

Position Paper No. 1

PERSPECTIVES OF SERBIA IN THE KNOWLEDGE-BASED ECONOMY

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Perspectives of Serbia in the Knowledge-Based Economy

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I Introduction

At the beginning of the industrial revolution, per capita income of the richest country in the world was 5 times higher than that of the poorest country. Yet, towards the end of the 20th century along with the beginning of the Fourth Industrial Revolution, that ratio increased to 400:1 (Landes, 1998). Thus today a prediction made in the early 19th century by the Swiss economist Sismonde de Sismondi may appear relevant, for his thesis stated that Industrial revolution would mark the beginning of an era in which life as we know it, economy and society will all be changed in unpredictable ways, as well as that it would be impossible to foresee exactly how this change will occur. And he was right. In the last two centuries, the society and economy have changed in a manner that would have been unimaginable to the economists of the early 19th century.

Do we today, in light of the Industrial Revolution 4.0, find ourselves facing a similar crossroad? Are the conditions in which the economic activity takes place, such as global economic interdependence and rapid technological change, bringing about an era in which the means of wealth production, life, and work are all to be dramatically changed? Today, globally speaking, we find ourselves in possession of the most advanced technology in the history of humankind, with great potential for further development. Apart from the most educated workforce in human history, the pace at which knowledge is created has been unprecedented so far: the volume of knowledge doubles itself every five years (Tocan, 2012). World economic integration has never been at a higher level, and the market has never been more accessible and yet more demanding. At the same time, competition has never been sharper, while the interdependence of national economies has become more prominent. Market fragmentation has lost its significance due to globalization, as tightly defined market niches have become global and large enough, making those jobs lucrative and possible that would not be cost-effective at the local, national market due to the lack of demand.

For Serbia as a developing country, and in the context of dynamic technological changes, as well as the globalization of economic flows, several issues stand out as prominent: what are the characteristics of the new economy within 4.0? To what extent are there conditions for its development in a country like Serbia?

These questions will directly determine the future of the economic, as well as social development in Serbia. As a country that is in the process of European integration, the issues raised have become even more essential. The time of change has already begun. Yet the pace of these changes depends, among other things, on the ways in which social and political institutions will adapt to rapid technological advancement.

II What is a Knowledge-Based Economy?

The concept of the *new economy* (Sum & Jessop, 2013) was created within the framework of the evolutionary institutional theory. Yet, the term is widely used as

a synonym for the knowledge-based economy (KBE), knowledge economy, digital economy, and is directly linked to the notion of the Industrial Revolution 4.0. For the purpose of this analysis, we use the knowledge-based economy to indicate to the *new economy* concept as the KBE has rapidly become a popular narrative immersed in the processes of shaping economic strategies and public policies (Leydesdorff, 2006), being led by the pioneering work within the OECD (OECD, 1996).

Shifting the focus to *knowledge* as a factor of economic growth and the key ingredient in creating economic value began with new growth theories. These theories indicate to the importance of human capital, innovation, research and development (R&D), infrastructure development, and the capacity of the society to absorb and use new technologies (Barkhordari, Fattahi & Azims, 2018). In new growth models, knowledge [1] influences economic growth through more efficient methods of production, organization and/or creation of new or improved products and services. Such impact of knowledge on the economic process stimulates additional investment, while additional investment increases the efficiency of the use of technology and generates innovation. This process makes economic growth continuous. Economic growth is further stimulated by the so-called spillover effects that are perpetuated by creation, utilization, and diffusion of knowledge, meaning that firms which interact with the epicenter of knowledge/innovation gain access to knowledge at acceptable, often low cost. Knowledge in such an economy becomes the main engine of economic growth, wealth, innovation and employment in all industries (APEC, 2000; Leadbeater, 1999).

In the new economy, traditional industries, such as railways or agriculture, also become knowledge-based industries. For example, the fast trains of today and those from two-three decades ago appear to be incomparable - from the aspect of the services they provide, the technology they are based on, as well as the knowledge needed to effectively manage them as a business system. According to Buhr (2015), it is estimated that the agricultural and forestry sector in Germany will increase to 15% by 2025 due to the more innovative use of resources and novel business models with a gross added value of almost € 3 billion. As a result, the World Bank points to the new economy, that is, the knowledge-based, as an economy in which the use and utilization of knowledge are applied to a large number of traditional and new economic sectors. The knowledge that is manifested through technology, better processes, and better workforce so becomes the main driver of improving productivity and growth (WB, 2007).

