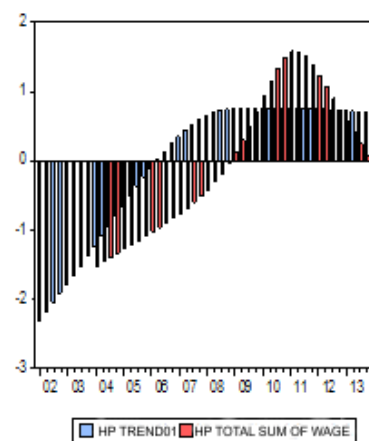
Figure 2 shows the percentage deviation of the actual value trend macroeconomic bases. It is evident that in the Republic of Serbia different macroeconomic bases oscillate in different phases of the business cycle. Access to the European Central Bank, takes this fact into account. Figure 2 shows that in the period of high demand (positive output gap), the unemployment rate was above trend, especially in the period 2004- 2006, and the rest period ranged below its trend. The wage bill was depressed compared to the trend in the period 2010-2011, which indicates that the fiscal policy of the Republic of Serbia was explicitly restrictive (reduction of public sector wages). Private consumption fluctuated around a trend, but in 2004 and the first quarter of 2007 to the fourth quarter of 2008 was above trend (high credit growth), which in turn suggests that the monetary policy of the Republic of Serbia was expansive (down real interest rates). Deviation base gross operating surplus above trend in the Republic of Serbia was explicitly in the period 2006-2008 (high economic growth and real wage growth), and the deviation below trend during the period 2010- 2011 (due to reduced investment in production capacity and the difficulty of financing the current production activities of the company).

**Figure 2 Deviation from the baseline macroeconomic trend and the GDP gap, the period 2002 to 2014 year (first quarter)**

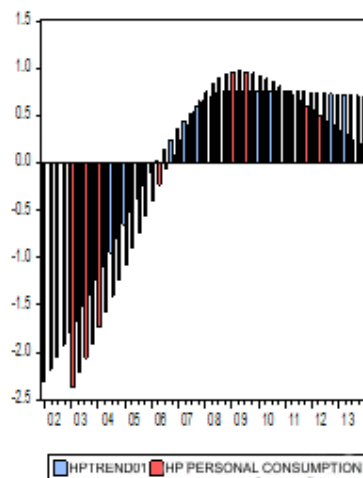
a) The deviation from the trend of unemployment and the GDP gap



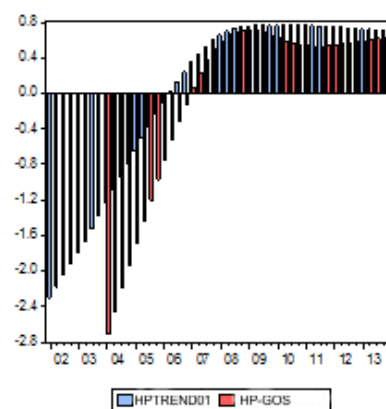
b) The deviation the total sum of salaries of the trend and the GDP gap



c) The deviation from the trend in personal consumption and the GDP gap



d) The deviation of the gross operating surplus of the trend and the GDP gap



*Source:* The data for the calculation of macroeconomic bases from the Republic Institute for Statistics. Their trend is the author of the calculation using the HP filter.

*Rating elasticity cyclical sensitive elements of budget revenues and expenditures relative to their macroeconomic base* is done by econometric. The first econometric testing is necessary to determine the order of integration of individual variables by testing the presence of unit root in all the sensitive elements of the budget cycle and their macroeconomic base. After that, the

access to the cointegration analysis of the Johansen method was used (Johansen, 2002; Lutkepohl, 2005).

Possible variants after testing co-integration are:

1) series are non-stationary, with unit root, but are not cointegrated. It is necessary to apply a standard analysis of time series such as (unrestricted) VAR model that is applied to the first difference of the observed time series;

2) series are non-stationary, with a unit root and mutually cointegrated in one cointegration relation. In this case is used (limited) VAR model;

3) series are stationary, they have a unit root, and there are more of cointegration relations (Mladenovic & Nojković, 2009, pp.130-134).

Summary of the results of applying the expanded the Dickey-Fuller unit root test is shown in Table 2. The number corresponds to the number of unit root application process of differentiation in order to come to a time series that is stationary. In addition, this number determines the level of integration of the series. All series are the non-stationary level, that is stationary during the first differential. The table shows that the time series of income taxes, excise taxes, social security contributions, unemployment benefit and wage bill with one unit root, which means they are integrated of order one (mark I (1)). Time series of personal income tax, value added tax, personal consumption, gross operating surplus and employment are fixed in other differential of which is formed by applying the first difference twice. This means that this series with two unit roots and the level of integration of the two rows, I (2)).

**Table 2 Summary of results of the expanded the Dickey-Fuller test (ADF)**

Cyclically sensitive elements of the budget (in current price)	The Level of integration	Macroeconomic bases (in current price)	The Level of integration
Income tax	I(2)	Wages	I (1)
Corporate tax	I(1)	Gross operating surplus	I (2)
VAT	I (2)	Personal consumption	I (2)
Excise	I (1)	Personal consumption	I (2)
Social security contributions	I (1)	Total sum of wages	I (1)
Unemployment benefits	I (1)	Number of unemployed	I (2)

*Source:* Original data from the database of the Ministry of Finance of the Republic of Serbia. Testing the presence of unit root with the help of Dickey-Fuller's test was carried out by the author.

The difference between time series with and without unit root has clear economic implications. While the impact of random shocks to the level of stationary time series weakens over time, the effect of shock on the level of time series with unit root has a permanent effect for an indefinite period of time.

The estimated parameters of the integration vectors are needed to construct a short-term error correction model, which has the following form (Bouthevillain et al., 2001):

$$\Delta \ln X_t = \alpha + \beta(\ln X_{t-1} - \gamma \ln V_{t-1} + \varphi + \delta t + \dots) + \delta_1 \Delta \ln V_t + \delta_2 \Delta \ln V_{t-1} + A + \xi, \quad (1)$$

where is  $X_t$  budget income or expense, expressed in current prices,  $V_t$  the respective macroeconomic basis, at constant prices,  $\alpha$  represents a change in the trend in fiscal relations,  $\gamma$  long term elasticity of budget revenues and expenditures,  $\beta$  is a parameter of short-term adjustment of budget revenues and expenditures to deviations from the long-term balance and parameters  $\delta_1$  and  $\delta_2$  are the short-term elasticity components of the budget in relation to the relevant macroeconomic base in the same period in the previous. The expression within the brackets is called a model error correction. It can include constant  $\varphi$  and /or trend  $\delta$ , which also stems from the selection of appropriate cointegration vector.  $A$  represents a binary (dummy) variables or certain specific characteristics of the economy that are important for the assessment equation.

In the case of cointegration analysis to establish the existence of any cointegration vector, it is estimated the next short-term model (Bouthevillain et al., 2001):

$$\Delta \ln X = \alpha + \delta t + \beta \Delta \ln V + A + \xi. \quad (2)$$

In the case of the tested pairs of individual elements of the state budget and their macroeconomic bases, in addition to a pair of value added tax-personal consumption and excise para-personal consumption, established the existence of a long-term equilibrium relationship, or at least one cointegration vectors using  $\lambda$  (trace) statistics. Given that the four pairs of budget components and related macroeconomic bases set up by one cointegration vector for assessing short-term elasticity of budget components used short-term model is shown by the equation (1). Parameters cointegration vector are needed to calculate the error correction member which is part of the short-term model. In the case of value added tax and personal consumption, as well as excise taxes and personal consumption estimated model shown by Equation (2).

It should be noted that the value of short-term elasticity of budget components relative to their base takes the value of the parameter  $\delta_1$  from the equation (1). In the event that the estimated coefficient is statistically significant or a sign of deviating from the theoretically expected, coefficient is used in addition to the variable (macro-economic basis) in first differences with a time lag, which is statistically significant and has the expected sign. Short-term



elasticity of the personal income tax based on the weight of wages, value added tax in relation to the personal consumption of social security contributions in relation to the mass of salaries and benefits for the unemployed relative to the number of unemployed with the values of macroeconomic bases in first differences in the same period, that correspond to the parameter  $\delta_j$ . Economic theory suggests that the growth of macroeconomic bases need to grow and the corresponding budget tax forms or expense. The empirical results of this analysis are interpreted in Table 3, to confirm this. The one-percenters wage increase leads to an increase in tax revenue from the personal income tax by 0.33% in the short term, while in the long term, to increase 0.16%. The increase in gross operating surplus of 1% leads to an increase in revenues from taxes on profits of 0.84% in the short term. Long-term elasticity in the case of income tax is 0.18, which means that an increase in the tax base by 1% in the long term increase tax revenues from corporate income tax for 0.18%. Short-term elasticity of the value added tax suggests that one percent increase in personal consumption causes an increase in tax revenues for 0.55%. Since he founded not one cointegration relationship between the value-added tax and personal consumption, there is no long-term relationship between these two variables.

**Table 3 Short-term and long-term elasticity of cyclical components sensitive budget of the Republic of Serbia for the period 2005-2014 (first quarter)**

Cyclically sensitive elements of the budget (in current price)	Macroeconomic bases (in current price)	Long-term elasticity (cointegration vector $\delta$ )	Parameter adjustment ( $\alpha$ )	Short-term elasticity
Income tax	Wages	0.16	1.06	0.33
Corporate tax	Gross operating surplus (GOS)	0.18	2.29	0.84
VAT	Personal consumption	-	1.8	0.55
Excise	Personal consumption	-	1.6	0.21
Social security contributions	Total sum of wages	0.06	0.6	0.85
Unemployment benefits	Number of unemployed	0.26	0.31	0.67

*Source:* Econometric estimates of the elasticity of the elements of the budget calculated by the authors based on the data of the Ministry of Finance of the Republic of Serbia, the National Bank of Serbia and the Statistical office of the Republic of Serbia.

The same interpretation applies to the excise tax, but the short-term elasticity coefficient is slightly lower (0.21). One-percenters increase in income (wage) affect the growth of social security contributions from the 0.85% in the short term, ie 0.06% in the long term. The coefficient of elasticity of unemployment benefits in relation to the number of unemployed suggests that

the increase in unemployment by 1% influences the increase in the amount of unemployment benefits from 0.67% in the short term, ie 0.26% in the long term.

Only long-term and short-term elasticity and their comparison with earlier estimates for Serbia (Arsić et al., 2013; Fiscal Council, 2012), but also with the EU-15 (Švaljek et al., 2009) is presented in Table 4. Comparison of the estimated short-term elasticity suggesting that they differ from the corresponding estimate elasticities of other authors, and EU-15. The elasticity of the personal income tax in relation to the wage bill, and the elasticity of the value added tax in respect of personal consumption was slightly lower than the average EU-15. Other estimates of the elasticity of budget components relative to their macroeconomic base in the average EU-15. Differences in the estimated coefficient of elasticity incite different methods of calculation which the authors applied. Specifically, this paper used the methods of the European Central Bank (HP filter). Fiscal Council uses the methods OECD (Cobb-Douglas production function). Also in the work by Arsić et al. (2013) used methods OECD, or by using HP filter.

**Table 4 Comparison of elasticity of cyclical components sensitive budget of the Republic of Serbia prepared by different methods**

Cyclically sensitive elements of the budget (in current price)	Macroeconomic bases (in current price)	Serbia (this paper)	Serbia (Fiscal Council)	Serbia (Arsi et al. 2013)	EU-15 (min-max)
Income tax	Wages	0.33	1	0.84	(1.20-2.60)
Corporate tax	Gross operating surplus (GOS)	0.8	1.16	1.52	(0.72-1.50)
VAT	Personal consumption	0.55	1	1.05	(0.69-1.12)
Excise	Personal consumption	0.21	/	/	/
Social security contributions	Total sum of wages	0.85	1	0.72	(0.89-1.00)
Unemployment benefits	Number of unemployed	0.67	1	1	(0.20-1.07)

*Source:* authors; Arsić et al. (2013); Fiscal Council (2012); Švaljek et al. (2009).

The main objective of fiscal policy is that it spontaneously acting counter-cyclically. When the economy losing momentum, earnings are low, falling company profits and consumption is rather low. This means that the funds collected in taxes are reduced. At the same time, unemployment benefits and other subsidies from the budget increase. In this way, the budget balance deteriorates and fiscal policy automatically becomes expansive. These different effects are called automatic stabilizers of fiscal policy. Automatic stabilizers act

by themselves. Discretionary fiscal policy is in turn required to be made an explicit decision to amend taxes or public spending. However, such decisions are made and slowly introduced. Once implemented, the decisions in the context of fiscal policy tend exercising more rapid impact on the economy (6-12 months) monetary policy (12-24 months). Due to the automatic stabilizers, budget figures do not reveal what the government is doing with its fiscal policy. The budget must be changed for two reasons. It can, for example, to improve because the government is cutting public spending or increase taxes or because the economy is in a state of rapid economic development. To distinguish between these two factors, it is useful to analyze the cyclically adjusted budgets.

*Calculating cyclical fiscal deficit and score the character of fiscal policy* in the Republic of Serbia was carried out using the method of the European Central Bank during the smoothing parameter  $\lambda = 300$ , using the HP filter. The procedure is based on the concept of self GDP. Let  $b^c$  means the cyclical component of the budget balance as a percentage of GDP,  $R$  denotes public revenues and  $S$  public spending,  $R^*/R = (Y^*/Y)^\rho$  and  $S^*/S = (Y^*/Y)^\eta$ ,  $\rho$  and  $\eta$  is elasticity  $R$  and  $S$  in relation to the macroeconomic base,  $(Y_t - Y_t^*)/Y_t^*$  represents the output gap (Carnot et al., 2011, p. 207):

$$b_t^c = (\rho R_t/Y_t - \eta S_t/Y_t) (Y_t - Y_t^*)/Y_t^* \quad (3)$$

$R$  and  $S$  can be defined as the total public revenues and public expenditures, or limited to a part that is sensitive to the production cycle. In the latter case, the separate components of  $R$  and  $S$ , which are not considered to be cyclically sensitive, will be included in the structural balance.<sup>1</sup>

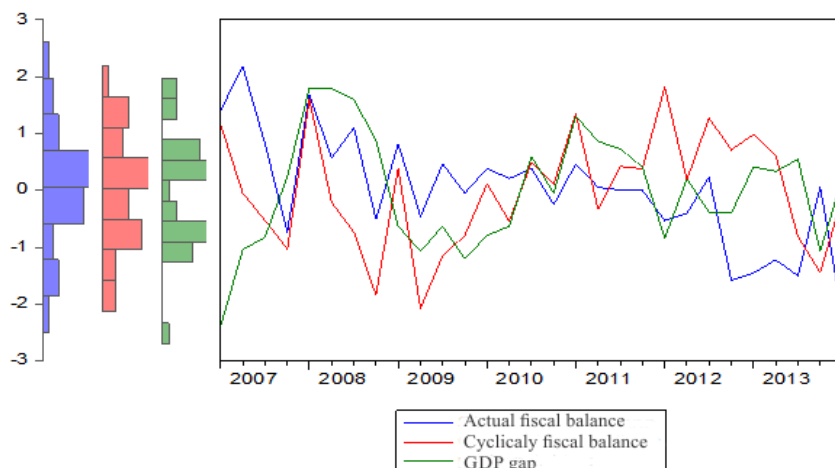
The cyclically adjusted budget balance is an estimate of what would be the balance in a given year if the output gap is zero. The actual budget balance is lower than the cyclically adjusted budget balance when GDP is below its potential, i.e. when the output gap is negative and vice versa when the output gap is positive. The difference between the actual and the cyclically adjusted budget balance is the result of automatic stabilizers (Baldwin & Wyplosz, 2010, p. 523).

The following figure illustrates the comparison of actual and cyclically adjusted fiscal deficit from the previous analysis, in relation to the GDP gap.

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<sup>1</sup> Based on the current average elasticity in the member countries of the OECD, the cyclical component of the budget can be roughly estimated as  $(R/Y + 1/4 S/Y) \cdot$  Production gap or  $b_c^t = y_{\text{gap}} \cdot \eta$ , where  $\eta$  denotes the sensitivity of the fiscal balance I is equal to the difference between the elasticity of tax revenue and public expenditure. With an average size of government from around 40% of GDP, this means that, according to the golden rule,  $b_c$  is about half of the output gap.

**Figure 3 Actual and cyclically adjusted budget of the Republic of Serbia, from 2007 to 2014 (first quarter)**



*Note:* All variables are measured as percentage of GDP.

*Source:* data from the actual fiscal balance and GDP are from the database of the Ministry of Finance, the cyclically adjusted deficit and the GDP gap is calculated by the author. Graphical interpretation was done by the author. Napomena: sve varijable su merene kao procenat BDP-a.

Figure 3 reveals that the actual balance in the Republic of Serbia is mostly moving along with self GDP, indicating that automatic stabilizers operate. It should be noted that the actual fiscal balance over the gap of GDP by the fourth quarter of 2008, which means that at that time the economy was expanding and had positive GDP gap. A slight improvement in the fiscal balance is noticeable from the fourth quarter of 2010, when we started with measures of fiscal consolidation. However, since 2012, again fiscal balance has deteriorated. This suggests that GDP was below its potential, and the output gap is negative, which is consistent with expectations that the crisis increases the fiscal deficit. The cyclically adjusted budget, which is a measure of discretionary actions, tends in the same direction of movement as well as the GDP gap. It shows that the government in good years, when the GDP gap was growing, implemented a restrictive fiscal policy, while its expansionary policy in a situation where the GDP gap was decreasing. However, a careful examination of the figures indicates the exceptions in the Republic of Serbia. In the pre-crisis period, until 2008, the Government of the Republic of Serbia led pro-cyclical fiscal policy in an already overheated economy, achieving the fiscal deficit instead of a surplus. A similar situation exists in the fourth quarter of 2009, second quarter of 2010 and in the period between 2012 and 2013 because the fiscal policy response is not expansive, but due to limited fiscal space in the Republic of Serbia, even

restrictive. Since 2013, fiscal policy has forced countercyclical movement, which alleviates the effects of the economic cycle.

### 3. Evaluation of the Fiscal position of the Republic of Serbia on the Basis of the Structural Fiscal Deficit

To estimate the structural fiscal balance different econometric method is used, which can produce different results on the same data in a given time period <sup>2</sup>. Arithmetic,  $b^{struc}$  denotes the structural fiscal balance,  $b_t$  budget balance,  $b^c$  cyclical component of the budget balance, as a percentage of GDP:

$$b^{struc} = b_t - b_t^c. \quad (4)$$

Estimate cyclically-adjusted and structural fiscal deficit refers to the period from the first quarter of 2007 to the first quarter of 2014. The analysis is based on quarterly data, because the number of annual data is insufficient for econometric estimates. Although this is a relatively short period of time, there is a significant problem to compare data in most of the analyzed time series, and, in some cases, there is a problem of reliability. So, in some cases, the adjustment to the official data to improve their comparability was necessary, while in other cases it was not possible (in these cases were used dummy variables (Eng. Dummy) to isolate the impact of methodological changes). Structural fiscal deficit is obtained as the difference between the actual level of income and expense and the cyclical part of public revenues and expenditures (which are calculated in the previous section). Structural fiscal deficit reflects the size of the fiscal deficit independent of the business cycle. For the calculation of the structural fiscal deficit primary deficit of the consolidated state is commonly used, not the consolidated deficit of the state because it considers the expenses for interest are not the result of current fiscal policy.

The empirical results thus obtained structural results for the Republic of Serbia are given in the first column of Table 5 in the context of comparison with the results of other authors. The Government of the Republic of Serbia during the expansion that preceded the current crisis, has achieved high economic growth and high external deficits that temporarily generate high public revenues. These revenues are interpreted as permanent, resulting in the adoption of legislation that is permanently increases public spending and reduced some taxes. Despite the high public revenue, the actual fiscal deficit in Serbia in the period 2006-2008 was relatively low, suggesting that the government takes an expansive fiscal policy. However, the structural fiscal deficit in this period in the Republic of Serbia is already very high, which indicates the need to tighten fiscal policy. During this period, the state should achieve a surplus and

<sup>2</sup> Prescribing mandatory methods for the evaluation of the structural fiscal deficit at the EU level can be partially solved the problem of using different methodologies.

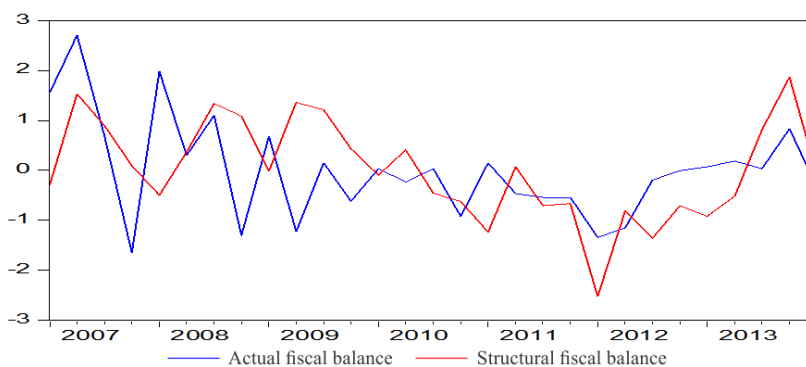
accumulate reserves for "hard times." The systematic increase in public spending and the reduction of certain taxes at the beginning of the crisis in late 2008 led to a strong and lasting growth of the fiscal deficit and the rapid growth of public debt. In the past few years, in the Republic of Serbia recorded a structural fiscal deficit of over 4% of GDP per year (in 2012 a record 5.6% of GDP), which led to a rapid and significant growth of public debt to a level of 63.5 % of GDP at the end of the first quarter of 2014, threatening to jeopardize the sustainability of public finances.

**Table 5 Comparison of results of estimate of the structural balance by various authors for the Republic of Serbia, as a % of GDP in the period 2008 – 2013**

<i>Year</i>	<i>Structural deficit (this paper)</i>	<i>Structural deficit (Arsić et al., 2013)</i>	<i>Structural deficit (IMF)</i>
2008.	-2.3	-4.7	-4.1
2009.	-4.3	-3.9	-4.1
2010.	-4.6	-4.1	-4.4
2011.	-4.7	-4.6	-5.3
2012.	-5.6	/	-5.8
2013.	-4.1	/	-5.5

Source: Authors; Arsić et al., 2013; IMF Word Economic Outlook, April 2014.

**Figure 4 Actual and structural fiscal balance in the Republic of Serbia, in the period from 2007 to 2014 (first quarter), as a % of GDP**



Source: primary data on the components of the structural deficit taken from the Ministry of Finance, calculation and graphical display of the structural deficit having committed the authors.

Comparison of actual and structural deficit shown in Figure 4 can be concluded that the structural fiscal deficit was relatively close to the actual deficit. The conclusion suggests that: (1) automatic stabilizers generally played a more prominent role than consistent countercyclical discretionary fiscal policy, and (2) changes in discretionary fiscal policy were late or were not well targeted (related to the other factors, not the stabilization of GDP).

#### 4. Conclusion

For the assessment of the fiscal position of the Republic of Serbia in real circumstances the authors used cyclically-adjusted deficit, structural deficit and the primary balance.

The cyclically adjusted budget, which is a measure of discretionary actions, tends in the same direction of movement as well as the GDP gap. This shows that during an economic expansion, when the GDP gap is growing, the government implements a restrictive fiscal policy, while its expansionary policy in a situation where the GDP gap is decreasing. However, the econometric analysis shows that only since 2013, the fiscal policy in the Republic of Serbia tends toward countercyclical movement, which relieves the effects of the economic cycle.

