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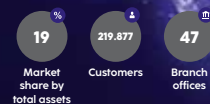
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In the last two years, nothing has changed the global economic landscape more than the climate emergency, the COVID-19 roller coaster, and related geopolitical winds. There is not much time to respond to key risk stressors from the related chain of trends surrounded by exponentialities. The planet is warming, health is being destroyed and geopolitics dominates economic calculus, while the economic system lets that happen. Humanity has less than a decade left until climate change becomes irreversible. A response should be prompt and comprehensive. It requires more radical ideas, such as a paradigm change in economics, both macro and micro. The aforementioned means putting in place a new nexus of economics rules. This issue of *EP* is dedicated to the emerging contours of the circular model of growth and heterodox economic policy platform from the perspective of Serbia in order to make it ready for the transition toward a climate-minded and health-minded economy.

The introductory paper prepared by a duo of authors, *D. Đuričin* and *I. Vuksanović Herceg*, is devoted to the impact of context change in the case of a small, landlocked, open and low-income economy such as Serbia. The general conclusion is that the "green transition" through industrial policies and impact investment could be a historic opportunity for the economy to recover after the pandemic turns into an endemic.

The adoption of new economics rules triggers a lot of changes in core (monetary and fiscal) and structural policies. Consequently, there are two sorts of papers. The first one focuses on macroeconomics and core policies. This part begins with the contribution of *J. Tabaković*, the Governor of the NBS, providing a clear answer to the question where Serbia stands in the inflation landscape, continues with the contribution of a duo of authors, *M. Kovačević* and *M. Stevović*, who further develop the story about macroeconomic indicators, definitely replacing widespread guesswork inspired by ideological predilections with a fact-based discussion, and closes with the paper written by *S. Aranđelovic*, dedicated to the tax policy adjustments.

The second block contains the papers that discuss structural policies as a manifestation of the reversibility principle in defining the circular model of growth and heterodox economic policy platform. The things do not look so pretty, as you will see after reading the paper prepared by a quartet of authors, *J. Lazarević*, *N. Savić*, *A. Petrov* and *E. Marinković,* examining the relationship between talents and innovations. The next paper, authored by *S. Kisić*, focuses on a closely related topic, entrepreneurship education. The author is trying to determine how deep and radical changes affect skill set development. A duo of authors, *A. Vučković* and *G. Pitić,* have explained how innovative amalgams of frontier technologies can contribute to energy efficiency by reducing energy consumption by up to 50%. A multidisciplinary team of authors, including *S. Vuković*, *M. Topalović*, *D. Lazović* and *D. Lončar,* has presented a comprehensive empirical test addressing the COVID-19 pandemic as a macroeconomic variable. At the end, a trio of authors, *G. Petković*, *R. Pindžo* and *A. Bradić Marinković*, have observed and consulted visitors to gain a valuable insight for their endeavor to develop the tourism strategy.

One of the pleasures of reading both segments of this issue is a chance to learn from people who undertake extraordinary original research with the aim of creating a self-perpetuating cycle of sustainable and inclusive growth, both toward people and nature.

Prof. Dragan Đuričin, Editor in Chief

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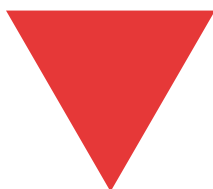
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ENVISIONING A NEW ECONOMIC SYSTEM AFTER THE TRANSITION FROM PANDEMIC TO ENDEMIC: SERBIA'S PERSPECTIVE

Vizija novog ekonomskog sistema posle prelaska pandemije u endemiju iz perspektive Srbije

Abstract

In the last two and a half centuries, industrialization, propelled by a catalytic impact of free-market capitalism, has been contributing to prosperity and breaking the limits beyond all imagination that during the history inhibited the development of human potential. Unfortunately, neoliberal capitalism, as the last and most extreme variant of free-market capitalism, has shown some hidden fractures. After the Great Recession of 2008, the problems due to inbuilt fault lines and misconceptions erupted to the surface. Over the last two years, marked by the COVID-19 pandemic, the world economy has been passing through a complex crisis, a crisis within the spectrum of crises. Again, the flip side of a major success proved to be a major failure. The new virus simply magnified and accelerated doom and gloom in the economic system. The major strategic shifts such as climate crisis, structural crisis of capitalism, microbe mutations and superinfections, and, particularly, the Fourth Industrial Revolution, have contributed jointly to the disruption of incumbents in business, regulatory settings and society as a whole. Exponential change is the New Normal. The economic system is simply surrounded with exponentiality. Neoliberal capitalism has definitely hurt sustainability, along with renewability and inclusivity, of the global economic system and the entire planet. In a time of the explosion of systemic, climate and biological risks, a delicate and subtle issue has emerged as to how to adjust the existing system to exponential change conceptually, financially and operationally. In fact, the current economic system is not able to adequately respond to exponential challenges by transforming threats into opportunities. In times of the climate crisis, the pandemic is just the tip of the iceberg which, by the way, is melting away. The COVID-19 is not a perpetual virus. Someday the pandemic will end. In fact, the transition from pandemic to endemic is imminent. Accordingly, in the post-pandemic world key performance will be the capacity of a new economic system to respond positively to ever-increasing old challenges, in particular to the climate emergency and related issues. So, the green transition is an imperative of modern Economics. At the start of the pandemic, most governments relied on expansionary monetary and fiscal policies with the aim of relaxing the "fear of fear" (unspent savings and pent-up demand). During the crisis money pumping was about US$ 13 trillion on a global level. The continuation of this policy has pushed the world economy into an unstable mode because it leads to an increase in aggregate demand that largely exceeds the supply level, drives wage-price spirals and deepens other structural imbalances. In the context of extremely low or even negative interest rates, economic agents take an extra high credit risk and the state takes an unmanageable sovereign risk. Consequently, today's debt in many core economies is substantially higher than in any previous stagflation episode. When the inflation risk premium pushes interest rate hikes, public and private agents with an increasing debt burden and lower earnings face insolvency threat due to such a hawkish turn. Among many negative scenarios, overheating and stagflation followed by growing indebtedness are the most dangerous outcomes. Given today's ultra-loose and even costly anti-crisis core economic policies, the confidence in the "invisible hand" of the market and unconventional and experimental economic policies, praised by mainstream economists as a panacea for all imbalances, has definitely disappeared and may be easily turned into a pipe dream everywhere. There is not much time to respond to the New Normal. Humanity has less than a decade left until climate change becomes irreversible. The response should be prompt, comprehensive and compatible with exponential change. So, mitigation of a complex crisis requires the consideration of more radical ideas. Without a paradigm change, the economy will not be able to resolve the current crisis and work in a sustainable and inclusive way for the sake of people and nature in a rapidly changing context of the New Normal. Every crisis is a catalyst for change. To reimagine the economy, apart from the shift

to the circular model of growth and heterodox economic policy platform, public governance must change, too. Moreover, to take advantage of the leading trends, the economic system must follow substantially different economics rules in many fundamental aspects. In an emerging system, the government and basic economic agents will work symbiotically with the aim of serving nature and human needs through industrial policies and impact investments, devoting concerted efforts to coordination and fostering experimentation on all levels. Automatic macroeconomic stabilizers will play the role of a liaison between structural and core economic policies by maintaining a sustainable balance between private and public sectors. In Industry 4.0, governance should also respect the sustainable development goals, as well as environmental, social and governance metrics arising from mission-oriented governance or Governance 4.0. The aforementioned does not mean that after the paradigm change we will have a new precisely defined blueprint that will tell us in detail what to do. Economics is not big science, but a social or contextual science. In the age of Industry 4.0 characterized by endless innovative amalgams arising from the intersection of breakthroughs in AI, robotics, and life science, Economics can treat the economic system only as a nonlinear one. So, what the paradigm shift brings to the emerging contours of new Economics is not a new theory, but the nexus of new rules we can follow in the context of exponential change. The purpose of this paper is not to endorse, but to discuss the subject from the title with a special focus on Serbia. Our intention is just to provide the overview of emerging intellectual trajectories relevant to the current crisis mitigation and to sketch out the nexus of economics rules that will pave the way for a resilient, sustainable and inclusive economy. A common concern is related to the circular economy growth model and heterodox economic policy platform because both elements are able to address the key pressing issues in times of exponential change. Bearing in mind that Serbia does not have a significant fiscal space or fully convertible currency, on the one hand, and the lack of retained earnings in the private sector and value-subtracted public sector, on the other, the key issue for Serbia's future strategy is going to be fixing the green transition finance. The paper is structured in four parts, except Introduction and Conclusion. In the first part we review the neoliberal economics rules and associated policies as well as the unconventional policies that were intended to address the challenges brought by the Great Recession of 2008. In the second part we point to the fallacies and contradictions of the experimental policies measures implemented during the COVID-19 crisis and call for a turnaround in the economic system. The contours of a new economic system based on a completely different nexus of economics rules and policies arising from the circular economy growth model and heterodox economic policy platform are described in the third part. Finally, in the fourth part we portray the key macroeconomic trends in Serbia's economy in 2021 and identify the areas that need restructuring in order to be ready for a transition toward a climate-minded and health-minded economy.

Keywords: *Serbia, exponentiality, COVID-19 crisis, economic crisis, climate crisis, biological crisis, green transition, industrial policies, impact investments, automatic macroeconomic stabilizers*

Sažetak

U poslednja dva i po veka industrijalizacija, podržana katalizatorskim dejstvom tržišnog kapitalizma, kontinuirano je doprinosila prosperitetu koji je omogućio da se prevaziđu ograničenja koja su u prethodnoj istoriji sputavala razvoj ljudskih potencijala. Nažalost, neoliberalni kapitalizam, kao poslednja i ekstremna varijanta tržišnog kapitalizma, ispoljio je određene skrivene pukotine. Posle Velike recesije iz 2008, problemi sistema zbog imanentnih previda i pogrešnih koncepcija eruptirali su na površinu. U poslednje dve godine, označene kao pandemija kovida 19, svetska ekonomija prolazi kroz kompleksnu krizu, krizu u spektru kriza. Ponovo se pokazalo da lice velikog uspeha može biti naličje velikog neuspeha. Novi virus je jednostavno uvećao i ubrzao propadanje i uništavanje ekonomskog sistema. Glavne strategijske promene u sadejstvu kao što su klimatska kriza, strukturna kriza kapitalizma, mutacije mikroba i superinfekcije, a posebno četvrta industrijska revolucija, doprinose disrupciji postojećih subjekata u biznisu, regulatornog okvira i društva u celini. Eksponencijalna promena je nova normalnost. Eksponencijalnost okružuje ekonomski sistem. Neoliberalni kapitalizam je definitivno doprineo uništenju održivosti, obnovljivosti i inkluzivnosti globalnog ekonomskog sistema i planete u celini. U periodu povećanja sistemskog, klimatskog i biološkog rizika, pojavljuju se delikatni i osetljivi problemi u vezi sa tim kako prilagoditi postojeći sistem eksponencijalnim promenama konceptualno, finansijski i operativno. Činjenica je da postojeći sistem nije u stanju da adekvatno odgovori na izazove eksponencijalnosti pretvaranjem pretnji u mogućnosti. U vreme klimatske krize, pandemija je samo vrh ledenog brega koji je, uzgred budi rečeno, izložen procesu otopljavanja. Kovid 19 nije večni virus. Jednog dana pandemija će prestati. Naime, prelazak pandemije u endemiju je neminovan. Posledično, u svetu posle pandemije ključna performansa će biti kapacitet novog ekonomskog sistema da pozitivno odgovori na stare izazove koji su se u međuvremenu intenzivirali, a posebno na klimatske promene i povezana pitanja. Dakle, transformacija prema zelenoj ekonomiji je imperativ moderne ekonomske teorije. Na startu pandemije većina vlada je bazirala svoj odgovor na ekspanzivnim monetarnim i fiskalnim politikama sa ciljem da umanje „strah od straha" (neupotrebljena štednja i odložena tražnja). Tokom krize upumpani novac u sistem dostigao je oko USD 13 hiljada milijardi na globalnom nivou. Ponavljanje takve politike gurnulo je globalnu ekonomiju u nestabilnost, kroz rast agregatne tražnje koji značajno prevazilazi nivo ponude, ubrzava spiralu plate/cene i produbljuje druge strukturne neravnoteže. U kontekstu ekstremno niskih, čak i negativnih, kamatnih stopa, ekonomski subjekti preuzimaju nestandardno visok kreditni rizik, a država preuzima rizik suverenog duga koji se teško može kontrolisati. Posledično, danas je dug u većini ključnih svetskih privreda bitno veći nego u bilo kojoj prethodnoj stagflacionoj epizodi. Kada monetarna politika postane restriktivnija zbog toga što premija za rizik inflacije gura rast kamatnih stopa, javna i privatna preduzeća sa rastućim teretom duga i umanjenim prinosnim potencijalom lako podležu riziku nesolventnosti. Između mogućih negativnih scenarija, pregrejavanje i stagflacija u kombinaciji sa rastom duga su verovatno najopasniji ishodi. Usled današnjih loših i još važnije skupih ključnih antikriznih ekonomskih politika, poverenje u „nevidljivu ruku" tržišta i nekonvencionalne i eksperimentalne ekonomske politike, od strane mejnstrim ekonomista prepisivanih skoro kao univerzalni lek

za sve neravnoteže, svuda je definitivno nestalo i pretvorilo se u zabludu. Nema puno vremena da se odgovori na nove normalnosti. Čovečanstvo ima manje od dekade da odreaguje dok klimatske promene ne postanu ireverzibilne. Odgovor mora biti brz, sveobuhvatan i mora računati sa eksponencijalnim karakterom promena. Dakle, rešenje kompleksne krize zahteva uvođenje radikalnih ideja. Bez promene paradigme, ekonomija neće biti u stanju da reši postojeću krizu i radi na održiv i inkluzivan način za dobrobit ljudi i prirode u brzo promenljivom kontekstu novih normalnosti. Svaka kriza je katalizator promena. Da bi se ponovo osmislio ekonomski sistem, pored uvođenja cirkularnog modela rasta i heterodoksne platforme za vođenje ekonomskih politika, javno upravljanje se takođe mora promeniti. Štaviše, da bi se iskoristila prednost vodećih trendova razvoja, ekonomski sistem mora funkcionisati na sasvim drugačijim osnovama u većini fundamentalnih aspekata. U sistemu koji nastaje vlada i osnovni ekonomski subjekti radiće simbiotski sa idejom da doprinesu očuvanju prirode i potrebama ljudi pomoću industrijskih politika i namenskih investicija sa koordiniranim naporom i uz nastojanje da se ohrabri eksperimentisanje na svim nivoima. Automatski makroekonomski stabilizatori igraju ulogu veze između strukturnih i ključnih makroekonomskih politika, održavajući dinamičku ravnotežu između privatnog i javnog sektora. U Industriji 4.0 upravljanje mora biti vođeno misijom u smislu respektovanja ciljeva održivog razvoja kao i pokazatelja koji opisuju okruženje, društvene odnose i opšte upravljanje (Upravljanje 4.0). Prethodno ne znači da ćemo posle promene paradigme već imati precizno definisani okvir koji omogućava uvid u detalje koje treba da primenimo. Ekonomska teorija nije prirodna nauka, već društvena nauka ili nauka o kontekstu. U eri Industrije 4.0 koju karakteriše neograničeni broj inovativnih amalgama koji nastaju u preseku prodora iz oblasti AI, robotike i prirodnih nauka, ekonomska teorija tretira ekonomski sistem kao nelinearni sistem. Dakle, ono što promena paradigme donosi nastajućim konturama nove ekonomije nije nova teorija sa stalnom paradigmom, već skup pravila koja treba slediti u uslovima eksponencijalnih promena. Svrha ovog članka nije da potvrdi, već da diskutuje izazov iz naslova rada, sa posebnim fokusom na Srbiju. Namera je da se da pregled nastajućih intelektualnih putanja razmišljanja koje su relevantne za razrešenje sadašnje krize i skicira skup ekonomskih pravila koja treba da dovedu do elastične, održive i inkluzivne ekonomije. Glavna pažnja je usmerena na cirkularni model rasta i heterodoksnu platformu za vođenje ekonomskih politika zbog njihove sposobnosti da daju odgovore na glavne probleme vremena eksponencijalnih promena. Imajući u vidu da Srbija nema odgovarajući fiskalni prostor niti konvertibilnu valutu, s jedne strane, kao i nedovoljnu akumulaciju u privatnom sektoru i dominaciju preduzeća koja generišu gubitke u javnom sektoru, s druge strane, ključni problem Srbije je pronalaženje modela finansiranja zelene transformacije. Rad je strukturiran u četiri dela, pored uvoda i zaključka. U prvom delu razmatramo pravila neoliberalne ekonomije i povezane politike, kao i nekonvencionalne politike koje su kreirane kao odgovor na izazove koje je donela Velika recesija iz 2008. godine. U drugom delu ukazujemo na zablude i kontradiktornosti eksperimentalnih politika i mera primenjenih tokom krize izazvane pandemijom kovida 19 i ukazujemo na potrebu za zaokretom u ekonomskom sistemu. Konture novog ekonomskog sistema zasnovanog na potpuno drugačijem sklopu ekonomskih pravila i politika, koji proizilazi iz cirkularnog modela rasta i heterodoksne platforme za vođenje ekonomskih politika, opisane su u trećem delu. Konačno, u četvrtom delu prezentujemo ključne makroekonomske trendove koji su karakterisali privredu Srbije u 2021. godini i identifikujemo oblasti koje zahtevaju restrukturiranje kako bi spremno dočekale tranziciju ka ekonomiji u kojoj će biti uspostavljena svest o značaju klimatskih promena i njihovom uticaju na ljudsko zdravlje.

Ključne reči: *Srbija, eksponencijalnost, kovid 19 kriza, ekonomska kriza, klimatska kriza, biološka kriza, zelena transformacija, industrijske politike, investicije sa svrhom, automatski makroekonomski stabilizatori*

Introduction

These days humanity is a victim of overarching structural changes, sometimes called the New Normal, and the inability of the economic system and society to use them for progress. The cumulative effect of exponential change is an unprecedented crisis, precisely, a crisis within the spectrum of crises. Ordinary people, not only luminaries and scientists, understand the mess we are in. Economic agents on a variety of levels are overwhelmed by exponentiality. Accordingly, economic growth is stuck amid the "fear of fear" as the prevailing perception of reality.

The time we live in is marked by black swan phenomena. The COVID-19 pandemic and the impact of geopolitics on the economy are new macroeconomic variables. There is a growing recognition that the economic system is incapable of responding to an interconnected nature of the leading trends it faces. Managing changes in an emerging conundrum when the same leading trend affects other leading trends positively, negatively or both simultaneously is difficult. In times of universal polarization, pull and push factors are holistically creating the change imperative for everyone. The key pull factors with negative effects in a causal and chronological order are as follows: economic crisis, climate crisis, health crisis, energy crisis, and (geo)political crisis. The key push factor with an ambivalent effect is technological change within Industry 4.0. Namely, the last industrial revolution is partially positive and partially negative factor. Despite the fact that there are endless opportunities for the capitalization based on universal connectivity brought by Industry 4.0 solutions, the implementation of innovative amalgams is often associated with the disruption of incumbents and structural changes in both economy and society. All these

factors triggering a historic change are anthropogenic, which means that they are, in the last instance, manageable. So, the previous conclusion seems encouraging.

The latest complex crisis is a result of human choices. Anthropogenic root cause of the climate crisis is a colorful example. The manifestations of hectic weather, such as an extremely hot and dry summer season as well as unpredictable and extreme precipitation events during the whole year, are direct consequences of global warming, triggered by the linear model of production and our modern way of life, particularly urbanization, transport and tourism. Accordingly, human activities are pushing the planet away from the Anthropocene epoch, started with industrialization, to the "Firecene" epoch, which is further intensified due to the ignorance of negative externalities and public goods as well as the abuse of natural monopolies.

In such a mess, the logical question is going to be: What would be the major concern for the future, economic crisis, climate crisis, biological crisis, energy security, geopolitical crisis, or any? A simple answer is: holistic interference between them. For example, superyachts and space tourism, as typical examples of investment habits of the "top 1 percent" of the super-rich, have the highest carbon footprint of all assets.

A particular problem is coming from the fact that the current economic system is facing the exponential change full of the structural imbalances embedded in neoliberal economics rules. Neoliberal capitalism economics rules have been largely endorsed by academic circles, high politics, and policymakers. More than four decades ago some of the most influential economists such as monetarists from the Chicago School, mainstream economists from multilateral financial organizations (IMF/WB), and US Treasury established the new doctrine and elevated them almost to a new ideology. The key pillars of this approach are market fundamentalism, inflation targeting, and degressive taxation, all in the name of economic growth and prosperity for all. The most influential politicians promoting the same ideas in politics, such as *R. Regan* and *M. Thatcher*, actually increased the popularity of new ideology in the Western Hemisphere, Latin America as well as in transition economies, particularly from East

and Central Europe. Policymakers, inspired by such ideas, made the last contribution to the popularity of the related nexus of economics rules and policy platform through their implementation in real policies, tools and measures.

The standpoint that the government needs to take a back seat in the economy and intervene only when major problems arise proved to be Achilles' heel of this concept. Fault lines in setting economics rules as well as misconceptions and, particularly, inconsistencies in their implementation are the causes of structural imbalances of modern capitalism such as financialization, deindustrialization, and concentration of income and wealth. Mega trends such as Industry 4.0 are only deepening inbuilt structural imbalances. More recently, the COVID-19 pandemic magnified and massively accelerated structural imbalances the economy had been exposed to. The pandemic-induced lockdown broke up global supply chains, unmasked the medical system dysfunctionalities due to privatization and outsourcing, shed light on the lack of strategic flexibility necessary for the green transition and revealed a disproportionate impact of the crisis on different social groups. Since the start of the pandemic, according to OXFRAM [18], the world's 10 richest persons doubled their personal wealth, from US\$ 700 billion to US\$ 1.5 trillion. In the same period, about 160 million of people around the world fell into poverty. In December 2021, when CPI reached 6.5% Y/Y, the US government ran deficit of US\$ 3.1 trillion and increased debt to US\$ 28 trillion. Adding that in the next decade tax gap will be US\$ 7 trillion, we can see that the world's biggest economy and champion of market fundamentalism is faced with serious threats to sustainability.

Great Recession of 2008: Reconsideration of neoliberal economics rules

In the period 1980-2019, which coincided with the last stage of neoliberal capitalism, the global GDP increased more than fourfold, actually from US\$ 20 trillion to US\$ 87 trillion [25, p. 6]. Despite respectable rates of GDP growth, there were some weaknesses in this model of capitalism. The Great Recession of 2008 showed that the accumulated problems erupted from hidden fractures. Again, the flip side of a major success turned out to be a major failure.

Economic history does not repeat itself, but it rhymes. Every crisis is a critical period in human history because it fuels overall instability. Also, crisis is a catalyst for change. Guided by these views, architects of the system and policymakers started reconsidering the conventional economics rules in the aftermath of the Great Recession of 2008.

In market fundamentalism, the "invisible hand" of the market is embodied in economics rules and affects interactions and institutional settings. Egoism as the first derivative of well-being, maximization of shareholder value as an ultimate goal, market forces as an almost exclusive coordination mechanism as well as a way of value recognition and distribution to shareholders, have caused deep fractures in the system of shareholder capitalism. This variant of capitalism left out the majority of humankind from experiencing the effects of growth.

The main defects of market fundamentalism are: financialization, deindustrialization and concentration of income and wealth. Financialization has two aspects. First, the financial sector has largely been financing itself. Most fund flows go back into FIRE (Finance, Insurance, Real Estate). A debt-driven system with high moral hazard creates speculative bubbles. Second, the real economy itself has been highly financialized, too. Shareholder return has priority over longer term investments. Dividend payments and share buybacks are used to boost short-term games rather than to finance CAPEX. So, deindustrialization is the flip side of financialization. The previous two deficiencies of the system are directly related to the problem of income and wealth concentration. Namely, the effects of economic activities were concentrated on the "top 1 percent" of the super-rich. Due to global financialization, one of the major beneficiaries of income distribution and unprecedented wealth concentration is the financial sector. In this sector, an extraordinary profitability level has almost nothing to do with ingenuity and risk appetite in allocation of credits and generation of risk-adjusted return based on endless securitization. On the contrary, it is rather a consequence of information asymmetry and market cornering. Since 2009, earnings in the US capital markets increased more than six times.

Such a model, in itself, poses an existential threat to both the planet and economic system because growth has been achieved by applying the concepts and tools that neglect negative external effects and public goods and abuse natural monopolies. Such a system accelerates climate change, depletion of natural resources, along with a massive degradation of the ecosystem. So, in the linear model of growth, economic agents take resources from the earth almost for free. Through industrialization, they make things out of them for use. And then, they throw away whatever is left. The price is paid not only in environmental degradation and depletion of natural resources, but also through greenhouse gas emissions. In fact, the mentioned dysfunctions of the system derail or even undo the economic system from a sustainable and inclusive growth trajectory.

To put it in a nutshell, in this model economic agents have been optimizing their behavior by using the linear growth model, while policymakers have been targeting inflation. But this simplification of reality is not effective at all. Shifting the economy toward circularity, which means toward sustainable and inclusive growth, calls for major changes in the nexus of economics rules.

After the Great Recession of 2008, architects of the economic system and policymakers were searching for a new conceptual platform able to provide the wholesale solutions base for the problems that went beyond the linear model of growth, neoliberalism, market fundamentalism, Washington Consensus, shareholder capitalism, or call it whatever you want, because these concepts unfortunately proved to be a great disappointment. Also, the perception of the universality of neoliberal economics rules, such as liberalization, deregulation, privatization and outsourcing, has been partially revised. The anti-crisis measures such as austerity and related right-sizing of capital, assets and people that were implemented in the real economy are not consistent with government bailouts following the new rule "too big to fail" in the financial sector.

Policymakers are actually living in a dual world of austerity and money printing, independently of output, in terms of level, structure, and dynamic. Bailouts in the financial sector tend to replace the conventional rules such as hard budget constraints, both macro and micro. By ignoring hard budget constraints, new policy measures have directly downplayed price stability. Moreover, to

avoid costly side effects of bankruptcies in the financial sector, policymakers constantly delay imposing a hawkish monetary turn with monetary brakes such as tapering and interest rate hikes. Low, or even negative, interest rates policy jeopardizes a fundamental concept in business finance, net present value, contributing to further deindustrialization.

Experience with a partial revision of the conventional neoliberal economics rules confirms that all possible outcomes are coming from an empty set. The new policy mix can only "buy us some time", but with tremendous costs. Radical and systemic changes in economics rules are necessary. Without the growth model change and adoption of the related economic policy platform, over the medium term, or maybe earlier, a variety of ongoing structural imbalances may push the economy from today's mild stagflation into more severe conditions in the future: reflation, overheating, stagflation, or recession.

Reflation is the first possible scenario of the overall impact of unconventional policy measures. Despite the constant striving for CPI moderation according to 2% target, reflation becomes a possible alternative because growth initially fueled by money supply, may produce the escalation of inflationary pressures, particularly when the policy rate exceeds the natural interest rate. Avoiding the risk of capital market crash by reducing the real value of fixed nominal rate on debt, the monetary power could choose a second-best solution, to accommodate inflation, rather than to keep it in line with 2% target. Such a policy change will be followed by monetary tightening. To avoid a significant impact of monetary undertightening on stocks and bonds profitability, the central bank may provide a hawkish turn. Typical measures of a hawkish turn are tapering of the central bank balance sheet through long-end bonds withdrawal and interest rate hike. Unfortunately, such monetary policy shift may lead to the stocks rotation from a bull to a bear market territory as well as from defensive to cyclical stocks. The previous implies the beginning of a new inflation cycle or reflation.

Overheating of capital markets and related spillover is the second possible scenario. Despite growing unspent savings and pent-up demand, the continuation of money supply and fiscal stimulus could boost demand in some sectors, such as tech, construction, real estate, etc.,

contributing to the inflationary spiraling. Without output growth, inflation would remain on a high or even higher level and contribute to overheating.

The third scenario would be stagflation. It is characterized by high inflation and much slower or even stagnating growth. In this scenario, debt, both macro and micro, is soaring. So, the central bank would struggle to decrease interest rates with the aim of de-anchoring inflation expectations and avoiding the financial market crash. Unfortunately, output gap in the real economy decreases overall growth, pushing costs up and contributing to the cost inflation hike. In this case, nominal bond yields would rise much higher as the stock market enters a bear territory with a sharp reduction in the price level, all typical of stagflation.

The last scenario would be the most radical, recession, financial panic or depression, maybe. With an exclusive focus on monetary measures and in the absence of structural policies, the slowdown in aggregate demand would prevail. Slower growth outlook would lead to deflation, affecting a virtuous cycle of output gap increase and further downside in capital markets. A spiral of negative effects might escalate to the extremes such as financial panic or depression.

The general conclusion that can be drawn based on the revision of neoliberal economics rules is that all possible policies have failed to fulfill their purpose. Namely, an economy can never solve the biggest challenges it faces by relying exclusively on the "invisible hand" of the market and monetary measures as almost exclusive policy tools for inflation control. In particular, in an economy with output gap and growing debt burden, expansionary core policies (monetary and fiscal) without structural policies can only lead to wage-price spiral, along with negative and/or cancerous growth.

COVID-19 crisis: Experiments that definitely depart from neoliberal economics rules

During the whole period of market fundamentalism, nature, adversely affected by anthropogenic fractures of the system, was sending a lot of warnings. After the climate emergency, the latest disruptive trend is a biological

crisis due to microbe mutations and superinfections. By exacerbating the "fear of fear" from the previous crisis, the COVID-19 pandemic has actually pushed the economic system into pause. The global supply chains crash are everywhere, commodities are in a supercycle (price escalation plus volatility), soaring yields in capital markets create super bubbles, shortages and volatilities in energy supply are obvious, and geopolitics is gaining supremacy over economic reasoning in trade and investments.

In every complex crisis as the current one, the key victim is economic growth. Output gap is associated with unemployment, debt increase, as well as over-proportional growth in capital markets. Growing popularity of cryptocurrencies as a "limited issuance of nothing", is an example of massive confidence loss. In comparison with crypto currencies, official currencies and even reserve currencies are going to be exponentially weak. Or, the fact that government bonds yields tumble, while speculative equity yields surge, is another indication that financial markets respond to signals over-proportionally. In such bewildering times, marked by plenty of contradictions and conflicting signals, the economy cannot escape a downside scenario autonomously.

When imposing the so-called experimental economic policies during the COVID-19 crisis, policymakers feel free to violate not only the neoliberal economics rules, but also the unconventional economics rules implemented during the Great Recession of 2008. During a negative demand shock provoked by the lockdown, they started to implement hyper-strong expansionary monetary and fiscal policies. The ultimate irony was that governments that previously practiced austerity, hammered under the twin blows of output gap and demand crunch, have switched to the opposite mission statement "whatever it takes" to keep their economies alive.

By doing so, they tend to overlook many details. Despite massive liquidity injection and employment growth, economic growth and productivity improvement remained weak. Without structural policies and impact investment, money supply is neither capable of ensuring sustainable growth, nor keeping macro balances under control. When it comes to inflation, such an approach

in policy making is counterproductive. That becomes particularly evident in case of output gap, given that expansionary monetary and fiscal policies provoke yields spike in capital markets, at first, and, after that, core inflation surges as a result of growing inflationary pressures in commodities and energy sources. During the COVID-19 crisis the prices of tech stocks deviated 2-3 sigma from trend line and, consequently, they inflated a super bubble in capital markets. On the other hand, when the prices of commodities and energy sources escalate significantly, the economic system loses inflation hedge factors which affect core inflation directly and consumer price inflation indirectly. So, with super bubbles in capital markets and without anti-inflation anchors in commercial markets, the global economy gravitates toward a "risk-on" mood and, consequently, price-cost spiraling. So, for a small, open and low-income economy, the import of global inflation seems imminent.

One of the problems in the period of the reconsideration of conventional economics rules was an inconsistent implementation of policy rules: Friedmanite market fundamentalism in "good" times and Keynesian deficit financing in "bad" times. Moreover, during the COVID-19 crisis, with the experimental economic policy platform, policymakers have fallen into a new trap, ruling out both Friedmanite conservatism and new- Keynesian unconventionalities. The policy tools such as massive quantitative easing, almost zero or even negative interest rates, wages furlough, massive stimulus packages released to the private sector, helicopter money, etc. are only deepening the imbalances to which the economic system has been previously exposed. The turnarounds in the policy mix, dominated by experimental measures, are frequent. For example, after a long quantitative easing in monetary policy, tapering as quantitative tightening follows. These policy zigzags pose a puzzle for economic agents. So, bubble bursts and overall instability are inevitable. Such an economy fluctuates from crisis to crisis, unable not only to capitalize on structural changes, but also to mitigate the lasting problems as the climate emergency and restructure itself in a rational way.

The central problem is mismanagement of different risk classes, encompassing not only the nexus of risks

related to the economic system such as system, inflation, credit and technology risks, but also the nexus of risks pertaining to global commons including climate, biological, social and (geo)political risks. As a consequence, in the New Normal the current economic rules are not fit for the relationship between purpose and value.

Peripheral economies should draw one more lesson from core economies. Namely, the assumptions about universal applicability of the neoliberal policies mix proved to be false in case of diverse macroeconomic fundamentals. The paradigm shift in Economics also matters. In addition to the clear contours of circular growth model, along with industrial policies and impact investments, we need automatic macroeconomic stabilizers as a liaison between core (monetary, fiscal, labor, etc.) and industrial policies and impact investments.

A special problem for an emerging economic system is going to be the annulment of geopolitical impact. When the economy is in retreat, geopolitical influence is growing. Each crisis provides fertile ground for the supremacy of geopolitics over economic calculus in trade and investments. This impact depends on political cycle and is highly unpredictable. For example, former US President *D. Trump*, in order to promote protectionism and local economic interests, imposed tariffs on China and pulled out the US from COP 25, regardless of the fact that they are the world's second biggest polluter. His successor *J. Biden* is not only keeping China tariffs in place but also expanding the protectionism basket by adding new forms such as Nord Stream sanctions, while he is getting the US back into the COP 26 agreement. The impact of geopolitics may become an unsolvable problem in small, open and low-income economies, particularly bearing in mind that sometimes policymakers may come in their positions without insight into a global picture and more indoctrinated by local neoliberal fanatics. National economies with the delay in economic development cannot decouple from China as the biggest and ever-growing manufacturing hub and the world's leader in Industry 4.0 solutions, as well as from the Russian Federation as one of the leaders in oil and gas supply. But in the New Normal geopolitics could play a catalytic role in solving the global problems such as climate change and growing

biological risk. Amid such dramatic changes, agile local leaders must find the ways to keep the country's interests intact without jeopardizing global commons.

The paradigm change in Economics has conceptual and technical aspects. The development of conceptual aspect is climate-minded and health-minded. Highly recognizable key elements of the technical aspect are the circular economy model of growth and heterodox economic policy platform, see [6], [7], [8]. So, a new approach should be able to resolve the existing economic problems and simultaneously balance the requirements of global environmental, economic and social justice.

To survive and prosper, the contours of all post-crisis economies should look similar, independently of their macroeconomic fundamentals. If the system architects decide to follow a sustainable and inclusive growth trajectory, they must be prepared not only for the challenges of the last complex crisis *per se*, but also for the challenges arising from mega trends in a post-carbon, post-Covid and post-industrial era ahead. Also, this should be a turning point which will catalyze further changes across the economy and society as a whole.

Embracing a more responsible model of capitalism means that the transformation of shareholder capitalism in terms of *M. Friedman* [9], to stakeholder capitalism in terms of *K. Schwab* [21], is imminent. In this process, universal connectivity as a legacy of Industry 4.0 is playing the role of a driving force in increasing the awareness of global issues among basic economic agents, governments and institutions. Governments and institutions are increasingly recognizing the need for the policies which keep all stakeholders engaged in achieving the sustainable development goals (SDGs), defined by the United Nations [27]. The 17 SDGs and 169 targets call for innovative amalgams of different technological fields. For example, SDG 7, Affordable and Clean Energy, has three targets to reach by 2030, double rate improvement in energy efficiency, substantial increase of the share of renewable energy in energy mix, and universal access to lead edge energy technologies. Moreover, business leaders across all industries should recognize that a profit-making, climate-friendly and diseases-resilient business model also contributes to more successful business performance

measured by environmental, social and governance (ESG) metrics.

During the last pandemic, mainstream economists have provided the explanation that inflation is a "transitory" phenomenon. A new version of inflation heresies is coming from the following reasoning. Inflationary pressure is driven by the pandemic-related temporary factors such as supply chain disruptions, supply-side squeeze, reallocation of spending from services and goods to real estates and securities. Moreover, boosted income and extraordinary money supply intended to "keep the economy going" are also temporary factors. But we cannot forget that "transitory" inflation could be an acceptable explanation only under a rare set of conditions such as: sectoral adjustments are driven by the changes in demand pattern, monetary stimulus does not impede profitability increase in the sectors that require rightsizing and the existence of stable wage levels. These conditions are difficult to attain everywhere, particularly in open, small and emerging economies without fiscal space and heavily indebted, first of all, because a significant share of the informal economy strongly affects the flexibility of labor market, and also because the expansion of new sectors depends primarily on supply side and energy constraints.

The experiments that depart from the conventional economics rules in the great majority of cases at best are able to buy time, even in a costly way. They are not able to rebuild the economy in a sustainable and inclusive manner. To save the economic system from major disruptions, the neoliberal model needs to undergo a radical transformation. To escape from the crisis, a new economy requires monetary tightening which has to start immediately in the existing sectors of economy. Tapering and successive interest rates hikes should replace the expansionary monetary policy measures. The new sectors (primarily, carbon-neutral) require a quite different monetary (and fiscal) regime.

As for new tax policy, fiscal tightening should start right now and continue in the middle term, at least. Massive tax exemptions and tacit acquiescence in the global race to the bottom rate are stale policy alternatives. Establishing progressive taxation, solidarity tax, a global minimum tax rate are fresh policy alternatives. Automatic fiscal stabilizers are needed in new sectors.

Indeed, the list of changes goes on. Whereas in the neoliberal labor policy the buzzword was the "labor market flexibility", normally based on deregulation, now the focus has shifted to Industry 4.0 related sectors with new skill sets, viable jobs and unionization of employees with the aim of strengthening their bargaining power. Also, a new trade policy will be complementary with a new labor policy. Instead of the global division of labor, a new focus is on safeguarding domestic production due to the COVID-19-induced supply chain bottlenecks. Also, tech giants and platform companies, mostly practicing a "winner takes all" strategy, in the new trade policy will be treated as the examples of monopolistic behavior, which means that they need to be regulated and/or broken up into smaller pieces.

When the pieces of an economy do not fit together due to conceptual fault lines and incompatibility with requirements of leading trends and, particularly, are not in harmony with the laws of nature, deepening of the old fractures of the system and emergence of the new ones become inevitable. Without a paradigm change and radical turnaround in the system, what we may expect in the near future is a series of super bubbles. They dampen optimism and agility for reforms.

Although the journey of change is at an early stage, it is clear that a quite dramatic wave of changes is ahead of us. The momentum of change and trajectory hold promise for sustainability and inclusivity, both toward the people and the planet as a whole. So, it seems reasonable to ask the elite to adjust its role to new requirements and to implement the new nexus of economics rules for the future we want. So, there is hope that the elite should get the job done.

New economics rules: Leading through restructuring

Neoliberal capitalism has definitely hurt renewability, sustainability and inclusivity not only of the economic system *per se*, but also the planet as a whole. The global average temperature has already risen to 1.5°C above the pre-industrial level, and if "as-is" scenario continues, it may increase to 5°C by the end of the century. Global

warming has already dramatically squeezed biodiversity (>50%), reduced the areas for human habitation and triggered climate-induced migration. Humanity has less than a decade left to stop irreversible damage from climate change [10]. Accordingly, humanity is going through an extremely delicate period. Implementing a carbon-neutral economic model of growth and aligning greenhouse gas emissions with the net-zero framework represent a complex and uncertain endeavor conceptually, operationally, and financially.

The research regarding the development of new economics rules has been intensified after the disappointing results of both unconventional and experimental policies trying to save neoliberal capitalism from itself. The relevant experts have expressed numerous concerns, even doubts. They agree that without a new purpose-value relationship, it is impossible to put the economy on a green transition path. Industrial policies combined with impact investments could contribute to sustainable economic growth and a carbon-neutral economy. "Going green" standards in investment, financing, production and consumption are crucial to providing maximum support to a carbon-neutral future and minimizing the possibility of so-called "carbon washing".

Despite the cloud of controversies surrounding the two reconsiderations of neoliberal economics rules since the Great Recession of 2008, a completely new concept was born recently. It is based on two pillars: the circular model of growth and the heterodox economic policy platform. Paradoxically, the credit for the popularization of the new approach primarily goes to the old timers of market fundamentalism such as [14], [19], [23], [24], who have demonstrated evolutionary competence and readiness to reformulate the old rules and endorse the most important conceptual innovations. Industrial policies and impact investments have been consistently promoted by economics visionaries such as *D. Rodrik* [20] and *D. Acemoglu* [1], while *O. Blanchard* [3] concentrated on automatic macroeconomic stabilizers. The previous novelties are compatible with some breakthrough ideas coming from *M. Mazzucato* [15] regarding a mission economy and *S. Brunnhuber* [4] about green financing.

The new economy platform has offered sustainable solutions for structural imbalances the economy has been exposed to, as well as the solutions that are able to capitalize on mega trends and promote a new vision of economic prosperity, this time in balance with nature. In search of direction, the key question is: What is a sustainable economy all about? A simple answer is: an economy capable of mitigating key risk stressors from the past and achieving the sustainable development goals (SDGs) in the future. The UN via the nexus of SDGs has established the goals and targets for building a sustainable, inclusive, green and healthy economy for all. This is a goal-setting framework for every economic agent in all jurisdictions.

The last crisis is mainly the result of structural imbalances of neoliberal capitalism. Reducing greenhouse gas emissions to a tolerable level and setting up carbon-neutral industrialization conceptually, financially and operationally are complex tasks. The new economy platform can give fresh impetus to these processes. The government should carry out a transition process to the new economy. To give the economic system a new direction, the government must structure economics rules by respecting the current planetary boundaries. Fundamentally, it is a litmus test of its ability to respond to overall exponentiality.

Apart from a focus on shareholder value, the new paradigm takes into consideration three additional perspectives: environment, society and governance (ESG). So, ESG metrics are regarded as a necessary requirement in the definition of a new performance measurement system. In this way, along with value creation, the economic system should also demonstrate compassion toward all stakeholders, not only shareholders. Actually, the new approach introduces three categories of rules contributing to three purposes: "leading for good", "doing good", and "being good".

To be honest, besides some important conceptual anchors, the new platform is an unchartered territory in many aspects. A typical example is the development of consistent metrics for assessing the different stakeholders' accountabilities.

New economics rules actually help leading through restructuring. To promote the new approach, the responsible government should create a virtuous cycle of competition ("invisible hand" of the market) and coordination ("visible

hand" of the state) by imposing adequate industrial policies and impact investments with the aim of driving a systemic change in the economy and society necessary for achieving the SDGs.

Such an approach calls for a radical and systemic change. It cannot be implemented through the improvements based on the reconsideration of neoliberal rules and/or trial-and-error experimentation with ad hoc rules. The new economics rules help create a new mindset of economic agents, including consumers (decide not to buy products and services that harm the environment and increase waste), but also investors or debt holders (choose as partners the economic agents that use carbon-neutral and sustainable methods of production). Simplifying to the extreme, to impose the new rules, along with the adoption of baseline standards and ESG metrics aimed at reaching the SDGs, every national economy needs more regulations than deregulations and a new balance between the state and the market.

"Just transition" from the old system to the new one is a global process. As the modern world is universally interconnected, no one is safe until everyone is safe. Divergence in approaches must be absolutely avoided. Normally, the nexus of rules should be open. The great challenge is: How to integrate small, open and low-income economies in the process of implementation of emerging baseline rules, standards and metrics? And, more importantly: How to balance the financial consequences of impact investments at a local level with negative external effects of global environmental degradation? Recognition of non-material assets could not cover all negative externalities. So, in the capital allocation process an exclusive focus on negative external effects is not enough. Some additional measures are needed, e.g. "shadow prices".

The first step in the development of new economics rules implies the revision of conventional understanding of basic human cognition in Economics, the relationship between purpose and value. After a great many of empirical studies in the field of behavioral economics, neuropsychology and neurophysiology, a nexus of new economic rules arrived. As behaviorists like *D. Kahneman* [12] has eloquently shown, humans (instead of "homo economicus") are not exclusively rational and consistent.

Also, well-being is not the first derivative of egoism. In fact, global commons are a reality economic agents could and should follow. Moreover, there is no symmetry between risk and return [13], and economic agents do not optimally react to some incentives and orient themselves toward satisfactory instead of maximized profit. Actually, when it comes to investment decisions, the fear of loss is greater than the satisfaction based on greater return due to greater risk taking. The previous rules are framing a circular growth model and the heterodox economic policy platform based on industrial policies, impact investment and automatic macroeconomic stabilizers in monetary, fiscal, education and labor policies, at least [8]. By choosing industrial policies for tradable sectors and undertaking impact investments, the public sector actually crowds in private-sector investment and increases the multiplier effect.

According to the neoliberal line of reasoning, the state's main role is the creation of a level playing field and fixing market failures. A shift toward the new economy requires a mission-oriented approach. New economics rules are promoting the coordination between "visible hand" of the state and "invisible hand" of the market. The previous affects the interactions between economic agents and institutional setting. Both governments and markets are co-creators and co-shapers of a new level playing field [15, pp. 138-139]. Prioritization is almost everything when you seek to trigger a turnaround. Currently, the main priorities in the development of a carbon-neutral economy, in causal and chronological order, are as follows:

a.   Climate risk mitigation
b.   Financing the green transition
c.   Strategic restructuring of the system

Interestingly, Industry 4.0 solutions run through all previous priorities. It is almost a panacea for key problems.

a. Climate risk mitigation. In the last couple of decades Mother Nature sent us a lot of messages caused by the negligence of external negative effects, disregard for common goods, and abuse of natural monopolies by private companies and individuals. The acceleration of disruption in all three layers of the planet, physical system, biodiversity and socio-economic system, is evident. The current economic system has become a major force inflicting the climate emergency. Climate risk, along with biological

risk, is an existential threat. Humanity should not take for granted energy production and related industries based on fossil fuels. In the future renewables will be the most valuable planet's resource.

The key priorities include cutting emissions of greenhouse gasses, carbon capture (and offset), and the development of new energy technologies and connected industrial technologies with net-zero emission. The green transition is not just about the substitution of fossil fuels with renewable sources. It is actually a cross-sectorial transformation of the economy with the mission to create the new economic structure based on the reversibility principle which defines how we will produce, consume, and invest in the future. The green transition also requires the reduction in material content and energy consumption in all industries as well as waste management in accordance with the 3R rule of a circular economy (Repurpose, Reuse, and Recycle). These changes cause enormous difficulties, but are manageable. Industrial policies and impact investment provide the SDGs-based framework for a green transition. Also, the rejuvenation of industrial policies in tradable sector could be beneficial to keeping macroeconomic balances under control.

The COP 26, recently held in Glasgow, was a place of the revival of global ambitions toward the climate crisis mitigation program initiated in 2015. According to this document [26], the first step is that the 20 biggest polluters responsible for more than 80% of greenhouse gas emissions should step away from a business-as-usual approach. This decade will be critical to limit global warming to well below 2.0°C by 2050. It requires, for example, that the US reduce their greenhouse gas emissions by 45% and the EU by 50% by the end of this decade.

As for the green transition, electricity production from fossil fuels, particularly from coal, must stop forever by 2050. This turnaround needs a gradual implementation. Energy security is a primary reason. Until now electricity from renewables has not been a viable substitute for heating systems. When you do not have a robust renewable alternative, the reduction in energy production based on fossil fuels leads to the overall instability in energy supply and prices soaring. A significant impact on assets prices that is likely to be produced by green technologies may have systemic effects on the market. Namely, related assets prices may jump at critical moments when markets fully internalize the reality of growing production costs. To avoid a dangerous assets repricing effect, it is necessary to adjust the pricing system in public utilities directly by implementing inflation indices or indirectly through price reversions.

Maintaining a sustainable balance between purpose and effect in economic transactions is a critical component of any conceptual platform in Economics. The neoliberal orthodoxies have wrongly hypothesized about the exogenous character of technology as something that affects resource allocation, but does not depend on it. If economic theory is not capable of recognizing the endogeneity of a new technology and its potential impact on negative external effects such as climate change and microbe pandemics, it means that it is completely detached from reality. To mitigate the problems as fundamental as these ones, there is a need for a paradigm change based on a radical reconsideration of deeply rooted economics rules. Putting the endogeneity of technology in the context will promote a mission-driven economy and reaffirm industrial policies and associated impact investments. When it comes to the energy transition, carbon-neutral energy production, carbon capture and related investment interventions are far more important than investment in energy security or optimization of energy consumption. So, according to the new approach, impact investments in connected technologies need to be directed more aggressively than they have ever been under neoliberal rules and their recent modifications. Moreover, the disregard for negative external effects, prices of public goods and natural monopolies is a strong economic argument to be made for explaining why essential public goods (earth, water, land, wild, minerals, etc.) should be evaluated in a different way than private goods. "Shadow pricing" is probably the best way to neutralize negative external effects due to market imperfections.

b. Financing the green transition. Finance has a critical role in tackling the climate emergency and other SDGs. In the past, the government as an asset allocator had a small pocket of investments in the SDGs.

But, in recent times the attitude has changed. In fact, financial intermediaries must stop providing funds for the

investments that pollute and despoil environment. Rather, they must provide the funds for the investments needed to redirect the economy toward a green transition. Also, to mitigate sustainability risk, the government should actually endogenize negative externalities. By doing this, the government related institutions and money could crowd out private investment in same direction.

Typical neoliberal measures to solve the climate emergency problem and redirect the economy toward a sustainable path are taxes, incentives and subsidies, or "carrots and sticks". For example, the government charges carbon taxes in case of negative external effects and pays subsidies in case of positive external effects. Unfortunately, the impact of these measures is limited. Moreover, carbon tax affects the competitive advantage of nations, particularly if energy production is based predominantly on fossil fuels. China is an excellent example. Serbia is not an exception to the rule. Also, the risk of a subprime carbon bubble is real. Despite a positive effect, typical neoliberal carrots such as R&D subsidies and tax incentives are not of such magnitude to finance the needed green transition.

As far as the quantum of green transition funding is concerned, this is a quantum leap from billion to trillion. It is estimated recently by the IMF [11] that the world economy requires US$ 25-30 trillion a year to achieve the SDGs. This amount is less than 12% of total financial assets of about US$ 350 trillion [27].

Despite evident space, financial intermediaries are hesitant to invest in long-term SDGs, including the green transition. The main reason is risk. In many cases, banks and insurance companies expect more incentives from regulators to embark on a green path. Also, the real economy is not able to invest massively in the green transition burdened with the profitability problem. Hence, the private sector (both in finance and in real economy) alone cannot drive a necessary shift that reflects the SDGs.

The climate emergency and related sustainability risk are not operational risks. They belong to the systemic risk nexus. So, the government should contribute to the relaxation of such level of risk through the introduction of some institutions and policy measures. After that, the private sector will follow. A magnitude of funding and long-term character of these investments require financial

institutions which are willing to take the associated risks, able to mobilize a critical mass of capital and, by doing this, crowd in private investors.

In the new economy, financial intermediaries could play a catalytic role in addressing and financing the SDGs. Namely, they should redefine their purpose by showing a broader responsibility towards all stakeholders instead of an exclusive focus on shareholders.

Some extent of financing can go through credit institutions providing green credits. Credit institutions must encourage investors in renewable energy through credit conditions. They will fulfil the new purpose by imposing baseline standards for green investment and the calculation of cost of capital based on shadow prices. The central bank could take into consideration the related obligatory reserves and policy rate adjustments. The banks that have provided loans for fossil fuel production should be obliged to hold more obligatory reserves and related companies should not be effectively subsidized through the deductibility of related investments from earnings.

Debt financing of the carbon-neutral economy and global commons is feasible given the size and scale of the global financial system. Recently, the 6 largest US banks have announced that they are ready to lend US$ 1.6 trillion in the next 10 years for that purpose. Recently, the COP 26 has defined an amount of US$ 100 billion per year for financing a green transition in developing countries.

Going green could be a viable investment. Viable investments, by definition, mean that every asset you buy will double your wealth in about 17-18 years. From the previous perspective, payoff of investment in green technology may be competitive, particularly when the ESG metrics are included in calculations of effects. Impact investments are capable of delivering satisfactory return consisting of shareholder value and monetary effects that contribute to global commons. There is an increasing body of empirical evidence that this kind of investment can be economically viable. According to [25, p. 3], 10-year investment in the SDGs has delivered a 24% premium return over the financial industry benchmark.

An important role in solving the lack of funding for green technology development and implementation can

be attributed to new institutions, such as sustainability budget, green development bank, and sovereign wealth fund.

Contrary to the state budget which is cash flow based, the sustainability budget could be based on high yield state guaranteed long term bonds. Targeted buyers of such green bonds are pension funds and insurance companies. Confronting the low interest rates environment, the sustainability budget is also a way to sustainable finance, not only a sustainable real economy.

Green development bank has been created not just to provide green credits and underwrite green bonds, but also to assist in defining baseline carbon-neutral standards, as well as to guarantee that investors will be compensated if carbon price turns out to be lower than expected. Also, green development bank must take risk in the early stages of leading edge technologies and release the guarantees for the climate change adaptation projects. Sovereign wealth funds should also invest in "green bonds" as a financing tool for the most promising green technologies such as energy storage and green hydrogen.

Carbon tax and incentives, subsidies, minimum yield guarantees, green credits and green bonds could create a self-perpetuating cycle of financing green transition. By balancing purpose and effect, in both new sectors of the economy and restructured ones, government-led green quantitative easing (green QE), as a form of purpose-driven deficit financing aimed at achieving the SDGs, could be recognized as an additional way of financing [4].

When it comes to the state involvement in economic recovery and climate crisis mitigation, only investments such as Roosevelt's New Deal will match the magnitude required in a green transition. The so-called Green New Deal is actually a growth strategy which requires the largest shift finance has ever attempted. The New Green Deal with targeted, measurable and long-term goals, was already announced in the US in 2019, in the EU in 2020 and in China in 2021. The EU plans to mobilize at least EUR 1 trillion of sustainability-related investments by 2030. A half of funds will come from the EU budget. About EUR 100 billion will be provided by the European Bank for Reconstruction and Development to finance the green transition in Eastern and Central Europe.

c. Strategic restructuring of the system. The first explanatory element of modern times is exponential change. In the last 20 years humanity has changed more than in the last 300 years. Practically, we are surrounded with exponentialities. Universal connectivity, as a free good of modern times, makes possible the multiple intersections of AI, robotics, and life science. In such surroundings, the number of innovative amalgams from different fields, embodied in new products, services, business models and platforms, is practically endless. Also, the opportunities for symbioses of breakthroughs from different technological fields are unlimited. One of the possibilities is a human-machine fusion. This is not science fiction. This is a scientific fact.

Innovative amalgams are disruptive, by definition. The great majority of jobs people do as a routine and clerical are under disruption due to AI and robotics, giving rise to the social cohesion problem. Following strictly the economic reasons, at least 50% of routine jobs in industry, logistics and finance could be replaced by digital twins, thus reducing the aggregate demand and contributing to further wealth concentration. Both effects could break social and economic limits and push society into a conundrum.

The expansion of Industry 4.0 solutions requires the development of Governance 4.0 capable of redirecting research toward fertile fields, particularly to extended intelligence (EI), along with artificial intelligence (AI), and balancing between purpose and effect. A key element of the new approach is coordination between critical stakeholders. The heterodox economic policy platform is promoting industrial policies as co-creators and shapers of markets, as well as the system integrators of private and public interests. Restoring convergence through the mix of horizontal and vertical industrial policies must be regarded as a priority.

Structural policies and impact investments are simultaneously strengthening the role of science and technology and preventing political pandemic based on false concepts. In a world overflowing with disinformation, perception dominates facts. In social networks and other echo chambers, perceptions almost regularly dominate a fact-based scientific analysis and data. The previous

causes an "infodemic". It is a manifestation of the crisis of values and a festivity of irrational egoism. Infodemic is the predecessor to political pandemic that emerges when political leaders do not take prompt and adequate actions due to an overwhelming confusion resulting from fake news and unfounded analyses released by unethical opinion makers, influencers and their followers. The dominance of such trends quickly transforms progress into regression.

Serbia's macroeconomic audit for 2021

In 2014, Serbia was faced with almost shocking statistics on macroeconomics. No economy with such transitional output gap can overcome the crisis without fiscal consolidation. It was the reason behind the introduction of the fiscal consolidation program in 2014. The government took many proactive steps to make it work. After the successful implementation of fiscal consolidation program, we have witnessed a completely different economic system.

We use two sets of data to contour the strategic audit of Serbia's economy. Figure 1 portrays the trends in major macroeconomic data in three periods, fiscal consolidation (2014-2018), rebound (2019) and the COVID-19 crisis (2020-2021), respectively. Obviously, the negative impact of the COVID-19 crisis on fiscal balance in the last period could not be avoided. A sharp decline in real GDP in 1H 2020 has been mitigated until the end of 2020. However, in 2021, the government managed to get things back to normal, decreasing the gap in fiscal balance from -8.0% to -1.8%, while real GDP growth rate for 3Q 2021 looks encouraging (7.7%). Construction and ICT have been

given a boost. Growth rate in construction was 25%. ICT is the largest exporter. Public and external debt require an additional caution to avoid losing financial stability.

The general conclusion is that the overall economic policy is tight, keeping most of the macroeconomic figures (unemployment, exchange rate, interest rate and current account deficit) within controlled corridors. As expected, the global pressures on commodity prices, energy resources and transportation costs led to inflation spillovers. In fact, CPI for 3Q 2021 of 5.7% Q/Q is so far so good, reasonably good.

2021 was the year of significant growth, 7.7% in 3Q, and 7.5% at the end of 2021. In 2021, credit rating agencies expressed confidence in Serbia's economy. For example, S&P has upgraded the country's outlook from "stable" to "positive", while Serbia's rating has remained BB.

As for vulnerability indicators (Figure 2), demography is a major vulnerability, maybe. Demographic situation in Serbia is an exact replica of ever aging Europe. The population pyramid in Serbia has changed dramatically from the start of geopolitical crisis more than three decades ago. Along with a population decline, Serbia has a reversed pyramid or a pyramid with generational shift. Namely, Millennials and Generation Z are not in the majority. So, we have a demographic paradox: there are far more elderly people than the young. From the previous perspective, we can evaluate unemployment data. Unemployment rate fell to 10.5%. Wage rate exceeded the forecasts. These data are extremely important because, as already mentioned, demography is one of the impactful problems Serbia faces [2]. Labor scarcities have persisted

Figure 1: Macroeconomic data, period: 2014-3Q 2021

Macroeconomic data	Fiscal consolidation program					Rebound	Covid-19	
	2014	2015	2016	2017	2018	2019	2020	Q3 2021
Consolidated fiscal result as % of GDP	-6.2	-3.5	-1.2	1.1	0.6	-0.2	-8.0	-1.8
Current account as % of GDP	-5.6	-3.5	-2.9	-5.2	-4.8	-6.9	-4.1	-5.5
CPI (%, relative to the same month a year earlier)	1.7	1.5	1.6	3.0	2.0	1.9	1.3	5.7
Unemployment rate (%)	20.6	18.9	16.4	14.5	13.7	11.2	9.7	10.5
Real GDP growth (%)	-1.6	1.8	3.3	2.1	4.5	4.2	-0.9	7.7
Public debt as % of GDP	66.2	70.0	67.7	57.8	53.6	51.9	57.0	56.5
NPL ratio (share in total loans)	21.5	21.6	17.0	9.8	5.7	4.1	3.7	3.5
RSD/EUR exchange rate (period average)	117.31	120.73	123.12	121.34	118.27	117.85	117.58	117.57
External debt as % GDP	72.4	73.4	72.0	65.1	62.2	61.4	65.8	68.8
FDI net (mil EUR)	1,236	1,804	1,899	2,418	3,157	3,551	2,938	2,747

Figure 2: Vulnerability indicators

Financial vulnerability indicators		
Indicators	**Value**	**Reference value**
Indebtedness		
• Public debt*/GDP	56.5%	<60%
• External debt/GDP	68.8%	<80%
• External debt/Export	131.0%	<220%
Credit rating		
• S&P	BB+/positive	rank > BB+
• Fitch	BB+/stable	rank > BB+
• Moody's Investors Service	Ba2 /stable	rank > BB+
Fiscal capacity		
• Tax revenues as % GDP	37%	<34%
• Shadow economy as % GDP	34%	<31%

Operational vulnerability indicators		
Indicators	**Value**	**Reference value**
Okun index (inflation + unemployment)	16.2%	<12%
Gini coefficient**	33.3%	<30%
Current account as % GDP	-5.5%	>-5%
Consolidated fiscal result as % GDP	-1.8%	>-3%
Total dependency ratio***	54.7%	<50%
Youth unemployment	23.1%	<20%

Competitiveness vulnerability indicators		
Indicators	**Value**	**Reference value**
Export (goods)/GDP	38.9%	>50%
Currency change (Sept 2021/Sept 2020)		
• Nominal change	/	<5%
• Real appreciation	2.2%	<0%
Global Competitiveness Index****	72 of 141	65-SEE average
Corruption Perception Index	94 of 180	59-SEE average
Economic Freedom Index	54 of 169	62-SEE average

   * Central Government
  ** Gini coefficient of equivalised disposable income - EU-SILC survey 2020, Eurostat
 *** Statistical Office of the Republic of Serbia, data 2020
**** Global Competitiveness Report 2019-2020

regardless of wage growth. Workers are simply demanding more everywhere. Without a demographic bonus typical of developing economies, Serbia could not count on the growth model based on FDI forever. Industrial policies based on Industry 4.0 solutions must have a level playing field with FDI. In addition to infrastructure, one of the key priorities in structural portfolio of the economy is related to a green transition.