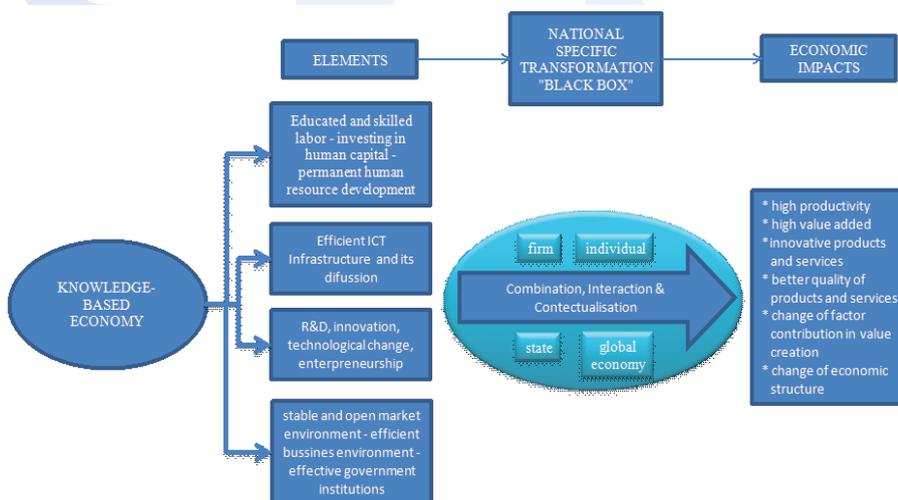
Changes in the new economy are fast and are particularly relevant to the small and medium-sized enterprises since they account for over 99% of the total number of businesses in the majority of both developed and developing countries. In these circumstances, the organization of business activity becomes more time and space flexible, less hierarchical, and more automated. On the other hand, the work processes gain increased transparency, the work performance is more visible, while the control of business processes is decentralized. Thus, small and medium-sized enterprises are seen as entities which will mostly benefit by integrating the above aspects in their business processes.

[1] Investing in knowledge does not only imply the production of new knowledge, but also contextualization, dissemination, and preservation of existing knowledge.

III Main pillars of the new economy

Recently, there have been extracted numerous approaches to the knowledge-based economy. Yet, from the perspective of policy impact, three dominant approaches can be distilled: the World Bank concept (Aubert & Reiffers, 2004; World Bank 2007), APEC's approach (2000) and the OECD's model of KBE (1996). All three concepts contain an (almost) identical pillar structure upon which knowledge-based economy is based, however, the differences appear in the domain of characteristics and coverage of individual structural elements. Key common elements are as follows: 1) educated labor and investment in human capital (First Pillar); 2) efficient and comprehensive ICT infrastructure (Second Pillar); 3) research and development, technological innovations, innovations in business, entrepreneurship (Third Pillar); 4) a stable and open market, a stimulating business environment built upon effective governance and clear rules of the game (Fourth Pillar). On the basis of these elements, Figure 1 is derived aimed at showing the architecture of the new economy.

Figure 1: Knowledge-based economy framework: Elements, processes, impacts



Source : Author

Remaining approaches are rather oriented either to individual/fewer industries or to national/regional context-dependency and coverage, such as the MTC index of innovative economics based on the analysis of financial services, technology, and science (Massachusetts Technology Collaborative, 2017). Moreover, from the available data, it is clear that particular KBE approaches are focused only to the certain elements of a knowledge-based economy and their international coverage, such as for example the European Innovation Index (EU, 2018) that incorporates specific factors and direct indicators of the innovation capacity of European economies. Additionally, the World Bank introduces the Fifth Pillar that includes the intangible social factors, such as the capacity to formulate the vision, level of trust and self-confidence of individuals, including the dominant values immersed in the social relationships (Aubert & Reiffers, 2004).

The **First Pillar** concerns the education and skills of the labor force as the key to the success in the new economy. The knowledge in the context of the new economy is the key prerequisite for economic growth. According to Cader (2008), the economies that more efficiently use existing knowledge while simultaneously generating new knowledge have a comparative advantage to those who do not use opportunities based on the use of existing and new knowledge.