The estimated structural deficit in the Republic of Serbia (4.1% of GDP) suggests that the actual deficit heavily influenced by systemic factors that relate to the operation of automatic stabilizer. This means that the fiscal deficit in the Republic of Serbia will not be automatically will be eliminated from the economic recovery, but discretionary fiscal policy is necessary in order to reduce public expenditure and raising revenue. Since the structural fiscal deficit reflects the impact of long-term macroeconomic trends, it is necessary to promptly adopt economic policy measures in order to prevent their impact on the growth of the fiscal deficit.

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## EMPIRIJSKA OCENA FISKALNE POZICIJE REPUBLIKE SRBIJE

**Apstrakt:** U ovom radu se ocenjuje veličina ciklične i strukturne komponente fiskalnog deficita Republike Srbije za period od prvog kvartala 2002. godine do drugog kvartala 2014. godine. Korišćena je metoda Evropske centralne banke, gde je pretpostavljeno da su ciklički osetljivi elementi državnog budžeta porez na dohodak, porez na dobit, porez na dodatu na vrednost, akcize, doprinosi za socijalno osiguranje i naknade za nezaposlene. Elastičnost ciklički osetljivih elemenata u odnosu na njihove makroekonomske osnovice su ocenjene VEC modelom sa korekcijom odstupanja. Rezultati sugerišu da su automatski stabilizatori, generalno više odigrali ulogu nego dosledna kontraciklična diskreciona fiskalna politika, što znači da su diskrecione mere bile neblagovremene ili nisu bile dobro usmerene.

**Ključne reči:** ciklični deficit, strukturni deficit, BDP.

### Authors' biographies

**Jadranka Đurović Todorović** has been a full professor at the Faculty of Economics, University of Niš since 2012. Her fields of interest are monetary economics and public finance. She teaches at all three levels of study. She is a winner of the Silver sign of University of Niš, as the best graduate student in 1992 and the October Award of the City of Leskovac for Finance in 2015. She is a reviewer in numerous journals and author of 4 books and 3 monographies. She has been a participant of many domestic and international projects in field of economics and she is the author of more than 140 scientific articles published in domestic and international journals and thematic collections of papers from international and domestic scientific conferences.

**Marija Vuković**, maiden name Vlahović, is a lecturer at the Higher School of Professional Studies in Novi Sad, specialising in the scientific field of Finance. She teaches International Taxation and Financial Strategies and Tax Planning. Her work focuses on the analysis of the level of fiscal deficit and exploring possibilities for its financing; the design of the tax system in terms of equity and efficiency; design of adequate and responsible policy of public spending; encouraging healthy fiscal decentralization; optimisation level of borrowing by the central and local authorities and finding alternative borrowing options. Marija Vuković is interested in gender-sensitised approach to these issues.





## MODELLING AND PROGNOSIS OF THE EXPORT OF THE REPUBLIC OF SERBIA BY USING SEASONAL HOLT-WINTERS AND ARIMA METHOD

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**Abstract:** Low labour costs as one of the key sources of export stimulation, the competitive advantage of domestic agricultural production and bilateral agreements with partner countries - all promote export as a potentially significant factor of encouragement of economic development of the Republic of Serbia. Taking into account this fact, on the one hand, and balance of payments problems that Serbia has been facing over the years, on the other hand, the subject of this paper is an analysis of trends in the Republic of Serbia export and explanation of variations in the export trends during the period from 2004 to 2014. The aim of the paper is to explore export trends forecast from January to December 2015. The analysis uses Holt-Winters and ARIMA methods for analysing time series. The paper provides insight into the export trend forecasts for the period of 12 months, and thus confirms the possibility of practical usage of the time series analysis methods in forecasting macroeconomic variables such as export. The used methods identify increase of export during the summer and its decrease after October 2015. The paper establishes the existence of a high degree of congruence between forecasts obtained by using two methods, which confirm a high quality of the elaborated methods in the analysis of exports.

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**JEL classification:** C32, C53, F17

## **1. Introduction**

Time series analysis and its usage have a growing importance in different research fields such as business, economics, engineering, medicine, environment, social sciences, politics and so on. This paper applies time series analysis in order to follow the trends of the Republic of Serbia export on a monthly level during the period from 2004 to 2014. Analysis of export trends during the time is important due to the profound influence of that indicator on economic growth, on the one hand, and due to problems which Serbia faces and which are connected with balance of payments, on the other hand. The subject of the paper is an analysis of the trends of the Republic of Serbia export as one of the key macroeconomic variables, as well as the explanation of variations in the export trends during the analysed period of time. The aim of the paper is to explore the export trends forecast during 2015, as well as giving comparative analysis of the results of export extrapolation gained by using Holt-Winters and ARIMA methods.

The Statistical Office of the Republic of Serbia is used as a data source. Holt-Winters smoothing and ARIMA method are used as time series methods for variables' trends forecast during the time. Microsoft Excel and EViews 7 have been used during the research. Forecasting refers to the period January-December 2015.

The first part of the paper shows an overview of the literature about export trends and its importance for a national economy. The second part is occupied with analysis of Serbian overall foreign trade picture with the emphasis on the export. This part of the paper shows trends of foreign trade deficit, export, import content of exports, foreign trade balance by type of activity, as well as the most important foreign trade partners of the Republic of Serbia in 2014. The third part presents the research methodology used in the paper, where the authors explain Holt Winters smoothing and ARIMA method, emphasizing the Box-Jenkins methodology. Finally, the fourth part contains the results of the conducted research.

## **2. Overview of the Literature about the Role and Importance of the Export for a National Economy**

Numerous theories about foreign trade demonstrate a great importance and continual actuality of that issue. Generally, all authors who have been occupied with the role and importance of the foreign trade could be classified as liberals and protectionists, with a separation of the mercantilism as a precursor theory. *The mercantilism* which is caused by socio-economic conditions in Europe from the beginning of XV to the middle of XVIII century, observed the wealth of a nation through its quantity of the silver and gold. Thus, foreign trade was

considered as a source of wealth, because mercantilists saw a foreign trade surplus as the only factor of increasing gold supply in a country, and hence a wealth of nation. On the other hand, internal trade results only in the change of silver and gold owner, but not in the change of gold supply in a country. *Liberal theory of the foreign trade* looks on a country specialization for production of certain products as not only necessary, but also highly worth for every country. As for the *protectionism*, it propagates the protection of an insufficiently developed country for a certain time, with the aim of its strengthening and forming as an equal participant in the world market (Todorović & Marković, 2013, p. 52, 55).

The role of foreign trade in keeping and encouraging economic development has been the subject of different points of view. From the orthodox point of view, import should be a supported activity, because the competitive pressure of international trade stimulates growth through the strengthening of efficient resource allocation, as well as through the involvement of innovation and learning from a foreign competition. On the other hand, export means the widening of aggregate demand, the advancement of the full employment of factors of production and the increase of income which can be used for the payment of import as the encouragement of consumption and technological progress. The orthodox point of view can be presented by Nurkse's sentence that foreign trade is "engine of growth" which drives the global economy of XIX century (Nurkse, 1960, from Moon, 1998, p. 8).

On the other hand, some economists emphasise the importance of external markets for foreign trade, especially the role of Third World countries. The export of these countries traditionally has the source in sectors whose demand is not perspective, and which has limited intersectoral relations. These sectors produce primary products and they are characterised by a low wage level. Additionally, the great expansion of existing branches is not only impossible, but also undesirable. Meanwhile, the large number of importing products from powerful foreign economic branches can uncapacitate the development of new domestic branches. In that way, trade dependence can lead to distortions which endanger economic growth. What is more, an extensive reliance on trade can cause the great country's sensitivity to market distortions or political pressures, especially if that trade is concentrated on the small number of products or the small number of trade partners – what is typical for small and poor countries (Moon, 1998, p. 9).

Between these two opposed attitudes there is a middle ground, whose representative is *Kravis*. He considers trade as the consequence, but also as the cause of growth in the same time. Furthermore, he thinks that trade is just one of the various causes of economic growth. Aside, trade stimulates economic growth just under certain conditions, and what is the most important, the main drivers of growth are internal (Kravis, 1970, p. 859). *Levis* adds that "the

engine of growth should be technological change, with international trade serving as a lubricating oil and not as fuel”(Lewis, 1978, from Moon, 1998, p. 9).

The existence of cheap labour force in developing countries can enable competitive advantage for the production and export of labor-intensive sectors. The development of export-oriented and labor-intensive sectors can create an enormous income and the possibilities of employment for poor inhabitants, but it also can enable the absorption of advanced skills to developed countries through export. However, not all developing countries with cheap labor force are equally successful in the export of labor-intensive products. It results in a great difference between various developing countries’ realized performances. According to some authors, factors which determined this success are the transport infrastructure of the exporting country and transport costs (Mottaleb & Kalirajan, 2014, p. 1450043-3).

Different schools of economic thought have various attitudes about the influence of the export on economic growth. Two opposed attitudes can be found in the papers of neoclassicists and Marxists. The argument of the neoclassical theory of foreign trade about the contribution of export and trade to economic performances is based on the better allocation of resources. Marxists and neo-marxists considered foreign trade as the mechanism of exploitation of less developed countries by the industrialised world (Rati, 1985, p. 425).

Some authors looked at the importance of export and foreign trade for economic growth through technical and technological infrastructure. Country openness for international trade and global market give the possibility for the adoption of the most advanced production technology and management techniques, what stimulates added investment in research and development as well as the engagement of the most qualitative human resources. In that way the conditions for efficiency increase in costs and production volume are provided, what will finally lead to the increase in production level (Milenković, 2012, p. 140).

Export directly contributes to export sector growth in different ways. Export increases the usage of existing capacities, stimulating the growth of investment. Furthermore, export makes possible for enterprises to take advantage of the economy of scales through the increase in production. Exit to the world market raises the awareness of technological progress and gives incentives for the increase in innovations. Export is a complex phenomenon, so it is important to analyse the relation between these macroeconomic variables through the mechanisms of interaction, as well as their synergistic effect on a country’s export (Marković & Marković, 2014). Eventually, exporters are faced with foreign competition pressure which stimulates efforts for efficiency increase. Thus, if the output of every two economic sectors is determined by typical

neoclassical production function, it is expected greater marginal factor productivity in export sectors in comparison to non-export-oriented sectors (Ibrahim & MacPhee, 2003, p. 258).

Hussain and Saaed carried out the research on the connection between import, export and economic growth by using ARIMA method. These authors conclude that import causes a great increase of export and economic growth. They explained that conclusion in the following way – the import of capital goods used for the development of the infrastructure contributes to the exports of that infrastructure products, what has growth increase as a synergistic effect (Hussain & Saaed, 2015, p. 68). According to that, the structure of import is the factor of a great importance, so the import increase is not *per se* a negative phenomenon.

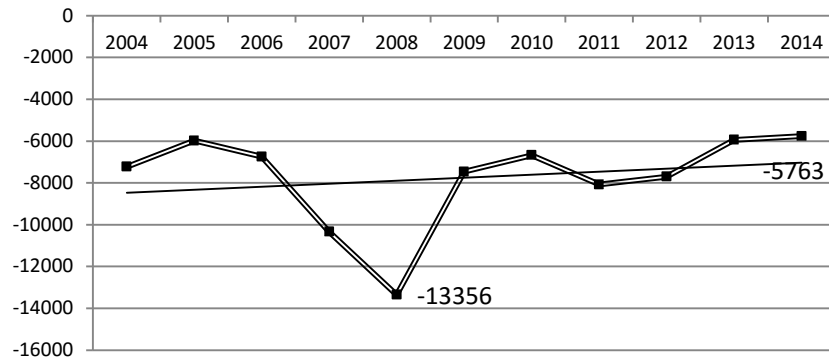
The influence of import on economic development can be analysed through instrument known as a foreign trade multiplier. It is the connection between the national income and export of the economy. The foreign trade multiplier may be defined as an amount by which national income will be raised by unit increases in exports (Acin et al., 2006, p. 43). This indicator means that the export increase for one unit leads to the income increase, which causes import and saving increase in the proportion conditioned by the national standard of living level.

There is a possibility that the increase of export and domestic consumption leads to the increase of domestic investment through an acceleration process. Namely, domestic production capacities are increased through added investment in order to satisfy the increased demand of exporters and domestic consumers. It is uncertain to what extent will operate multiplier's effect. The effect will probably be small or absent if economy operates below the level of full employment of production factors (Hultman, 1967, p. 149).

### **3. The Analysis of Export and the Foreign Trade Picture of the Republic of Serbia**

The main feature of the foreign trade position of the Republic of Serbia is the existence of the foreign trade deficit during a long period. The main problem is the structure of deficit, hence Serbia imports the great amount of products which it produces itself. Actual data show reduced deficit, although it has the value of 5.763 million dollars in 2014. The following graph represents deficit trends in the period from 2004 to 2014.

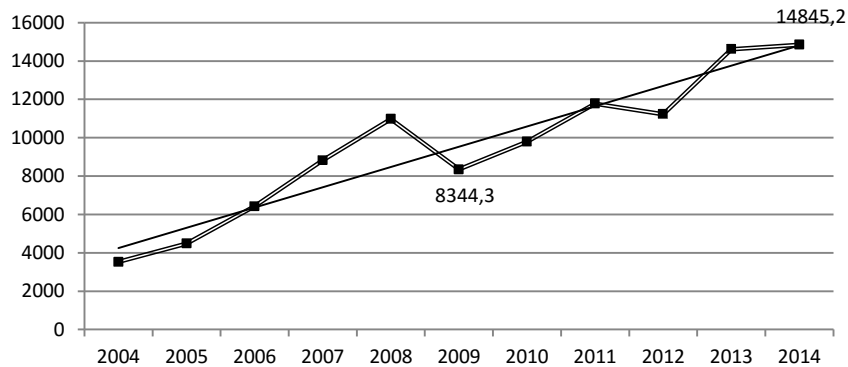
**Graph 1 Foreign trade deficit, Republic of Serbia, 2004-2014, million dollars**



*Source:* Authors, based on Statistical Office of the Republic of Serbia data

Graph 1 shows that the foreign trade deficit was the highest in 2008 when it recorded the value of 13.356 million dollars. On the other hand, the lowest deficit was achieved in the last year, 2014, when a negative difference between export and import amounted 5.763 million dollars. The trendline has a slight positive growth, what is the proof of gradual decrease of deficit during several last years.

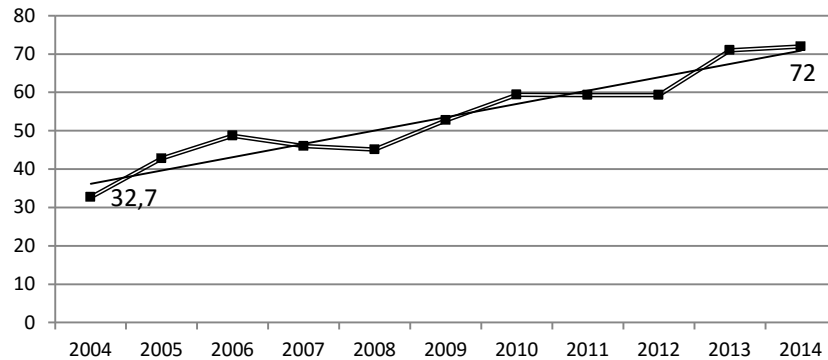
**Graph 2 Export value in million dollars, 2004-2014, Republic of Serbia**



*Source:* Authors, based on Statistical Office of the Republic of Serbia data

As for the export trends, it records growth trend from 2004 to 2014. Except for 2009 and 2012 when export fell, we can see the growth of this indicator during the whole analysed period. It recorded value of 14.845,2 million dollars in 2014.

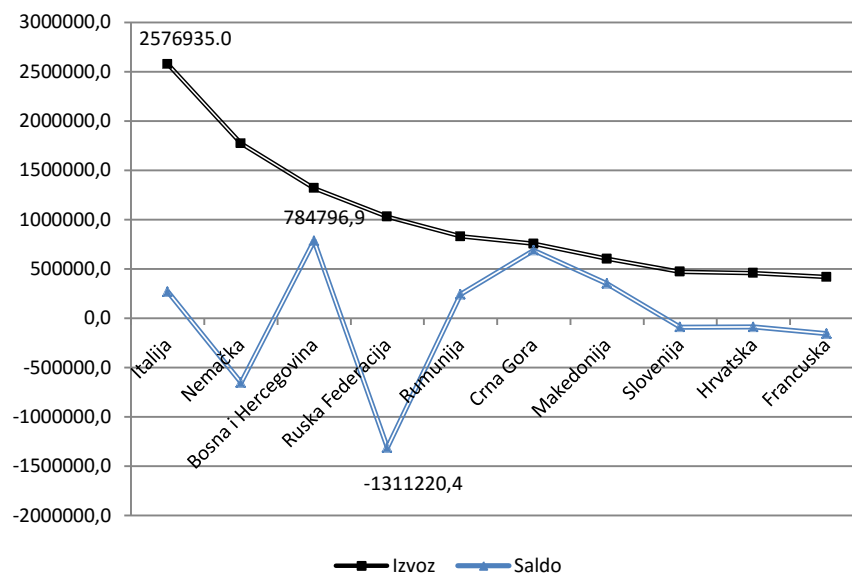
**Graph 3 Import contents of export (%), Republic of Serbia**



Source: Authors, based on Statistical Office of the Republic of Serbia data

The previous graph gives us similar conclusion to others, so far derived conclusions. From 2004 import contents of export has been increasing, hence trendline has a greater positive slope in comparison to the foreign trade deficit trendline. Import contents of export were 32.7% in 2004, while a positive change was made in 2014 when this indicator amounted to 72%.

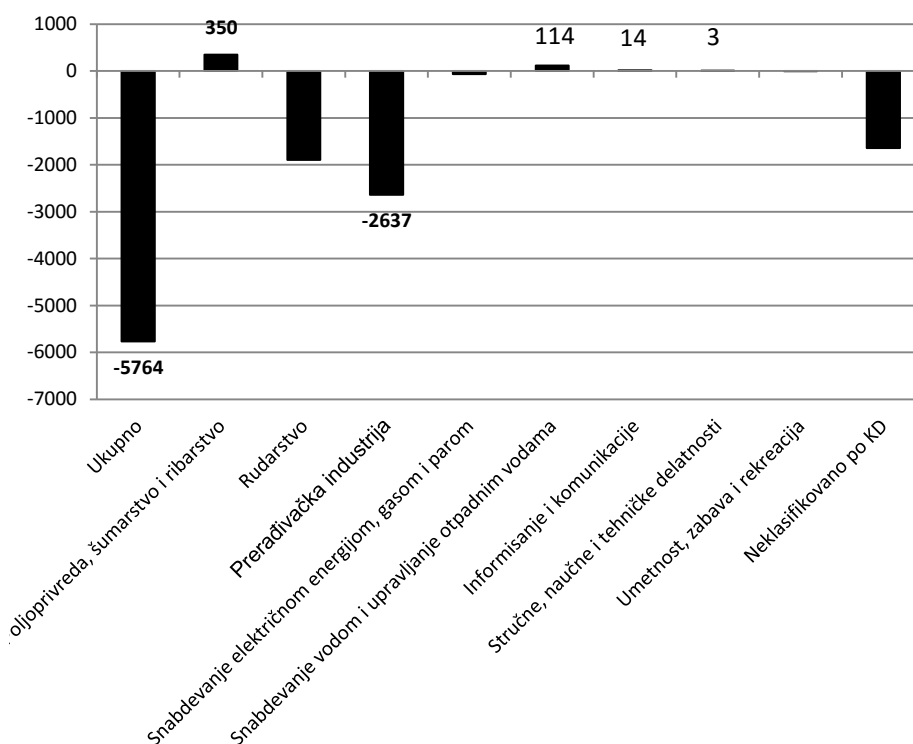
**Graph 4 The ten most important foreign trade partners of the Republic of Serbia in 2014, in thousands of dinars**



Source: Authors, based on Statistical Office of the Republic of Serbia data

The previous graph represents the ten most important foreign trade partners of the Republic of Serbia in 2014. The greatest export value was realized in the trade exchange with Italy, amounting to 2.576.935 thousand dollars. As for the largest positive trade balance, Bosnia and Hercegovina stands out among observed ten countries. Serbia realised the surplus in the foreign trade exchange with Bosnia and Hercegovina in the value of 784.796,9 thousand dollars. The foreign trade surplus was achieved also in trade with Italy, Romania, Montenegro and FYR Macedonia. It is interesting that Serbia accomplished foreign trade deficit in the trade exchange with the Russian Federation. Even though the import of oil and gas from Russia makes the largest part of import value from Russia, there is a conclusion about an unjustifiably high deficit in the trade exchange with this country. Namely, the existence of The Free Trade Agreement from 2000 gives domestic exporters the possibilities of achieving the advantages of tax-free export in Russia for the majority of products. Thus, one of the imperative of export strategy is the increase of domestic product export in Russia as well as the reduction of the existing foreign trade deficit.

**Graph 5 Value of foreign trade balance according to classification of activities, 2014, Republic of Serbia, million dollars**



Source: Authors, based on Statistical Office of the Republic of Serbia data



Graph 5 shows the positive share of the agriculture, forestry and fishing (350 million dollars), the water supplying and wastewater management (114 million dollars), the information and communication (14 million dollars), as well as the professional, scientific and technological activities (3 million dollars) in the structure of foreign trade balance according to the classification of activities. All remaining activities record the negative value of foreign trade balance, where the biggest negative share in that balance has a processing industry (-2.637 million dollars). This results in total negative foreign trade balance in 2014, i.e. in the foreign trade deficit value of 5.764 million dollars.

Accordingly, it can be concluded that the existence of positive trend in export and foreign trade balance, with the presence of numerous problems as well as a large space for the improvement of foreign trade picture of Serbia. One of the key competitive advantages of the Republic of Serbia is low labor force price. This advantage should be used for the encouragement of export through production by lower prices. Furthermore, taking into account the fact about the competitive advantage of domestic agriculture, as well as the existence of numerous bilateral agreement with partner countries, we deduce that export is an important potential factor of encouragement of economic growth of the Republic of Serbia.

#### **4. Research Methodology**

Time series analysis has as an aim identification of models that explains variations in the conduct of some phenomenon during a time and its future state forecast on the basis of noted condition in the past and present. There are numerous methods to be used in time series analysis. This paper uses two methods: Holt-Winters smoothing and ARIMA method, with the aim of forecasting monthly export trends in the Republic of Serbia for the period January-December 2015.

Seasonal Holt-Winters smoothing is used for data with trends and seasonal character. The theory recognizes linear, exponential and damped trend. Linear trend means that time series increases (decreases) in an equal absolute amount from one period to another. The exponential trend implies that time series increases (decreases) in an equal relative amount from one period to another. A damped trend means a combination of linear and exponential trend, where an increase (a decrease) is existed in absolute amount in the first period, while the phenomenon experiences relative changes in every following period by the principle of exponential trend. Seasonality is defined as a tendency of time-series data to exhibit behavior that repeats itself every S period. The term season is used to represent the period of time before behaviour begins to repeat itself (S – season length in periods).

There are two main Holt-Winters models – Multiplicative and Additive. The *additive model* implies kind of forecast where an expected seasonal amount of certain phenomenon increase is added to the annual average. The *multiplicative model* includes a relative change of analysed variable which is greater if the absolute amount of this variable is greater, and inverse. In additive models, series shows stable seasonal fluctuations, notwithstanding a general level of time series trends. As for a multiplicative model, seasonal fluctuation amount varies depending on general series level.