Aggregate demand is once again robust. Earnings dynamic is normalizing. Foreign trade is nearing to pre-pandemic level. FDI is at a record high of more than EUR 4 billion at the end of 2021, raising hopes that economic expansion will continue. Investments, both state and private, are increasing, too. Current account deficit as % of GDP is still in negative territory (- 5.5%).

Figure 2 shows the reflections of policy lessons in 2021 on key vulnerability indicators. The first worrisome sign is an increase in public debt (56.5%). Despite the increase, public debt is still out of the red zone. However, external debt may become a matter of concern (68.8%). According to the WB, a ratio external debt/GDP indicates a low level of indebtedness if it is below 45%, and a high level of indebtedness when it is over 80%. Care must be taken not to let the last figure slip into the red zone. On the other hand, competitiveness of the national economy has not been significantly deteriorated. The Corruption Perception Index is something to worry about. Although still on a "bellow the target" level, exports remained uncompromised (38.9%). Also, the government managed to regain control in the fiscal sphere by getting back to low levels of fiscal deficit (-1.8%). Overall, we could say that, from the economic vulnerability perspective, Serbia is in a delicate position of slowly but decisively improving its fiscal stability while increasing growth and not jeopardizing the level of indebtedness. The result of this "dance" will define the final outcome of the COVID-19 set of measures.

The reversed population pyramid continues to frighten (dependency ratio of 54.7%), threatening to

collapse the entire pension system. On the other side, youth unemployment is maybe the most dangerous vulnerability of the economy from the sustainability perspective. A country with already adverse demographic pyramid has too many unemployed youngsters (23.1%). Moreover, the share of young people who are not in employment, education or training (NEET) is 18.1%. A mighty thought that has to become information for action for any prudent policymaker.

The COVID-19 pandemic is still macroeconomic variable because related costs have become quite significant. After a short period of rebound in 2019, the COVID-19 crisis put the economy on pause in 2020. In the first pandemic year, the share of medical costs in GDP formation increased by 1.6 p.p., reaching 6.6% of GDP or 13.4% of the budget. Adding the pandemic related stimulus to medical costs, we can see that the overall pandemic related costs reached 15% of GDP. The COVID-19 pandemic has eaten up a significant portion of the effects of growth. To compensate lost growth and make a longer-term debt sustainable, in the 5-year period Serbia's economy will need the compound average growth rate (CAGR) of minimum 2.8% [6, p. 133]. In 2021, the share of medical costs in GDP is slightly lower. Also, there is a decrease in COVID-19 related stimulus in GDP formation. Concretely, the share of medical costs in GDP formation is 6.2% and total pandemic related costs in GDP account for 12.9%. By using the same formula[1], the appropriate CAGR for the next 5-year period that compensates for such costs is 2.46%.

The major government's initiatives in monetary and fiscal spheres during the first and second year of the pandemic have been creating commitment and accountability. Two main measures of monetary policy were moratorium on loans and the policy rate lowering. The major fiscal measures included postponement of taxes, wages furlough, subsidies to strategic sectors, helicopter money, etc. All core policy measures were a reasonable remedy for downside scenario due to the

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1   CAGR $= \sqrt[N]{1+M} - 1$
     where CAGR – compound average growth rate
     N – number of years
     M – COVID-19 mitigation costs as % of GDP in year zero

collapse in economic activities as well as the decrease in employment and living standard at the start of the pandemic. Also, structural policies measures proved effective. So, in 2H 2020 we saw a positive change going forward. At the end of 2020, the growth rate was 0.9%. Positive trend continued in 2021.

Unfortunately, inflation accelerated more than expected in 2H 2021. Inflation rate jumps most since 2014 measured by CPI, PCE, CORE PCE core inflation, or any. In December 2021 CPI Y/Y reached 7.9%. Average inflation was 4%, and core inflation was 3.5%. A logical question is: Where is Serbia in the inflation landscape?

During the COVID-19 crisis, overall scarcities have reflected in prices. Moreover, there is an unfortunate asymmetry, price increases from shortages tend to be disproportionately larger than price decreases from surpluses. So, interest rates hike will increase unemployment more than it will decrease inflation.

Despite the energy cost increase and commodities supercycle, significant internal drivers of inflation are massive overheating of the labor market fueled by soft lending in cash credits, construction and housing loans, as well as infrastructure development and its financing based on inter-state debt agreements with grace periods. Some consumer prices have been skyrocketing to 8-year high.

The NBS has declared in 3Q 2021 that inflation is "transitory". Making a judgment about whether inflation is transitory or structural in its character depends on the answer to the question: Is inflation driven by expectations or by macroeconomic fundamentals?

Based on the previous nexus of macroeconomic fundamentals presented in Figure 1 and vulnerability indicators from Figure 2, we can confirm with high certainty that the current inflation in Serbia is not chronic, so far. Namely, rising inflationary pressure is driven primarily by the pandemic-related transitory factors such as supply chain disruptions, supply-side squeeze, and reallocation of spending from services to real estate as an anti-inflation hedge. Moreover, boosted income as a result of expansionary core economic policies is also a temporary factor.

The NBS has been patient and has not overreacted by taking the direct measures such as raising interest

rates. Its response has been based on indirect, less robust monetary policy measures. In comparison with FED faster 2022 runoffs based on 4-5 hikes, the NBS plans to keep interest rate, more or less, stable.

The NBS has used some tools to support the labor market and ensure that inflation does not take root. Inflation-fighting strategy is based on fixed exchange rate, currency convertibility and a low and stable policy rate. As for the policy rate, energy, materials, metals, construction and ICT stocks that battered on rate hike conviction are drivers of growth. Under such circumstances, rate hikes initiated by the NBS are highly unlikely. Moreover, the NBS does not plan to trim balance sheet by introducing some forms of tapering. Anyway, monetary tightening is demand test for government bond yields.

No doubt, seizing inflation number will be healthy for the economy due to an impact on yields increase and expectations growth. The NBS expects inflation falling in 2022. To do that, the NBS needs to be more hawkish. Otherwise, inflation will keep elevating. Also, bond-buying program provided by the NBS for state-owned companies as a back stop in financial trouble can be a risky business. Policymakers have to wonder about that. Last but not least, inflation may be driven by backward indexation caused by wage-price spirals. It may become a source of system vulnerability, particularly at the time of multiple elections.

Instead of conclusion:
Emerging contours of the economic system after the transition from pandemic to endemic

In the last two years, the economic outlook in every national economy was periodically disrupted by the pandemic roller coaster and changes in (geo)political winds. Recently, the IMF has cut Serbia's economic growth forecast for 2022. Growth is slowing under the impact of power shortage. From the beginning of the year, inflation fears rise amid imported inflationary pressures such as negative supply shocks, commodities supercycle and announcement of interest rates hike. In 2022, the era of low or even negative yielding debt is coming to an end. In Serbia, we cannot predict that

high inflation will decrease by hawkish monetary turn. Anyhow, the impact of macroeconomic fundamentals will be stronger. All this brings us back to the point that it is unlikely to see inflation lift-off in 2022. But we hope that inflation will not sink into hyperinflation territory and will not persist in the middle term.

The risk that policymakers in a small, landlocked, open and low-income economy as Serbia may copy the policy measures from core economies without paying attention to their specifics is well elaborated. In the conditions of transitional output gap, limited fiscal space and lack of a fully convertible currency, being dependent on expansionary monetary and fiscal policies is not only extremely dangerous, but almost impossible. The deepest fault line emerges when stimulus package is financed by debt denominated in reserve currencies. When the current economic system is full of structural imbalances, the top risk is associated with the postponement of the new economy principles build-up based on the paradigm change in Economics.

A more severe problem in peripheral economies like Serbia is the model of growth based on export-oriented industrialization relying on import of technologies. Successive import of technologies from abroad has a limitation which was recognized as the "middle income trap" [5, pp. 19-24]. After some level of economic development this phenomenon is actually blocking economic growth based on more productive investment opportunities. Namely, both market and government imperfections inhibit the development and entrance of internally developed lead-edge technologies. Structural changes in the economy and the generation of an enlarging middle class require the respect for technological frontiers as they ensure well-paid productive jobs and, apart from the export, an additional focus on the home market and services, as well.

These days investment in a greener and sustainable economy based on Industry 4.0 solutions is critical. Industrial policies, as well as impact investments, are catalysts for structural changes and economic growth. By using structural policies, the economy should expand, over tradable sector and infrastructure, into renewable energy, medical equipment, ICT and related sectors. So, the green transition is embodied in economics rules.

Each optimist, or even constructive sceptic, would welcome leaders who act "out of the box", freely navigating in a largely unchartered territory of the paradigm shift in Economics and the pandemic roller coaster. Tracing the emerging contours of the circular model of growth and heterodox economic policy platform and identifying future industrial policies and impact investments in a specific national economy are typical examples of this kind of behavior. According to this line of reasoning, as for Serbia, we could predict that the year 2022 will bring, along with fears, some chances for a sustainable recovery and strategic restructuring.

To master every uncertainty is not feasible. The government must concentrate on the key ones. The Competence Center for Industry 4.0 established recently with the World Economic Forum is a step in the right direction.

Currently, the mission statement for each national economy is to transform handicaps of the "fear of fear", as a primary human perception of growing climate and biological risks, into the benefits coming from the creation of the new economic system based on a paradigm shift. Bouncing back from multiple shocks of the complex crisis and its aftermath in an economy such as Serbia, particularly due to structural imbalances from the past and mainly disruptive leading trends in external environment, implies abandoning the current model of growth and related economic policy platform and setting up a new economic system. The foregoing does not necessarily mean that the rules behind the mentioned novelty will prevail immediately. Anyhow, this concept could serve as good orientation for future policies corresponding with the view of opinion makers with excessive confidence.

This year the virus will not be eradicated, but probably altered. After the transition from pandemic to endemic, the chain of positive events may become a reality. But rebounding from the New Normal to the Better Normal needs many things to happen. First and foremost, the economic system must step away from the linear model of growth and orthodox economic policy platform almost exclusively focused on inflation targeting and adopt a new conceptual platform with industrial policies, impact

investments and automatic macroeconomic stabilizers at the center. Despite the transformation of the pandemic into endemic, putting in place the new economic system to provide a simultaneous response to climate risk as a major long-term challenge must not wait.

One of the challenges in the post-pandemic period will be to get people back to productive work. A big risk is thinking that the labor participation in times of work at home, wages furlough and overall absenteeism due to the fear of virus could contribute in a sustainable way to GDP formation, recovery and more prosperous economic system. Industrial policies have the potential to resolve the problem of covid-related bubbles in the GDP formation as well as cyclical or even stagnating growth.

Globalization of the green transition is unstoppable. In the next period, the renewables will be the most valuable planet's resource. We can see structural changes in economies all over the European continent toward net-zero emission technologies, substitution of fossil fuels with renewable sources, more environmentally-friendly model of consumption, as well as the acceleration of digitalization and Industry 4.0 solutions. Serbia should follow global trends. In particular, to reach the compatibility imperative with the EU, Serbia has to demonstrate a more agile approach to a carbon-neutral future. Europe is warming faster than the global average. The EU is on the front line with a very ambitious plan to cut carbon emissions. Namely, the EU plans to reach net-zero by 2050. It is an imperative for Serbia, as a European country that goes through the EU accession process, to take part in this transition. The first step in this direction is the accreditation of Serbia's economy in line with the EU green transition rules.

In a green transition, the state should play an active role. One powerful idea would be to establish the free zone for Industry 4.0 solutions with the aim of building the machine-to-machine platform for carbon-neutral technologies. The complementarities between FDI and industrial policies could bolster the role of free zone in the green transition based on Industry 4.0 solutions.

Financing of the green transition is crucial. Despite the COVID-19 pandemic, macroeconomic fundamentals in Serbia are "fair enough" and inflation is "transitory", so far. Nevertheless, Serbia does not have enough fiscal

space to finance massive carbon-neutral investments. The private sector is not able to agglomerate a critical mass of money to participate significantly. Credit rating is fair but cannot guarantee debt financing for such a magnitude of investments. So, green QE and alternatives such as green loans, green bonds, etc. could be the ultimate sources of financing. The COP 26 [26] decided to raise US$ 100 billion per year for developing economies with the obligation to reduce carbon emissions according to recognized standards. The EU Commission will kick off the credit-based program of decarbonization in 2H 2022 with EUR 100 billion for Eastern and Central Europe economies. As a candidate country, Serbia should be agile in this respect.

The base-case scenario for Serbia restructuring should encompass infrastructure spending, construction, agriculture, and related industries as well as a green transition, all based on Industry 4.0 solutions. Namely, we can propose a two-pronged program of financing, based on lending in compliance with hard budget constraint and more innovative ways of financing including green QE. The possibility of weakening growth due to interest rates hike may produce growth shocks. So, the NBS has to implement gradual monetary tightening.

Contrary to the previous recommendations, in the analyzed period the government provided financing to the energy sector based on fossil fuels (particularly coal) and partially supported with financial aid other parts of the economy, both public and private, that are incompatible with a green transition. The main reason was energy security. Investment in fossil fuels is long-lived, which means that the exploitation of facilities takes decades. Bearing in mind that these investments cause major setbacks in the implementation of the EU plans to become carbon-neutral, they will certainly become "outdated assets" in the foreseeable future. In this case, public utilities will demand compensation with the aim of socializing downside risk. Other way around, the government will ban such investments. But, for now, this option is unfeasible for Serbia because 68% of electricity production comes from coal. Another option is to introduce carbon taxes and subsidies. Since markets are short-sighted and often fail to fully account

for key risks, in order to preserve financial stability, the implementation of these tools must be overseen by the NBS.

Energy security and sustainability should be in focus. So far, Serbia has done almost nothing to reduce its dependence on coal. Also, excessive spending on fossil fuel subsidies is evident. An additional problem is operational inefficiency in coal-related line in public utility EPS, which has erupted at the end of 2021. After that, the economic growth outlook has worsened. One of the main reasons is outsourcing of non-core businesses from the structural portfolio of EPS. By causing the loss of institutional memory from the former internal market, outsourcing actually leads to inadequate and costly services. Instead of outsourcing, a better solution will be public-private partnership in the area of renewable energy sources.

To address global climate issues, the transformation of the energy sector in Serbia must be the first priority. It could be a gradual process. The energy sector should evolve, learn and adapt. There is almost no dilemma about what initiatives have to be followed. The priority for public utilities from the energy sector is to undergo a green transition through public-private partnerships. Even the biggest fossil fuel producers, e.g. Saudi Arabia, have committed themselves to net-zero carbon emissions. These days ARAMCO, a green hydrogen plant in Saudi Arabia, is the largest in the world. It could serve as a role model for public utilities such as EPS and Srbijagas.

During the COVID-19 crisis, the anti-crisis program was the first and easy step. The following steps are essential. The green transition is a historic opportunity for the economy to recover and prosper in a sustainable and inclusive way. The economic system we choose today will have effects for decades to come. We must act in a way that will lead the economy and society toward a better post-pandemic future. The transformation into a circular economy is compatible with the path to climate neutrality. All stakeholders must act together to confront the climate and biodiversity emergency.

In last two years the anti-crisis program has stabilized the economy. Strategic restructuring of the economy toward a carbon-neutral future embodied in the new economics rules we discussed in this paper will leave a legacy.

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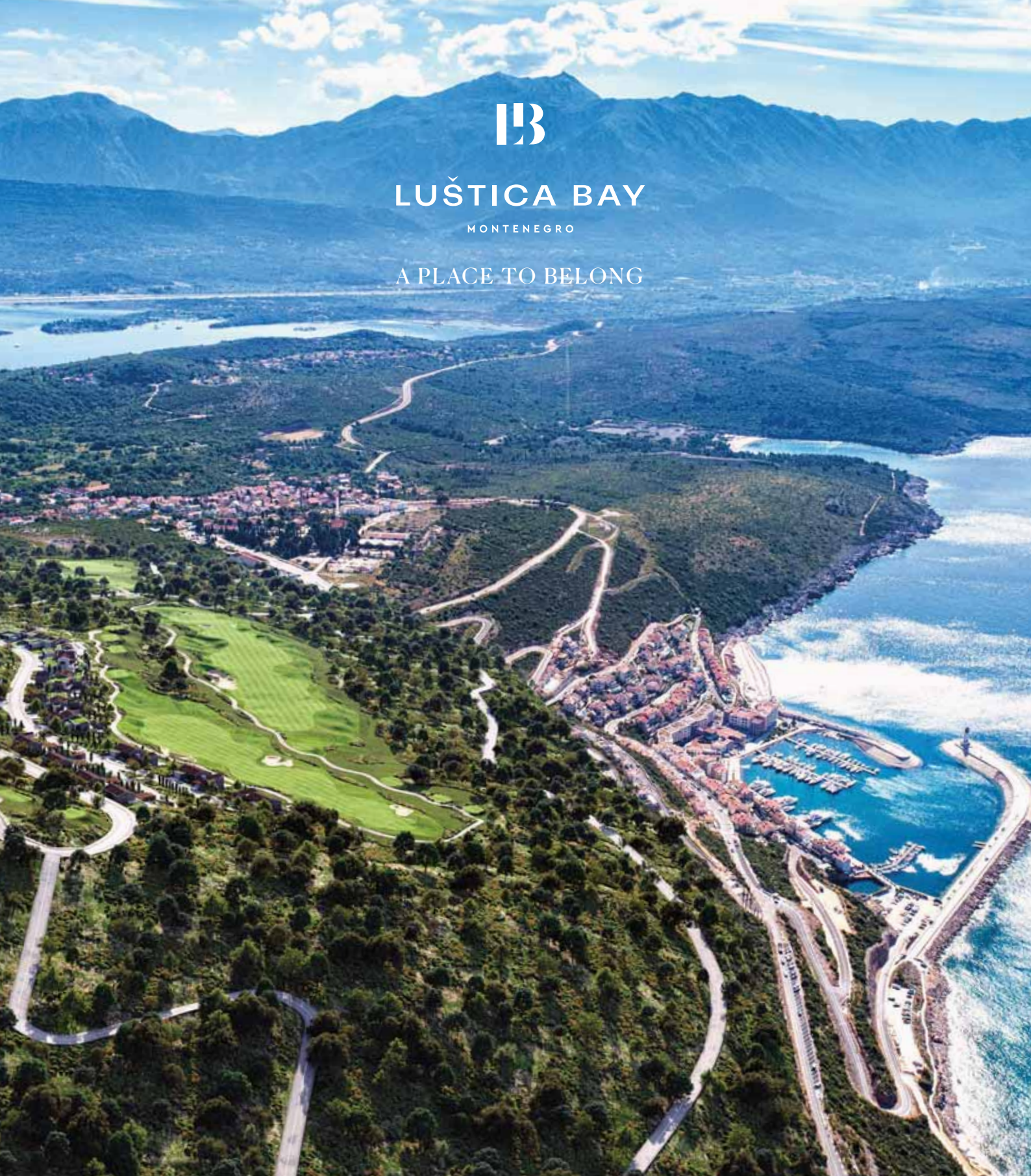
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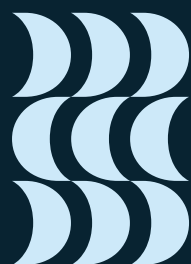Governor
National Bank of Serbia

INFLATION FACTORS DURING THE PANDEMIC: GLOBAL TRENDS AND THE CASE OF SERBIA

Faktori inflacije tokom pandemije: globalna kretanja i slučaj Srbije

Abstract

No issue has stirred such debate recently as inflation. In this paper, inflation factors are divided into three groups: 1) global – which dictated inflation movements in 2020 and 2021 in the majority of countries; 2) base effect, which was also a shared component; 3) domestic factors, specific for each country, which gave rise to the differences in the monetary policy response. Factors of ongoing global inflation movements are presented, as well as the assessment of its character in the case of Serbia. The paper offers a response to what monetary policy can and should do in order to preserve price stability over the medium run. Generally, the decomposition of y-o-y inflation rates into global, regional and domestic factors by applying the principal components method indicates that global factors played a key role in determining inflation growth in Serbia and the neighbouring countries in 2021. Also, autocorrelation functions for various groups of price time series were assessed – unprocessed food, processed food, petroleum products and core inflation, where the results obtained indicate that core inflation is a relatively good estimate of the durability of inflationary pressures, as well as that deviations of headline inflation from core inflation are, as a rule, temporary in nature. All of the NBS analyses suggest that there are no fundamental demand-side pressures that would drive Serbia's inflation up in the medium term.

Keywords: *inflation, monetary policy, prices of primary commodities, halts in global value chains, pandemic*

Sažetak

Skoro se oko neke teme nisu vodile diskusije kao oko inflacije. U ovom radu faktori inflacije podeljeni su u tri grupe: 1) globalne - koji su opredeljivali kretanje inflacije u 2020. i 2021. godini u najvećem broju zemalja; 2) bazni efekat koji je takođe bio zajednička komponenta; 3) domaće faktore koji su specifični za svaku zemlju, što je opredelilo i razlike u reakciji monetarne politike. U radu su dati faktori tekućeg kretanja inflacije na globalnom nivou, kao i ocena njenog karaktera u slučaju Srbije. Nudi se i odgovor šta monetarna politika može i treba da preduzme da bi se očuvala cenovna stabilnost u srednjem roku. Generalno, dekompozicija mg. stopa inflacije na globalne, regionalne i domaće faktore primenom metoda glavnih komponenti upućuje da su globalni faktori ključno opredelili rast inflacije u Srbiji i zemljama u okruženju u 2021. godini. Ocenjene su i autokorelacione funkcije za različite grupe vremenskih serija cena – neprerađene hrane, prerađene hrane, naftnih derivata i bazne inflacije, gde dobijeni rezultati ukazuju da bazna inflacija predstavlja relativno dobru ocenu trajnosti inflatornih pritisaka, kao i da su odstupanja ukupne od bazne inflacije po pravilu privremenog karaktera. Sve analize NBS ukazuju da nema fundamentalnih pritisaka sa strane tražnje koji bi u srednjem roku povećali inflaciju u Srbiji.

Ključne reči: *inflacija, monetarna politika, cene primarnih proizvoda, zastoji u globalnim lancima snabdevanja, pandemija*

Introduction

Before the COVID-19 pandemic hit the global economy, inflation in the majority of advanced and emerging countries was at a historical low. Central banks pursued an extremely accommodative monetary policy in an effort to bring inflation closer to the target in a sustainable way. The languid global economic recovery in the period following the global economic crisis of 2008 was not conducive to central banks' efforts, as it was accompanied by low productivity and investments, and in the years leading up to the pandemic it also featured heightened geopolitical and trade tensions. Slow global growth was a key factor of low prices of primary commodities in the global market and the ensuing disinflationary pressures.

Soon after the pandemic broke out, it became clear that this global shock would have strong effects on the level of economic activity and inflation across economies. The effects were pronounced on both the demand and supply sides, with the potential to impair business and consumer confidence. The pandemic also struck domestic and external demand, as well as global production chains which suffered halts and occasional disruptions. Due to the introduction of restrictive health measures, some service sectors, such as tourism, catering and transport, were almost entirely suspended or reduced to a minimum, especially in the first months of the pandemic. Central banks were the first line of defence, responding promptly at the onset of the pandemic by monetary policy accommodation, and conventional and unconventional measures. Then came fiscal programmes, whose scope depended on the room which countries had created in the pre-crisis period.

Failure to respond would have meant a collapse of the labour market, workers being fired and/or a drastic fall in income. Such failure to act would have cost dearly. There were many unknown variables, but the goal was clear: to safeguard the economy, and preserve jobs, liquidity and favourable financing conditions. To preserve consumer and business confidence. In such a mosaic of many intertwined factors having opposite effects on inflation, it was uncertain which factor would prevail and how inflation would move going forward.

In the initial stage of the pandemic, there were more of those who thought that inflation would remain low [1, p. 3; 2; 3; 4, p. 7; 5, p. 13]. The question arises as to the reason behind such expectations. Primarily a drastic fall in demand and consumer and business confidence, increased risk aversion and significantly lower global oil prices. Still, there were some back then who hinted at potential inflation growth [6; 7] stating that, once extraordinary measures are revoked and the existing inventories exhausted, a significant rise in consumption would trigger inflation. Also, there were estimates that depreciation pressures in some countries could boost inflationary pressures, thus limiting room for a more accommodative effect of monetary policy [8, p. 18].

What actually happened? In the first stage, the so-called „lockdown", the disinflationary trend picked up the pace at the global level. The negative shock on the supply side that arose due to the disruptions in company operations (to prevent the spread of the virus) did not cause any major inflationary pressures. The reason behind this is the simultaneous sharp fall in global demand amid temporary containment measures. There was also a simultaneous drop in investments and spending in conditions of heightened uncertainty. This collapsed the global oil price and, in turn, the majority of countries saw a slowdown in price growth, and even their fall. The exception were several countries where even before the pandemic inflation was relatively high, and during the pandemic it continued to grow mostly as a consequence of depreciation pressures.

In the second stage, the so-called „opening", restrictive health measure were mitigated, and progress in vaccine rollout increased optimism with respect to the global economic recovery. After strong fiscal stimuli, monetary policy support and savings accumulated during the first stage of the pandemic, global demand was „unlocked". Supply cannot adapt to the rising demand in the short term, partly because of the fact that there was still a shortage of some raw materials and production inputs, which created production bottlenecks and halts in global value chains. In parallel, more favourable global growth outlook generated a more significant rise in the prices of primary commodities in the global market. After a

period of extremely low inflation in 2020, all of this together resulted in a rise in cost-push pressures and accelerated inflation in 2021. We are entering a period where after a long time inflation is recording growth at the global level (in some countries it is at the highest level in decades), and analyses are being launched to determine to what extent this is attributable to temporary factors, or whether inflation is establishing an upward trend. Data in this paper are given ending with and inclusive of 2021.

The largest number of central banks, including the Federal Reserve System and the European Central Bank, as well as the majority of international financial institutions, agree that as of mid-2022, inflationary pressures would calm down [9; 10, p. 11]. Still, they communicated also that inflationary pressures have turned out to be stronger and more durable than previously expected.

Bearing in mind the urgency of this topic for economic policy makers, notably for the monetary policy, as well as that debates and concerns over the durability of inflationary pressures have intensified, further in the paper we will present the factors behind the current inflation growth at the global level, and an assessment of its character in the case of Serbia. We will also offer a response to the question of what monetary policy can and should do to preserve price stability in the medium term.

Causes of inflation growth globally and in Serbia in 2021

Inflation factors in 2021 can be analysed through three key groups:

1. global factors,
2. base effect,
3. domestic factors.

Global factors dictated the movement of inflation in the majority of countries in 2020 and 2021. Moreover, the low base effect in the so-called acute stage of the pandemic, marked by a sharp drop in the prices of primary commodities, was also a shared component. The difference is created by the impact of domestic factors specific for each country, which also dictated the differences in monetary policy response by country.

Impact of global factors on inflation

What characterised the global conditions in the initial stage of the pandemic, in the first half of 2020? A drastic fall in consumption and production, which adversely affected the labour market, notably employment, as we can see in the example of the USA (Charts 1 and 2).

Together with the plummeting global oil prices, this resulted in a significant slowdown in inflation globally, and in some countries even drove inflation into the

Chart 1: Contributions to s-a real GDP growth rate of the USA
(quarterly, in pp)

Net exports
Change in inventories
Gross fixed capital formation
Government consumption
Household consumption
GDP (in %)
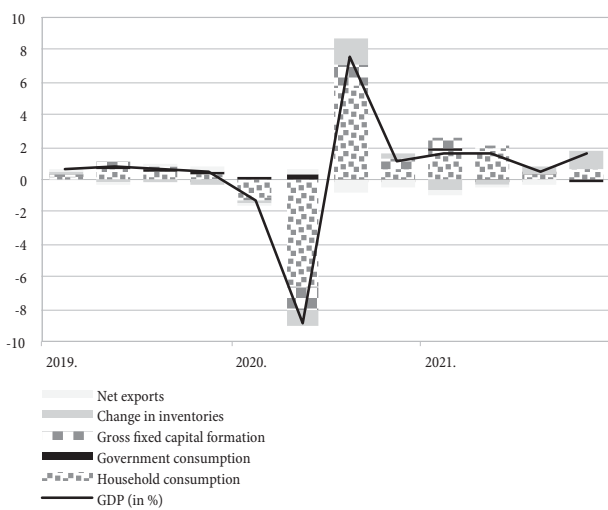
Source: U.S. Bureau of Economic Analysis.

Chart 2: US labour market and economic activity indicators
(in index points)

ISM Manufacturing (LHS)
Participation rate (LHS)
Unemployment rate, in % (RHS)
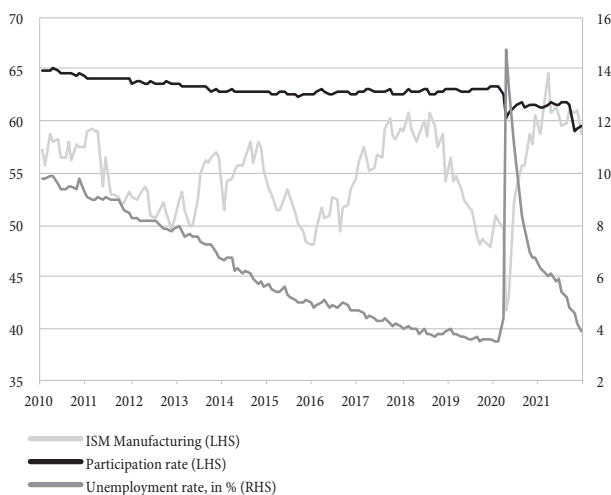
Sources: U.S. Bureau of Labor Statistics and Institute for Supply Management.

negative territory. In the euro area, our key foreign trade partner, y-o-y inflation (measured by the Harmonised Index of Consumer Prices) in April 2020 measured 0.3%. In August that year it went into the negative territory and remained there until end-2020. In Serbia, inflation was also low during 2020, and ended the year with the y-o-y rate of 1.3% (Chart 3).

Among global factors of low inflation in 2020, **global oil prices** were dominant, falling to around USD 20 per barrel in April 2020 (Chart 4), while oil futures stepped into the negative zone for the first time in history. As economies gradually opened and health measures were loosened, with OPEC+ countries cutting down production, global oil prices posted an upward trend as of mid-2020. The trend picked up further with announcements about progress in vaccine research and distribution as of end-2020. It continued into 2021, when accelerated recovery of economies led to a continued rise in oil demand, though the supply from OPEC+ countries did not manage to keep up with the trend entirely. As a result, global oil prices during 2021 exceeded their pre-crisis level (Chart 5), and at around USD 84 dollars per barrel in October 2021, they were more than 80% higher relative to the same period a year earlier. The news about the spread of the new omicron variant and poorer prospects for global growth on this account led to a temporary drop in global oil prices in November and December 2021, before moving back to upward trajectory in January 2022 due to geopolitical tensions. Such developments during 2021

spilled over onto retail prices of petroleum products, which in December 2021 were higher in y-o-y terms by 28.6% in the euro area and by 23.5% in Serbia (Chart 6). In terms of the composition of headline inflation, we can see that retail prices of petroleum products contributed -0.6 pp (euro area) and -0.7 pp (Serbia) to headline inflation in December 2020, compared with 1.2 pp (euro area) and 1.4 pp (Serbia) in December 2021.

A tendency similar to that of oil prices was also recorded by **global metal prices**. In the first stage of the pandemic, i.e. from February to May 2020, they posted a fall, though less pronounced than that of oil prices. Specifically, in April the global prices of metals were around 15% lower than at the start of the year. As the year went on, and with the gradual loosening of containment measures, these prices struck an upward path, accelerating during 2021, only to reach their multiyear maximums in May and June 2021. This was certainly facilitated by the rising demand from China and other developed countries. With news about the spreading of new coronavirus strains and somewhat unfavourable prospects for the world's largest metal consumers, the prices of metals recorded a fall, but still remained significantly above the pre-crisis level. Ultimately, in October 2021, the global prices of metals and minerals were by around 42% higher y-o-y, but went down in November, just as the global prices of oil. Underpinned by higher demand, this prices again recorded increase in December.

Chart 3: Inflation in euro area and Serbia (y-o-y rates, in %)
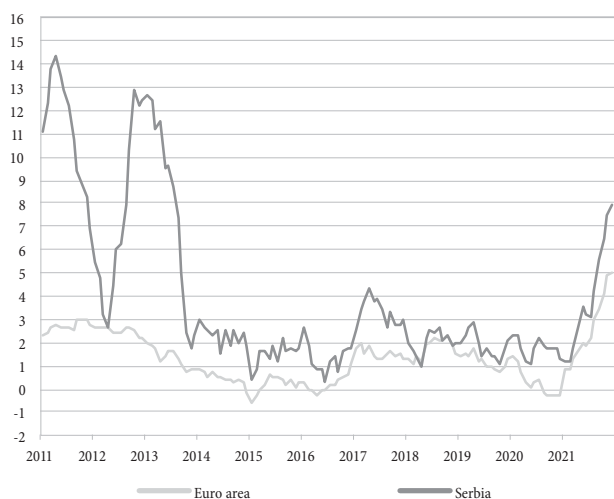
Source: Eurostat.

Chart 4: World oil price movements (average monthly prices, in USD)

Source: Bloomberg.

In the period February–May 2020, **global prices of primary agricultural commodities** (maize, wheat, soybean) were also on a decline, and in conditions of a globally dampened demand and large inventories in April 2020 they were around 8% lower relative to end-2019. Still, around mid-2020, the prices of this group of primary commodities also struck an upward path. In addition to increased demand from China, which sought to renew the livestock capital, poorer than anticipated harvest in the USA and unfavourable weather conditions, notably in Brazil and Argentina – the world's largest corn and coffee producers – also reflected on the prices of primary commodities. The higher prices of primary agricultural commodities drove up the costs of food production which, together with the rising demand in the wake of the loosening of epidemiological measures and progress in vaccine rollout since the start of Q2 2021, dictated the rise in the prices of meat and other food products.

The lack of shipping containers also illustrates the depth of the disturbance. The rise in fuel prices and implementation of tighter health and sanitary measures, which prolonged the time for loading the goods, **slowed down the entire transport chain and resulted in the lack of shipping containers**. With the recovery and then a sudden rise in demand for consumer goods, the price of container transport surged. Specifically, after years of stability, the price of overseas container shipping from China to the Mediterranean increased almost six-fold

relative to 2020 (Chart 7). With lower prices of primary commodities, trend of rising transportation costs was temporarily interrupted in November 2021, while rising trend again continued in December.

The halt in global supply chains is also a factor that stands out with its impact on the strengthening of cost-push pressures, both in the lockdown and opening stages of the global economy (Chart 8). On the one hand, global demand suddenly surged after the economies opened, while on the other, there were structural differences in terms of the speed that can reactivate the capacities and respond to the requirements of growing demand. Production bottlenecks were particularly pronounced with microchips, construction wood, metals and plastics.

The hike in production costs, driven by the prices of primary commodities in the global market, as well as shortages of some production inputs, resulted in **strong growth in industrial producer prices in many European countries**, which was two-digit in y-o-y terms since the mid of 2021 (Chart 9).

As a consequence of all of the noted global factors, primarily the higher prices of primary commodities, the rise in industrial producer prices for the domestic market in November measured 16.7%, before slowing down to 14.7% in December. The increase in the global prices of oil, metals and primary agricultural commodities within producer prices had a direct effect on the prices of petroleum products, basic metals and food products

Chart 5: Global prices of primary commodities (Jan. 2019 =100)
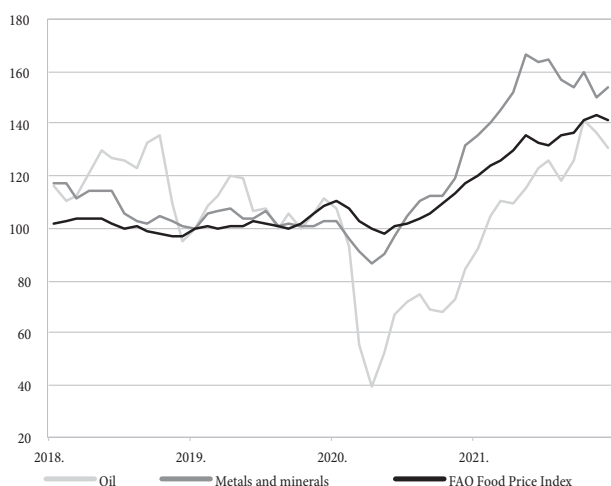
Sources: Bloomberg, World Bank, UN FAO.

Chart 6: Rise in petroleum product prices (y-o-y rates, %)
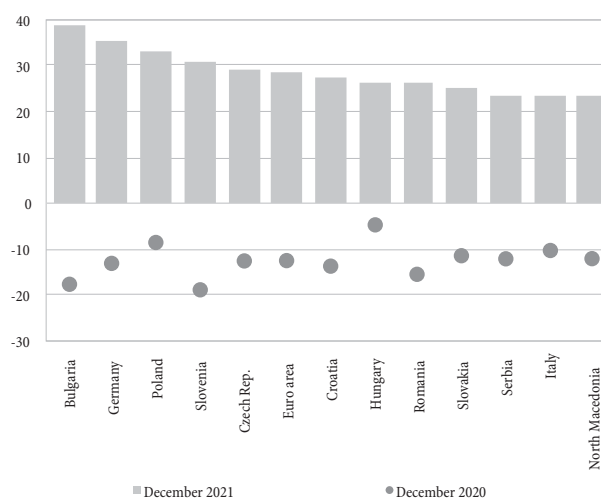
Sources: Eurostat, NBS calculation.

(aggregate contribution of these three industrial sectors to producer prices in December equalled 9.3 pp). Under the impact of the rise in the prices of primary commodities, we also saw a robust increase in the producer prices of chemicals and chemical products, as well as rubber and plastic products.

Impact of imported inflation on inflation in Serbia

That the impact of the global prices of primary commodities on industrial producer prices in Serbia was statistically significant is confirmed by the NBS's econometric analysis.

The NBS conducted the econometric analysis based on the assessment of the relationship between monthly changes in industrial producer prices for the local market with the global prices of primary commodities expressed in dinars, for the period between January 2009 and May 2021 [11, p.15]. The obtained results of the analysis suggest that the global prices of oil, primary agricultural commodities and metals spill over onto domestic producer prices **during the same or the following month**, via the rise in cost-push pressures.

According to imported inflation indicator, which the NBS created for the purpose of its macroeconomic

Chart 7: Price of overseas container shipping (Jan. 2019 = 100)
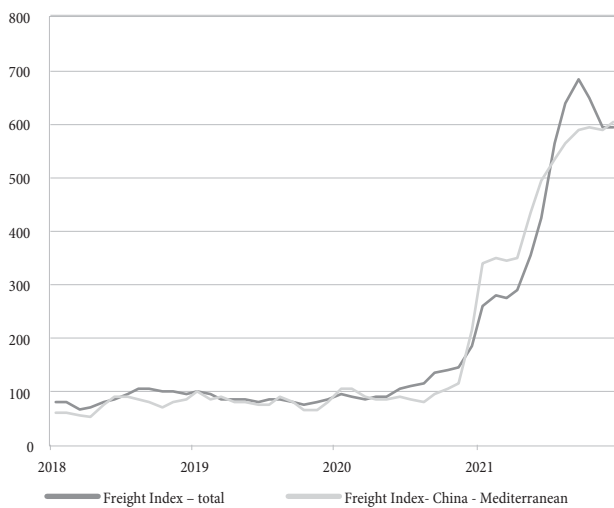
Source: Reuters.

Chart 8: Supply chain disruptions (in index points)
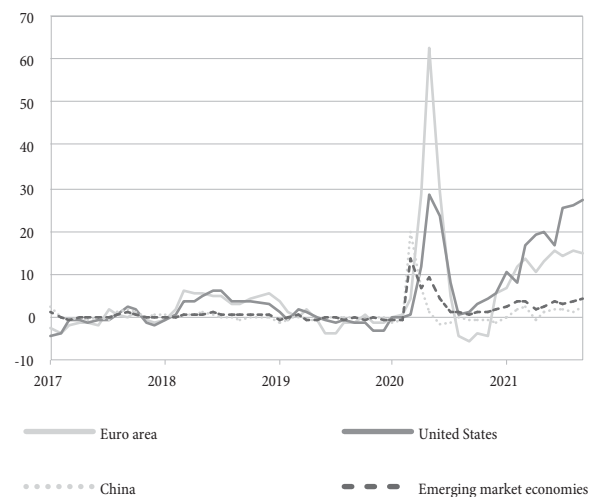
Source: WEO, IMF, October 2021.

Chart 9: Industrial producer prices (y-o-y rates, %)
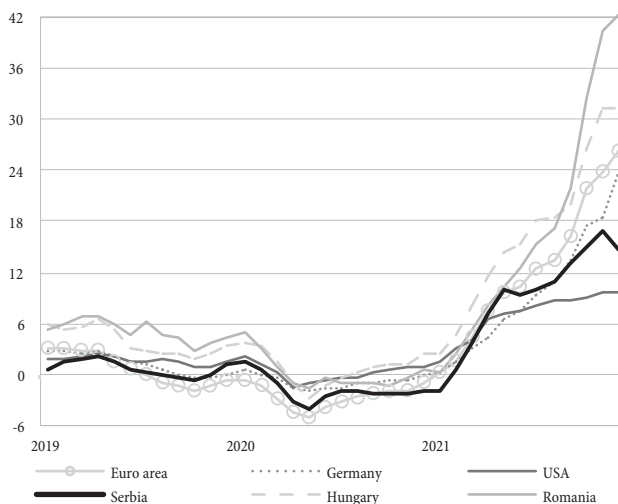
Surce: Eurostat.

Chart 10: Benchmark natural gas price for Europe, Dutch TTF(EUR/MWh)
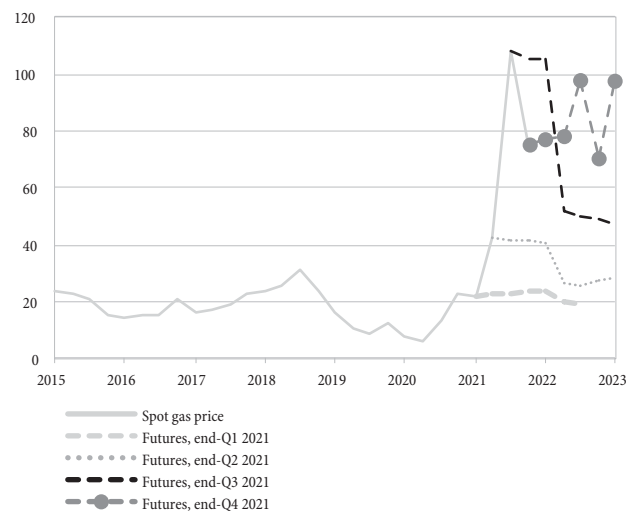
Source: Refinitive.

projections[1] [12, p. 12], in December 2021 imported inflation measured 12.4% y-o-y, while at end-2020 it was in the negative zone (-1.9%). In addition to these growing **cost-push pressures on account of the global prices of primary agricultural commodities, transport and halts in global supply chains**, another factor leading to higher imported inflation was the **higher prices of natural gas and electricity, notably in the euro area**, from which we import the most. Increased **demand** for this energy source was the result of: economic recovery after the pandemic;

adverse weather conditions during last winter and summer (which led to a simultaneous reduction in the production of energy from renewable sources); transition towards production with a smaller degree of carbon-dioxide emission; while the **supply** was affected by the decrease in the inflow of gas from Russia to the rest of Europe, due to delays in the launch of the new gas pipeline. Under the impact of these numerous factors on both the demand and supply sides, the prices of natural gas in the global market recorded a significant increase during 2021, and in mid-October reached record high levels (Chart 10). Although the price of natural gas for Europe decreased at end of October, low stocks and increased demand for gas in the winter months caused its further growth to

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1   The indicator was calculated as a weighted average of the changes in the global prices of oil and food, consumer prices in the EU and Germany's export prices. The weights were the shares of corresponding groups of products and services in the composition of Serbia's import.

Chart 11: Decomposition of y-o-y inflation rate in Serbia (in pp)
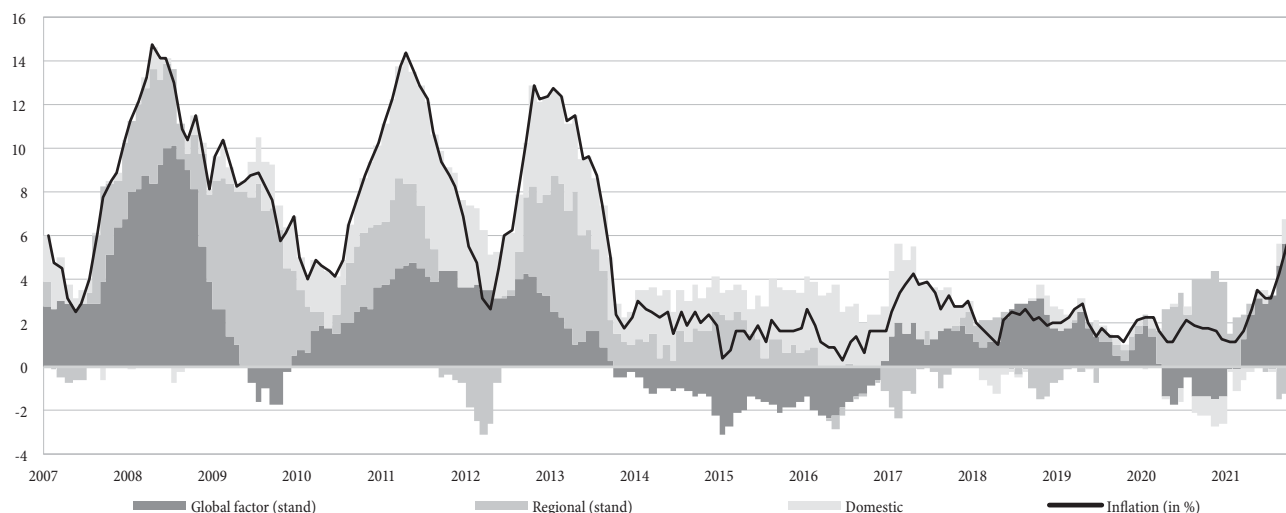
Sources: SORS, NBS calculation.

Chart 12: Contribution to inflation by country – December 2021 and December 2020 (in pp)
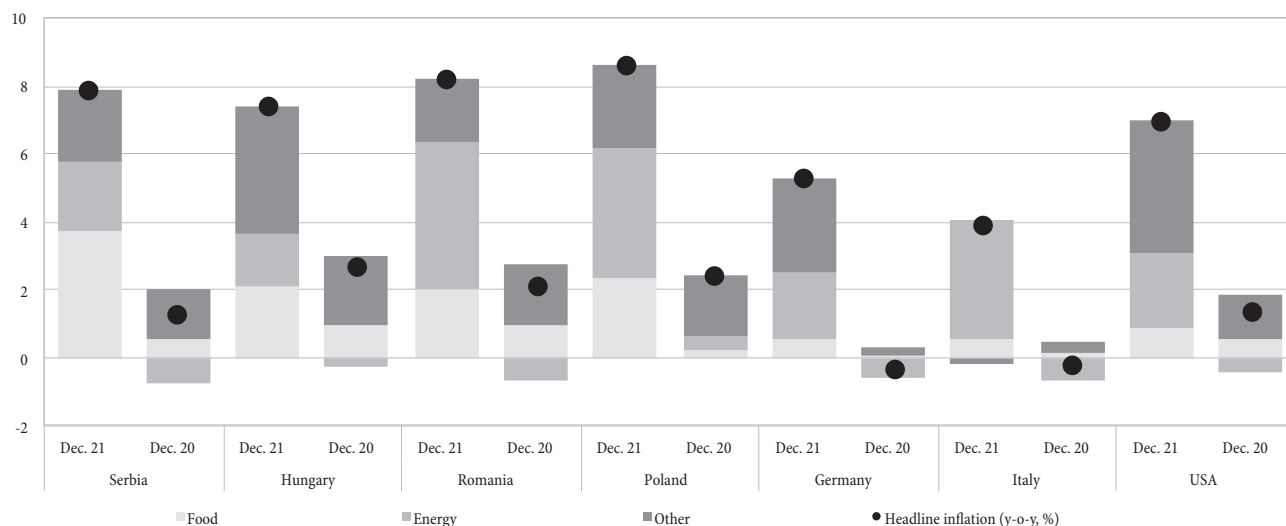
Sources: national statistical offices, NBS calculation.

new record high level in mid-December. The effects of the energy crisis fell particularly hard on Europe, which is highly import dependent on gas. What happened? In 2021, gas inventories in Europe dropped to a minimum, and gas prices rose by more than 600% from 2020. This resulted in a sharp increase in the prices of electricity, as well as coal as an alternative energy source (the use of coal is restricted by the decarbonisation policy). The effects of the high increase in energy prices are mostly felt in areas with high energy dependency, such as the production of construction materials, chemicals and pharmaceuticals, basic metals, and mineral fertilisers for agriculture.

That global factors are crucial to inflation growth in Serbia and the neighbouring countries in 2021 is confirmed by the decomposition of y-o-y inflation rates in Serbia into global, regional and domestic factors, by applying the principal components method. Decomposition was conducted on a data base for 33 European countries (advanced and emerging), for the period from January 2007 until and inclusive of October 2021 (Chart 11). A similar conclusion is also indicated by the fact that key differences in contributions to y-o-y inflation rate at end-2021 and in 2020 come from the prices of energy and partly food, which are mostly determined by the global prices of primary commodities (Chart 12). This conclusion is also applicable to Serbia, as well as other countries.

Base effect

The second common factor dictating inflation movements in 2021 in Serbia and globally is the base effect, which the ECB defines as a purely mechanical effect, i.e. low base from the previous year. The base effect can be described as the effect which an unusual monthly change in the prices from a year ago has on the current y-o-y inflation rate. It is usually calculated as a deviation of the monthly (non-seasonally adjusted) inflation rate achieved 12 months ago, from the estimated typical monthly change for that month. This means that the base effect in the observed month will be positive if price growth a year ago was smaller (or a fall was bigger) than seasonally usual for that month, and vice versa – it will be negative if price growth a year ago

was bigger (or a fall was smaller) than usual. The positive base effect will act towards increasing, and the negative towards decreasing y-o-y inflation [11, p. 69–70].

Looking at 2021, the **base effect was present in the period March–May for energy prices**, which is attributable to the impact of the pandemic on the global prices of oil in the same period in 2020, and thereby on the reduction of the prices of petroleum products in the domestic market. **On average, y-o-y inflation in those three months of 2021 was around 0.4 pp higher solely based on the low base effect.** A positive base effect was also present in the August-October period, on account of the prices of unprocessed food which were lower in the same period of 2020 that usual for the season (notably prices of fruit and fresh meat). During 2020, the prices of fresh meat also reflected the dampened demand, which was impacted by the fact that celebrations and other mass gatherings were not held due to the pandemic.

The NBS estimates that the base effect will have a significant impact on the profile of y-o-y inflation in 2022 as well, and this time it will act towards its slowdown. Overall, the base effect will be almost neutral in January and February, because the higher base for energy prices will mitigate the effect of the lower base for the prices of unprocessed food. As of March, in addition to energy prices, the base effect will also be negative on account of the prices of unprocessed food. The negative base effect will be the strongest in August (-0.6 pp) and September (-1.1 pp), because the prices of vegetables and fruit during Q3 2021 recorded growth, whereas they usually record a seasonal fall in the third quarter (Chart 13), as well as in November (–0.9 pp), due to relatively high increase of processed food prices affected by cost-pressures from world commodities. In aggregate, y-o-y inflation in 2022 will be 3.9 pp lower due to the base effect, which will significantly contribute to its slowdown (Chart 14).

Impact of domestic factors on inflation in Serbia

Among domestic factors, inflation movements in 2021 were predominantly determined by **unprocessed food prices**. The prices of **fruit and vegetables** in early 2021 recorded lower growth than typical for the season (considerably

below the multiyear average), pushing y-o-y inflation in January and February below the lower bound of the target tolerance band. However, due to the effects of cold weather, the lower price growth of this product group early in the year was almost fully compensated for in April. In Q3 as well, fruit and vegetable prices in the domestic market displayed seasonally unusual movements, again as a consequence of unfavourable weather conditions, i.e. high temperatures and drought. In y-o-y terms, vegetable prices rose by 22.4% in December. **Fresh meat** prices in the domestic market also recorded high y-o-y growth in December (23.1%). Fresh meat prices reflected growth in prices of primary agricultural commodities, as well as the fact that they trended low throughout 2020, which was unfavourable for one part of producers and also created the effect of an extremely low base. The contribution of unprocessed food prices to y-o-y inflation thus reached 2.1 pp in December, determining around 25% of the December inflation outcome, while at end-2020 their contribution was mildly negative.

The rise in global prices of primary agricultural commodities, via higher cost-push pressures in food production, also triggered an increase in **processed food prices**, which posted a y-o-y rise of 8.0% in December 2021 (the overall contribution of food prices in December thus reached 3.7 pp, i.e. the prices of unprocessed and processed

food determined around 47% of the December inflation outcome). That pass-through is effected via producer prices, with the results of the econometric analysis of the National Bank of Serbia [11, p.16] demonstrating that the pass-through from producer to consumer prices is not complete. According to the estimates at which we arrived, **a 1% monthly increase in food production prices triggers a roughly 0.4% rise in consumer prices of processed food and fresh meat,** and the pass-through largely occurs within the same month.

The results of the analysis showed that the pass-through effect from producer to consumer prices is not complete in case of other products and services either – around one half of the monthly increase in producer prices passes through to consumer prices. This explains why producer prices increased more than consumer prices in 2021.

Specific for Serbia was the fact that, as opposed to global oil prices, natural gas prices did not directly impact Serbia's inflation to any major extent. Thanks to the underground storage facility in Banatski Dvor and the launch of the TurkStream pipeline, Serbia has improved its natural gas supply to the market. Based on favourable contracts signed with Russia, in effect until mid-2022, Serbia is paying a much lower gas price compared to market prices in the rest of Europe. The electricity price

Chart 13: Decomposition of the base effect into key components in 2021 and 2022 (in pp)

- Energy products
- Unprocessed food
- Processed food
- Industrial products (excluding food and energy)
- Services
- Base effect
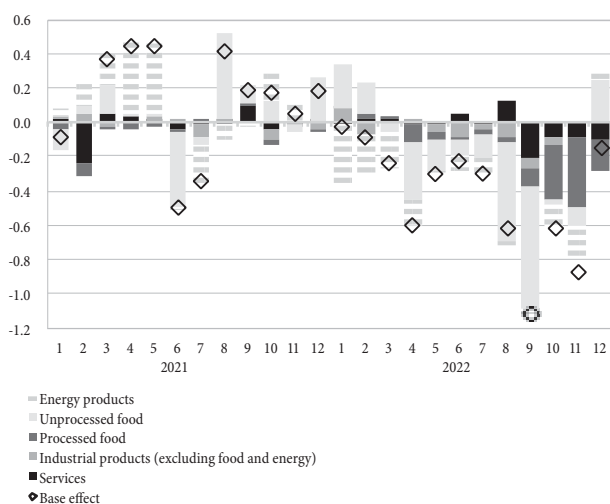
Sources: SORS and NBS calculation.

Chart 14: Cumulative impact of the base effect on y-o-y inflation since January 2021 (in pp)

- Base effect of energy products
- Base effect of unprocessed food
- Base effect of processed food
- Base effect of industrial products (excluding food and energy)
- Base effect of services
- Cumulative impact of base effect
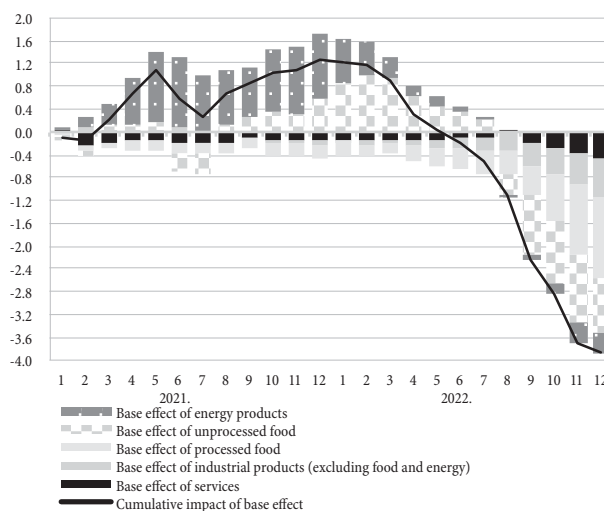
Sources: SORS and NBS calculation.

for households is administered, and the approvals for its adjustments are issued by the Energy Agency. In the largest part of the corporate sector, the electricity price is market-based, but, at the end of 2021 the Government decided that electricity price for the corporate sector should be temporarily capped for a 6 months period at the level of EUR 75 per MWh, while the global energy market is facing difficulties. All this suggests that natural gas and electricity prices should not cause any larger disturbances for the domestic economy, nor add to cost-push pressures on inflation. Still, indirect effects on domestic inflation on account of higher energy prices in the global market do exist, as they are embedded in the prices of imported products.

Demand is surely an important factor underlying the movement of inflation in both directions. Though domestic demand has rallied vigorously in 2021 and Serbia will have posted one of the best growth results in Europe in the two pandemic years (around 6.5% cumulatively), domestic demand created no major inflationary pressures. This is due to simultaneous growth in potential output, i.e. growth in production capacities and jobs, which is supported by extensive and timely monetary and fiscal stimuli aimed at preserving the economy during the pandemic. On that account, a significant boost to Serbia's economic growth in 2021 also came from investment and exports, not just from private consumption.

This is also indicated by the NBS's assessment of the output gap, which is used as a standard measure of demand by other central banks as well. According to the NBS's assessment, the output gap will remain negative until the end of the projection horizon, i.e. over the next two years, which means that **demand-side disinflationary pressures will persist until the end of the projection horizon, with a gradual weakening of this effect** (Chart 15). Also, though growth in private and public sector employment and wages is expected to continue, consumption is estimated to rise more slowly than nominal GDP and therefore no major demand-side inflationary pressures are expected in the medium term either.

Significant domestic factors which contributed to price stability in the past eight years and which in 2021 limited the pass-through effect from imported to domestic prices, i.e. from elevated food and energy prices to other prices, are the relative stability of the exchange rate and mid-term inflation expectations of the financial and corporate sectors anchored within the bounds of the target band. These are at the same time the key factors which helped core inflation in 2021 to run below headline inflation and remain around the target of 3.0% (3.5% at year-end).

Medium-term inflation expectations of financial sector in December (Chart 16) equalled 3.5% (two years ahead) and 3% (three years ahead). Corporates medium-

Chart 15: Output gap estimate, February 2022 (% of potential output)
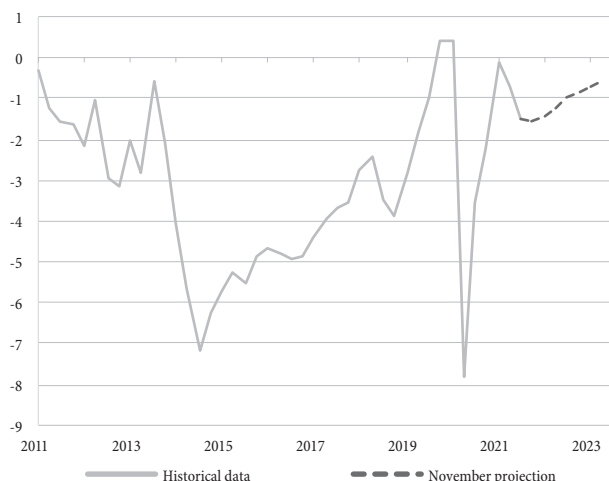
Sources: SORS and NBS.

Chart 16: Medium-term inflation expectations (in %)

Sources: Ipsos/Ninamedija and NBS.

term expectations are 4% (two years ahead) and 3.0% (three years ahead). This indicates that the financial and corporate sectors assess that the Serbian inflation is mainly driven by factors with temporary effect and that in the medium-term it would return to pre-pandemic levels.

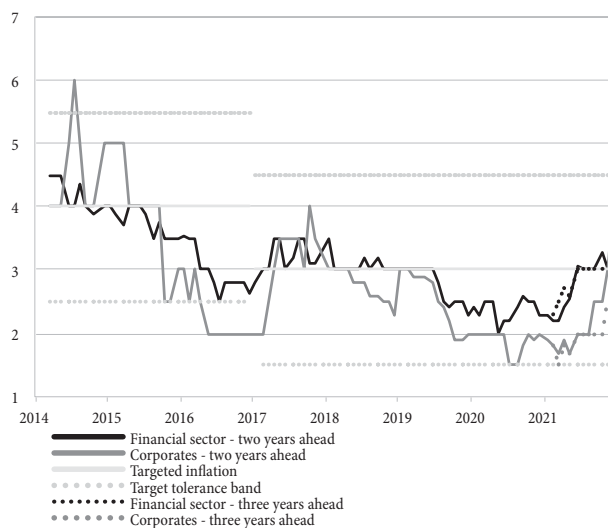Bearing in mind that according to our previous assessments, the pass-through effect of the exchange rate on inflation after one quarter is around 0.15%, and in the one-year period around 0.4–0.45%, it is clear that the exchange rate can significantly mitigate or heighten the imported prices' impact on domestic inflation. Chart 17 also shows that the impact of shocks in the movement of global prices of primary commodities on domestic inflation was additionally strengthened until August 2012 by the effects of a considerable weakening of the dinar against the euro, which resulted in high and volatile inflation at home. The Chart also reflects the fact that the achieved and maintained relative stability of the dinar exchange rate in the period after August 2012 contributed to a lower level and volatility of domestic inflation and inflation expectations.