Thus, the key to the new economy is the quality and availability of human resources, that is, highly educated labor force. Apart from knowledge acquired through formal education, non-formal education represents a valuable resource, such as for example in-job training and learning-by-doing (Dämon, 2017). In addition to quality, it is necessary for human resources to be entrepreneurial, adaptable, capable of working in decentralized structures, and motivated to learn. Furthermore, the connections and interactions between educated individuals and providers and consumers of new knowledge, that is, the economy, state, and society are of decisive importance in creating value. This particularly applies to the fields of technology, science, and medicine, including the domain of social sciences that enquire the place and the state of the social skills needed in the context of the new economy. Production and business exchange are always taking place in a social setting in which social skills are important and at a price. In this environment, companies also become an important player in generating and creating practical know-how with a commercial purpose.

The **Second Pillar** represents information and communication technologies (ICT), that is, ICT infrastructure and the level of ICT diffusion in society. These enable the efficient exchange of knowledge and information, their rapid use and application in the economy, and therefore increase productivity, innovation, and quality of products and services. The use of ICT drastically reduces the costs of collecting, processing and distributing information, leading to an accelerated process of generating new knowledge. In this sense, the new technologies attract business activity by reducing transport and manufacturing costs, as well as by facilitating easier market access (Barkhordari, Fattahi, & Azimi, 2018). The contribution of ICT to the businesses' revenue growth and returns is most dynamic in the sphere of IT industry, the spot ICT application is central to the business processes, and notably in the field of electronics, high technology, and automated production (Buhr, 2015). It appears that ICT will not eventually grow to be less crucial for the development, as the ICT-based technologies are becoming better, faster, cheaper and easier to use, introducing new applications on a regular and broad basis (Atkinson & Andes, 2008). According to experts, traditional sectors characterized by low or medium technological level can also benefit significantly from some of the segments associated with new technologies. For example, advanced materials and manufacturing technologies can have a particularly strong impact on the growth of the business performance of enterprises within the lower and middle technology sectors (European Commission, 2018).

The **Third KBE Pillar** focuses on research and development (R&D), technological innovation, and innovation in business and entrepreneurship. The innovation support system, the R&D, as well as the degree to which entrepreneurship is developed, integrally determine the potential for dynamic economic growth in the national economy. National innovation systems that include networks of companies, research centers, universities, and research consultants are tasked with

keeping the pace with new knowledge and technologies, linking to the global knowledge flows, their adoption, and adaptation to local conditions and local needs (World Bank, 2007).

The innovation system refers to the ability of all economic sectors and organizations to learn, adapt and change. In the economic sense, the national innovation system is the basis for generating new products and services. This is what creates the knowledge needed to redesign business processes with the aim of achieving more efficient production (Atkinson & Andes, 2008), including product differentiation through innovative design, effective marketing and efficient distribution (Chen & Dahlman, 2005).

Besides, the entrepreneurship backed by the created knowledge and science development is among the key features of the new economy (Atkinson & Andes, 2008). Its key role is reflected in the successful transformation of knowledge into a product and object of business transactions, as globalization led by the new technology has made production faster, more flexible and geographically dispersed, while smaller production series are feasible and economical. The majority of the discussed features of the new economy are most visible in the ICT industry. This economic sector shows the highest productivity and innovation results which stem from a high level of investment in innovation, intensive use and experimentation with new technologies, including a highly educated workforce and application of innovative business models.

The stable and open market, a stimulating business environment based on efficient administration and policy are central to the **Fourth Pillar** of the new economy. The creation of sufficient and useful knowledge is only probable in an efficient institutional, regulatory and macroeconomic context. The role of institutions is thus to accelerate the flow of information while protecting the individual and organizational intellectual rights. An efficient system of rules in the field of governance, financial system, labor market, trade, and macroeconomic framework is a decisive prerequisite for transforming knowledge into a standard market transaction object. Therefore, the essence of public policies is to stimulate the accumulation of human capital, stimulate knowledge distribution and create conditions for companies to undertake organizational changes in order to draw maximum benefits from the use of new technologies (OECD, 1996).

Although each KBE pillar has its own particular role in creating economic value, they show a high level of mutual complementary. For example, ICT is inextricably linked to the quality of human resources, as the use of the Internet and computers in the educational process increases the quality of educational output. On the other hand, firms are expected to invest in employee training when technology develops in order to remain competitive (Dahlman & Utz, 2005). Moreover, increased human capital that is focal to KBE goes hand in hand with the evolving trend of new technologies based on the new knowledge and skills leading to further development via investment in innovation endeavors. This is particularly imminent to the context of the higher education system whose role is to, amongst others, contribute to scientific and economic development by generating a set of

innovations. Finally, the full effects of ICT, as with other technologies that profoundly influence economic processes, can be expected only once organizational and social adaptations had happened, that is, when the adjustments in regulatory and institutional frameworks are made.