The *additive seasonal model* is used when time series data show additive seasonality. This model is appropriate for those time series that have amplitude of the seasonal pattern independent of the average level of the series. The additive version of the model can be described by the following formulas (Valakevicius & Brazenas, 2015, p. 385):

$$\begin{aligned} L_j &= \alpha(y_j - S_{j-s}) + (1 - \alpha)(L_{j-1} + b_{j-1}) \\ b_j &= \beta(L_j - L_{j-1}) + (1 - \beta)b_{j-1} \\ S_j &= \gamma(y_j - L_j) + (1 - \gamma)S_{j-s} \\ F_{j+1} &= L_j + b_j + S_{j+1-s} \\ j &= s + 1, s + 2, \dots, \end{aligned} \quad (1)$$

where  $\alpha, \beta, \gamma \in [0, 1]$  are the smoothing parameters,  $L_j$  is the smoothed level at time  $j$ ,  $b_j$  is the change in the trend at moment  $j$ ,  $S_j$  is the seasonal smooth at moment  $j$ ,  $s$  is the number of periods in the season, and  $F_{j+1}$  is one step ahead forecasted value. This initial values are calculated by the following formulas:

$$\begin{aligned} L_s &= \frac{1}{s} \\ b_s &= \frac{1}{s} \left[ \frac{y_{s+1} - y_1}{s} + \frac{y_{s+2} - y_2}{s} + \dots + \frac{y_{s+s} - y_s}{s} \right] \\ S_j &= y_j - L_s, \\ j &= 1, 2, \dots, s. \end{aligned} \quad (2)$$

Although the additive seasonal Holt-Winters model is a broadly used for forecasting in time series analysis, some authors consider its basic form as an insufficiently effective for giving reliable estimates of time series. Analysing the results of the additive seasonal Holt-Winters model, Lawton (1998, p. 394) noticed its good forecast results. However, when it comes to errors in the estimates of the time series features, this author marked trend as correctly

estimated, but not the values for the level and the seasonal terms. Some strategies for adjusting and correcting Holt-Winters estimates are annual renormalisation, annual component adjustment and the variant of adjusted Holt-Winters suggested by Robert and McKenzie.

*Multiplicative seasonal model* is used when data have multiplicative seasonality. The Multiplicative model is a more frequently implemented in computer forecasting software in comparison to additive seasonal model. Although the multiplicative Holt-Winters method provides us with a forecast for each future time period, it has a disadvantage related to the forecast error. Namely, this method does not give us information about forecast error. In order to solve that problem, literature suggests prediction interval which can have form presented in the following formula (Koehler et al., 2001, p. 269):

$$\text{Forecast} \pm k \times \sqrt{\text{variance of the forecast error}}, \quad (3)$$

where element  $k$  depends on the probability distribution of the forecast error.

Multiplicative seasonal model can be described by the following formulas (Valakevicius & Brazenas, 2015, p. 386):

$$\begin{aligned} L_j &= \alpha \left( \frac{y_j}{S_{j-s}} \right) + (1 - \alpha)(L_{j-1} + b_{j-1}) \\ b_j &= \beta(L_j - L_{j-1}) + (1 - \beta)b_{j-1} \\ S_j &= \gamma \frac{y_j}{L_j} + (1 - \gamma)S_{j-s} \\ F_{j+1} &= (L_j + b_j)S_{j+1-s} \\ j &= s + 1, s + 2, \dots \end{aligned} \quad (4)$$

The initial values of the model are computed using the same formulas as in the additive version of the model, except for seasonal variables:

$$S_j = \frac{y_j}{L_s}, j = 1, 2, \dots, s \quad (5)$$

Due to the complexity of the basic versions of the two mentioned models of Holt-Winters method, there are mostly used their simplified versions. The simplified versions do not include variable  $b$ .

*ARIMA time series methods* (Autoregressive Integrated Moving Average) are based on the three-stage Box-Jenkins methodology. Pioneers in that area are Box and Jenkins, who popularized approach that combines autoregressive models and moving average models. Although both models were used even earlier, the contribution of Box and Jenkins consists in the development of the

systematic methodology for the identification and estimation of models which can include both approaches. That fact qualifies Box-Jenkins models in a high class methodology (Dobre & Alexandru, 2008, p. 156).

The Box-Jenkins methodology is a powerful method for determining mathematical models of various stochastic-process phenomena. Essentially, this is the methodology of systematic multi-stage modelling for identifying and estimating models which include and combine autoregressive (AR) and moving average (MA) models, in order to find the best adjusted time series of original data, and make forecasts. The basic advantage of Box-Jenkins methodology is extracting a large number of information from analysed empirical time series, using a small number of parameters. Furthermore, this methodology can be used for modelling both stationary and non-stationary time series, with and without seasonal patterns (Baldigara & Mamula, 2015, p. 21).

The disadvantage of using the Box-Jenkins methodology is related to the period of the forecast. Namely, the period of twelve months, which is used as a forecast period in our paper can be evaluated as a relatively short. Although analysis, technically, can be conducted for a longer forecast period, the accuracy of forecasting will be smaller in that case. Choosing forecast period of twelve months, we chose accuracy instead of forecast period length.

Seasonal character of time series is a common and frequent pattern of changes that repeats over  $S$  time period. If observed phenomenon is seasonal, it is necessary to generalize ARIMA process and create the SARIMA model in order to relieve seasonality. Seasonal Autoregressive Integrated Moving Average (SARIMA) process is designed to model time series with trends, seasonal pattern and short time correlation. It is developed from the standard model of Box and Jenkins (1970) and incorporates both seasonal autoregressive and moving average factors into the modelling process. The seasonal ARIMA (SARIMA) models incorporate both non-seasonal and seasonal factors in a multiplicative model as follows (Etuk, 2012, p. 29):

$$ARIMA(p,d,q) \times (P,D,Q)_s \quad (6)$$

where:

$p$  – non-seasonal AR order,

$d$  – non-seasonal differencing,

$q$  – non-seasonal MA order,

$P$  – seasonal AR order,

$Q$  – seasonal MA order,

$S$  – time span of repeating seasonal pattern.

The Box-Jenkins methodology includes three interactive steps: (1) the model identification stage, (2) the estimation stage, (3) the diagnostic checking stage (Baldigara & Mamula, 2015, p. 22). *The first stage* implies verification of time series stationarity. *The estimation stage* involves model defining, so it is the most important step of used methodology. Following scheme shows theoretical base for defining adequate model.

**Table 1 Types of autocorrelation functions**

Shape of time series trends	Proposed model
<b>Exponential, descending to zero</b>	AR model, the use the plot of partial autocorrelation for determining AR variables.
<b>Time series with a changing sign, that converges to zero</b>	AR model, the use the plot of partial autocorrelation for determining AR variables.
<b>Time series has several spikes, the others stay at zero level.</b>	Moving average model (MA)
<b>Time series declines after several lags.</b>	Combination of autoregressive model and moving average model (ARMA)
<b>High values at fixed intervals.</b>	Include seasonal autoregressive variables

Source: Nastić, N. (2012). *Empirijsko istraživanje cijena u BiH 2006-2010. i prognoza inflacije za 2011. godinu – primjena ARIMA modela*, Zbornik radova Ekonomskog fakulteta, 6, p. 91-104.

Within *the diagnostic checking stage* it we must establish validity of the model by checking key parameters. Realization of all three stages of Box-Jenkins methodology results in trend prognosis of indicator which is the object of analysis in defined time period.

## 5. Research Results

### 5.1. Holt-Winters Smoothing

Using the seasonal Holt-Winters smoothing, the authors tried to overcome the problem of the same forecasted values for every forecast period, what is the key disadvantage of exponential smoothing. When it comes to use of Holt-Winters method, we started from establishing two models – additive and multiplicative. Both models used following parameters: 0.7 for alfa ( $\alpha$ ), 0.5 for beta ( $\beta$ ) i 0.2 for gama ( $\gamma$ ). That choice of constants is caused by intense for giving greater

importance new values in exponential smoothed components and giving equal importance new and earlier trend assessment.

After defining smoothing parameters, the next step was establishing additive and multiplicative model of export trends for the period January 2004 - December 2014. In order to choose a high quality model, we calculated an error deviation for every model. Root mean square error (RMSE) and Residual sum of squares (RSS) are used as indicators of error deviation. Root mean square error for the additive model amounts 73.11527, while the same indicator for the multiplicative model has the value of 69.01904. The residual sum of squares as the error deviation between the regression function and database records 705651.2 for additive model, and 628798.9 for multiplicative model. These data are shown in the following table.

**Table 2 Measurement of accuracy for forecasts given by Holt-Winters method**

Model/ Accuracy measures forecast	Root mean square error (RMSE)	Residual sum of squares (RSS)
<b>Additive model</b> ( $\alpha=0.7$ $\beta=0.5$ , $\gamma=0.2$ )	73.11527	705651.2
<b>Multiplicative model</b> ( $\alpha=0.7$ $\beta=0.5$ , $\gamma=0.2$ )	69.01904	628798.9

*Source:* Authors, based on Statistical Office of the Republic of Serbia and EViews 7 data

Observing calculated values of model accuracy, we can conclude smaller values in multiplicative model, for both RMSE and RSS. It means that root mean square error and the residual sum of squares smoothed from empirical data are smaller in the multiplicative model in comparison to the additive model. Eventually, this leads to the conclusion about greater acceptability of multiplicative model, as well as about better forecast given by this model. Thus, the multiplicative model will be used in the further analysis.

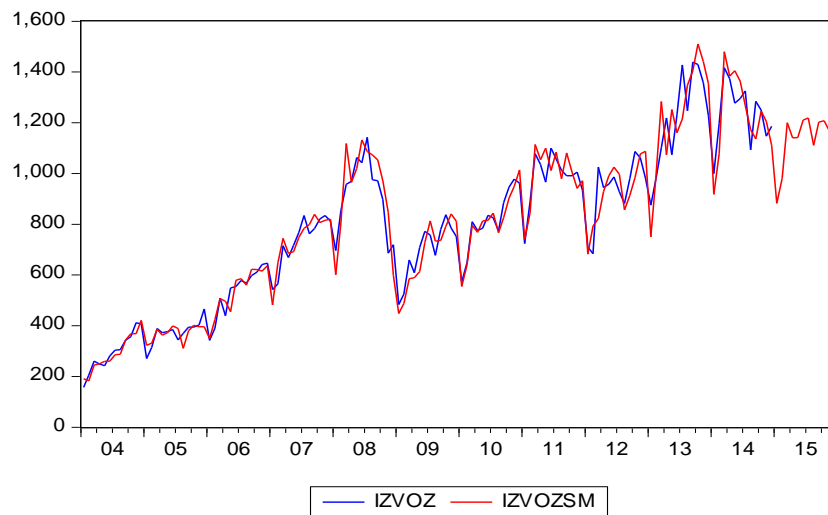
With the aim of clearer analyzing given results, there is shown initial time series of export trends in the period January 2004 – December 2014, as well as smoothed values given by the Holt-Winters method. Forecasted export values are clearly shown in the graph. According to the given model, it is expected that the export's continuous decrease started at the end of 2014, also in January and February 2015, while increasing trends are expected starting from March 2015. After that, from March to October 2015 it is noticed a stagnation trend, while new declining series of the analysed indicator starts from November and December 2015. The biggest forecasted export value refers to July, while the lowest one was marked in January 2015.

**Table 3 Export trends forecast using the multiplicative Holt-Winters smoothing method**

Forecast period	Export forecast (in million dollars)
January 2015	<b>882.08</b>
February 2015	980.26
March 2015	1.200,11
April 2015	1.140,25
May 2015	1.141,94
Jun 2015	1.210,31
July 2015	<b>1.219,13</b>
August 2015	1.111,04
September 2015	1.202,74
Oktober 2015	1.207,67
November 2015	1.168,56
December 2015	1.148,51

Source: Authors, based on Statistical Office of the Republic of Serbia data

**Graph 6: Initial, smoothed and forecasted export values**

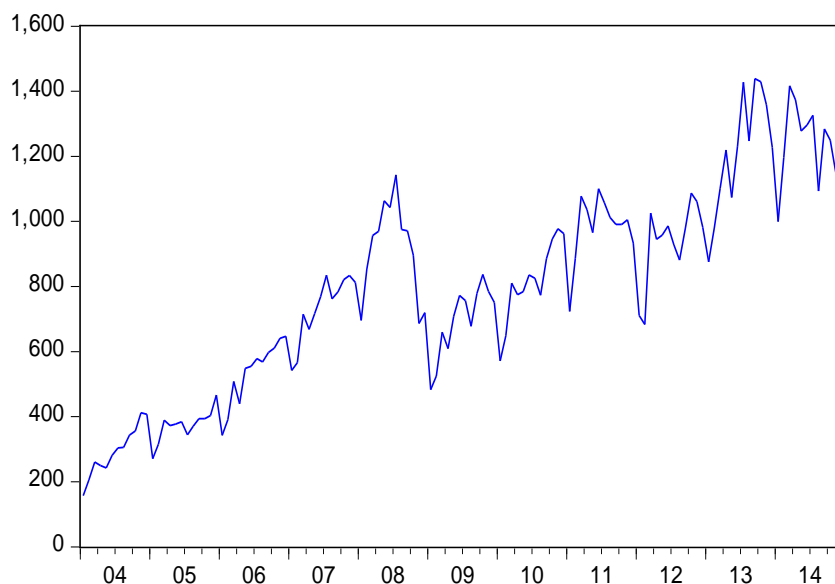


Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

### 5.2. ARIMA Method

Within the application of ARIMA method, there are conducted all three mentioned phases of the Box-Jenkins methodology. During the first phase – the model identification, it is monitored the time series stationarity, whereas the basic precondition for the creation of ARIMA model is a stationary time series, i.e. observed time series must have a constant variance and mean at a time. The key assumption within a time series analysis is the stationarity and linearity of every dynamic process, i.e. stochastic process which generates a phenomenon at a time. On the basis of graphical representation, correlogram and unit root tests, (Augmented Dickey-Fuller Unit Root Test i Phillips-Perron Unit Root Test), there is confirmed the stationarity of time series.

**Graph 7 Export trends, January 2004-December 2014, Republic of Serbia, mil. dollars**

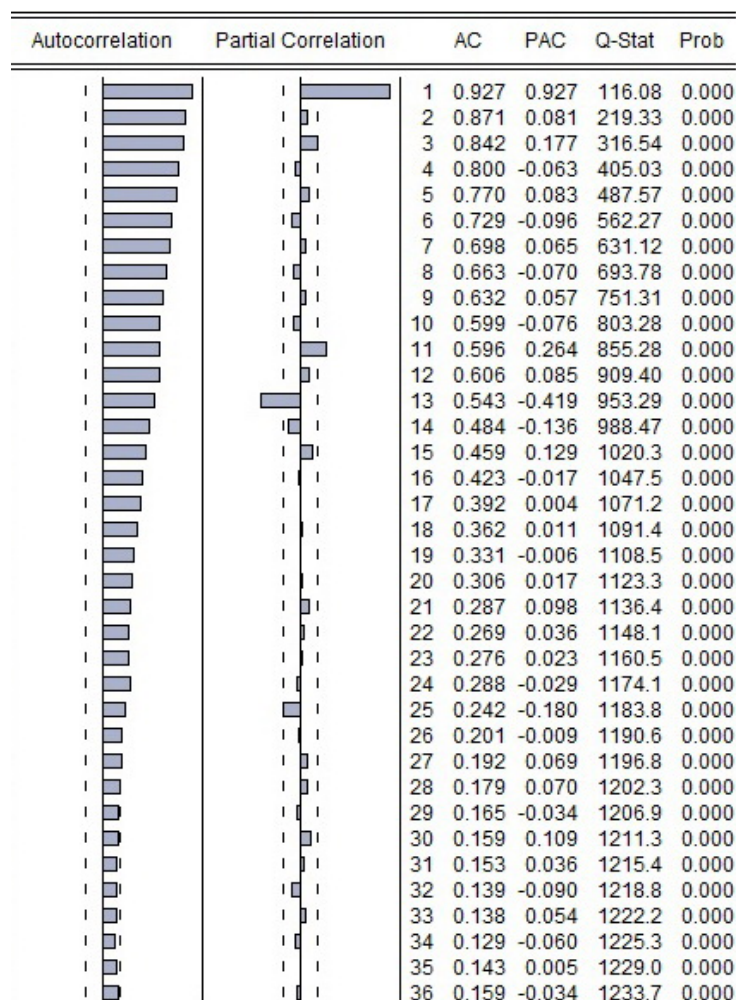


*Source:* Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

The Graph above shows the existence of marked trend in the movement of export during the 11 year period. Thus, it is noted a non-stationarity as a characteristic of the analysed time series. The confirmation of that conclusion was conducted through the following time series correlogram.



**Graph 8 Correlogram of Export**



Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

The decreasing trend of autocorrelation and partial correlation after the first lag shows non-stationarity of time series. Finally, unit root tests (Augmented Dickey-Fuller Unit Root Test and Phillips-Perron Unit Root Test) are the third confirmation of accuracy of the conclusion concerning the basic data non-stationarity. Null hypothesis forecasts the existence of unit root, i.e. non-stationarity of the time series. Gained value of the Augmented Dickey-Fuller test statistic is 1,476235, what is less than a critical value of this test for the error level of 5%. All that indicates the acceptance of the null hypothesis and the existence of non-stationarity.

**Table 4 Augmented Dickey-Fuller and Phillips-Perron Unit Root Test for Export**

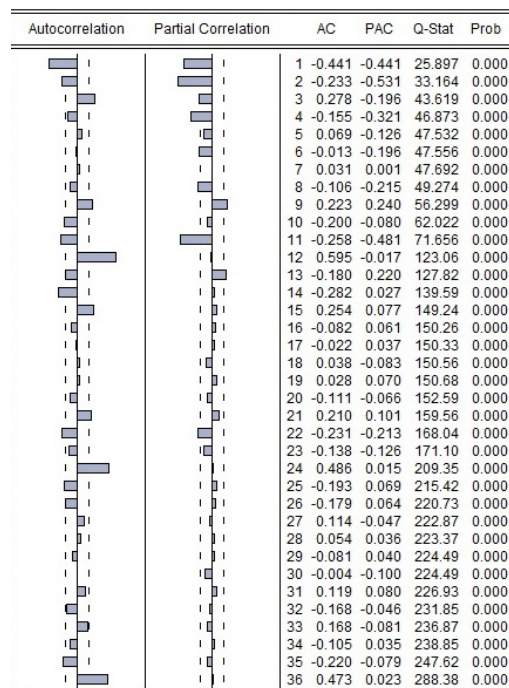
	t-Statistic	Prob.*		Adj. t-Stat	Prob.*
Augmented Dickey-Fuller test statistic	-1.476235	0.5423	Phillips-Perron test statistic	-1.919333	0.3226
Test critical values: 1% level	-3.486064		Test critical values: 1% level	-3.480818	
5% level	-2.885863		5% level	-2.883579	
10% level	-2.579818		10% level	-2.578601	

\*Mackinnon (1996) one-sided p-values.

\*Mackinnon (1996) one-sided p-values.

*Source:* Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

With the aim of achieving stationarity, we firstly conducted a transformation of time series through the logarithm, and afterwards a process of differentiating of the first and second order. A stationarity of the analysed series is confirmed by correlogram and mentioned tests, that followed.

**Graph 9 Correlogram of logexport for the second derivative**

*Source:* Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

As it is shown in the previous graph, the autocorrelation and partial correlation of logexport do not have a decreasing trend, as it was the case with

the indicator export, what is the first sign of the stationarity of gained time series after a process of differentiating and logarithmic process.

After the process of transformation of the original series, the result of the Augmented Dickey-Fuller test for the second derivative indicates the value of 5.757437, what is greater than this test value for 5% level (2.886290). The same is with the t-statistics for the Phillips-Perron test, which amounts 71.69636, what is also greater than the test value for the 5% level. In that way we have adopted an alternative hypothesis on the absence of unit roots, i.e. time series stationarity.

**Table 5 Augmented Dickey-Fuller and Phillips-Perron Unit Root Test – Logexport, The second derivative**

	t-Statistic	Prob.*		Adj. t-Stat	Prob.*
Augmented Dickey-Fuller test statistic	-5.757437	0.0000	Phillips-Perron test statistic	-71.69636	0.0001
Test critical values: 1% level	-3.487046		Test critical values: 1% level	-3.481623	
5% level	-2.886290		5% level	-2.883930	
10% level	-2.580046		10% level	-2.578788	

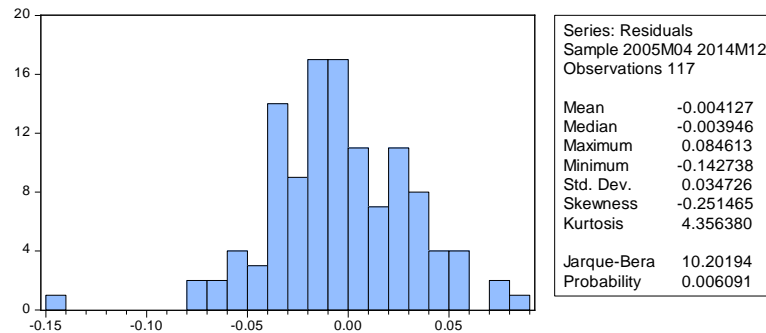
\*Mackinnon (1996) one-sided p-values.

\*Mackinnon (1996) one-sided p-values.

*Source:* Authors, based on Statistical Office of the Republic of Serbia data and EViews 7data

The estimation stage is the second and the most extensive stage of the Box-Jenkins methodology, where is supposed to be created model that will be reduced on one model after the diagnostics. This reduced model will be used for the Republic of Serbia future export values forecast. The existing empirical researches indicate various models which are used depending on a time series type. In our case, aiming to get the most effective ARIMA model, special attention will be dedicated to the choice of autoregressive variables (the lags of the dependent variable) and moving average (the lags of residual values). During the research there have been 25 checked models with different combinations of AR and MA variables. According to the Akaike and Schwarz criteria, model AR(1) SAR(12) MA(1) SMA(12), i.e.  $(1,2,1) \times (12,2,12)_{12}$  is highlighted as the most acceptable.

Within the diagnostic checking stage, it is estimated the validity of the chosen model, based on its compatibility with the real data and quality of its predictive power. According to the histogram and correlograms (the correlogram of residuals and the correlogram of residuals squares) chosen model has the normal distribution of residuals, while its autocorrelation and partial correlation show random movement of residuals.