The importance of the exchange rate and anchored inflation expectations for maintaining price stability is also confirmed by IMF materials. The analysis presented in the October 2021 WEO, monitoring 55 high-inflation episodes, evenly distributed across advanced and emerging economies, indicates that, in the countries

observed, depreciation is the key and statistically significant factor ushering in high inflation episodes [10, p. 52]. On average, for emerging economies, the nominal exchange rate depreciated by around 8% in the quarter the high-inflation episode began. According to the results of this analysis, inflation accelerations were also preceded by an upsurge in fiscal and current account deficits in emerging economies (Chart 18). As shown by the analysis, episodes during which inflation remained elevated for six quarters or more were also associated with a steeper rise in medium-term inflation expectations.

Similarly, the IMF analysis from the October 2018 WEO, conducted for a panel of 19 emerging economies for the period Q1 2004 – Q1 2018, reveals the importance of domestic factors for inflation movements, primarily medium-term inflation expectations and the output gap [13, p. 106]. According to the results of this analysis, after the effect of the external shock dissipates, inflation more quickly returns to its long-run level if inflation expectations are better anchored. This gives policymakers more space to apply a lower-scale monetary policy response, which by extension means less fluctuation of economic activity.

The above factors – domestic demand, maintained relative stability of the exchange rate and mid-term inflation expectations within the bounds of the target, explain why core inflation in Serbia is lower than in

Chart 17: Contributions of individual components to y-o-y growth rate of imported prices (in pp)
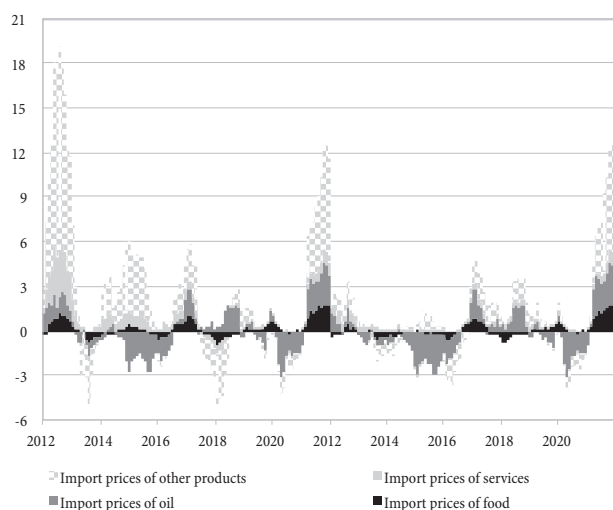
Sources: Destatis, FAO, Bloomberg, Eurostat, SORS

Chart 18: High inflation episodes
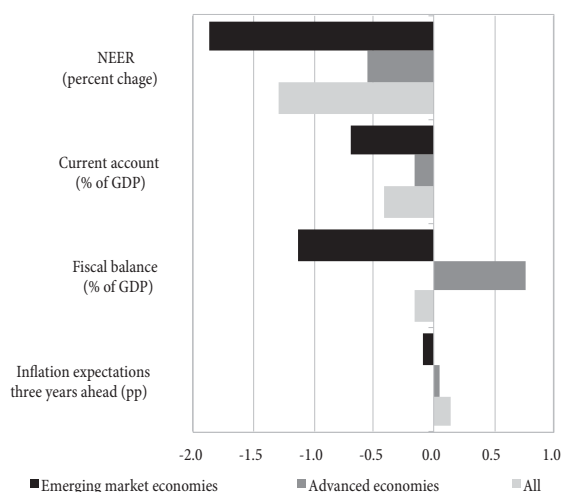
Note: The chart shows the difference between the average value in the three quarters prior to the inflation pick-up episode (q-3 to q-1) and the average value in the past six quarters (q-9 to q-4).

Sources: WEO, IMF, October 2021 and NBS calculation.

many neighbouring countries which are also running inflation targeting regimes, but face core inflation above the upper bound of the target (Chart 19). Also, some of the observed countries experienced economic overheating and strengthening of inflationary pressures driven by labour market factors even before the pandemic, while COVID-19 outbreak only briefly "cooled" the inflation in its initial months.

What are the expectations regarding future inflation movements globally and in Serbia?

Since Q2 2021 debate has been going on as to whether elevated inflation is temporary or more durable in character. While cost-push pressures turned out stronger and more persistent than initially expected, the prevailing estimate is that global inflationary pressures should gradually subside in the coming period [10; 15].

An upswing in primary commodity prices like that recorded in 2021 is unlikely to occur again in 2022. Specifically, the close to 70% hike in the global oil price or the 30% rise in global prices of primary agricultural commodities are unlikely to be repeated. The estimates of international financial institutions and those based on futures also indicate that both global oil prices and prices of primary agricultural commodities will experience a

mild fall in 2022. Apart from the stabilisation of global economic growth and wearing off of the effect of a sudden expansion in demand, this should also be supported by supply-side factors – a gradual lifting of caps on oil production and the new agricultural season, after the last one which recorded below-average output worldwide. Inflationary pressures which in late 2021 also stemmed from high-rising energy prices (natural gas, coal, oil) are estimated as temporary, with prices expected to return to lower levels in early 2022 as heating demand slackens and inventories are adjusted. It is also expected that halts in global supply chains and product shortages in most of the production branches will gradually be resolved, i.e. that global supply will step up. The effects of sizeable monetary and fiscal stimuli which were necessary during the first stage of the pandemic in order to preserve the economy and jobs will also gradually wear off. The impact of accumulated savings and delayed consumption, which in the phase of economic opening contributed to a significant and accelerated demand growth, will also be exhausted. In other words, **in the coming period supply and demand should gradually converge and balance at the global level.** Still, economic growth will continue to face uncertainties with the emergence of the new virus strain, which could again impact supply and demand, as well as inflation.

Chart 19: Headline and core inflation by country (y-o-y growth in %)
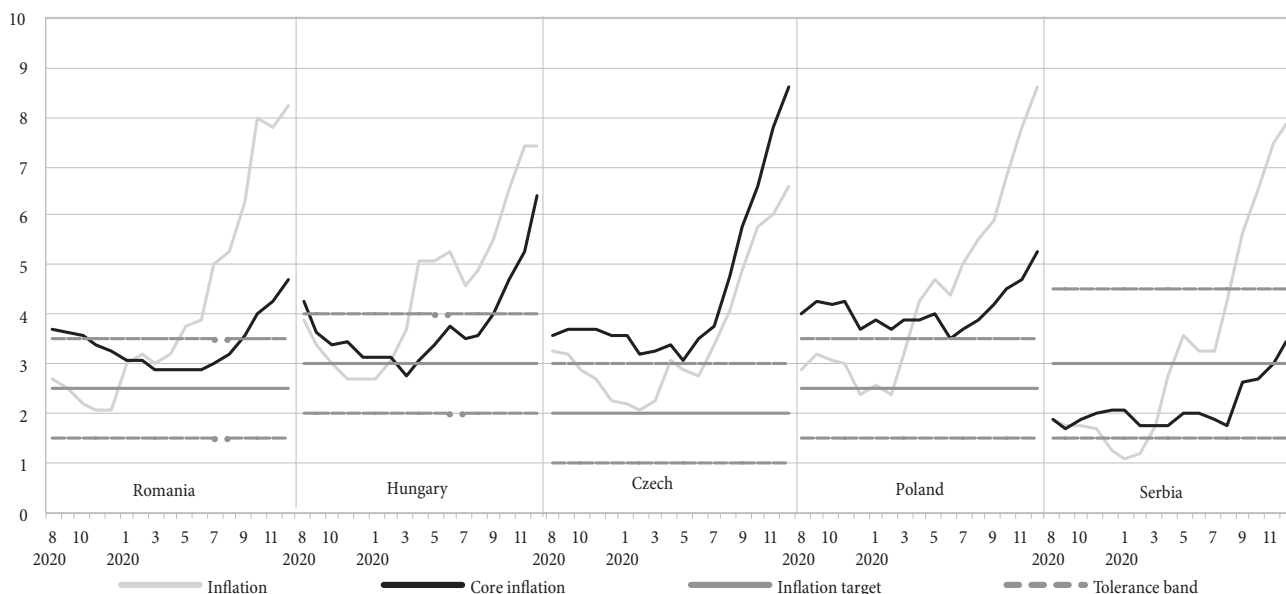
Sources: central banks of selected countries.

Historically, extended inflation episodes were linked to three factors, which in some cases worked individually, and in others in combination:

1. demand which outstripped supply over a longer period;
2. wage growth above productivity growth, when persisting over an extended period; and
3. unanchored inflation expectations.

It is easiest to reduce inflationary pressures on account of the first factor [16, p. 4]. The other two factors may be addressed as well, except that the response must be more complex.

Global inflation growth is for the time being not considered durable, because medium-term inflation expectations are anchored, due to which the so-called secondary effects are not present. Still, these is a risk that further inflation growth could shift them [14, p. 82]. For this reason, and for the sake of further strengthening of the labour market and potential closing of the unemployment gap [17], which would most probably strengthen the so-called Philips curve, i.e. the link between demand and inflation, central banks must exert further caution to avoid the deepening of medium-term inflationary pressures.

According to our central projection from November 2021[2] (Chart 20), we expect that, once the effects of the 2021 rise in oil and fruit and vegetable prices drop out from the

calculation, y-o-y inflation will start to decline as of Q2 2022 and to be around the central target at end-2022, and to remain there in 2023 as well. The inflation decline will mostly be supported by the weakening inflationary effect of most supply-side factors which in 2021 were related to disturbances triggered by the global economy's exit from the pandemic and to the agricultural season. The resolution of the energy crisis in the global market will also contribute to a decline in inflation through several channels. Such movement will also be aided by the measures taken by the National Bank of Serbia, aimed at reducing monetary policy accommodation.

As our econometric analyses reveal, most of inflation growth in Serbia is estimated to be temporary in character. Specifically, we have assessed autocorrelation functions for different groups of time series of prices – unprocessed food, processed food, petroleum products and core inflation. When a group of prices is under the effect of temporary, short-term factors, their time series displays a low degree of autocorrelation. As shown in Chart 22, the time series of unprocessed food has zero autocorrelation at the first lag already, while petroleum products have zero autocorrelation from the second lag onwards. By contrast, a higher degree of autocorrelation for prices included in the calculation of core inflation and, to a smaller extent, also for processed food prices, indicates that their movement is more persistent, i.e. when they go up, their growth continues for some time [17, p. 19]. **The obtained results indicate that**

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2   At the moment when paper was finished, February projections were run, but they were not closed.

Chart 20: Medium-term inflation projection (%)

Source: NBS.

Chart 21: Y-o-y growth rates of core and headline inflation (%)

Sources: SORS and NBS calculation.

core inflation is a relatively good measure of durability of inflationary pressures, and that departures of headline from core inflation are, as a rule, temporary in character. With this in mind, **in order to assess the durability of inflationary pressures and the scale of monetary policy response, it is key to estimate the anticipated movement in core inflation. Under our November 2021 projection, core inflation will remain within the target tolerance band until the end of the projection horizon, which indicates that for the time being there are no fundamental demand-side pressures that would push up inflation in Serbia in the medium term.**

What monetary policy can and should do to prevent inflationary pressures?

Generally speaking, central banks are less concerned about inflation when it is guided by supply-side factors, as they are mostly temporary in character and their direct impact on inflation withers after a while. When these factors produce no major secondary effects, inflation returns to its previous level after their impact ceases, even without a monetary policy response. It is clear that monetary policy cannot influence global prices of primary commodities, for example, nor resolve the problem of value chain disruptions or the energy crisis. Even if production costs went up amid elevated prices of energy, production inputs and transport, a more significant monetary policy tightening through higher interest rates could raise production costs further, add to inflationary pressures

and slacken economic activity. In that case, the monetary policy response would only amplify the effect of the shock on inflation and economic activity.

If the central bank estimates that higher cost-push pressures are spilling over to other prices through inflation expectations, i.e. if the rise in prices of some products and services produces secondary effects, monetary policy should respond in order to contain growth in inflation expectations and prevent further spillover to other prices. The same holds true when cost-push pressures exert pressure on robust growth in wages, much above nominal GDP growth.

A completely opposite approach to containing inflation is adopted in case of demand-side inflationary pressures, where the response of the central bank's monetary and prudential policies is much more efficient. For example, higher loan costs discourage further growth in demand, and it is also possible to take prudential measures limiting loan supply.

There is consensus that monetary policy makers need to monitor different inflation factors from the domestic and international environment and estimate the nature and intensity of their impact on inflation. At the same time, monetary policy makers should not disregard the impact of these factors on the pace of economic growth and on financial stability, which is why it is important that the response is adequate and timely. If monetary tightening is early and/or excessive, economic growth could slow down. Namely, this could weaken the earlier positive effects of monetary relaxation, while pressures

Chart 22: Correlograms of CPI component series
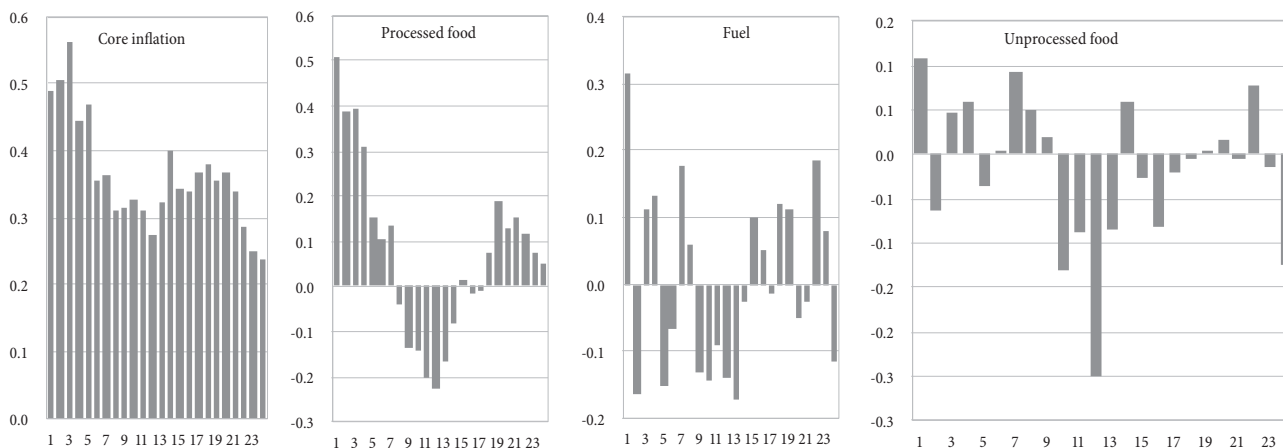
Source: NBS calculation.

on inflation may turn out to be temporary. Furthermore, a more aggressive monetary policy response could have a negative impact on financial stability as well since it would unnecessarily increase the cost of loans. Conversely, monetary policy tightening could also be late and/or insufficient, if inflation pressures later prove not to have been temporary, i.e. if there was an overheating of the economy and an opening of the inflationary spiral amid heightened pressures for excessive wage increase. Such inadequately measured response has the potential to produce negative effects through several channels – lower real value of households' and businesses' income; loss of a part of central banks' credibility as they failed to respond timely; need for a more robust response to compensate for what has been missed, which would reflect negatively on economic growth.

For this reason, central banks are now facing the question of how best to ensure fine tuning and avoid the trap of early/late and/or excessive/insufficient responses. One thing is sure – there is not and cannot be any single answer to the question as to how fast monetary policy should be tightened in current circumstances and whether it should be tightened at all, since the impact of domestic factors varies greatly across countries. Some central banks are taking faster and more robust responses in present circumstances. Others are postponing monetary tightening or responding gradually, on a smaller scale. Probably more than ever, central banks are under additional pressure as the markets are vigilant and keeping a close eye on central banks' each move (hawks and doves, as market analysts call them). At the beginning and at the end of the day, it is clear that everyone is watching closely the unfolding of events in the international arena and the responses of other central banks, but they are adjusting their own monetary strategy to conditions at home.

Central banks of small and open economies find it even more difficult to decide in 2021 if and when to start monetary tightening due to the uncertainty regarding the response of leading central banks, most notably the ECB and the Fed. The impact of change in their policies will be felt through several channels, most notably the financial and trade channels, via their effect on movement in capital, goods and services, and interest rates in the international

financial market which then spill over to national economies. Countries with marked macroeconomic imbalances and substantial needs for external financing find it particularly difficult to estimate the effect of change in leading central banks' policies and to adjust to them timely.

In the monetary strategy (Strategy) of the National Bank of Serbia, the inflation target is a medium-term target, which means that inflation outturns can depart from the target in the short run, amid exogenous disruptions. The National Bank of Serbia will also allow such temporary departures if restoring inflation to target level over a short time horizon calls for changes in monetary policy that could trigger macroeconomic volatility. The Strategy cites sudden changes in prices of primary commodities as an example of exogenous disruptions which could cause inflation to depart temporarily from the target [19, p. 3].

Serbia's monetary policy framework gives monetary policy scope to respond by its instruments so as to avoid a trade-off between the preservation of price stability, financial stability and support to sustainable economic growth. Drawing on the flexibility of the framework which we ourselves created in late 2012, the inflation targeting regime applied by the National Bank of Serbia ensures precisely that. Since December 2012, key auctions of repo sale of dinar securities were conducted applying the variable multiple interest rate method, providing another channel of monetary policy influence – the possibility to respond promptly, even without changing the main interest rates, and the possibility to respond between Executive Board meetings. Monetary policy decisions are also guided by the fact that the transmission mechanism of monetary policy takes place at different speed and intensity through different channels. In other words, time needs to pass in order for the full effects of measures to play out, through different channels, on the level of economic activity, domestic demand and labour market, as well as inflation. Decisions are therefore taken not only based on departures of current inflation from the target, but also based on the departures of expected one-year ahead inflation from the target.

When all facts are considered: 1. that inflation in Serbia is guided primarily by supply-side factors; 2. that inflation expectations are within the bounds of the target band, and

3. that in the monetary policy horizon, according to the November National Bank of Serbia's projection, inflation will be within the bounds of the target band, we estimated that, in such conditions there was no need for a faster or more substantial tightening of monetary conditions, but that gradual monetary policy adjustment is called for. Using the flexibility of the current monetary framework which we created ourselves, since October 2021 we have been gradually reducing monetary policy accommodation without changing our main interest rates. In addition to discontinuing repo securities purchase auctions through which in the prior period (during the pandemic) banks were provided with dinar liquidity, the National Bank of Serbia is gradually increasing the percentage of excess dinar liquidity which it withdraws for a week through reverse repo auctions (repo sale of securities), as well as the weighted average rate in these auctions. Since October 2021, this rate increased from 0.11%, to 0.75%, which is its level at the latest reverse repo auction in the first week of February 2022. These measures were taken in view of heightened cost-push pressures in the international and domestic environment and the need to keep inflation expectations anchored and financial conditions favourable, which is still necessary given the uncertainty about the course of the pandemic and the emergence of new virus strains. We assess that the desired effects can be achieved at a somewhat lower degree of monetary accommodation as well. The National Bank of Serbia stands ready to respond promptly by using all monetary policy instruments on hand should any of the risks that would keep inflation above the upper bound of the target band for a prolonged period of time materialise.

Concluding remarks

Inflation increased in many countries in 2021 on the tide of economic recovery, with consumer and business optimism rising, buoyed up by fiscal and monetary accommodation. And whereas demand, bolstered by measures, recovered robustly, production fell short in some segments, creating disruptions in value chains. The sudden rise in global prices of primary commodities, shortages of some production inputs and supply bottlenecks led to amplified cost-push

pressures which, coupled with the effects of last year's low base, pushed inflation up to several decades' highs in many advanced economies. The same question is debated worldwide: are pressures temporary or more durable in character?

Globally elevated inflation pressures have so far had no major impact on a change in economic behaviour of market participants and their inflation expectations, but extended duration of high cost-push pressures could change this. If inflation expectations go up, so will the potential of secondary effects. Also, some structural factors could keep inflation more permanently above central banks' targets, such as labour force shortfalls in some sectors. Altogether, this calls for careful monitoring and assessment of the nature and intensity of inflationary pressures, with clear and transparent communication with the public and readiness to respond promptly and adequately using all disposable measures.

Though assessments prevail that inflation growth has for its most part resulted from temporary factors, the extended duration of global value chain disruptions, especially when they are more complex, reveals that global supply is not sufficiently flexible when faced with demand which displays a high growth potential. Potential more durable consequences should therefore not be disregarded either. Specifically, the "stop and go" recovery has resulted from: 1. differentiated sectoral impact of the pandemic, which monetary and fiscal measures were not able to balance out fully; 2. changeable epidemiological conditions in some countries; 3. differences among countries with regard to stimuli directed at preserving capacities included in global production and trade chains. Together with the still unclear effects of the pandemic on the composition of demand, this has heightened uncertainty with regard to macroeconomic developments and, by extension, prices, and again opened the question of stagflation. What do we know? If structural factors are the key determinant of inflation, monetary policies will face a new kind of challenges to which they will not be able to respond using their measures only. On the other hand, the contribution to be expected from fiscal and structural policies will greatly depend on the fiscal space available for repairing these distortions. Substantial fiscal stimuli taken so far

have narrowed this space in many economies. This will be particularly important for small and open economies, where fiscal space, along with the efficiency of previously undertaken measures, will significantly determine the possibility of external financing and, by extension, the stability of the exchange rate. In Serbia, in the conditions of full coordination of adequate monetary and fiscal policy measures, external imbalances have narrowed drastically, while the internal balance has been struck and reserves built up. A proactive approach, coupled with the implementation of structural reforms, bolstered our economy's resilience to numerous external uncertainties.

Historically speaking, episodes of long and persistent inflation were mostly associated with: excessive demand growth over a longer period of time; high and unsustainable wage growth above productivity; unanchored inflation expectations; macroeconomic imbalances resulting in a weakening of the domestic currency. As a result of our policies, Serbia is now far from that scenario – medium-term inflation expectations of the financial and corporate sectors are anchored around target midpoint, external imbalance has improved significantly, while the country's FX reserves are at an all-time high, contributing to relative stability of the exchange rate. The medium-term macroeconomic framework, also agreed with the IMF, envisages robust investment in infrastructure coupled with a strengthening of the fiscal position, preservation of external position within sustainable bounds, inflation returning to pre-pandemic projected paths and wage growth below nominal GDP. This view is shared by international financial institutions which expect inflation in Serbia to slow in 2022 and return within the target band, as the effects of temporary factors wear off. An example of such expectations is Standard&Poor's which in its press release in mid-December 2021 revised up Serbia's investment-grade outlook, which means we are half a step away from achieving our goal: "… *in contrast with regional peers, core inflation has remained within the NBS's target thanks to the stable exchange rate, but also thanks to broadly anchored inflation expectations on the back of the institution's effective efforts to keep low and stable inflation over the last seven years… This could mean that headline inflation could converge back to the NBS' target tolerance band of 3%* ±

1.5% fairly quickly in the second half of 2022 as prices of food and energy normalize" [20, p. 3].

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has been serving as Governor of the National Bank of Serbia since August 2012. In early 1992, she was employed by Prištinska banka a.d., part of the Beogradska banka system, as Deputy General Manager and continued to work in the banking industry until 1999. From March 1998 until October 2000, she served as Minister of Economic and Ownership Transformation in the Serbian Government. Since 1999 until her appointment as Governor, she worked in the Telecommunications Company "Telekom Srbija", initially at the position of General Manager of the Logistics Department (March 2005-December 2008), after which she worked as an expert for economic operations.

She obtained an MA degree in 1999 from the Faculty of Economics of the University of Priština and earned her PhD in Economics from the same university in May 2011. She has authored a number of studies on privatisation and financial markets. In 2006 and 2007, she lectured at the Faculty of Management in Novi Sad.

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SERBIA 2030: DEBT SUSTAINABILITY AND GROWTH PERFORMANCE TESTING

Srbija 2030 – testiranje održivosti duga i performansi rasta

Abstract

The aim of this paper is to examine the adequacy of the chosen growth model of the country through the lens of Serbia's external debt sustainability. For this purpose, an empirical model was developed for making long-term projections and testing the debt sustainability, which can be considered as an operational tool when compared to existing models developed by the International Monetary Fund and the World Bank. Unlike these models, the proposed model binds all macroeconomic balance tables so that the item of one table indicates the dynamics and levels of items from other tables, thus ensuring both internal and external validity of the model. The proposed model of macroeconomic projections, in fact, implies the development of simultaneous projections of individual macroeconomic aggregates and variables as well as their reconciliation. As a result, a complete system of interconnected long-term projections is obtained. On the basis of such macro-projections, it is possible to examine the movement of debt and in this regard to examine the sensitivity of projected debt values to various macroeconomic shocks. This is extremely important in the context of growing uncertainty in the world, both in terms of economic developments and security. The consequences of the COVID-19 pandemic are yet to be summed up, but it is quite obvious that due to increased market risks, investors will be increasingly cautious when investing in other countries, which can pose serious challenges for Serbia, as a small and open economy, to finance its chosen path of economic growth and development.

Keywords: *external debt sustainability, macroeconomic projections, growth model, model sensitivity*

Sažetak

Cilj ovog rada je da se ispita adekvatnost odabranog modela rasta zemlje kroz prizmu održivosti spoljnog duga Srbije. U tu svrhu razvijen je iskustveni model za izradu dugoročnih projekcija i testiranje održivosti duga zemlje, koji se može smatrati nekom vrstom operacionalizacije već postojećih modela razvijenih od strane Međunarodnog monetarnog fonda i Svetske banke. Za razliku od ovih modela, predloženi model uvezuje sve makroekonomske bilansne tabele tako što veličine iz jedne tabele postuliraju dinamiku i nivoe veličina iz drugih tabela čime se obezbeđuje kako interna, tako i eksterna validnost modela. Predloženi model makroekonomskih projekcija zapravo podrazumeva simultanu izradu projekcija pojedinačnih makroekonomskih agregata i veličina, kao i njihovo međusobno usaglašavanje. Rezultat toga je sistem međusobno uvezanih dugoročnih projekcija. Na osnovu tako izrađenih makroprojekcija moguće je ispitati kretanje duga i, u vezi sa tim, ispitati osetljivost projektovanih veličina duga na različite makroekonomske šokove. Ovo je posebno važno u uslovima sve veće nesigurnosti u svetu, kako u pogledu ekonomskih kretanja, tako i bezbednosti. Posledice pandemije kovida 19 će se tek sumirati, međutim, sasvim je izvesno da će, usled povećanih rizika na tržištima, investitori biti sve više oprezniji prilikom ulaganja u druge zemlje, što za Srbiju, kao malu i otvorenu ekonomiju, može da donese ozbiljne izazove u pogledu finansiranja njenog odabranog puta ekonomskog rasta i razvoja.

Ključne reči: *održivost spoljnog duga, makroekonomske projekcije, model rasta, senzitivnost modela*

Introduction

The level and dynamics of external indebtedness present one of the fundamental macroeconomic challenges faced by policymakers. According to the criteria of the International Monetary Fund and the World Bank, a country's over-indebtedness occurs when its debt exceeds the share of 80% in GDP, i.e. when the ratio of total debt to exports of goods and services exceeds the limit of 220%. Since borrowing policy is an integral part of macroeconomic policy, its success depends on how much the general macroeconomic policy is effective. To secure this, policymakers need an effective tool to analyze the current economy and to predict and understand the future state of the economy on a broad scale. In fact, they need to know whether the chosen growth model will reduce or increase the country's indebtedness.

However, the majority of available methods are based on the combination of conjunctive analysis and the application of complex econometric models. Applied to developing economies, facing both internal and external pressures, such models are generally less acceptable due to short and fragmented data series, difficulty in achieving the consistency of all projections, their neglecting of qualitative nature of the institutional factors, etc. Such limitation may be solved by using a set of macroeconomic balance equations, with a low share of behavioral equations. This approach is in the core of financial programming models used by the International Monetary Fund (IMF) and the World Bank (WB).

The first model of financial programming was developed by Polak (1957). In essence, the model can be regarded as a systematic attempt to integrate monetary policy with the balance of payments issues. Based on this model, it was developed an extended financial programming model that underlies the IMF stabilization programs designed for economies operating under a fixed exchange rate. In practice, the model has been modified several times.

In the early 1970s, the World Bank developed Revised Minimum Standard Model - RMSM. The main objective of the model is to determine what is necessary level of investments, imports, and external financing so as to achieve the targeted real growth rate of GDP and exports. In essence, the model relies on a two-gap accounting framework – investment-saving gap and external trade gap. If the level of savings is not sufficient to finance a targeted level of investment, then it must be financed from abroad in the form of net import. The clarity of the model is its main strength but also a source of weakness. The simplicity of the linkages in the model, the lack of prices and other key policy variables, and the number of exogenous variables pose numerous challenges [1, p. 28].

In order to explore more policy options, the model was extended so as to include multiple economic agents in a consistent flow-of-funds framework. This flow-of-funds version of the RMSM is known as the Revised Minimum Standard Model eXtended (RMSM-X). Namely, the basic version of the RMSM-X consists of four economic agents or sectors: Public (Central government), Monetary (Central bank and deposit money banks), Foreign (The balance of payments) and Private (Rest of the economy). Each sector consists of two accounts – a current account and a capital account.

Like the RMSM, the RMSM-X is based on the fundamental macroeconomic identity,

$$Y = Cg + Cp + Ig + Ip + X - M$$

where Y, Cg and Cp, Ig and Ip, X, and M stand for GDP at market prices, government and private consumption, government and private investments, export of goods and services, and imports of goods and services, respectively.

Essentially, RMSM-X integrates into the RMSM framework, the IMF's approach to economic stabilization, generally referred to as financial programming, which is extensively based on practical experiences obtained through beneficiary country work.

The model of macroeconomic projections presented in this paper is in line with this the IMF-WB RMSM-X framework. It is named the model of macroeconomic projections for testing long-term debt and growth performances sustainability.

Depending upon the selected scenario of economic growth and the respective model assumptions, once the model is executed, it provides the output results which are further used to calculate indicators of the country's external macroeconomic position. The indicators are

accompanied with the projection implementation risks. This is followed by an overview of alternative development scenario of lower economic growth in relation to the presented basic scenario.

Apart from technical part, the proposed model takes into account an expert analysis and knowledge on structural characteristics and the performance development of an economy. At the same time, the application of econometric models is avoided due to the above-mentioned issues associated with this kind of quantitative approaches. By doing so, in terms of the statistical-mathematical apparatus, the model is maximally simplified. Nevertheless, complexity is emphasized in the field of the balances connectivity (the nucleus of the model is the bridge between the expenditure side of GDP, "Balance of payments" and the state and envisaged repayment of public and commercial debt of the country).

Methodological framework

The model used in this paper is set up as a set of balanced accounts, without involving econometric estimations, with the use of certain approximate relations, acknowledged in practice. Thereby it is possible, in real time and as required to carry out actions in each time point and in each place in the related tables, following the changed model assumptions. This ensures the frame for carrying out the scenario analysis. In addition, it is possible to quantify the effects of certain policies and measures and to assess possible causes of an external shock on the country macroeconomic balance [7, p. 7].

This model of macroeconomic projections builds upon simultaneous projections of the following components:
- Projections of prices and exchange rate;
- Projection of GDP ("Gross Domestic Product") and its expenditure side components in current prices;
- Projections of BOP ("Balance of Payments");
- Projections of saving and investment balance;
- Plan of external indebtedness and repayment and plan of budget income, expenditure and deficit.

When reconciled, all these projected components make a system of long-term projections, similar to the system of communicating vessels.

The core of the projections model is the bridge between GDP from the expenditure side and balance of payments – the so-called external economic relations balance.

The selected development scenario is usually created on five-year or ten-year basis. In particular case, the paper deals with 10-year interval, namely the projection period from 2021-2030.

Projections of the BOP and GDP by expenditure side start from setting up the goals of a certain development scenario, which are specified as exogenous variables. This means that the so-called target variables are to be stated. In terms of their nature, the distinction is made between the development dynamics values, the GDP expenditure side structure and so-called parameters of financial and real market stability. In this respect, the target value of development dynamics is GDP growth rate, while the target values for the GDP expenditure side are the share of external trade balance (goods and services) in GDP, share of gross fixed investments in GDP, and the share of the general government consumption in GDP (the sum of collective and individual consumption alimented from the budget sources, i.e. net earnings in public health service and public education). As the target variables for balance of payments are taken the share of exports of goods and services in GDP (set to 70% in 2030) and the minimum coverage of imports of goods and services by foreign exchange reserves according to the reduced external liquidity risk. Finally, the target parameters of financial and commodity market stability are consumer price index (CPI), foreign exchange rate, and target share of exports of goods and services in GDP.

Regarding the control variables for the model, they are – real index of household consumption excluding individual consumption alimented from the budget sources, gross fixed capital formation real index, and general government consumption real index. All these trends in the real and financial sector are reflected in the fiscal results, i.e. in the public consumption balance. However, when deriving fiscal projections certain limitations are imposed – the target values are defined taking into account the prescribed fiscal rules. This primarily concerns the dynamics and share of compensation of employees and pensions in GDP. In addition, the aim is to increase the share of fixed

investments in GDP. Therefore, on fiscal projections side, the target values are the share of salaries and wages and pensions in GDP, including their dynamics related to the GDP real growth and the share of capital investments.

Following the assumed relations as well as the target and control variables, a set of the external macroeconomic position indicators are compiled, namely:

- Share of current balance account in GDP;
- Share of imports of goods and services in GDP;
- Foreign exchange reserves as equivalent in the number of import months;
- External debt service ratio (capital and interest repayment in relation to exports of goods and services);
- External debt in relation to exports of goods and services;
- External debt in relation to GDP;
- Share of foreign direct investment in GDP;
- External trade volume (exports + imports) in relation to GDP;

In addition, indicators related to the fiscal accounts are derived, such as:

- Share of total income in GDP;
- Share of total expenditure in GDP;
- Share of capital investments in GDP;
- Share of fiscal deficit/sufficiency in GDP.

The major indicators for estimating the scenario sustainability, i.e. external macroeconomic position (called also: debt sustainability) are foreign exchange reserves expressed by import months and debt service ratio. When the volume of available foreign exchange reserves is below three-month imports value, or debt service ratio is above 25%, the scenario sustainability is critical and the assumptions, i.e. objectives are not sufficiently progressive. High growth rates of GDP and investments may make the scenario seem acceptable from the point of external position indicators. However, it ought to be acceptable from the aspect of given limits to growth and development, such as e.g. reform agenda or external restrictions. Therefore, the issue of calibrating growth dynamics is necessarily related to the assessment of circumstances and policies, as well as the time required to achieve accelerated reindustrialization process [7, p. 8].

Projection of GDP from the expenditure side

The model of GDP projection and its aggregates from the expenditure side, at current prices follow the combined methodological framework of the IMF's financial planning model and the Revised Minimum Standard Model of the World's Bank (RMSM).

In essence, the model can be regarded as the method-model, or heuristic one, since it does not rely on any theoretical concept of modelling macroeconomic balance but assumes relying on experience, i.e. expertise concerning structural characteristics of economy and knowledge, i.e. following policies, strategic documents, plans and their implementation.

The motivation to develop such an "empirical" model originated from a series of objective restrictions in econometric modelling of a small and open economy such as the Serbian economy, and they are the following:

- Inherited transition processes from the previous three decades;
- Market imperfections;
- Ad hoc and asynchronous, however also conflict policy, etc. [7, p. 9].

Compilation of the GDP aggregates from the expenditure side in 2020. The compilation of GDP from the expenditure side for the year 2020 was implemented in accordance with the methodology of annual national accounts[1]. The results are obtained from detailed annual calculations made of available data from administrative sources such as financial statements – balance sheet, income statement and statistical annex of enterprises, cooperatives, unincorporated enterprises, banks and other financial institutions, insurance companies, stock exchanges and brokers, budget beneficiaries and other legal entities, data of the National Bank of Serbia, Ministry of Finance, Tax Authority and other institutions, as well as regular statistical surveys and data available from the statistical system.

Estimation of the GDP aggregates from the expenditure side in 2021. The estimation of GDP in 2021 was carried

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1 Data on GDP and its aggregates are downloaded from the SORS dissemination database.
https://data.stat.gov.rs/Home/Result/09020104?languageCode=sr-Cyrl

out on the basis of the model starting from the equation of macroeconomic balance:

GDP = C + I + G + X – M,

where C stands for individual consumption; I for investments (gross fixed capital formation + changes in inventories); G for public consumption; X for exports of goods and services; M for imports of goods and services;

The starting point is certain target ratios and values in the stated equation. Namely, the following target parameters of dynamics and shares are combined:

- Target dynamics parameters:
  - Real GDP growth rate
- Target parameters of financial and non-financial market stability:
  - Consumer price index, COICOP
  - Foreign exchange index
- Target parameters of share in the structure of GDP use:
  - Share of external trade balance in GDP (goods and services)
  - Share of gross fixed capital formation in GDP
  - Share of public consumption in GDP (general government consumption, NPISH and collective consumption).

The Framework for this estimation includes also control variables whose role is to secure validity of the model: (i) real trend index of household consumption excluding individual consumption alimented from the budget sources, (ii) real trend index of gross fixed investments, and (iii) real trend index of general government consumption.

In other words, the projections of nominal GDP (for 2021 – estimate) and of GDP components from expenditure side were derived by defining GDP real growth rate, the share of investments, general government consumption and net exports in GDP, while applying the account of prices and deflators and derived real trend rates.

Calculation procedure for deflators of GDP aggregates from expenditure side, item by item. Before any calculation of the nominal values and real trends in the GDP aggregates from the expenditure side, it is necessary to derive the deflators for the forthcoming years (in our case – 2021 and further).

Firstly, we have derived GDP deflator for the first projection year, i.e. 2021. To this effect, as inputs for the calculation of this deflator, we take GDP real growth rate (k), share of net exports in GDP (d), coefficient of consumer prices trends (ic) and external trade deflator (id).

In formal expression, GDP deflator (k) is derived using the following equation:

$$k \approx i_c + d_0 \times \frac{r_1}{v_1} \times (i_c - i_d) \tag{1}$$

where:

d_0 – share of net exports in GDP, previous year ($d_0 = \frac{|\Delta X_0|}{GDP_0}$, where $|\Delta X_0|$ – absolute value of previous year net exports; GDP_0 – previous year GDP)

i_c – coefficient of consumer prices trends (current year average to previous year average);

i_d – coefficient of external trade deflator trend (current year average to previous year average);

r_1 – net exports real growth rate, current year;

v_1 – GDP real growth rate, current year.

When deriving the relation for calculating GDP deflator (k), as a starting point, it is used the following macroeconomic relation: GDP = T - $|\Delta X|$

where T – total domestic demands; ΔX – net exports of goods and services, i.e. the difference between exports and imports of goods and services that in the case of Serbia bears negative mark, therefore its absolute value is added to GDP in order to get the value of total domestic demands.

By transforming this relation into structural expression (GDP %) and introducing deflator, the following relation is obtained in the GDP deflator account:

$$\frac{1}{k} \approx \frac{(1+d_1)}{i_c} - \frac{d_1}{i_d} \tag{2}$$

where d_1 – share of net exports in GDP, current year, namely

$$d_1 = \frac{|\Delta X_1|}{GDP_1} = \frac{|\Delta X_0| \times r_1 \times i_d}{GDP_0 \times v_1 \times k} \tag{3}$$

where

$|\Delta X_1|$ – absolute value of net exports in current year;

GDP_1 – GDP, current year;

ΔX_0 – net exports in previous year;

GDP_0 – GDP, previous year;

r_1 – net exports real growth rate, current year;

v_1 – GDP real growth rate, current year;

k – GDP deflator.

By introducing formula (3) into expression (2), the final relation for calculating GDP deflator is obtained as follows:

$$k \approx i_c + d_0 \times \frac{r_1}{v_1} \times (i_c - i_d) \qquad (4)$$

By applying the formula (4), it is assumed that the inputs were given in advance, i.e. they are free or derived according to projection, i.e. forecasts.

In this manner, GDP real growth rate (v_1) was previously derived from the projected, i.e. estimated GDP components on production side (GVA by activities, at current prices). In our case, for the year 2021, GDP real growth rate was estimated to equal 7.4% based on the SORS forecasting methods, applied within the framework of the Quarterly national accounts.

For the next year (2020), the projection of the GDP real growth was taken, which was presented in the IMF press release – IMF Staff Completes Review Mission to Serbia[2].

Taking into account the given restrictions to growth and development, such as the dynamics of economic structural changes and the restrictions imposed from the environment, projected was GDP growth rate of 4% in the last years of the projection period. The forecasted growth of consumer prices (i_c) for 2021 equals 4.0%, and it was calculated by applying ARIMA model of time series analysis. In the forthcoming years of the projection period, as regards the basic model, no changes are forecasted concerning the consumer prices growth.

External trade deflator (i_d) for the current year was derived on the basis of the previously estimated RSD to EUR exchange rate and the inflation rate in the EU countries in 2021 as follows:

External trade deflator =
[(Average exchange rate for calculation of external trade's deflators_current year) /
(Average exchange rate for calculation of external trade's deflators _previous year)]
* (external prices growth). $\qquad$ (5)

2 This document is available at the IMF site: https://www.imf.org/en/News/Articles/2019/10/15/pr19375-IMF-Staff-Completes-Review-Mission-to-Serbia

However, the deflator calculations do not stop here. The deflator for collective consumption is identified with the GDP deflator (k) and the deflator for household consumption with inflation (i_c).

For the purpose of calculating the real trends of investments, deflator of investments is derived, as residual, according to the following relation:

$$k \approx \frac{\bar{C}}{i_c} + \frac{\bar{I}}{i_n} + \frac{\bar{G}}{k} + \frac{\overline{\Delta X}}{i_d} \qquad (6)$$

where
$\bar{C}$ – share of individual consumption in GDP (current year);
$\bar{I}$ – share of investments in GDP (current year);
$\bar{G}$ – share of public consumption in GDP (current year);
$\overline{\Delta X}$ – share of net exports in GDP (current year);
i_n - unknown deflator of investments.

The key assumption for the basic scenario is to anchor the deficit in external trade in goods and services and to reduce the share of deficit of balance of payments current transactions in GDP, where from restrained growth of domestic demand and consumption will result.

Results

Basic (real) development scenario – assumptions and related indicators

Since Serbia belongs to the group of small and open economies, its economic policy is significantly influenced by the development of the economic and political situation in the world, especially the trading partner-countries. The importance of investments and credit capital inflow from abroad are an essential part of the chosen growth model of the country. Unfortunately, the current global situation related to COVID-19 threatens to produce the overspill of world economic crises and its emergence as a BOP crisis in Serbia, given how severely the virus hit Serbia's main trade partners. However, Serbia has had a fiscal room for maneuver, which was pivotal in allowing the government to respond to the crisis. Also, it is recognized that the relative stability of the financial sector (capital adequacy of the banking sector, high exchange reserves etc.) may become an asset for post-COVID-19 recovery.

However, potential escalation of Russian-Ukraine crisis can jeopardize further adjustments and following recovery of the economy.

On the grounds of this, the presented model anticipates that the average GDP growth rate for the period 2021-2030 is equal to 4.4% (see Figure 1).

In 2021 GDP growth rate equals 7.4%, while in 2022 it would equal 4.3%. From 2023 onwards it would remain unchanged, with 4.0% all the way until the end of the projection period. According to this growth dynamics, until 2030 the GDP value would reach EUR 94.8 billion.

Available amount for GDP use (i.e. Gross National Expenditure) depends upon the sum of GDP and deficit of goods and services values. In the observed projection period, the share of external trade deficit in GDP increases from 8.3% as estimated in 2021, to 8.9% in 2025. The next year records a slight increase of 0.1 pp. and from that year on, the share remains at the level of 9.0% all the way until 2030.

The dynamics of the share of deficit of goods and services (negative net exports) in GDP are the major factor influencing movements of the share of the balance of payments current transactions deficit in GDP. With net exports target shares (of 9% until the end of the projection period), the current transactions deficit is estimated to express the share of 4.3% of GDP on average in the first five years of the projection period, i.e. from 2021 to 2025. This share of current transactions deficit in GDP is caused by payments coming due as regards the credits from the period before and an early purchase of eurosecurities from 2011 and 2013 in June 2019[3] as well as other financial arrangements with international institutions such as the EIB which provided EUR 200 million to the Development Fund of Serbia to support a faster COVID-19 recovery of Serbian SMEs and mid-caps in 2020, etc. After 2026 it falls from 4.2% to 3.7% in 2030. It should be noted that the share of current transactions deficit is decreasing slowly due to considerable influence of the due obligations on the basis of eurosecurities issue from 2019[4], with maturity date in 2029 (capital payment). Therefore, after the eurosecurities issue in 2019 and partially buying debt on the basis of previous eurosecurities issue, Serbia continues to issue new eurosecurities in order to get protected from the hedging risk of the excessive foreign exchange outflow on the basis of due capital settlement as well as COVID-19 and energy crisis. Moreover, on Sep 3, 2021 Fitch rating agency affirmed the Serbia credit rating at "BB+" with a stable perspective of further improvement.

The target parameters of the basic development scenario are the following:

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3 On 26 June 2019, the Republic of Serbia issued euro expressed government bonds in the international capital market, whereby insured were the funds for the partly refinancing of earlier issued debt securities, i.e. eurosecurities coming to maturity date in 2020 and 2021, amounting to USD 1.1 billion. It is worthwhile noting that this is the first issue of euro expressed government bonds in the international capital market. The issue nominal value amounted to EUR 1 billion, while the yield based on the issues price is 1.619%. The maturity date for this issue is 26 June 2029.

4 See the footnote above.

Figure 1: GDP trends, 2019-2030
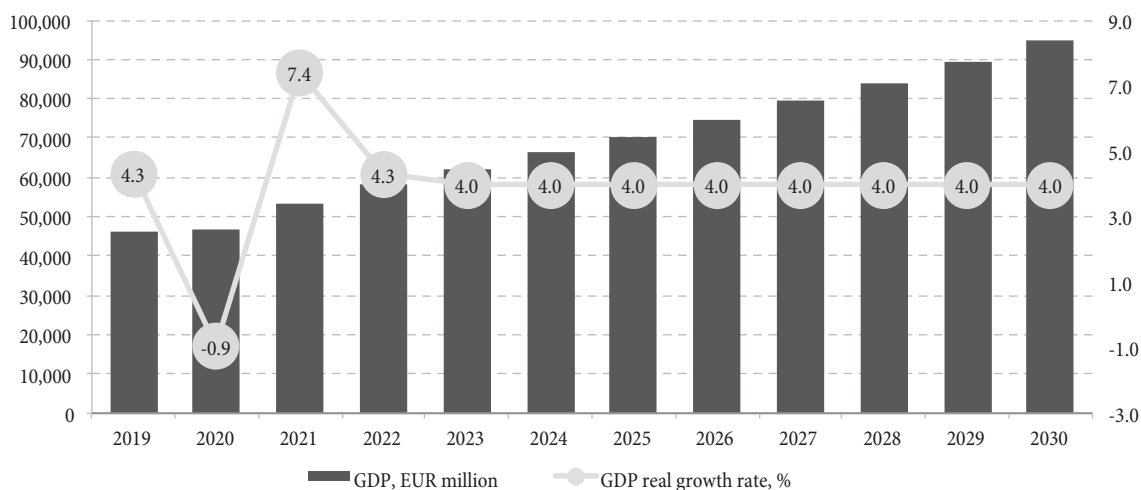
- Increased share of gross fixed capital formation/ investments in fixed assets to 25% in 2025 and 28% in 2030 (anticipating average annual growth of 7.3%),
- Reduced share of general government consumption[5] in GDP, from 17.8% in 2021 to 14.5% in 2030,
- Upgraded share of exports of goods and services in GDP, from 53.6% in 2021 to 70% in 2030,
- Reduced deficit of balance of payments current transactions, from 4.4% in 2021 to 3.7% of GDP in 2030.

Inflation was estimated at 4.0% in 2021, while for 2022 it was projected at 4.5%. In 2023 inflation rate would equal 3.5%, and from 2024 to the end of the projection period it would equal 3.0%. Until 2022 the RSD exchange rate was estimated to remain almost unchanged, whereupon its depreciation would equal 1.0% until the end of the projection period.

The target share of gross fixed capital formation will be realized in case its average annual real growth equals 7.3%. Thereby the share of gross domestic savings in gross investments, from the estimated 52.8% in 2021, would fall to 51.8% in 2023. From 2024 it would remain on upward trend reaching 61.2% in 2030 (see Figure 2).

With target shares of net exports (9% until the end of the projected period), final demand is rising at a slower pace than GDP. The average annual growth rates for the period 2021-2030 are the following: Gross domestic product (4.4%); Final consumption (4.0%); Gross fixed capital formation (7.2%)

When net exports and investments are targeted, household consumption is a residual item within final demand. Its share in GDP, is estimated at 64.5% in 2021. After an increase in 2022 and 2023 (65.9%), it continues to fall positioning at 64.8%. On the other side, the target share of general government consumption in GDP, from 17.67% in 2021, falls to 14.5% in 2030 (see Figure 3).

The explained changes of the GDP use structure demands high rates of imports growth and therefore highly positioned level of target exports – from 53.6% in 2021 to 70.0% in 2030. In the structure like this, the dominating growth of consumption is replaced by the dominating investment growth (see Figure 4).

Concerning the balance of payments, the main target parameters are the following: upgrading the share of exports of goods and services in GDP to 70% in 2030 (see Figure 5) and limiting the decrease in coverage of imports of goods and services by foreign exchange reserves to about 4.0 months at the end of the period observed.

In addition, for the period 2021-2030 the FDI/Foreign direct investment net inflow is projected to amount to EUR 47.8 billion. In the same period, the cumulative deficit of current transactions would amount to about EUR 30.0

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5 General government consumption was expressed as the sum of government collective consumption (component of expenditure side GDP according to SNA) and government individual consumption (also a component of expenditure side GDP as a part of total individual consumption – education, human health, etc.). This means that household consumption, as an aggregate of individual consumption, was subtracted for the amount of general government individual consumption.

Figure 2: Gross domestic investments – financing sources, GDP %
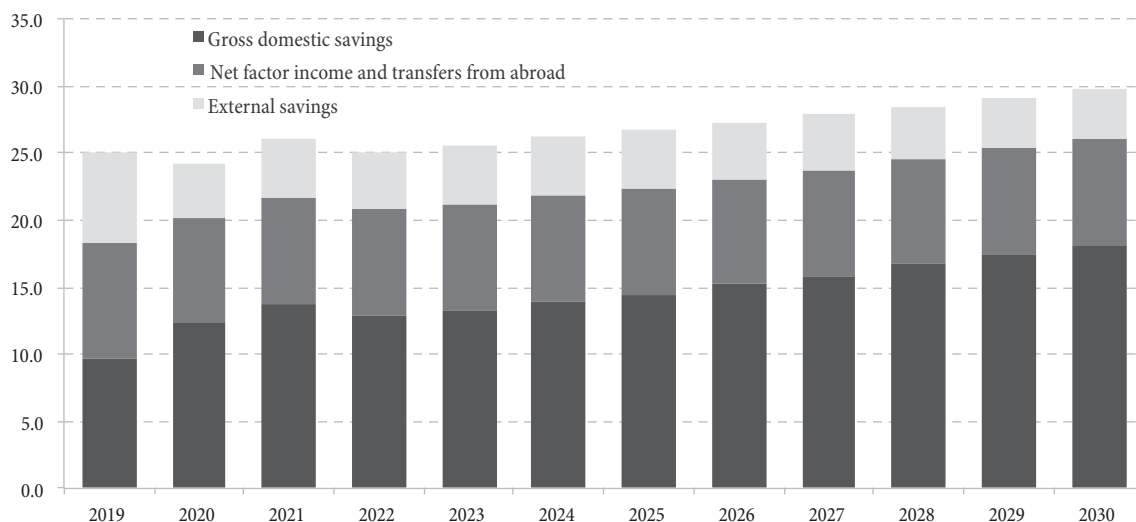
billing, while donations that could possibly relax the situation have not been taken into account.

In accordance with the given macroeconomic projections of the GDP expenditure side and balance of

payments, the projections of the fiscal frame for the period 2021-2030 were derived.

The projections of the major items of income, i.e. expenditure side – the items with the largest share in the

Figure 3: Household and general government consumption, and gross fixed investments, 2019–2030, %
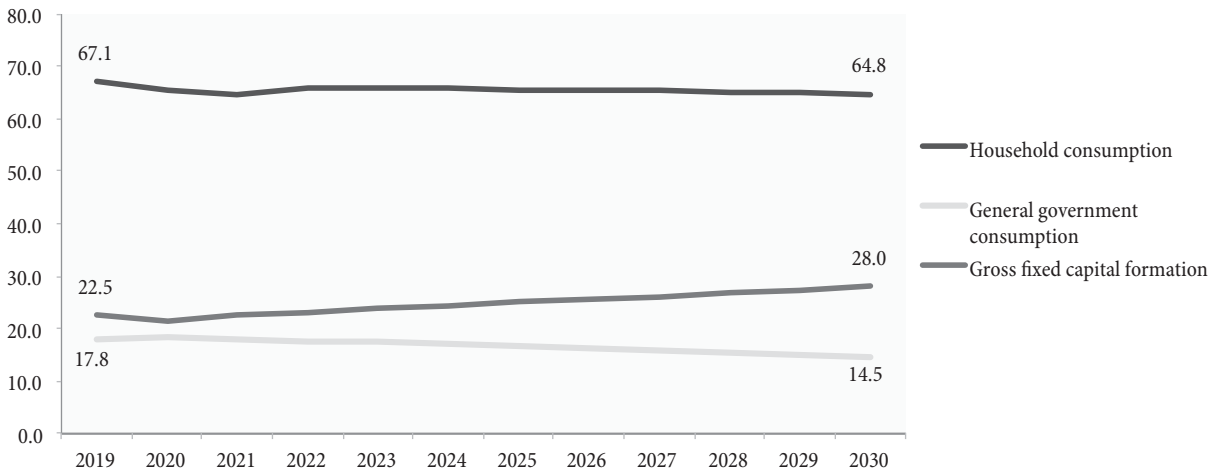
Figure 4: Inter-annual real growth of GDP, investments and consumption, 2019-2030, %

Figure 5: Current transactions deficit, 2019-2030, GDP %

budget income, i.e. expenditure – were handled with the utmost care. So, on income side it was necessary to make the most precise forecasts as regards the movements of income from VAT/ Value added taxes, taking into account that this item holds the top share in total income. Since these taxes actually belong to taxes on consumption, we may suppose that they will move in accordance with domestic demand. Also, the total VAT based income consists of VAT from imports and VAT in domestic market. Therefore, in our pr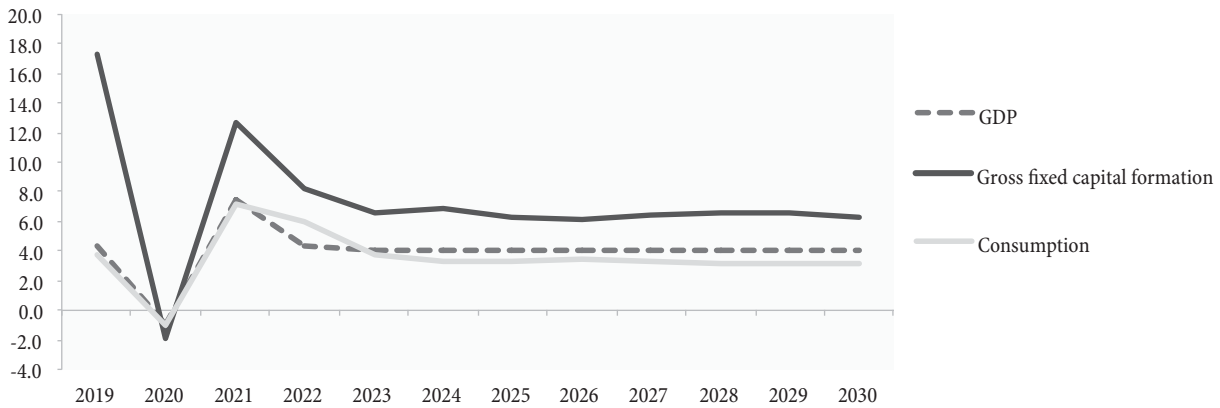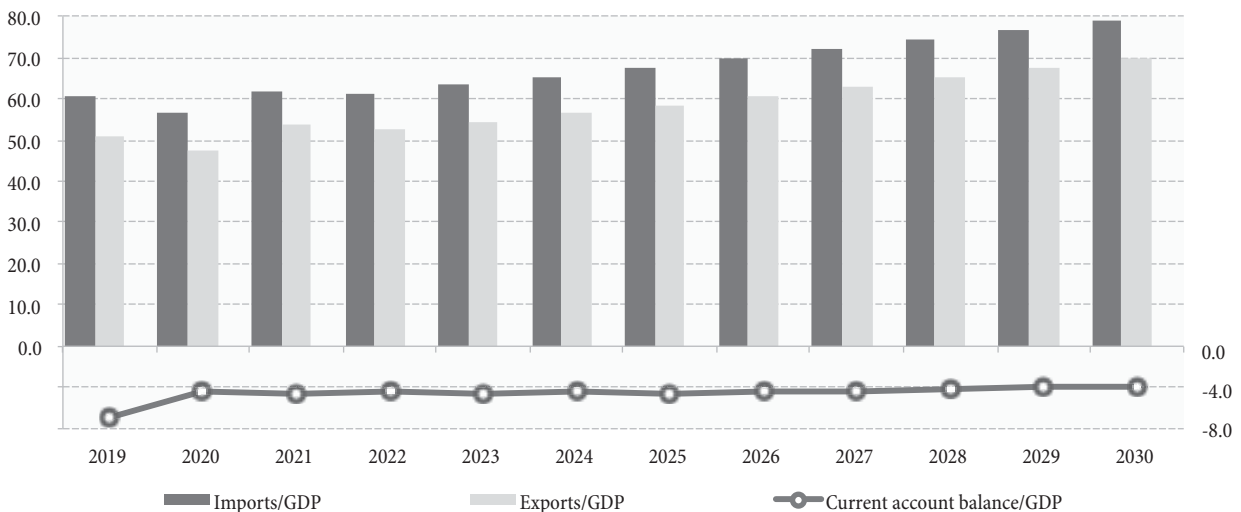ojections we supposed that VAT based income from imports will follow the import trends (the corrective element here is the coefficient reflecting the export – import dynamics ratio, since exported goods are subject to VAT refund). VAT based income in domestic market is calculated as the difference between the total VAT based income and VAT based income from imports. Also income from customs duties was forecasted on the basis of imports growth rate; however, all other items on the budget income side are assumed to move in accordance with the GDP trends.

As far as the budget expenditure side is concerned, for the expenditures mostly going to consumption (remuneration for employees, budgetary transfers, of which the largest item is transfers to the Pension and disablement fund, as well as social benefits from the budget), the projections were made on the basis of the estimated growth rates of the general government consumption, while the capital expenditures were anticipated according to the target share of capital expenditures in GDP equaling 6.5%.

For the purpose of projecting expenditures for pensions, Swiss formula was applied, which means that pension amounts were 50% made in accordance with the inflation rate, and 50% in accordance with the salaries and wages growth.

Apart from the basic formula for harmonizing pensions, introduced was the assumption on the top limit for the total amount of paid pensions, taking into account the specific fiscal rules defined by the Budget system law that are expected to ensure the reduced fiscal deficit in relation to GDP. The current provisions of this Law stipulate that 11% of GDP shall be assumed as the top limit for the total amount of paid pensions. In addition, it is a firm intention that the share of S&W of

the general government level in GDP should be limited to 7%. This is actually a form of macroeconomic automatic stabilization. These intentions shall be implemented with the aim to ensure the fiscal sustainability of the pension system.

In case the existing tax rates remain unchanged, the share of consolidated public revenues in GDP will stabilize at about 41%. Besides, the share of public expenditure in GDP would be decreased – from the estimated 47.4% for 2021, it would equal about 40% of GDP in 2030, which would mean the realized budget surplus in relative amount of about 1.9% of GDP at the end of the projection period. By considerably increasing the public investment in infrastructure, a higher economic growth rate should be ensured, both by direct investment and, more importantly, through indirect effects of the new infrastructure on the private investment growth. To this effect, the target share of public investment equaling 6.5% GDP was determined. In 2021, the relative volume of public investment equaled 7.5% GDP.

The starting position in the year 2021 makes the fiscal deficit of 4.1% GDP, which in the next five year is diminishing into the surplus of 0.4% GDP in 2027, which will be maintained until the end of the projection period. Likewise, in 2030 the budget surplus would equal 1.9% GDP. This result comes out from the assumptions built into the projections of the GDP expenditure side elements, namely those concerning the public consumption adjustments, i.e. the relative fall of the current public consumption when related to GDP. [7, p. 18]

Basic (real) development scenario: Results and implementation risks

The highest risk to the sustainability of macroeconomic growth and development scenario as a whole is closely related to the issue of external debt sustainability and external liquidity. In the relevant macroeconomic literature, there are variety of indicators defined and used for the analysis of external debt sustainability – for the purpose of this paper, the following indicators are chosen: (i) external liquidity indicators, (ii) external solvency indicators and (iii) indicators of national economic openness.

(i) External liquidity indicators

1. *Total external debt service ratio* (share of capital and interest repayment in exports of goods and services). In 2021 the estimated external debt service ratio equals 18.2%. Then the growth of 1.9 p.p. in 2022 (20.1%) is followed by a fall of 5 p.p. (15.1%). These high rates are seen as a consequence of obligations (interests and capital) that come due based on the country indebtedness in the earlier period. Afterwards, from year to year, this ratio tends to fall, with the exception of years 2027 and 2029 when it increases by 3.5 p.p. and 2.3 p.p. from the previous years respectively. In the last year of the projection period, the ratio equals 7.0%.