IV EU and Serbia in the New Economy: Trends and Status

Knowledge-based economy has been at the heart of Europe's development strategy since 2000. Facing the great changes brought by globalization, the aging of the population, the challenges of the new knowledge-based economy and competition in America and Asia, as well as the expected accession of new members, the EU has defined its goals and instruments to ensure competitiveness in changing conditions and improve the standard of its citizens. A key component of the Lisbon Treaty (2000-2010) was the development and advancement of knowledge that implied greater investment in education and professional development, scientific and technological research, and innovation.

The EU's strategic goals set in 2000 have been re-established in a new European Commission document "Europe 2020: a strategy for smart, sustainable and inclusive growth" for the period 2010-2020. An economy based on knowledge and innovation, the so-called Smart Growth (which promotes scientific and technological research and development, innovation, education, and digital society) is among the three main interconnected priorities of the Europe 2020 Strategy. This goal is related to sustainable growth (fostering competitiveness and more resource-efficient production) and inclusive growth (increased participation in the labor market, combating poverty and enhancing social cohesion).

Thus, in the past decade work continues on the task of making the common European economic space "the most competitive and most dynamic in the world, based on knowledge, which will generate sustainable economic growth with a greater number of better jobs and greater social cohesion" (European Commission, 2002). This appears to be the direction in which the more recent strategic documents move, such as the EU 2020 Strategy. The emphasis in 2020 Strategy is on wider human capital expansion (the number of people with tertiary education aged 30-34 should be at least 40% by 2020), including technological development in the domain of cleaner technologies to combat climate change. The latter should enhance the development of new sectors and consequently the expansion of the labor market, including the intensification of R&D, which should increase to at least 3% of GDP (European Commission, 2010). Similarly, the new industrial policy strategy, adopted in 2017, should enable the development of a smart, innovative and sustainable industry (European Commission, 2017).

Such orientation of the EU is equally important for the countries that gravitate to it in the process of European integration. Serbia had formally proclaimed the movement of its economy towards the knowledge-based economy in the Sustainable Development Strategy of the Republic of Serbia from 2008 (Government of the Republic of Serbia, 2008). Later sectoral and specific strategies, such as the Strategy and Policy of the Industry Development of the Republic of Serbia (Government of the Republic of Serbia, 2011), the Strategy on Development of

Information Technology Industry for the period 2017-2020 (Government of the Republic of Serbia, 2016a), the Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2016-2020 - Innovation Research (Government of the Republic of Serbia, 2016b), Trade Development Strategy (Government of the Republic of Serbia, 2016c), or Strategy on Development of New Generation Networks (Government of the Republic of Serbia, 2018), also affirmed commitment to an economic model based on knowledge.

V KBE in a Comparative Perspective: Serbia, Old and New EU Countries

How exactly Serbia is positioned in the field of new economy comparing to the new and old EU members? When observing through the main four pillars of KBE, discussed above, including trends in the period 2011-2017, Figure 2 shows that all selected countries show a general capacity increase, including Serbia. Still, it perceptible that certain segments of the new economy display a slight decline. Stagnation in some of the aspects also implies relative lagging, because those economies that failed to improve certain KBE domains or managed to only slightly improve them, even with good values, show deterioration of the relative position.

Figure 2 and the below analysis (unless differently stated) are based on the data available from the 2012 and 2018 Global Competitiveness Report. [2] It shows four (sub)indices [3] of global competitiveness [4] out of twelve, which constitute an integral index of the global competitiveness of a national economy. These indices largely converge with the KBE pillars represented in Figure 1. Namely, since there are no indicators that fully correspond to the theoretically constructed KBE concept, the four observed indices from the aforementioned Global Competitiveness Reports are indicative and credible values that correspond to (theoretical) elements of the KBE. The hypothetical values of each of these four indices range from 1 to 7, yet in practice, no country in any segment reaches a maximum value. [5] Since this is a composite index, i.e. indices composed of a large number of individual sub-indices, [6] all specific, individual values of some indices that are not visible in synthetic indices of the quality of institutions, higher education, ICT and their diffusion and quality of the innovation system, and which are referred to below, regard the data from the aforementioned reports on global competitiveness.