**Graph 10 Histogram of ARIMA residuals**

Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

**Graph 11 Correlogram of residuals and correlogram of residuals squares**

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 -0.001	-0.001	0.0003				1 0.061	0.061	0.4396	
		2 0.049	0.049	0.2857				2 0.093	0.089	1.4763	
		3 0.133	0.133	2.4334				3 0.026	0.016	1.5614	
		4 -0.069	-0.071	3.0183				4 -0.049	-0.060	1.8599	
		5 0.141	0.131	5.4961	0.019			5 -0.005	-0.003	1.8626	0.172
		6 -0.079	-0.095	6.2803	0.043			6 -0.034	-0.024	2.0045	0.367
		7 -0.079	-0.073	7.0791	0.069			7 -0.022	-0.016	2.0679	0.558
		8 -0.066	-0.103	7.6308	0.106			8 -0.039	-0.035	2.2653	0.687
		9 -0.081	-0.034	8.4678	0.132			9 0.048	0.057	2.5605	0.767
		10 -0.067	-0.075	9.0455	0.171			10 0.079	0.080	3.3825	0.760
		11 -0.132	-0.098	11.343	0.124			11 -0.005	-0.024	3.3852	0.847
		12 -0.038	-0.016	11.530	0.173			12 -0.093	-0.117	4.5359	0.806
		13 0.083	0.121	12.459	0.189			13 -0.003	0.011	4.5370	0.873
		14 -0.089	-0.075	13.528	0.196			14 -0.036	-0.009	4.7125	0.910
		15 0.016	0.004	13.563	0.258			15 -0.071	-0.067	5.4031	0.910
		16 -0.021	-0.042	13.624	0.325			16 0.012	0.017	5.4228	0.942
		17 0.065	0.078	14.208	0.359			17 -0.061	-0.041	5.9389	0.948
		18 0.006	-0.080	14.213	0.434			18 -0.091	-0.094	7.1089	0.930
		19 -0.133	-0.132	16.712	0.336			19 -0.094	-0.103	8.3716	0.908
		20 0.043	0.003	16.980	0.387			20 -0.081	-0.069	9.3037	0.900
		21 -0.060	-0.042	17.501	0.421			21 -0.065	-0.035	9.9079	0.907
		22 -0.150	-0.193	20.817	0.289			22 0.037	0.065	10.106	0.928
		23 0.062	0.070	21.394	0.315			23 -0.071	-0.089	10.857	0.929
		24 -0.103	-0.035	22.973	0.290			24 -0.050	-0.073	11.231	0.940
		25 -0.043	-0.050	23.247	0.331			25 -0.111	-0.116	13.096	0.905
		26 0.062	0.007	23.830	0.356			26 -0.056	-0.060	13.577	0.916
		27 -0.123	-0.061	26.160	0.293			27 -0.044	-0.047	13.876	0.930
		28 -0.012	-0.079	26.184	0.344			28 -0.079	-0.057	14.842	0.925
		29 0.017	-0.024	26.230	0.395			29 -0.039	-0.048	15.077	0.940
		30 -0.006	-0.061	26.234	0.450			30 0.238	0.255	24.114	0.569
		31 -0.016	-0.054	26.277	0.503			31 -0.043	-0.112	24.412	0.607
		32 -0.027	-0.055	26.395	0.551			32 -0.016	-0.136	24.454	0.657
		33 0.029	-0.037	26.538	0.597			33 -0.062	-0.102	25.082	0.674
		34 0.045	0.032	26.878	0.630			34 -0.036	0.018	25.304	0.710
		35 0.004	-0.015	26.881	0.678			35 -0.002	-0.017	25.304	0.754
		36 0.053	0.004	27.368	0.700			36 -0.090	-0.131	26.707	0.732

Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

The key parameters gained within the diagnostic checking stage also demonstrate the validity of the chosen model. These parameters are the coefficient of determination ( $R^2$ ), the values of Durbin-Watson statistics and the significance of F statistics. In the following picture, we can see that chosen model's coefficient of determination is 83.3%, what implies that the model explains 83.3% of the variance of the dependent variable. The Durbin-Watson d statistics is used for the testing of the first order autocorrelation existence. If  $d \approx 2$  model has the uncorrelated residuals, while  $d \approx 0$  means a sufficiently strong autocorrelation. Finally, an autocorrelation is negative when  $d > 2$ . In our case the Durbin-Watson d statistics amounts 1.97, what implies the existence of uncorrelated residuals. Concerning the F statistics significance of 0,00, we can conclude that chosen model is statistically significant for the error level of 1%.

**Graph 12 The key indicators of the gained model**

Dependent Variable: D(LOGIZVOZ,2)				
Method: Least Squares				
Date: 11/29/15 Time: 09:24				
Sample (adjusted): 2005M04 2014M12				
Included observations: 117 after adjustments				
Convergence achieved after 11 iterations				
MA Backcast: 2004M03 2005M03				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000781	0.001607	0.486258	0.6277
AR(1)	-0.240975	0.093813	-2.568671	0.0115
SAR(12)	0.952643	0.028691	33.20360	0.0000
MA(1)	-0.963278	0.014464	-66.59852	0.0000
SMA(12)	-0.711646	0.066151	-10.75794	0.0000
R-squared	0.832898	Mean dependent var		-0.000660
Adjusted R-squared	0.826931	S.D. dependent var		0.085552
S.E. of regression	0.035591	Akaike info criterion		-3.791646
Sum squared resid	0.141874	Schwarz criterion		-3.673604
Log likelihood	226.8113	Hannan-Quinn criter.		-3.743722
F-statistic	139.5628	Durbin-Watson stat		1.967461
Prob(F-statistic)	0.000000			
Inverted AR Roots	1.00	.86-.50i	.86+.50i	.50+.86i
	.50-.86i	.00+1.00i	-.00-1.00i	-.24
	-.50+.86i	-.50-.86i	-.86+.50i	-.86-.50i
	-1.00			
Inverted MA Roots	.97	.96	.84+.49i	.84-.49i
	.49-.84i	.49+.84i	.00+.97i	-.00-.97i
	-.49+.84i	-.49-.84i	-.84-.49i	-.84+.49i
	-.97			

Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

The test of heteroscedasticity (White test) is one more indicator of the model validity. Its value is smaller than the critical value for the Hi square 0.05;20, what is 31.410. Thus, the assumption about the model variance homoscedasticity is accepted. In that way it is shown that the model cannot be further widened and used with the aim of a log run forecasting (GARCH).

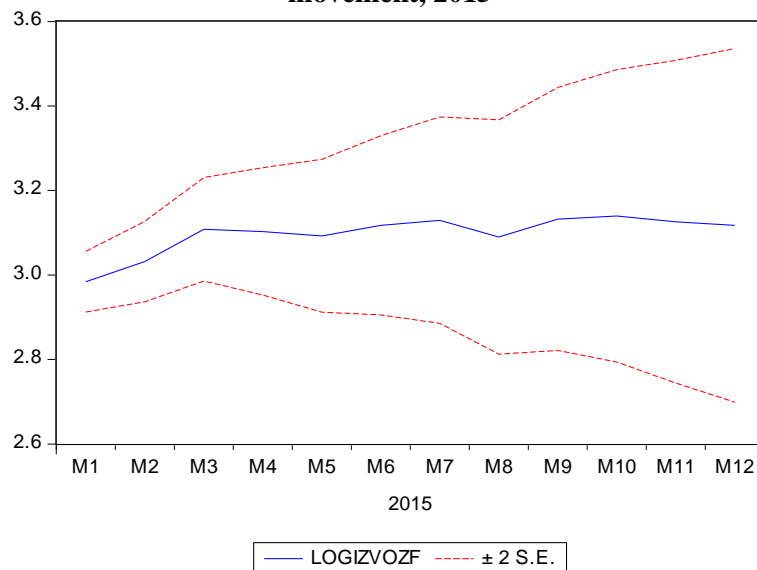


**Graph 13 White test – test of heteroscedasticity**

Heteroskedasticity Test: White			
F-statistic	0.662053	Prob. F(20,96)	0.8533
Obs*R-squared	14.18152	Prob. Chi-Square(20)	0.8212
Scaled explained SS	22.31853	Prob. Chi-Square(20)	0.3235

Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

In order to forecast the further values, the original number of observations is modified for the length of the forecast horizon. Concerning the tendency of the export forecast for the period January-December 2015, the following graph was gained. It incorporates three scenarios of the future export trends, where optimistic and pessimistic scenarios are determined as  $\pm$  two standard errors of the real export trend.

**Graph 14 Optimistic, pessimistic and realistic scenario of export's movement, 2015**

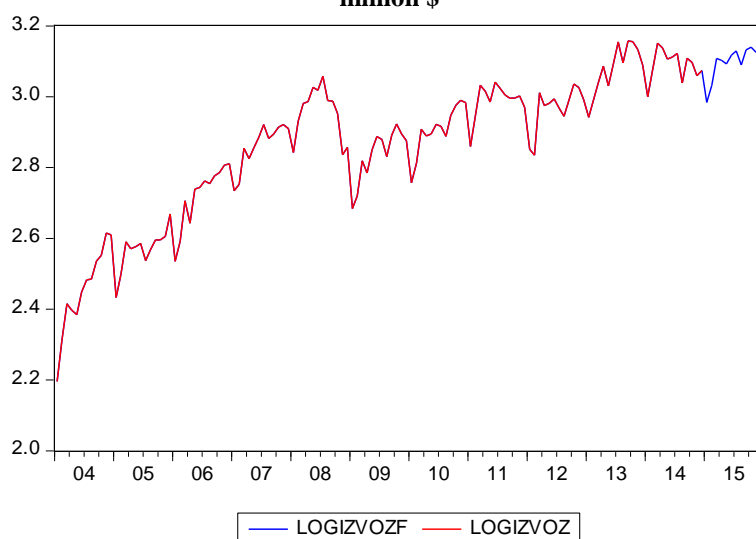
Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

The optimistic scenario shows that export values will amount from 3 to 3.6 units in y axis during 2015. That is equivalent to the range from 1,000 to 3,981.07 million dollars. According to the pessimistic scenario, export will have a decreasing tendency in the same period, from 2.85 to 2.70 units in y axis, i.e. from 630.96 to 398.11 million dollars. Eventually, the realistic scenario

forecasts the movement of export values about the third unit in y axis, i.e. about billion dollars, with the slow increasing tendency.

Final graph presents export trends in the period January 2004-December 2015. The same graph includes both, the real and forecasted values of the observed variable.

**Graph 15 Real (2004-2014) and forecasted(2015) export values, Republic of Serbia, million \$**



Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

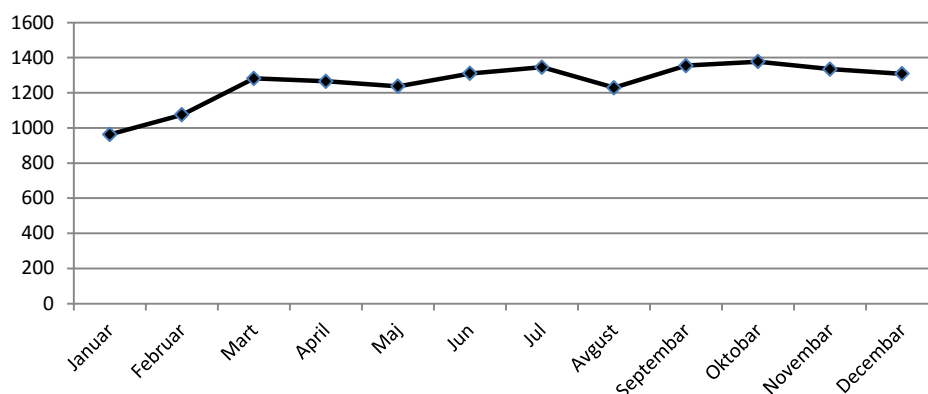
In the part of the graph that presents forecasted values, we can see that export will primarily decline, while the increasing tendency will begin from March 2015. This tendency will be present until the end of analysed year. Finally, the analysis resulted in the following forecasted values of export trends during 2015.

There is noticed the lowest forecasted export value in January, 963.22 million dollars, while the largest forecasted value can be expected in October, 1,377.53 million dollars.

**Table 6 Forecasted values of export trends during 2015 in million dollars**

Month	Export value
January	<b>963.2206</b>
February	1074.639
March	1282.044
April	1265.863
May	1236.737
Jun	1309.642
July	1345.767
August	1228.662
September	1354.747
October	<b>1377.531</b>
November	1334.493
December	1308.219

Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

**Graph 16: Forecasted export values during 2015, million dollars**

Source: Authors, based on Statistical Office of the Republic of Serbia data and EViews 7 data

Clearer view of the forecasted export values is shown in the graph above. According to it as well as the Table 6, it can be concluded that an increasing trend is present during the summer, while a decline in the export values can be expected after October.



## **6. Conclusion**

The paper presented the analysis of export trends of the Republic of Serbia with the explanation of variations in the conduct of export from January 2004 to December 2014. Furthermore, the paper provided an insight into the export trend forecast for the 12-month period, and thus proved the possibilities of practical usage of time series analysis methods in the forecasting macroeconomic variables, such as export.

The analysis of domestic export during the 11 month period recognises a chronic foreign trade deficit as the key characteristic of the foreign trade position of the Republic of Serbia. As one of the crucial problems is identified the import of numerous products which are produced in the country in a sufficient extent, as well as a predominant export of primary and unprocessed products. Despite this negative side, as the positive feature of the foreign trade of the Republic of Serbia is noticed as the increase in import contents of export. The same indicator increased from 32.7% in 2004 to 72% in the last analysed year, 2014. As the most important foreign trade partner is identified Italy, while trade with Bosnia and Hercegovina provides the largest surplus. The fact about the foreign trade deficit in trade with the Russian Federation, in spite of the existing free trade agreement, sets as an imperative to the usage of tax-free export advantages, as well as an increase in the quantity of products that will be exported into that country. As for a contribution of some economic activities to the foreign trade balance, predominant positive effect of agriculture, forestry and fishing should be emphasized. Thus, these activities should have primary importance within the planning of encouragements for production in the following period. Finally, a low labor force costs are one of the key factors of the encouragement of export through the production by lower prices.

The paper provided application of two different approaches in the process of modeling and prognosis of economic time series. The observed methods of time series analysis have been used as a tool for research of existing export trends, but for forecasting export values in the Republic of Serbia for the 12-month period, too.

Gained results confirm the theoretical features of used models. Two models, additive and multiplicative, were developed within the Holt-Winters smoothing, in order to check the quality of the gained forecasts and chose the model that shows greater reliability level. Both models used following parameters: 0.7 for alfa ( $\alpha$ ), 0.5 for beta ( $\beta$ ) i 0.2 for gama ( $\gamma$ ). As forecasted values were closer to the empirical data in the case of multiplicative model, as well as smoothing error was smaller for the root mean square error (RMSE) and the residual sum of squares (RSS) in the multiplicative model, it was chosen as more qualitative for forecast.

In the end, the paper also included the application of ARIMA (Autoregressive Integrated Moving Average) method, whose long run forecasts are considered as more qualitative in a comparison to the other gained by the Holt-Winters smoothing. For the year 2015, ARIMA method identified the increase of export values during the summer and their decrease after October. According to that forecast, the lowest forecasted value is expected in January, while the greater one is forecasted for October. That forecast is mostly compatible with one gained by the Holt-Winters smoothing, what implies high quality of used methods in the analysis of macroeconomic indicators such as export.

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## **MODELIRANJE I PROGNOZIRANJE IZVOZA REPUBLIKE SRBIJE PRIMENOM SEZONSKOG HOLT-WINTERSOVOG I ARIMA METODA**

Apstrakt: Niska cena radne snage kao jedan od ključnih izvora podsticanja izvoza, konkurentna prednost domaće poljoprivredne proizvodnje i bilateralni sporazumi sa partnerskim zemljama favorizuju izvoz kao potencijalno značajan faktor podsticanja privrednog razvoja Republike Srbije. Imajući u vidu ovu činjenicu, sa jedne strane, i platnobilansne probleme sa kojima se Srbija suočava tokom niza godina, sa druge strane, predmet ovog rada je analiza kretanja izvoza Republike Srbije i utvrđivanje zakonitosti u ponašanju ove makroekonomske varijable tokom perioda od 2004. do 2014. godine. Cilj rada predstavlja prognoziranje kretanja izvoza u periodu od januara do decembra 2015. godine. U analizi su korišćeni Holt-

Winters i ARIMA metode za analizu vremenskih serija. Rad je pružio uvid u prognozu kretanja izvoza za period od 12 meseci i time ukazao na mogućnost praktične upotrebe metoda analize vremenskih serija u prognozi makroekonomskih varijabli poput izvoza. Korišćene metode su identifikovale trend kretanja tokom 2015. godine pri kome dolazi do rasta vrednosti izvoza tokom letnjih meseci uz smanjenja istih nakon oktobra. Rad je utvrdio postojanja visokog stepena podudarnosti dobijenih prognoza putem dva korišćena metoda, što govori u prilog visokom kvalitetu obrađenih metoda u analizi izvoza.

Ključne reči: Izvoz, ARIMA, Holt-Winters metod, Box-Jenkins metodologija, spoljna trgovina, vremenske serije

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## DETERMINATION OF EXPERT GROUP PREFERENCES IN THE MULTI-CRITERIA MODEL FOR THE ANALYSIS OF LOCAL ECONOMIC ENVIRONMENT

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**Abstract:** Local economic environment is characterised by a range of economic, social, political and demographic parameters, based on which we can perform its analysis. Heterogeneity of relevant characteristics of the local economic environment imposes multiple criteria analysis as one of the suitable tools for the evaluation. Assessment of local economic environment often falls within the scope of group decision-making, as it is usually performed on the basis of an analysis of preferences of economic subjects or relevant experts on the issue of the economic environment at the local level. Regardless of whether it is based on economic subjects or expert group, in order to form a multi-criteria model, it is necessary to generate preferences of individuals into a single weight coefficient, which shows groups' preference on the importance of each criterion. The subject of this paper is determination of weight coefficients in the multi-criteria model for the analysis of local economic development based on the preferences from a group of experts, by applying adequate statistical tools, and then by ranking local governments according to the quality of business environment perceived by the expert group. In addition to descriptive statistics and testing the significance of differences, in the paper is applied multi-criteria method Simple Additive Weights - SAW.

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**JEL classification:** C44, C82, R58

## 1. Introduction

The business environment in which economic activity takes place is an important factor in attracting investment and acceleration of economic activity, both at the state level and at the level of cities and municipalities. For this reason, the local governments, in this regard, are *competition* to each other, and each one of them is trying to emphasise its comparative advantages.

Uneven economic development isn't rare anywhere in the world, because, in practice, it is impossible to accomplish completely equal development of the municipalities, but it is important to constantly work on reducing the gap between developed and developing municipalities. One of the ways to do this is by starting the initiative to create a friendly business environment in municipalities. This can be achieved by identifying and presenting their comparative advantages.

Thanks to their specific characteristics in relation to others, with prior secured favourable business environment for the investors, local governments become more *friendly oriented to investments*. In order to receive this attribute, local governments must be familiar with the standards for the improvement of local economic development (Stanković et al., 2014, p. 106).

Certification of municipalities is a process of evaluation of the quality of services and information that they provide to investors and businesses. This process is aimed at improving the business environment in Serbia through institutional reforms with active participation and cooperation of businesses, municipalities and citizens. Certification of cities is based on certain criteria and represents a sort of recognition of the quality of municipalities' functioning in order to attract foreign investment. However, in order to meet the requirements for certification, local governments must view their municipality from the perspective of potential investors, in terms of information and conditions that they require. Certification of municipalities in Serbia has been actively implemented during the last five years, and every city or municipality involved in this process receives specific recommendations for improving the functioning and creating a favourable business environment that includes efficient administration, transparent local government, adequate infrastructure and partnership with the economy (Stanković et al., 2014, p. 106). Direct effects of the certification process are reflected in increased investment, and indirect effects are reflected in reduced unemployment and rising living standards. The holder of this process is the *National Alliance for Local Economic Development* - NALED, an independent association of businesses, local governments and non-governmental organizations working together to create a favourable business environment in Serbia. The certification process conducted by NALED takes place in several stages. The last phase is the visit of verification commission, which makes a final assessment on the award of the certificate. If

the Commission's assessment is positive and the certificate is awarded, the municipality is promoted as a municipality with friendly business environment. The duration of the certification process depends on the willingness of the municipality to take the necessary measures to fulfill the defined criteria.

As the assessment is done on the basis of twelve diverse criteria, so the multi-criteria analysis method is imposed as a method of choice for the analysis of the local economic environment. This paper applied *SAW - Simple Additive Weight* method, which will be used to rank local governments whose assessment of the business environment was given by a group of experts involved in the research. The problem is methodologically defined as a problem of group decision-making, which integrates the subjective preferences of the expert group members into a single preference, reflecting the collective preferences of the expert team. In accordance with the above problem description, the structure of the paper, in addition to the introductory part and the review of literature, includes parts which describe the research methodology and defining of hypotheses, presents the results of statistical analysis, but also presents the formation of multi-criteria model and methodologies for its solution.

## 2. Literature Review

Management of the local economic environment involves making a series of decisions by national and local authorities, regulating and improving the business environment in order to boost economic activity and attract a larger number of investment projects on the territory of the observed local government. This is a complex process that requires an analysis of the interests of different stakeholders and at the same time, involves making decisions under conditions of different criteria for its evaluation. Therefore, it is a problem of multi-criteria analysis in which the decision-maker is a group of people. One such complex decision-making process can be successfully managed by using modern approaches to decision-making - application of relevant mathematical models and advanced decision support systems.

Decision-making theory and decision-making analysis, as well as quantitative approaches and modeling of the decision-making process experienced its greatest expansion in the period between the 1960s and the 1980s of the last century (Simon, 1960; Delbecq, 1967; Mintzberg, 1973; Eden & Harris, 1975; Lee & Moore, 1975; Moody, 1983; Mescon et al. 1985; Harrison, 1987). Significant progress in the implementation of methods and models of the decision-making analysis and theory in economic practice and in real decision-making problems occurred in parallel with the development of decision support systems. The high degree of the ability to modify the basic models of decision making, with real economic problems, was enabled through

the application of software tools that simplify this process (Turban et al., 2005; Pinheiro-Böhl, 2007; Burnstein & Holsapple, 2008; Sauter, 2011).

New business trends that promote democratic organisational structures, global connectivity and advanced techniques and models of decision-making, increasingly suggest that strategic decisions are based on the process of collective decision-making, not on a decision maker's preferences. Organisations and economic system, in general, tend to increasingly use the potential power of collective decision-making, where it is assumed that the group of experts can bring a better or at least more objective decision or assessment, as opposed to the individual (Dias & Sarabando, 2012; Keeney, 2009).

In relation to individual decision-making, group decision-making gives the advantage to the integration of a larger number of information, more experience, but also a better diversification of cognitive limiting factors of the individuals, minor evaluation errors and higher level of solutions acceptability (Sims, 2002; Kreitner & Cassidy 2011). The participation of the group in the process of decision-making can lead to better use of different competences, as well as a higher level of integration of individual responsibilities in order to find the optimal solution for a given system (De Haas & Kleingeld 1999). However, at the same time, group decision-making incorporates some possible drawbacks such as the dominance of intrusive individuals within the group (Kreitner & Cassidy, 2011).

Based on these characteristics, it can be concluded that the group decision-making requires a more complex approach to modeling, but also the implementation of complex decision support systems. A special type of modeling is required in situations where decisions must be made on the basis of different and often conflicting criteria and when decisions are made by the group. Multi-criteria decision models, with the group as a decision-maker, are often used in management accounting and control, strategic decision-making at the enterprise level, as well as in strategic management at the macro level as well as in the modeling of social choice problems (Hülle et al., 2011, Huang, Liao & Lin, 2009; Van den Honert & Lootsma, 1996; Wallenius et al., 2008).

### **3. Methodology of Research, Data and Hypotheses**

For the purpose of this research, we formed a sample of ten respondents made by ten experts from three cities in Serbia - Niš, Kragujevac and Belgrade. From a total of ten experts, five of them are from Niš, three are from Belgrade and two of them are from Kragujevac. These are mostly university employees, one of them is an employee in one of the ministries of the Republic of Serbia and one is employed in the local government of Niš. Nine of them have PhD title,



while one respondent has a master's degree. The survey was conducted through a questionnaire in December of 2014.

The questionnaire that was used for the purpose of this paper consists of 12 questions related to the criteria that NALED uses in the process of certification of cities and municipalities (Figure 1), questions were formulated in such a way that respondents expressed preferences on the basis of the so-called Likert scale. Likert scales are used for the operationalisation of a large number of variables, most commonly in social sciences, as well as in complex issues such as e.g. liberalism, conservatism, authoritarianism, religion, etc. Most often, it identifies several positions (preferably 4 or more) which can be considered an integral part of the concept that we seek to measure, and then the level of agreement measures that concept. Likert scale used in this work is the scale of five notches, where notch 1 indicates the lowest level of agreement of the decision-maker with the given statement, and notch 5, in contrast, represents the highest level of agreement.