In the first years of the projection period, as well as 2027 and 2029, notable is the risk of high external debt repayment burdens, which indicates the necessity of stronger investment activity grounded on significant growth of domestic savings share in financing investments, and then foreign direct investment.

2. *Foreign exchange reserves by months of imports (of goods and services)* – adequacy of foreign exchange reserves indicates the period in months when a country can maintain the existing level of imports in case all inflows are stopped.

Imports of goods and services coverage by foreign exchange reserves is reduced from the estimated 5.9 months in 2021, to 4.0 months in 2030, in accordance with the decreased risk as regards external liquidity (see Figure 6).

These movements in the foreign exchange reserves to imports ratio assume high external liquidity and the achieved investment rank in the country's credit rating, and thereby the possibility of less expensive borrowing (lower capital price). In accordance with Standard and Poor's methodology, the actual Serbia's credit rating for long-term borrowing in foreign currency is BB/positive outlook.

Under the unchanged conditions – ceteris paribus, the substitution of consumption development scenario with pro-investment one (basic scenario) and the transferring of investment focus towards exchangeable goods, as well as the adjustments in macroeconomic policy and sectorial policies can ensure that Serbia achieves investment rank in the country's credit rating, and thereby the access to less expensive capital for financing the selected model of growth and development. On the other side, due to a sharp rise of inflation in some leading economies of the world, it is to expect that the central banks will increase their reference interest rates.

(ii) External solvency indicators

3. *Share of total external debt in exports of goods and services.* In 2021 the estimated ratio external debt to exports of goods and services equals 123.0%, which is within sustainability limits (220%). From year to year this share records fall, and in 2030 it would equal 46.3%.

4. *Total external debt share in GDP.* In 2021 the estimated external debt amounts to 65.9% GDP. From year

Figure 6: Foreign exchange reserves and imports coverage, 2019-2030, GDP %

Foreign exchange reserves, EUR billion

Imports coverage by foreign exchange reserves, number of months (r. axis)
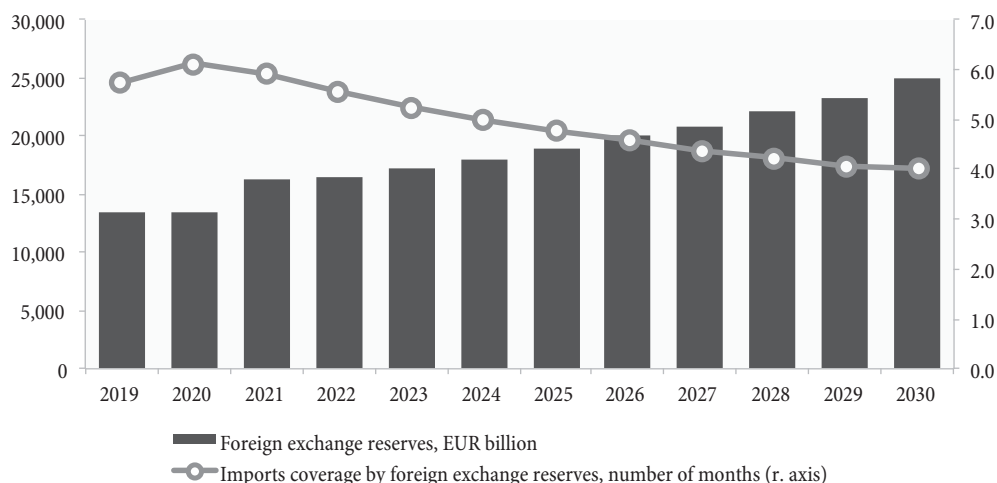
to year, external debt is growing in absolute expression, but in relative expression the share of external debt in GDP falls to 32.4% (see Figure 7).

(iii) Indicators of national economic openness

5. *Share of foreign direct investment/FDI in GDP.* In 2021 the estimated share of foreign direct investment/ FDI in GDP equals 6.8%, while in 2022 it will fall to 6.5% and remains at that level until the end of the projection period. The reduced FDI share in the last projection years is expected to come as a consequence of the possible profit outflow.

According to the projection, in the period 2021-2030 the net FDI inflow would amount to EUR 47.8 billion. The cumulative deficit of current transactions in the referent period amounts to almost EUR 30.0 billion.

The degree of economic openness is also measured by the external trade to GDP ratio (share of summed exports and imports in GDP), which notes growth from the estimated 115.6% in 2021 to 149.0% in 2030; namely, indicated is a high degree of economic openness in the projection period.

In terms of implementation risks, the distinction is made between international environment risks and internal risks. In the first case, the country may face deepening global economic crisis, migrant crisis, slower economic growth in the Serbian external trade partner countries, withdrawal of investors – capital outflow, energy crisis, more severe crediting conditions, etc. and climate changes. When it comes to internal risks, these may refer to further

consumption growth instead of investments, problem of economic illiquidity/liquidity, fall of FDI inflow, unfavorable demographic trends – birth rate fall, demographic aging and aging of working-age population, political risks, etc.

Alternative scenario of economic growth: Instead of the conclusion

When related to the presented basic scenario, the alternative, pessimistic scenario envisages a lower economic growth. So, the average annual growth in the period 2021-2030 equals 2.6%; however, the maximum growth rate (estimated 7.4%) would be achieved in 2021, thereafter it tends to fall and equals 1.4% in 2024. Then follows a period of 2% growth in the forthcoming projection period, i.e. until 2030 (see Figure 8). In addition, assumed is a growing share of current transactions deficit in GDP, from the estimated 4.4% in 2021 to 5.4% in 2030.

The target parameters envisaged by the alternative development scenario are the following:

- After the estimated 22.5% in 2021, the share of fixed investments in GDP remains at this level until 2023. In 2024 and the following years it is projected to be 22% all the way until 2030 (with the average annual growth of 3.1%);
- Maintained share of general government consumption in GDP of 17.0% during the whole projection period;
- Decreased share of exports of goods and services in GDP, from the estimated 53.6% in 2021 at 40.0% in 2030;

Figure 7: External indebtedness indicators, 2019-2030, %

External debt/GDP ⸻ External debt/exports ⸻ Debt service ratio
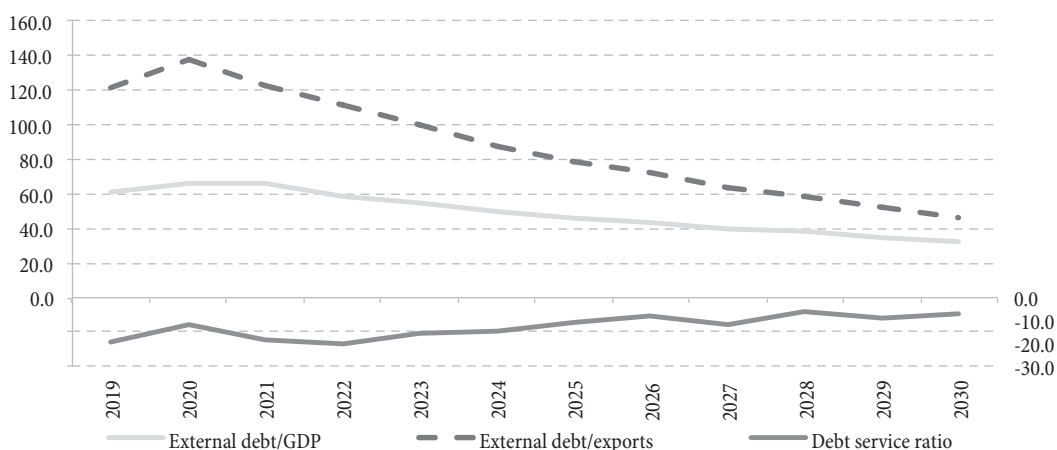
- Growing deficit of current transaction in the balance of payments, from 4.4% in 2021 to 5.4% GDP in 2030.

With the target shares of net exports (7% until the end of the projection period), final demand is growing at a faster pace than GDP. Following are the average annual growth rates for the period 202-2030: GDP (2.6%); Final consumption (2.8%); Investments (3.1%).

The projected low average annual growth rate of 2.6% combined with the increased all forms of consumption inevitably leads to the rising inflation rate and the RSD depreciation. Such a scenario could not ensure long-term sustainability, and as early as in 2022 foreign exchange reserves would start to fall, and this trend would be resumed until the end of the projected period. Therefore, the foreign exchange level would fall from the starting 5.9 months of imports coverage to 3.3 months. An alternative to spending foreign exchange reserves to cover the missing inflow is seen in borrowing at high price. As a result, external liquidity would "break" due to high interest rates. On a long-term basis, the external solvency of the country would deteriorate. Precisely, in the case of alternative scenario, the external debt to exports of goods and services ratio would reach the level of 107.0% in 2030. In the same year, the share of external debt in GDP would equal 42.8%.

Taking into account the reduced share of exports of goods and services in GDP, from estimated 53.6% in 2021 to 40.0% in 2030, which would also affect the imports, the deteriorated economic openness level is to be seen. Therefore, the openness of the economy would fall – from estimated 115.6% in 2021 to 87.0% in 2030.

Relatively lower influence of the external component on GDP at the end of the projection period is made in the circumstances of increased deficit, which may indicate the problems in economic structure, i.e. its problematic competitiveness.

Effects on external balance – Using the alternative scenario of economic growth, it is possible to identify the dangers and risks associated with the forthcoming period of lower economic growth in the projected period. In this manner, due to the decreased average annual GDP real growth rate – from 4.4% to 2.6% – in the period until 2030, the possibilities of increasing consumption would be limited to 2.8% annually, instead of 4.0%.

Namely, according to the basic scenario, GDP expressed in real terms (at constant prices, 2021=100) in the period 2021-2030 would be increased for EUR 17.7 billion, while according to the alternative scenario the decrease would amount to EUR 1.6 billion[6].

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6   For calculations at constant prices we applied the method of calculation at previous year prices, which assumes that for each year its previous year is taken as base year. The concept 'base year' means that this is year the values of which at current prices are applied as weights for calculations at constant prices.
    GDP calculation at previous year prices assumes that each previous year is regarded as base year, and that the weights are changed every year. According to this method, comparable are only two years that are expressed at same prices. The series of value data calculated at previous year prices cannot be used for real growth rates calculation, as the data are not comparable by years (each year is valued at previous year prices). In order to obtain the series of comparable data for calculating growth rates, it is necessary to apply the method of chain-linking, whereby the data are reduced to one, selected referent year. Referent year is the year used for presenting time series at constant prices. In the series of index numbers, it is the year having the value 100. In our case, this is the year 2018.

Figure 8: Cumulative GDP growth, 2021-2030, %
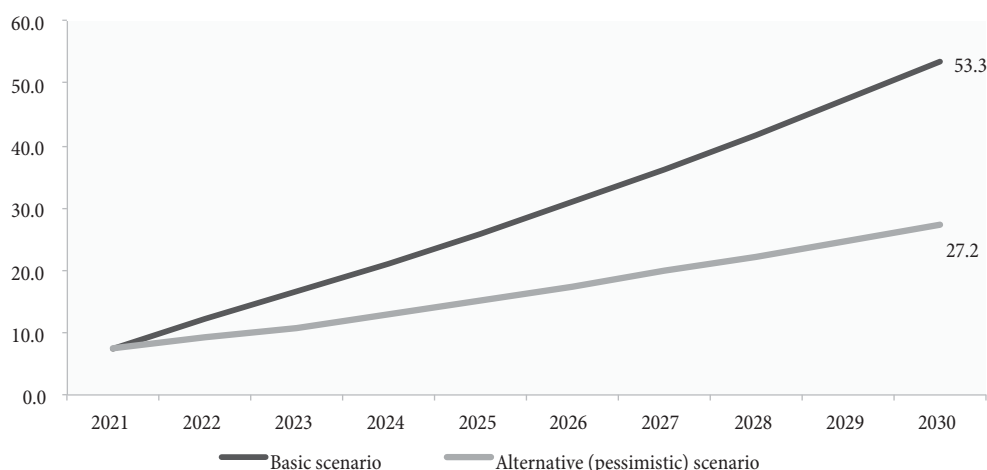
As far as investments are concerned (see Figure 9), according to the alternative scenario their growth is lower – on average it equals about 3.0% annually, which is by 4.2 p.p. less than envisaged by the basic scenario (7.2%). Consequently, the total investments for all projection years (cumulative) would amount less for EUR 40.5 billion. As regards FDI cumulative, they amount less for about EUR 16 billion.

The projected low average annual growth rate of 1.9%, combined with the increased all forms of consumption, inevitably leads to the rising inflation rate as well as RSD depreciation. Such scenario could not ensure long-term sustainability – high constraints are put on consumption of foreign exchange reserves as well as on debt service ratio.

Expressed on cumulative basis, the foreign exchange reserves would be reduced for about EUR 64.0 billion when related to the basic scenario. At the same time, according to the alternative scenario the coverage of imports of goods and services by foreign exchange reserves at the end of the projection period would equal about 3.3 months, in contrast to 4.0 months as envisaged by the basic scenario (see Figure 10).

An alternative to spending foreign exchange reserves to cover the missing inflow is seen in borrowing at high price. As a result, external liquidity would "break" due to high interest rates. On a long-term basis, the external solvency of the country would deteriorate. Precisely, in the case of alternative scenario, the external debt to exports of goods and services ratio would reach the level of 107.0%

Figure 9: Gross fixed investments – cumulative and average annual growth rate, 2021-2030
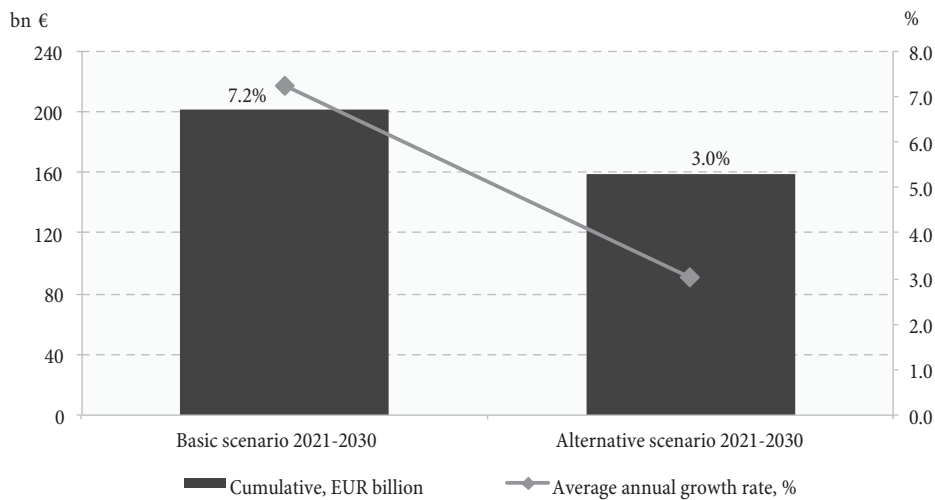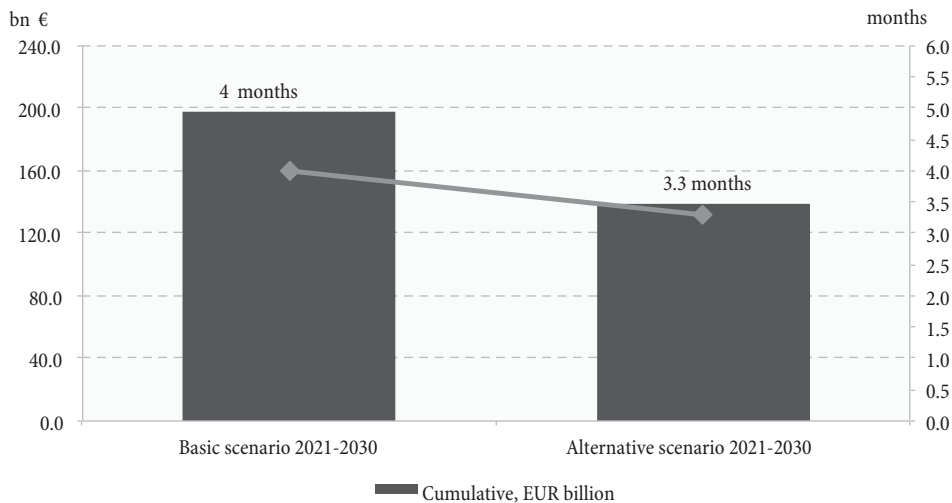

Figure 10: Foreign exchange reserves – cumulative and imports of goods and services, 2021-2030

in 2030. In the same year, the share of external debt in GDP would equal 42.8%.

Taking into account the reduced share of exports of goods and services in GDP, from estimated 53.6% in 2021 to 40.0% in 2030, which would also affect the imports, the deteriorated economic openness level is to be seen. Therefore, the share of exports of goods and services in GDP would fall – from estimated 115.6% in 2021 to 87.0% in 2030. According to the basic scenario, in the last year of the projection scenario this share equals 149.0%.

Relatively lower influence of the external component on GDP at the end of the projection period is made in the circumstances of increased deficit, which may indicate the problems in the economic structure, in the first place, low competitiveness.

Since Serbia is in the midway of reforms, the new model of economic growth and development in the forthcoming decade requires two mutually related U-turns. The first one assumes a U-turn from consumption to pro-investment and export-oriented economic growth. The second turn is indispensable to the domain of accelerated reforms and European integration and the respective macroeconomic and structural policies. Essentially, these are mutually dependent turns, however in the direction from the second to the first one. Without resuming and

successfully completing the reforms and the EU integration process, the implementation of the new model of growth and development in not possible [7, p. 25].

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TALENTS AND INNOVATIONS: CASE OF SERBIA

Talenti i inovativnost – slučaj Srbije

Abstract

This research focuses on talents and skills needed for companies' leap towards a higher level of innovativeness and competitiveness in the new digital era. We analyzed data collected through the online survey conducted among 84 companies that operate in Serbia. We did two correlation analyses. The first one observed determinant of innovation and digital transformation among surveyed companies. The results showed that R&D investments and management skills are correlated and significant for all observed digital transformation and innovativeness indicators. The analysis also showed that companies in Serbia are developing more sustaining than disruptive and radical innovations. The second correlation analysis presented the correlation between the indicator of future innovation and digital-driven growth and determinants of current skill gaps, skills in demand and an obstacle for talent development. We confirmed the correlation between the indicator and the skills gap in HR and Marketing business functions, both crucial for knowledge based-development and future business innovation-driven growth. Additionally, we confirmed correlation with analytical skills in demand and explained it through the fact that in the world where data presents new oil, skills that enable the company to transform data into useful business development information are crucial. Our results confirmed that investment in talents is important for future innovation development. We explained the lack of correlation with some skills in demand through the fact that companies in Serbia need more practical skills instead of soft skills for innovation and digital growth.

Keywords: *Serbia, uinnovation, digital transformation, talents, skill gap, skills in demand*

Sažetak

Istraživanje se fokusira na talente i veštine koje su kompanijama potrebne za prelazak ka višem nivou inovativnosti i konkurentnosti u digitalnoj eri. U radu je predstavljena analiza podataka prikupljenih putem onlajn ankete sprovedene među 84 kompanije koje posluju u Srbiji. Urađene su dve korelacione analize. Prva posmatra determinante inovacija i digitalne transformacije među anketiranim kompanijama. Rezultati pokazuju da su ulaganje u istraživanje i razvoj, zajedno sa veštinama upravljanja, statistički značajne i u korelaciji sa svim posmatranim indikatorima digitalne transformacije i inovativnosti. Analiza pokazuje i da kompanije u Srbiji razvijaju više održive nego disruptivne i radikalne inovacije. Druga analiza pokazuje korelaciju između indikatora budućih inovacija i digitalnog rasta, i determinanata koje se odnose na trenutne nedostatke u veštinama, veštine za kojima postoji rastuća tražnja i prepreku za razvoj talenata. Potvrdili smo korelaciju između indikatora i jaza u veštinama u HR-u i marketingu, koje su ključne za razvoj zasnovan na znanju i budući rast biznisa zasnovanom na inovacijama. Potvrdili smo i korelaciju sa analitičkim veštinama za kojima postoji rastuća tražnja. Pomenuto objašnjavamo činjenicom da su u svetu, u kome podaci dobijaju sve veći značaj, veštine vezane za transformaciju podataka u korisne informacije ključne za razvoj biznisa. Rezultati pokazuju da je ulaganje u talente izuzetno važno za budući razvoj inovativnosti. Nedostatak korelacije sa određenim mekim veštinama, za kojima postoji rastuća tražnja, objasnili smo činjenicom da je kompanijama u Srbiji potrebno više praktičnih veština za inovacije i digitalni rast.

Ključne reči: *Srbija. Inovacije, digitalna transformacija, talenti, jaz u veštinama, veštine za kojima postoji tražnja*

Introduction

Our research has been conducted in innovation-driven development in the last four years. We have presented the current state of Serbian innovation-driven development, where we emphasized the importance of Research and Development (R&D) and education for such improvement [72]. The conducted research was based on the survey done among high-tech IT companies, and since the investment in Information and Communications Technology (ICT) among companies in Serbia is 0.7% of profit, and far below the global average of 3.5% [80], through the next research, we have moved the focus on digital transformation [73]. We researched companies from the different sectors of the economy to evaluate the challenges they face in this process. Our findings suggest that knowledge and management skills are determinants of main importance for such transformation. Therefore, we researched further the skills in demand among companies and challenges they face in the time of "war for talents" and "talent paradox" [74]. Our findings showed that, on the one hand, companies in Serbia are in a "war for talents", while on the other hand, there is a presence of talent paradox. Although the unemployment rate among youth in Serbia is one of the highest in Europe, companies have difficulties finding and attracting talents with the necessary skills. Such talent paradox is further loaded with a "war for talents" that transcends local boundaries and becomes global. The latter means that companies in Serbia face both local and global competitiveness in attracting talents since youth in Serbia have ambitions to start their careers in foreign markets. The importance of knowledge and talents for tech and innovation-driven development is further confirmed through our latest research that, among others, had a specific focus on the Tech cluster [75].

This article aims to go further into details and analyze the determinants of innovativeness and digital transformation in companies in Serbia, strongly focusing on talents and skills needed for companies' leap towards a higher level of innovativeness and competitiveness in the new digital era. The research starts with a literature review in the field of digital transformation and talents development. The literature review helped us define the indicators and determinants of digital transformation and companies' innovation. The literature review is followed by the overall framework for innovation and knowledge-based development that shows the strength and weaknesses of the Serbian economy. Then, our survey results are presented, and they involve correlation analysis. We did two correlation analyses. The first one analyses the correlation between innovativeness and digital transformation indicators and their determinants. The other is focused on the correlation between the indicator of future innovation and digital-driven growth and determinants of current skill gaps, skills in demand and an obstacle for talent development.

In the concluding remarks, we present the main conclusions, limitations of conducted research and areas for further research in the field.

Literature review

The global economy is in an era whose development is determined by innovations and new technologies. In such an environment, innovation becomes imperative, and implementing new technologies is the core of business value creation, a critical factor of competitiveness.

Digital transformation is expected to be an even greater imperative for organizations in the short term [27], and digital technologies will have major effects on business [16, 64, 50]. However, according to Tabrizi, Lam, Girard and Vernon [84], digital transformation is one of the major risks, according to the managers and executives, in 2019. Also, the same group of authors points out that 70% of all initiatives for digital transformation do not achieve their goals.

Digital transformation can be defined as an ongoing process of changing how companies operate [22], linked to strategic business changes that yield results based on digital technology implementation [78]. However, little conceptual or empirical research in the current literature examines how organizations are digitally transforming [87, pp. 326-349]. In addition, digital transformation is a new field in the literature, and the academic community has so far paid very limited attention to this area, while the business community attaches great importance to

it given that new technologies have transformed entire industries.

Existing literature defines digital transformation as the use of new technologies [65,15] that create new business models [26, 36 pp. 123-139, 18, pp 1-19], dramatically improve firm performance [90, pp 1-68] and create a better user experience [68, 46, pp. 22-45, 86, pp. 889-901]. Haffke, Kalgovas and Benlian [32] and Horlacher and Schirmer [40] point out that digital transformation strives to improve (digital) sales and communication channels that create a drastic advantage in communication and customer relations.

According to Broekhuizen, Bart, Bhattacharya, Fabian and Haenlein [86], digitalization refers to using digital technologies to improve and create added value for consumers (see also Klötzer and Pflaum [50]). Therefore, digital transformation also refers to developing a new business model [86, pp. 899-901, 32, 36, pp. 123-139, 40, 39, pp.52-61]. However, in addition to answering how companies are digitally transforming, the current literature also lacks an answer on how companies can innovate through a business model. Although business model innovations have reshaped entire industries [66, pp. 617-632, 43, pp.52-60], very few formal studies have been done on the dynamics and processes of business model development [43, pp.52-60]. The foundation for research in this area was laid by Clayton Christensen back in 1997 [17], where the business model is defined as the way a company creates and delivers its value. George and Bock [31, p. 83-111] and Zott, Amit and Massa [89, pp. 1019-1042] emphasize that the business model of innovation is the foundation for achieving the firm's long-term performance. Innovative business models create new markets, new sources of profit, open new opportunities in existing markets [3, 98, pp. 1019-1042], and create new value by changing already established business models in a particular industry [5, pp. 39-56]. Precisely because of this, 54% of senior managers prefer innovation through a business model over innovation through a new product or service to gain a competitive advantage [3].

The dynamics with which digital technologies influence firms to change the way they do business also affect the need for firms to implement digital transformation as part of their strategy and vision [61 pp. 511-536, 55 p. 340]. Digital technologies alone do not create great value for organizations [44, pp. 1-6], and in that sense, they must be implemented in the value proposition and strategy of the company. In addition to strategy implementation, an important determinant of the success of the digital transformation is the organizational culture and agility of the organization to accept and implement change. Hartl and Hess [35] show that digital transformation requires a change in organizational culture, and because of such, often drastic, changes, leadership plays an important role in communicating tone from the top and influencing the foundation for organizational change [34, pp. 175-185, 37, p. 1855]. In addition to leaders, the bearers of every digital transformation are the people and the teams they make. As drastic changes brought about by digital transformation would not develop fear among employees but a sense of becoming competent for the jobs of the future, the role of leaders in conveying that message is crucial [81, 45]. Hess, Matt, Benlian, Wiesböck [36, pp. 123-139] state that implementing digital transformation in an organization requires a complete change in the skillset among employees and digital skills and talents in the organization are key to implementing digital transformation [21, 50].

Additional to digital transformation, human capital is becoming increasingly important in a world whose development is characterized by achieving competitiveness based on knowledge-driven innovation [82, pp. 122-133]. Such dynamics of development influence both companies and countries to create conditions for attracting, developing and retaining talent.

Although talent and human capital seem to become the focus only with the advent of the Internet revolution, this term was introduced by Adam Smith (1776), pointing out that talent is a treasure for an individual and the country of his residence. Shultz [77, pp. 13-19] defines human capital as the basis for improving firm assets, productivity and competitiveness [8, pp.49-61], which relates to knowledge, education, competencies and skills [63, pp. 381-393, 9, pp. 3-9]. Recent definitions of human capital include the culture and energy individuals invest in creating added value [88, 63, pp. 381-393, 12, pp. 17-33]. While a certain group of authors believe that talents are all

who make up an organization [67, p.12, 12, pp. 17-33, 11, pp. 439-457, 97, pp. 442-445], another group of authors think that talents are a certain group of exceptional individuals [79, pp. 331-338, 91].

Billing, De Smet, Reich, and Schaninger [10, pp. 778-794] point out that companies are exposed to high risks when it comes to talent development and skills building and that now is the time to invest in skills transformation and apply last year's lessons to crystallize their current and future skills need holistically. Since companies face difficulties to find talents, they invest in talent development [29, pp. 5-24, 6, pp. 144-148], and development programs include training [48, pp. 76-91, 19, pp. 63-70], development based on the development of relationships [70, pp. 330-354, 38, p. 133, 56, pp. 219-230] with all relevant stakeholders, and development through the business itself [93, 96, pp.63-95].

In an environment where there is a growing demand for talent, universities are under pressure to respond to these conditions by creating employees with the specific skills necessary to work more efficiently and solve complex tasks [4, pp. 411-422, 89, p. 181-190]. However, Handel [33, pp. 135-160] shows that cognitive skills do not decrease among the younger generations and that differences between what young people possess and what employers are looking for can occur if the need for certain skills increases sharply. Handel [33, pp. 135-160] also shows that the need for new skills is growing, but not faster than before and that employers are dissatisfied with the skills of potential employees, but it is difficult to compare whether this dissatisfaction is greater than before. At the same time, some authors show that the ability of graduates to meet the needs of employers is questionable, and Teichler [83, pp. 171-185] points out that the concern about skills mismatch [71, pp. 1025-1045] in terms of what the economy needs and what graduates have, has never disappeared. The development of technologies further reduces labour demand [7, 84, pp. 16-53, 53, 94] and affects the change in skills that employers expect graduates to possess [60, pp. 43-53], and in this sense, special emphasis is placed on soft skills [69, pp. 453-465], possession of entrepreneurial spirit [49, pp. 510-519], analytical and critical thinking [14, pp. 491-501].

Methodology

The research starts with the overall framework for innovation and knowledge-based development that shows the strength and weaknesses in the Serbian economy based on Global Innovation Index, Global Competitiveness Report and Global Talent Competitiveness Report indicators.

Additionally, for this paper, we have conducted an online survey among 84 companies during December 2021 and the beginning of January 2022. The survey has 41 questions, mostly closed-ended with pre-defined responses or rating scales. The survey was filed mostly by CEOs (37%) and HR/People ops managers (17%). Most of the respondents are male (54%) with master's degrees. The majority of the companies are from the ICT sector (33%), finance sector (20%), manufacturing industry and construction (9%, respectively). The survey was done by both foreign (45%) and domestic companies (55%). Observing by the size, the dominant respondents are large companies (33%), followed by medium (30%), small (25%) and micro-companies (12%). 36% of companies mainly sell on the domestic market, and 31% serve the global market, followed by 25% and 8% operating regionally and on the European market, respectively.

Based on the gathered data, we did two correlation analyses. The first one is between indicators of innovativeness and digital transformation and its determinants. The indicators of innovativeness are set to be: (i) company developed a new product in the last three years, (ii) the new product is new at the existing market where the company is selling its products and (iii) companies' attitude towards their innovativeness in comparison with competitors. The digital transformation indicator is: (i) The company has a digital transformation strategy, which is the first indicator of its awareness to transform its business digitally. The determinants of digital transformation and innovativeness are (i) investment in research and development, (ii) digital strategy implementation, (iii) organizational culture and leadership adoption to new business models, (iv) organizational culture and leadership adoption to digital and innovation development, (v) management skills and knowledge necessary to understand digital transformation. The second correlation analysis has analyzed the correlation

between the indicator of future innovation and digital-driven growth, and determinants of current skill gaps, skills in demand and an obstacle for talent development. The independent variable in this analysis is innovation and digital-driven growth (measured as companies plans to invest in innovation and digital development), and dependant variables are: current gaps that companies have in the functions of (i) HR and (ii) Marketing; skills in demand (iii) Analytical skills and digital competencies, (iv) attitude towards life-long learning, (v) social skills, and (vi) emotional intelligence; and we observed the obstacle for talent development through determinant of (vii) underperformed investments in employees (showing that company lack the budget for employees development).

The overall framework

The productivity growth has generally slowed over the past half-century, except for a brief burst during the mid-1990s and early 2000 [62, p. 2]. Also, productivity growth is a precondition for competitiveness improvement, a base for sustainable economic growth and development.

Productivity in Serbia is among the lowest in the region (see Graph 1), and the same reasons for such a state of productivity are still high rates of employment in the public sector and the fact that companies in Serbia need three times more employees for the same production level as a company in EU [94]. Companies in the ICT sector have better results; however, their productivity is

Graph 1: Output per worker in US$
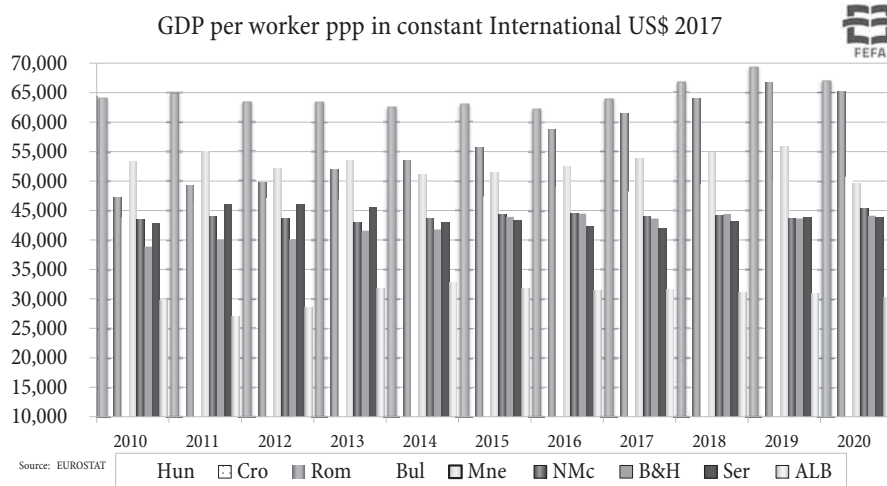
Graph 2: Labor productivity in the ICT sector
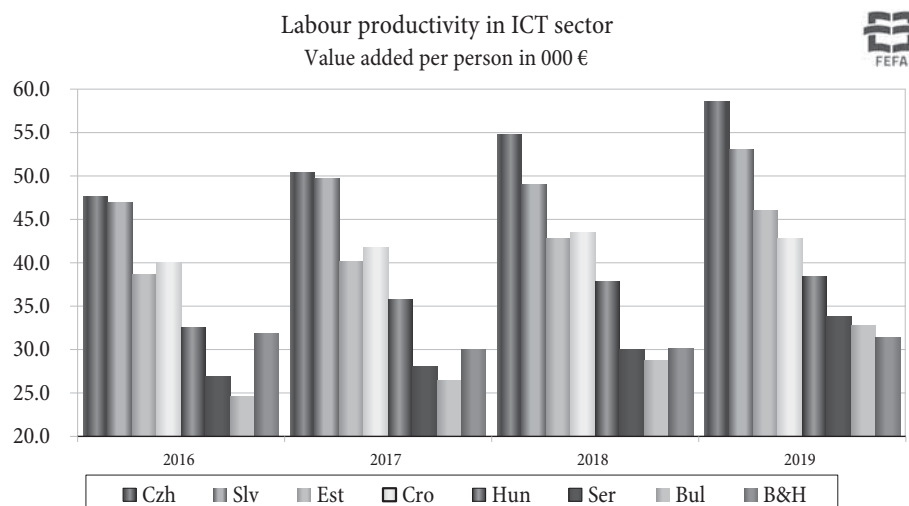
still a third of the EU level if we analyze apparent labour productivity [28].

Productivity can be improved by policies that strengthen competitiveness, better access to finance, and improved skills among the labour force [94]. Additionally, higher investments in research and development (R&D) can improve productivity, boosting innovativeness where knowledge plays a crucial role.

According to investments in R&D, Serbia is at the level of neighboring countries but far below the EU average (see Graph 3). The investments in R&D presents the most human and capital-intensive activity in the value chain. Therefore, the economy's productivity and innovative capacity growth also depend on both private and public R&D investments.

According to Global Innovation Index (GII) data [95, pp. 12-13], there is the growth of total business investment in R&D during the COVID-19, while in the previous two crises (Dotcom 2001, Great Recession 2008), these investments declined along with the fall in GDP.

GII 2021, expressed as a score, is improving in Serbia (Graph 5) and ranks Serbia as 54th within 132 countries (Graph 4). Thus, Serbia managed to catch up with a group of more innovative countries in the region, such as Bulgaria (35), Croatia (42), Romania (48) and Montenegro (50). As innovation is an important component for achieving sustainable growth and reducing the difference in the level of development compared to developed countries, it is necessary to find the key areas for improving innovation indicators of the Serbian economy.

Graph 3: R&D investments as a % of GDP

Share of R&D (% of GDP)

Source: WB Data & EUROSTAT
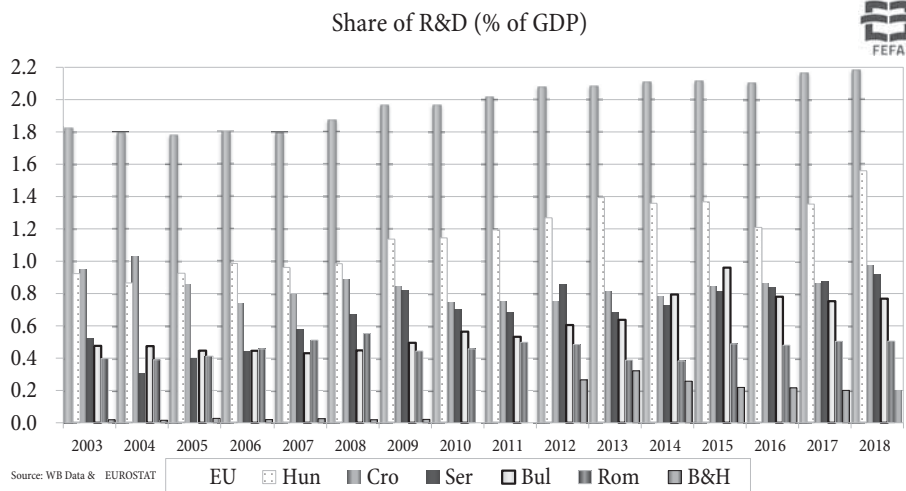
Graph 4 GII Ranks by countries

GII – ranks by countries

Source: GII, INSEAD, 2013, 2019. & 2021.
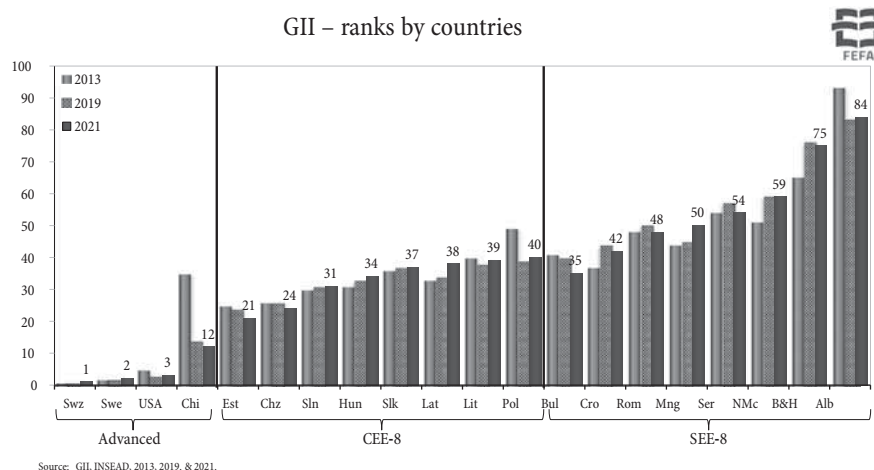
Serbia's GII (54) is better than Serbia's Global Competitiveness Index (GCI) (72) and GDP per capita PPP (75). As the GII consists of two components (innovation inputs and innovation outputs), the data indicate that Serbia had significantly improved its inputs and now ranks as 50th in the world compared to two years ago when it was at 62nd place. However, the ranking by output was maintained at 57th place (Graph 6).

Within the innovation inputs, the most important segments for improvement are:

(i) improve the quality of human capital by increasing overall and government investment in education and

(ii) raise the level of business sophistication by investing in knowledge and innovation linkages based on clusters.

Serbia is achieving good results in education coverage, while the quality and output of education are still not at a satisfactory level. The supply of education and the economy's demand is still not harmonized, which is one of the reasons for the high youth unemployment and the high percentage of those who become NEET (not in education, employment, and training).

The quality of math and science are important inputs for innovation-driven development. The fact that Serbia has a strong position according to this indicator presents one of the main competitive advantages. However, the problem arises when such talents need to be retained in the country, and according to that criterion, Serbia is one of the worst-ranked countries globally, ranking in 126th place (GTCI). Serbia's competitive position deteriorates if the focus shifts from technical to business knowledge.

Graph 5 GII 2013-2021 (Scores)

Source: GII, 2013, 2015, 2017, 2019, 2021, INSEAD.

Graph 6 GII – Serbia (ranks)

Source: GII, 2008, 2013, 2015, 2017, 2019, 2021, INSEAD.
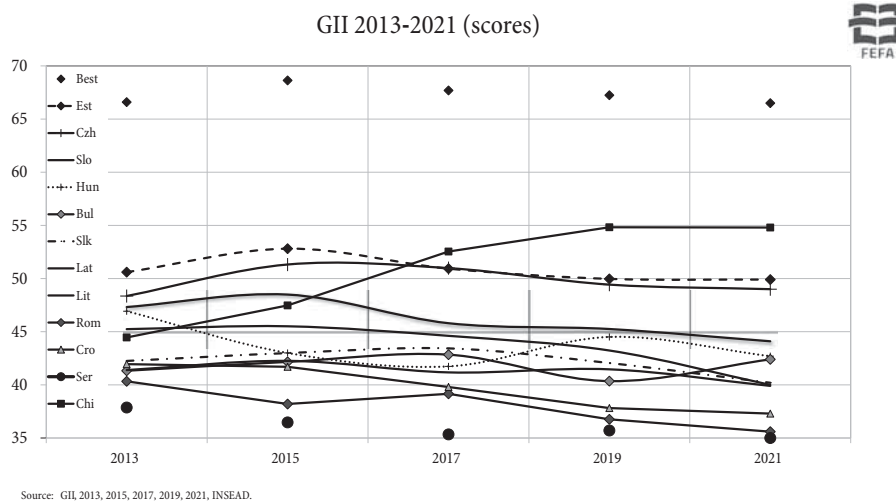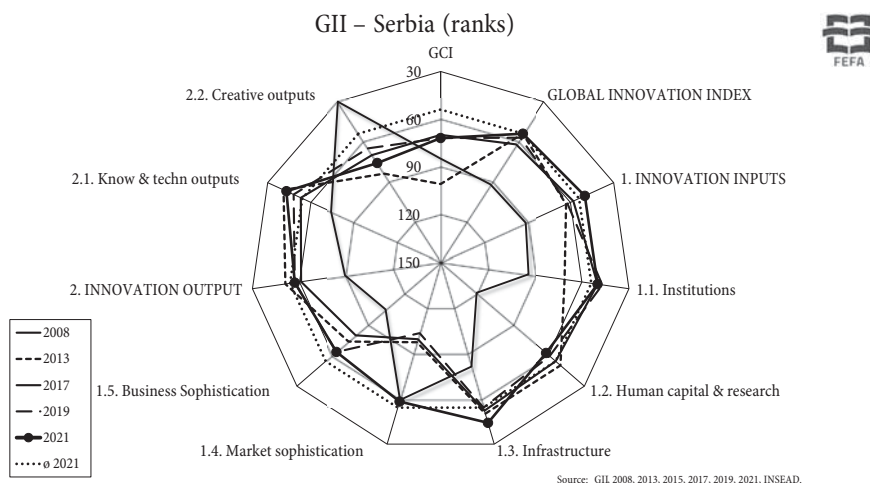
Given that innovations are part of products and services and business models themselves, there is a need to create quality and agile staff with business knowledge to present and offer value in the market and contribute to companies' growth and business development.

The other area for improvement is related to business sophistication and overall cooperation.

Business sophistication is determined by knowledge workers, innovation linkages and knowledge absorption. Although Serbia has a competitive advantage in knowledge-intensive employment (53rd, GII), there is still room for improvement. According to Eurostat [28], if we look at high-tech products export, which in Serbia counts for 1.9% of total export compared to the EU, presenting 17.9% of total export, we can conclude that some changes are

still necessary. The cause of such results is also related to low levels of R&D investments. Additionally, Serbia ranks 75th globally according to the high-tech products import indicator (GII). The Serbian economy still doesn't have high exposure to high-tech products because of the low level of local investments and insufficient level of such products import. The latter represents an important area to be improved for both local demand and business sophistication.

In the dynamic environments in which companies are developing today, the existence of cooperation is important for the development of innovation, bearing in mind that achieving fundamental change in the market is difficult by one isolated company [1, pp. 39-58, 92, 76, pp. 197-213]. However, the comprehensive cooperation between

Graph 7 GTCI – Ranks by countries

Source: GTCI, INSEAD, 2013, 2019. & 2021.
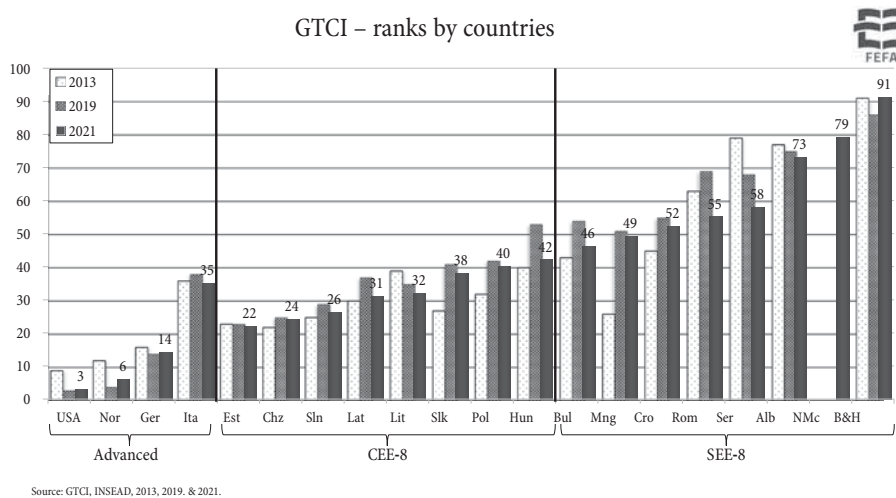
Graph 8 GTCI 2013-2021 (Scores)

Source: GTCI, 2013, 2015, 2017, 2019, 2021,INSEAD.
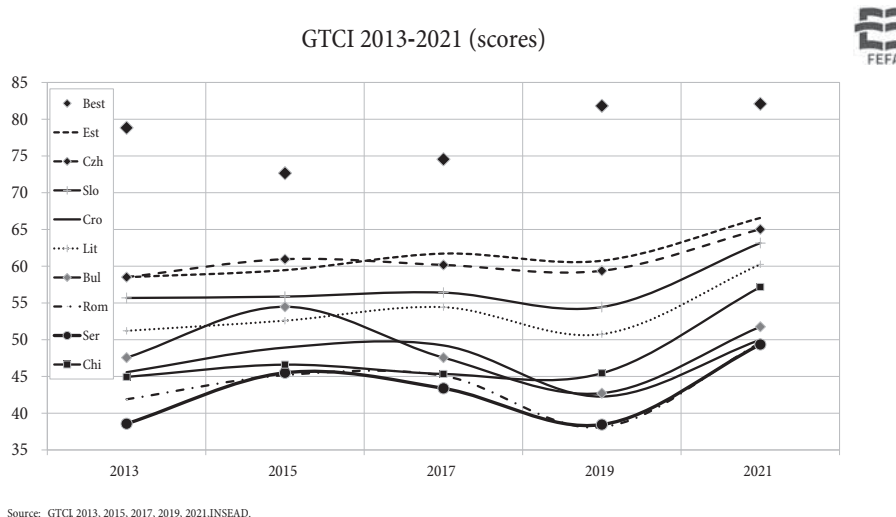
companies in Serbia is very low. Some improvements in this field are spotted in the tech sector within the Serbian economy. Research conducted among startups shows that the founders of Serbian startups are better connected globally than the average founder of startups worldwide. Such a result can be partly attributed to the large Serbian and ExYu diaspora [51]. However, the same research shows that the Belgrade and Novi Sad ecosystems lag the world average regarding local connectivity and how they help each other. Additionally, the quality of those relations, in general, is lower than the world average.

It is most important to improve the Creative output within the innovation output. According to this indicator, the causes of low rank are connected to the uncompetitive positions of Intangible assets, and above all, Trademarks, ICT and organizational model creation and Global brand value. As mentioned in the introduction, the investment in ICT among companies in Serbia is 0.7%, far below the global average of 3.5% [80] and presents an area for improvement for overall digital and innovation capacity lifting. There are several globally recognized brands and success stories from the Serbia market regarding the global brand value, and some have improved the location attractiveness based on strong brands and business success. This laid the foundation for further increase of the global brand value of companies in Serbia that will be determined by the ability to innovate and bring unique value to the market.

Considering that R&D also presents human-intensive activity, the importance of knowledge and skills among employees is unequivocal when creating an innovation output.

Global Talent Competitiveness Index (GTCI) 2021 expressed as a rank is improving in Serbia (58) (in 2013 it was 79th and in 2019 it was 68th). However, when looking at the GTCI by score, the decline in scores in Serbia in the period 2013-2019 is noticeable, followed by a recovery in 2021 (Graph 7 and 8), indicating the need for higher investments in both talent development and retention.

The position of Serbia, according to GTCI (58) [95], is better compared to its position among the Global Competitiveness Index (72) and GDP per capita PPP (75), but worse than GII (54). The GTCI consists of two components (inputs and outputs). The data indicate that Serbia has significantly improved its inputs and has a stable position in the output (Graph 9). The presented also indicates the necessity for improvement in both segments of this indicator, with the following four problems standing out in particular: brain retention (126), brain gain (124), social mobility (111) and employee development (111).

Serbia is among the worst-ranked countries when it comes to attracting talent on the one hand and retaining them on the other. The migration trend that existed in the 1960s and 1970s was primarily related to the departure of lower-skilled labour. However, today this trend implies the departure of talent (such as engineers, health workers,

Figure 8 GTCI - Serbia

Global Talent Competitiveness Index (GTCI) - Serbia

Source: GTCI, 2013, 2015, 2017, 2019, 2021, INSEAD.
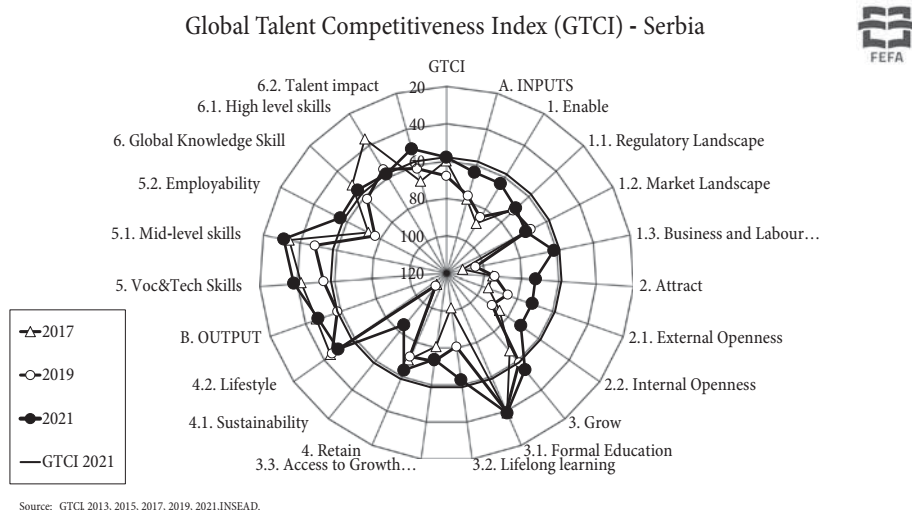
etc.), not only for higher wages but also for employment opportunities, higher quality of life and pursuance of more productive jobs. Low rank of social mobility means that it is still hard to improve the social and economic status based on personal efforts regardless of the socio-economic status of parents, which is related to inequalities of opportunities. Low employee development has roots in the low level of companies' investments in employee training. Although our previous research results [74, pp. 75-89] showed that companies are very dedicated to staff development, the low rank of the Serbian economy according to this indicator implies that other economies are investing more.

Innovation and digital transformation

We have analyzed the correlation between innovativeness and digital transformation indicators and their determinants (See Table 1).

Regarding the company's innovativeness by new product development, we observe that this indicator is in correlation with investment in R&D which mostly include human and capital-intensive activities in value creation. Within the sample, 76% of the companies invested in R&D in the past three years, and most of the companies that invested in R&D were large enterprises. Possibly, one of the main reasons why SMEs were investing less in comparison to larger companies could be related to current pandemic conditions. For instance, small businesses within COVID

conditions were more focused on liquidity problems, and most of the financial funds were invested in covering operating costs, showing a high level of financial fragility. Additionally, within Deloitte study [24] related to SMEs and their innovation activities, the results imply that 72% of German SMEs have experienced constraints: 1) financial constraints; 2) insufficient R&D, especially in comparison to large enterprises and 3) shortage of skilled labour. These results partially correlate with our survey, where 63% of SMEs finance innovation internally. The latter may imply financial constraints to external financing imposed by the financial institutions, meaning that banks implement restrictive credit policies towards SMEs, charging higher fees and interest rates and demanding higher collaterals, perceiving them as risky investments. Banks consider small businesses to be opaque in terms of financial condition with a lack of appropriate collateral, assessing their credit trustworthiness to be lower in comparison to large companies.

The lack of correlation between new product development and digital strategy implementation and organizational culture and leadership adoption to digital and new business model development could be related to the fact that surveyed companies innovate through significant product's improvement while still lacking innovativeness through business model innovations.

As has been already mentioned, the dynamics related to digital technologies' urges the companies to change the way they do business, affecting the need of the firms to

Table 1: Indicators and determinants of innovativeness and digital transformation

Innovativeness and digital transformation indicators	Development of new product		Digital transformation strategy		Innovative in comparation with competitors		New product is new on the market	
	Chi-square	Cramer's V	Chi-square	Cramer's V	Chi-square	Cramer's V	Chi-square	Cramer's V
Determinants of innovation and digital transformation								
Investment in R&D activities	9.439 (**)	0.335 (**)	1.676	0.141	5.600 (*)	0.258 (*)	5.901 (*)	0.265 (*)
Digital strategy impelementation	1.248	0.122	68.918 (**)	0.906 (**)	4.861 (*)	0.241 (*)	1.365	0.127
Organizational culture and leadership addoption to new business models	2.013	0.155	9.164 (**)	0.330 (**)	4.148 (*)	0.222 (*)	1.474	0.132
Organizational culture and leadership addoption to digital and innovations development	1.666	0.141	14.096 (**)	0.41 (**)	9.833 (**)	0.342 (**)	4.227 (*)	0.224 (*)
Management have skills and knowledge necessary to understand digital transformation	6.403 (*)	0.276 (*)	11.494 (**)	0.370 (**)	4.271 (*)	0.225 (*)	4.103 (*)	0.221 (*)

Source: Survey results and author's calculation
(*) indicates a correlation where the significance is less than 0.05, while (**) indicates a correlation with a significance less than 0.01.

implement digital transformation as part of their strategy and vision [61, pp. 511-536, 55, pp. 339-343]. Suppose we observe the indicator of digital transformation. In that case, we see the strong correlation with all determinants, except with investment in R&D. This could be related to the fact that the most important determinants of successful digital transformation are related to strategy implementation, leadership and management, and organizational culture and agility of the organization to accept and implement change as it is presented in the literature review [35, 34, pp. 175-185, 37, pp. 1854-1864].

Although management skills correlate with digital transformation, SMEs need to improve this determinant and boost the leap towards digital transformation. While many organizations define a digital strategy as a formal document, they lack a common language to strategize across functions that will enable C-suite executives beyond the CTO (Chief technology officer) or CIO (Chief information officer) to have tech-adjacent communications [25]. The lowest grades 1-3 (within the scale 1-5), related to whether management has the knowledge and skills necessary for digital transformation, were given by SMEs. Apart from management skills, SMEs were the most dominant in giving lower grades to adjustment of organizational culture and leadership to new business models. This is very important, bearing in mind that innovative business models can create new markets, new income sources and create new opportunities [3, 98, pp. 308-325]. Ibarra, Bigdeli, Igratua and Ganzarain [42, p. 76] emphasized that for SMEs, the development of new business models based on new technologies strongly depends on 1) long-term managerial orientation; 2) clearly defined strategy based on collaboration with all the relevant stakeholders with a focus on customer needs; 3) open innovation that involves free flows of knowledge related to both market needs and the potential of technologies, simultaneously collaborating with the customers. Improving those determinants could bring digital transformation to the centre of business value creation among SMEs and consequently strengthen competitiveness.

If we look at the companies' attitude towards their innovativeness compared to others, we can spot the correlation with all determinants. The correlation with

R&D is not surprising at all, since R&D is correlated to new products development and those new products were new at the global market in more than 60% of cases, mostly dominated by large companies (with 55% of this share for large companies, and 45% of SMEs). Such results are encouraging and present surveyed companies' ability to gain competitiveness within the conditions of fierce competition. The indicator of innovativeness in comparison with others is correlated with other determinants, which confirmed the importance of innovativeness and digital transformation introduction in the core of organizational culture.

Finally, the indicator that shows that a new product is new on the market where the company operates correlates with all determinants except strategy implementation and organizational culture and leadership adoption to new business models. R&D is correlated with this indicator, and 70% of companies that invest in new products development, export their product to the foreign markets (regional and global market). The companies within the survey claiming that they did not develop a new product for the market are mainly focused on the domestic market, without exporting to global markets. These results are very important, and they correlate with the findings of Manon, Mauricio and Christophe [54], who emphasized that innovative firms are more likely to be involved in international markets than non-innovative companies. Finally, most respondents who stated that they developed a new product for the markets invest in R&D (85%).

The lack of correlation between indicator that shows that a new product is new on the market with digital strategy implementation could be related to the fact that strategy implementation is more related to the processes in the company instead of the new product development. Finally, the lack of correlation between indicators that shows that new product is new on the market and organization culture and leadership adoption to new business models could imply that companies in Serbia are developing more sustaining than disruptive and radical innovations, meaning that significant products improvement are leading to competitiveness in the current market. Since the new business models change the number of industries, improving the companies' ability to bring

new value to the existing markets can further improve their competitiveness position and strength foundation for the firm's long-term performance, as stated in the literature review [99, pp. 1019-1042].

Importance of talents for innovation and digital-driven growth

Companies have difficulties in employing high-quality staff in general. Most of the surveyed companies consider that our education system does not meet the needs of the companies concerning innovation-driven growth. Only 2.4% of companies believe that the education system prepares a workforce that will meet the needs of innovation-driven growth. Moreover, 65% of companies state that they lack adequate staff when striving for growth based on innovation. This is in line with McKinsey report: *Beyond hiring: How companies are reskilling to address talent gaps* [57], where 87 % of responders say they are experiencing gaps concerning adequate staff and skills mismatch now or expect them within a few years. Within our sample, 83% of companies believe that developing new technologies will drastically change companies' skills in the coming period.

Since education does not meet companies needs for skills and knowledge on the one hand, and since the digital technologies will drastically change the skills the companies will need, we did the correlation analysis to see where the existing gaps are and demands in skills when it comes to innovation-driven growth.

We have analyzed the correlation between the indicator of future innovation and digital-driven growth and determinants of current skill gaps, skills in demand and an obstacle for talent development (See Table 2).

As presented in Table 2, there is a correlation between gaps in HR business function and innovation and digital-driven growth. On the one hand, talents play a crucial role since companies cannot make a profit without talented individuals in knowledge-based development [85, 30, pp. 225-237]. The correlation with a skills gap in HR shows that a company's ability to find, attract and retain talents is of the main importance in the time of "war for talents", which refers to fierce competition in attracting and retaining talent in companies [47]. It is when McKinsey introduces the notion of the talent war, attracting and retaining talent in an organization, that it becomes increasingly important [23] and one of the highest-ranked challenges among CEOs [13], which, if overcome, creates positive effects for an organization [52, 20]. The correlation between gaps in marketing skills among companies and the observed indicator could be related to the companies' needs to strengthen the business growth and development and expand their market potential further. Marketing skills will also be further in demand, as stated in McKinsey Report [57] on labour market trends after the COVID-19 pandemic, where it is pointed out that marketing, E-commerce, and other virtual transactions related to sales are booming.

What stands out in our survey is that 68% of companies, regardless of sectors and sizes, believe that

Table 2: Importance of talents for innovation and digital-driven growth

Indicator of innovation and digital driven growth	Future innovation and digital-driven growth	
	Chi-square	Cramer's V
Determinants of current skill gaps, skills in demand and obstacle for talent development		
HR (gap)	13.273 (**)	0.398 (**)
Marketing skills (gap)	6.365 (*)	0.275 (*)
Analytical skills and digital competencies (in demand)	4.416 (*)	0.229 (*)
Attitude towards life long learning (in demand)	2.532	0.174
Social skills (in demand)	1.672	0.141
Emotional inteligence (in demand)	1.081	0.113
Underperformed investment in employees (obstacle)	7.889 (**)	0.306 (**)

Source: Survey results and author's calculation
(*) indicates a correlation where the significance is less than 0.05, while (**) indicates a correlation with a significance less than 0.01.

our education system will not be able to meet the needs for these skills in the next 2-3 years.

Further, 30% of the surveyed companies pointed out that analytical skills and digital competencies are the skills they will need most due to the disruptions that new digital technologies will bring to their operations. Those skills correlate with the observed indicator, which is not surprising since we live in a world where data present the new oil. In such a world, skills that enable the company to transform data into useful business development information are crucial.

Similarly, when looking at the specific skills with the greatest mismatch between the education system and what will be necessary for the next five years, respondents expect skill gaps to open during that time and attitude towards life-long learning. The importance of this skill for innovation and digital-driven development needs, as McKinsey states [57], to become must the new norm if organizations want to stay ahead. However, this skill, together with social skills and emotional intelligence as skills in demand, are not correlated to the observed indicator. This could be related to the fact that companies in Serbia still do not consider those skills the most important for innovation-driven growth and need more practical skills (such as analytics) in the current state of development.