In the domain of the **First Pillar** which focuses on higher education and training, all selected countries show progress. The old EU member states achieved major development, which is, on the other hand, rooted in the well-developed base and already high values reached in this particular domain. Their success could be explained in several ways. It is a consequence of significant investment, deeper institutional changes, or of their already high level of education that allows for faster further progress. Nonetheless, it is certainly a product of the simultaneous action of all the above factors including others that are not encompassed by this analysis.

[2] Reports, in fact, measure the competitiveness of the observed economies in 2011 and 2017.

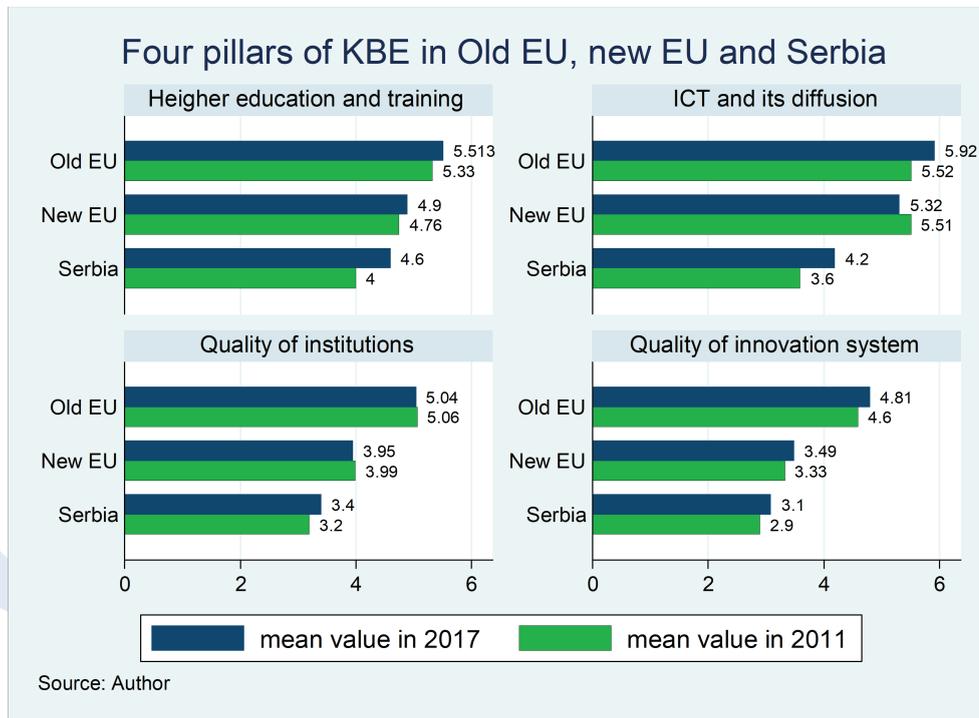
[3] In the Global Competitiveness Reports, these (sub) indices are also called the pillars on which the competitiveness of the national economy rests.

[4] These four indexes, presented in the Figure 2, are somewhat renamed. Namely, only the index of higher education and training corresponds fully to the terminology in the abovementioned reports. The index of ICT and its diffusion is referred to in the reports as the technological readiness index, the index of quality of institutions by the index of institutions, while the innovation quality index is simply labeled as innovation.

[5] This could partly be explained by the fact that these are subjective indexes, meaning they are predominantly constructed on the basis of expert opinions. On the other hand, the continuous flow of change in all segments (education, institutions, ICT, innovation system) suggests that there is always a need and opportunity for improvement, whereby each country individually always stays far from the limit (maximum) values.

[6] The higher education and training index contains 8 sub-indices; the institution's quality index contains 21 sub-indices; the ICT index and its diffusion contains 7 sub-indices; the innovation system quality index contains 7 sub-indices.

Figure 2: Four pillars of KBE in old EU member states, new EU member states, and Serbia



When it comes to the new EU Member States, it is evident that they show high total values in the domain of the First KBE Pillar, yet they slightly lag behind the old EU members' states group. This may be a result of a slowdown of the reforms in the field of higher education, insufficiently effective public policies whose implementation should stimulate investment in additional training for the workforce, or a consequence of a financial misuse, or gaps in the financing of higher education. However, when examining individual levels of the new EU members it is evident that some states not only show values higher than average in this group of countries (Slovenia, Estonia) but are ranked higher in this domain than a number of old member countries (Spain, Portugal, Greece, Luxembourg, Italy). Furthermore, when observed individually and in the context of relative positions, in the group of new member states (NMS), Slovakia fell by 9 and Romania by 15 places, although their quality of education and training remained at the same level as seven years ago. Although Croatia and Poland have slightly improved quality in this segment, these two countries fell by 4 and 9 places respectively. These results are reflecting keen competition on the global level as well as indirectly indicating to the utter significance which well-educated and well-trained labor have for a more dynamic economic activity.