**Figure 1 Criteria for evaluation of the business environment of cities and municipalities in Serbia according to NALED**

K1	• The municipality, in cooperation with the entire community developed a comprehensive strategic plan for local development
K2	• The municipality has set up a special department or person designated to be responsible for the promotion of local economic development
K3	• The municipality has set up a permanent Advisory Committee on Economic Affairs, which provides advice to municipal officials regarding issues of business community
K4	• The municipality provides key local public services on the available location and has a system for processing businessmen requests for a building permit in one place
K5	• The municipality has the ability to quickly provide accurate information to businessmen and maintain a database accessible to companies in their beginnings (start-ups), those who want to continue their business and to expand
K6	• The municipality has developed promotional material (to attract the investments)
K7	• Municipality is documenting their creditworthiness and calculates credit capacity
K8	• The municipality is actively involved in identifying the needs of entrepreneurs for labor and has sufficient education capacity to allow citizens to adapt to the businessmen demands
K9	• The municipality develops a partnership between public and private sectors
K10	• Municipal infrastructure is adequate and its utilities are reliable
K11	• The municipality has a clearly defined tax policy and tax collection policy that will stimulate economic development
K12	• The municipality has developed environmental standards and incorporated them into municipal development plans in accordance with the standards of the Republic of Serbia and EU Directives

Source: Systematised by authors, according to NALED data ([www.naled-serbia.org](http://www.naled-serbia.org))

These criteria will be used for the investigation of the expert group positions on their importance for the creation of business environment at the local level, their fulfillment in the observed environment, and an analysis of the gap formed between the demands placed on the importance of certain criteria and their fulfillment.

The research will test the following hypotheses:

**H<sub>1</sub>:** There is a statistically significant difference in the perception of experts regarding the achieved level of fulfillment of criteria in the respective local government, compared to the level of significance of that criteria for the creation of a favourable business environment;

**H<sub>2</sub>:** Perception by expert group members varies depending on the place where they live and work, or the perception of the significance of criteria changes depending on the unit of local self-government that is observed.

#### 4. Research Results

All research results presented in the paper can be systematised into two groups:

I. Statistical analysis of the results

II. The formation of multi-criteria model and ranking of local governments

##### 4.1. Statistical Analysis of the Results

The first step of statistical processing of data collected is to analyse the frequency of individual scores occurrences - descriptive statistics. As the expert group gave a separate opinion on the significance, and separate opinion about the fulfillment of the criteria, these data will be especially examined through the analysis of the results. Table 1 gives the descriptive statistics of the expert group preferences on the significance of the listed criteria for the business environment at the local level, but also on their fulfillment in local governments where experts live and work.

**Table 1** Descriptive statistics of *significance-fulfillment* score pairs

		Mean value	N	Std. deviation	Std. error
K1	Significance	3.70	10	1.160	0.367
	Fulfillment	2.30	10	0.675	0.213
K2	Significance	4.00	10	0.667	0.211
	Fulfillment	2.60	10	1.174	0.371
K3	Significance	3.70	10	0.823	0.260
	Fulfillment	2.00	10	1.054	0.333
K4	Significance	4.40	10	0.699	0.221
	Fulfillment	2.60	10	0.966	0.306

K5	Significance	4.10	10	0.738	0.233
	Fulfillment	2.50	10	1.080	0.342
K6	Significance	4.40	10	1.075	0.340
	Fulfillment	2.80	10	1.229	0.389
K7	Significance	3.50	10	0.850	0.269
	Fulfillment	2.00	10	0.667	0.211
K8	Significance	4.50	10	0.972	0.307
	Fulfillment	2.00	10	0.667	0.211
K9	Significance	3.80	10	1.476	0.467
	Fulfillment	2.10	10	0.876	0.277
K10	Significance	4.70	10	0.675	0.213
	Fulfillment	3.00	10	1.155	0.365
K11	Significance	4.00	10	1.155	0.365
	Fulfillment	3.20	10	1.549	0.490
K12	Significance	4.70	10	0.483	0.153
	Fulfillment	2.90	10	0.994	0.314

Source: Authors' calculations in SPSS

The most important criteria according to the experts, are the criteria K10 and K12 with an average significance score of 4.70. They are followed by K8 with an average score of 4.50 and K4 and K6 with a score of 4.40. The least important criteria for creation of a favourable business environment are the criteria K7 with an average score of 3.50 and criteria K1 with an average score of 3.70.

As far as the fulfillment of the criteria is concerned, the fulfillment of the criteria K11 has the best score, with an average score of 3.20, followed by K10 with an average score of 3.00. Afterwards, it is followed by K12 with a score of 2.90 and K6 with a score of 2.80. The least scores for the fulfillment of the criteria are given to K3, K7 and K8, who received an average score of 2. They are followed by a criterion K9 with an average score of 2.10 and K1 with a score of 2.30.

It can be concluded that there is an obvious difference between the perception of the importance of the criteria and the perception of its fulfillment.

This difference is largest in the criteria K8 and amounts to 2.5, and lowest with the criteria K11 and amounts to 0.8.

Since there is a difference in significance and fulfillment of the criteria observed, it is necessary to test the significance of this difference. The first segment of the analysis in this regard will be scores correlation between significance and fulfillment of the observed criteria, the results of which are presented in Table 2.

**Table 2 The correlation between score pairs of significance and fulfillment of the criteria in the model**

Criterion	N	The correlation coefficient	Significance
K1	10	0.412	0.237
K2	10	0.000	1.000
K3	10	0.128	0.724
K4	10	0.263	0.463
<b>K5</b>	<b>10</b>	<b>-0.488</b>	<b>0.153</b>
K6	10	0.404	0.247
K7	10	0.196	0.587
K8	10	0.514	0.128
K9	10	0.189	0.601
<b>K10</b>	<b>10</b>	<b>0.570</b>	<b>0.085</b>
K11	10	0.186	0.606
K12	10	0.393	0.261

*Source:* Authors' calculations in SPSS

In the criterion K10 there is the strongest agreement between significance and fulfillment, and the strongest disagreement (inverse correlation) is in K5. The correlation coefficient of the criteria K10 is 0.570, with the significance value of 0.085. Criterion K5 has a value of correlation coefficients -0.488 and a significance value of 0.153.

The second segment of the significance analysis for the differences between fulfillment and significance of all these criteria is the use of t-test to determine whether the established difference is statistically significant. T-test results are given in Table 3.

Only with the criterion K11 the difference between the significance and the fulfillment of the criterion is not statistically significant. Large differences

between fulfillment and significance scores of the criteria suggest that experts see in the local economic environment as insufficiently favourable, suggesting that it should be significantly improved in almost all segments tested. Through these tests, we proved the first hypothesis to test whether there is a statistically significant difference in the perception of experts regarding the achieved level of fulfillment of the criterion in the respective local government, compared to the level of significance of that criterion for the creation of a favourable business environment.

**Table 3 The results of t-test and the significance of score differences for significance and fulfillment of the observed criteria**

Criterion	Differences in score pairs					t	df	Significance
	95% Confidence interval of difference							
	Mean value	Std. deviation	Std. error	Lower	Higher			
K1	1.400	1.075	0.340	0.631	2.169	4.118	9	0.003
K2	1.400	1.350	0.427	0.434	2.366	3.280	9	0.010
K3	1.700	1.252	0.396	0.805	2.595	4.295	9	0.002
K4	1.800	1.033	0.327	1.061	2.539	5.511	9	0.000
K5	1.600	1.578	0.499	0.471	2.729	3.207	9	0.011
K6	1.600	1.265	0.400	0.695	2.505	4.000	9	0.003
K7	1.500	0.972	0.307	0.805	2.195	4.881	9	0.001
K8	2.500	0.850	0.269	1.892	3.108	9.303	9	0.000
K9	1.700	1.567	0.496	0.579	2.821	3.431	9	0.008
K10	1.700	0.949	0.300	1.021	2.379	5.667	9	0.000
K11	0.800	1.751	0.554	-0.453	2.053	1.445	9	0.182
K12	1.800	0.919	0.291	1.143	2.457	6.194	9	0.000

Source: Authors' calculations in SPSS

Further statistical analysis will be carried out to determine differences in the perception of experts about the significance and fulfillment of the criteria, depending on their place of work and residence. This will create a basis for comparison of the three local governments: Belgrade, Kragujevac and Niš. This comparison will be the starting point for the formation of multi-criteria model for ranking local governments according to the perceived economic environment.

**Table 4 Descriptive statistics of the significance scores for the criteria according to the place of work and residence of experts**

Local government		K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12
Bgd	Significance	3.67	3.33	3.67	4.33	3.67	3.67	2.67	4.33	2.00	4.00	2.67	4.67
	N	3	3	3	3	3	3	3	3	3	3	3	3
	Std. deviation	0.577	0.577	0.577	0.577	0.577	1.528	0.577	0.577	1.000	1.000	0.577	0.577
Kg	Significance	5.00	4.50	4.00	5.00	5.00	4.00	4.50	5.00	5.00	5.00	5.00	5.00
	N	2	2	2	2	2	2	2	2	2	2	2	2
	Std. deviation	0.000	0.707	1.414	0.000	0.000	0.000	0.707	0.000	0.000	0.000	0.000	0.000
Niš	Significance	3.20	4.20	3.60	4.20	4.00	5.00	3.60	4.40	4.40	5.00	4.40	4.60
	N	5	5	5	5	5	5	5	5	5	5	5	5
	Std. deviation	1.304	0.447	0.894	0.837	0.707	0.707	0.548	1.342	0.894	0.000	0.894	0.548
In total	Significance	3.70	4.00	3.70	4.40	4.10	4.40	3.50	4.50	3.80	4.70	4.00	4.70
	N	10	10	10	10	10	10	10	10	10	10	10	10
	Std. deviation	1.160	0.667	0.823	0.699	0.738	1.075	0.850	0.972	1.476	0.675	1.155	0.483

Source: Authors' calculations in SPSS

From the results of Table 4, we can conclude that experts from Belgrade, rated criterion K12 as the most important, with an average score of 4.67, followed by criteria K4 and K8 with an average score of 4.33. The least important evaluated criterion is K9 that got a very low average score - 2. In Kragujevac, the significance of a large number of criteria was given the score of 5, those criteria are: K1, K4, K5, K8, K9, K10, K11 and K12. The least important criteria assessed are K3 and K5, but they also have the high average score - 4. In Niš, only the significance of criteria K6 was scored with an average score of 5, following a criterion K12 with an average score of 4.60 and criteria K8, K9 and K11 that were scored with 4.40. The least important criterion was K1 with a score of 3.20.

For the analysis of the significance of differences in the significance of the criteria depending on the experts' place of work and residence, a method of analysis of variance (ANOVA) was used. Variance analysis is an analytical model for testing the significance of differences and it is used when there are more than two groups of respondents. The advantage of this method is reflected in the fact that it takes into account all the variability, as well as their impact, which is impossible to evaluate otherwise. When choosing a model, one should

take into account the nature of the observed features, the observation units, as well as characteristics of the model, in order to best meet the set objectives and enable you to use the data collected to yield valid results. ANOVA test results are given in Table 5.

**Table 5. Testing the importance of differences in the assessment of criteriasignificance depending on the place of work and residence of the experts**

		Sum squares	df	The mean value of the square	F	Significance
K1	Among the (Combined) groups	4.633	2	2.317	2.172	0.185
	In the group	7.467	7	1.067		
	In total	12.100	9			
K2	Among the (Combined) groups	2.033	2	1.017	3.619	0.083
	In the group	1.967	7	0.281		
	In total	4.000	9			
K3	Among the (Combined) groups	0.233	2	0.117	0.139	0.872
	In the group	5.867	7	0.838		
	In total	6.100	9			
K4	Among the (Combined) groups	0.933	2	0.467	0.942	0.434
	In the group	3.467	7	0.495		
	In total	4.400	9			
K5	Among the (Combined) groups	2.233	2	1.117	2.931	0.119
	In the group	2.667	7	0.381		
	In total	4.900	9			
K6	Among the (Combined) groups	3.733	2	1.867	1.960	0.211
	In the group	6.667	7	0.952		
	In total	10.400	9			
K7	Among the (Combined) groups	<b>4.133</b>	<b>2</b>	<b>2.067</b>	<b>6.113</b>	<b>0.029</b>
	In the group	<b>2.367</b>	<b>7</b>	<b>0.338</b>		
	In total	<b>6.500</b>	<b>9</b>			
K8	Among the (Combined) groups	0.633	2	0.317	0.282	0.763
	In the group	7.867	7	1.124		
	In total	8.500	9			

[illegible]



	Std. deviation	0.548	1.095	1.304	0.837	1.304	0.894	0.707	0.707	0.894	1.225	1.517	0.837
In total	Fulfillment	2.30	2.60	2.00	2.60	2.50	2.80	2.00	2.00	2.10	3.00	3.20	2.90
	N	10	10	10	10	10	10	10	10	10	10	10	10
	Std. deviation	0.675	1.174	1.054	0.966	1.080	1.229	0.667	0.667	0.876	1.155	1.549	0.994

Source: Authors' calculations in SPSS

Experts from Belgrade gave the highest average score to the fulfillment of the criteria K11 and K12 (3.00), followed by the criteria K4 and K19 (2.67). The minimum fulfillment is, in their opinion, present in criteria K3, K7 and K9 that got an average score of 2. In Kragujevac, the best score for fulfillment was given to the following criteria: K6 and K10, and the smallest score are for the criteria K2, K3 and K9. In Niš, the highest average score of 3.60 was given to the fulfillment of the criteria K11, and worst-scored fulfillment of the criteria is in K7 and K8.

**Table 7 Testing the significance of differences in the assessment of fulfillment of the criteria depending on the place of work and residence of the experts**

			The sum of squares	Df	The mean value of the square	F	Significance
K1	Among the groups	(Combined)	0.233	2	0.117	0.211	0.815
	In the group		3.867	7	0.552		
	In total		4.100	9			
K2	Among the groups	(Combined)	4.433	2	2.217	1.948	0.213
	In the group		7.967	7	1.138		
	In total		12.400	9			
K3	Among the groups	(Combined)	0.700	2	0.350	0.263	0.776
	In the group		9.300	7	1.329		
	In total		10.000	9			
K4	Among the groups	(Combined)	0.933	2	0.467	0.438	0.662
	In the group		7.467	7	1.067		
	In total		8.400	9			
K5	Among the groups	(Combined)	1.033	2	0.517	0.382	0.696
	In the group		9.467	7	1.352		

	In total	10.500	9			
K6	Among the (Combined) groups	1.233	2	0.617	0.349	0.717
	In the group	12.367	7	1.767		
	In total	13.600	9			
K7	Among the (Combined) groups	0.000	2	0.000	0.000	1.000
	In the group	4.000	7	0.571		
	In total	4.000	9			
K8	Among the (Combined) groups	0.000	2	0.000	0.000	1.000
	In the group	4.000	7	0.571		
	In total	4.000	9			
K9	Among the (Combined) groups	1.200	2	0.600	0.737	0.512
	In the group	5.700	7	0.814		
	In total	6.900	9			
K10	Among the (Combined) groups	0.833	2	0.417	0.261	0.777
	In the group	11.167	7	1.595		
	In total	12.000	9			
K11	Among the (Combined) groups	1.900	2	0.950	0.338	0.725
	In the group	19.700	7	2.814		
	In total	21.600	9			
K12	Among the (Combined) groups	2.100	2	1.050	1.081	0.390
	In the group	6.800	7	0.971		
	In total	8.900	9			

Source: Authors' calculations in SPSS

Based on the results shown in Table 7, when we view the fulfillment of the criteria, there are no statistically significant differences between the cities in any of the criteria.

As for testing the hypothesis  $H_2$ , we can conclude that it is not refuted, but that it cannot be accepted as proved, because there are differences in significance with the three criteria K7, K9 and K11 (Table 5), while there are no statistically significant differences in fulfillment (Table 7).

#### 4.2. The Formation of Multi-Criteria Model and Ranking of Local Governments

Multi-criteria model is formed as weight coefficients were determined by additive normalisation of the average criterion significance results (Table 4), according to the preferences of all experts, regardless of their place of work and residence. The data from Table 6 form decision-making matrix, with presented average experts' scores on the perception of fulfillment of the criteria in local governments where they live and work.

Determined values of weight coefficients are presented in Table 8.

**Table 8 Determining the weight coefficients**

	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12
Sign.	3.7	4.00	3.70	4.40	4.10	4.40	3.50	4.50	3.80	4.70	4.00	4.70
$W_j$	0.075	0.081	0.075	0.089	0.083	0.089	0.071	0.091	0.077	0.095	0.081	0.095

Source: Authors' calculations

Method of *SAW - Simple Additive Weight* and its application in solving the problem involves linearised matrix of decision-making. The value of each alternative is calculated by multiplying its linearised parameters for each of the attributes with corresponding weight coefficient and then summing up the obtained products.

Let it be a problem where we have  $m$  alternatives  $A_i$  ( $i=1,2,...,m$ ) and  $n$  criteria  $K_j$  ( $j=1, 2,..., n$ ) and let the vector  $W$  be the vector of weights  $w_j$  ( $j=1, 2,..., n$ ) whose values are normalized ( $\sum_{j=1}^n w_j = 1$ ). Then, according to Hwang and Yoon (1981), the value of  $i$ -th alternative  $V(A_i)$  is calculated as

$$V(A_i) = \sum_{j=1}^n r_{ij} w_j, \quad i = 1, 2, ..., m \quad (1)$$

where  $r_{ij}$  are coefficients of the linearised decision matrix. Linearisation, otherwise called simple, or linear normalisation, is the simplest form of standardization of decision matrix coefficients. Coefficients of decision matrix  $x_{ij}$ , reported with different measuring units are transformed into comparable linearised coefficients  $r_{ij}$  in the following way:

$$r_{ij}^+ = \frac{x_{ij}}{x_j^*} \quad r_{ij}^- = \frac{x_j^-}{x_{ij}} \quad (2)$$

where linearised values of revenue attributes are marked with  $r_{ij}^+$ , and linearised values of the expenditure attributes are  $r_{ij}^-$ . Values  $x_j^*$  and  $x_j^-$  are calculated as

$$x_j^* = \max_i x_{ij} \quad (3)$$

$$x_j^- = \min_i x_{ij}. \quad (4)$$

Optimal alternative  $A^*$  is defined as:

$$A^* = \max_i \sum_{j=1}^n r_{ij} w_j, \quad i = 1, 2, \dots, m \quad (5)$$

Obtained values  $V(A_i)$  of all alternatives form the so-called vector of priorities, on the basis of which it is possible not only to determine the optimal alternative, but also to perform the complete ranking of alternatives.

Based on the SAW method algorithm, the linearised matrix of decision-making is determined, as well as preferential linearised matrix for the described decision-making problem in ranking of local governments according to the perceived local economic environment by a group of experts. The results are presented in Table 9 and Table 10.

**Table 9 Linearised matrix of decision-making**

LS	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12
BG	0.971	0.728	0.909	0.954	0.832	0.763	1.000	1.000	0.833	0.763	0.833	0.938
KG	0.833	0.469	0.682	0.714	0.714	1.000	1.000	1.000	0.625	1.000	0.694	0.625
Niš	1.000	1.000	1.000	1.000	1.000	0.743	1.000	1.000	1.000	0.857	1.000	1.000

*Source:* Authors' calculations

**Table 10 Preferential linearised matrix of decision-making**

LS	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12
BG	0.073	0.059	0.068	0.085	0.069	0.068	0.071	0.091	0.064	0.072	0.067	0.089
KG	0.062	0.038	0.051	0.063	0.059	0.089	0.071	0.091	0.048	0.095	0.056	0.059
Niš	0.075	0.081	0.075	0.089	0.083	0.066	0.071	0.091	0.077	0.081	0.081	0.095

*Source:* Authors' calculation

The final ranking of the observed local governments that was determined based on the relation (5) is given in Table 11.

**Table 11. Priorities' vector and ranking of local governments**

Local government	V (A <sub>i</sub> )	Rank
Belgrade	0.875232	2
Kragujevac	0.782682	3
Niš	0.963579	1

*Source:* Authors' calculation

Ranking of local governments involved in the study shows that the city of Niš has the best rank, followed by Belgrade and then at the end with Kragujevac. The established rank demonstrates subjective preferences of the expert group and does not comply with certain realistic indicators of economic activity in those cities. Although Belgrade is undoubtedly the city with the highest economic activity, average salary and employment rate, it is not the highest ranked city according to the given model. This phenomenon is due to higher expectations of experts in municipalities where business activities are more intensive and where the objective indicators of economic activities are also better. On the other hand, the expectations of experts in underdeveloped local governments were modest, and this has led to inversions in rankings in relation to the objective information about the business environment in the observed local governments.

## **5. Conclusion**

The local economic environment is determined by different economic, social, technical and technological factors, which, because of their heterogeneity impose the need for applying the method of multi-criteria analysis, as a relevant approach in assessing the local economic environment. One of the key elements in the formation of the multi-criteria model is the determination of weight coefficients. This task becomes especially complicated in cases where decision-makers are groups of experts rather than the individuals. There is a need for integration of individual preferences into one that would express the collective opinion, that is, group preference.

A multi-criteria model was developed based on the criteria for assessing the local economic environment used by the National Alliance for Local Economic Development (NALED) in the process for certification of cities with favourable business environment. With the analysis of individual preferences by a group of experts in the field of local economic development in three local governments in Serbia (Belgrade, Kragujevac and Niš), it was concluded that there is a statistically significant difference in the perception of significance and perception of fulfillment in almost all the criteria which are included in the model. When place of work and residence of the expert group members is taken as a basis for comparison, it can be concluded that only three criteria show a statistical difference in the perception of criteria significance. On the other hand, when it comes to meeting (fulfilling) the criteria, there were no statistically significant differences.

The paper is based on empirical results and proves that there is a statistically significant difference in the perception of experts regarding the achieved level of fulfillment of criteria in the respective local government, compared to the level of significance of the same criteria for the creation of a favourable business environment. On the other hand, the hypothesis of the existence of

differences in the significance and fulfillment of the criteria on the basis of perception of expert group members who live and work in different places does not confirm but it also does not prove that the residence of an expert group member is the factor that makes the difference. Namely, only in three criteria, we observed have a statistically significant difference in the perception of the significance of those criteria for the improvement of local economic environment depending on the place of work and residence of expert group members, while the fulfillment of the criteria show no such difference.

The described model is limited in terms of taking more of the given criteria for evaluating local economic environment defined by NALED. One of the research development directions will primarily focus on identifying the criteria for assessing the local economic environment where business community is the decision-maker, and identifying the criteria that are relevant to the assessment of the business climate at the local level in terms of economic agents who do business there. Also, further research will be focused on the application of other methods of multi-criteria analysis for scoring group preferences, namely, the analytic hierarchy process method.