The significant share of surveyed companies (39%) allocates between 1-3% of total revenues to developing skills that are key to an innovation-based growth strategy. However, the correlation results show a relationship between underperformed employee investments and observed indicator. The result is not surprising, considering that skills among employees represent one of the main determinants for innovation-driven growth. Therefore, the prospect for such growth is related to the current obstacle and need for greater budgets and investments in talent development since they represent one of the key determinants for innovation-driven growth.

Additional to the correlation analysis, we have prepared the results showing how the COVID-19 crisis have affected the companies needs for talents. As observed in the Mc Kinsey Global Institute survey [57] on the future of work after the COVID-19 pandemic, COVID-19 may propel faster adoption of new technologies and

AI, especially in work areas with high physical proximity. Agrawal, De Smet, Lacroix, and Reich [2] point out that the digitalization of COVID-19 introduced teleworking, which dramatically accelerated the need to develop new workforce skills. Companies exhibited extraordinary flexibility and adaptability in responding to our sample's innovation-based growth pandemic. However, 70% responded that the COVID-19 pandemic did not significantly affect the need to internally improve the skills necessary for innovation-based growth.

Interestingly, 52% of the surveyed companies significantly increased the number of employees (over 10%) during the pandemic, while the rest of the surveyed companies (48%) did not significantly reduce the number of employees during the pandemic peak. It implies either that companies have adapted well to pandemic conditions or that the need for specific skills has increased during the pandemic due to changing market conditions. If we analyze companies by their size, we conclude that, to the greatest extent, large and medium-sized companies have significantly increased the number of employees (over 10%). This growth has spilt over to hiring employees who possess the skills necessary to work in the digital world, including creativity, digital communication, and digital skills.

Conclusion

This research focuses on talents and skills needed for companies' leap towards a higher level of innovativeness and competitiveness in the new digital era.

We confirmed that R&D investments and management skills are correlated and significant for all observed digital transformation and innovativeness indicators. Our research showed that R&D investments correlate with all observed innovation indicators but are not correlated to the digital transformation of companies. The correlation with innovation indicators is expected since R&D investments present the base and determinant of main importance for innovation-driven development. We explained the lack of correlation between R&D and digital transformation through the fact that the most important determinants of successful digital transformation are more related to strategy implementation,

leadership and management, and organizational culture and agility of the organization to accept and implement change. Therefore, the correlation between management skills and digital transformation and all innovativeness indicators is expected since knowledge plays a crucial role in innovation development, and management skills are of the main importance for organizational culture adoption to digital transformation.

Our correlation analysis showed the lack of correlation between some determinants of organizational culture and digital strategy implementation, and indicator of innovation presented through new product development, and the fact that new product is new on the market. We explained that the lack of correlation with digital strategy implementation could be related to the fact that strategy implementation is more related to the processes in the company instead of the new product development, while the lack of correlation between this indicator and organization culture and leadership adoption to new business models could imply that companies in Serbia are developing more sustaining than disruptive and radical innovations.

We also confirmed that current skill gaps, one demanded skill, and talent development obstacle correlate with future innovation and digital-driven growth. The research results confirmed that gaps in HR and Marketing are correlated to the observed indicator and are crucial for future business growth and development based on innovation. We confirmed the correlation between all observed determinants and an indicator, except for some skills in demand. We explained the lack of correlation with skills in demand related to attitude towards life-long learning, social skills, and emotional skills in demand by explaining that companies in Serbia need more practical skills than soft skills. We emphasized the importance of analytical skills and investment in talent development for future growth based on innovation.

The research has its limitations which open opportunities for future research in the field. The limitations are primarily in special talent management techniques and practices that companies in Serbia implement to develop talents. In that sense, future research can focus on the field of internal practices that companies conduct for this purpose. The topic of brain drain is mentioned in this paper as the cause

of certain challenges. However, there is room for research analyzing the effects of brain drain on long-term economic and social growth and development based on innovation. When it comes to digital transformation, the researchers observed only one indicator, and further research can be focused on identification and indicators analysis at a different level of digital transformation maturity. Finally, the transformation and modernization of the education system according to the needs of the current and future economy is a special topic, which requires and opens the possibility for new research in terms of more specific needs, ways and effects of transformation.

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„Goodbye and hello!"

Instead of the end – a new beginning

telenor becomes Yettel.

Aleksandar Vučković
Belgrade Metropolitan University
FEFA

Goran Pitić
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NEW TECHNOLOGIES IN ENERGY MANAGEMENT SYSTEMS OF BUILDINGS

Nove tehnologije u sistemima upravljanja energijom u zgradama

Abstract

This paper provides an overview of trends in the application of digital technologies in the energy management system of commercial buildings. In recent years, energy management in buildings, based on digital technologies, has resulted in the reduction in energy consumption of up to 50%. The paper covers trends in the development and application of digital devices and software in various technological areas such as Internet of Things, Edge Computing, Cloud Computing, Big Data, Artificial Intelligence, and Blockchain. Based on the review of the results of the conducted experiments as well as the characteristics of the technologies themselves, automation has been defined as a cornerstone of maximization of energy savings and digital transformation of the energy management system in buildings.

Keywords: *digital transformation, technology, energy efficiency, energy management model, automation, commercial and public buildings, review*

Sažetak

U ovom radu se pruža pregled trendova u domenu primene digitalnih tehnologija u upravljanju energetskim sistemom poslovnih zgrada. Upravljanje energijom u zgradama se poslednjih godina sve više oslanja na digitalne tehnologije, kojima je moguće smanjiti potrošnju energije i do 50%. Radom su obuhvaćeni trendovi razvoja i primene digitalnih uređaja i softvera iz raznih tehnoloških oblasti kao što su internet stvari, edge computing, cloud computing, big data, veštačka inteligencija i blockchain. Na osnovu pregleda rezultata sprovedenih eksperimenata, kao i karakteristika samih tehnologija, zaključeno je da automatizacija predstavlja kamen temeljac maksimizacije energetskih ušteda i digitalne transformacije sistema energetskog menadžmenta u zgradama.

Ključne reči: *digitalna transformacija, tehnologija, energetska efikasnost, model energetskog menadžmenta, automatizacija, poslovne i javne zgrade, pregled*

Introduction

Exponential rise of new technologies has changed the way we live and work. The possibilities that digital technologies provide are fundamentally changing the way business systems are managed. Schwab [53] refers to the current historical moment as the Fourth Industrial Revolution or Industry 4.0, describing it as the integration of physical, digital and biological systems which contributes to the creation of radical and systemic changes in the way of life and work of individuals, organizations and society as a whole [53]. The creation of cyber-physical systems in various areas of life and work, as the main feature of the modern age, is also analyzed in [11], [30], [67]. According to [48], cyber-physical systems are physical and engineered systems whose operations are monitored, coordinated, controlled and integrated by a computing and communication core. A similar definition of cyber-physical systems is given in [4], where these systems are described as a new generation of systems with integrated computational and physical capabilities that can interact with humans through many new modalities. The creation of cyber-physical systems is largely enabled by the intensive development of the Internet and digital technologies in general. Numerous management systems are undergoing a process of digital transformation in order to adapt their way of working to the opportunities and challenges brought by the development of digital technologies. Based on the review of definitions, presented in [57, p. 24], it can be concluded that digital transformation is a process of integration of digital technologies in all areas of management of an organization, which leads to a fundamental change in its overall functioning. Digital transformation is primarily organizational, i.e. strategic, not technological issue [49, p. X], and therefore the organization is required to substantially change its way of working, which should be characterized by short development periods, individualization on demand, flexibility, decentralization, and resource efficiency [29]. Based on an extensive literature review, in [17] is indicated that digital transformation is aimed at improving user experience, efficiency of business processes as well as business models. On the other hand, digital technologies such as Internet of Things, Blockchain, Hyperautomation,

Edge Computing, Cloud Computing, Augmented Reality, Artificial Intelligence, Quantum Computing, are just the enablers of these transformations [61]. Many of these technologies find their active use in the field of energy management.

The energy management system is defined in the ISO 50001 standard as a set of interrelated or interacting elements to establish an energy policy and energy objectives, and processes and procedures to achieve those objectives [23]. Noticeable advances in energy efficiency in recent years have boosted progress in decoupling energy consumption from the buildings sector floor area growth. Final energy use in buildings increased from 118 EJ in 2010 to almost 130 EJ in 2019 at an average annual rate of 1%, falling behind average annual 2% expansion in floor area during the same period [20]. Nevertheless, buildings sector energy intensity needs to drop nearly five times more quickly over the next ten years than it did in the past five to be in line with the Net Zero Emissions by 2050 Scenario. This means the energy consumed per square meter in 2030 must be 45% less than in 2020 [20]. Based on the presented data on the current situation and trends, it is clear that achieving the goals of global energy sustainability, as a balance between energy consumption and the share of renewable energy in total consumption [36], is still far away, at least when it comes to buildings. Energy consumption in buildings is mostly related to heating, ventilation, air-conditioning, cooling, lighting, and operation of household appliances and other equipment [46]. According to [20], the greatest progress in recent years in terms of energy efficiency has been made in the field of lighting, while, on the other hand, the consumption of energy for cooling is growing. A big problem is the consumption of energy for the operation of devices, which consume almost 15% of electricity in the world, and only one third of them comply with mandatory standards on energy efficiency [20].

People's interest in providing optimal comfort in the buildings in which they live and work has been present since prehistoric times. Also, with the increase in the importance of energy costs, as well as environmental pollution, the interest in energy efficiency of buildings grew. The beginnings of energy management in buildings were recorded as early as 5,500 BC and concerned the

method of building houses so as to ensure a stable internal temperature throughout the year. From then until today, the methods of building facilities, as well as the application of technical measures to improve energy efficiency, have come a long way. In the 1970s, the concept of "green house" was introduced, to be later improved and upgraded through the development of other concepts. All the mentioned concepts have a common goal of minimizing energy consumption while achieving optimal comfort for users as well as independent production of all necessary energy with the use of renewable sources [22].

In recent years, along with the development of technology in the field of energy efficiency, the standards in the field of energy management have been developed. These standards concern both technical specifications in the field of building performance and energy performance and management models of the entire energy system [10], [13], [62]. The ISO 50001 standard, as one of the most recent international standards in the field of energy management, is based on the PDCA (Plan-Do-Check-Act) cycle and represents a suitable framework for defining the model of energy management in buildings. This standard introduces a comprehensive approach in energy management by prescribing the obligation to develop and implement energy policy, establish goals and action plans, make optimal decisions in accordance with energy consumption, measure results and continuous improvements in energy management systems [23]. Measuring the systemic nature of energy management is also the subject of various maturity models of energy management, which aim to analyze the practice in this area, looking for the room for improvement [3], [21], [65]. Basically, both the standard for energy management and the energy management maturity model are in the pursuit of ways to meet the needs of users with the lowest possible energy consumption. Also, the mentioned standards and models point out the necessity for continuous improvements in the energy management system, since the technologies, as well as the user needs, are constantly changing. For this reason, it is necessary to consider the possibilities that digital technologies provide in terms of improving energy efficiency, reducing CO2 emissions and improving indoor comfort and, based on that, to examine

the possibility of creating a new energy management model in buildings.

In the following text, based on the literature review, an analysis of the effects of the application of digital technologies in energy management in buildings will be presented. Also, trends in individual technological areas important for energy management in buildings will be described.

Application of digital technologies in energy management in buildings

The application of digital technologies in energy management in buildings has been present in scientific research and practice for more than 25 years [18]. With the introduction of these technologies in the field of energy efficiency in buildings, the primary goal was to create building automation systems, i.e. systems that are an integral part of smart or intelligent buildings. Building automation systems refer to the systems that use hardware (sensors, internal communication networks, controllers, etc.) and software to fully or partially automatically control devices and installations in a building. These systems are widely used in buildings and enable automatic control of home and work devices, as well as the systems related to heating, ventilation, air-conditioning, cooling (HVAC), lighting, water heating, energy production, security, etc. [12] The basis of the energy system automation in a building consists of several processes [2], [8], [12], [44]:

- Using sensors to collect data on the occupancy, behavior and habits of building users;
- Processing of collected data using software and recognizing patterns concerning the occupancy, behavior and habits of building users;
- Software prediction of future occupancy and behavior of building users based on recognized patterns;
- Based on the anticipated occupancy and behavior of users, the controller that is connected to the devices and installations via the network, automatically sends them instructions on the mode of operation to be applied;
- Devices and installations in the building adjust their work to the instructions received from the controller.

Numerous studies have found that building automation systems contribute to a significant reduction in energy consumption. Table 1 presents the results of experiments in the development and testing of building automation systems, in terms of energy savings. These are experiments that are conducted under real-life conditions, i.e. in real buildings or premises.

Based on the experiments shown in Table 1, it can be seen that the building automation system contributes to energy savings of up to 50%. The amount of savings depends on the applied technological solution, type and characteristics of the building (purpose, area, type of construction, etc.) and characteristics of users (time spent in the building, needs for indoor comfort, occupancy, etc.). Successful functioning of the building automation system implies the ability to overcome various technological challenges. Namely, one of the challenges is the ability of the system to collect, process and analyze large amounts of often unstructured data in real time. Also, another challenge is related to the need for the system to be able to adequately store and keep the collected data as well as to predict the future state of the energy system. A special challenge is the networking of smart buildings, where it is necessary for energy management systems in individual buildings to be integrated into the system of several buildings [32], [47],

[51], [68]. Therefore, contemporary building automation systems rely on technologies such as the Internet of Things, Edge Computing, Cloud Computing, Big Data, Artificial Intelligence, and Blockchain. An overview of the use of each of these technologies in building energy management will be provided below.

Internet of Things (IoT)

According to estimates given in [33], Internet of Things (IoT) technology will directly or indirectly contribute to the creation of economic value with over USD 11 billion on a global level in 2025. The Internet of Things is described as the network of physical objects - "things" - that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet [43]. IoT has already found a wide application in the management of energy systems in buildings. This technology is indispensable in creating a building automation system since it collects a number of data relevant to energy management, and then this data is transferred to a place for further analysis and processing. Also, the Internet of Things allows the transmission of commands and instructions to end parts of the system (devices and installations) [7]. The IoT hardware

Table 1: Overview of the results of conducted experiments related to the development and testing of building automation systems

Articles	Results
[2]	The experiment showed that the building automation model achieves 33.1% energy savings compared to the traditional way of consumption.
[14]	By testing the system in three public buildings which are located in climates with different hydro-meteorological conditions, the average savings in energy consumption of the HVAC system of 42% were achieved.
[15]	By testing the system in a public building, it was determined that the system can achieve savings in energy consumption of about 30%.
[16]	Savings of 23.9% in electricity consumption were achieved by applying a lighting controller compared to a system without a controller.
[42]	In the laboratory at the faculty, where the savings in energy consumption were measured, savings between 14% and 30% were achieved, depending on the day when the consumption was measured, i.e. an average of 20% for the entire month of the experiment. In the commercial building, where the savings were also measured, the average energy savings for cooling and lighting in the amount of 23.12% were achieved.
[44]	Compared to the manual system, the automatic system achieved 10% savings for total energy consumption, with 25.6% for thermal energy, 16.5% for lighting and 6.2% for auxiliary electric energy.
[45]	Energy savings of electrical appliances of 46% in the home and 61% in the office were achieved.
[59]	In the period when the system was installed, there was 27.5% lower electricity consumption compared to the period when the system was not installed.
[60]	The automation system, developed as part of this research, contributes to a 56% reduction in device usage and a 50% reduction in energy consumption.
[71]	The measured results indicate that the smart HVAC system achieved energy savings of about 14%, while the control system for energy consumption of electrical devices contributed to a reduction in consumption of 33%.

requires operating systems and communication protocols to interact with human (user) and other devices. There are middleware components that facilitate communication and exchange of information between devices. In IoT architecture, integration layers play an important role in combining and integrating information acquired from thousands of devices and presenting this information to users [25]. IoT technology in energy management includes several key elements:

- Sensors. These serve the purpose of measuring parameters such as temperature, humidity, lighting levels, and room occupancy. The IoT plays a role in facilitating the injection of smart "things" in the environment.

- Controllers. These develop the system's response - the response is synthesized from the data that is collected by the sensors by applying appropriate optimization algorithms.

- Output devices. These actually implement the commands received from the controller [37].

For a building energy management system to be fully operational, it is imperative to have real-time robust information flow from a variety of heterogeneous sensors deployed within the building, presenting the current building operation (e.g. energy consumption, environmental conditions, occupancy, etc.) [6]. According to [5], the design goals of sensors deployment are as follows:

- Low power consumption. It is desired that the deployed sensors and/or controllers do not consume significant power impacting their life (when powered from a battery) or utility (when powered from mains) [5].

- Wide network coverage. For collecting spatially distributed information, more than one end controller or node may be deployed. Often, these end nodes relay the collected data to a central node or gateway for storage or further processing. The deployment must ensure that all nodes are within the communication range of at least one node and together cover the whole area that is to be monitored, under different real world scenarios. Often, multi-hop strategies are used to increase network coverage [5].

- Robust. The real world presents many unforeseen challenges which the sensor deployment must account

for. It is often desired that the system is capable of easy healing and recovery [5].

- Ease of deployment and maintenance. Ease of deployment and maintenance outside the controlled settings has always been an important challenge and design goal of sensor network deployments [5].

An integrated IoT system allows the building manager to monitor and sense the building's different environmental parameters (e.g. through motion and noise detectors, temperature and humidity sensors, and electricity and water flow meters), collect the relevant human activity information (occupancy, heat map, etc.), and estimate the energy usage (e.g. by comparing the current information with previously collected historical data), which will be fed into a smart management system that will manipulate actuators (e.g. switches, controllers, and thermostats) to efficiently manage the building's environment according to expectations and designated rules. Such an IoT platform (which is an open platform) can interface and connect with various subsystems of different vendors, e.g. sensing subsystems (people counting, temperature, humidity, light, noise, and motion), control subsystems (thermostats, switches, smart plugs, and actuators), and metering subsystems (energy consumption, water flow, etc.) [63].

The 5G network represents the fifth generation of mobile internet, which implies higher speed and signal quality compared to the previous generations, but also completely new features. These new features include greater capabilities for connecting multiple devices via the Internet of Things, reduced latency in communication between devices, and the ability to process large amounts of data in real time [9], [19]. With billions of devices connected to the cloud, 5G will play a crucial role in reducing energy consumption and shaping new processes and applications, leading to better energy efficiency [9].

Edge Computing

The development of technology and lower costs of its use in the domain of the Internet of Things have led to the greater use of sensors in buildings as well as the diversity and amount of information they collect [70]. Solutions that involve centralized system architecture,

based on uploading, storing, processing and analyzing data in cloud systems, are not able to effectively track the aforementioned increase in the amount and diversity of information. In this regard, it was necessary to develop a technology in the field of energy management which will be accurate and able to complete processing and analysis with the lowest possible costs, without congestion of the system, and without latency [35]. The solution was found in the form of Edge Computing. This technology implies that the functions of data processing and analysis are performed on the "edge" of the energy system, i.e. almost in the devices that collect data, which makes the system decentralized. In this way, there is no transfer of data to a central database for data processing and analysis, but all of them are processed and analyzed in different devices in the system [56], [69]. The ability of devices, in addition to collecting, processing and analyzing data, was created using embedded software, which is often based on artificial intelligence [35]. Although this technology in energy management does not eliminate the need for Cloud Computing, it still relieves the system and improves its manageability [31].

Cloud Computing

The large amount of data collected by sensors within the energy system of buildings must be adequately stored, processed, analyzed and stored in order to create optimal models of energy management. It is often expensive and not efficient enough to perform all these operations in-house, i.e. on their own servers. Cloud computing is a set of services which provide users with the ability to store and share their data among themselves on dedicated Internet platforms. Also, within the mentioned platforms, it is possible to access various software intended for processing and analysis of collected data [24], [38], [55]. Cloud computing is an on-demand computing model that eliminates or reduces the need for companies and organizations to have in-house high-cost software, hardware, and network infrastructures [40]. Cloud computing can provide many advantages for smart buildings' energy management systems such as providing the required software models that implement different control and

monitoring algorithms and providing optimization methods for more efficient energy consumption in smart buildings [39]. When IoT is integrated with the cloud, real-time service can be provided extensively, and a huge amount of data is produced, which requires a huge amount of storage space that can be provided by the cloud. The management of energy in a cloud platform allows users to easily access the energy management system through public or private clouds via a Web browser or application programming interfaces (APIs) [52].

Big Data

Digitization, which is present in all areas of life and work, contributes to the generation of a huge amount of data. Therefore, data is a potentially important organizational resource, but in order to use it in the right way, it is necessary to have the ability to turn the data into information important for making optimal decisions. It is for these purposes that the Big Data concept is used. This concept entails modern technology and methods, which concern the processes of collecting, organizing, processing and analyzing often complex and unstructured data, given in sets of huge dimensions, where the above processes are performed faster than by using traditional concepts [1], [27], [34].

The development of the Internet of Things has contributed to the creation of sensors capable of collecting a variety of energy data in buildings. The diversity of these data is present on several levels. On the one hand, these data can concern the interior of the building (indoor temperature and humidity, occupancy level, energy load and consumption, etc.), as well as the data from the external environment such as weather conditions [1], [34]. On the other hand, data can be collected at the level of the entire building, floors, rooms, and even individual users and devices [1], [34]. The sensors used in the energy management of buildings have the possibility of continuous operation, and thus a continuous data collection. By deploying a large number of sensors in the building, a huge amount of data is collected, and it is constantly increasing [1], [41]. At the same time, in order to keep the energy system aligned with internal and external factors, it is necessary

to process the collected data on a daily, hourly, and often real-time basis [1]. Based on all the above, it is obvious that energy data meets the three main Big Data criteria (Variety, Volume, and Velocity) [1].

The purpose of collecting and processing energy data is to better understand the characteristics of the building's energy system, external and internal factors that affect it, as well as the needs, behaviors and characteristics of users [27]. In this way, a basis is created for predicting the future state of the energy system and, accordingly, making optimal energy management decisions. The integration and development of systems based on the Internet of Things are important enablers of a wide range of applications, both for industries and the general population, helping to make smart buildings a reality [41]. That is why the development and implementation of Big Data must keep pace with the development of the Internet of Things, in order to ensure data-driven management of the energy system in buildings and maximize energy efficiency.

Artificial Intelligence

Artificial intelligence is a machine (computer) simulation of processes that form the basis of human intelligence, such as learning (gathering information and rules on how to use it), understanding (using certain rules to draw appropriate conclusions based on available information) and corrections (independent reaction to changes in the environment and adaptation to them) [28], [54], [66]. According to [66], a typical AI based prediction method in energy management in buildings contains four main steps:

- The first step is to acquire historical input and output data. The input data are the aspects that impact or correlate with the output data. These aspects include, but are not limited to the following: exterior weather condition, occupants, global heat loss coefficient, and day types. The output data are those parameters that represent building energy consumption. The sampling periods of both inputs and outputs vary from year to minute according to the prediction time scale of the research [66].
- The next step is to preprocess the collected data into a suitable format before they are used to train the

prediction model. To some extent, the initial data may not be able to be used directly by the model. Some data preprocessing techniques such as data transformation, data normalization, and data interpolation are applied in this step to improve data quality and reduce a negative impact [66].

- Once the data is ready, the third step is to train the prediction model. Since the key concept of empirical modeling is learning from historical data, a training process is required to develop the model. This step is achieved by selecting appropriate parameters for the model. The parameter selection is impacted by the size of training data, the selection of input variables, and the performance indicators [66].
- The last step is testing the model. In this step, testing data will be loaded to the trained model to test the prediction performance of the model [66].

Within the described concept, it is important to pay attention to its most prominent branches, machine learning (ML) and artificial neural networks (ANN).

Machine learning involves the development and application of algorithms that enable computers to, automatically and without human intervention, collect and process data, and create relevant information of importance to users. ML models operate as a black box and need no information on building systems [54]. They discover the relation between various input features and output targets (e.g. energy performance) using given data. When the ML models are trained with enough data, they can be used to predict targets for unseen samples, though the relation between the features and the targets is not defined. In this case, the targeted energy parameter is calculated using simulation (in general engineering method) or measured and used for training the model [54]. Another method of ML is mainly applied to unlabeled data to cluster them based on hidden pattern and underlying similarities in features. This method is very beneficial for the application of energy benchmarking where a determination of baseline buildings is crucial for calculating the energy performance of similar cases [54].

Artificial neural networks, as a basis for the development of artificial intelligence, are computer systems, created based on the model of neural networks that exist

in the human brain. In other words, these are systems of connected process units, which, based on given rules and templates, adopt and process information from the outside world and then create the result in the form of reports or decisions [50]. When it comes to the application of ANN in energy management in buildings, numerous studies have confirmed its effectiveness in terms of heating and cooling loads estimation, prediction of indoor air temperature, prediction of energy consumption, and energy management modeling. With an adequately trained system, prediction accuracy is over 99% [28].

Blockchain

Energy management in buildings nowadays goes beyond individual buildings and is increasingly viewed in the context of optimizing energy consumption at the level of several smart buildings. Namely, in order to lower costs and increase the reliability of supply, many organizations, within their buildings, also produce energy from renewable sources, which they then use for their own needs. These organizations are called prosumers. However, the energy produced can also be traded between organizations using blockchain technology. In this way, overall, it is possible to achieve savings in energy production at the community level, i.e. the energy produced is properly distributed so that there is no loss [26], [58], [64]. Blockchain is a distributed ledger technology which is managed by peers on a peer-to-peer network. This technology exists without a central administrator or centralized data storage. Data could be spread across several sites and the data quality is maintained by replicating and encrypting the database [26]. Various examples of blockchain technology application in the energy management are given in [58]. Regarding energy efficiency in buildings, for example, virtual coins or green certificates can be created to reward renewable energy producers or rational consumers, in order to promote production from renewable energy sources, decrease of consumption or load shifting. It is also possible to set up a local energy market between producers and consumers using virtual currency [58]. The community encompasses the local energy actors, the physical power system through which electricity flows, and the energy

management mechanisms. A common approach consists in using a local aggregator to centrally collect flexible building parameters and renewable energy sources data to optimize a given objective, both in planning and real-time operations. A decentralized approach implies that without the aggregator agent, the goal of the community is to agree on a consensus that optimizes a given shared objective function. The aggregator is entirely replaced by the Blockchain environment and every energy actor only interacts with the Blockchain [64].

Discussion on the application of digital technologies in energy management in buildings

This paper shows that automation systems in buildings contribute to significant energy savings in commercial and public buildings. With the development of digital technologies, these systems become more precise, more reliable and easier to manage, and contribute more to greater overall energy savings. Namely, the energy management system today involves collecting data via sensors and smart meters (Internet of Things), their processing on the spot (Edge Computing), their storage and additional analysis (Cloud Computing), analysis of large amounts of collected diverse data (Big Data), consumption forecasting and automatic taking of actions based on collected data and projected consumption (Artificial Intelligence), and energy trade between several networked buildings (Blockchain). With such a defined system, the aim is to reduce human participation in the building energy management system, i.e. to create the management system which would be largely under control of artificial intelligence. However, having in mind the users' preferences, it is possible that the management will be only partially automated, i.e. that users will retain the possibility of independent management, based on the data collected. By applying automated energy management systems in buildings, it is possible to eliminate irrational consumption or human errors that can lead to energy consumption which is higher than optimal.

Automation of the energy management in buildings provides an opportunity for organizations to collect

and analyze data on various parameters of the energy system, as well as to predict future consumption, costs, carbon dioxide emissions and so on. The availability of this information gives organizations the opportunity to respond more effectively to the requirements of energy management standards, such as defining goals, strategies and plans, monitoring indicators and taking measures for improvement. Also, through automation, the energy system adapts its work to the needs of building users while striving to minimize energy consumption. In this way, organizations are relieved of the burden of managing this domain and have the opportunity to focus more on their primary activities. Accordingly, the automation of the energy system in commercial buildings contributes to both greater organizational efficiency and more successful implementation of business strategies.

Conclusion

Digital transformation is one of the most important features of the modern age. The application of digital technologies introduces significant changes in all areas of life and work, most often in terms of improved efficiency of organizational processes and greater customer satisfaction. However, another feature of the modern age is climate change, whose negative impact is most often stimulated by the emission of carbon dioxide due to the combustion of fossil fuels used in energy production. Buildings are significant consumers of energy in the world. All of the above has imposed a need on organizations to improve energy efficiency in their buildings.

In the mid-1990s, in both science and practice, a more intensive research effort began in terms of creating building automation systems to optimize energy consumption. Based on the analysis of experiments conducted in the last 10 years, it was determined that the application of digital technologies or, more precisely, the building automation system in energy management in buildings, contributes to energy savings of up to 50%. This system reduces the possibility of human error and irrational energy consumption, and also, thanks to the collection of diverse data and learning abilities, the system adapts to the needs of users.

Future research in the field of digital technologies in energy management of buildings should be focused on:

- Development of more precise sensors with lower probability of failure;
- Implementation of a 5G network to make machine-to-machine communication faster and more reliable;
- Improving the ability of artificial intelligence to anticipate and undertake activities in real time to adapt the energy system to ever-changing circumstances;
- Further development of embedded software in building energy management system;
- Taking the opportunities that blockchain technology provides in the field of networking buildings in smart communities.

Also, there is room for further research when it comes to integrating the energy management in buildings with the strategic management of organizations. Namely, it is necessary to explore the impact of various organizational factors on energy efficiency in buildings and, accordingly, to complete the digital transformation of the energy management model.

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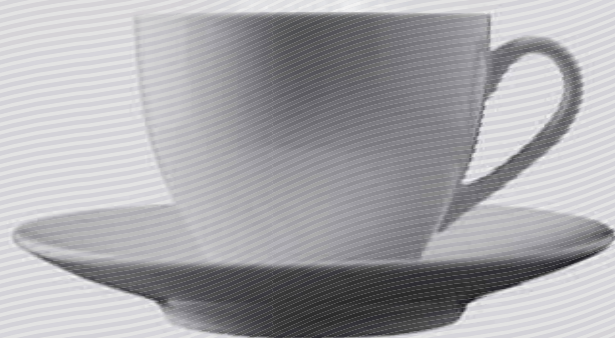
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IMPACT OF THE COVID-19 PANDEMIC ON THE PERFORMANCE AND COSTS OF HOSPITAL HEALTH CARE IN SERBIA

Uticaj pandemije kovida 19 na učinak i troškove bolničke zdravstvene zaštite u Srbiji

Abstract

Since its appearance at the end of 2019, the disease of the COVID-19 virus has grown from the local level into a global pandemic that has not bypassed the Republic of Serbia. The COVID-19 pandemic has affected the health system, the economy and the general condition of the population. Depending on the available hospital and staff capacities, each of the countries affected by the COVID-19 pandemic has established measures to struggle and treat citizens affected by the pandemic. In the newly created conditions, state-owned health care institutions and the Republic of Serbia focused their capacities on treatment and rehabilitation of COVID-19 patients, which had an impact on the management, organization of work and efficiency of health care institutions as well as additional costs for the overall health care system in the period from March 2020 to January 2022. This study shows the effects of the pandemic on the performance and costs of state-owned health facilities with a special focus on acute inpatient facilities in the Republic of Serbia. Medical analysis consists of: differences in the total number of patients, outpatients, changes in the number of visits in the private sector, the value of the case-mix index, the number of operations in acute hospitals, day hospital procedures, and consumption of reserve antibiotics. The financial analysis consists of: allocations for health in the budget of the Republic of Serbia, investments in public health, additional allocations due to the COVID-19 pandemic, analysis of the budget of the Health Insurance Fund (HIF), expenditures on salaries, drugs and medical supplies, cost per day, and average cost per patient. The result of the COVID-19 pandemic is a decline in elective operations and the number of outpatient visits and, on the other hand, an increase in spending in the health sector, as a result of significant growth in investment in tertiary institutions and in new hospitals, wages and overall current spending.

Keywords: *COVID-19, hospital care, non-COVID patients, performance, costs, Serbia*

Sažetak

Od svog pojavljivanja krajem 2019. godine, bolest izazvana virusom kovid 19 je sa lokalnog nivoa prerasla u globalnu pandemiju koja nije zaobišla ni Republiku Srbiju. Pandemija kovida 19 uticala je na zdravstveni sistem, privredu i opšte stanje stanovništva. U zavisnosti od raspoloživih bolničkih kapaciteta i kapaciteta osoblja, svaka od zemalja pogođenih pandemijom kovida 19 uspostavila je mere za borbu i lečenje građana pogođenih pandemijom. U novonastalim uslovima, državne zdravstvene ustanove i Republika Srbija su svoje kapacitete usmerile na lečenje i rehabilitaciju obolelih od kovida 19, što je uticalo na upravljanje, organizaciju rada i efikasnost zdravstvenih ustanova, kao i na dodatne troškove za ukupan zdravstveni sistem u periodu od marta 2020. do januara 2022. godine. Ova studija pokazuje uticaje pandemije na rad i troškove zdravstvenih ustanova u državnom vlasništvu sa posebnim osvrtom na akutne stacionarne kapacitete ustanova u Republici Srbiji. Medicinsku analizu čine: razlike u ukupnom broju pacijenata, ambulantnih pacijenata, promene u broju poseta u privatnom sektoru, vrednosti *case-mix* indeksa, broj tretiranih hirurških kliničkih epizoda, broj procedura u dnevnoj bolnici i potrošnje rezervnih antibiotika. Finansijsku analizu čine: izdvajanja za zdravstvo u budžetu Republike Srbije, ulaganja u javno zdravlje, dodatna izdvajanja zbog pandemije kovida 19, analiza budžeta Republičkog fonda za zdravstveno osiguranje (RFZO), rashodi po osnovu zarada, lekova i medicinskog materijala, cene po bolesničkom danu i prosečne cene po pacijentu. Posledica pandemije kovida 19 je pad elektivnih operacija i broja ambulantnih poseta, a sa druge strane povećanje potrošnje u zdravstvenom sektoru, kao rezultat značajnog rasta investicija u tercijarne ustanove i nove bolnice, plate i ukupnu tekuću potrošnju.

Ključne reči: *kovid 19, bolnička nega, pacijenti koji nisu kovid, performanse, troškovi, Srbija*

Introduction

From the appearance of the first case of COVID-19 in Serbia (March 6, 2020) until January 28, 2022, the total number of registered cases was 1,616,584, and 13,417 people died from this disease. The public health crisis reflected by these data posed two key challenges to the health system in Serbia: first, the ability of the public health system to identify, isolate and treat all COVID-19 cases and, second, the availability of health care capacities for non-COVID-19 health needs in the context of a general national crisis unseen since World War II. In response to these challenges of the COVID-19 pandemic crisis, all segments of the public health system came under immense pressure, putting in the spotlight its advantages and disadvantages. Stationary capacities, so-called state hospitals (founded by the Republic or the Autonomous Province) were under the greatest "blow" due to excessive and enormous needs for diagnosis, treatment and rehabilitation of patients with COVID-19. Therefore, it is necessary to analyze the impact and consequences that the pandemic crisis has had on hospital capacities in terms of crisis management, organization, efficiency and quality of health care provided, but also the consequent costs of this type of treatment. In our study, we will deal with the effects of the pandemic on certain aspects of work performance and costs of acute inpatient hospitals defined by the Healthcare Network Plan of health institutions of Serbia. The research objective of the paper is to identify and discuss the impact of the COVID-19 pandemic on the structure and accessibility of various health services in Serbian hospitals, and to shed light on a variance in work efficiency and costs of the hospitals in the COVID period compared to the pre-COVID period.

Data and methodology

Many recent studies all over the world focus their attention on the COVID-19 impact on general health care indicators [2], [6], [4], but also on performance indicators and costs of acute hospitals [1], [12]. General conclusion of these studies is that COVID-19 has put immense pressure on hospital capacities and deteriorated physical and human infrastructure for treatment of non-COVID patients. At the same time, this imbalance between COVID and non-COVID health services has produced a negative impact on overall health outcomes and has increased the level of public health care costs, while deflecting a number of non-COVID patients toward private health care institutions.

Data from the e-invoice system of the Health Insurance Fund (HIF) for 2019, 2020 and the first quarter of 2021 were retrospectively analyzed, in relation to the model of payment by diagnosis related groups (DRG) for 57 acute inpatient hospitals defined by the Decree on the Healthcare Network Plan of health institutions of the Republic of Serbia. The analysis did not include the capacities of COVID hospitals (Batajnica, Novi Sad and Kruševac), nor military medical institutions and temporary hospitals.

Data from the matrix of cost centers of hospital institutions for 2019, 2020 and the first quarter of 2021, established on the basis of the Methodology of cost centers of healthcare institutions and the Rulebook on contracting health care of the HIF, were retrospectively analyzed.

For the statistical processing of data, the methodology of descriptive statistics was used.

Results and discussion

Despite the admission and treatment of a large number of COVID patients, the *total number of treated hospital cases* was on average 20,000 clinical episodes (diagnosis related groups - DRG) less in 2020 compared to 2019. We notice that the pandemic and the establishment of inpatient hospital capacities primarily for the purpose of treating COVID patients are in correlation with the decline in the total number of hospitalized episodes, in the peaks of pandemic waves during April, August and November 2020. The conversion of a number of hospital institutions into the so-called COVID hospitals has prevented hospital treatment of non-COVID patients and thus contributed to the reduction of the scope and content of health services in most of the hospital institutions we monitored (see Figure 1).

Simultaneously with the decrease in the total number of hospitalizations, there was a significant decrease in *outpatient visits to hospitals.* By comparing the total number of outpatient examinations in the first quarter of 2020

(before the beginning of the pandemic) and the second quarter of 2020, a reduction of these hospital services by as much as 57% was recorded (see Figure 2). Given the number of specialist-consultative examinations necessary for non-COVID patients, as well as the treatment and follow-up of patients with chronic diseases, the impact of the pandemic on reducing the availability of specialist examinations is evident. We can assume that this will result in the increase of existing and the formation of new waiting lists, as well as the provision of this type of health services within private health institutions that are paid "out of pocket".

It is obvious that out-of-pocket health consumption in *private healthcare institutions* has grown since the beginning of the COVID-19 pandemic. People need prompt health service, which could not be accessed in public hospitals during the infection peaks, especially when public hospitals are turned partly or fully into COVID hospitals. The three biggest private health services providers (Medigroup, Euromedik and BelMedic) recorded 14% growth in total turnover and number of employees in 2020 compared to 2019. Combined turnover increased from EUR 75 to 85 million and number of employees grew from 1,692 to 1,486 (206 new employees)[1]. These numbers prove public-to-private spillover effect and show that the additional pressure is put on private hospitals infrastructure due to the COVID-19 pandemic, both in COVID and non-COVID health services.

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1   Serbian Business Registry, APR, accessed Jan 28th, 2022.

Figure 1: Total number of episodes of treatment - DRG in 2019 and 2020
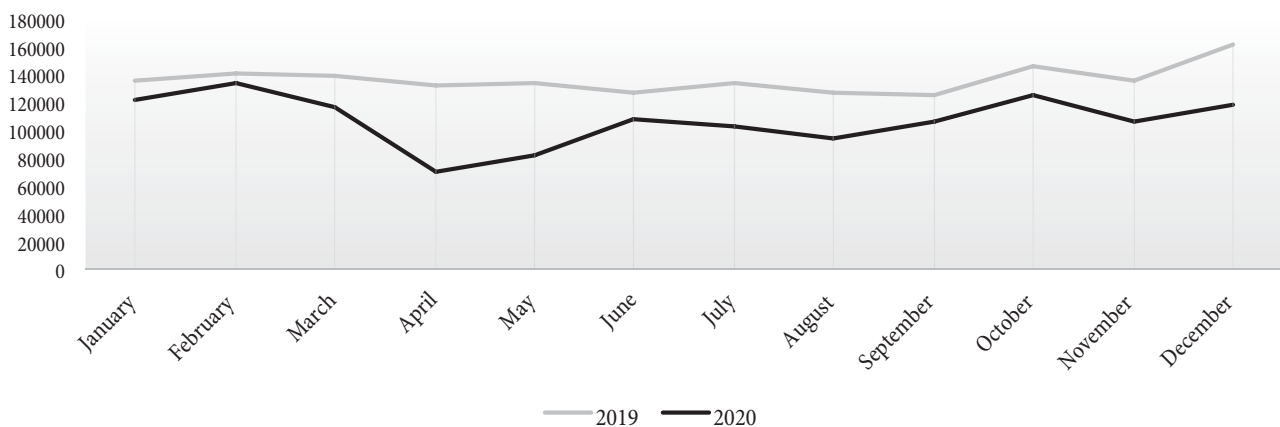
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

Figure 2: Comparative overview of the number of outpatient visits to hospitals in the first and second quarters of 2020

Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

According to the Statistical Office of the Republic of Serbia, *mortality trends* in Serbia are discouraging in 2020 and 2021. Annual mortality figures in the period 2016-2019 were within the range from 100,834 to 103,722. In 2020, 114,954 people died, which was an increase of more than 13% from 2019 mortality level. In 2021, almost 136,000 people died, which is 18% growth compared to 2020. It means that Serbia has experienced 16% mortality compound annual g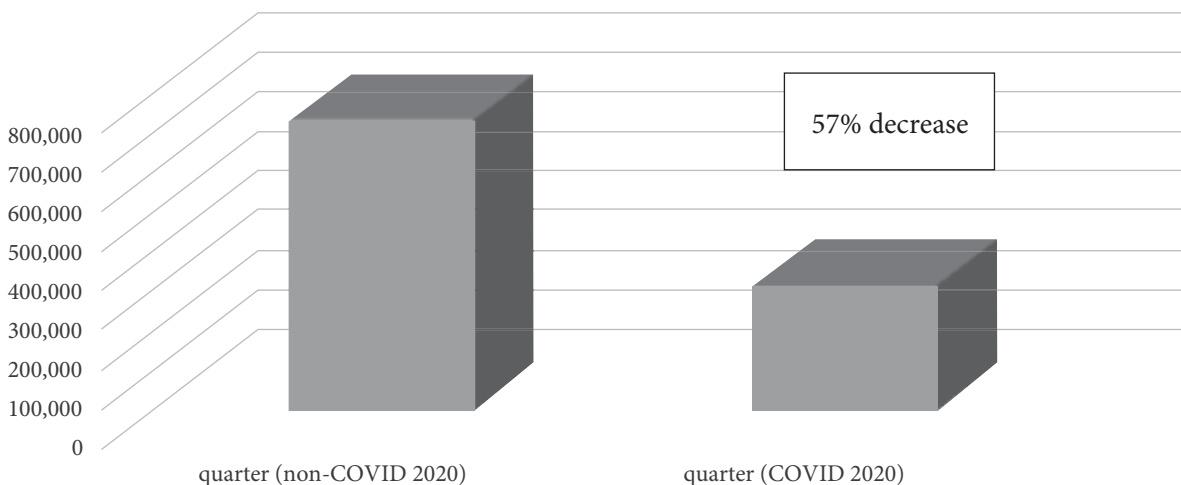rowth rate in 2020-2021 compared to pre-COVID 2019. Since the first COVID-19 case appeared at the beginning of March 2019, about 13,000 people died from this disease, out of which 9,457 people died from COVID-19 in 2021. Lower accessibility of hospital healthcare for non-COVID patients, accompanied with the fear of those patients from infections if visiting hospitals, has had an indirect impact on deteriorated health status of those patients. For example, according to the SORS, the number of deaths from cardiac diseases in Serbia increased from 52,330 in 2019 to 55,305 in 2020 (6% growth).

In terms of the structure, regarding to complexity and cost of treated clinical episodes, *the value of the case-mix index* in the observed period was analyzed. The case-mix index represents the average value of the weighting factor of diagnostically related groups, which represents the numerical value of the cost or cost of treatment of a defined clinical episode. Also, the weighting coefficient,

and thus its average value for all treated clinical episodes in the observed period, can, as a rule, be considered as a measure of the clinical complexity of treatment. Higher values of the case-mix index are characteristic of tertiary, narrowly specialized hospitals or clinics that are capable of diagnosing and treating a larger volume of more complex clinical cases in terms of human resources and equipment, and vice versa, lower values reflect less treatment of complex clinical patients. A comparative analysis of the value of the case-mix index in 2019 and 2020 shows a significant decline from 1.7 to 1.1 (see Figure 3). In relation to the less common fluctuations of this value, we can assume that the temporary suspension of hospital admissions of non-COVID patients or their reduced volume of treatment in many hospitals during the pandemic crisis resulted in a reduction in the case-mix index. Also, having in mind the international clinical experience so far, that the majority of clinical cases related to COVID-19 do not belong to complex clinical episodes - DRG (treatment in intensive care units or the need for mechanical ventilatory support), it is clear that the weights of these groups could not affect the increase in the value of the case-mix index.

As a significant part of health services provided by acute inpatient institutions, we have comparatively analyzed the *number of treated surgical clinical episodes* in the period before and during the pandemic, which

Figure 3: Comparative presentation of the values of the case-mix index for 2019 and 2020
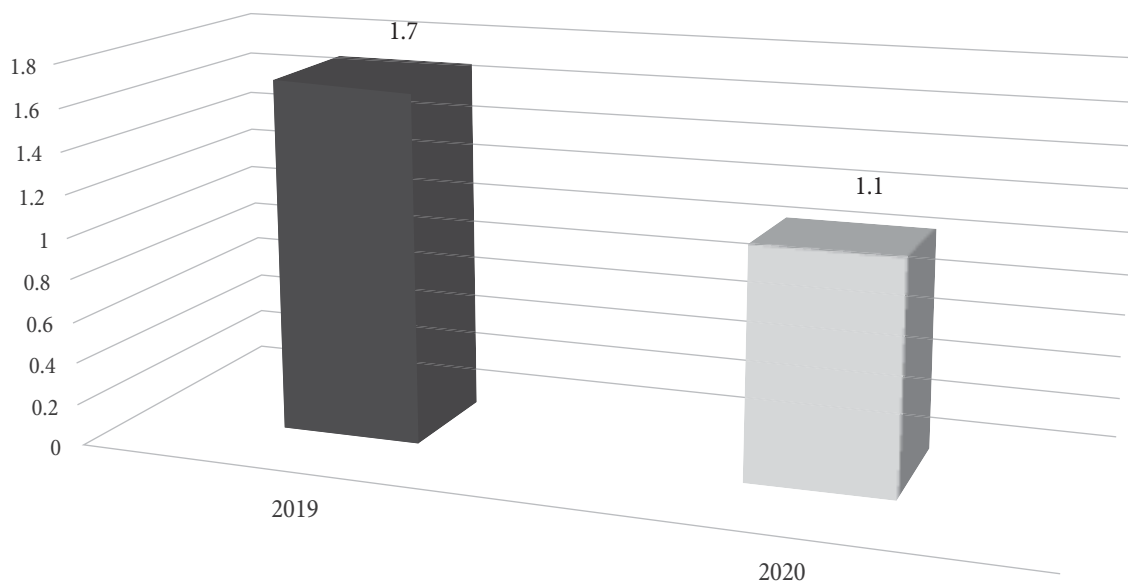
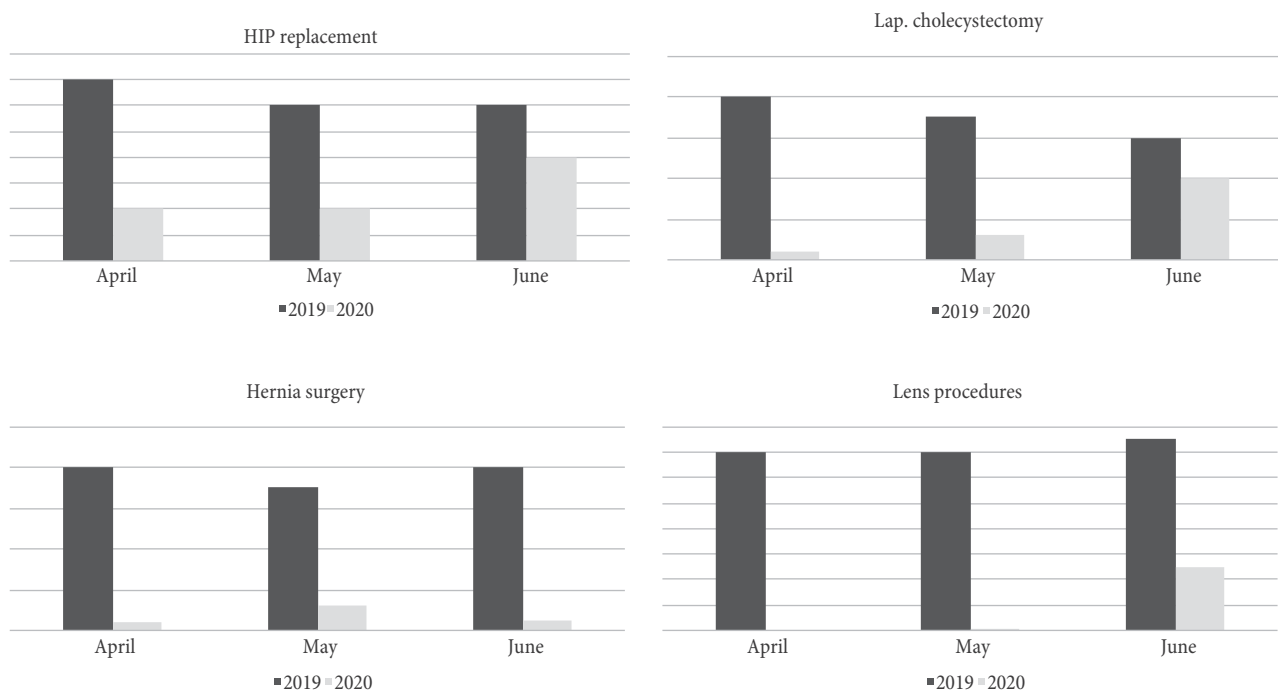Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

are the most common surgical operations in hospitals in Serbia. In addition, implantation of a hip endoprosthesis, implantation of a lens, laparoscopic gallbladder surgery and hernia surgery are, as a rule, pre-scheduled, so-called elective surgeries. Depending on the intensity of the COVID-19 pandemic, and thus the number of hospitalized cases, there is a drastic decline in the number of operations performed, from 30% of hip or gallbladder surgeries in June 2020, to almost negligible number of lens procedures and other surgeries at the peak of the pandemic waves during April 2020 (see Figure 4). Given the existing waiting lists for individual surgeries (e.g. the installation of a hip endoprosthesis at the Institute for Orthopedic and Surgical Diseases "Banjica", more than 4,200 patients are waiting with an expected date of surgery for those at the bottom of the list at the end of 2025), an increase in the number of patients and waiting times is expected, but also the potential formation of new waiting lists for operations and procedures for which it has not been the case so far.

Within the existing model of payment of "acute hospitals" by the HIF, as an indicator of the performance and quality of work of the institution, the number of cases treated within the day hospital or "same day" (defined as the *number of surgical or invasive non-surgical procedures*)

is monitored. Comparing data on these indicators in 2019 and 2020, there is a decline in the number of day hospital services in tertiary health care institutions such as University Clinical Centers and Clinical Hospital Centers, Institutes for Oncology and Orthopedic Surgery ranging from 10 to 30% (see Figure 5). In addition to the previously described reduced volume of inpatients and outpatient examinations, there has been a decrease in the number of services provided in the day hospital during the pandemic, which in general indicates a reduction in the performance of hospitals.

The use of the so-called reserve antibiotics in the hospital treatment of patients was analyzed as another defined indicator of the performance and quality of work of the hospital institution. A comparative analysis of data for 2019 and 2020 showed a significant increase in the use of these antibiotics in most hospitals, with the exception of small hospitals, oncology institutes and gynecological and obstetric institutions (see Figure 6). Treatment of inpatients with "reserve antibiotics" certainly reflects an increased influx of more serious clinical cases during the COVID-19 pandemic, but further causes may be sought in the possible increase in hospital-acquired infections caused by resistant bacterial strains.

Figure 4: Comparative overview of performed elective surgical procedures in 2019 and 2020

Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

In parallel with the analysis of individual indicators of the scope and content of provided health services, and indicators of work performance and quality of work of acute inpatient hospitals, *the use of financial resources and their structure* in the observed period was analyzed.

Within the total *budget expenditure*, the share of expenditures intended for health through the appropriation of the Ministry of Health has doubled in the period from 2019 (see Figure 7).

The mentioned increase of the budget for health in the budget can be explained by the increase of funds for certain program activities within the program budget of the Ministry of Health. Thus, program activities, i.e. allocations for planned investments have been increased by more than four times. In 2020, the increase in budget funds for planned investments amounted to almost EUR 45 million, and in 2021 by a further EUR 124 million (see Figure 8).

The reconstruction of the University Clinical Center of Serbia and other tertiary hospital institutions had the largest share in the allocations for planned investments, but the impact of the COVID-19 pandemic also caused expenditures for equipping the so-called COVID hospitals

Figure 5: Comparative overview of the number of cases treated within the day hospital for certain categories of hospital institutions in 2019 and 2020
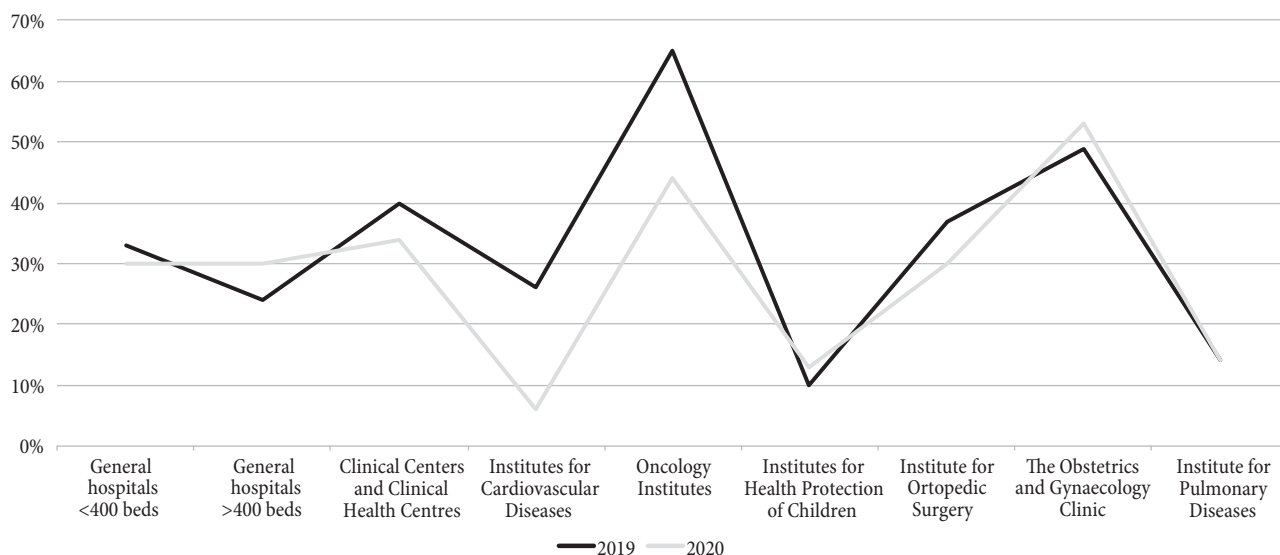
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

Figure 6: Comparative overview of the percentage of patients treated with so-called reserve antibiotics in 2019 and 2020
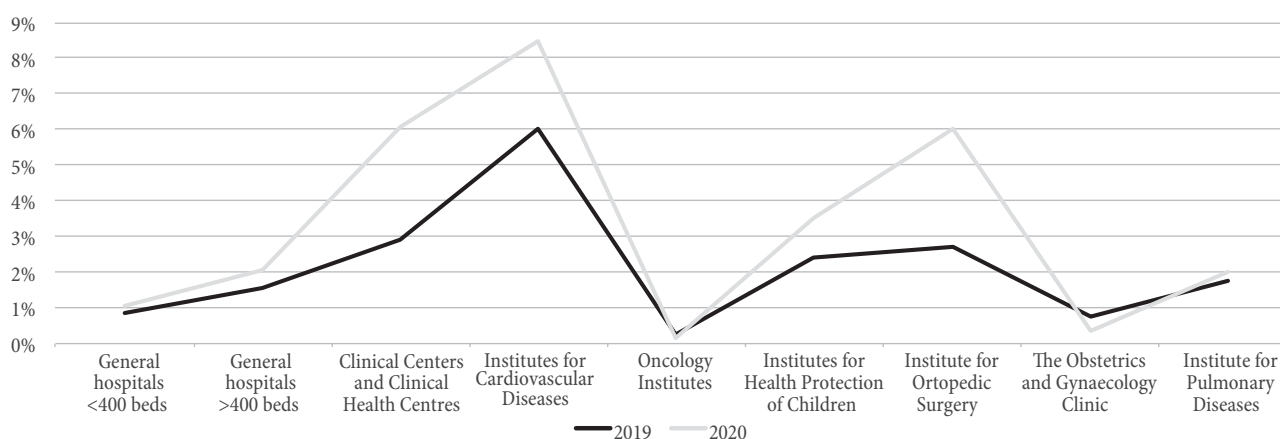
Note: Vancomycin, Tigecycline, Piperacillin, Tazabactam, Merepenem, Teicoplanin, Ganciclovir, Cilastatin, Amfothericin B, Colistitemate sodium, Micafugin sodium, Anidulafugin
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

in 2020 and 2021 in the amount of more than EUR 40 million (see Table 1).

One of the most important reasons for the increase in health care allocations is the doubling of expenditures for the program of exercising rights from compulsory health insurance, which included a new program activity "Prevention and mitigation of the consequences caused by COVID-19 disease caused by SARS-CoV-2 virus" in the amount of EUR 76,990,956 (2020) and EUR 80,218,118

(2021) and has a significant share in the total planned expenditures for the health-related section of 26% in 2020 and 17.5% in 2021 (see Figure 9).

Based on the data from the financial plans of the HIF for 2019, 2020, and 2021, a significant increase in total funds is observed. Compared to the pre-pandemic 2019, in 2021 financial resources have increased by more than EUR 672 million or 28.8%. At the same time, the share of hospital financing (secondary and tertiary health care)

Table 1: The most significant infrastructure investments in the period 2019-2021

	2019	2020	2021
Reconstruction of the Clinical Center of Serbia, Belgrade	6,669,035 €	26,757,484 €	151,861,908 €
Reconstruction of the Clinical Center Kragujevac	0 €	305,853 €	841,312 €
Reconstruction of the Clinical Center Nis	3,486,371 €	3,980,492 €	641,105 €
Reconstruction of the Clinical Center of Vojvodina, Novi Sad	93,597 €	2,202,268 €	8,527,084 €
Construction and equipping of "COVID" hospital in Novi Sad	0 €	0 €	17,146,021 €
Equipping "COVID" hospitals	0 €	23,512,476 €	0 €
Total	10,249,003 €	56,758,573 €	179,017,429 €

Source: Ministry of Finance of the Republic of Serbia

Figure 7: The share of the "health" sector in total planned expenditures, 2019-2021
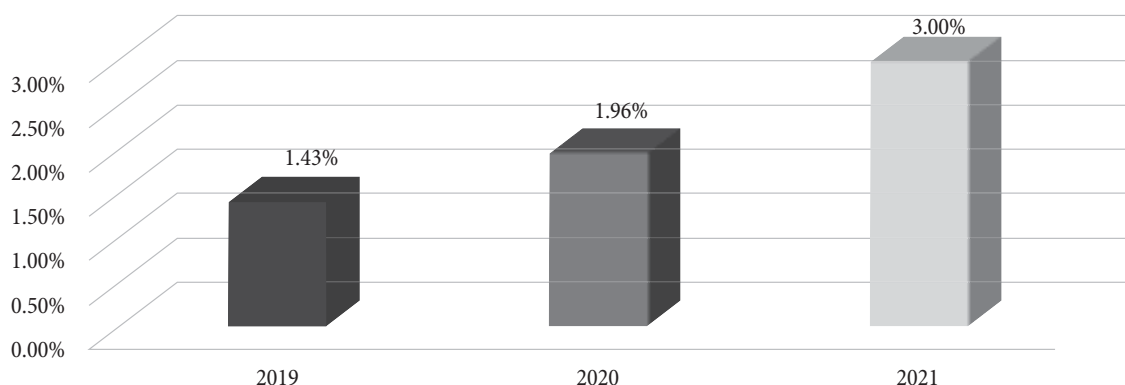
Source: Ministry of Finance of the Republic of Serbia [16], [13], [18]

Figure 8: Planned investments and their growth in the period 2019-2021
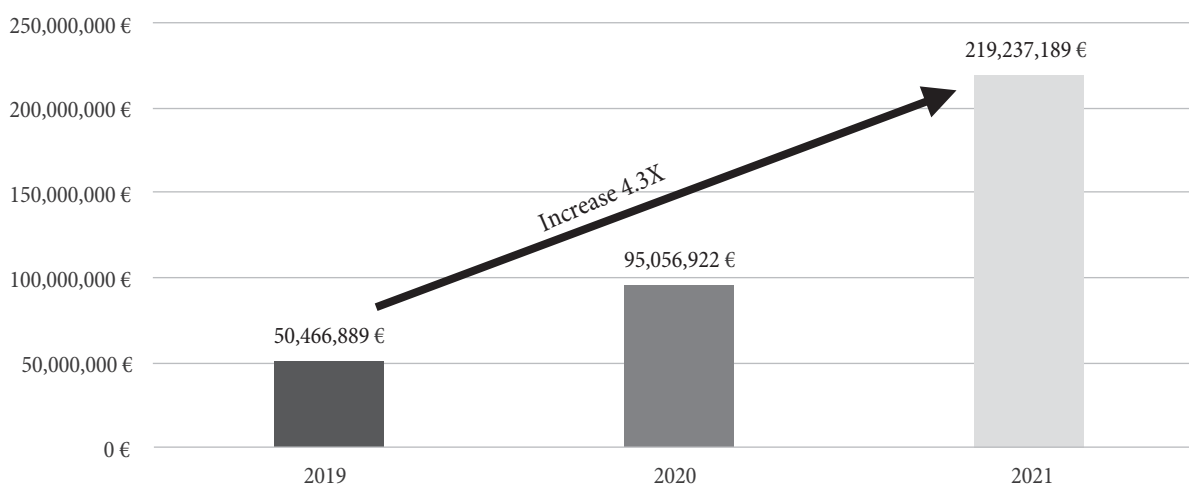
Source: Ministry of Finance of the Republic of Serbia [16], [13], [18]

was maintained at a steady level of 51% of the total HIF budget (see Figure 10).