In the field of higher education and workforce training, Serbia has made major improvements and is closest to the average of both new and old EU member states. An improvement of 15% in the period 2011 to 2017 corresponds to the progress achieved only by Ireland in the same period. Results in this domain are show higher values comparing to those in Hungary, Romania, Croatia, and Slovakia, and are at the same level as in Bulgaria, and being close to those achieved in Luxembourg. In this segment, the quality of science and mathematics shows as particularly high, being equalized with Israel. The latter indicator shows higher

values for Serbia compared to 16 other new and old EU member states. In 2017, Serbia was ranked twice as better than in 2011 (29th place versus 58th).

However, a number of other indicators point to the problems that exist in this domain, especially when it comes to the quality of the overall education system, the quality of business schools, access to the Internet in schools, etc. Likewise, it is a worryingly reckless condition in the domain of the degree of availability of training for the employed workforce, despite the fact that the value of the sub-index that measures investments in employee training revolves around 2.9 to 3.4.

The trend towards improvement of all elements in this segment of KBE is present, but there is obviously a huge backlog of obstacles on the way to a more significant approximation to the average values of new and old EU member states. The intensification of convergence would require greater investment, as well as a redesign of the institutional frameworks governing the field of higher education.

In the field of the **Second Pillar** that refers to the information and communication technologies (ICT) and their application, the progress is uneven. While the old EU members continue with the ICT expansion trend, the new EU member states show on average a decline in this KBE segment. In order to be understood these developments can be clarified by the very nature of the elements that make up this pillar/index. Namely, feeble growth may result from the lack of adequate capacities in the domain of human capital that would absorb the latest technologies, including the lack of capital to boost the introduction of new technologies, whereby the old technologies would be fully utilized or amortized.

When it comes to Serbia, technological readiness to adopt new ICT technologies represents, by all accounts, the major challenge. Serbia is significantly lagging behind even its first neighboring country, Romania, whilst the gap between the founding core of the EU and Serbia will hardly be significantly reduced in the near future. If Serbia would continue to overcome its backlog in relation to old EU member states at the average annual rate it has followed for the past six years, and that is under the assumption that the member states remain at the current value of the ICT index (which is also an unrealistic assumption), Serbia would converge the value of ICT in the old EU member states from 2017 in 17 years.

With almost a fifth of the population having access to fixed broadband internet and 67.4% of those with mobile broadband, in these two domains, compared to other aspects that measure the technological capacity of the country, Serbia is top ranked. In addition, over the past 7 years, the number of broadband users has increased by more than half a million, to almost 1.5 million subscriptions. However, in relative terms, Serbia is positioned below new/old EU members' average values, as Figure 2 shows.

At the company level, a set of issues are notable in the sphere of ICT and the diffusion of new technologies. In particular, issues are notable in relation to technology assimilation, technology transfer over FDI and, to a great extent, Internet bandwidth. The absorption of the latest technologies by firms is very limited. On the one hand, the set of reasons for such a result may be found in the lack of

recognition of the significance of new technology for improving business results. On the other hand, there is a lack of adequate competitive pressures that would force companies to invest in new technologies. Yet the assimilation of new technologies might be perceived as another barrier to the solution of a number of existing issues in the context of numerous, and already existing issues in various business segments in Serbia. This is mainly due to additional investments in the new technology, including the investment in workforce training or redesign of business processes. The question remains to what extent FDI contribute to the transfer of new technologies to Serbia. In total, such a setting induces risks of Serbia's low ranking on a "value-adding curve," ensuing in use of cheap labor to add value to the global production chain, while high-value business operations remain outside of Serbia.

However, ICT and investment in information and communication infrastructure are not necessarily central to inclining enterprise performance. This is notably true for situations in which there is a lack of sufficiently educated and trained workforce, as well as appropriate organizational and management structures (Åsgeirsdoóttir, 2006). These are at the same time some of the main challenges that Serbia faces within the auspices of the new economy.