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## UTVRĐIVANJE PREFERENCIJA EKSPERTSKE GRUPE U VIŠEKRITERIJUMSKOM MODELU ZA ANALIZU LOKALNOG EKONOMSKOG OKRUŽENJA

**Apstrakt:** Lokalno ekonomsko okruženja karakteriše niz ekonomskih, socioloških, političkih i demografskih parametara, na osnovu kojih se može izvršiti njegova analiza. Raznorodnost relevantnih karakteristika lokalnog ekonomskog okruženja nameće višekriterijumsku analizu kao jedan od pogodnih alata za njegovu evaluaciju. Ocena lokalnog ekonomskog okruženja vrlo često spada u domen grupnog odlučivanja, jer se uobičajeno vrši na bazi analize mišljenja privrednih subjekata ili relevantnih eksperata o stanju ekonomskog okruženja na lokalnu. Bez obzira da li je reč o privrednim subjektima ili ekspertske grupe, u cilju formiranja višekriterijumskog modela neophodno je izvršiti generisanje preferencija pojedinaca u jedinstveni težinski koeficijent kojim se iskazuje preferencija grupe o značaju svakog od kriterijuma. Predmet rada je utvrđivanje težinskih koeficijenata u višekriterijumskom modelu za analizu lokalnog ekonomskog razvoja na osnovu preferencija grupe eksperata primenom adekvatnih statističkih alata, a zatim i rangiranje lokalnih samouprava prema kvalitetu percipiranog poslovnog ambijenta od strane ekspertske grupe. Pored deskriptivne statistike i testiranja značajnosti razlika, u radu je primenjen višekriterijumski metod Jednostavnih aditivnih težina (*Simple Additive Weights- SAW*).

**Ključne reči:** Lokalno ekonomsko okruženje, višekriterijumska analiza, težinski koeficijenti, grupno odlučivanje, SAW metod

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## IMPACT OF NATIONAL CULTURE ON INTERNATIONAL HUMAN RESOURCE MANAGEMENT

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**Abstract:** In today's business conditions, the internationalisation of business becomes an almost inevitable precondition for future growth and development of organisations. However, internationalisation of business usually requires organisations to implement some changes in the way they operated in the previous period. One of the areas that require some changes is the area of human resource management, too. Factors which require modifications in this system are related primarily to the legal regulations of other countries, but also to the characteristics of their national culture. The former influence comes from the fact that national culture exerts a powerful influence on the system of values, attitudes and behaviour of people in a particular country and, among the other things, on the preferences for policies and procedures in the field of human resources management. Starting from the above, this paper analyses the impact of certain dimensions of national culture on the preferred content of human resources management in organisations in certain countries. The aim of the paper is to provide the theoretical basis for organisations that internationalised their business, or intend to do so, to create system of human resource management in the entities abroad which, at least, will represent the balance between the system that is applied at headquarter and one that is preferred in entities abroad, in order to be effective.

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### 1. Introduction

In today's business environment characterised by the process of globalisation and extremely strong competition, a growing number of organisations a chance for further growth and development seek in the process of internationalisation of the business. However, entering at the international business scene carries a

number of challenges. First of all, the expansion of business in other countries require possessing knowledge about their legal regulations, the characteristics of the local labour market, characteristics of the political and economic system, the characteristics of the national culture, etc. These are the reasons which require organisations that internationalize their business to implement certain modifications in their former way of doing business and, among other things, in the system of human resource management (HRM).

Since the national culture, as a system of deeply founded values, attitudes and behaviours of the members of a society (Leung et al., 2005) to a large extent determines the characteristics of other systems of the country (legal, political, economic and others), it implies that the culture of observed countries is one of the most important factors that must be taken into account in the case of entering at the international business scene. Consequently, the national culture becomes a very important factor when it comes to designing the content of international human resource management (IHRM), too. The fact that national culture is very important for the content of IHRM is clearly singled out by the fact that within this concept a special segment, comparative human resource management, which examines the differences in the content of HRM between countries primarily caused by the characteristics of the national culture, has emerged.

Having in mind the fact that national culture has influence on the preferred style and the content of HRM in organisations of a certain country (Stone et al., 2006), the aim of this paper is to show the connection between certain dimensions of national culture and preferred policies and procedures in this area. The initial assumption of the paper is that organisations when within the framework of the internationalisation of business establish business entities in other countries, should recognise the impact of national culture of the host country when designing the content of IHRM in order to be effective.

The paper is structured as follows: firstly, it reviews the literature about the concept of IHRM and the most known models of national culture formulated by the referent authors from this field, then analyses the impact of dimensions of the national culture on particular policies and procedures in the field of HRM, while the last part analyses the impact of national culture of some countries on the preferred content of HRM in them. In the paper the method of analysis, synthesis, comparison and generalisation were used.

## **2. The Concept of International Human Resource Management**

As a result of business expansion beyond the borders of a country and the need to manage geographically dispersed workforce of diverse cultural background,

within the field of human resources management intensively is developing a special segment - international human resources management (IHRM). This concept characterizes numerous specifics in comparison to the so-called *national human resource management*, particularly the need of organisations that have internationalized business while designing the policies and procedures from the area of human resource management to take into account the specificities of the local area.<sup>1</sup>

When we speak about what IHRM really means, the referent literature provides us many answers. For example, Briscoe and his associates (2009) under IHRM assume studying and implementing all activities from the field of HRM that have an impact on the process of human resources management in organisations in the global environment (Briscoe et al., 2009, p. 20). Scullion (2005), for example, believes that IHRM represents the way in which multinational companies (MNCs) manage their geographically dispersed workforce trying to gain competitive advantage in the local and global level through the human resources (Scullion, 2005, p. 5). Furthermore, Gomes (2012) believes that the IHRM is the process of acquiring, allocation and effective use of human resources in international business (Gomes, 2012, p. 2). Similar opinion has Taylor and his associates (1996), who point out that IHRM is a set of activities, functions and processes aimed at attracting, developing and retaining human resources in the MNCs, i.e. set of activities that are used to manage employees in MNCs both in the country and abroad (Teylor et al., 1996, p. 960).

From the above it can be concluded that in understanding the essence of the concept of IHRM there are no major differences. Also, it can be concluded that this area is of a great interest. Consequently, the literature from this field is very rich, and within this concept three specific areas can be clearly distinguished (Brewster et al., 2007):

- Cross-cultural management,
- Comparative human resource management and
- International human resource management.

Authors dealing with cross-cultural aspect of IHRM base their research on the fact that each country has its own unique set of deep-based values and beliefs that are reflected in the way the people in that country think and behave, and how that society functions in general. The authors that belong to this field believe that understanding these differences is crucial for organisations with internationalized business in order to adequately design the activities in the area

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<sup>1</sup>The obligation for every company is to implement legislation rules that applies in the host country. However, the extent to which other specifics really will be taken into account will depend on the strategic approach of IHRM that MNC adopted. These approaches can be: ethnocentric, polycentric, regiocentric or geocentric approach.

of IHRM, such as recruitment, selection, training and development, performance measurement, staff remuneration, etc.

Within the area of comparative human resource management two key areas of research could be identified. The first area is related to the differences in the content and preferred style of HRM between countries, while the second area of research is related to the study of differences in the content of HRM within one MNC which has its entities in different countries.

International human resource management, as the third area of study within the IHRM, deals with the way in which organisations that have internationalized their businesses manage human resources in entities abroad. The authors in this field focus on those parts of HRM which had to be modified due to entering companies at the international business scene.

The foregoing shows that in all segments of the concept of IHRM national culture has an important place and that the specifics of IHRM, comparing to the national HRM, are largely based precisely on the impact of the characteristics of this variable. Therefore, in the following text the national culture and its dimensions observed from the perspective of the referent authors from this field will be discussed.

### **3. Dimensions of National Culture as a Basis for Designing International Human Resource Management**

About what is meant by national culture there are many answers. However, most authors when defining national culture as a category base their opinion on the definition formulated by Gerhart Hofstede. The aforementioned author believes that national culture is a kind of mental programming, or patterns of thought, feeling and action that each person acquires in childhood, and then applied throughout life (Hofstede, 2001, p. 25).

National culture is the category which is very much studied, among the other things because of the fact that it is a convenient tool for explaining many phenomena in management, such as leadership style, organisational structure, motivation, etc. (House et al., 2004; Hofstede, 2001). However, this concept has also been proven to be a suitable tool for clarifying the difference in preferred content of HRM between members of different countries.

The first authors who studied the national culture through certain dimensions were Kluckhohn and Strodtbeck (1961). These authors believe that the dimensions of national culture, in fact, reflect the fundamental issues that every society faces with (Kluckhohn & Strodtbeck, 1961). They pointed out that on each fundamental question there are three possible answers, which reflect the differences in the characteristics of national cultures of different countries. The

overview of fundamental questions, i.e. dimensions of national culture, as well as the possible answers to these questions according to Kluckhohn and Strodtbeck are given in Table 1.

**Table 1 Dimensions of national culture according to Kluckhohn and Strodtbeck**

The fundamental question / dimensions of national culture	Dominant belief
Understanding human nature	People by nature are good. People by nature are evil. People by nature are neither good nor evil.
The relationship with nature	People can and should master nature. People must subjugate nature. People should achieve harmony with nature.
The nature of human activity	People should strive to achieve specific goals and accomplishment. People should strive to develop themselves into integrated whole. People should focus on living at the present moment.
Relationship among individuals	Individualistic - the advantage has own interests. Collateral - primacy have small groups and care for them. Lineal - relations between people are based on the relationships of dominance and subordination.
Time orientation	Past. Present. Future.
Understanding the space	Private. Public. Mixed.

Source: Kluckhohn, F. R. & Strodtbeck, F. L (1961). *Variations in value orientations*. Evanston: Row, Peterson. (Quoted in Hills, M. D. (2002). Kluckhohn and Strodtbeck's Values Orientation Theory. Online Readings in Psychology and Culture, 4(4). <http://dx.doi.org/10.9707/2307-0919.1040>).

One of the most famous models of national culture is the model formulated by Gerhart Hofstede (1980). The aforementioned author firstly found that there are four key dimensions according to which national cultures differ, and later added a fifth one (time orientation) (Hofstede, 1980; Hofstede & Bond, 1984). Dimensions according to which national cultures differ aforementioned author found in the extensive study conducted while he was employed as a psychologist at IBM. This study included 117,000 employees of the company who were employed in more than 40 countries. Review of the national culture dimensions according to Hofstede is given in Table 2.

**Table 2 Dimensions of national culture according to Hofstede**

Dimension of national culture	Content
Power distance	<ul style="list-style-type: none"> <li>• <i>Low</i> - power is dispersed in society and people see themselves as equal.</li> <li>• <i>High</i> - society accepts (approve) the unequal distribution of power.</li> </ul>
Uncertainty avoidance	<ul style="list-style-type: none"> <li>• <i>Low</i>- people are tolerant of risk and different/alternative options.</li> <li>• <i>High</i> - people feel fear and embarrassment when they find themselves in unusual situations.</li> </ul>
Individualism vs. Collectivism	<ul style="list-style-type: none"> <li>• <i>Individualism</i> - connections between people are weak; it is expected that everyone takes care of his/her own interests and the interests of his/her immediate family.</li> <li>• <i>Collectivism</i> - people from the birth are integrated into cohesive groups which provide lifelong protection in exchange for loyalty.</li> </ul>
Masculine vs. feminine values	<ul style="list-style-type: none"> <li>• <i>Masculine values</i> – there is a strong tendency for achievements; awards and recognitions are the main motivating factors of behaviour.</li> <li>• <i>Feminine values</i> - the emphasis is on the quality of life, sustainable development of society, the balance between private and professional life; there are no differences between women and men in the same positions.</li> </ul>
Long-term vs. short-term orientation	<ul style="list-style-type: none"> <li>• <i>Long-term orientation</i> - people values tradition, they are patience and persistence to achieve results that will be manifested in the long run.</li> <li>• <i>Short-term orientation</i> - focus is on the present and the near future.</li> </ul>

Source: adapted according to Hofstede, G. (1983). The cultural relativity of organizational practices and theories. *Journal of International Business Studies*, 14 (2), 75-89 i Hofstede, G. & Bond, M. H. (1984). Hofstede's Culture Dimensions: An Independent Validation Using Rokeach's Value Survey. *Journal of Cross-Cultural Psychology*, 15 (4), 417-433.

Extensive research of the dimensions of national culture was also conducted by Fons Trompenaars and Hampden-Turner (1997). The study, which lasted over 10 years, and by which has been covered more than 1,500 executives from 28 countries, the aforementioned authors found that there are seven dimensions by which national cultures differ. These dimensions are as follows (Table 3).

Project GLOBE (Global Leadership and Organisational Behaviour Effectiveness) is also a very ambitious research project in the field of the study of culture, conducted in the 1990s of the 20th century. The goal was to determine whether and which dimensions of leadership are caused by the characteristics of the national culture. This project included over 17,000 middle managers from 62 countries. According to the researchers of the project

GLOBE there are nine dimensions of national culture, such as: power distance, uncertainty avoidance, human orientation, institutional collectivism, intragroup collectivism, determination, gender equality, orientation towards the future, focus on performance (House et al., 2004).

**Table 3 Dimensions of national culture by Trompenaars and Hampden-Turner**

Dimension of national culture	Content
Universalism vs. particularism	<ul style="list-style-type: none"> <li>• <i>Universalism</i> - there is a belief that certain principles and rules are the best and should be applied in all situations or countries.</li> <li>• <i>Particularism</i> - emphasizes the uniqueness and the need of taking into account the specificities in all spheres of life.</li> </ul>
Individualism vs. communitarianism	<ul style="list-style-type: none"> <li>• <i>Individualism</i> - interests of the individual and his/her family are above the group interests.</li> <li>• <i>Communitarianism</i> - interests of the group have priority.</li> </ul>
Neutral vs. emotional	<ul style="list-style-type: none"> <li>• <i>Neutral</i> - people try to control their emotions and to demonstrate poise and composure.</li> <li>• <i>Emotional</i> - individuals are not reluctant to express their deepest emotions.</li> </ul>
Specific vs. diffuse	<ul style="list-style-type: none"> <li>• <i>Specific</i> - people clearly separates public and private life and the roles that have in their lives, where these roles do not influence each other.</li> <li>• <i>Diffuse</i> - the difference between private and public life is not clear; the roles of people, public and private, are not separated and the individual is seen as an integral person.</li> </ul>
Achievement vs. ascription	<ul style="list-style-type: none"> <li>• <i>Achievement</i> - peoples' worth is evaluated on the basis of personal competences and outcomes that are the result of individual work and achievements.</li> <li>• <i>Ascription</i> - peoples are valued according to personal relationships and family heritage.</li> </ul>
Time orientation	<ul style="list-style-type: none"> <li>• <i>Sequential time culture</i> - time is viewed as a resource so it tends to be used in the most efficient way; there is no clear line between the time dedicated to work and other activities.</li> <li>• <i>Synchronic time culture</i> - there is a clear distance between work and pleasure; relations between people are much more important than strict adherence to the agenda, protocol, etc.</li> </ul>
Internal direction vs. outer direction	<ul style="list-style-type: none"> <li>• <i>Internal directed culture</i> - people believe that they can influence and control their environment (and their destiny).</li> <li>• <i>Outer directed culture</i> - people believe that they cannot influence neither the environment nor on their own destiny.</li> </ul>

Source: Trompenaars, F. & Hampden-Turner, C. (1997). *Riding the Waves of Culture: Understanding Cultural Diversity in Business* (2nd ed). London: Nicholas Brealey Publishing. (quoted in Vance, M. Ch. & Paik, Y. (2006). *Managing a global workforce: challenges and opportunities in international human resource management*. New York: M. E Sharpe, Inc.).

It can be concluded that the researchers in this project have been adopted the dimensions of culture as they have been formulated by the previous authors. However, their contribution is reflected in the fact that they found that there are some dimensions of leadership that are important to its effectiveness in different cultures, i.e. there are dimensions of leadership that differently affect the effectiveness of leadership in different cultures (Janićijević, 2013, p. 584).

In addition, it is important for the design of policies and procedures within IHRM to know the dimensions of the national culture of a certain country, it is important to bear in mind the fact that the characteristics of the culture of a certain country are not static, but dynamic category which can change during the time. These changes can have two directions: (a) reducing the cultural differences between different countries, which is known as cultural convergence and (b) the deepening of differences, which is known as cultural divergence (Thomas, 2008).

A factor that specially contributed to the cultural convergence is the process of globalisation. However, besides the fact that globalisation significantly contributed to the cultural convergence there are many other factors which also contributed to cultural convergence, such as developing the mass media, migration of people in order to acquire education or for economic reasons, etc. These phenomena indicate that certain norms of behaviour, way of thinking and values combine with others, and as a result a mixture of different cultures appears. So, it happens that many traditional collectivist culture accept a certain individualistic norms of behaviour and, conversely, individualistic culture accept certain norms of behaviour from collectivist cultures.

In contrast to the cultural convergence there is an opposite phenomenon - cultural divergence. This phenomenon implies that the cultures over time become more and more distanced and that their characteristics become more and more diverse (Vance & Paik, 2006).

However, in the literature there is almost a consensus that cultural convergence and cultural divergence are extremes, i.e. that they are phenomenon which are located at the opposite sides of the continuum. In the reality what really happens is the process of crossvergence (Ralston et al., 1997). There is the expectation that this trend (crossvergence) will continue in the future and will be increasingly strengthened by the process of globalisation.

In order to investigate the influence of the culture of a specific country on the HRM system in organisations of that country and to analyse its implications for the content of IHRM, it is important to bear in mind that besides the dimensions of national culture of the country concerned, HRM system in organizations is also influenced by the organizational (corporate) culture. The question that naturally arises here is: What culture, national or organisational, has a greater influence on the attitudes and behaviour of the employees in a



particular organization? Most of the authors believe that the greater influence on the behaviour and attitudes of employees in particular organisation, and also on the preferred content of HRM, has a national culture. As the argument for such an opinion, authors state that people establish their organisational values after their nationally based values have already been developed, and that they their existing system of values transfer to the organisation. On the other hand, if there are discrepancies between the values that promote national culture and the values that promote the founder of the organisation, authors believe that the impact of organisational culture on the employees' values, fundamental attitudes and beliefs is weaker in comparison to the influence of the national culture. Authors also believe that the influence of organisational culture on the attitudes and behaviour of the employees is of a shorter duration (Triandis, 1995). This suggests that national culture has a strong influence on which policies and practices in the field of HRM in a particular country will be more preferred and generally more prevalent.

#### **4. Influence of Some Dimensions of National Culture on the Content of Human Resources Management**

The influence of national culture on the content of the HRM can be monitored and analysed in almost all its segments. However, the following text will analyse how certain dimensions of national culture exert their influence on key activities in this field, such as: recruitment and selection of candidates, training and development of the employees, performance appraisal and remuneration.

Regarding the influence of national culture on *the recruitment* of candidates this impact can be analysed how national culture affects this process through the system of values of the recruiters, but also through the system of values and preferences of the job applicants (Stone et al. 2007). Stone and his colleagues (2007) concluded that if recruiters come from countries with collectivistic values, in that case it is more likely that the priority will be given to the personal or relationship-oriented recruitment sources, such as employee referrals, networking at job fairs etc. In contrast, when recruiters belong to countries where individualistic values are dominated aforementioned authors believe that the recruiters in this case will opt for recruitment sources such as employment agencies, newspapers advertisements, online recruiting, or sources where personal acquaintance and personal contacts are not of great importance (Stone et al., 2007).

It is also believed that the system of values of the applicants can influence the process of recruitment by deciding for which job to apply. If the applicants support the individualistic values there is an assumption that they would prefer jobs and organisations where they will be able to express their personal achievements and quality, or jobs that offers a significant degree of autonomy

and opportunity for advancement. On the other hand, if the applicants have collectivistic values, Stone and his colleagues (2007) state that it is more likely that such applicants will apply for jobs that will allow them to work in a team, and to cooperate with others.

Rieche and colleagues (2012) also state that national culture exerts some influence on the process of recruitment. They state that in collectivist cultures organisations prefer firstly to look for individuals for the vacant position within the organisation (internal recruitment) in order to encourage loyalty and commitment of the existing employees (Rieche et al., 2012). In support of the preference for internal recruitment in such cultures, some other authors also state that if some applicants come from the external labour market later they have difficulties to fit into the work environment and develop social relations with other employees, and even face with some kind of resistance (Björkman & Lu, 1999).

National culture, may also influence the *process of selection* of applicants in several ways: through the profile of the ideal applicant, selection criteria and methods of selection. So, for example, in the USA, whose culture is individualistic and characterised by individual orientation towards achievements, efficiency and rationality, organisations prefer job applicants who support individualistic values, who are focused on results, who are proactive and can autonomously perform tasks (Stone et al. 2007). On the other hand, if it is about collectivist culture, then the profile of the ideal job applicant is different - priority is given to the applicants who are willing to work in a team and who subordinate their own goals to the goals of group or organisation.

Regarding the impact of national culture on the selection process Aycan (2005) states that in cultures that are high performance oriented organisations in the selection process mostly use hard criteria, such as job related knowledge and technical skills, while the organisation which are low performance-oriented favor soft criteria, such as relational skills, or even belonging to a certain social class (Aycan, 2005).

The influence of national culture can be recognised when it comes to the usual methods of selection, too. For example, in cultures that are characterised by high risk avoidance, organisations use a wide range of methods in order to gather enough information upon which will be based valid decision. Also, in cultures that are highly performance-oriented the methods that are standardized and closely linked to the job requirements are used to a much greater extent.

The influence of national culture is also recognised when it comes to *training and development* of the employees. For example, in high power distance cultures where coaches have great authority, the communication between them and the trainees is very formalised. Furthermore, the influence of culture can be recognised when it comes to the design of the training

programmes. In which direction can go this impact, it can be seen from the results of the study conducted on the population of students in the USA who come from different countries and cultures. Research has shown that the Anglo-Americans (individualistic culture) prefer training programmes that are individualised and goal oriented (focused on the realization of precisely defined tasks and goals) and where the learning environment is competitive. On the other hand, when it comes to students who come from countries in Latin America (collectivist cultures), it was found that they prefer unstructured learning methods, informal environment during the training programmes, followed by training methods that group oriented, as well as training methods that allow active participation and experimentation (McIntyre, 1996 in Stone et al., 2007). Another study showed that students from Asia (collectivist culture) prefer formal training sessions, training methods that are group oriented, cooperative learning environment, etc. (Chi-Ching & Noi, 2001 in Stone et al., 2007). From the above arises the message that in order to create effective training programmes, it is necessary to design them in accordance with the preferences of the trainees which are substantially based on cultural values of the country of origin.

Culture can also affect *employees performance appraisal system*. This influence can be identified at each stage of this process. Stone and his colleges (2007) indicate that the values endorsed by the members of particular national culture, first of all, affect the criteria which usually are used for measuring the performance of the employees, methods that are used to measure employees' performance, as well as the methods that are used to provide employees with feedback (Stone et al., 2007). In explaining how cultural values influence the performance appraisal system these authors state that there are two types of criteria usually used in performance management systems: (a) task performance and (b) contextual performance criteria. These authors suggest that if it comes to the individualist culture that is more likely to be used task performance criteria. In this case, employees' performance will be compared to the performance standards, tasks and responsibilities determined in job description. On the other hand, if it is about collectivist culture, then the contextual performance criteria will be more used, i.e., the successfulness of the employees will be appraised by how successful they are in cooperation, innovativeness, providing assistance to others, etc. (Stone et al., 2007). In short, when it comes to the individualist culture, the emphasis in evaluating performances is on the individual performances, while in collectivist emphasis is on teamwork and group results.

Dimensions of national culture have some influence on the appraisal system in terms of subject of the appraisal, too. For example, in high power distance cultures superiors require loyalty and obedience of his/her subordinates, so when it comes to assessing the performance of the employees performances that

are evaluated are based on the behaviour of the employees, not on the results they achieved. Therefore, there is a belief that in such system, it is enough to monitor the work of the employees in terms if they meet the prescribed procedure to be evaluated positively.