An insight into the program structure of the *HIF expenditures* shows a growth trend in most programs, especially in 2021. The increase in funding for hospital health care programs in 2021 compared to the period before the COVID-19 pandemic was 29% (see Figure 11).

The increase in expenditures for hospital health care by almost a third compared to 2019 was caused primarily by the increase in salaries of employees in secondary and tertiary health care institutions. Observing the share of costs by appropriate purposes, in Figure 12 we see that in contrast to the increase in the *share of costs* for salaries of 7%, costs by other purposes (drugs, consumables, blood and blood products, etc.) were at the same or lower level in relation to 2019, i.e. before the advent of the COVID-19 pandemic. The previously shown reduction in the total volume of services provided in these institutions, especially when observing non-COVID patients, provides an explanation for the reduced consumption of drugs and medical supplies, while the indirect costs had a discrete reduction.

Considering that the *increase in salaries* mostly participated in the increase of HIF expenditures for health care in health institutions, we analyzed the trend of this increase in relation to the level of health care for 2019, 2020 and 2021. The total increase in salaries in primary, secondary and tertiary health care institutions was 30%

Figure 9: Support for the realization of the rights from the obligatory health insurance in the period 2019-2021
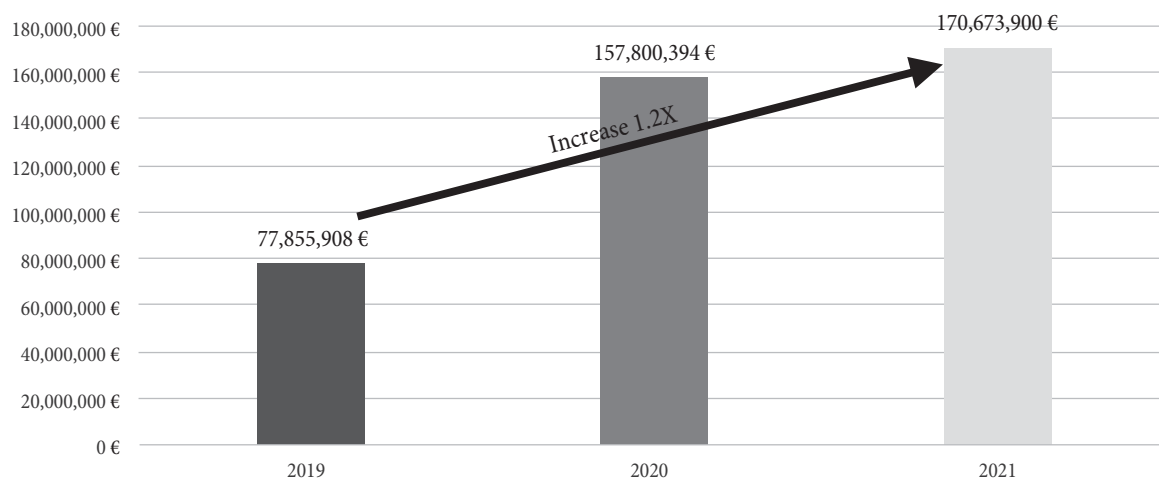
Source: Ministry of Finance of the Republic of Serbia

Figure 10: Comparative overview of the total "budget" of the HIF based on the financial plan for 2019, 2020 and 2021 (thousand EUR)
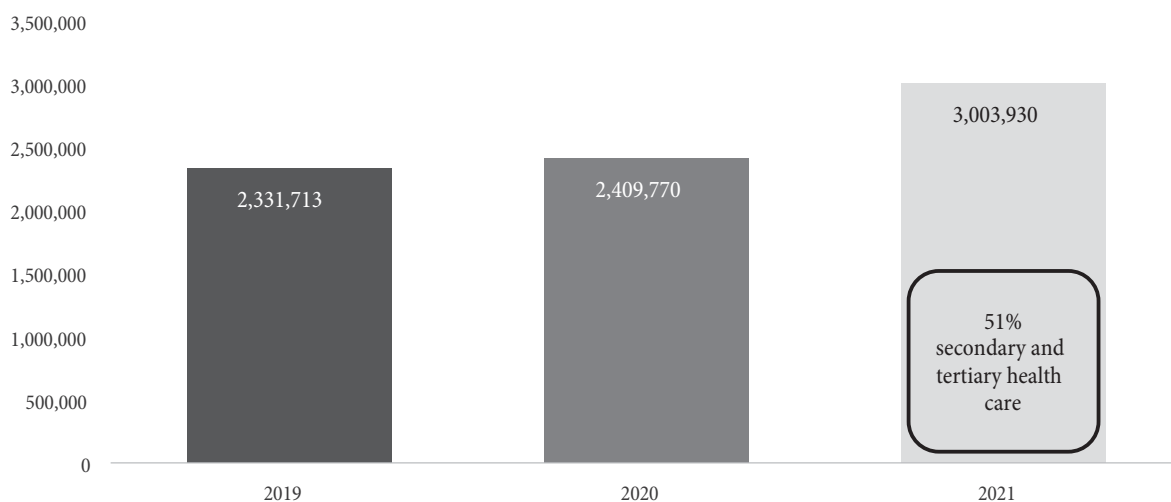
Source: HIF – Health Insurance Fund

compared to the period before the COVID-19 pandemic (2019). Of that, the increase in salaries for hospital institutions in 2021 was nominally higher by EUR 195.8 million (see Figure 13).

Figure 11: Comparative overview of financial resources by individual programs in the "budget" of the HIF for 2019 and 2020 (thousand EUR)
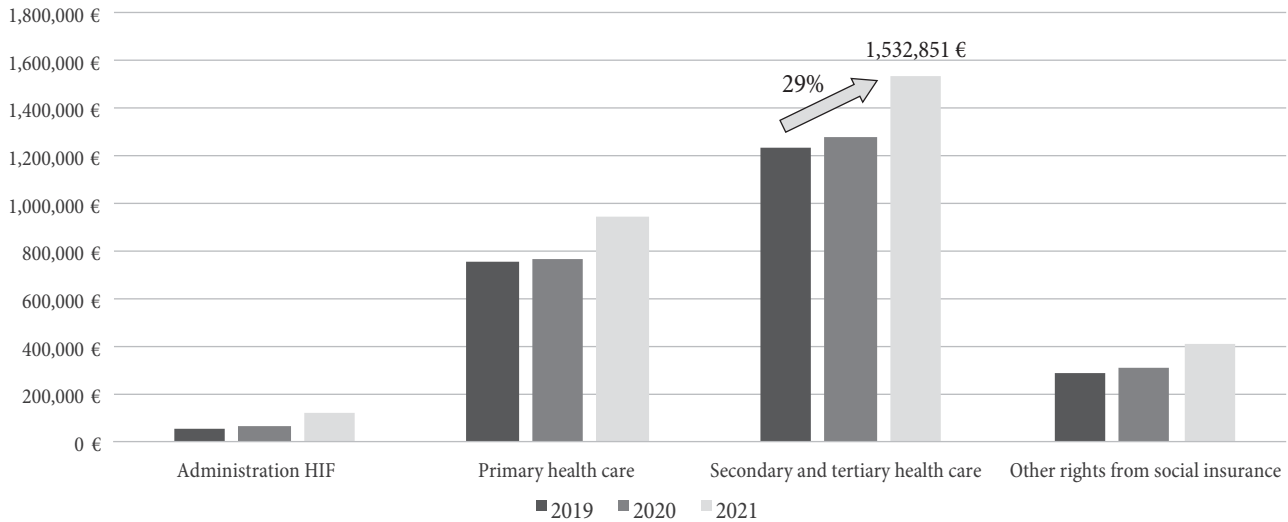
Source: HIF – Health Insurance Fund

Figure 12: Comparative presentation of the share of costs in the total budget of acute hospitals by individual purposes in 2019, 2020 and 2021
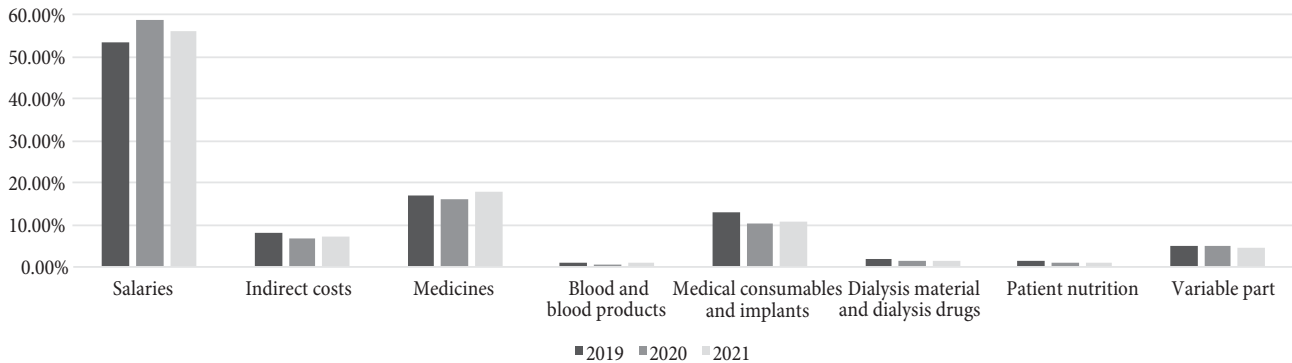
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

Figure 13: Comparative overview of expenditures for salaries in relation to the level of health care in 2019, 2020 and 2021
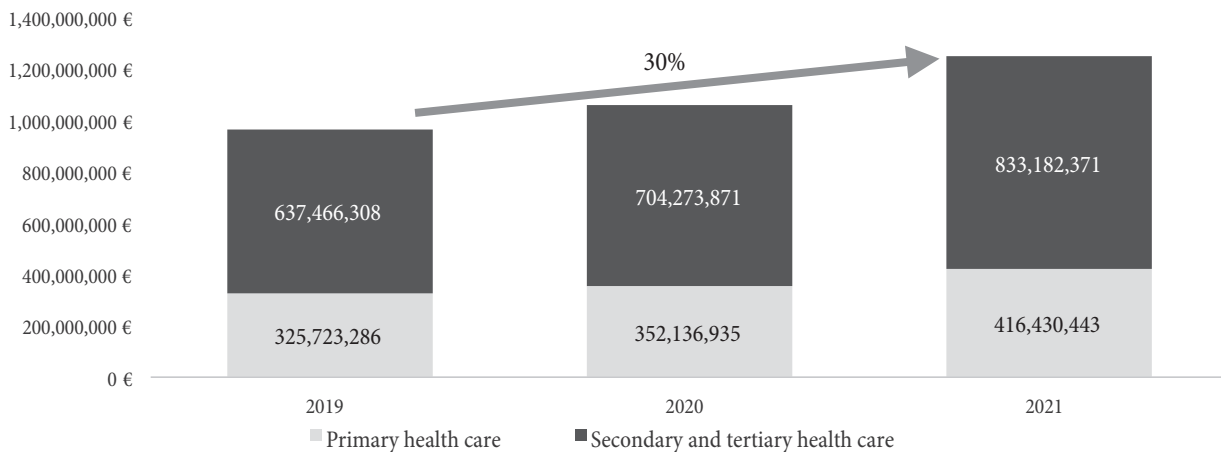
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

While the previously presented share of costs for medicines and consumables had a slight decrease, the total *expenditures for medicines and consumables* in 2021 were higher by 11% compared to 2019. Comparing the costs of medicines and consumables in relation to institutions of different levels of health care, we see that this increase is caused by increased spending in hospitals, while in primary health care institutions there was a decline in these costs (see Figure 14).

By analyzing the costs reported by hospitals that we observed in the period 2019 and 2020, we come to the result which shows that the average *cost of a bed-day* was increased in each month of 2020 compared to the period before the pandemic. This was especially pronounced in the peaks of the pandemic waves during April, May,

August and September of 2020. The explanation for this lies in the fact that hospital health care institutions are still predominantly paid on the basis of inputs, i.e. capacities (expenditures for salaries, energy, etc.) and that the total number of patients for the same or similar invoiced value gives a relatively higher cost per bed-day (see Figure 15).

Also, the average cost per patient was higher in the observed period. A total of a smaller number of hospitalized patients, for the same or higher amount of hospital budgets, resulted in an increase in the mentioned cost (see Figure 16).

In the context of the COVID-19 pandemic, special attention is paid to the *cost structure for the treatment of*

Figure 14: Comparative overview of expenditures for medicines and consumables in relation to the level of health care in 2019, 2020 and 2021
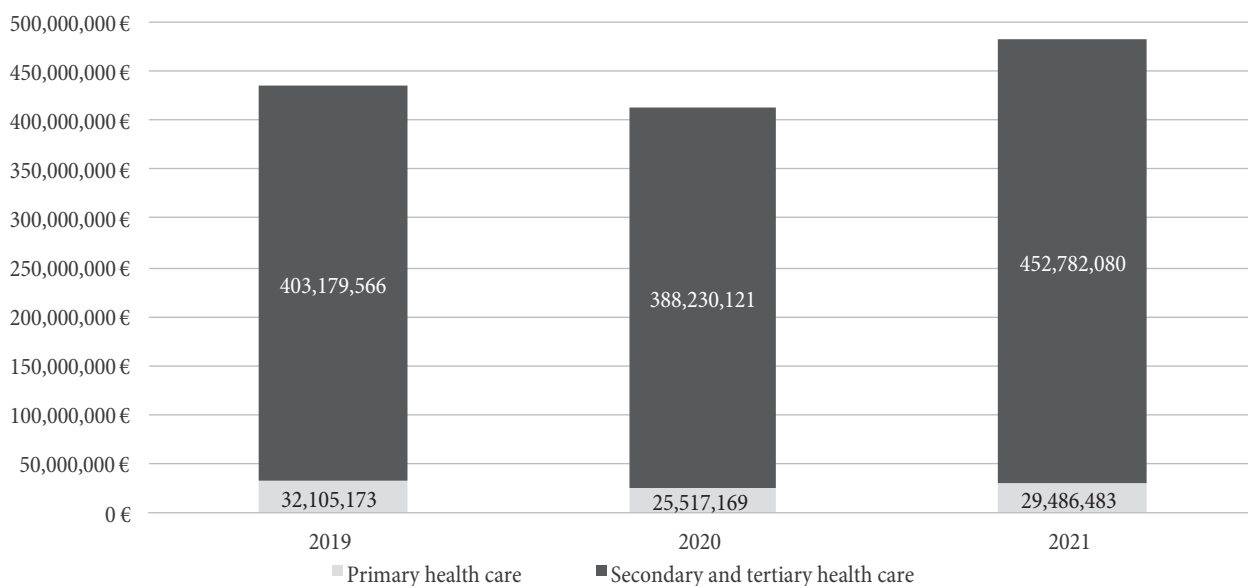
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

Figure 15: Comparative presentation of the average cost per day of hospitalization by months in 2019 and 2020
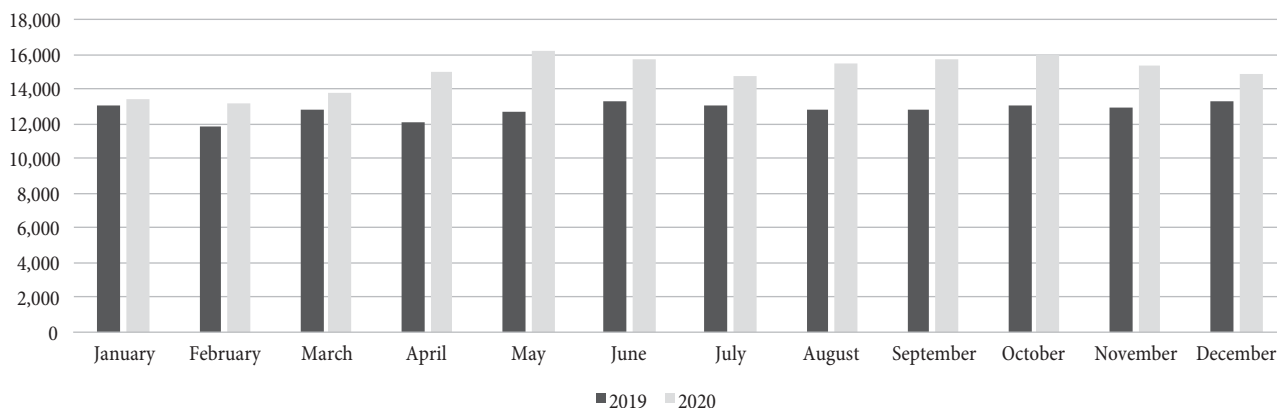
Source: HIF – Health Insurance Fund / SSHP – Second Serbia Health Project

complex clinical episodes in intensive care units, which is expected to be the most expensive form of hospital treatment. Compared to the previously shown decrease in the total number of hospitalizations, the number of sick days in intensive care units decreased by 10 to 30%, depending on the month of 2021 compared to 2019 (see Figure 17). Since this research does not cover the capacities of COVID hospitals, which also have the capacities of intensive care units, it is not possible to see the overall picture of this form of treatment and the consequent costs.

However, observing the *share of bed-days* realized in intensive care units in relation to the total number of bed-days, the pressure on these capacities is noticeable in the period since the beginning of the pandemic. Compared to 2019, in 2020 the share of the so-called bed-days was higher by 5 to 15%. This has certainly contributed to the increase in the cost of hospital treatment, especially during

the periods of the largest influx of COVID patients during the pandemic waves in April, August and December 2021 (see Figure 18).

Conclusion

The COVID-19 pandemic, despite an excessive increase in the number of COVID patients and pressure on the hospital system, has contributed to a reduction in the scope and content of hospital services provided. The system of so-called state hospitals, playing a key role in the organized response to the COVID-19 pandemic, was forced to significantly reduce the number of services provided to non-COVID patients, which further complicates the inherited burden with waiting lists and reduces the availability of certain health care services. Despite the decrease in the volume and content of hospital health

Figure 16: Comparative overview of the average cost per patient in hospital treatment by months in 2019 and 2020
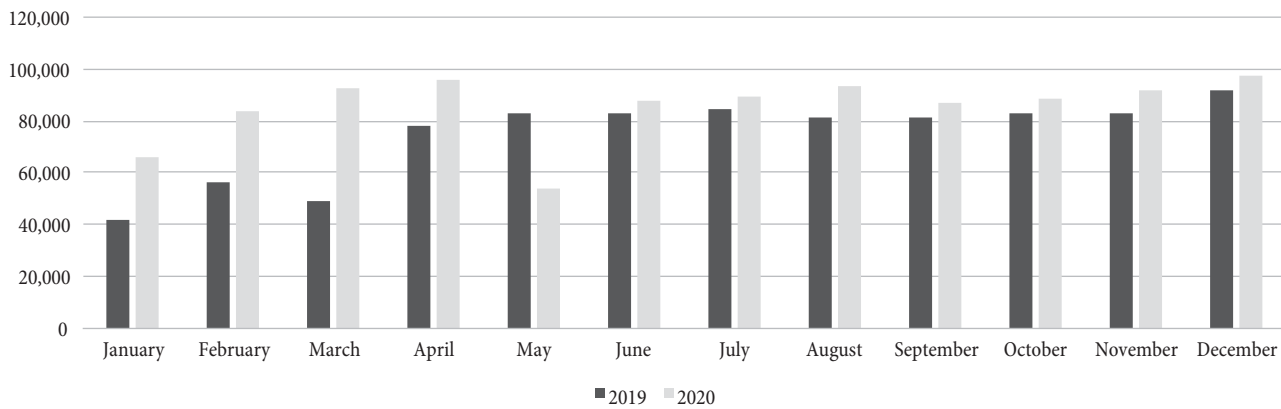
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

Figure 17: Comparative overview of the total number of bed-days in intensive care units by months in 2019 and 2020
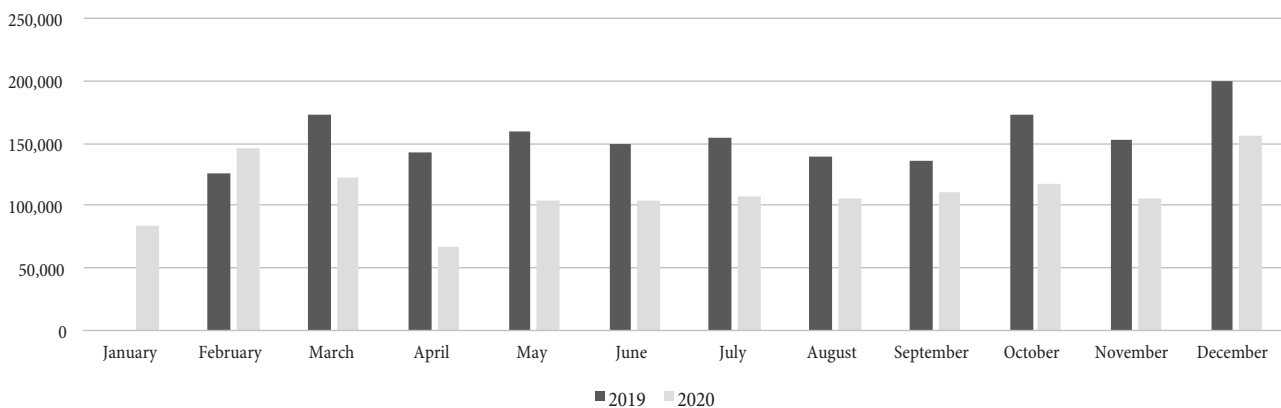
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

Figure 18: Comparative overview of the share of sick days in intensive care units in relation to the total number of sick days by months in 2019 and 2020
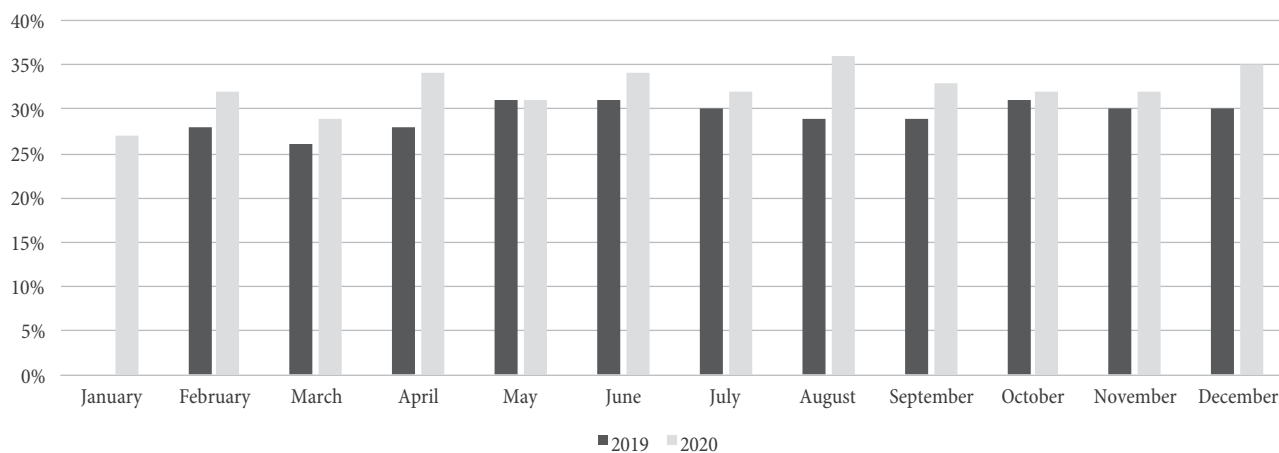
Source: HIF – Health Insurance Fund/SSHP – Second Serbia Health Project

services provided during the COVID-19 pandemic, the costs of hospital health care increased significantly, primarily in the part related to the increase of employees' salaries. The very significant increase in the HIF budget during the COVID-19 pandemic was primarily caused by the increase in expenditures for hospital health care (29%), due to the increase in expenditures for salaries and medicines in hospitals. The inherited, so-called historical model of payment for hospital services based on the payment of input costs (inputs), i.e. payments by capacity and not by performance, due to the COVID-19 pandemic resulted in a significant increase in hospital costs and reduced productivity of hospital capacity.

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TAX POLICY REFORM FOR SUSTAINABLE ECONOMIC GROWTH IN SERBIA

Reforma poreske politike za održivi privredni rast u Srbiji

Abstract

In the last two decades, the Serbian economy posted an average growth rate of 3.8 percent, which was above the average growth rate in the EU, Central and Eastern Europe (CEE)[1] and the Western Balkans[2]. Together with sharp decline in population, this has led to some economic convergence in terms of the GDP per capita, although the gap to the EU and CEE countries remains significant (57 and 42 percent respectively). To achieve full economic convergence with the European countries, Serbian economy needs to post long run growth rates of 4-6 percent per year, in a sustainable manner, which primarily refers to a more fair distribution of growth dividend (reduction of economic inequality) and limiting negative environmental footprint. In this sense, the reform of tax policy can make a contribution to the sustainable growth of the Serbian economy, through: *i)* a slight reduction in the overall tax burden, primarily through a significant cut in labour taxes, which may be financed by means of broadening the environmental taxes base, increase in consumption taxes and reducing unproductive public expenditures, *ii)* moderately increasing the progressivity of the personal income tax, recurring property tax and inheritance tax, and *iii)* broadening the environmental taxes base (with the focus on energy and pollution taxes) and introducing the tax incentives for households to switch to green energy sources.

Keywords: *tax policy, reforms, economic growth, inequality, environment, sustainable development.*

Sažetak

U poslednje dve decenije privreda Srbije beležila je prosečnu stopu rasta od 3,8 odsto, što je bilo iznad prosečne stope rasta u EU, Centralnoj i Istočnoj Evropi (CIE) i Zapadnom Balkanu. Zajedno sa naglim padom stanovništva, ovo je dovelo do određene ekonomske konvergencije u smislu BDP-a po glavi stanovnika, iako je jaz u odnosu na zemlje EU i CIE i dalje značajan (57 odnosno 42 procenta). Da bi ostvarila punu ekonomsku konvergenciju sa evropskim zemljama, privreda Srbije bi trebalo da beleži dugoročne stope rasta od 4-6 odsto godišnje, na održiv način, što se pre svega odnosi na pravedniju raspodelu koristi od rasta (smanjenje ekonomske nejednakosti) i ograničavanje negativnog uticaja na životnu sredinu. U tom smislu, reforma poreske politike može doprineti održivom rastu srpske privrede, kroz: *i)* blago smanjenje ukupnog poreskog opterećenja, pre svega kroz značajno umanjenje poreza na rad, koje se može finansirati povećanjem poreza na potrošnju, povećanjem obuhvata ekoloških poreza i smanjenjem neproduktivnih javnih rashoda, *ii)* umereno povećanje progresivnosti poreza na dohodak fizičkih lica, godišnjeg poreza na imovinu i poreza nasledstvo, te *iii)* proširenje obuhvata ekoloških poreza (sa fokusom na poreze na energente i zagađenje) i razmatranje uvođenja poreskih podsticaja za domaćinstva za prelazak na zelene izvore energije.

Ključne reči: *poreska politika, reforme, privredni rast, nejednakost, životna sredina, održivi razvoj*

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1 Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

2 Albania, Bosnia and Herzegovina, Montenegro and North Macedonia

Introduction

Over the last two decades (2000-2021), Serbian economy posted relatively strong economic growth, with the average GDP growth rate of 3.8 percent per year. Economic growth in Serbia over that period exceeded the average GDP growth rate of EU member states, but also of the Central and Eastern Europe and the Western Balkans countries. In that respect, the last two decades can be decomposed into four sub-periods, based on the speed of economic growth: *i)* 2000-2008: period of strong growth of Serbian economy that significantly outweighed the growth performances of other EU, CEE and Western Balkans countries, *ii)* 2008-2012: period of recession and sluggish growth caused by the global financial crisis and Eurozone crisis, *iii)* 2013-2017: period of recession and slow growth, driven by the 2014 floods, fiscal consolidation and incomplete structural reforms, *iv)* 2018-2021: period of solid growth interrupted by the 2020 COVID-19 pandemic recession (Figure 1) through which Serbia went with milder recession than most other European countries. Solid average GDP growth

rate in Serbia over the last two decades led to notable convergence of Serbia to both the old EU member states and the CEE countries. This may be attributed to above the average growth performances from 2000 to 2007 and 2018 onwards.

Economic outcomes, growth performances and convergence are often measured using the GDP per capita indicator, which is shaped by both GDP and population dynamics. Over the last two decades migration and fertility trends led to considerable rise in population in developed European countries and decline in emerging European countries from the Central, Eastern and South Eastern Europe (Table 1). In similar way, the total population of Serbia over the last two decades declined by around 620 thousand, i.e. by 8.2 percent, which was more severe relative decrease than on average in other CEE and the Western Balkans countries. Decrease in population reduced future growth potential of Serbia economy, but at the same time, it had a positive direct contribution on GDP per capita growth dynamics.

Figure 1: GDP growth rates in Europe, 2020-2022 (in %)
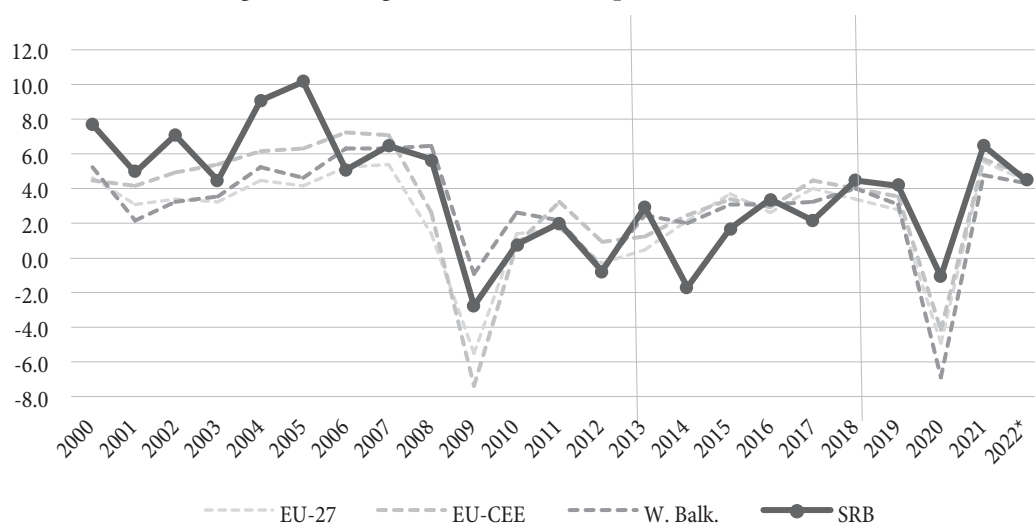
Source: IMF World Economic Outlook Database, Oct 2021

Table 1: Population dynamics in Europe 2000-2021

	2000	2021	2000-2021 change	2000-2021 change	2000-2021 average annual change
	million	*million*	*million*	*(%)*	*(%)*
EU-27	426.09	445.47	19.38	4.5	0.21
EU-CEE	108.40	102.14	-6.25	-5.8	-0.28
W. Balkans	9.46	8.83	-0.63	-6.6	-0.33
Serbia	7.52	6.90	-0.62	-8.2	-0.41

Source: Author's calculations using data from the IMF WEO Database

As the result of economic growth and demographic decline, GDP per capita in Serbia increased by 125 percent over the last two decades, which is considerably above the rise posted in the EU-27 (70 percent), CEE countries (106 percent) and Western Balkans Countries (88 percent). Nevertheless, with GDP per capita of 19.4 thousand international USD (in 2017 constant prices) in 2021 Serbia ranked 28th within the group of 31 European countries (Figure 2).

Growth data suggest that over the last two decades Serbia posted sizeable economic convergence to other European countries, in the last decade outperforming the Western Balkans average (Table 2). In 2021, GDP per capita in Serbia was by around 19 percent above the Western Balkans average, but still 42 percent below the CEE average and 57 percent below the EU-27 average.

Table 2: GDP per capita (intl. USD constant prices 2017) in Serbia relative to other countries

	2000	2008	2013	2018	2021
EU-27	0.27	0.31	0.38	0.36	0.43
EU-CEE	0.50	0.46	0.55	0.49	0.58
W. Balkans	0.95	0.95	1.06	0.96	1.19

Source: Author's calculations using data from the IMF WEO Database

The above presented data show that in spite of substantial economic development posted the last two decades, Serbia still has a significant way to go until the full-scale convergence to the CEE and other EU member states. In order to achieve that, it is necessary to have lasting GDP growth rate of 4-6 percent per year in the coming decades. For growth to be lasting, the growth dividend needs to be shared in a more equitable manner, while taking more care of the environmental footprint. In that sense, this paper provides analysis of the properties of the current tax system of Serbia and assesses the potential space for its improvement, in order to contribute to acceleration of economic growth in a sustainable way, i.e. by ensuring improvement of welfare distribution and reduction of negative impact on environment.

Consequently, in the second section, we discuss the impact of tax system on economic growth to identify the key tax policy reforms in Serbia intended to promote growth. The following sections discusses the impact of tax system on economic inequality to identify space for improvement of redistributive capacities of Serbian tax system. In the fourth section, the issue of environmental taxes is discussed, both from normative, European and Serbian perspective, while the final section concludes.

Tax policy and economic growth

Tax policy and public finance stability

The main objective of a tax system is to provide sufficient volume of tax revenues for funding of government

Figure 2: GDP per capita, intl. USD constant prices 2017
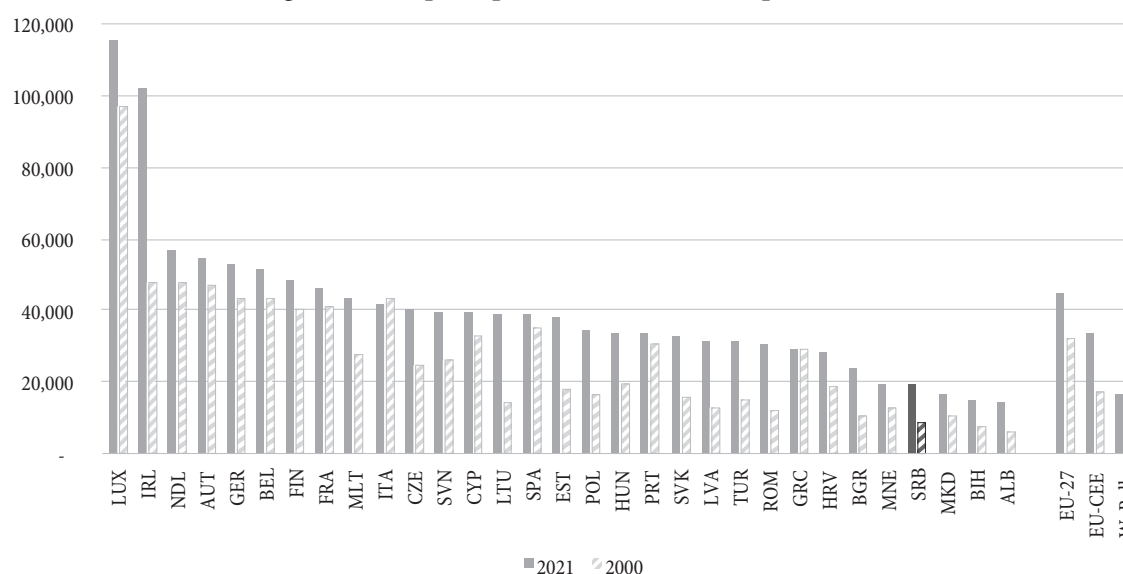
Source: IMF World Economic Outlook Database, Oct 2021

services, thus ensuring public finance sustainability and macroeconomic stability. If that aim is not met, public finance system generates public debt, which after certain threshold may have adverse impact on macroeconomic stability and economic growth. Empirical literature on the effects of public debt on economic growth suggests that the threshold level of debt, above which the negative impact kicks-in, is increasing in the level of economic development. Thus, [13] found that public debt threshold in developed countries ranges from 90 percent to 94 percent of GDP, while in developing countries ranging from 44 percent to 45 percent of GDP. Recent studies on European emerging economies imply that in more developed CEE countries the threshold of public debt is around 71 percent of GDP, while in the less developed Western Balkans countries the threshold is considerably lower, standing at around 58 percent of GDP [6].

At the end of 2021 public debt of Serbia stood at 56.9percent of GDP, which was below the EU-27 average (77.9 percent of GDP) and the Western Balkans average (66.7 percent of GDP), but still higher than the CEE average (54 percent of GDP). This means that after successful implementation of fiscal consolidation programme, both on spending and the revenue side of the budget, public debt of Serbia is not far from sustainable level, although lover debt (below 50 percent of GDP) would be beneficial, as it would create space for counter-cyclical fiscal interventions in the future. In that respect, considering relatively modest level of structural fiscal deficit and the trajectory of public debt, it may be concluded that the tax system of Serbia currently delivers in terms of its main objective, by generating close to sufficient amount of tax revenues, required for fiscal sustainability. Further steps in terms of curbing the shadow economy and promoting tax compliance would enhance the revenue performances of Serbian tax system, with positive impact on economic efficiency.

Level and structure of tax burden

Tax system can affect the drivers of economic growth through two channels: level of the total tax burden and the structure of tax burden/level of particular taxes [11].

Tax revenues are a precondition for provision of public goods and other government services that are crucial enablers of economic activity, such as security, rule of law, education, public administration, etc. However, above certain level burden, efficiency costs associated with taxation (their negative impact on labour supply, education, consumption/savings behaviour, investment, risk taking, entrepreneurship, etc.) outperform the benefits from tax-funded public goods and services. Empirical literature on optimal size of government sector is rich (see [7]), but it provides no unanimous view on the optimal size of government, suggesting that it depends on the country characteristics, structure of government expenditures, government efficiency, structure of the tax system, etc. Literature also shows that on average 10 percent increase in tax burden is associated with the reduction in GDP growth rate by 0.2 percent [1]

The most of empirical studies dealing with the link between the level of tax burden/size of government and economic growth, take tax-revenue-to-GDP ratio as the indicator of the size of the total tax burden. Data presented in Figure 3 show that in term of the relative volume of total tax revenues, Serbia is close to European median. However, distribution of countries also indicates that the total tax burden in less developed European countries from CEE and Western Balkans region is on average lower than in Serbia. Considering theoretical and empirical argument, it may be concluded that slight reduction in the overall tax burden in Serbia, bringing it closer to the CEE average might be beneficial for economic growth. However, substantial cut in the overall tax burden would not be feasible, if the government is to provide public goods and services in line with social-democratic, mechanistic paradigm.

All taxes, except for lump-sum tax, change relative prices thus distorting economic efficiency. Due to equity concerns, lump-sum taxes are usually not part of contemporary tax systems, which mostly consist of taxes on personal and corporate income, property/wealth and consumption. All of these taxes may affect the economic behaviour, including the labour/leisure, consumption/saving, consumption/investment, education, risk taking and other decisions. Since not all taxes affect economic behaviour in the similar way, it is argued that structure

of the overall tax burden and the tax system is also a significant driver of economic growth. Earlier literature [12] divided taxes into distortionary (those which affect investment decisions, such as personal and corporate income tax) and non-distortionary (those that affect labour/leisure decisions only, such as consumption taxes), arguing that shifting tax burden from distortionary to non-distortionary may foster economic growth. Since than it became almost a common view in academic and policy literature that income taxes are more distortive to economic growth than consumption or property taxes ([3], [10]). In their empirical study for the set of developed countries, [3] found that corporate income taxes appear to have the strongest negative impact on economic growth, followed by personal income tax. On the other hand, consumption taxes have been found to have considerably less negative effects on economic performance, while property taxes being the least harmful for growth (in particular recurring taxes on immovable property and inheritance).

Data on the structure of tax revenues show that in Serbia tax burden is almost equally split between (personal and corporate) income taxes and consumption taxes, while in the CEE countries and especially in developed European countries, income taxes account for much larger share of the total tax revenues (Figure 4). Considering above mentioned empirical insights it can be argued that

Figure 3: Total tax revenues in Europe, 2019 (% of GDP)
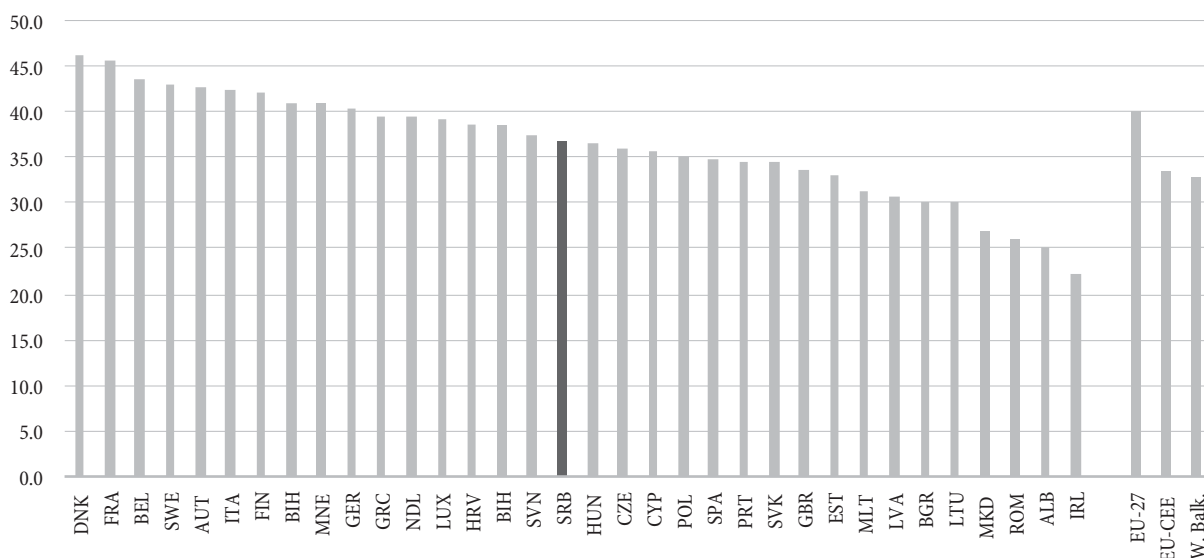
Source: Author's calculations based on the Eurostat data and [17]

Figure 4: Structure of tax revenues in Europe, 2019 (%)
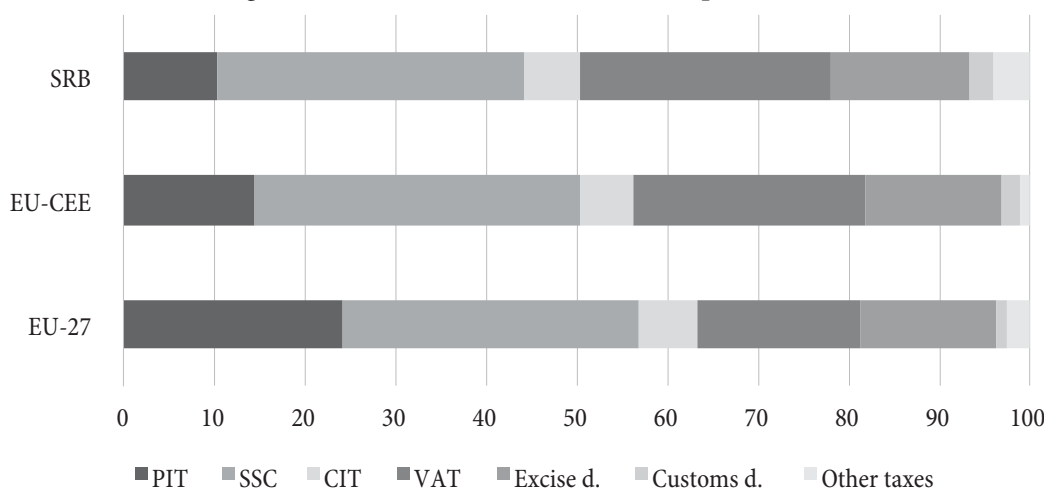
Source: Taxation Trends in the EU, IMF WEO Database, [17]

structure of the tax system in Serbia is not more harmful for economic growth than it is the case in other European countries on average.

Since some empirical studies suggest that taxes can be ranked in terms of their negative impact on economic growth, it may be useful to evaluate properties of the Serbian tax system also from the point of view of individual taxes. Data presented in Table 3 show that all statutory tax rates in Serbia are below the EU-27 and CEE average. In comparison to the Western Balkans countries, all taxes are higher in Serbia (except for the property transfer tax), the difference being particularly salient in respect of labour taxes (personal income tax and social security contributions).

Pro-growth tax policy reforms opportunities

Serbian labour market saw improvement in the last few years in terms of rise in employment and reduction in work informality, due to labour market reforms implemented in 2014, stronger economic growth performances since 2018 and slight reduction in the labour taxes wedge. However, the unemployment rate in Serbia in the third quarter 2021, according to the Labour Force Survey data, stood at 10.5 percent, which was still significantly above the CEE average (around 6.3 percent), while employment and activity rates in Serbia being lower than the CEE average. At the same time, around 15 percent of employees in Serbia have been working in informal sector.

Table 3. Statutory tax rates in Serbia and Europe (%)

	EU-27	EU-CEE	W. Balkans	SRB
CIT	21.9	15.5	12.5	15
Labor taxes: PIT+SSC (% of labor costs)	39.5	40.2	30.0	37.9
Property tax	0.7	0.4		0.40
Inheritance tax	25.3	14.6	2.42	2.5
Property transfer tax	4.1	2.2	4.9	2.5
VAT - standard	21.5	21.3	18.8	20
VAT - lower	11.3	10.8	7.0	10
Excise - cigarettes (EUR/pack)	2.83	2.11	1.08	1.14
Excise - fuel (EUR/lit)	0.54	0.46	0.46	0.48

Source: Author's calculations using the data from Eurostat and [17]

Figure 5: Labour tax wedge (% of total labour costs)
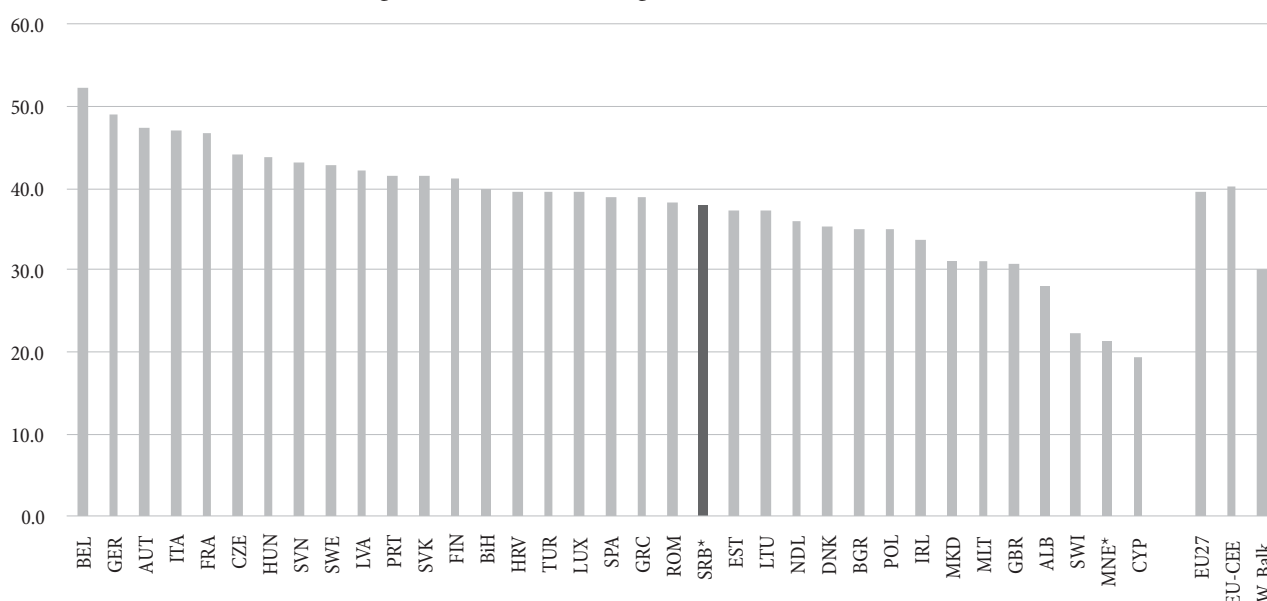
Source: Eurostat, Western Balkans Labour Market Trends, author's calculations*
*Data for Montenegro refer to tax rules in 2020, except for Serbia and Montenegro, for which the data refer to 2022

Labour and capital income taxes are among the most distortive, only the corporate income tax being more harmful for growth. At the same time, labour taxes in Serbia are significantly higher than in the most other Western Balkans and some CEE countries (Figure 5). Therefore, further reduction of labour taxes could be beneficial for labour market activation, work formalization, discouraging of outbound migrations and economic growth in general. In the last few years Serbia has slightly reduced the labour tax wedge, by raising the non-taxable threshold and modestly cutting the rates of social security contributions on behalf of employer, but the overall tax wedge remain fairly high from the regional perspective. However, to trigger stronger labour market and growth effects, more pronounced reduction in labour tax wedge may be required.

To be sustainable and not to harm macroeconomic stability, that reform should be accompanied with increase in other (less distortive) taxes, such as VAT, excise duties, other environmental taxes or property taxes and/or reduction in government expenditures. For instance, abolishing healthcare contributions, in the same manner as done in Montenegro since 2022, would reduce the labour tax wedge in Serbia from 38 percent to around 29 percent. However, such reform would imply salient decrease in tax revenues by around 3.3 percent of GDP. To compensate for revenue loss, increase in VAT rate from 20 percent/10 percent to 26 percent/13 percent would be required. If other taxes are to be raised (e.g. broadening the base for energy taxes) too and some government expenditures to slightly reduced (e.g. cut in subsidies), less pronounced increase in VAT rates would be required. In addition to reduction in the overall labour tax wedge, a reform should also focus on parametric improvement of labour tax scheme, which is currently particularly burdensome for low skilled/part time workers [19].

Tax policy and economic inequality

For economic growth to be sustainable, growth dividend should be shared in a manner that does not aggravate economic inequality. High economic inequality may be harmful for social welfare, due to diminishing marginal utility of income, but it can also have adverse impact on social and political dynamics, creating a fertile ground for populist political agenda [14]. Economic inequality can be observed from income/consumption or wealth distribution perspective.

According to Survey of Income and Living Conditions (SILC) data (Figure 6), disposable income inequality in Serbia, measured with Gini coefficient in 2019 stood at 33.3, which was above the EU-27 and CEE average (30.2

Figure 6: Gini coefficient based on disposable income, 2019
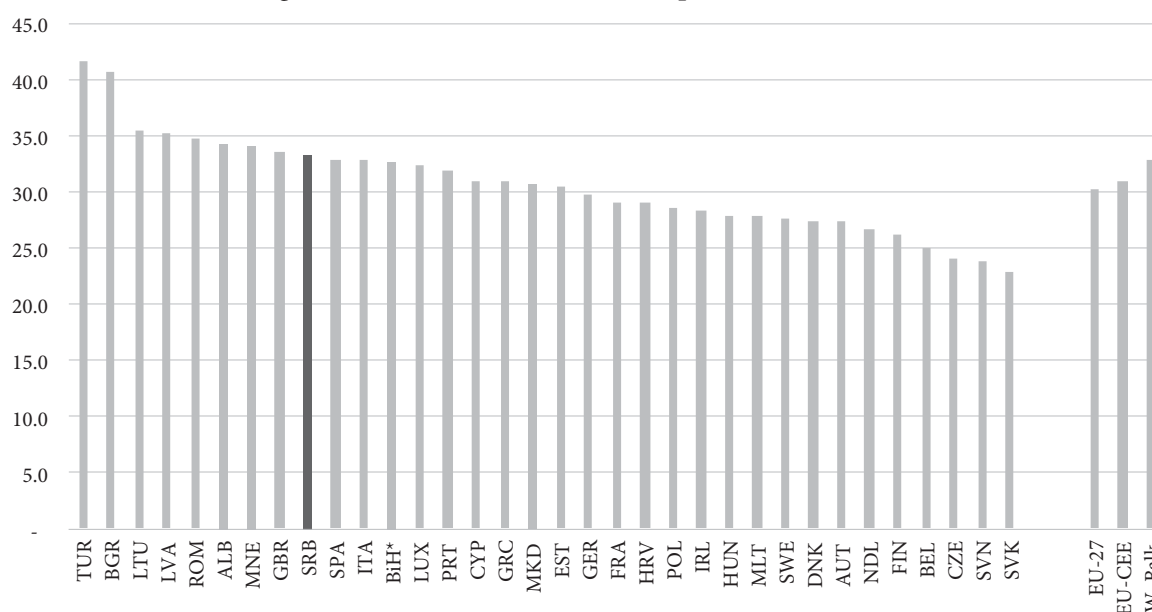
Source: Eurostat. For BiH data refer to 2015

and 30.9 respectively) and close to (but still higher than) the Western Balkans average (33.0). Although it can be argued that inequality measures using SILC data are not fully comparable across Europe, due to its structure and peculiarities of earning and consumption patterns in particular countries, it still may be read as an approximate signal of the scale of inequality.

Disposable income inequality is the results of market income distribution and characteristics of personal income tax, social security contributions and the social benefit systems. In line with the focus of this paper, we will concentrate on the impact of the tax system. In majority of European countries, personal income tax systems have been designed in progressive manner, thus making after-tax income distribution less unequal than the pre-tax income distribution. Data presented in Figure 7 show that in EU-27 and CEE countries, personal income tax reduces Gini coefficient by 4.0 and 2.4 pp respectively. At the same time, studies for Serbia show that impact of income tax in Serbia on reduction of Gini coefficient ranges from close to 0.4 pp [2] to 0.9 pp (as indicated by microsimulations based on administrative data). Therefore, it may be concluded that the personal income tax system in Serbia is less progressive and less redistributive than in other EU and CEE countries on average, which means that the reform of labour taxes should be done not only with the aim to reduce the tax wedge, but also to modestly increase the degree of tax progressivity.

Considering the aforesaid, it is concluded that to enhance contribution of tax system to reduction of income inequality, Serbia may require a reform income tax system that would increase progressivity (e.g. bringing it close to the CEE average) by raising non-taxable threshold and/or considering introduction of one or two higher marginal tax rates, to be applied to higher incomes. In that respect, when designing the reform, government should take into account also the adverse negative effects a strongly progressive tax system may have on capital flows, labour supply/demand, work informality, entrepreneurship, etc.

Measuring wealth distribution (particularly at the right tail of the distribution) is associated with more complications than measuring income distribution, which is why the results based on various methods and data sources may differ considerably. According to Global Wealth Databook (GWD) data [9], Gini coefficient based on wealth distribution in Serbia in 2021 was around 70.6, while the World Economic Forum (WEF) database results indicate that wealth Gini coefficient in Serbia was 54.2, which is 1.6 times higher than disposable income inequality. Wealth inequality in Serbia, according to these data is comparable to the EU-27, CEE and Western Balkans average (Figure 8). In spite of the differences in the level of

Figure 7: Change in Gini coefficient after PIT, 2019 (pp)
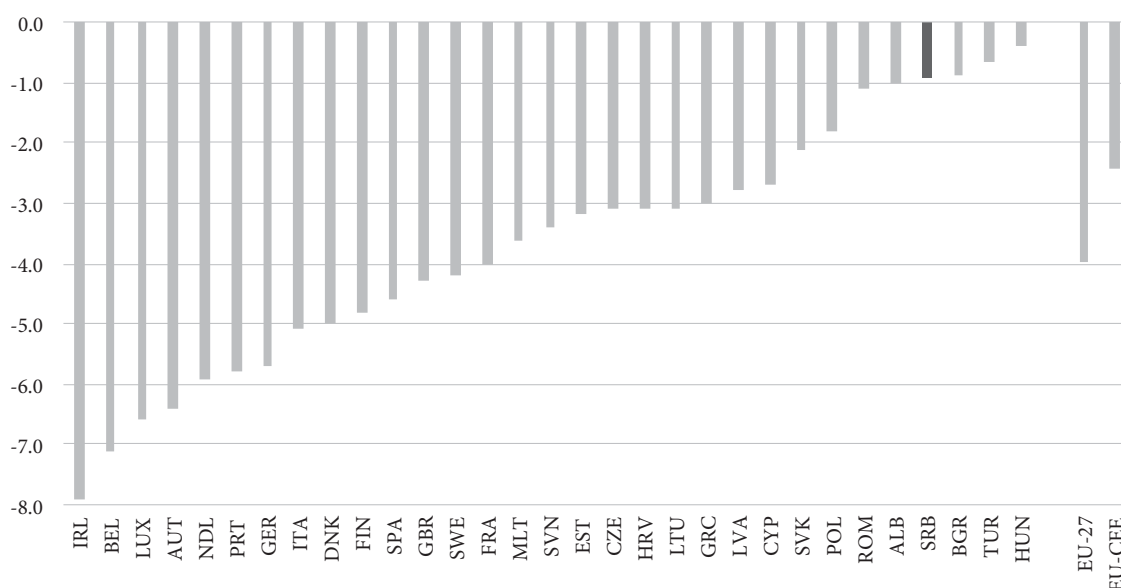
Source: Author's calculations using Euromod and Commitment to Equity databases

inequality, there is a relatively high correlation between the Gini indices based on GWD and WEF data. In both cases wealth inequality is substantially higher than the income inequality in all European countries [18], which suggests that economic inequality should be addressed not only from income, but also from wealth perspective.

Although high wealth inequality is not a mere consequence of lack of redistributive capacities of the tax system, tax instruments can play a significant role (together with other public policy instruments) in alleviating wealth inequality, which is globally on the rise since late 1990s. In respect of the impact of tax system on wealth inequality, property taxes play a central role. Recurring property tax rates (0.4 percent for legal entities and 0.4 – 2 percent for individuals) in Serbia are comparable to the tax rates in other CEE countries, although effective rates are below the EU-27 average (Table 2). Therefore, structure of the tax rates in Serbian property tax system is not seen as the central issue, in terms of enhancing its redistributive power, even though differentiation of tax rates by the types of taxpayers creates space for arbitrage. To improve the equitability and progressivity of Serbian property tax, a set of parametric changes may be needed [18]: *i)* introducing property tax base deductions for housing loans, this reducing the burden on those with high gross, but relatively low net wealth, *ii)* stating the tax credit in the absolute amount, rather than *ad valorem*, *iii)* improving tax enforcement by means of update of tax

records, *iv)* reforming the system of taxation of "luxury goods" (tax on use, holding and carrying goods), by linking the tax base and tax liability closer to the actual value of those goods, *v)* extending the property tax jurisdiction worldwide for tax residents, with introduction of double taxation avoidance methods, thus enabling cross-check of income and wealth dynamics.

One of the reasons of high concentration of wealth is linked to failure of inheritance tax schemes. Although most of European countries (except for Cyprus, Slovakia, Czechia, Sweden, Portugal, etc.) do have inheritance tax in their tax systems [16], the taxation rules are designed in a way that provides exemptions or allowances in majority of cases (usually for heirs in the first line), which is also the case in Serbia. In addition to that, inheritance tax rates in most European countries are higher than in Serbia, some of them applying progressive tax rates in the range from 3 to 80 percent, while in Serbia the flat rates of 1.5 percent or 2.5 percent apply. Low statutory tax rates in comparison to other European countries (Table 2) and widespread system of exemptions, significantly narrows the tax base and redistributive capacities of this tax. Therefore, to improve economic equalization power of tax system in Serbia, parametric changes to the inheritance tax system may be useful. In that sense, the main changes aimed to enhance tax progressivity would be focused on the following issues [18]: *i)* abolishing general tax exemption for the first line of heirs and introducing the general non-taxable amount of

Figure 8: Gini coefficient based on wealth in Europe
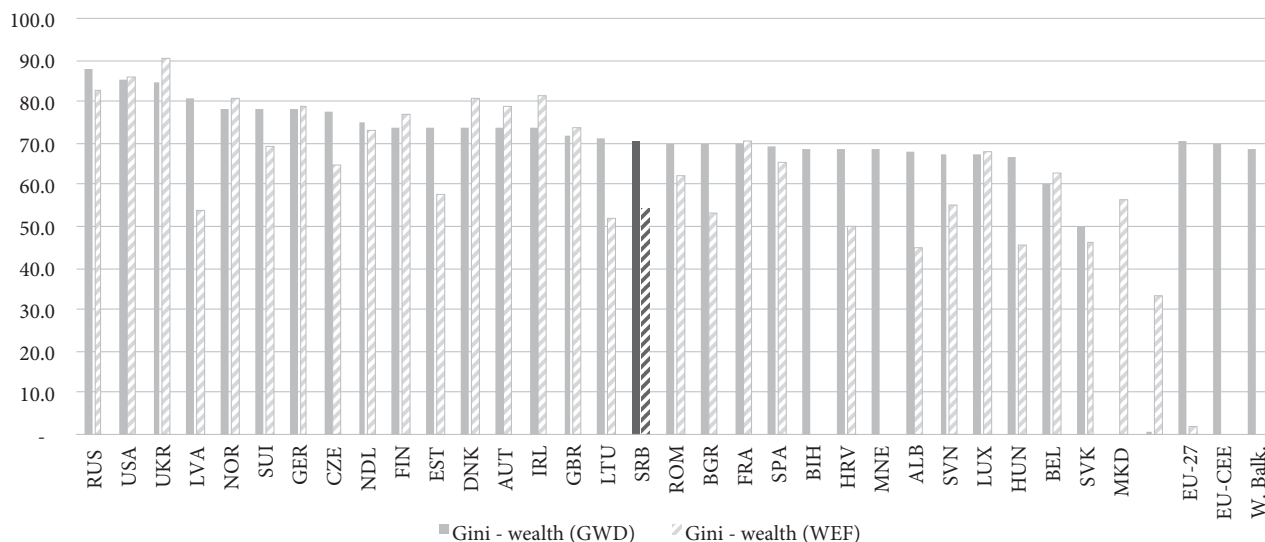
Source: Author's calculations based on WEF Database, [9] and [18]

inheritance equivalent to present value of lifetime average earnings (e.g. around EUR 300 thousand), *ii)* evaluating the options to enhance direct tax progressivity, by means of the reform of tax schedules, *iii)* extending Serbian tax jurisdiction to worldwide inheritance, in case the testator was Serbian tax resident.