The **Third Pillar** of the KBE, which focuses on research and development, technological innovation, business innovation, and entrepreneurship, shows dynamic variations in all observed countries. As mentioned earlier, the innovation support system, the R&D, and entrepreneurship development integrally determine the potential for dynamic economic growth in the national economy.

When scrutinizing the distances from the maximum value, this pillar represents the most challenging segment for the old and new EU member states. In particular, the progress of the value of this index in the previous six-year period for the old EU member states (0.21) is slightly amplified compared to the new ones (0.16), including slight divergence. If we translate the pace of progress in this segment into years, new member states will need on average more than 4 years to achieve the quality of the innovative system of old EU countries registered in 2011. This can be an additional barrier to the more dynamic development of these economies in the coming period. Nonetheless, the progress that has been achieved by both new and old member states can be interpreted as a result of tighter competition between countries, but also, no less significantly, greater interdependence across the common European market.

In the Serbian context, the progress has been made across the elements of the Third KBE Pillar too. According to available data, Serbia's progress (0.2) over the past seven years has been almost identical to the progress made in the old EU member states. Consequently, the gap between Serbia and the new member states has decreased, since they, as it has been previously indicated, have shown less progressive development across the elements of this particular KBE pillar. While in 2011 there were no significant differences across this KBE pillar between Serbia and the other selected countries, the values for 2017 show that Serbia was ahead of Croatia, at the same level with Romania, and only slightly behind Lithuania, Bulgaria, Slovakia, and Greece. Still, according to the values of this parameter, all selected countries show significant distance from the ideal

values, indicating to the bulk of challenges these countries are encountering in their efforts to building a system that allows a dynamic process of creating new knowledge and innovation.

In particular segments, Serbia has better results than most new member states, as is the case with the quality of scientific research institutions. The data shows that Serbia is far ahead in a registered number of PCT patents per million inhabitants (ranked 50th globally) despite the fact that the great majority of EU economies display better economic characteristics comparing to Serbian economy. Yet, the comparative advantage of Serbia in this segment is undermined by the slow development pace and fable initial values, particularly when compared to the values achieved by the old member states. On the other hand, the relative distance from the maximum values shown across selected countries (mainly the new member states), including the progress countries achieved over the past six years, still allows for Serbia to remain competitive in this segment of KBE.

If the innovation capacity of Serbia and other selected countries is observed through the achieved level of economic development, that is, the GDP per capita, the existing capacities of the innovation system in Serbia are fairly developed. On the other hand, a whole set of issues remains unaddressed and pending: state procurement of new technologies, availability of scientists and engineers, and particularly investment in R&D by companies. Generally, the aggregate level of R&D expenditures, which refers to total public and private sector investments in Serbia, is quite low - only 0.9% in the last year (2015), for which the data is available (World Bank, 2018).

As for the **Fourth Pillar**, or the quality of institutions and the institutional frameworks, a hysteresis can be spotted. In other words, there appears to be almost no change. In the old and new EU member states, the institutional frameworks on average experienced slight index values decrease, 0.02 and 0.04, respectively. Essentially, this effect can be neglected, even though particular experiences are quite different. Namely, the biggest contribution to the fall in the index values of the old member states is the worsening of the institutional environment in Sweden (a decline from 6.1 to 5.6) and Denmark (fall from 5.9 to 5.5), but their values remain well above the average for the old member states. A similar conclusion could be made for the new EU member states. While countries with weaker institutional frameworks, such as Bulgaria and Romania, make progress (of 0.2, which is the same as in the case of Serbia), countries that were previously more progressive mostly report stagnation or even a downturn of this pillar. The worst deterioration in the institutional environment in the group of new member states was recorded by Cyprus (0.6), Poland (0.4) and Hungary (0.3), while the Czech Republic achieved an impressive improvement of 0.6 units, reaching the value of the institution's quality index of 4.2 (significantly higher index value comparing to Italy and Greece, and equivalent to Spain and Portugal).