Some dimensions of culture have an impact on the preferences when it comes to the methods that organisations use for appraisal purposes. Thus, certain studies suggest that the in individualist cultures it is more likely that a formal and individual appraisal system will use objective, while in collectivist cultures it is informal and subjective appraisal system (Stone-Romero & Stone, 2002). Furthermore, some research suggests that when it comes to feedback interview, in individualist cultures, employees sometimes respond negatively, i.e. they express anger, and even a tendency toward a kind of revenge to the feedback agent in order to protect their integrity. On the other hand, in Japan (collectivist cultures) employees on the negative appraisal also react with emotions, but the dominant emotion is not anger, but shame because they did not achieve satisfactory performances (Stone-Romero & Stone, 2002).

In other research it was found that the impact of culture can be recognised when it comes to the way of communication during the feedback interview, as well as what is the focus of the communication. It has been found that in individualist cultures appraisals are usually communicated by direct talking with employees, whereas in collectivist cultures feedback is usually given indirectly through some kind of friendly conversation (Hofstede, 1983). Regarding the content of the feedback, some studies have shown that in individualist cultures focus is on how employees to improve their performance in order to make progress in their career, whereas in collectivist cultures, this is not the case, since in them progresses in career is usually based on the years of employment (Milliman et al., 1998).

Culture, as a system of values and rules of behaviour may affect *the compensation system*, too. That impact goes so far that the word *compensation* that is used to indicate the rewards that employees receive in return for their work, has a different interpretation in different cultures. For example, in most European countries, this term is considered more as a repayment for injury or damages, so in this countries the term remuneration is more preferred (Vance & Paik, 2006).

When it comes to compensation system the influence of national culture can be most apparently recognised in the area of designing the compensation package. Thus, in individualist cultures, it is commonplace that compensation depends on the performances of the individuals, while in collectivist cultures, this is usually not the case. In collectivist cultures, salary is usually fixed and if there is a variable part, it is usually based on the group or team performances. Further, the dimension of uncertainty avoidance also has its implications for the

compensation system. Thus, in cultures with a high degree of uncertainty avoidance compensation packages are structured in a way that small part depends on performances, because this is a way to provide certainty and predictability in payments to employees. In contrast, in cultures with low risk avoidance compensation packages are generally structured so that greater share is variable and depends on the results that have been achieved (Chiang, 2005).

Culture dimension such as masculine vs. feminine values, has also its implications for the design of the compensation system. Thus, in cultures where dominate masculine values employees prefer rewards such as money, promotion and etc., while in the cultures where dominate feminine values, there are preferences towards intangible rewards (e.g. job security, recognition, etc.).

Knowing the impact of certain dimensions of national culture on the preferred content of HRM in a particular country is very important for MNCs when designing their system of IHRM. If MNC implements management system which is not in the line with generally accepted values and rules of behaviour in a specific country, employees in that entity of MNC dissatisfaction with such system can be expressed through low level of commitment and motivation as well as through unsatisfactory performances. Therefore, it is necessary that MNC creates such system of IHRM that at least will be a balance between the policies and procedures advocated by headquarters and those that are preferred in entities abroad.

### **5. Impact of Dimensions of National Culture on the Content of Human Resource Management in Some Countries - Cases of Japan, USA, Turkey and Serbia**

Having in mind that dimensions of national culture have some influence on the preferred content of the HRM system in organisations of the certain country, hereinafter will be analysed examples of Japan, the USA, Turkey and Serbia. More precisely, the author will analyse how dimensions of national culture of these countries affect the HRM system in their organisations.

*Japan.* One of the main characteristics of the national culture of Japan is collectivism. How collectivism is strong, or how individualism is weak, it can be concluded upon the results that Hofstede obtained. This author found that the index of individualism of Japanese culture is 46, while, by comparison, in the US, this index has value 91 (Hofstede, 1997). Strong collectivistic orientation in Japan can also be seen on the basis how people in this country understand the basic group to which they belong. Namely, in Japan, as a member of one's basic group (which typically include spouses and children) is also considered organisation in which one works (Tayeb, 2004).

In addition, national culture of Japan is not only characterised by collectivism, it is also characterised by masculine values, pursuit for achievements, willingness to hard work and sacrifice. In addition, the national culture of this country is characterised by high uncertainty avoidance, too. This is one of the reasons why most organisations in this country, despite all the turbulence in the labour market, still offer lifelong employment in exchange for loyalty and adequate performances. Among the other characteristics of national culture of Japan that should be mentioned is the orientation towards harmony. It reflects the orientation of avoiding conflicts, achieving harmony and establishing cooperative relations. In addition, the culture of Japan is also characterised by very strong respect for social status. This dimension of culture in everyday life manifests itself in numerous ways, such as, for example, the depth of the slope during the meeting, the way in which seating at the table is organised, the time that individuals are allowed to speak in the group, etc.

Main characteristics of the HRM system in organisations in Japan which are culturally grounded are as follows (Tayeb, 2004):

- Teamwork: multi-skill work teams, team appraisal and reward.
- Collective decision-making.
- Discreet performance appraisal.
- Life-time (long-term) employment for regular core employees.
- Seniority-based pay and promotion.
- Strong sense of obligation to colleagues and superiors, however to a certain extent discrimination against women.
- Commitment to high quality.
- Loyalty and long-term commitment to organisation, etc.

United States of America. Hofstede (1997) in his research found that one of the main characteristics of the national culture of the United States of America (USA) is individualism. This dimension of national culture of USA manifests itself in many ways. For example, members of this culture believe that every individual shapes and controls his/her own destiny. In addition, people are very ambitious, independent and put high value on freedom and individual achievements. In addition to individualism, the national culture of the USA is characterised by a low power distance (index 40). This dimension of culture manifests by advocating egalitarianism - attitudes towards people are not based on differences in status, age and the like. Furthermore, the USA national culture characterizes supporting masculine values (index 62). This dimension of culture manifests itself in a way that there is a strong tendency for achievements. An important characteristic of USA culture is also high tolerance of uncertainty (index 46) (Hofstede, 1997). This characteristic means that people in this country generally support changes and are motivated for entrepreneurship behaviour.

The other characteristics of the national culture of USA include ethnocentrism and orientation towards future. Ethnocentrism manifests in a way that there is a strong belief that their system of values is superior than the others (Tayeb, 2004). As a result of orientation towards future in the USA generally dominates attitude that current ways of operation and functioning can and should always be replaced by better ones.

The implications of these dimensions of national culture of USA on the dominant characteristics of HRM system in this country, manifest in the following way (Tayeb, 2004):

- Promotion and reward are based on merits not on the status, age and the like.
- Preference towards participative leadership style.
- Employees are willing to make decisions, take initiative, build their image and demonstrate entrepreneurial behaviour.
- Subordinates have freedom to question authority of the superiors.
- Employees are willing to leave the organisation in order to build their careers and achieve greater success.
- Organisations easily decide to lay off employees.
- Problems with employees prefer to be solved through HRM system that is seen as a means to avoid the need for union organizing.
- A high degree of professionalism, etc.

*Turkey.* Basic dimensions of national culture of Turkey are collectivism, high degree of uncertainty avoidance, high power distance, equal level of masculine and feminine values (Hofstede, 1997). Also this is a highly contextual culture (Tayeb, 2004). However, studies conducted recently show that certain dimensions of Turkish national culture, such as collectivism have a high degree of uncertainty avoidance and high degree of power distance are somewhat relativised (Ayacan, 2001). Having in mind the geographical position of Turkey this tendency is not surprising.

Dimensions of national culture of Turkey have the influence on HRM practices in this country in the following ways:

- There is a large power distance between superiors and subordinates, although some managers express a high degree of tolerance, and empathy.
- Autocratic leadership style is increasingly relativised.
- Managers are high achievement-oriented but low power-oriented,
- There is still inequality in the decision-making process.

*Serbia.* Basic dimensions of Serbian national culture are collectivism, high power distance, uncertainty avoidance and the balance between masculine and feminine values (Hofstede, 2002). An important dimension of Serbian culture is, above all, collectivism. How collectivism is strong or how individualism is

low may be concluded according to the value of the index of individualism (25). Furthermore, Serbia is a very strong power distance culture which indicates the value of this index, too. According to the research conducted by Hofstede this index is 86. However, dominant dimension of national culture in Serbia is uncertainty avoidance since this index has value 92. When it comes to masculine and feminine values, in Serbia they are almost equally represented. Index of masculine values is 43 (Hofstede, 2002).

In the absence of the empirical studies in which correlation between certain dimensions of national culture of Serbia and the content of HRM system that is applied in the organisations in this country, can be identified, certain theoretical studies, however, suggest that the above-mentioned dimensions of national culture of Serbia affect that the most common procedure and practice in the field of HRM in Serbian organisations to be as follows (Bogićević Milikić, 2009):

- Due to high uncertainty aversion, in filling the senior managerial positions, the priority is given to internal recruitment, while when it comes to filling junior management positions the advantage has the external recruitment. In the case when mid-level managers recruit from external sources, due to high risk aversion organisations usually seek the assistance of consultants.
- High degree of collectivism affects that preferred methods of recruitment are recommendations of existing staff, various events (seminars, symposia, etc.), job fairs, etc., rather than recruitment by newspapers ads or by e-recruitment.
- Due to a high degree of collectivism and risk avoidance the organizations in Serbia when advertising the need for filling the vacant positions stress that job involves teamwork, interaction with others, security and so on, rather than possibilities of individual achievements (although this situation is changing in favor of individual achievements - B. Dj.).
- When it comes to the selection process, high power distance, high degree of collectivism and feminine values are not often standardised, and are based on the recommendations of someone who is already a member of the organization, unstructured interviews and informal conversation with the candidate. In these circumstances, the most common selection criteria are: personality traits (the impact of feminine values), education (the impact of high power distance), loyalty and harmony in the organization (the impact of collectivism).
- When it comes to the promotion, high degree of collectivism and high power distance imply that it is realistic to expect that in Serbian organizations basic criteria for advancement are good interpersonal relations, years of service, loyalty and commitment to the organization.

Finally, high degree of collectivism and high risk aversion lead to the conclusion that preferred reward system in Serbian organization is one where



salary is fixed, i.e. independent of the achieved performances, or at least that its major part has fixed character.

## **6. Conclusion**

Having in mind the fact that business expansion beyond the borders of a country becomes precondition for the organizations' further progress, but also for the development of the national economy as a whole, as well as that the number of organizations that operate at the international business scene increase, this paper deals with one of the biggest challenges of the process of internationalisation of business. That is the creation of adequate human resources management system. This is a challenge because employees who are employed in the entities abroad usually have different cultural background. This paper points out that although the content of the IHRM system is caused by a variety of factors from the international context, the national culture is of a particular importance since this factor has impact on a deeply based way of thinking, attitudes and behaviour of people. As a result, it is natural to expect that employees from different countries exhibit different preferences for policies and procedures in this area. While some HRM practices may consider adequate and appropriate, others may be considered inappropriate or even the unnatural. Since the employees dissatisfaction with IHRM system can be expressed through low level of organizational commitment and low level of performances, organizations when design HRM system that is going to be implemented in the entities abroad, this system, at the very least, should be a compromise between the system of values and standards of behaviour for which headquarter of the organization is stands for, with a system of values and norms of behaviour that local population prefer.

To highlight a clear link between certain dimensions of national culture and preferred policies and procedures in the field of human resources management, this paper firstly pointed out the essence of the concept of IHRM as well as its main segments. It was noted that the basis of all segments of IHRM is culture. It was also noted that culture is the factor upon which in the case of the internationalisation of business should be paid special attention. Further, the dimensions of national culture are observed from the perspective of the referent authors in this field are presented. Their effects on the policies and procedures in the field of HRM are also analysed. In the last part of the paper four countries were selected and key dimensions of their national cultures were analysed, as well as how these dimensions influence the content of HRM in these countries.

Although this paper has its limitations, which is primarily reflected in the lack of the empirical research that will confirm the causal relationship between the dimensions of particular national culture and policies and procedures in the field HRM that are appropriate for organisations of that country, it can serve as a kind of guidance for the management who plans to internationalize the

business which factors should be taken into account in order to create an effective IHRM system.

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## UTICAJ NACIONALNE KULTURE NA MEĐUNARODNI MENADŽMENT LJUDSKIH RESURSA

**Apstrakt:** U današnjim uslovima poslovanja internacionalizacija poslovnih aktivnosti postaje gotovo nezaobilazan uslov za dalji rast i razvoj preduzeća. Međutim, izlazak na međunarodnu poslovnu scenu najčešće zahteva da organizacije izvrše određene promene u načinu na koji su do tada funkcionisale. Jedna od oblasti koja zahteva izvesne promene jeste i oblast upravljanja ljudskim resursima. Faktori koji uslovljavaju modifikacije u ovom sistemu vezani su, pre svega, za pravnu regulativu drugih zemalja, ali i za karakteristike nacionalne kulture. Ovo zbog toga što nacionalna kultura ispoljava snažan uticaj na sistem vrednosti, stavove i ponašanje ljudi u određenoj zemlji pa, između ostalog, i na preferencije prema politikama i procedurama iz oblasti menadžmenta ljudskih resursa. Polazeći od navedenog, rad se bavi analizom uticaja pojedinih dimenzija nacionalne kulture na preferirani sadržaj menadžmenta ljudskih resursa u organizacijama u određenim zemljama. Cilj rada je da se pruži teorijska osnova koja će omogućiti organizacijama koje su internacionalizovale poslovanje, ili to nameravaju da učine, da kreiraju takav sistem menadžmenta ljudskih resursa u entitetima u inostranstvu koji bi, u najmanju ruku, predstavljao balans između sistema koji se primenjuje u sedištu organizacije i onog koji se preferira u entitetima u inostranstvu da bi ovaj sistem bio efektivan.

**Ključne reči:** internacionalizacija poslovanja, nacionalna kultura, međunarodni menadžment ljudskih resursa, zaposleni.

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## **IDENTIFICATION OF KEY DETERMINANTS OF SATISFACTION OF USERS OF ELECTRONIC BANKING SERVICES**

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UDC  
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Review  
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**Abstract:** Under the conditions of increased competition, imperatives for banking institutions are focusing on the provision of better quality services, meeting the needs of clients and adjusting to their specific demands, as these are the conditions for achieving satisfaction. Satisfaction has a consequent effect on the realisation of communication, but also economic business goals of market players. In accordance with these facts, the significance of measuring the quality of services needs to be pointed out. In recent years, the tendency of increase in the number of bank clients who use electronic banking services has been perceived in the Republic of Serbia. Advantages of this modern service are numerous, and the ones that stand out among them are saving time, more favourable price, comfortable and fast transaction execution. The purpose of this paper is to examine the satisfaction of clients in relation to electronic banking services, i.e. to come to a conclusion which elements of service quality have an impact on satisfaction, as well as to assess the intensity of such impact. In order to obtain the necessary information, we have used the measures of descriptive statistical analysis, reliability analysis, correlation and regression analysis. The data have been collected using the survey method and the questionnaire distributed to respondents for the purpose of specific research has been created on the basis of previous research in the quality of service field. The results have shown that three dimensions of modified SERVQUAL model (security, ease of use and responsibility) have a statistically significant impact on satisfaction, while other factors (reliability, empathy and website

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content) have, in their joint effect, indicated a non-significant impact on satisfaction. The contribution of this paper is reflected in the fact that the identification of factors (reliability, empathy, website content) that have not achieved a significant impact in their joint effect on the satisfaction of clients with electronic banking can be a signal for the management of financial institutions to take action in order to reduce the perceived risk, maintain trust, provide training and development of employees, modernize website appearance.

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## 1. Introduction

The banking market in the Republic of Serbia has in recent years been marked by intense and dynamic changes. Institutional reforms, expansion of the portfolio of banking products and services, globalisation of banking activities are just a few examples of changes the banking sector has been facing lately (Marinković, Obradović, 2012). In addition to these changes, a major impact on bank operations is achieved through new trends in client behaviour. As in other service sectors, this refers primarily to savings and rationality that are becoming significant characteristics of their behavior (Jeary, 2009). Lack of time and the general dynamics of everyday life affect clients in such sense that they look for more comfortable and faster ways of transaction execution. In this respect, we point out the significant changes in client behaviour caused by the Internet as a global interactive medium (Stanković et al., 2012) and the phenomenon of the modern age that impacts all aspects of people's life and work.

Apart from the fact that the Internet exercises its impact at social, legal and consumer level, companies and the banking sector are also under pressure to apply new information-communication technologies more intensively (Liébana et al., 2013).

Four factors affecting the acceptance or non-acceptance of electronic banking are (Parasuraman, 2000):

- Optimism - extent to which people have a positive outlook on technology and believe it brings them greater control, flexibility and efficiency in life,
- Innovativeness – extent to which people are technological leaders and opinion leaders,
- Discomfort – extent to which people perceive the lack of control over technology and feel overwhelmed by it and

- Uncertainty – extent to which people do not trust technology and doubt its ability to function properly.

If the level of optimism and innovativeness is higher, the extent of acceptance of electronic banking is also higher. On the other hand, greater discomfort and uncertainty affect the end result in such a manner that the extent of non-acceptance of this on-line service is greater.

Data of the Statistical Office of the Republic of Serbia at the end of the third quarter of 2014 show a tendency of increase in the number of households owning a computer (63.2%) and also an increase in the number of households with the Internet access (62.8%) (www.stat.gov.rs). According to data obtained from the National Bank of Serbia, there has been an increase in the number of users of Internet banking in the Republic of Serbia.

**Table 1 Total number of bank clients and total number of users of Internet banking**

Quarter	I/2013	II/2013	III/2013	IV/2013	I/2014	II/2014
Total number of clients	8.446.666	8.408.376	8.452.502	8.475.949	8.517.231	8.561.581
Internet banking	892.905	924.730	962.684	991.424	1.019.637	1.061.917

*Source:* Customized according to: www.nbs.rs, National Bank of Serbia, date of access Sept. 17<sup>th</sup>, 2014.

The number of users of Internet banking in relation to the total number of bank clients at the end of the second quarter of 2014 amounted to approximately 12,40%. In developed countries such as the United States, for example, this percentage amounted to approx. 40% in 2010 (Nilay Yajnik, 2013).

Banks offer their financial services via the Internet and want to accelerate the process of adoption of this business method since they are aware that the costs of providing services in this way are lower in comparison to the traditional way of going to the bank and paying over the counter (Polatoglu, Ekin, 2001). Also, in line with the general trend present when it comes to consumer behavior, consumers/clients in the Republic of Serbia today have high demands regarding the quality of products and/or services they use, while additional competition among the offering parties imposes the need for continuous quality improvement in order to increase the level of satisfaction (Maričić et al., 2012).

This research has been created in order to determine the degree of satisfaction of users of on-line banking services as well as the factors that determine satisfaction to the greatest extent. The preparation of this paper included the application of a SERVQUAL model adapted in accordance with the specifics of electronic banking services. Although the influence of

SERVQUAL model dimensions on client satisfaction was researched extensively in the past, a lesser number of researches focused on the analysis of the said variables in the field of electronic banking. Empirical research by applying the surveying method was used to collect data from 108 clients of banks operating within the territory of the Republic of Serbia. The results of this research are useful in multiple ways since they provide the management with an insight into the attitudes of clients regarding the quality of services. In this way it is possible, on the one hand, to undertake corrective measures to improve certain satisfaction determinants, or improve the quality of those determinants with which they are already satisfied, and provide the quality that will thrill them.

## **2. Literature Overview**

### **2.1. Quality of Services**

Quality of services is a concept that has attracted much attention and discussion in research literature because there have been difficulties in defining the quality of services and also there is no general consensus when it comes to measuring the quality of services (Wisniewski, 2001).

Difficulties in defining the quality of services arise from certain characteristics of services such as intangibility, a high degree of contact between the service provider and consumer (client), the fact that the process of providing services is visible to a large extent, simultaneous production and use of a service.

Personal views of users play an important role in efforts to define the quality of services, and also participate in a certain way in the creation of additional difficulties. Namely, what one user assesses as top quality may seem average or even below average to another (Marinković et al., 2011). Accordingly (Garvin, 1984), concludes that quality lies in the eye of the beholder. Specifically, the elements that include habits, attitudes, experiences, value set or social class of an individual are just some of the factors that determine the manner in which a person can perceive quality (Marinković, Senić, 2012).

In the service sector, the definitions of quality of services are focused on meeting consumer needs and demands, and how well a delivered service meets consumer expectations (Lam, Zhang, 1999). In line with this, the quality of services can be defined as the difference between customer expectations and their actual experiences. If expectations are greater than performance, such quality is regarded as unsatisfactory which further affects the creation of dissatisfaction” (Parasuraman et al., 1985; Lewis, Mitchell, 1990).



When speaking of quality, quality of service is inextricably linked to the quality of the service provider. This means that utility workers will treat consumers well if they themselves feel that their company treats them well. It is therefore very important to choose adequate people who will primarily be able to satisfy consumers and solve their problems. Physical environment refers to the natural environment in which a service is provided. In this sense, researches are focused on the ambience of space in which the service is “received”, general atmosphere, décor, effect of colours, brightness. The process is related to procedures, mechanisms and activity flow based on which services are delivered to consumers. The time of waiting for service execution can affect satisfaction and loyalty (Salai, Božidarević, 2009). In terms of production processes, customers are actually those who are quite often directly involved in the transaction and represent a part of the overall service delivery system. If the customers are perceived as service co-producers but are not doing their job well, the overall quality of service can be compromised significantly (Marinković et al., 2011).

Generally speaking, there are two general approaches to the quality of services. According to the first, the quality of services is based on a comparison of customer expectations regarding the service to be delivered and actual perceptions in relation to the service delivered. (Grönroos, 1984; Parasuraman et al., 1985). Another approach suggests that measuring the quality of services should include only customer perceptions (Caro, García, 2007).

Certain authors believe that quality consists of two dimensions, functional and technical. The functional dimension refers to how a service is delivered, while the technical relates to what the customer receives as a result of the service provided (Grönroos, 1982).

Delivery of financial services over the Internet should be observed as a partial part of the overall customer service and distribution strategy. In addition to the fact that client migration to electronic banking system results in significant savings for the bank, clients themselves obtain a number of benefits (Sathye, 1999). Banks have in mind the increasing customer expectations in terms of service quality, which express the need for instant access to information at any time and from any location (Liébana et al., 2013).

The most significant advantages of electronic banking are convenience, security, efficiency and cost effectiveness and they largely exceed the benefits of traditional banking. Leading Chinese banks have also implemented on-line banking as an additional service, expressing their three advantages for clients, such as guarantee of safety of client funds, service accessible 24/7 and favourable price for each successful transaction, while the unsuccessful ones are not charged, and the entire process is completed within seconds after the user sends his/her message (Xiaoyan Li S.L., 2005).

Over the years, in literature that deals with research of services, a large number of models has been developed with an aim to explain what affects the quality of services, as well as to measure the overall quality of service. Most of these models are a comparison of expected and delivered service (Grönroos, 1982). Based on this model Parasuraman et al. (1985) created a model with five gaps, which was later used to create a model that contains 22 questions/findings for evaluating the quality of service-SERVQUAL (Parasuraman et al., 1988). This model comes down to measuring reliability, responsibility, security, empathy and tangibility which have been identified as the five most critical dimensions of the quality of service.

When it comes to researches on the quality of services in banking, especially in the field of electronic banking, one could say that the majority of researches applied the SERVQUAL model or some of its modifications. Certain authors advocate that the SERVQUAL model is not applicable in all service areas, and some of them suggest a multidimensional and hierarchical model where quality is seen as a construct of the highest order, defined by three dimensions of the second order – personal interaction, physical environment and outcome, which are further defined by seven dimensions of the third order – behaviour, expertise, problem solving, equipment, ambience, waiting time and valencies (Caro, García, 2007). Despite the criticism, the SERVQUAL model was applied in this research (Marinković et al., 2011).