Tax policy and environment protection

Environment protection has gained importance in academic and policy debates in the last decade. Three out of 17 UN Sustainable Development Goals are directly linked to environment protection, while several other goals implicitly affect the environmental issues. In similar way, the European Union has set out the goal to reduce CO_2 emission by 30 percent by 2030 in comparison to 1990. Environmental issues are discussed in economics within the negative externalities framework. Therefore, environment protection can be tackled by means of market-based instruments (as suggested by the Coase theorem) and/or government actions. Since market-based instruments often provide no sufficient correction, there is an increasing focus on the options in terms of government policies, which may be grouped into three pillars: environmental taxes, "cap and trade" emission scheme and environmental standards.

Environmental tax is defined as a tax whose tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific negative impact on the environment [5]. Being broadly defined, environmental taxes entail four groups of taxes: energy taxes, pollution taxes, resources taxes and transportation taxes. Environmental taxes are seen as a way to correct for market deficiencies and make private agents account for negative social costs of their actions in their optimization process. As such, environmental taxes yield double dividend - they discourage behaviour that leaves negative environmental footprint, while raising tax revenues by means of environmental taxes creates fiscal space for reduction in other more distortive taxes, such as income taxes. Meta-analysis conducted by [8] concluded that 55 percent of all simulations did result in a double dividend, as suggested by the theory. As they raise the price of goods that (in their production or use) have a negative impact on environment (e.g. raising the price of energy), environmental taxes may be harmful for economic growth. However, if the extra tax revenues raised by means of environmental taxes enable reduction in other taxes, the negative growth consequences may be partially or fully reverted. In their study on growth impact of carbon taxes, [4] found that a $30/ton carbon tax would reduce GDP by roughly 3.5 percent in 2050, while when introduction of carbon tax is accompanied with the revenue neutral cuts in capital income taxes, the growth impact becomes positive - leading to a 1.3 percent higher level of GDP in 2050.

EU environmental policy is strongly relying on energy taxation and emission trading system. In terms of energy taxation, the EU has adopted the Energy taxation directive (Directive 2003/96/EC on the taxation of energy products and electricity), which makes introduction of energy consumption taxes in all member states mandatory, with prescribed lower ceilings in terms of the tax rates. In addition to that, all EU member states participate in Emission Trading Scheme, while member states are free to impose other types of environmental taxes in line with their policy goals [6].

Environmental policy in Serbia is relying on taxation, with the great focus on energy taxation and some contribution of other environmental taxes. Environmental taxes in Serbia generate tax revenues of around 3.3 percent of GDP, which is considerably above the EU-27 and CEE average (2.5 and 2.8 percent of GDP respectively). However, around 95-96 percent of the total environmental taxes revenues in Serbia come from energy taxation, around 3 percent from pollution taxes, close to 1 percent from transportation taxes, while the share or resources taxes is very small.

Energy taxes (excise duties) in Serbia are to some extent aligned with the relevant EU directives. To attain full harmonization, the base for energy taxation in Serbia should be broadened, by imposing the excise duties on coal and coke. In 2018 Serbia has enacted the Law on Charges for Use of Public Goods, which imposes 15 groups of charges (with more than a hundred types of charges), many of which having features of pollution or resources tax. That law has replaced numerous other laws and bylaws, thus making the system of charges systemic, coherent,

transparent and foreseeable. However, low revenue effects of these charges (in comparison to European countries) suggest that there is a space for their further refinement, following the polluter-pays principle. In addition to that, participation in the European Emission Trading scheme in the future may generate additional tax revenues in Serbia, together with the benefits in terms of reduction of pollution.

Since environmental taxes in Serbia are already relatively high (due to energy taxes), while above listed reforms imply broadening the tax base, reform of environmental taxes in Serbia may be seen as an opportunity to reduce other distortive taxes (e.g. labour taxes) and to offer tax breaks to households for their investments in environmental friendly energy sources.

Conclusion

After a period of solid economic growth (2000-2008), Serbian economy saw weaker and volatile growth dynamics over the next decade (2009-2017), due to exogenous factors (global economic crisis, Eurozone crisis, floods) and internal constraints (fiscal consolidation, challenges regarding structural reforms, etc.). Finally, since 2018 Serbian economy performed relatively well in terms of growth dynamics from the comparative perspective, even during the pandemic crisis. However, to attain substantial convergence with the developed European countries and the CEE economies, Serbia needs to post 4-6 percent annual GDP growth rates over the long run - in the next decades. To be able to achieve that, it is necessary to ensure lasting macroeconomic stability and considerable leap in terms of structural reforms, including improvement in structural characteristics of fiscal policy and public finances. Growth outcomes in the coming period will be crucially dependent on the success in boosting public and domestic private investment in physical capital (and maintaining high inflow of foreign investments), dynamics of human capital shaped by the quality of education, fertility and migration trends, and the capability to generate and absorb new technologies. Willingness to invest in physical capital and individual's propensity to invest in education and not to migrate abroad, substantially depend on the development

of institutions, defined as set of inclusive, fair and efficient rules applied in non-selective and effective manner [15].

In terms of improvement of the structural characteristics of public finances, after successful implementation of fiscal consolidation and increase in the amount of public investment, space for improvement of pro-growth impetus remains in several fields: *i)* selection and implementation of public investment projects, *ii)* overhaul of the system of selection, compensation and promotion of civil servants, *iii)* reduction in non-productive subsidies and non-targeted cash transfers, *iv)* improvement of the system of financing of healthcare and education, *v)* reform of local governments financing scheme, *vi)* improvement of efficiency of state-owned enterprises, *vi)* further steps in tackling shadow economy, as well as *vi)* in further reform of the tax system.

Reform of tax policy is not a crucial component of structural reforms, but if implemented in efficient and effective manner, it can yield considerable growth dividend. In that respect, to contribute to achievement of sustainable development goals, tax reform in Serbia should be shaped taking into account three overall objectives: to foster economic growth, to contribute to reduction of economic inequality and to reduce negative environmental footprint of households and companies. In that sense, building on relevant theoretical and empirical arguments and using the benchmark indicators for other European countries, in this paper the main elements of tax reform aimed to foster sustainable development of Serbia have been outlined. First, to foster growth, the tax reform should be done to slightly reduce the overall tax burden, with significant reduction in labour taxes, financed by means of broadening base of environmental taxes, increase in consumption taxes and cut in unproductive government spending. Second, to ensure that growth benefits are fairly distributed, the tax reform should entail changes in the personal income tax, property tax and inheritance tax that would moderately increase overall tax progressivity, notwithstanding the need to control the negative effects on productive behaviour. Third, to be efficient environmental policy should be comprehensive, including both tax and non-tax (regulatory) instruments. In that sense, to contribute to sustainable environment, future tax policy reform in Serbia should also consider

the options to broaden the base for environmental taxes (excise duties on coal and coke, redesign of some forms of pollution taxes and in the future also participation in the European Emission Trading System) and to offer tax incentives for environmental friendly consumption and investments by households.

The described outline of the reform provides for general directions, why concrete decisions on the parametrization of the reform should be built on comprehensive, data-driven and evidence-based estimations of economic and fiscal impact. Conducting such reform of the tax system would also require further investment in tax enforcement and tax collection institutions and mechanisms, with the focus on digitalization and strengthening the human capital component.

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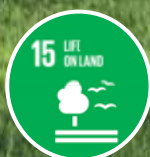
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COMPETITIVENESS FACTORS OF SERBIAN TOURISM

Faktori konkurentnosti srpskog turizma

Abstract

According to the concept of authenticity, competitiveness of a tourist destination depends on the complex interdependence of numerous destination components and their interaction with the visitors of the destination. The global standard for measuring competitiveness of countries is the TTC Index of the World Economic Forum, the ranking list where Serbia holds a relatively weak position. This position has been cyclically improving and deteriorating, and opposite trends of indicators within individual sub-indices also contribute to this, suggesting that activities are uncoordinated. The Tourism Development Strategy of Serbia (TDS), as an umbrella document to coordinate efforts to develop and improve the competitiveness of Serbian tourism, identifies priority products and destinations in Serbia. Such established priorities should contribute both to the coordination among key stakeholders and, consequently, to competitiveness in the international market. The analysis conducted in this paper indicates that TDS has only partially identified the products and destinations chosen by visitors.

Keywords: *competitiveness, index, tourist destination, strategy, tourism product, priority.*

Sažetak

Konkurentnost turističke destinacije, prema konceptu autentičnosti, zavisi od kompleksne međuzavisnosti brojnih komponenti same destinacije i interakcije ovih komponenti sa posetiocima destinacije. Globalni standard za merenje konkurentnosti zemalja predstavlja TTC indeks Svetskog ekonomskog foruma, na čijoj rang listi Srbija zauzima relativno slab položaj. Taj se položaj ciklično popravlja i kvari, a tome doprinose i suprotna kretanja pokazatelja unutar pojedinih sub-indeksa, ukazujući na nekoordinisane aktivnosti. Strategija razvoja turizma Srbije (TDS), kao krovni dokument u cilju koordinacije napora u razvoju i unapređenju konkurentnosti srpskog turizma, identifikuje prioritetne proizvode i destinacije unutar Srbije. Poznati prioriteti bi trebalo da doprinesu kako koordinaciji ključnih stejkholdera, tako posledično i konkurentnosti na međunarodnom tržištu. Sprovedena analiza u ovom radu ukazuje da je TDS samo delimično identifikovala proizvode i destinacije koje biraju posetioci.

Ključne reči: *konkurentnost, indeks, turistička destinacija, strategija, turistički proizvod, prioritet.*

113

Introduction

Over the last few decades, up until the COVID-19 pandemic outbreak, the concept of a tourist destination has evolved due to intensive development of tourism, increase in the complexity of the structure of tourist destinations, maturing of theoretical thought, but also due to the influence of theorists on tourism development practice to a greater extent than in the past. However, it should not be forgotten that tourist destinations are the most complicated entities to manage and market due to complex and sensitive relationships among stakeholders [34]. Faced with increasingly fierce competition, the international tourism market needs to understand the sources of competitiveness for a tourist destination and how competitiveness can be improved and maintained [27].

In 2021-22, the Tourism Development Strategy of Serbia 2016-2025 (TDS) adopted in 2015 underwent an evaluation of the implementation process under the auspices of the EU Delegation to Serbia. Numerous findings of this evaluation process are presented in the following text.

As an overarching document, TDS should guide activities of different tourism stakeholders in a coordinated way, but without suspending the market competition. However, in many cases, there were instances of comments that are not indicative of a healthy, competitive market. For instance, there were reports about "unhealthy" competition from regional tourism agencies expecting Government of Serbia to protect the market from foreign competition, which is incompatible with the modern and pro-European business model. In addition to this, the civil servants have rather poor knowledge of TDS, and are therefore not capable of linking the evaluations of their work units to the achievement of strategic goals. However, TDS contains two robust coordinating mechanisms – priority tourism products and priority tourist destinations. It is expected that most marketing and other efforts will follow this prioritization and, consequently, that these priorities will drive tourism demand in Serbia. The research questions in this paper refer to the drivers of competitiveness of Serbian tourism: Has TDS properly targeted priority tourism products? Has TDS properly targeted priority tourist destinations in Serbia?

The evaluation methodology is based on three sets of data. The first set of data comes from an external source, the World Economic Forum, and covers general competitiveness of Serbia based on the Travel & Tourism Competitiveness Index (TTCI). The second set of internal data comes from the visitors' survey managed by the National Tourism Organization of Serbia (TOS). Surveys at the national level are conducted every five years, one year on a representative sample of domestic tourists and the following year on a sample of foreign tourists. Data from four years were used in this analysis: 2015 and 2020 for domestic, and 2016 and 2021 for the foreign visitors' survey. The third type of data stems from primary research carried out by authors who have held a number of interviews with different stakeholders, civil servants, experts from academic and business circles, and business people.

Literature review

Given that destination competitiveness is a complex and multifaceted concept [4], [17], the scholarly literature agreed that tourism competitiveness is challenging to define and specify due to the influence of multiple factors or dimensions that have an impact on a destination's success [5], [14]. It is defined as the ability of a tourist destination to create added value and thus increase national wealth by managing assets and processes' attractiveness by integrating these relationships into an economic and social model that takes sustainability into account [33]. In other words, it is the ability of tourist destinations to optimize their attractiveness to the local community and visitors, to deliver high-quality, innovative, attractive and differentiated tourism products and services while providing value for money [7]. A destination's competitiveness has been increasingly recognized as a critical factor for its survival and success [1], [6], [8], [10], and it has become an essential tool in strategic destination positioning and marketing [11].

If the destinations thrive on being successful, they must create tourism products that simultaneously sustain their resources [15], [21] and combine elements of different approaches to the authenticity of tourist experiences [3]. In that sense, it is essential to understand what destination

competitiveness means from the tourists' perspective. Their attitudes about destination competitiveness define the destination itself [28], creating key competitiveness indicators/factors [30]. However, recent research suggests that individual experiences of tourists and the environment in which the tourist experience takes place must be interpreted more holistically – as a social practice that integrates participants and context [2]. More scholars claim that personal relationships and emotions awakened during the tourists' experience affect their perception of the authenticity of the destination itself, and consequently the degree of its competitiveness [18]. To better understand the modern approach to destination competitiveness, it is necessary to consider the interdependence of the overall (eco)system [22], given that a complex paradigm allows for a combination of elements of different approaches to the authenticity of tourist experiences, avoiding fragmentation and limitations [32].

Hence, tourists' perspective should be of interest to practitioners and policymakers [33] to help them better understand the level of destination performance against its major competitors [16]. However, there is no consensus on measuring a destination's competitiveness [19], [26]. Additionally, a single, universal set of indicators applicable to all destinations has not been developed yet [12]. Consequently, the introduction of systematic monitoring and measurement of destination competitiveness is crucial for creating a more objective assessment of the strengths and weaknesses of a particular destination. A better understanding of competitive advantages/disadvantages should contribute to formulating more efficient development policies [29] to implement tourism plans and actions [35]. The destination type, the stage of its life cycle, the tourism products offer and the market segments that it communicates are essential in understanding the factors affecting its competitiveness. Furthermore, these determinants reveal critical factors for improving the destination's competitive position and contribute to the development of competitiveness.

However, the current tourist flows are inextricably linked to the overall competitiveness of a destination, so the need to develop a framework and indicators of destination competitiveness [13] has become a necessity.

Several models for measuring competitiveness of tourist destinations were created, and we shall now provide an overview of the most relevant ones. In 2003, the Conceptual Model of Destination Competitiveness was developed, including five key determinants: destination policy, planning and development, destination management, core resources, attractors and supporting factors and resources [27], [20]. The criteria of environmental protection and sustainability were added subsequently. Furthermore, several variables mentioned above became a part of the so-called Integrated Model proposed by researchers in South Korea and Australia. In the same year, Dwyer et al. [9] added competitiveness determinants such as inherited resources, created resources, supporting factors and resources, destination management, situational conditions and demand conditions to the model. This model emphasizes the importance of demand and adds socioeconomic prosperity as the required outcome.

The Travel & Tourism Competitiveness Index (TTCI), circulated by the World Economic Forum, has significantly eliminated the problem of quantifying key indicators in the presented models. Although this index has been the subject of certain methodological criticism, such as the arbitrary weighting of variables [31], it is a composite indicator of competitiveness of the main tourist destinations in the world that aims to evaluate the factors and policies that make a destination attractive for international tourism [13]. In addition to this, some minor methodological changes have been introduced in the last few years. Still, this index allows us to benchmark the competitiveness of destinations during a specific period. Based on the assessment, destinations gain insight into their own competitiveness, primary sources and disadvantages that need improvement if they want to survive in the increasingly demanding tourism market.

Competitiveness of Serbia as a tourist destination

To assess the competitiveness of the Republic of Serbia, the Travel & Tourism Competitiveness Index (TTCI) has been selected as the primary methodological tool. The TTCI is used for the strategic decision-making process in

state and business sectors. Based on the available data, it is possible to perform a cross-country analysis and establish the competitiveness of the tourism sector of one country in comparison to others – globally, regionally and bilaterally. In addition, the index could be used for a competitiveness analysis of a country in a given time frame. The TTCI is a composite index comprising four sub-indices.

The first sub-index – **A: Enabling Environment**, aims to cover the general situation in each observed country in four pillars. These are: *A.01 Business Environment* (12 indicators that measure the level in which the business environment is favorable for economic entities), *A.02 Safety and Security* (five indicators to capture the level of security and threats of terrorism), *A.03 Health and Hygiene* (six indicators that cover drinking water quality, hospital beds, HIV and malaria cases), *A.04 Human Resources and Labor Market* (nine indicators that are divided into two groups - Qualification and Labor Force (four indicators related to the level of education in the labor market and consumer relations) and Labor Market (five indicators aimed at assessing the situation in the labor market in terms of finding and hiring trained workers, their wages and productivity, as well as gender equality), and A.*05 ICT Readiness* (eight indicators regarding development and usage of B2B transactions, internet, mobile telephones and quality of electricity supply).

The second sub-index, **B: T&T Policy and Enabling Conditions,** has 4 pillars and measures the impact of policies and strategic decisions on the T&T sector. The first pillar – *B.06 Prioritization of Travel & Tourism* (6 indicators that measure the extent to which the government in each country prioritizes the travel and tourism sector based on the assessment of development prioritization, expenditure for tourism, the effectiveness of marketing, availability of tourism statistics and country brand strategy). The second pillar, *B.07 International Openness*, includes indicators that cover policies for visa regime, the openness of air transport services and regional trade agreements. The second sub-index also includes the *B.08 Price Competitiveness* pillar, with 4 indicators focused on airport charges, hotel and fuel prices and purchasing power parity. The fourth pillar – *B.09 Environmental Sustainability,* consists of 10 indicators that assess the

environment as an essential competitive advantage of a country's future attractiveness as a destination. It mainly covers government policies and regulations governing this issue (particulate matter concentration, wastewater treatment, etc.).

Sub-index C: Infrastructure has three pillars – *C.10 Air Transportatio*n, with six indicators, *C.11 Ground and Port Infrastructure,* with seven indicators, and *C.12 Tourist Service Infrastructure,* with four indicators. This sub-index assesses the development and quality of these infrastructures.

Finally, the fourth sub-index **D: Natural and Cultural Resources** covers two pillars – **D.13 Natural Resources**, which measures the number of World Heritage natural sites and their condition, while *D.14 Cultural Resources and Business Travel* assesses the number of World Heritage cultural sites, sports stadiums and cultural and environmental tourism digital demand, within ten indicators in total. The individual value of each sub-index is generated based on indicator values (190 in total for TTCI).

The first TTC global index, which covered 124 countries, was published in 2007 and then republished every two years. The last report, published in 2019, included 140 countries.

In this research, the focus is on the 2015-2019 period, according to available data, from the baseline values to mid-term achievements, in order to cover the scope of the "Tourism Development Strategy of Serbia 2016-2025". The analysis includes all countries listed as Serbia's main competitors, as stated in the Strategy itself: "The main competitors (of Serbia) in the area of Southern, i.e., Mediterranean Europe are Slovenia, Croatia, Albania and Montenegro, as well as the bordering countries of Hungary, Romania and Bulgaria. The analysis also covers data for Bosnia and Herzegovina, North Macedonia, Russia and Turkey as countries with a significant impact on Serbian tourism.

The first step is the assessment of the position of Serbian tourism competitiveness, compared to all the countries (overall rank) and to the selected countries (sample rank).

According to the data in Table 1, it is evident that Serbia's competitive position is not favorable, neither on the

global list nor in comparison with the selected countries. Two reports confirmed a low ranking (95th place) at the comprehensive level, while in 2017-2019, Serbia moved up the scale by 12 places and reached 83rd place. If we observe only the selected countries, Serbia ranked 10th during the two reporting periods, and reached 9th place in the last report. The results achieved are certainly not satisfactory. An additional analysis should single out indicators that recorded a decline in ranking between 2015 and 2019 and indicators where there is most room for improvement.

If we group individual indicators listed in Table 2 according to sub-indices, we can conclude that they are

grouped into only two – **A: Enabling Environment** (1.12 indicator in *A.01 Business Pillar*, 2.04 and 2.05 indicators in A.*02 Safety and Security Pillar*, 3.02 and 3.03 indicators in *A.03 Health and Hygiene Pillar*, and 5.06 indicator in *A.05 ICT Readiness Pillar*) and *B*: **T&T Policy and Enabling Conditions** (6.06 indicator in *B.06 Prioritization of T&T Pillar* and 9.09 indicator in *B.09 Environmental Sustainability Pillar*). Other indicators recorded an improvement on the ranking list over the same period, as presented in Table 3.

The *A.01 Business Environment Pillar* recorded an impressive growth in the 2015-2019 period (advancement by 59 places from 2015 and by 38 places from 2017) based on several indicators: 1.05 Time required to deal with construction permits (88 places), 1.06 Cost (% of construction cost) to deal with construction permits (86 places), 1.11 Extent and effect of taxation on incentives to invest (46 places), 1.02 Business impact of rules on FDI (44 places) and 1.08 Time required to start a business (40 places). *A.04 HR and Labor Market Pillar* is the second area with satisfactory improvement, especially for two indicators, 4.08 Pay and productivity (55 places) and 4.03 Extent of staff training (41 places). Both pillars are part of the first sub-index – Enabling environment. T&T Policy and Enabling Conditions also improved their respective rankings, with two leading indicators, 7.01 Visa requirements (49 places) and 6.03 Effectiveness of marketing and branding to attract tourists.

Table 1: Ranks and values of TTCI for Serbia and selected countries (2015-2019)

Country	Sample rank	2015		Country	2017		Country	2019	
		Rank	Value		Rank	Value		Rank	Value
HRV	1	33	4.3	HRV	32	4.4	HRV	27	4.5
SVN	2	39	4.2	SVN	41	4.2	SVN	36	4.3
HUN	3	41	4.1	RUS	43	4.2	RUS	39	4.3
TUR	4	44	4.1	TUR	44	4.1	TUR	43	4.2
RUS	5	45	4.1	BGR	45	4.1	BGR	45	4.2
BGR	6	49	4.0	HUN	49	1.1	HUN	48	4.0
ROU	7	66	3.8	ROU	68	3.8	ROU	56	3.9
MNE	8	67	3.8	MNE	72	3.7	MNE	67	3.6
MKD	9	82	3.5	MKD	89	3.5	SRB	**83**	**3.6**
SRB	**10**	**95**	**3.3**	SRB	**95**	**3.4**	ALB	86	3.4
ALB	11	106	3.2	ALB	98	3.4	MKD	101	3.4
BIH	12	n/a	n/a	BIH	113	3.1	BIH	105	3.3

Source: [37].

Table 2: Top 10 indicators with the most significant decline in ranking (2019)

Indicators	Rank			Decline (places)
	2015	2017	2019	2019/2015
3.03 % of population with access to improved drinking water	43	51	89	**46**
6.06 Country brand strategy rating	98	127	133	**35**
2.04 Business costs of terrorism	58	74	77	**19**
5.06 Active mobile broadband internet subscriptions/100 pop.	39	40	57	**18**
1.12 Rate of other taxes (%) of profits	76	91	94	**18**
3.02 % of population using at least basic sanitation services	46	46	62	**16**
2.05 Homicide cases/100,000 pop.	30	-	46	**16**
9.06 Baseline water stress	36	46	49	**13**
9.09 Wastewater treatment	80	75	91	**11**
8.04 Fuel price levels	108	116	118	**10**

Source: [37].

Table 3: Areas with the most prominent advancement in the 2015-2019 period

Pillars and indicators	Rank			Advancement (places)
	2015	2017	2019	2019/2015
1.05 Time required to deal with construction permits	129	77	41	**88**
1.06 Cost to deal with construction permits	139	88	53	**86**
4.08 Pay and productivity	114	105	59	**55**
7.01 Visa requirements	67	69	18	**49**
1.11 Extent and effect of taxation on incentives to invest	134	105	88	**46**
1.02 Business impact of rules on FDI	128	102	84	**44**
4.03 Extent of staff training	133	125	92	**41**
6.03 Effectiveness of marketing and branding to attract tourists	119	107	78	**41**
1.08 Time required to start a business	68	40	28	**40**

Source: [37].

It is important to notice that within the same pillar, it is possible to identify shifts in opposite directions. This is most evident in *Pillar 6. Prioritization of Travel & Tourism*, where indicator 6.06 Country brand strategy rating showed a strong decline, while 6.03 Effectiveness of marketing and branding to attract tourists showed a substantial increase. It could be assumed that short-term "selling" efforts surpassed "strategic marketing efforts". Albeit to a lesser extent, this is also present in *Pillar 1: Business Environment,* where significant progress was recorded in many indicators (time and cost of construction permits, treatment of FDI, starting a business), but where negative trends were observed when it came to taxes. This is an indicator that, on one hand, the state encourages new, especially foreign businesses. On the other hand, it taxes the existing businesses more directly, through taxes, or indirectly, through levies on fuel and other excise goods.

Table 4: Areas with most room for improvement of Serbia's TTCI

Pillars	Rank		
	2015	2017	2019
D.13. Natural Resources	135	130	127
B.06 Prioritization of Travel & Tourism	113	116	109
B.07 International Openness	101	106	71

Source: [37].

Such uncoordinated activities undid part of the positive trends, and the progress of Serbian tourism on the list of competitiveness was slowed down.

In order to find the elements with potential for improvement of Serbia's position on the T&T Competitiveness list, we isolated the indicators with lower individual ranks and therefore with significant room for improvement.

Even though all of the above indicators recorded improvement from 2015 to 2019, their values are still low, affecting their rank, and ultimately the position of the total TTCI for Serbia.

Evaluation of policy and promotional activities

Strategic promotional efforts – National campaigns focused on destination Serbia

Promotional efforts of Serbia as a destination should focus on priority products and destinations, expecting that these should be major pillars of competitiveness. National Tourism Organization of Serbia (TOS) has an essential role in promoting Serbia as a destination in target foreign markets. An overview of the campaigns delivered during the implementation of the new TDS is provided in Table 5.

Table 5: Overview of TOS campaigns

Year	Campaign	Content / products / motives
2015	My Serbia	Four international bloggers travelled around Serbia for two weeks and published their impressions with #MySerbia and interacted with four local bloggers and the public on social networks, proposing next destinations
2016	My Serbia Serbia – Everything I love (winter campaign) -	Promo caravan "My Serbia" in 14 cities: Beograd, Novi Sad, Niš, Kragujevac, Čačak, Zrenjanin, Sombor, Kruševac, Vranje, Valjevo, Novi Pazar, Užice, Zaječar and Požarevac. TOS promotional campaign aimed at promoting Serbia's winter holiday capacities in mountain centers, spa towns and cities
2017	#vidisrbiju – The perfect vacation is at your fingertips	The focus was on tourism products: active holidays and new destinations, spas, escaping the city to stay in nature. Pillars of the campaign: Nature (emotion); Vicinity (action); possibility (ratio: everything equipped); health (relax, family vacation)
2018	Serbia moments – What you will remember	#seeserbia – citizens shared their impressions, photos and short videos on social networks – each month a different tourism product / theme
2019	This summer / winter	#seeserbia – citizens shared on social networks their impressions, photos and short videos on cities, spas, cultural heritage, active holidays, mountains – each month a different tourism product / theme
2020	Choose your adventure! #seeserbia	Focus on active holidays and stay in nature – caused by the COVID-19 pandemic
2021	I♥Serbia	Campaign focus: active vacation, vacation in nature, cultural and historical heritage, vacation in spas and gastronomy – digital communication so as to discover additional attractions in new places in order to prolong stay
2022	Experience Serbia!	Focus on experiences in Serbia – promotion of a new visual identity

Source: [23].

This overview indicates that the focus of the TOS' campaigns was placed on the domestic market. Except for four international bloggers animating their followers in different countries, all the other campaigns were animating just the local visitors, even with the event roadshow at various Serbian destinations. Focus was also placed on social media, suggesting a wish to approach the young population in Serbia and instigate their interactive participation in sharing experiences.

When analyzing tourism products, emphasis was placed on active holidays, nature, health and occasionally on cultural heritage. Speaking of destinations, the campaigns focused on spas, mountains and occasionally cities. Some priority tourism products were out of focus: MICE, touring, nautical tourism, events and transit tourism. When it comes to priority destinations, it is not easy to single out destinations out of focus, but it could be suspected that rivers (Danube) were somewhat ignored. These indications can be compared with the share of certain products and destinations in total foreign and domestic visits from 2015 to 2021.

Strategy goals achievement – Tourism product portfolio

The Tourism Development Strategy 2016-2025 has recognized a portfolio of ten priority tourism products and classified them into three groups: high priority products – to be developed in the first five years; medium priority products – to be developed in the next five years; and value-added priority products that need to be developed continuously. The portfolio was adopted from an earlier version of the tourism development strategy, dating from 2006 and refreshed in 2010, with one product added: transit tourism. The TDS Action Plan envisaged a program for each tourism product to be developed, which did not occur. While interviewing civil servants, the following statement could often be heard, "Strategic products have not been developed – no documents have been adopted, and no one speaks of that. Tourist organizations are only concerned with the near future. Nothing motivates them to think strategically."

The strategic marketing plan extracted "hidden" key proposals from these tourism products: Tailor-made

Danube, Vibrant Cities, Enriching Natural Experiences, Cultural Mosaic and Experiential Meeting Hub. These key proposals should propel experiences that are to connect tourism products, priority destinations and target segments. However, this abstract construction appears not to be so precise, and therefore interviewees understood them as five products derived from a portfolio of ten products. Based on this level of understanding, it is questionable if it can be implemented and in what manner. An additional problem is the lack of knowledge of the very concept of tourism products according to the UNWTO definition by those who should care for these tourism products. During the interviews, our interlocutors mentioned skiing, gastronomy, cultural tourism and other specific activities as tourism products. The UNWTO tourism product is a more complex and generalized system encompassing many specific products, such as those listed above. Therefore, according to the definition of the UN World Tourism Organization, "A tourism product is a combination of tangible and intangible elements, such as natural, cultural and man-made resources, attractions, facilities, services and activities around a specific center of interest which represents the core of the destination marketing mix and creates an overall visitor experience including emotional aspects for the potential customers. A tourism product is priced and sold through distribution channels, and it has a life-cycle. "[36].

The understanding of this definition proposed by UNWTO and of the products derived from in the portfolio of Serbia is, according to TDS, poor. The level of knowledge about these and many other basic principles among civil servants, the business community and the civil sector must be improved significantly. Notwithstanding this ignorance, the strategic product portfolio adopted by the TDS document was taken as a basis for further analysis and presented in Figure 1. Data presented in this figure relate to answers of foreign visitors about the reason that attracted them to Serbia as a destination.

Percentage values for the tourism products reflect foreign visitors' preferences listed in answers about why they visited Serbia. Answers concerning their motives to visit Serbia were classified to meet the product portfolio matrix. Since there were multiple answers, cumulative

Figure 1: Foreign visitors' consumption of Serbian tourism products

Foreign visitors: Share in the Serbian tourism product portfolio in 2016 and 2021 – All the different reasons to visit Serbia

| High priority | | Next 5 years |

MICE and business trips
2016 – 22.9%
2021 – 3.7%

Mountains, Lakes (Nature, active)
2016 – 42.8%
2021 – 39.1%

Short city breaks (fun&shop)
2016 – 49.2%

Health, Spa, Wellness
2016 – 6.3%
2021 – 6.3%

Medium priority — Next 5-10 years

Touring

Nautical tourism

Added-value priority — Continuous

Events
2016 – 14.4%
2021 – 7.2%

Special interests – Culture
2016 – 62.4%;
2021 – 57.5%

Rural tourism

Transit tourism
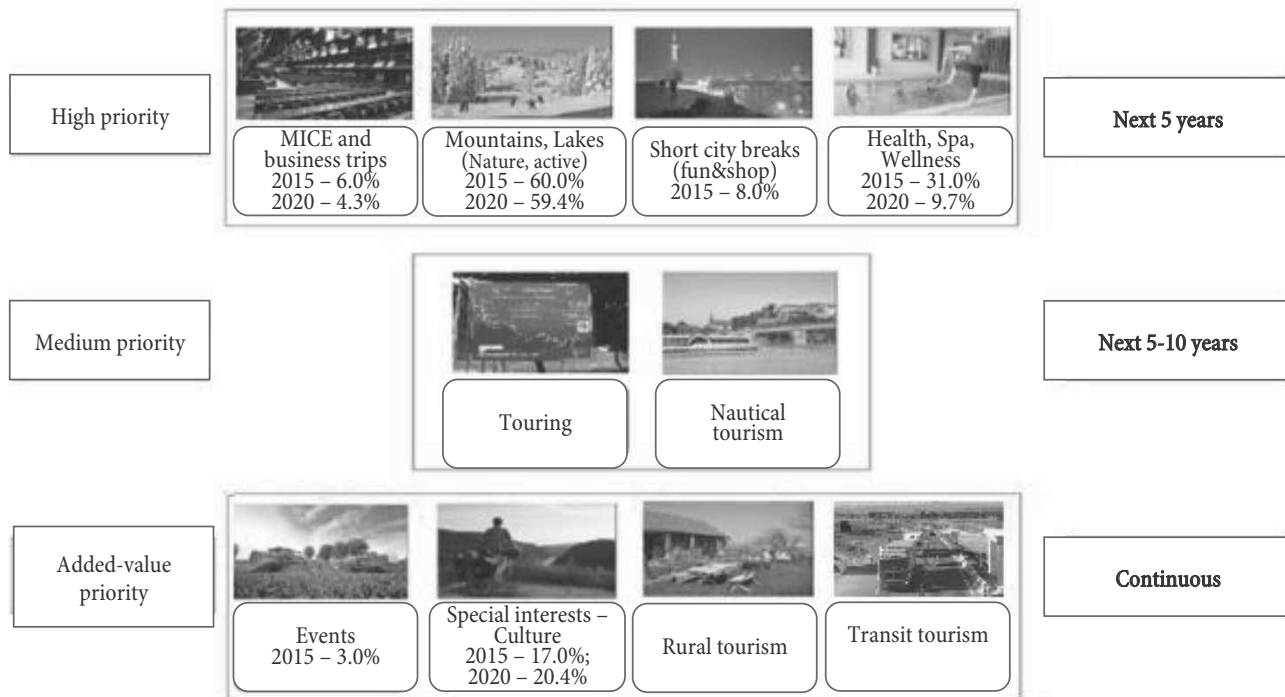2021 – 17.1%
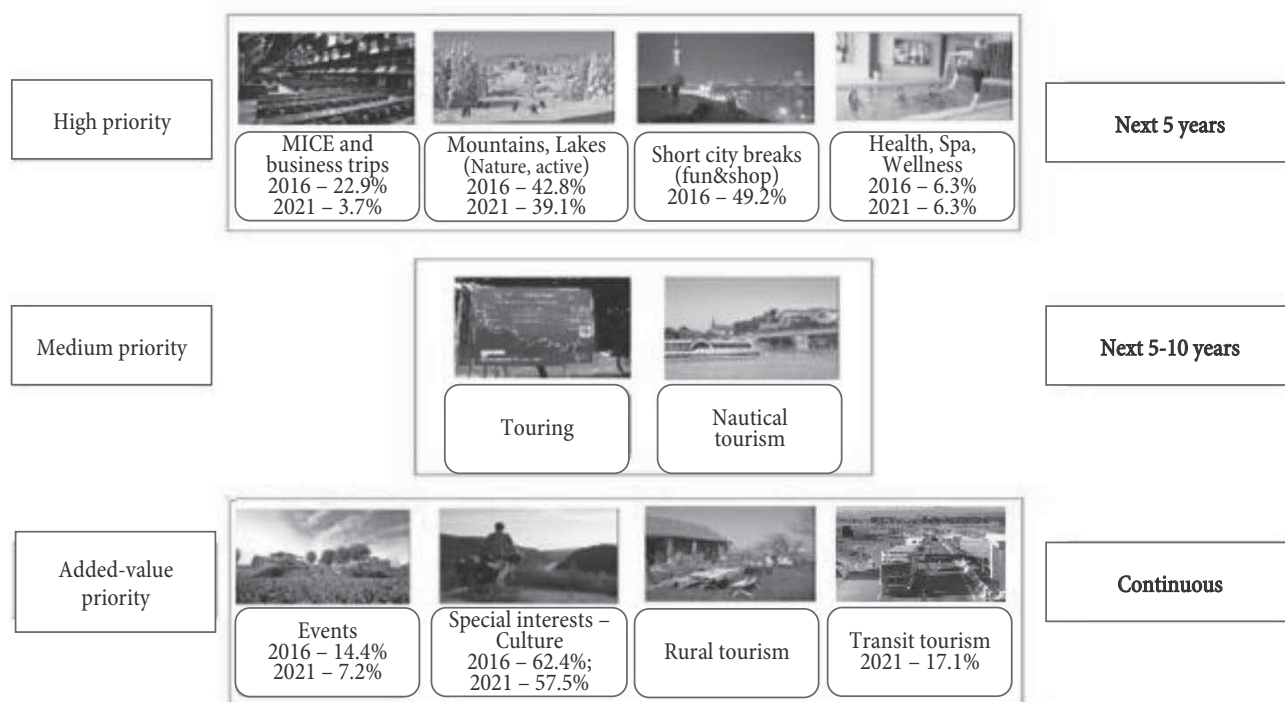
Source: [25].

value is more than 100%, which means that, for example, 22.9% of foreign visitors saying that they visited Serbia for business reasons awarded the 1st, 2nd or some other place to this motive, together with several other reasons to come to Serbia. Certain values arise as a combination of several motives. For example, Mountains and Lakes is as a combination of visitors who came for an active holiday and sport and those attracted by natural sights. These visits may overlap with visits to the rivers, but this could not be verified by using the existing data. Empirical data show that the share of mountain tourists prevails, mainly when observing the destinations visited. Touring is connected to cultural tourism and probably shares a high percentage of visitors represented by this icon. However, there are some answers that are not included in the values presented, and those were some very frequent motivators to come to Serbia in 2021 – gastronomy (22.8%), price/value ratio (28.6%), accommodation quality (14.9%), and additional content for families with children (8.3%). Some new motives appeared in 2021, such as "proximity of destination (17.3%)", "favorable epidemiological situation (12.1%)", "direct flights (8.4%)", or "no visa requirements (0.4%)".

The lessons learnt from this analysis say that some of the priority products were well-prioritized for foreign visitors: special interests (culture) in particular, and mountains and lakes for active holidays. Rural tourism, nautical tourism and touring were either not mentioned by the interviewees, or were not designed for foreign visitors, and they should, therefore, be checked in future surveys. However, some of the products, such as Health, spa and wellness, did not reach their full potential when it comes to foreign visits. Some products were hit by the COVID-19 pandemic: MICE, City breaks and Events. The answers clearly show that in 2021, second tier of festivals (Love Fest, Nishville and Beer Fest) attracted visitors, while major events (Exit and Guča) failed due to pandemic reasons. Transit tourism was not recorded in 2016. It appeared only in 2021. Although it is not a genuine tourism product, it should be monitored in the post-pandemic times, expecting it to enter the fade-out stage.

A similar figure reflects the motives of domestic tourists to visit various destinations in Serbia, again based on an adopted portfolio of tourism products in the current 2016-2025 TDS. The most popular product from the perspective of Serbian tourists is Nature and active

Figure 2: Domestic visitors' consumption of Serbian tourism products

Domestic visitors: Share in the Serbian tourism product portfolio in 2015 and 2020 – All the different reasons to visit Serbia

High priority					Next 5 years
	MICE and business trips 2015 – 6.0% 2020 – 4.3%	Mountains, Lakes (Nature, active) 2015 – 60.0% 2020 – 59.4%	Short city breaks (fun&shop) 2015 – 8.0%	Health, Spa, Wellness 2015 – 31.0% 2020 – 9.7%	
Medium priority		Touring	Nautical tourism		Next 5-10 years
Added-value priority		Events 2015 – 3.0%	Special interests – Culture 2015 – 17.0%; 2020 – 20.4%	Rural tourism Transit tourism	Continuous

Source: [24].

holiday (around 60% in 2015 and 2020), which correlates to Mountains and lakes in Figure 2. It is important to notice that active holiday can also relate to rivers and nautical activities and rural tourism, but this survey instrument could not capture this.

Serbian tourists are far more attracted by natural sites and stays in the natural environment than it is the case with cultural heritage, which is the second-ranked tourism product in their opinion (around 20%). Interest in cultural sites is increasing in Serbia, which corresponds to the process of adapting new cultural locations and introducing them in the tourist offer, as they were inaccessible for comfortable visits until recently. On the other hand, cultural heritage is far less (almost three times) popular among the domestic than among foreign visitors. Combining foreign and domestic visitors, cultural and natural heritage (mountains and lakes) are the two most popular tourism products and represent the backbone of Serbia's tourist offer.

Health and spa/wellness offer is traditionally very popular among the Serbian population, and this product alone engages around 30% of domestic visits, which is illustrated by the responses of domestic tourists in 2015. However, COVID-19 caused the older population and other visitors of poor health to avoid travel in 2020, generating a substantial (temporary) drop in demand for this product (9.7%). MICE and Business trips also recorded a drop from 6% in 2015 to 4.3% in 2020, which could even be described as a rather satisfactory outcome, having in mind the total lockdown from March 15th to May 6th and various restrictive measures during the rest of the year. Events and short city breaks associated with fun and entertainment in big cities have disappeared from the domestic tourism product map in 2020. The event industry and city hotels have suffered the most during the COVID-19 pandemic, inducing the emergence of a new product – business nomad package in city hotels offering long city stays combining tourism and business for those professionals bringing their office in a backpack. Some tourism products could not be identified in the responses of visitors who were describing why they chose to spend their holiday in Serbia: Touring, Nautical tourism, Rural tourism, Transit tourism. Touring did not appear to interest either foreign or domestic tourists. Organized groups or individuals following thematic routes are not very frequent in Serbia, and such products are rare. One

of them is the Roman Emperors and Danube Wine Route, certified by the EU Council, but better known to foreign explorers than to the regional population. Similar goes for thematic routes such as Via Dinarica and Eurovelo VI cycling route, while the once popular Monastery route has nowadays all but disappeared from the tourist offer. Although they are formally priority tourism product, the circular tours were mainly present in the form of school field trips and among travelers from distant destinations, which was stopped by the pandemic. No organized activities to support the development of this tourism product have been observed, except for the marking of wine routes and bicycle signalization. If the intention is to keep this tourism product a priority, organized support to its development would be necessary. In this respect, the last strategic document was the master plan of the Roman Emperors Route development, which showcases how a strategic document can initiate long-term success. Nautical tourism is developing around the increasing number of Danube cruiser stops in several spots in Serbia: Belgrade, Novi Sad, Donji Milanovac, Golubac. Local nautical tourism is somewhat underdeveloped, with only several cruising ships run by local hotels (Aqua Star Danube, Đerdap, Silver Lake) and several smaller vessels for local cruising. There is no organized travel across the Serbian rivers, from one bank to the other. A specific form of nautical tourism is rafting, and it is popular in the hilly part of Serbia, but only during summer and among a limited number of visitors. There is no well-organized or popular training for skippers, sailing and other sport and recreational activities on Serbian rivers and lakes. This tourism product needs a strategic document that would analyze the demand and supply side of nautical tourism in Serbia and outline further activities for its development. Rural tourism has boomed during the COVID-19 pandemic, and during the summer of 2020, it was almost impossible to find a room if not booked during springtime. In the survey answers concerning the accommodation type, rural households were chosen in 2% of all the responses in 2015 and in 5% in 2020. The rising shift towards health safety, crowd avoidance, contactless experience, and staying outdoors further helps to develop this product. The strategic document "Master Plan for Sustainable Development of Rural Tourism in Serbia (2011)", prepared at the request of the Serbian ministry in charge of tourism under the auspices of UNWTO, has provided guidelines for the development of this tourism product, proving once again that strategic documents are essential and useful. After ten years of implementation, this document needs to be updated, particularly having in mind the impact of COVID-19. Transit tourism is not a standard, well-known tourism product either in tourism literature or in UNWTO documents. Transit tourism is of no relevance to the domestic visitors, since distances within Serbia are not significant. Also, there is no explanation for which target segments of foreign visitors this tourist product should be important. Since this product predominantly revolves around traffic utilities (petrol stations and motels), it is questionable if it should be included in the priority tourism product lists.

Strategy goals achievement – Portfolio of priority tourism destinations

The 2016-2025 TDS listed 18 priority destinations in Serbia, abandoning the former four clusters. The change emerged due to frequent criticism that clusters were too big and too complicated to manage. The real problem arises because tourism budgets are part of the local municipality budgets, which is why coordinating management and money from the considerable number of municipalities in the last two clusters posed a significant problem. However, the clusters of Vojvodina and Belgrade had in place all the administrative prerequisites for successful operation and continued to perform on an enviable level, showcasing the advantages of the previous model: concentration of resources and ability to employ better marketing of its destination. The newly introduced prioritization, which affects almost one third of the municipalities in Serbia, actually questions the very notion of priority, given the excessively broad focus and dispersion of resources across too many destinations.

All 18 newly promoted priority tourist destinations listed in the strategic document are presented in Figure 3, with detailed descriptions of the destinations provided in the rectangular callouts. Furthermore, the callouts also

include the percentages of visitors who opted for these top destinations while visiting Serbia. Besides the rectangular ones, there is also a cloud callout (Leskovac in the first map) denoting a destination that was not on the priority destination list in the TDS.

Belgrade remains a top Serbian destination for foreign visitors, even during the COVID-19 pandemic, although its importance declined with the drop of interests in short city breaks, events and MICE. Still, Belgrade accounted for 43.9% of visitors in 2021. Novi Sad, as the second most important destination in Serbia and an urban destination like Belgrade, improved its position during COVID-19. The same evidence is observed for Niš and its adjacent spa (Niška banja). This means that Belgrade, Niš and Novi Sad, as urban destinations, together accounted for 63.3% of all foreign visits in 2016 and for 63.6% of all foreign visits in 2021, which indicates a high concentration of foreign tourists in three urban centers, with the greatest share

of them opting for Belgrade. It is important to point out that all three cities cover a wider area. Novi Sad includes Fruška Gora mountain with Vrdnik thermal spa, and Niš includes Niška banja thermal spa. All of this additionally indicates the importance of a broader destination – offering a portfolio of attractions for different people, or even for the same person with different interests, which is quite expected from the point of view of a modern tourist.

The second tier of destinations from the viewpoint of foreign visitors are mountains and lake destinations: Western Serbia region with mountains Zlatibor, Tara and Mokra gora (2016 – 5.7%; 2021 – 12.1%), Kopaonik mountain (2016 – 2.4%) and Subotica with Lake Palić (2016 – 3.0%; 2021 – 4.1%). These destinations are famous for their natural attractions that invite guests interested in active holidays and recreation, generating 11-15% of foreign arrivals. However, all these destinations boast a relatively high level of development, including tourist

Figure 3: Foreign visitors' consumption of Serbia's priority tourist destinations

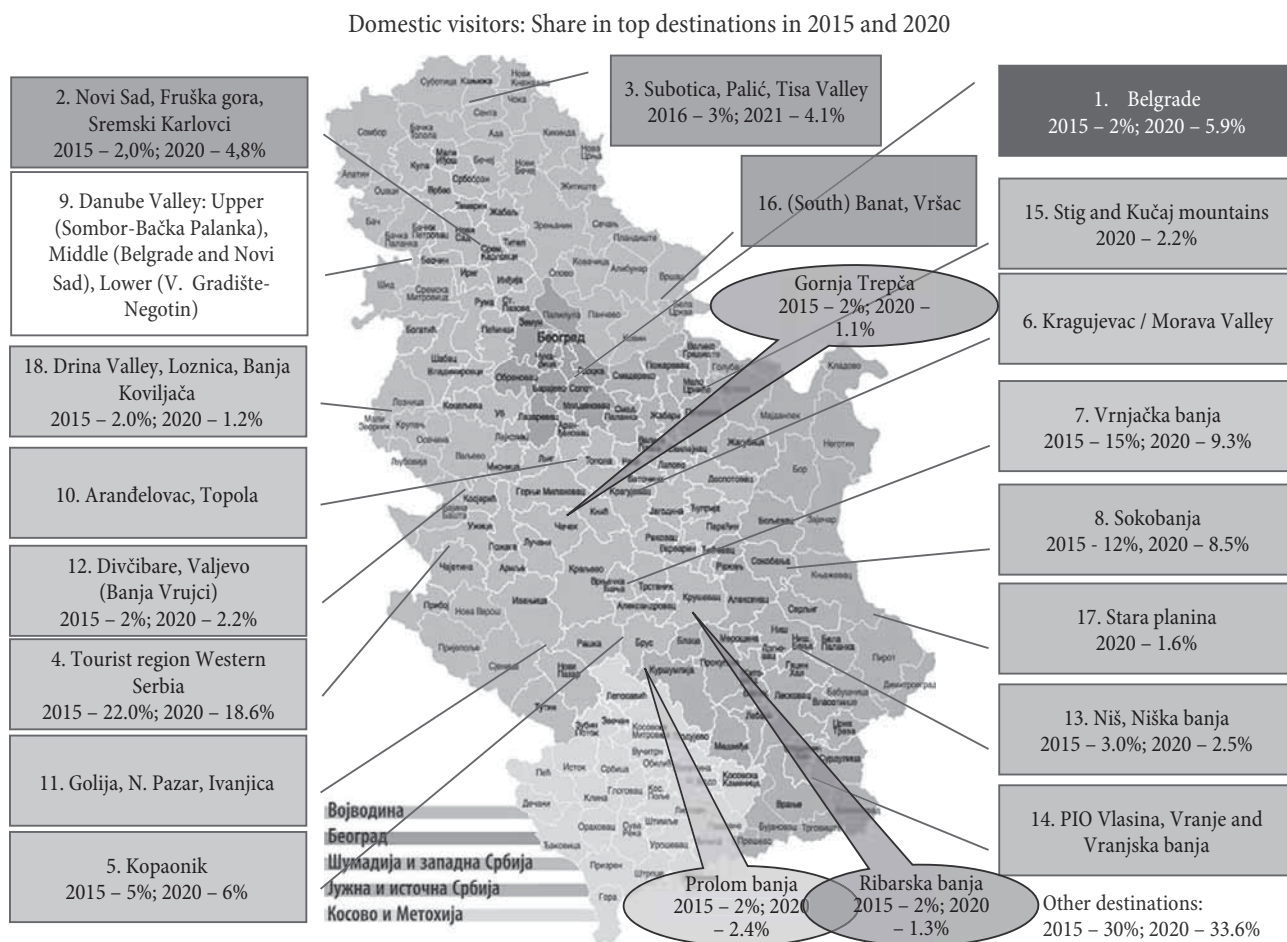Foreign visitors: Share in top destinations in 2016 and 2021
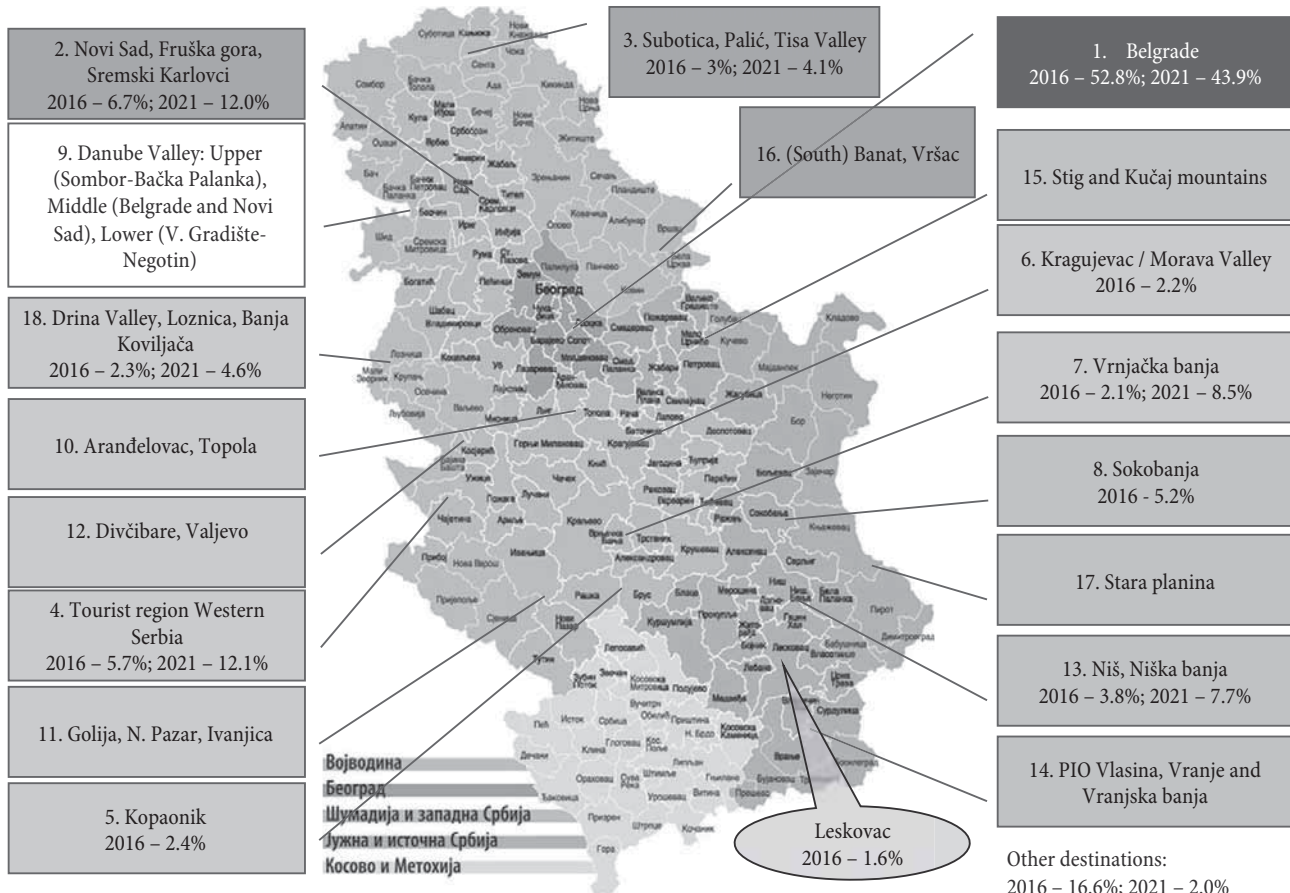
Source: [25].

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infrastructure and diversified accommodation facilities offering pools, spa and wellness centers. The third tier of destinations for foreign visitors are spa towns: Drina Valley and Banja Koviljača (2016 – 2.3%; 2021 – 4.6%), Vrnjačka banja (2016 – 2.1%; 2021 – 8.5%) and Sokobanja (2016 – 5.2%). Traditionally, spa towns are destinations for local visitors and visitors from the region (for example, Banja Koviljača attracts visitors from the Bosnian vicinity), attracting around 10% of foreign visitors. However, spas have attracted even more foreign visitors during the pandemic, since their accommodation capacities are smaller, the health and safety regime is more formal, and parks and walking trails are comfortable for a safe stay in landscaped open spaces.

A number of priority tourist destinations from the TDS document did not attract a significant number of foreign visitors according to the two mentioned surveys: the Danube region, Aranđelovac and Topola, Divčibare and Valjevo, Golija, Novi Pazar and Ivanjica, Stig and Kučaj mountains, Stara planina, Vlasina and Vranje with its adjacent spa town. It does not mean that these destinations did not attract foreign visitors at all, particularly when it comes to certain parts in these destinations. A good example is the Golubac Fortress, with an increasing number of cruisers stops and a rising number of organized bus tours. However, the entire region did not perform well as a priority destination. The same conclusion can be formulated for many other destinations, as well. It is interesting to note how one destination came to be one of the most popular destinations for foreign guests in 2016. Namely, with just one large seven-day event (Roštiljijada – The Barbecue Festival), the city of Leskovac managed to attract a considerable number of visitors, primarily from the surrounding area (Bulgaria and North Macedonia). The pandemic "removed" Leskovac from the list of the most popular destinations, but it can be expected that this "festival" of gastronomic

Figure 4: Domestic visitors' consumption of Serbia's priority tourist destinations

Domestic visitors: Share in top destinations in 2015 and 2020

2. Novi Sad, Fruška gora, Sremski Karlovci
2015 – 2,0%; 2020 – 4,8%

3. Subotica, Palić, Tisa Valley
2016 – 3%; 2021 – 4.1%

1. Belgrade
2015 – 2%; 2020 – 5.9%

9. Danube Valley: Upper (Sombor-Bačka Palanka), Middle (Belgrade and Novi Sad), Lower (V. Gradište-Negotin)

16. (South) Banat, Vršac

15. Stig and Kučaj mountains
2020 – 2.2%

Gornja Trepča
2015 – 2%; 2020 – 1.1%

6. Kragujevac / Morava Valley

18. Drina Valley, Loznica, Banja Koviljača
2015 – 2.0%; 2020 – 1.2%

7. Vrnjačka banja
2015 – 15%; 2020 – 9.3%

10. Aranđelovac, Topola

8. Sokobanja
2015 - 12%, 2020 – 8.5%

12. Divčibare, Valjevo (Banja Vrujci)
2015 – 2%; 2020 – 2.2%

17. Stara planina
2020 – 1.6%

4. Tourist region Western Serbia
2015 – 22.0%; 2020 – 18.6%

13. Niš, Niška banja
2015 – 3.0%; 2020 – 2.5%

11. Golija, N. Pazar, Ivanjica

14. PIO Vlasina, Vranje and Vranjska banja

5. Kopaonik
2015 – 5%; 2020 – 6%

Vojvodina
Београд
Шумадија и западна Србија
Јужна и источна Србија
Косово и Метохија

Prolom banja
2015 – 2%; 2020 – 2.4%

Ribarska banja
2015 – 2%; 2020 – 1.3%

Other destinations:
2015 – 30%; 2020 – 33.6%

Source: [24].

specialties that are very popular in this part of the world will make a triumphant comeback. A similar conclusion can be formulated when analyzing visits made by the domestic visitors, with a somewhat different ranking of destination types, as presented in the following map.

Mountains and lakes destinations are the most popular when it comes to domestic visitors: Western Serbia region with mountains Zlatibor, Tara and Mokra gora (2015 – 22.0%; 2020 – 18.6%), followed by the mountain Kopaonik (2015 – 5.0%; 2020 – 6.0%), but also Kučaj mountains and Lake Bor (2020 – 2.2%), Divčibare and Valjevo mountains (2015 – 2.0%; 2020 – 2.2%) and Stara planina mountain (2020 – 1.6%). Domestic visitors are highly interested in different mountains and lakes, even if the level of comfort is not as high. Spa towns are also very important for domestic visitors in Serbia: Vrnjačka banja (2015 – 15.0%; 2020 – 9.3%), Sokobanja (2015 – 12.0%, 2020 – 8.5%), Drina Valley and Banja Koviljača (2015 – 2.0%; 2020 – 1.2%) are prioritized destinations in the present tourism strategy. However, three more spa destinations emerged as rather prominent, despite the fact that they are not mentioned in the priority destination list: Prolom banja, which is actually a system of two spas – Prolom and Lukovska banja (2015 – 2.0%; 2020 – 2.4%), then Ribarska banja (2015 – 2.0%; 2020 – 103%) and also Gornja Trepča (2015 – 2.0%; 2020 – 1.1%). In addition to this, two urban destinations have spa offers in their immediate vicinity: Novi Sad with its Vrdnik spa and Niš with its Niška banja. Urban areas are important destinations for domestic visitors, but far less than for foreign tourists: Belgrade (2015 – 2.0%; 2020 – 5.9%), Novi Sad (2015 – 2.0%; 2020 – 4.8%) and Niš (2015 – 3.0%; 2020 – 2.5%). Interestingly, all three urban areas account for a similar proportion of domestic visitors, i.e., without a leading position for Belgrade. Finally, a considerable number of destinations were not a priority for domestic visitors, although the strategic document recognizes them: the Danube region, Aranđelovac and Topola, Golija, Novi Pazar and Ivanjica, South Banat and Vršac, Kragujevac and Morava Valley, Vlasina and Vranje with its spa. Those are the very same destinations that neither foreign visitors recognized as attractive ones. Prioritization of these destinations in the 2016-2025 TDS has not yielded positive results.

Conclusions and recommendations

The main findings of our analysis point out that priority products and destinations were only partially well-recognized and only partly supported through organized activities. Consequently, the achievements in foreign and domestic visits were also only partial.

Priority products were partially correctly listed with the balancing effect when comparing interests of foreign and domestic visitors: mountains and lakes are more important for domestic and much less for foreign visitors. The same situation is observed in terms of spas, which were important before COVID-19, and they are expected to be important again as soon as the pandemic allows it. The Special interest (culture) products are highly important for foreign visitors and are increasingly more important for locals, particularly in open space sites. Transit tourism appears to have gained interest among foreigners during the pandemic, but it needs to be monitored. Some products need to be redefined to be more attractive and easier to recognize (i.e., Touring and Rural tourism) by tourists and statisticians. Nautical tourism is not a priority product for foreign or domestic visitors yet, but this might change. MICE and business trips are present and will retain a moderate level of popularity, but this is a highly profitable image-building product. However, MICE and business trips are expected to recover after the pandemic as very significant tourism products for foreign visitors. A very similar situation is observed when it comes to Short city breaks and Event tourism. Strategic development needs strategic support, meaning that not only "quick-win" products should receive state support. On the contrary, those products that need long-term development promise a better payback (for instance, rural tourism and nautical tourism).