In Serbia, although the quality of the institutional framework has improved, it still represents the greatest challenge in overcoming pitfalls in establishing the principles of the new economy. This is manifested through significant resistance to improving trends of institutional frameworks, due to, amongst others, close interdependency of institutional development and the political climate including the

interests of international and national economic and political actors that tend to further undermine the prospects for development of this crucial KBE pillar. Despite the relative progress in this domain between 2011 and 2017 manifested by the increase of index values from 3.2 to 3.4 (see Figure 2), including the positive trend in the global ranking (from place 121 to 104), Serbia is still at the bottom of the list among selected countries. However, a number of countries are only slightly better, like Bulgaria, Croatia, Slovakia, Romania, and Italy. The segment in which Serbia has achieved convincingly the best results of institutional quality concerns the efficiency of public spending - among the new EU member states only Cyprus shows better results, while countries like France or Belgium are positioned lower on the list in this segment.

Besides, the functioning of state institutions notably in relation to tax policy, political instability, and widespread corruption, is identified as the most problematic factor for doing business in Serbia.

VI Conclusions and Further Steps

With almost a decade of delay, Serbia has joined European efforts to build the preconditions for the transition to the knowledge-based economy and in this manner respond to the challenges brought about by dynamic technological changes and the globalization of economic flows. This process has proved to be extremely complex since it coincided with the onset of the global financial crisis that left severe consequences in Serbia and only deepened the already existing problems such as the inefficiency of the economy, high unemployment, and incompatibility of the education system with the needs of the market.

In spite of an exceptionally slow 10-year economic growth and delayed construction of new economic structures (in both traditional and new sectors), according to the indicators of the four pillars, Serbia has nonetheless made substantial progress in some of the sub-segments. This progress, however, has shown to be uneven and restricted, and the convergence within and among the pillars appears to be lacking.

In Pillar 1 (education), Serbia needs a fundamental reform that would increase the quality of the education system, as well as introduce a more comprehensively designed training system for the workforce. In order to navigate the transition to the knowledge-based economy, it is necessary to establish a partnership between the economy and society. Making the information about the developments in the labor market available to the education system is an indispensable precondition for the creation of an adequate education system that would nourish those skills which are in demand. Thereby skill development strategies should be adapted to the development of different sectors of the economy. Skills considered essential for building the knowledge-based economy are language skills, entrepreneurship, STEM skills including artistic skills, creativity, problem-solving, as well as digital skills and ethics. *Only under the condition of uniform progress in the field of both education and workforce training would it be possible to establish and strengthen the connections and interactions between educated individuals and the economy.* This appears to be of crucial importance for creating value in the knowledge-based economy, since knowledge in the form

of new technologies, better production, and management processes, as well as more qualified workforce, becomes the main driver of productivity and growth improvement.

In order to harness the potential of the growing ICT sector, as well as the potential of its good access to fixed and mobile broadband internet, Serbia must significantly improve the level of technology absorption at the company level. In order to make progress in Pillar 2, which includes an efficient and comprehensive ICT infrastructure, a series of tax and other incentives should be introduced to enable companies to recognize new technologies as an important instrument for improving business results. One of the prerequisites for implementing these technologies is the adequate availability of an educated and trained workforce, and appropriate organizational and management structures capable of adopting and implementing new business models introduced by the knowledge-based economy.

For an efficient exchange of knowledge and information, as well as their rapid use and application in the economy with the aim of achieving productivity growth, increased use of innovations, and a faster improvement of the quality of products and services, *it is necessary to enhance the use of the existing capacities of the innovation system (Pillar 3) by significantly increasing the volume of state procurement of advanced technologies, as well as increasing the investment of companies in R&D.* Some steps towards the latter have already been made at the end of this year. [7]

Even though some improvement of the quality of the institutional environment is notable, Serbia still needs to make significant efforts in order to build a stable and open market, a stimulating business environment based on efficient administration and clear rules of the game (Pillar 4).

Revolution 4.0 has made all countries, both developed and developing, face the same question: in conditions of high global economic interdependence and strongly influential technological changes, how are we to tailor the ways of producing wealth, while preserving the good quality of life and ensuring dignified working conditions for the citizens?

For Serbia as a developing country, this task appears to be particularly challenging since its existing structure of the economy dominated by the production of goods and services of low added value should transform and utilize the knowledge potential, innovative capacities and digital infrastructure in order to build an economy dominated by business operations with high-added value.

Although progress is measured in several elements of each segment of the KBE, the gap is still notable in relation to the old and new EU member states. Enhancing convergence in all segments of the KBE requires greater investment, redesign of the overall institutional framework, and involvement of a wider range of participants into these processes, participants from the education sector, business sector, and the civil society sector.

[7] Law on Amendments to the Law on Corporate Income Tax (Official Gazette of the Republic of Serbia, No. 95/2018).

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