## ***2.2. Satisfaction and Measuring Satisfaction***

Customer satisfaction in modern business management is one of the key factors of growth of competitive advantage and profitability of a company (Maričić, 2011). In addition, satisfaction is regarded as one of the main objectives of marketing, but also means to achieve other goals such as profit, market share, loyalty (Maričić et al., 2012). Satisfaction is a directly experienced by purchasing and using products and services as a result of created and delivered value (Johson, Wenhstein, 2007). Satisfaction depends directly on the benefits of a product or service to consumers (Maričić et al., 2012).

Expectations of customers are often referred to in connection with the concept of satisfaction. Specifically, expectations are thought to create a frame of reference about which one makes a comparative judgment. Thus, outcomes poorer than expected (a negative disconfirmation) are rated below this reference point, whereas those better than expected (a positive disconfirmation) are evaluated above this base. Authors Oh and Parks (1997) propose a model of non-confirmation of expectations. The reaction of consumers to the assessment of the difference between previous expectations and actual performance of service offer corresponds to realized satisfaction. Positive confirmation occurs if the product is better than the consumer expects, and the consequence of that is

user satisfaction. However, performance poorer than expected provide negative confirmation, i.e. dissatisfaction (Lam, Zhang, 1999). In this regard, the delivery of service offer achieves satisfaction if the previous expectations of product consumers/service users are at least fulfilled, or even exceeded if possible (Grubor, 2011).

From a marketing perspective, consumer/client satisfaction is achieved when his needs and desires are fulfilled. Electronic banking, as an integral part of the general bank business strategy, provides higher quality services and thus a higher level of client satisfaction. New relationships with clients are built in this way with an aim to learn about their needs. Satisfaction is a determinant that facilitates the personalisation/customerisation of banking services, assists the development and maintenance of long-term relationships and improvement of profitability, enhancement of loyalty, reduction in the rate of departures (Liébana et al., 2013).

In many cases, financial institutions are not concerned about the assessment and measurement of satisfaction of users with electronic banking service, but also are not interested to improve their effectiveness and efficiency, which would later lead to achieving higher rates of satisfaction and profitability (Liébana et al., 2013).

Measuring satisfaction is sometimes difficult since it is a latent variable that depends on the subjective perception of the customer on the quality of a product or service. During measuring, it is very important to identify the adequate variables, i.e. attributes to be measured (Marinković et al., 2011). Measuring satisfaction is very important because the conditions for successful marketing management and determining the effectiveness and efficiency of various marketing programs, concepts and instruments are created in this manner. Effects can be reviewed and adequate measures of business improvement can be reviewed based on results.

The current level of client satisfaction with banking services worldwide is perhaps best evidenced by the results of a research conducted by a famous company, "Ernst & Young", published in 2011. The research which included more than 20,500 individuals from Europe, the USA, Canada, China, Japan, India, Latin American countries and South Africa, revealed, among other things, that internet banking, ATMs and branches are channels for the provision of banking services which clients around the world are mostly satisfied with.

According to the American Customer Satisfaction Index (2011) report, the on-line banking is preferred in relation to other channels available to bank clients. The data imply that this percentage amounts to 55%, branches were chosen by 28% of clients, ATMs 13%, where only 2% opted for calling call centers and mobile banking (Liébana et al., 2013). This report states that, despite the complicated situation in the banking sector, primarily referring to the

financial crisis and the creation of mergers and acquisitions, the general level of user satisfaction with electronic banking has increased in the previous years, reaching a level of over 80%. Also, the report cites that the level of satisfaction with electronic banking is approximately 20% higher than satisfaction with banking in general.

Finally, it is very important to measure consumer satisfaction and have knowledge of the determinants that define it. In this sense, this is important for banks as well, since in this way they can obtain returns on investment (Liébana et al., 2013).

### ***2.3. Demographic Profile of Users of Electronic Banking***

Dynamism that is evident in the business world largely influences the behaviour of consumers, i.e. users of certain services. Results of numerous studies have created a profile of an average user of electronic banking.

Howcroft et al. (2002) found that younger users valued more those benefits of electronic banking which are reflected in convenience and time saving, compared to older consumers. Younger consumers consider the lack of face-to-face contact to be less important, in comparison to older clients. On the other hand, a lower degree of face-to-face contact that is typical for the electronic banking field is the basis for maintaining strong relationships with clients (Marinković, Obradović, 2012).

Howcroft et al. (2002) conducted a research which also found that the level of education does not affect the use of electronic banking. However, Karjaluoto et al. (2002) obtained information that a typical user of electronic banking in Finland is a highly educated, relatively young and wealthy person with good knowledge of computers, especially the Internet. Research conducted by authors Sarel and Marmorstein (2003a,b) proved that household income and education have a significant impact on the acceptance of electronic banking among mature Finnish clients. Singh (2004) used his study to obtain information that, in South Africa, Internet banking is applied more among men than women, and that users belong to the category of employed people with high earnings.

Certain authors (Gerrard et al., 2006) found that those who accept Internet banking perceive this service as something that is compatible with their lifestyle. On the other hand, those who do not accept these services perceive them as more complex, and also believe that their application requires a higher level of computer skills.

Empirical results show that satisfaction with electronic banking services is a specific phenomenon and that it varies among certain client segments. For example, the highest level of confidence in the banking system in general can be

found in Malta, Finland and Luxembourg and the lowest in Spain (Järvinen, R.A., 2014). As for the situation in the Republic of Serbia, research from 2008 showed that SMS notifications and electronic banking was mostly used by persons under 40 years of age, highly educated, students or employees, mostly with higher earnings. (TNS Medium Gallup (2008) The results of this research show that an average user of electronic banking in the Republic of Serbia is a highly educated female person, age 26-35. They are mostly employed people living in urban areas.

### **3. Research Methodology**

In order to measure the level of bank client satisfaction with electronic banking, but also to obtain information about the extent to which satisfaction is determined by certain aspects of service offer, field research was conducted using the survey method.

The research included 108 respondents who were clients of one of 16 banks that appeared within this research as service suppliers. The data were collected during the period from September 11<sup>th</sup>, 2014 to September 27<sup>th</sup>, 2014 in the city of Novi Sad. The content of the questionnaire was divided into two parts. In the first part, the respondents stated their basic demographic characteristics (gender, age, qualifications), and also which bank was their choice when it comes to using electronic banking services. The second part of the questionnaire consisted of 28 statements divided into 7 groups. The findings were related to the assessment of quality of services and were tailored to the specific research based on researches of eminent authors in the field of assessing the quality of services.

The basis for the creation and evaluation of four dimensions of quality of service (reliability, responsibility, security and empathy) was the SERVQUAL model (Parasuraman et al, 1988; Lam, Zhang, 1999). Also, the research covered two more dimensions of quality of services relating to the ease of use of electronic banking service and website contents, designed based on studies conducted by Liébana et al. (2013). Satisfaction was measured using the parameters applied in ACSI (American Customer Satisfaction Index) model (Fornell et al., 1996).

Certain authors (Maričić et al., 2012) state that it is necessary to measure the impact of each variable on the degree of satisfaction with 2-6 findings, and this recommendation was applied in this research where the number of findings ranges from 3 to 5. The degree of agreement with the above findings was marked by respondents using the five-point Likert scale, where score 1 meant "strongly disagree" while score 5 meant "strongly agree". The SPSS package (The Statistical Package for the Social Sciences) was used for processing and

analysis of data collected. Statistical methods used in this study were descriptive statistical analysis, analysis of value of the Cronbach's alpha coefficient, correlation and regression analysis.

The first step included the application of descriptive statistical analysis to the whole sample and calculation of arithmetic mean and standard deviation for each finding. The degree of bank client satisfaction with various elements of electronic banking services was measured in this way, along with the establishment of homogeneity of respondent attitudes. In the next step, the reliability and internal consistency of variables were measured on the basis of Cronbach's alpha coefficient. The degree of mutual dependence of newly formed variables of the model was established via correlation analysis in the third step. The fourth task was related to regression analysis. Simple regression analysis examines the individual impact of each of the dimensions of quality of service on satisfaction. That is, it examines the effect of each independent variable on dependent variables. Multiple regression analysis was applied in order to examine the impact of all the dimensions of quality of electronic banking service on client satisfaction. The multicollinearity problem was examined by measuring the value of VIF (variance inflation factor).

The sample included more female respondents (55.6%) compared to the number of surveyed male respondents (44.4%).

As for age structure, half of the respondents belonged to the 26-35 years of age category (50.9%), followed by respondents aged 36-45 (35.2%). Respondents aged 46-65 amounted to 10.2%, while the smallest number of respondents belonged to the 25 or less years of age category with only 3.7%.

Regarding their qualifications, most respondents were highly educated persons (42.6%), followed by persons with Master's/doctoral degree (25%), then respondents having high school diplomas (23.1%) while the smallest number of respondents had university degrees (9.3%).

**Table 2 Sample structure (n=108)**

<b>Demographic profile</b>	<b>Number of respondents (n)</b>	<b>Percentage (%)</b>
Gender		
Men	48	44,4
Women	60	55,6
Age		
To 25 years	4	3,7
26-35 years	55	50,9
36-45 years	38	35,2
46-65 years	11	10,2
Over 65 years	0	
Professional qualifications		
Primary school	0	0
High school	25	23,1
University degrees	10	9,3
Highly educated	46	42,6
Master's/doctor's degree	27	25,0

*Source:* Authors' calculation

#### **4. Research Results**

The values of arithmetic mean and standard deviation based on 28 selected findings were calculated by applying descriptive statistical analysis. Using the entire sample, the results indicate that respondents are generally moderately satisfied with the quality of electronic banking service.

The most favourable client attitude was expressed for the claim that Internet banking is user friendly (arithmetic mean = 4.47), while the least favourable attitude was expressed in the case of the finding that the application of electronic banking gives an impression that the best things for the client are always the bank's priority (arithmetic mean = 3.30. The lowest degree of disagreement was found with the said claim (standard deviation = 0.618). The highest degree of disagreement was found with the claim that electronic banking provides information on when the service shall be executed (standard deviation = 1.240). Generally speaking, the respondents assessed their attitudes towards the quality of service offers of banks relating to electronic banking in the range between 3.30 do 4.47 (Table 3).

**Table 3 Results of descriptive statistical analysis**

<b>Findings</b>	<b>M</b>	<b>SD</b>
Electronic banking provides information on when the service shall be executed.	3.65	1.240
Employees (customer service) show sincere efforts in solving clients' problems.	3.91	0.892
The bank provides electronic banking services without errors.	4.04	0.906
Electronic banking is precise.	4.32	0.747
Electronic banking gives confidence to clients.	3.75	0.898
Employees (customer service) are never too busy to respond to clients' questions.	3.50	0.859
Employees (customer service) are ready to assist clients at any time.	3.74	0.715
Employees (customer service) have enough knowledge to answer all questions asked by clients.	3.72	0.926
Clients feel safe in relation to all elements of realization of a particular transaction.	3.75	0.948
Data and operations carried out using electronic banking services are confidential.	3.68	1.066
I believe that electronic banking services are secure.	3.82	0.926
There is agility-speed/urgency/resourcefulness in the completion of transactions/queries.	4.11	0.801
Internet banking is user friendly.	4.47	0.618
Internet banking is easy to use.	4.44	0.646
Navigation and management of electronic banking services are easy.	4.35	0.715
Electronic banking services are easily accessible.	4.44	0.777
Electronic banking has convenient working hours-nonstop.	4.44	0.846
Using electronic banking services leaves the impression that the best things for the client are always the bank's priority.	3.30	1.061
Electronic banking website provides up to date information – new/fresh/corrected information.	3.94	0.926
The content of information on electronic banking website meets my needs.	4.10	0.808
Electronic banking website provides reports that meet my needs.	4.13	0.855
Electronic banking website provides enough information.	4.14	0.891
The website contains clear and comprehensive information.	3.96	0.946
Information provided by electronic banking website is helpful.	4.19	0.880



Rate your overall level of satisfaction with electronic banking services.	4.17	0.704
Summing up your overall experience with electronic banking, your general impression is that you are very satisfied with e-banking.	4.07	0.720
Complete electronic banking service is highly above the anticipated one.	3.65	0.868
Imagine an ideal way of functioning of electronic banking. The electronic banking that you use is close to the provision of such a service.	3.82	0.841
<i>M – arithmetic mean; SD – standard deviation</i>		

Source: Authors' calculation

The findings that were used in the questionnaire were grouped into 7 factors.

The first factor *Reliability* includes those findings that reflect the precision of electronic banking service, i.e. execution of transactions without errors, as well as providing information about the time necessary for service rendering. In addition, it includes the finding that is related to the readiness of employees in customer service to resolve clients' problems.

The second factor *Responsibility* is related to client findings that reflect their attitudes towards employees (customer service), which primarily include the readiness of employees to assist clients at any time, answer the clients' questions, and respondents also stated whether the employees have the necessary knowledge to answer all questions and in general to what extent does electronic banking give confidence to clients.

The third factor *Security* takes into account the findings pertaining to security, confidentiality and safety in relation to the implementation of a specific transaction. Also, one of the findings within this factor measures the attitudes of respondents in terms of the speed of transaction execution.

The fourth factor *Ease of use* includes those findings by which respondents express their attitudes as to whether electronic banking is user friendly, to what extent it is easy to use, whether the management of this service is easy and eventually whether electronic banking services are readily available.

The fifth factor is *Empathy* and includes elements related to working hours, attitudes of respondents on whether they believe that the bank operates in the best interest of its clients and whether it provides them with up-to-date information.

The sixth factor entitled *Website content* is associated with findings that respondents used to express their attitudes on the content, scope, clarity and usefulness of information available on the electronic banking website. Also, one

of the findings is linked to the statement on whether the reports provided by the website meet the clients' needs.

The last, seventh factor is *Satisfaction* and includes elements that, based on experience, show the total level of satisfaction, attitudes in relation to expectations and attitude expressed by respondents regarding the ideal electronic banking service.

Checking the internal consistency of claims in the context of new variables, as well as the reliability of newly formed variables is achieved using Cronbach's alpha coefficient. The values of this coefficient obtained in the present research range from 0.718 (empathy) to 0.955 (website content). The high values of this coefficient shown in Table 4 indicate a high degree of factor reliability, and also prove the internal consistency of findings grouped around these seven factors.

**Table 4 Reliability of variables – values of Cronbach's alpha coefficient**

Variables	Cronbach's alpha
Reliability	0,762
Responsibility	0,728
Security	0,848
Ease of use	0,880
Empathy	0,718
Website content	0,955
Satisfaction	0,914

*Source:* Authors' calculation

Correlation analysis results are presented in Table 5. A statistically significant degree of correlation appears among all variables within the model.

The values of Pearson coefficient were used to determine the degree of linear dependence between the model variables. If this coefficient is greater than 0.6 then there is a strong correlation between the variables of the model, if its value is within the range of 0.4 to 0.6, then the correlation is of moderate intensity, and values ranging between 0 and 0.4 indicate a weak correlation between the variables.

**Table 5 Correlation analysis**

Variables	1	2	3	4	5	6	7
Reliability	1	0,694***	0,617***	0,513***	0,163*	0,428***	0,594***
Responsibility	0,694***	1	0,667***	0,563***	0,255***	0,387***	0,636***
Security	0,617***	0,667***	1	0,510***	0,162*	0,284***	0,616***
Ease of use	0,513***	0,563***	0,510***	1	0,276***	0,475***	0,580***
Empathy	0,163*	0,255***	0,162*	0,276***	1	,549***	0,306***
Website content	0,428***	0,387***	0,284***	0,475***	0,549***	1	0,461***
Satisfaction	0,594***	0,636***	0,616***	0,580***	0,306***	0,461***	1

Note:  $p < 0.01$  (\*\*);  $p < 0.1$  (\*);

Source: Authors' calculation

The results of correlation analysis indicate that the greatest degree of correlation is found between reliability and responsibility (0.694) and the lowest between responsibility and empathy (0.255).

Finally, regression analysis was used for the processing of data obtained. Simple regression analysis aims to determine the effect of *one* independent variable on the dependent variable. The results indicate that all independent variables (observed individually) have a significant effect on client satisfaction which the dependent variable. Responsibility has the greatest impact on satisfaction:  $\beta = 0.636$ ,  $t = 8.476$ ,  $p < 0.01$ , while empathy has the smallest impact on satisfaction of clients that use electronic banking:  $\beta = 0.306$ ,  $t = 3.309$ ,  $p < 0.05$ .

**Table 6 Simple regression analysis (Dependent variable: Total satisfaction)**

Variables	$\beta$	t	Sig.	R <sup>2</sup>	F
Reliability	0,594	7,598	0,000**	0,353	57,727
Responsibility	0,636	8,476	0,000**	0,404	71,836
Security	0,616	8,051	0,000**	0,379	64,825
Ease of use	0,580	7,322	0,000**	0,336	53,608
Empathy	0,306	3,309	0,001*	0,094	10,952
Website content	0,461	5,343	0,000**	0,212	28,547

Note:  $p < 0.01$  (\*\*),  $p < 0.05$  (\*)

Source: Authors' calculation

Multiple regression analysis was used to examine the *joint* impact of independent variables on consumer satisfaction, which appeared in the model as a dependent variable. The results of this analysis are presented in Table 7.

The coefficient of determination  $r^2$  is 0.553 which means that 55.3% of variability in client satisfaction is described using independent variables that appear in the model, while the rest of variability is under the influence of other factors.

The results have shown that three variables have a statistically significant impact on client satisfaction: security:  $\beta = 0.257$ ,  $t = 2.711$ ,  $p < 0.01$ ; ease of use:  $\beta = 0.189$ ,  $t = 2.148$ ,  $p < 0.05$  and responsibility:  $\beta = 0.196$ ,  $t = 1.848$ ,  $p < 0.1$ . The reliability, empathy and website content factors showed insignificant impact on satisfaction in their joint effect.

**Table 7 Multiple regression analysis (Dependent variable: Total satisfaction)**

Variables	$\beta$	t	Sig.	VIF
Reliability	0,137	1,358	0,178	2,308
Responsibility	0,196	1,848	0,068*	2,547
Security	0,257	2,711	0,008***	2,039
Ease of use	0,189	2,148	0,034**	1,746
Empathy	0,072	0,889	0,376	1,477
Website content	0,124	1,368	0,174	1,853

Note:  $p < 0.01$  (\*\*);  $p < 0.05$  (\*);  $p < 0.1$  (·);  $R^2 = 0.553$

Source: Authors' calculation

Multicollinearity through VIF factor was tested prior to conducting regression analysis. As these values for all variables range from 1.447 to 2.547, this was actually a sign that performing regression analysis was justified, i.e. that multicollinearity did not represent a serious problem within this study.

## 5. Conclusion

There have been numerous changes observed in the field of banking operations, and special concern is directed towards the sensitivity of bank clients, and thus it is imperative to provide high quality services that will ensure their satisfaction. The aim of this research was to analyse the attitudes of clients regarding the impact of certain dimensions of quality of electronic banking services on satisfaction.

The results obtained by multiple regression analysis have shown that three dimensions of SERVQUAL model (security, ease of use and responsibility)

have a statistically significant impact on satisfaction, while other factors (reliability, empathy and website content) have, in their joint effect, indicated a non-significant impact on satisfaction. These results in some way reflect the profile of an average user of electronic banking in the Republic of Serbia that, despite the progress of technology in the field of data and transaction protection, show a certain amount of skepticism since security is their greatest concern. The results have also shown that it is important to work more actively on the promotion of ease of use.

The contribution of this paper is reflected in the fact that the identification of factors (reliability, empathy, website content) that have not achieved a significant impact in their joint effect on the satisfaction of clients with electronic banking can be a signal for the management of financial institutions to take action in order to reduce the perceived risk, maintain trust, provide training and development of employees, modernize website appearance. Findings about which factor the clients are most dissatisfied with is actually important information for marketers in banking since, based on that, they can create better designed marketing campaigns (Gerrard et al., 2006).

Bank managers may be engaged in other fields by identifying a large number of non-users, i.e. they can plan and implement adequate promotional activities and thus highlight the advantages of electronic banking and persuade non-users that the use of electronic banking is in their interest. This is a difficult but challenging task because it is rather difficult to change habits which influence the clients to still use banking services in a traditional way on a much larger scale.

In the forthcoming period, it would be interesting to explore the attitudes of users in order to learn which characteristics should an ideal system of electronic banking have, and the model that could be applied is pooled analysis. This method is applicable given that it does not consider the impact of one characteristic on the selection, but jointly observes several characteristics at a time.

Practical implications indicate that data obtained provide a framework for improving the promotional strategy, highlighting the factors that respondents marked as dominant (security, ease of use, responsibility).

Eventually, it should be noted that banking institutions should focus on the creation of CRM systems that would be able to combine satisfaction and service characteristics, and thus would secure the return of customers (Liébana et al., 2013). Therefore, it is of utter importance for any bank to retain its clients and their satisfaction (Levesque et al., 1996).

The limitation of this research is related to the selection of the sample. Applicable sample selection was used in this research. In addition, the use of a

larger sample of respondents was suggested in order to obtain more detailed data. Also, this research is limited to data obtained by surveying the clients in one city and therefore these results should not be generalized.

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### **IDENTIFIKACIJA KLJUČNIH DETERMINANTI SATISFAKCIJE KORISNIKA USLUGA ELEKTRONSKOG BANKARSTVA**

Apstrakt: U uslovima pojačane konkurencije, bankarskim institucijama se kao imperativ postavlja fokusiranje na pružanje kvalitetnijih usluga, zadovoljavanje potreba klijenata i prilagođavanje njihovim specifičnim zahtevima jer su to uslovi za postizanje satisfakcije. Satisfakcija posledično deluje na ostvarenje komunikacionih ali i ekonomskih ciljeva poslovanja tržišnih aktera. U skladu sa ovim činjenicama ukazuje se na značaj merenja kvaliteta usluga. U Republici Srbiji poslednjih godina uočava se tendencija povećanja broja klijenata banaka koji koriste uslugu elektronskog bankarstva. Mnogobrojne su prednosti ovog modernog servisa a među najznačajnijim se ističu ušteda vremena, povoljnija cena, komforno i brzo obavljanje transakcije. Svrha rada je da se ispita satisfakcija klijenata uslugom elektronskog bankarstva, odnosno da se dode do saznanja koji elementi kvaliteta usluge imaju uticaj na satisfakciju i da se ispita intenzitet tog uticaja. Kako bi dobili neophodne informacije korišćene su mere deskriptivne statističke analize, analiza pouzdanosti, korelacija i regresiona analiza. Podaci su prikupljeni korišćenjem metode anketiranja, a upitnik koji je distribuiran ispitanicima za potrebe konkretnog istraživanja kreiran je na osnovu ranijih istraživanja u oblasti kvaliteta usluga. Rezultati su pokazali da tri dimenzije modifikovanog SERVQUAL modela (bezbednosti, lakoća korišćenja i odgovornost) imaju statistički značajan uticaj na satisfakciju, dok su ostali faktori (pouzdanost, empatija i sadržaj veb-sajta) u svom zajedničkom dejstvu na satisfakciju pokazali nesignifikantan uticaj. Doprinos rada ogleda se u tome da identifikacija faktora (pouzdanost, empatija, sadržaj veb-sajta) koji u zajedničkom dejstvu nisu ostvarili signifikantan uticaj na satisfakciju klijenata elektronskim bankarstvom može biti signal menadžmentu finansijskih institucija da preduzmu aktivnosti na smanjenju percipiranog rizika, održavanju poverenja, obuke i usavršavanja zaposlenih, modernizaciji izgleda veb-sajta.

Ključne reči: kvalitet usluga, satisfakcija, elektronsko bankarstvo, SERVQUAL model



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