Priority destinations were also listed correctly only to an extent. Foreign visitors are attracted to destinations with developed infrastructure, well-maintained attractions and established accommodation facilities for different types of visitors. Destinations missing either of these three components cannot attract experienced foreign visitors. This explains the high concentration of foreign visitors in urban areas or certain mountain (Zlatibor, Kopaonik)

and spa (Vrnjačka banja) destinations. Domestic visitors prefer spas and mountains and certain urban areas for events, shopping, and business stays. Both foreign and domestic visitors failed to recognize the attractiveness of rivers (Danube), South Banat, Stig and Kučaj mountains.

Lesson learned from the analysis presented say that it is not enough to include many destinations in the priority list. Although these destinations are recognized in the 2016-2025 TDS, neither foreign nor domestic tourists recognize them as being attractive. It would be much better to focus on destinations already recognized by visitors and then to try to add one or two new destinations in each 5-year development period. Too many priority destinations on the list cause a distraction and lack of focus both with tourists and policymakers.

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SIEMENS

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Транснафта

SERBIAN BIOGAS ASSOCIATION

🔥 Serbian Biogas Association is a non-profit, non-governmental association founded in March 2012 to rally the companies planning to build first biogas facilities in Serbia. The primary motive for the move was to achieve the goals aiming to develop and encourage the production and utilisation of biogas as a renewable energy source.

🔥 Today, the Serbian Biogas Association is a representative association with over 50 members, mainly owners of biogas plants, but also other institutions and companies related to this technology directly or indirectly. In the coming years, the member-financed association wants to become a mouthpiece for politics and society and actively promote the creation of framework conditions and standards.

🔥 In partnership with domestic and international institutions, the SBA is intensively engaged in the further training of its members in the utilisation of renewables and operation of biogas plants.

🔥 SBA is in a partnership project with the German Biogas Association (GBA), financed by the Chamber and Association Partnership Program (KVP) of the German Ministry for Economic Cooperation and Development (BMZ).

Biogas SRBIJA

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SKILLS FOR THE FUTURE: ASSESSMENT OF THE EFFECTS OF THE "COMPANY PROGRAMME" IN SERBIA

Veštine za budućnost – procena efekata programa „Učenička kompanija" u Srbiji

Abstract

The changes brought about by the Fourth Industrial Revolution across all areas of human activity have had a significant impact on the knowledge and skills requirements of the population. Research shows that in the era of automation, in addition to the need to develop basic digital skills for all, and advanced digital skills for a certain group of workers, the need to develop social and emotional skills is also on the rise. The development of creativity, innovation, analytical and critical thinking, teamwork, self-efficacy, emotional intelligence is gaining in importance. These skills are an integral part of entrepreneurial competence and are developed through entrepreneurship education. Today, entrepreneurship education is approached in a broader context, as education that is crucial for personal development and realization, education that enables individuals to adapt to dynamic changes in the labour market and be active members of society. There are several approaches, methods and models of entrepreneurship education. According to worldwide experience, the best effects in the development of entrepreneurial competencies are achieved through informal types of education, and the "Company Programme" (CP) has globally been recognized as an example of good practice. This programme is based on experiential learning and is implemented in high schools. In order to provide recommendations for the selection of optimal solutions in the approach to entrepreneurship education in Serbia, a study was conducted to assess the effects of the implementation of the Company Programme on the development of entrepreneurial competencies. The research was carried out with the 2018/2019 school year generation of the Company Programme participants, from 74 schools in 45 cities in Serbia. Based on the results obtained, we may come to the conclusion that the Company Programme has resulted in very high development of student self-efficacy (Cohen's d 1.39), great progress in the development of teamwork skills and project management (Cohen's d of 0.89 and 0.79, respectively) and moderate progress in creativity (Cohen's d 0.56).

Keywords: *entrepreneurship education, skills, Company Programme, Student Company, mini-company, self-efficacy, Junior Achievement, education, Serbia.*

Sažetak

Promene koje je donela IV industrijska revolucija na svim poljima ljudskog delovanja značajno su uticale i na potrebe u znanjima i veštinama populacije. Istraživanja pokazuju da u eri automatizacije pored neophodnosti razvoja bazičnih digitalnih veština kod svih, i naprednih digitalnih veština za određenu grupu radnika, rastu potrebe za razvojem socijalnih i emocionalnih veština. Razvoj kreativnosti, inovativnosti, analitičkog i kritičkog mišljenja, timskog rada, samoefikasnosti, emocionalne inteligencije dobijaju na značaju. Navedene veštine predstavljaju sastavni deo preduzetničke kompetencije i razvijaju se kroz preduzetničko obrazovanje. U svetu se danas preduzetničkom obrazovanju pristupa u širem kontekstu, kao obrazovanju koje je od ključne važnosti za lični razvoj i realizaciju, obrazovanju koje osposobljava pojedinca da se prilagođava dinamičnim promenama na tržištu rada i da bude aktivan član društva. Postoji više pristupa, metoda i modela preduzetničkog obrazovanja. Prema svetskim iskustvima najbolji efekti u razvoju preduzetničkih kompetencija se postižu kroz neformalne oblike obrazovanja, a kao primer dobre prakse na globalnom nivou je prepoznat program Učenička kompanija (UK). Ovaj program se bazira na iskustvenom učenju i realizuje se u srednjim školama. U cilju davanja preporuka za izbor optimalnih rešenja u koncipiranju preduzetničkog obrazovanja u Srbiji, sprovedeno je istraživanje procene efekata primene programa UK na razvoj preduzetničkih kompetencija. Istraživanje je sprovedeno sa učenicima, učesnicima u programu UK, školske 2018/19. godine, iz 74 škole iz 45 gradova u Srbiji. Rezultati istraživanja su pokazali da je kod učenika došlo do veoma velikog razvoja samoefikasnosti (Koenov d 1,39), velikog napretka u razvoju veština timskog rada i upravljanju projektima (Koenov d 0,89 i Koenov d 0,79) i umerenog napretka kreativnosti (Koenov d 0,56). To govori u prilog uključivanja ovog programa, kao neformalnog oblika obrazovanja, u sve srednje škole u Srbiji.

Ključne reči: *preduzetničko obrazovanje, veštine, Učenička kompanija, mini kompanija, samoefikasnost, Dostignuća mladih, obrazovanje, Srbija.*

Introduction

The upsurge of new technologies and trends is leading to a turnaround in business models and a change in the division of labour between workers and machines, bringing about the transformation of current job profiles. As a direct result of these changes, the types of skills needed to perform most jobs will undergo a profound shift.

New technologies are opening up new opportunities, increasing productivity, and stimulating growth. However, not everyone is going to be a winner in this process, because adaptation is what is called for, and how long it will take and what the price to be paid economically and socially is going to be will primarily depend on developing the knowledge and skills of the population [22]. Positive effects will not come about on their own; it is imperative to mobilise governments, the business community, the education system and all the structures of the society in the right direction [26]. The impact of Industry 4.0 on potential growth models and the labour market in Serbia has been comprehensively studied by Djuričin and Lončar [6] and Vujović [31].

Imbalances will emerge in the short term; on the one hand, there will be armies of the unemployed, especially among the youth, who are particularly vulnerable, while, on the other hand, companies will not be able to satisfy their needs for people with specific knowledge and skills.

Existing models of education that offer profiled skill-sets for certain occupations will not be able to respond to the demands of time. Bearing in mind that, according to estimates, current students will have to change several occupations by the end of their career lives to adapt to the labour market demands [22], that there are no longer clear boundaries among professions, that the dynamics of technological development is progressively creating new occupational categories, it is obvious that shifts in the concept of education will be inevitable. "Skill acquisition and development are essential for the performance and modernisation of labour markets in order to provide new forms of flexibility and security for job seekers, employees, and employers alike" [11, p. 2]. In this light, entrepreneurship education plays a particularly significant role.

Skill shift and entrepreneurship education

According to the World Economic Forum's estimates, the global average skills stability – the proportion of core skills required to perform a job that will remain the same – is expected to be about 58%, meaning an average shift of 42% in required workforce skills over the 2018-2022 period [35, p. 11].

The question of what skills are needed for the future has become the subject of intensive research with the aim of timely preparing the workforce for the jobs of the future [22], [25], [26].

In their *Skill shift: automation and the future of the workforce* report [4], researchers from the McKinsey Global Institute have provided particularly analytical and functional answers to questions on what will be the forthcoming changes in the demand for workforce skills and how work will be organized within companies, as people are increasingly interacting with machines in the workplace.

They have defined a new taxonomy of 25 workforce skills. They group skills into five categories: physical and manual, basic cognitive, higher cognitive, social and emotional, and technological. Based on the quantification of time spent on 25 core workplace skills today and in the future of the United States and five European countries, with a special focus on five sectors: banking and insurance, energy and mining, healthcare, manufacturing and retail, they have made an assessment of the evolution of requirements for certain skills by 2030.

In the survey findings they state the following:

"While advanced technological skills are essential for running a highly automated and digitized economy, people with these skills will inevitably be a minority. However, there is also a significant need for everyone to develop basic digital skills for the new age of automation. We find that basic digital skills are the second fastest-growing category among our 25 skills – after advanced IT and programming skills. They increase by 69 percent in the United States and by 65 percent in Europe. Our executive survey indicates that workers in all corporate functions are expected to improve their digital literacy over the next three years, and especially employees in

functions including sourcing, procurement, and supply-chain-management. Accompanying the adoption of advanced technologies into the workplace will be an increase in the need for workers with finely tuned social and emotional skills – skills that machines are a long way from mastering" [4, p. 11].

Research has also shown that future workers will spend significantly more time using social and emotional skills than they do today. Overall, between 2016 and 2030, the demand for these social and emotional skills will increase across all industries by 26 percent in the United States and by 22 percent in Europe. Among all the analysis of skill shifts, the rise in demand for entrepreneurship and initiative taking will go up the fastest, with an increase of 33 percent in the United States and 32 percent in Europe. Other social and emotional skills, such as leadership and managing others, have also shown a strong increase [4, p. 11].

It is obvious that economists, other researchers, and experts in organizational practice use different definitions when talking about workforce skills, yet, based on the aforementioned research, certain unambiguous conclusions might be drawn. Automation and new technologies are leading to increasing skills' instability, and adapting to change calls for substantial endeavours aimed at the development of knowledge and skills of the population. All research studies emphasize the importance of soft skills or social and emotional skills as they are referred to in some research papers.

The question that may be raised is how to develop these skills.

Without going into a deeper analysis of the different types of classifications, or further discussion on which of the listed skills are skills and which ones are abilities, we may unequivocally claim that they are all important components of the entrepreneurship competence, and are developed through entrepreneurship education. Therefore, in these times, entrepreneurship education needs to be approached and viewed in a broader context, as education essential for personal development and realisation, education that will enable the individual to adapt to dynamic changes in the labour market and be an active member of society.

Goals, principles and methods of entrepreneurship education

Entrepreneurship education includes "all educational activities that seek to prepare people to be responsible, enterprising individuals who have the skills, knowledge and attitudes needed to prepare them to achieve the goals they set for themselves to live a fulfilled life" [13, p. 3]. The goal of entrepreneurship education is to develop *entrepreneurial competences*. Entrepreneurial competences are defined as a combination of knowledge, skills and attitudes related to entrepreneurship. Within entrepreneurial competences, we may distinguish *skills* such as analytical thinking, goal-setting, teamwork, negotiation, presentation, leadership skills, motivation, decision-making, time management, etc. [14], [11]. In terms of *attitudes*, we speak of creativity, sense of initiative, need for achievement, risk-taking tendency, self-efficacy, locus of control [24], [23], [1], [16]. As far as *knowledge* is concerned, it refers to the understanding of the role of entrepreneurs, as well as knowledge of relevance for carrying out entrepreneurial activities (planning, budgeting, making calculations, and a number of other areas of knowledge important for the successful managing of company functions). The basic and at the same time indispensable level of knowledge to be acquired should ensure the financial literacy of the participants [16], [7].

In the last few decades, there has been an increase in activities aimed at the development and implementation of entrepreneurship education at all levels of education in Europe. In a multitude of existing programmes, it is possible to clearly distinguish three approaches to this type of education [16]. The first approach may be termed *education about entrepreneurship*. In this type of programmes, entrepreneurship is studied as a societal phenomenon. Set against the background of economy and innovation, this theoretical approach explores who becomes an entrepreneur, what motivates entrepreneurs, and analyses the factors that affect entrepreneurial processes. The second approach, which may be called *education for entrepreneurship*, focuses on the acquisition of skills and knowledge relevant to starting a new company. Central elements in such teaching include acquiring knowledge and training in budgeting, business plan development,

marketing strategy, business organization plan, and reflecting on the motives for starting a business. The third approach, *education through entrepreneurship*, uses the entrepreneurial process as a method or tool for achieving a specific set of learning objectives. These processes range from specific entrepreneurial activities aimed at developing a company or working on case studies, or participating in activities that combine practical and theoretical learning and/or collaboration between schools and the business community. This approach is based on experiential learning.

The first two approaches (*about* and *for*) recognize the close connection between entrepreneurship and the economic development theory. The third approach (*through*) is broader and includes the competence to perceive new opportunities and put them to work in different areas of society.

In addition to the differences in content, as far as entrepreneurship education is concerned, there are also differences in the methods used, which may be formal, non-formal and informal.

Within the educational system (the formal method), entrepreneurship can be realized as a separate subject in the curriculum, as a part of or a topic within other subjects (the integrated approach), or in a problem-oriented way as part of the syllabi of several related subjects (cross-curricular approach).

Entrepreneurship education in Europe

Two thirds of European countries have incorporated entrepreneurial learning at the level of primary education. The most dominant is the transversal, horizontal and cross-curricular approach based on learning outcomes. In primary education, half of the countries have had the learning outcomes defined, and they mainly refer to attitudes towards entrepreneurship as well as transversal entrepreneurial attitudes. There are no countries working on practical entrepreneurial skills at the primary school level [13], [5].

At the secondary school level, entrepreneurship education has, in one way or another, been introduced in all countries. Approximately two thirds of the countries have opted for an integrated and cross-curricular approach,

with somewhat greater representation of the integrated approach. In some countries, entrepreneurship is taught as a separate subject; in these cases, entrepreneurial learning is covered in different ways: as a separate compulsory subject, as one of the optional elective subjects or as part of an economic group of subjects.

Studies of the impact of entrepreneurship education across methods and educational levels have shown that the greatest effects of entrepreneurship education are achieved through experiential learning and its implementation at lower levels of education [33], [34]. The high school period seems to be especially important. Given the lack of time and money as a resource, and the difference in the effects of individual programmes, it is essential to choose the most efficient method and programme. Research studies around the world have shown that informal types of education lead to particularly good effects in the field of entrepreneurship education and the best model of good practice is the mini-company or the Company Programme model [10], [14], [13].

The European Commission's Directorate-General for Enterprise has recognized this programme as the best method of entrepreneurship education for students.

The mini-company method encompasses all the three approaches to entrepreneurship education (*about*, *for* and *through*), i.e., it brings together the theoretical and practical approach, and is realized in collaboration between the educational and business sectors.

The mini-company is the most widespread method used in most European countries. Approximately 350,000 students participate in this programme in Europe annually. Some European countries have incorporated the Company Programme[1] as an option into their curricula, while in other countries, the programme is offered through extra-curricular activities or national programmes.

Entrepreneurship education in Serbia

When it comes to the analysis of the state of entrepreneurship education in Serbia, what may be asserted is that, although there is a growing awareness of the need for the development

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1   The Company Programme is encountered under different names in different countries. Although several terms are widely used, such as mini-company, student company, young enterprise, they all refer to the same programme (author's remark).

of entrepreneurship education in Serbia, the actual work on its development has not gone far yet.

The need to develop the enterprising disposition, skills and knowledge has been expressed in a number of laws and strategic documents (Law on Foundations of Education System, 2009; Law on Primary Education, 2013; Law on Secondary Education, 2013; Law on Adult Education, 2013; National Strategy for Youth, 2005; Strategy for the Development of Education in Serbia by 2020, 2012; Strategy for the Support to Development of Small and Medium-Sized Enterprises, Entrepreneurship and Competitiveness for the Period from 2015 to 2020, 2015, etc.). However, a comprehensive framework for the implementation of entrepreneurship education across educational levels and profiles has not yet been defined.

Entrepreneurship education has so far been incorporated as a separate subject only in secondary vocational schools since 2004/2005. It is on the list of compulsory vocational subjects with an annual course-load of 62 to 64 hours and is taught in the final year of education. The main objectives of entrepreneurship education are to enable students to acquire basic entrepreneurial skills and knowledge, to develop positive attitudes towards entrepreneurship, as well as to prepare them to actively seek employment or self-employment. The subject is mostly taught by teachers of general, general vocational and vocational subjects who have passed a two-day training programme with an emphasis on active teaching methods [5].

In addition, the Ministry of Education, Science and Technological Development implements various programmes and projects related to entrepreneurship which are being or have been carried out with the support of various development partners (such as the German and Norwegian governments, USAID, corporations, NGOs) [5]. However, these are mostly pilot projects of limited scope and duration (only a certain number of schools, defined by type of school or territorially). Systematic attempts to incorporate entrepreneurship into curricula for primary schools, general high schools, secondary art schools are still underway.

As far as entrepreneurship education in Serbia is concerned, it may be suggested that so far continuous development and a clearly defined concept are provided only through informal programmes implemented by the Junior Achievement organization in Serbia.

Junior Achievement Serbia is part of the global Junior Achievement Worldwide (JAW) network, founded in 1919, which covers 121 countries across all continents and is the world's largest entrepreneurship education programme attended by more than 10 million students annually.

The implementation of this programme in Serbia started in 2005 with the establishment of the Junior Achievement organization. Since then, more than 60,000 students from 286 primary and secondary schools from all over Serbia have been enrolled in its entrepreneurship and financial literacy education programmes. By combining theoretical and practical, hands-on teaching, the mentoring programme, organizing competitions and fairs, these students are given the opportunity to learn the principles of business operations and are at the same time encouraged to develop their entrepreneurial competencies.

The programme is implemented within schools with the assistance of mentor teachers who have previously undergone training, developed and licensed by Junior Achievement Worldwide and certified by the Ministry of Education, Science and Technological Development of the Government of the Republic of Serbia. It is important to point out that the implementation of this programme, both across the world and in Serbia, is financially supported by the business sector.

In 2013 and 2014, the European Commission declared the Junior Achievement organization in Serbia the national winner in the field of entrepreneurship promotion and a runner-up at the European level. Long-standing active advocacy of the importance of entrepreneurship education in Serbia has resulted in the introduction of Junior Achievement activities into current strategies and action plans of the Ministry of Economy, Ministry of Education, Science and Technological Development and the Ministry of Youth and Sports. The programmes have been accredited by the Ministry of Education, Science and Technological Development of the Republic of Serbia and are listed in the catalogue of programmes approved by the Institute for Advancement of Education.

The focus of the programme is on encouraging students' innovation and creativity, entrepreneurship,

experiential learning while developing skills that contribute to employability, economic and financial literacy. Unquestionably, the flagship, the most recognizable and most important programme implemented within Junior Achievement is the Company Programme.

The Company Programme

The Company Programme is globally recognized as an example of good practice in entrepreneurship education. This programme is based on the learning-by-doing principle. Following a standardized curriculum, students, under the supervision of trained mentors, create a company, develop it and close it during a school year period. Students are given the opportunity to run their own companies, with real products and services, as well as to manage the money earned during the entire period of their high school education.

Student companies are formed at the beginning of the school year and throughout the duration of the programme, students go through all the stages of an actual company's business operations: raising finance for starting up a company, defining the organizational structure of the company, assigning roles/position among team members, choosing the product or service that the company will provide based on their own ideas, market research, preparation of the business plan, product/service creation, marketing strategy, product design and business promotion, communication with business associates and consumers, exhibiting and selling at competitions school and local events, closing the company and settling its financial balance.

Participation in competitions is an integral part of the programme concept. For instance, Junior Achievement Serbia organizes four regional competitions for the student companies across the country, where companies compete for the national finals, where they eventually vie for the best student company in Serbia. Every year, the best Serbian student company attends the European competition where it measures its strength against other peers - the best student companies from 35 European countries.

Although the guiding idea behind this programme is to foster entrepreneurial spirit and financial literacy, and the most important outcome sought after in the programme is to open the opportunities for self-employment and youth employment, this programme also contributes significantly to the students' personal growth [16], [19], [17].

Review of research measuring the effects of the implementation of the Company Programme

In order to scientifically test the effects of the implementation of the Company Programme, as well as to determine the cost-effectiveness of investing in this type of education, after a number of years of implementation of the programme, many countries have conducted independent research. Owing to that, there is a large number of research studies that explore the results of this method of entrepreneurship education. Coverage, applied methodology as well as tasks set in the research varied from country to country.

Research has shown that the programme leads to the successful achievement of short-term outcomes in forming positive attitudes towards entrepreneurship and developing entrepreneurial skills [16], [17], [7], whereas the long-term effects may be observed in higher start-up rates, higher employability, a better career development [9], [8], [1], [33].

The United Kingdom is one of the European countries with the longest history of implementing the Company Programme (the Young Enterprise programme). Upon 50 years of running this programme, a survey has been conducted on a sample of 371 alumni showing that the participants of this programme are 26% more likely to run their own business than their peers, that their companies have a higher turnover (with 12% of the enterprises earning more than 500,000 pounds, compared with 3% of businesses in the control group), employ more people than other comparable companies (11% employing 51 to 100 people, versus 9% in the control group), that their companies were more resilient in surviving the recession crisis period (49.6% increased sales during the crisis, and 30% developed new products), their companies are highly diversified, innovative, and so on [1].

Following 10 years of the implementation of the Company Programme in Sweden, research has been carried out with the aim of assessing the impact of the programme

and the cost-effectiveness of this type of education. The study was conducted in the period from 1990 to 2007 on a sample of 166,603 participants of the programme from 1980 to 2007 and a control group of 221,530 respondents who were not involved in the programme. The findings have shown that programme participants launched their own business at the beginning of their career in 20% more cases compared to the control group and did it a year earlier on average. The companies started by programme participants created 130,000 jobs annually over the 20-year period. Companies set up by the Company Programme participants had a 20% higher income on average compared to the control group companies, with the survival span of their companies being longer, contributing more to the budget revenues. When employed in other companies, they advanced faster and the companies employing them grew faster too [33].

Numerous studies that have observed its short-term effects have confirmed the significance of the impact the mini-company method has on the development of entrepreneurial competences of its participants [16].

The Innovation Cluster for Entrepreneurship Education (ICEE) started in January 2015 and ran until January 2018. The project was co-funded by the European Commission through the Erasmus + programme. The leading partner in the consortium, with responsibility for its implementation, was Junior Achievement Europe (JA Europe).

The ICEE project was a policy experiment. To move towards the European goal that every young person should have a practical entrepreneurial experience before they leave school, the consortium tested what the scenario would look like if 50% of students between 15 and 20 years of age had such an experience. At the centre of the study was a mini-company scheme called the JA Company Programme (CP).

In this project, twenty upper secondary schools in Belgium, Estonia, Finland, Italy and Latvia participated in a 27-month field trial using mini-companies as the practical entrepreneurial experience. These schools were compared with the situation at five control schools. The research in ICEE was based on a combination of qualitative and quantitative methods. A quantitative study included

surveys to students, teachers, parents and business people. The net samples were 7000 students, 3500 parents, 1000 teachers and 400 business people. The data were collected over two school years. In the qualitative study, 150 people from ten of the participating schools were interviewed in addition to head teachers and representatives from JA and the ministries.

In order to assess the relevance of the Company Programme as accurately as possible, three groups of respondents were observed: students in the tested schools who attended the programme and their teachers and parents; students from the same schools who did not attend the programme and their teachers and parents; students in control schools not included in the programme and their teachers and parents. The attitudes of the respondents were based on pre- and post-tests, and the size of the sample and the high degree of cooperation of the respondents provides reliability in terms of the validity of the results. The study also examined the effects of independent variables such as student age, gender, parental education and occupation, previous entrepreneurial experience, and immigrant status. Research results are given by countries and aggregately. Interestingly, variations in results across countries are relatively small.

What do the obtained overall results tell us?

The number of hours spent in activities, i.e., the quantity of activities, is crucial for achieving effects in experiential learning in programmes such as the Company Programme. During the research, 70% of students spent more than 100 hours engaged in the Company Programme, 30% worked for 99 or less hours. It turned out that for students who spent more than 100 hours in the Company Programme, the programme has resulted in positive effects in several fields. Those who spent fewer hours in the programme had a similar result to students who were not included in the programme. It is an established fact that the main aim of the programme is to enable students to form their own real enterprise and to discover first-hand how a company functions. However, in addition, it was shown that students with high engagement in the Company Programme had significantly higher scores compared to students with less engagement, or no engagement, when measuring their perceived feasibility

for self-employment, self-efficacy, project management, sense of initiative, entrepreneurship, school performance. These results were found both in the group of students who had Company Programme as a mandatory part of the curriculum, and in the group of students for whom it was an elective activity. Researchers have drawn two important implications from this: firstly, schools must allow for enough time for activities in student companies, and students, on the other hand, must make an effort to work on their student companies after school [16, p. 7].

Priorities defined by the government, curricula, teacher training and cooperation between the education and business sectors play a key role in the development of entrepreneurship education [16].

These results provide strong enough arguments for serious consideration of the prospects for a wider implementation of the Company Programme in the educational system in Serbia.

An empirical analysis of the effects of the Company Programme implementation in high schools in Serbia

To assess the effects of the implementation of the Company Programme (CP) in high schools in Serbia, an empirical study was conducted. The research has encompassed all high school students in Serbia who participated in the CP in the 2018/2019 school year. The participant test group is made up of members of those teams that have completed all the CP cycles and have participated in regional competitions. According to the Junior Achievement Serbia records for the 2018/2019 school year, a total of 131 companies from 74 schools in 45 cities in Serbia participated in regional competitions. A total of 608 students took part in these competitions, out of which 403 female and 205 male students.

Questionnaire design and structure

The research related to the student group was carried out using two online surveys (pre-test, post-test). The first survey (pre-test) was administered in the student company establishment stage and its goal was to obtain students'

perceptions of their entrepreneurial competencies at the CP outset. The second survey (post-test) was undertaken immediately after the end of the CP and its purpose was to acquire answers to the same pre-test questions so as to establish whether, and if so, to what extent there was a shift in attitudes, i.e., whether the CP has had an impact on the development of entrepreneurial competencies.

The pre-test questionnaire consisted of 49 questions. Nine questions referred to students' personal data (gender, age, type of school the student attends, academic achievement – grade point average in the previous school year, parental education, family financial status, parental entrepreneurial experience, previous experience with the CP), whereas 40 questions were aimed at gaining insight into the effects of the programme. The post-test questionnaire contained 51 questions. Of the two additional questions, one dealt with the assessment of the number of hours the student spent in the CP activities, whereas the other one addressed students' evaluation of the usefulness of the programme.

Respondents' personal data (gender, age, type of school, etc.) were viewed as independent variables. Students' perceptions of their entrepreneurial competencies were observed as dependent variables. Questions aimed at determining students' entrepreneurial competencies were stated as attitudes (e.g., when testing teamwork skills, one of the questions was: "I am able to listen to what the others are saying when working in a group", or when assessing self-efficacy: "I can deal efficiently with unexpected events") with close-ended responses. The five-point Likert scale was used for the answers (1 - I totally disagree, 2 - I mostly disagree, 3 - I neither agree nor disagree, 4 - I mostly agree, 5 - I totally agree). Consequently, the overall analysis is based on students' subjective assessment of their entrepreneurial competencies before and upon participating in the CP.

All statements related to the development of entrepreneurial competencies have been adopted from the ICEE study [16]. This was done for two reasons: firstly, these statements were subjected to careful scrutiny by expert teams in five countries and are based on questions used in similar studies according to Johansen, [16, p. 40], and, secondly, the use of the same questions allows for a methodologically more reliable comparison of results.

The pre-test survey was conducted with the logistical support of the Junior Achievement Serbia organization. Information on the purpose of the research, as well as practical instructions on how to access and complete the survey, with a link for survey access, were sent by e-mail to teachers, mentors and directors of student companies, who, in turn, passed them on to other team members.

The process of establishing student companies in various schools took place from the beginning of November 2018 to mid-January 2019. With that in mind, the pre-test survey was activated in mid-December 2018 (18 December). A total of 297 students responded to this first survey.

The post-test survey began on 26 May 2019, after the end of the National Competition of Student Companies, the last annual activity envisaged by the programme. An e-mail with instructions and a link to the survey was sent directly to the e-mail addresses of students who responded to the pre-test survey. The survey was completed on 15 June and the final number of responses to the post-test survey was 155. Poorer response to the post-test survey might be attributed to the end of the school year, preparations for the matriculation and the university entrance exams.

If we compare the number of responses to the pre-test and the post-test survey in terms of the number of students who have started and completed the programme (608 students) in the given school year, we may conclude that we had a satisfactory response, consistent with experience in similar research studies which may serve as a valid basis for further quantitative analysis.

As the CP allows for the participation of students ranging from the first to the fourth year of high school, it is common for some students who had the opportunity to join earlier programmes, to wish to take up activities in a new student company in the next school year. With this in mind, the survey had a question asking about the number of times the student has been a CP participant. The answers received have shown that 17% of the pre-test survey respondents (51 students) have participated for the second time, and 7% (21 students) have participated for the third time. In the post-test survey, 23.2% (36 students) participated in the CP for the second time and 12.3% (19 students) for the third time. Since the research methodology is based on measuring the shift in attitudes, skills and

knowledge before and upon completing the programme, the responses of students who have already participated in the CP have been excluded from further processing. In that way, the number of responses that were subjected to quantitative analysis in the pre-test survey was reduced to 225, and in the post-test survey to 100 answers.

Methods of quantitative analysis

The quantitative analysis of data obtained through surveys was performed using the statistical software package SPSS (Statistical Package for Social Sciences). For the purpose of hypotheses testing, several statistical methods were applied in the processing of data. The respondents' structure in terms of gender, age, academic achievement, type of school and other independent variables is presented using the descriptive statistics indicators. Average values for the responses and standard deviation were calculated.

Cohen's coefficient (Cohen's d) and t-tests were used to assess the effect of the training on CP participants, in terms of whether and if so, to what degree and in which direction their responses have changed. Cohen's coefficient shows the standardized difference between the mean values of the two observed groups. Cohen's coefficient with a value of 1 means that the two observed groups differ by one standard deviation, with a value of 2 by two standard deviations and so on. Depending on the research area (be it medical, psychological, sociological, etc.), there are several scales for interpreting the Cohen's d coefficient. With this in mind, the scale recommended for this type of research was used, and according to this scale, the coefficient value of 0.1 indicates a very small effect size, 0.2 a small effect size, 0.5 a medium effect size, 0.8 a large effect size, 1.2 a very large effect size and 2 a huge effect size [21].

In order to determine whether there is a significant difference in achievement between the groups of students defined by an independent variable (e.g., by gender, school type, etc.), one-factor ANCOVA was used with statistical control of the effects of some other continuous variables (covariates).

The reliability of the indicators was tested using Cronbach's alpha coefficient. This coefficient measures

how closely the items, in our case the set of questions in a group, are interrelated according to the observed property. The ideal case is when Cronbach's alpha is greater than 0.7. In interpreting this indicator, it is important to keep in mind that the coefficient is very sensitive to the number of items or questions in the group. Groups with a small number of items often have a lower Cronbach's coefficient, for example, 0.5. In that case, it is methodologically more sound to calculate the mean value of the correlation between items. Briggs and Cheek recommend values of 0.2 to 0.4 as the optimal range of inter-item correlation [28]. As the indicators in this research are based on sets of four to five questions, which is a relatively small number of items, in addition to the Cronbach's alpha coefficient for each indicator, the mean value of the inter-item correlation was calculated. All tests were carried out with a significance level of 5%.

Analysis of the survey participants' structure

As the effects of the CP may potentially be dependent on the age of the students, their gender, type of school, academic achievement, parental education, family social status, previous contacts with entrepreneurship either through family experience or some other type of direct contact, all these characteristics are treated as independent variables. In addition, as an independent variable, the post-test survey tracked the number of hours students spent during the school year in the CP activities. ICEE research has shown that there are large differences in the effects of the programme depending on how much time the student has spent working in the CP.

In terms of *gender*, it may be observed that female students were more represented in both the pre- (67.6%) and the post-test survey (70%). The higher relative participation of female students may be primarily attributed to the structure of schools that have adopted and implemented the CP (high participation of economic and medical schools where female students are more represented) and, to a certain extent, to the commonly observable phenomenon that female students show greater responsibility in fulfilling school obligations, which is how they probably perceived this survey as well.

Observed according to the *age structure*, the survey encompassed students who were 15 to 19 years of age at the time of the survey. The largest number of students (40.9%) who responded to the pre-test survey were born in 2001, 24.4% were born in 2000, followed by 21.8% in 2002 and 11.1% were born in 2003. This age structure has been expected since teacher mentors usually work with students in the third and fourth years of high school.

In the post-test survey, there was a change in the structure of students according to age. The share of students born in 2001, although still the most represented (33%), has decreased relatively, the share of students born in 2002 has increased (31%), while other birth years have remained at approximately the same level.

An analysis of the structure of students by *type of school* shows that the most represented were students from economic schools (28.4%), followed by technical (23.6%), medical (12.4%) and general high schools (16 %). Students of other secondary vocational schools accounted for 16%, and agricultural schools for 3.1% of the total number. Art schools were the least represented (0.4%). The structure of students by type of school did not change significantly in the post-test survey. The structure of schools included in the programme follows the structure of secondary schools in Serbia relatively well. In the 2017/18 school year, there were a total of 510 high schools in Serbia, of which 60.8% were vocational schools, 21.8% general high schools, 9.6% mixed schools and 7.8% art schools.

The analysis of the surveyed students according to their *academic achievement* in the previous grade shows that the majority of the participants in the pre-test survey, as well as in the programme in general, were excellent students[2] (64.4%), followed by very good students (28.4%), while the participation of good students (6.2%) and students with satisfactory academic achievement (0.9%) was relatively small. The post-test survey was mostly taken by excellent students (75%) and very good students (24%), with only one student who had good grades. The structure of students in the programme based on their academic achievement certainly does not follow the average structure of high school students according

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2   The structure of all responses to the first survey (297 responses) shows that as many as 66% were completed by excellent students.

to that criterion. Such a high participation percentage of excellent and very good students can be explained on the one hand, by the interest of those who show good results in school in additional school activities, and on the other hand, by the approach mentor teachers use in informing and selecting students for the CP [16].

Data on the *educational level of the programme participants' parents* were obtained using the information on the highest level of education attained by the students' parents. Based on the responses received in the pre-test survey, it can be concluded that the mothers of the largest number of students completed high school education (61.8%), followed by university (16%) and college education (15.1%). Only 7.1% of students were born to mothers who have completed only primary school. A similar structure according to maternal education was maintained in the post-test survey.

The set structure referring to paternal education in the pre-test and post-test survey shows an insignificant difference in comparison to the structure referring to maternal education. Most fathers have completed secondary school (59.1%), followed by university (18.7%) and college education (15.6%), whereas 6.7% of fathers have attained only the primary school level.

Relevant literature states that the development of youth entrepreneurial competencies is strongly influenced by close experiences gained either directly through parents who are or have been involved in entrepreneurship or through closer contacts with entrepreneurs [29]. To explore whether these factors also have an impact on the effects of the CP, the survey included questions, such as "Do your parents have or have they had prior entrepreneurial experience", explaining what this would mean, and the question "Do you know someone who is an entrepreneur?"

The answers to these questions show that 60.9% of students come from families that do not have prior entrepreneurial experience.

It is also believed that the *family financial status* can affect student achievement in the educational process [29], and therefore the survey included the question "What is the average monthly income of your family?" offering answers on a scale with the following intervals: up to 40,000 dinars, from 41,000 to 70,000 dinars, from 71,000 to 100,000 dinars and over 100,000 dinars. There were 31% of students in the category with the lowest income, in the next category there were 32.4% of students. 22.7% of students had a family income of 70,000 to 100,000, and only 13.8% of students came from families with a monthly income of over 100,000 dinars. The structure of students according to their families' income did not change significantly from pre-test to post-test

Research conducted in Belgium, Finland, Italy, Estonia and Lithuania [16] has shown that the effects of the CP implementation are highly dependent on the time students devote to the CP activities. The results showed a significant difference in the achievements of those who were engaged over 100 hours and those engaged less than 99 hours. The achievements of the low-activity students were similar to the results of the control group that was not involved in the CP [17, p.6]. Therefore, the post-test survey included a question in which students were asked to state whether they were engaged for less or more than 100 hours. Those who were involved for more than 100 hours, were able to determine more precisely the number of hours in the intervals of 20 hours, from 100 to 160 hours, or over 160 hours.

The ICEE study has shown that the *average time spent in a student company*, when looking at time spent both in and out of school, in all five countries, was around 160 hours in the 25 CP weeks [16, p.6]. Our survey reports that 67% of students spent more than 100 hours in the CP activities. The largest number, 21% of them, spent 121 to 140 hours working in the company, followed by 15% from 141 hours to 160 hours and 18% over 161 hours[3]. In the ICEE survey, 70% of students spent more than 100 hours in the programme, which is very similar to the structure of our students according to the time spent in activities in the CP [16, p.38].

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3 The accuracy of the answers according to the scale should be taken tentatively, regardless of the fact that the question was accompanied with an example of how the time spent should be calculated. When testing the survey questions, it was shown that students do not have a clear picture of how much time they spent in programme activities.

The CP effects on the development of entrepreneurial competencies: results and discussion

Entrepreneurial competencies comprise a wide range of skills, attitudes and knowledge. The scope of the study renders it unfeasible to explore the CP effects in all possible fields so the focus is on verifying the CP effects on self-efficacy, creativity, teamwork and project management competencies. These fields were chosen because of their importance for further students' personal and professional development.

Self-efficacy

Self-efficacy refers to an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments [4]. Self-efficacy is based on the idea of the importance of subjective experience of personal competence in the attainment of various goals, not on actual knowledge and skills. It is not perceived as a personality trait, but as a belief in one's own capacity to align knowledge and abilities, in order to achieve the desired goals in certain areas and circumstances.

Based on many years of research, the creator of the concept, psychologist Albert Bandura, states that self-efficacy beliefs determine how people feel, think, motivate themselves and behave, and that they include cognitive, motivational, affective and selection processes. "A strong sense of efficacy enhances human accomplishment and personal well-being in many ways. People with high assurance in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an efficacious outlook fosters intrinsic interest and deep engrossment in activities. They set themselves challenging goals and maintain strong commitment to them. They heighten and sustain their efforts in the face of failure. They quickly recover their sense of efficacy after failures or setbacks. They attribute failure to insufficient effort or deficient knowledge and skills which are acquirable. They approach threatening situations with assurance that they can exercise control over them. Such an efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression" [3, p. 2].

By way of comparison, he claims that "people who doubt their capabilities shy away from difficult tasks which they view as personal threats. They have low aspirations and weak commitment to the goals they choose to pursue" [3, p. 2].

Albert Bandura developed the concept of self-efficacy in the 1970s within the framework of socio-cognitive theory. Ever since then, the term has been widely accepted and researched across various fields of theoretical and applied psychology. However, the term "self-efficacy" is sometimes identified or confused with the term "self-esteem". As Bandura argues, "the construct of self-efficacy differs from the colloquial term confidence". Confidence is a nonspecific term, a catchphrase that refers to strength of belief but does not necessarily specify what the certainty is about and therefore cannot be accepted as a construct in theoretical analysis. In order to clarify the difference in terms, Bandura states that, for example, a person's confidence statement may be that they are good at math; but when it comes to the same person's self-efficacy, then it is about his/her belief that s/he will know how to solve specific tasks in the forthcoming exam.

Having in mind the importance of the effects of self-efficacy for future students' development, special attention in this research has been devoted to monitoring the effects of the CP on the development of this attitude.

The level of self-efficacy in students was tested based on the questions: Qs1 "I can deal efficiently with unexpected events"; Qs2 "Thanks to my resourcefulness, I know how to handle unforeseen situations"; Qs3 "I can solve most problems if I invest the necessary effort"; Qs4 "I remain calm when facing difficulties because I can rely on my coping abilities"; and Qs5 "I can usually handle whatever comes my way". These questions were taken from the ICEE survey [16, p. 51-52].

It is interesting to note that the students evaluated their abilities relatively high at the very CP start. The average score on most of the questions ranged above 4 on both tests. For example, they rated their ability to solve most problems if they invest the necessary effort on average with over 4.5 on both tests (Table 1). In comparison, their European peers' responses ranged around 3.6, averaging 3.7 on the post-test in a group of students who had more than 100 hours of the CP engagement [16, p. 51].

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4   https://www.apa.org/pi/aids/resources/education/self-efficacy

As the results of the ICEE study have shown that there is a significant difference in student achievement depending on the number of hours involved in the CP activities, in the post-test we singled out the responses of students who spent more than 100 hours in the CP activities. When their responses were compared with the responses to the pre-test, the group was shown to have made significant progress. Among them, Cohen's d for individual questions ranged from the lowest value of 0.222 to 0.488, which indicates a shift from low to medium level effect size. Thus, our research confirmed the claim that the extent of students' dedication to the programme is crucial, confirming the statement that "deep dive is better than light touch: working 100 hours or more in the mini-company gives better results" [16, p. 7]. This is important for mentors and schools to keep in mind when planning time in the CP organization.

Since individual answers provide only fragments for assessing self-efficacy, the indicator of self-efficacy levels was determined based on a set of answers to the questions asked in the survey. The reliability of the indicator was tested via Cronbach's alpha coefficient, and its value in both pre- and post-tests is higher than 0.8, indicating that the questions are closely interrelated to the observed property. By comparing the mean values of pre- and post-test responses of the CP participants with a more than 100 hours of engagement, it can be concluded that there has

been a significant shift in the development of self-efficacy. Cohen's d is 1.3389, which, interpreted on this coefficient's scale of values represents a very large effect size (Table 2).

Such effects of the CP on the development of self-efficacy in students can be well understood when we keep in mind that according to Bandura, "the most effective way of creating a strong sense of efficacy is through mastery experiences. Successes build a robust belief in one's personal efficacy. Failures undermine it, especially if failures occur before a sense of efficacy is firmly established. If people experience only easy successes they come to expect quick results and are easily discouraged by failure. A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort. Some setbacks and difficulties in human pursuits serve a useful purpose in teaching that success usually requires sustained effort" [3, pp. 2-3].

As the next important factor in the development of self-efficacy, Bandura cites "vicarious experiences", i.e., experiences that are gained by observing people similar to oneself. The attitude "If they can do it, I can do it as well" is being developed in this way. The greater the perceived similarity with the observed model, the greater the effects of this modelling. Although this factor is not as strong as personal experience, it has significant effects. It has a particularly strong influence in the development of self-efficacy in people who are insecure [3].

Bearing in mind that the CP method of work is based on experiential learning, that it involves peer teamwork, it is not surprising that it leads to the given effects in the development of students' self-efficacy.

The analysis of the potential impact of factors, such as gender, type of school or some other independent variable, has shown that only maternal education had a statistically significant effect on the development of self-efficacy. Cohen's coefficient for students whose mothers

Table 1: Self-efficacy: comparative results for pre-test and post-test responses

Question	Mean pre-test	Std. deviation pre-test	Mean post-test*	Std. deviation post-test	Cohen's d
Qs_1	4.138	0.7926	4.418	0.6775	0.380
Qs_2	4.058	0.882	4.433	0.633	0.488
Qs_3	4.533	0.7258	4.672	0.5042	0.222
Qs_4	4.009	0.9306	4.313	0.7826	0.354
Qs_5	4.018	0.796	4.224	0.7349	0.269

*results of students who spent more than 100 hours in the CP activities.

Table 2: Observed indicators of entrepreneurial competences on the pre-test and post-test and Cohen's d coefficient

Indicator	Mean pre-test	Std. deviation pre-test	Mean post-test*	Std. deviation post-test	Cohen's d	Cronbach's Alfa pre-test	Cronbach's Alfa post-test
Self-efficacy	4.15	0.642	4.41	0.509	1.3389	0.834	0.813
Creativity	4.27	0.537	4.47	0.47	0.564	0.695	0.721
Teamwork	4.65	0.481	4.7	0.431	0.8937	0.77	0.744
Project management	3.64	0.990	4.11	0.843	0.7917	0.902	0.913

*results of students who spent more than 100 hours in CP activities.

had completed primary school education was 0.1 (small effect size), for high school level 0.41 (medium effect size), and for students whose mothers had acquired university education it was 0.94 (large effect size). In the ICEE research, parental education has also proven to be important for the development of self-efficacy; however, their study has not looked into maternal and paternal education separately [16, p. 52].

In research studies related to the effects of entrepreneurship education, several authors studied the connection between self-efficacy and entrepreneurial intentions. Their results show a high correlation between self-efficacy and expressed entrepreneurial intentions [27]. This was an additional reason to pay special attention to the development of this attitude.

Creativity

There are many definitions of creativity in literature, depending on whether it is viewed from the angle of art, science, education, psychology, innovation or some other area of human creativity. Creativity is related to the richness of ideas, originality of thought, as well as their use in practical work. Therefore, a broad enough definition may be accepted, which views creativity as "the ability to create something new with the skill of imagination, be it a new solution to a problem, a new method or device, or a new art object or form".[5]

Students' creativity was assessed using the following questions: Qc1 "I am good at combining ideas in new ways"; Qc2 "My thoughts, ideas, and actions are often original"; Qc3 "I am good at making routine tasks exciting"; Qc4 "I like trying out new things and activities"; Qc5 "I am often able to come up with answers to difficult problems" (Johansen, 2018, p. 51). The extent to which the questions are closely related to the observed property was tested via Cronbach's alpha coefficient. It was 0.695 in the pre-test and 0.715 in the post-test, which indicates an acceptable degree of reliability of the selected questions.

A comparison of the responses received by first-time CP participants before and after the CP completion, has shown that there has been slight progress in this field. Cohen's d ranged from 0.033 to 0.189. When the answers of high-activity students engaged in the CP for more than 100 hours were filtered out, the effect size shifted from small to medium. Cohen's d ratio ranged from 0.040 to 0.415 (Table 3).

Table 3: Creativity: comparative results for pre-test and post-test responses

Question	Mean pre-test	Std. deviation pre-test	Mean post-test*	Std. deviation post-test	Cohen's d
Qc_1	4.462	0.7674	4.642	0.5422	0.271
Qc_2	4.133	0.8292	4.358	0.7528	0.284
Qc_3	3.911	0.9454	4.284	0.8493	0.415
Qc_4	4.662	0.628	4.687	0.6327	0.040
Qc_5	4.178	0.7987	4.373	0.5989	0.276

*results of students who spent more than 100 hours in the CP activities.

Students rated their creativity relatively high at the beginning. The average score on most of the above questions was higher than 4 on both tests. Interestingly, the lowest score (3.9) was given on the question "I am good at making routine tasks exciting", and the highest self-confidence was shown on the question "I like trying out new things and activities", with the average score of 4.66 on the pre-test, increasing to 4.69 in the post-test. Compared to their peers' answer in the ICEE survey, it can be seen that they ranged around 3.5, and averaged 3.6 on the post-test, in a group of students with high CP activity exceeding 100 hours [16].

Stepping aside from fragmentary observations to the indicator of creativity, it can be concluded that a group of students who had high CP activity, more than 100 hours, made moderate progress. The value of Cohen's d is 0.587 (Table 2).

The analysis of the impact of other factors, apart from the number of hours spent in the CP, has shown that only maternal education had a statically significant influence on the development of creativity in students. The biggest step in the development of their creativity was made by students whose mothers had a university education (Cohen's d of 0.587). The ICEE research has also shown that children of parents with a university degree achieve the greatest progress in this field [16].

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5 https://sr.wikipedia.org/sr-ec/%D0%A1%D1%82%D0%B2%D0%B0%D1%80%D0%B0%D0%BB%D0%B0%D1%88%D1%82%D0%B2%D0%BE
   https://dictionary.cambridge.org/dictionary/english/creativity

Teamwork

A team is a group of two or more individuals who must interact to achieve one or more common goals, and the competence to work in a team is central to the CP. Teamwork was assessed by five items: Qt1 "I am able to work together with other people"; Qt2 "I am able to actively participate in teamwork"; Qt3 "I am good at promoting my own ideas and opinions when working in a group"; Qt4 "I am good at giving positive feedback when working in a group"; Qt5 "I am able to listen to what the others are saying when working in a group" [16].

The value of Cronbach's alpha for this indicator was 0.770 on the pre-test, and 0.744, on the post-test for the group that was engaged for over 100 hours, which shows that the questions are closely related and well formulated for the needs of indicators being investigated. The value of Cronbach's alpha in the ICEE study was 0.81 (Table 2).

Table 4: Teamwork: comparative results for pre-test and post-test responses

Question	Mean pre-test	Std. deviation pre-test	Mean post-test*	Std. deviation post-test	Cohen's d
Qt$_1$	4.738	0.6322	4.657	0.7082	0.121
Qt$_2$	4.778	0.5626	4.776	0.5985	0.03
Qt$_3$	4.462	0.7904	4.627	0.6475	0.228
Qt$_4$	4.507	0.7799	4.672	0.5874	0.239
Qt$_5$	4.773	0.5237	4.791	0.5086	0.035

*results of students who spent more than 100 hours in the CP activities.

It may be noticed that the students were self-confident in this field as well. The average scores on the test were above 4.5 for most questions. The lowest average score (4.4) was measured for the question "I am good at promoting my own ideas and opinions when working in a group", and the highest (4.78) for the question "I am able to actively participate in teamwork" (Table 4). In addition to a quite high starting position, the analysis of the answers received shows that there has been a further development of teamwork skills during the CP.

The average value of the teamwork indicators on the pre-test was 4.65, and on the post-test 4.7. Cohen's d is 0.89, which indicates a large impact of training on the observed set (Table 2). In the ICEE study, the average values on the pre-test for this indicator were 3.9, on the post-test 4.0, with Cohen's d at 0.18.

In addition to the number of hours spent in the CP, the ANCOVA test has shown that the age of the participants was also important for the effects of the programme in this field (< 0.05). Students, born in 2000 and 2001, had significant progress in this field (Cohen's d of 0.34 and 0.26, respectively), compared to students born in 2002 and 2003, where Cohen's d ranged from 0.036 up to 0.015.

Project management

In order to determine the indicators for project management skills, the survey included the following questions: Qp1 "I am able to create a project plan"; Qp2 "I am able to set project goals"; Qp3 "I am able to structure tasks in a project"; Qp4 "I am able to delegate various tasks/activities in a project" [16, p. 51].

The value of Cronbach's alpha for this indicator was 0.9 in the pre-test, and in the post-test, in the group that was engaged for more than 100 hours, it was 0.934. This suggests that the questions are closely related and aligned well with the needs of the survey. The value of Cronbach's alpha in the ICEE study was 0.81.

In assessing their abilities in this area, students were more modest compared to previous skills. The average value of answers to the questions asked in the pre-test was around 3.6. After the end of the programme, it was 4.1 (Table 5). This is the only area in which our students' scores were close to the scores derived from the ICEE survey students' responses. Their answers on the pre-test were 3.5, and after the programme 3.7. The value of Cohen's d was 0.24, which was the highest value of this coefficient, i.e., the largest shift in the results in the observed fields.

Table 5: Project management: comparative results for pre-test and post-test responses

Question	Mean pre-test	Std. deviation pre-test	Mean post-test	Std. deviation post-test	Cohen's d
Qp$_1$	3.467	1.1042	3.985	0.9769	0.475
Qp$_2$	3.822	1.0956	4.179	0.9523	0.348
Qp$_3$	3.684	1.0577	4.149	0.9415	0.464
Qp$_4$	3.604	1.1607	4.149	0.9132	0.493

*results of students who spent more than 100 hours in the CP activities.

Cohen's d for this indicator in our study was 0.79 indicating a large impact of training on the observed set (Table 2). The differences in the values of Cohen's d in our study and the ICEE study, in addition to possible and expected differences in the effects of the programme, can also be explained by the sensitivity of this indicator to the size of the set.

The ANCOVA test has shown that the effects of the CP in this field were influenced by the age of the students and maternal education. Cohen's d was 0.64 in the generation born in 2000, then 0.57 in the generation born in 2001, which was also the most numerous in the survey, and 0.72 in the generation born in 2002. This coefficient for the youngest students, the 2003 generation, was 0.3. When observing the influence of maternal education on project management, it can be stated that measured by Cohen's coefficient, the greatest progress has been made by students whose mothers have a university degree. In that group, Cohen's d was 1.1, which speaks of a very big shift. The group of students whose mothers had completed high school had Cohen's d of 0.64, and the students of mothers with primary school education was 0.09. The influence of parents' education on this area has also been demonstrated in the ICEE research study [16, p. 52].

Concluding remarks

The changes brought about by the Fourth Industrial Revolution in all areas of human activity have significantly affected the requirements in terms of knowledge and skills of the population. Research shows that in the era of automation, in addition to the need to develop basic digital skills for all, and advanced digital skills for a certain group of workers, the need to develop social and emotional skills is also growing. The development of creativity, innovation, analytical and critical thinking, teamwork, self-efficacy, emotional intelligence is gaining in importance. These skills are an integral part of entrepreneurial competence and are developed through entrepreneurship education. In the world today, that type of education is being approached in a wider context, as education essential for personal development and realization, education that will enable the individual to adapt to dynamic changes in the labour market and be an active member of society.

There are several approaches, methods and models of entrepreneurship education. According to world experiences, the best effects in the development of entrepreneurial competencies are achieved through informal types of education, and the Company Programme has globally been recognized as an example of good practice. This programme is based on experiential learning and is implemented in high schools. In order to give recommendations for the selection of optimal solutions in the approach to entrepreneurship education in Serbia, a study was conducted to assess the effects of the implementation of the Company Programme on the development of entrepreneurial competencies. The research was carried out with the 2018/2019 school year generation of the CP participants, from 74 schools in 45 cities in Serbia, who have completed the entire programme (608 students).

Based on the results obtained, we may come to the conclusion that the CP has had significant effects on the development of self-efficacy, creativity, teamwork skills, project management knowledge and skills in students. Measured by Cohen's d, it has been shown that there has been a very high development of student self-efficacy (Cohen's d 1.39), great progress in teamwork development and project management (Cohen's d of 0.89 and 0.79, respectively) and moderate progress in creativity (Cohen's d 0.56).

When interpreting these results, it is important to bear in mind that the post-test was administered immediately after the end of the programme. Research on the effects of the CP, conducted with programme participants in several countries several years after their CP involvement, has shown that the CP alumni while going through various life situations and experientially testing their abilities, became aware of how much impact this programme has had on their skills and attitudes. With this in mind, we believe that the effects of the programme are greater than the quantitative analysis shows.

So far, there have been no comprehensive studies of the application of the CP in Serbia. The attention of the scholarly audience, both in this country and in the region, has been mainly directed at examining entrepreneurial intentions and attitudes towards entrepreneurship among

students, and in this sense, we have very limited insights into the effects of entrepreneurship programmes offered to high school students.

Serbia is introducing entrepreneurship education into its education system, but there is still no clearly defined strategy for the development of this type of education for different levels and educational profiles. Currently, entrepreneurship, as a subject, has been introduced in the final grade of secondary vocational schools, and in other secondary schools and at lower educational levels, this competence is envisaged to be developed through cross-curricular collaboration. The conclusion of numerous worldwide studies on the CP effects that are also confirmed by our research results speaks in favour of the inclusion of the CP as an educational programme in all high schools in Serbia.

The beneficial effects of the programme are based on a standardized training method that combines practical and theoretical teaching, which spontaneously develops students' engagement and alleviates the problem of insufficiently, or inadequately, trained entrepreneurship teachers. An additional quality is that the CP programme is implemented in cooperation between the business and education sectors, naturally connecting the two sectors, which may further contribute to reducing the lagging of the education system behind the needs of the economy.
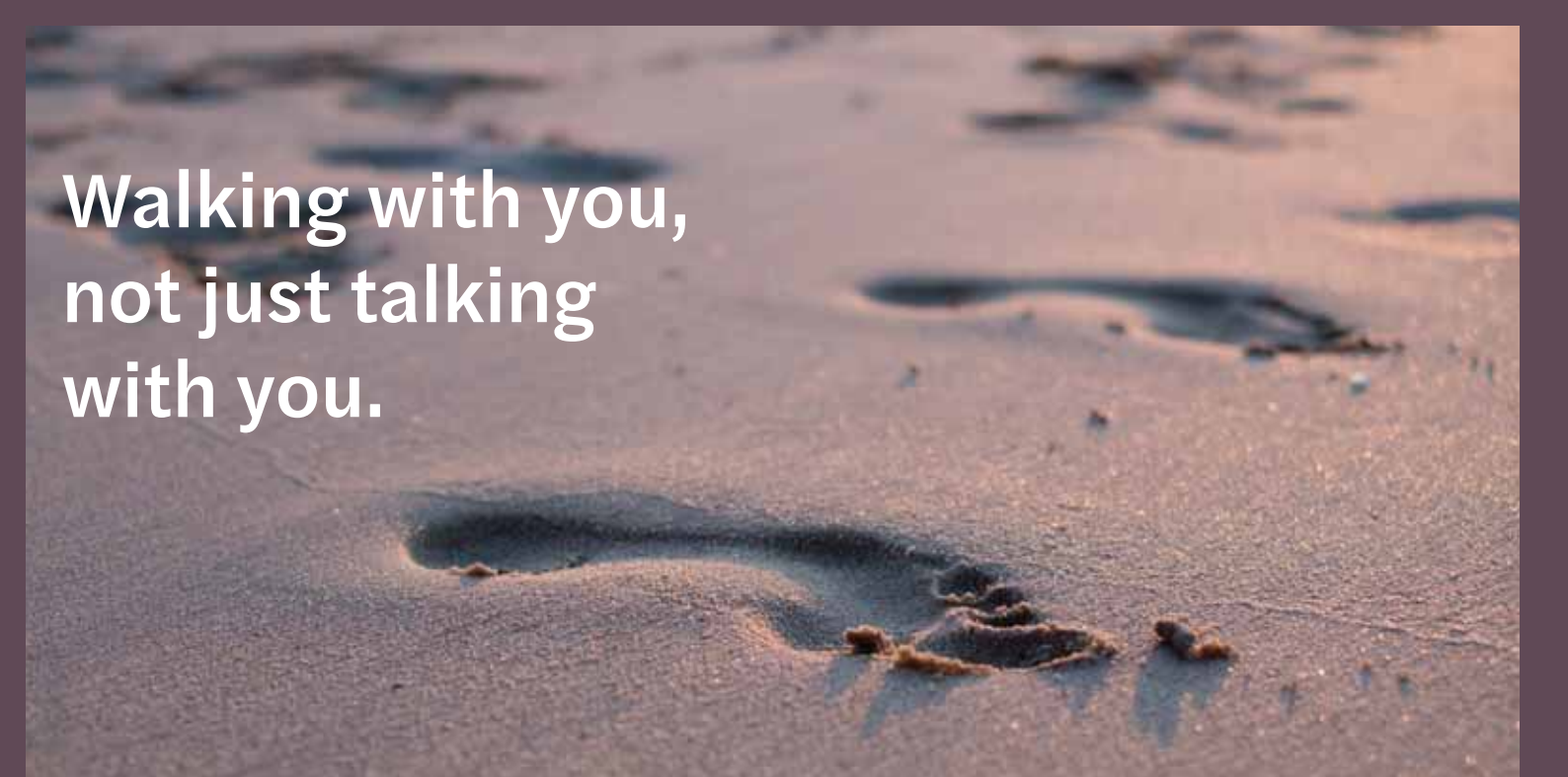
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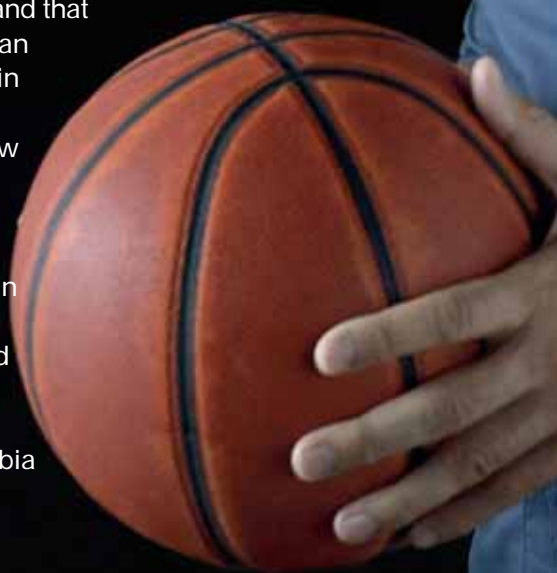
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National Cashless Payment Initiative is a joint project between the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Mastercard and Visa, implemented within the develoPPP programme of the German Federal Ministry for Economic Cooperation and Development (BMZ) in partnership with NALED and the Ministry of Finance of the Republic of Serbia.

The National Cashless Payment Initiative is aimed at creating better conditions for the development and encouragement of usage of all types of cashless payment in the private and public sector.

The backbone of the project is the Support Program for Introduction of Cashless Payments (POS Programme) for small merchants and institutions that have not accepted card or instant payments so far, and among the priorities are the improvement of the regulatory framework in this area, raising awareness of citizens and businesses about a cashless society.

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