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SCIENCE, EDUCATION,  
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## THE CONTRIBUTION TO THE MAKING OF THE NEW INDUSTRIAL POLICY OF SERBIA

*Slavka Zeković<sup>3</sup>*

### Abstract

This paper explores the economic and industrial development in Serbia, and the possibilities for their recovery based on the framework of the Fourth Industrial Revolution (4IR). The paper has two aims: first, to provide a brief review of the economic development in Serbia; and second, to give some recommendations for the re/neo-industrialization strategy or the Strategy Smart Specialization (S3) in accordance with the new European industrial policy (based on the 4IR and regional innovation systems - RISs). An analytical and conceptual framework has been applied for the understanding and improvement of a new industrial policy by S3. Research is based on the preliminary use of a data-driven approach in a multi-dimensional framework related to the 4IR. The future Serbian S3 should identify the strategic areas for intervention and promote the creation of innovative products and services in several domains. Some recommendations are also given for the preparation of S3 in line with the innovation-led growth. The new Serbian economy based on S3 should support sectoral modernization, competitiveness, and effective transformation in accordance with the requirements of the 4IR and the real possibilities for their implementation.

*Key words: New industrial policy, Strategy smart specialization, Fourth Industrial Revolution, regional innovation system, Serbia*

### Introduction

After the global financial crisis (2008), there was renewed interest in the empowerment of Industrial Strategy in Europe. According to the Eurostat data (2019), the European economy was to recover its growth to the pre-crisis level by 2016, but with a wide productivity gap compared to other leading economies. Therefore, a new industrial strategy was considered as the main vehicle through which the gap in competitiveness could be reduced, economic growth and well-being improved, [1,2] and a civilization jump could be made [3]. Pitelis [4] indicated that the industrial strategy supports sector interdependences between manufacturing and services and it contains the “measures to enhance the outcome of firms, sectors, industries, and clusters towards a desired objective”. These measures

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include support for “start-up” industry, science and technology policies, human development, state procurement, regulation, anti-trust policy, merger policy, foreign direct investment, intellectual property rights, distribution of finance, regional policy and industrial clusters [5].

Since the Lisbon strategy (2000), the industrial strategy in Europe applied the “horizontal” approach to policies until 2010, e.g. the creation of supra-national and national competitive conditions for growth and innovation by regulating different rules, competition policy, human capital, etc. In the focus of the Lisbon strategy was the territorial-based approach to improve industrial competitiveness, regional innovation, networking links, knowledge transfers, etc. [6]. The policies of some EU countries specialized in innovative value creation activities (i.e. research, design, marketing, logistics), with the manufacturing of commodities from low-cost emerging economies, resulted in unaffected and non-captured “created value” within the EU [7]. Also off-shoring forms can attract more innovation-intensive sectors and lessen the innovation capacities and “created value”.

According to the Europe 2020 strategy, the EU industrial strategy has changed its approach towards more “vertical” coordination. The EU Innovation program and Cohesion policy 2020 have included the so-called “smart specialization strategies” (S3) as their main component, with mandatory adoption at national level in all member states [8]. All EU countries should adopt the national S3 until 2020. Also the S3 are presented as “research and innovation strategies for smart specialization”.

The main challenges of the European economy and industry can be weak growth, competitiveness, socio-economic inequalities, digitalization, a new technology, the creation and capture of a new value, which should be retained in domicile territories as the base for innovative, sustainable, inclusive, and more balanced growth. The new industrial strategy of the EU, based on the framework RIS3, a concept of the 4IR, globalization 4.0, and Horizon 2021-2017, can be used for improving structural weaknesses, competitiveness, increasing innovative, sustainable and inclusive growth. Pyke [9] stated that the inclusive growth is better achieved by policies that include promoting effective partnership forums, social protection, decent working conditions, labor regulatory frameworks and active labor market initiatives. The new technology can transform the existing industrial structures, open competition issues, education, new skills, regulation and global governance. The global contextual framework and rapid technology progress (by 4IR) deeply change the essence, the scope, skills, cooperation, and the allocation of future sustainable development. This requires a new perspective for the creation of an industrial strategy which should take into account the main challenges at all levels, especially in developing countries.

### **The economic development of Serbia in the post-socialist period**

The political and socio-economic crisis in Serbia and the collapse of its economy in the post-socialist era (1990s) were initiated by endogenous and exogenous circumstances (the disintegration of SFRY, wars, UN sanctions and isolation, excessive damage to infrastructure and industry by NATO bombing). From the 1990s, under the neoliberal agenda, the post-socialist “transitional Odyssey” started, which included: 1) Economic transformation from a self-management socialist



economy into market economy (etatization, privatization, marketization, liberalization, deregulation) and 2) Post-Fordist development (domination of the service sector, weakening of industry and dynamic growth of the so-called “creative” economy). Transitional recession has caused strong de-industrialization, negative industrial growth with a decrease of its role in the economic development (to 15.1% of the GDP in 2017), as well as a drastic drop in macro-economic indicators (Figure 1). The privatization of company assets in Serbia was unsuccessful in 25% of the companies that were sold, with a substantial number of bankruptcies as well.

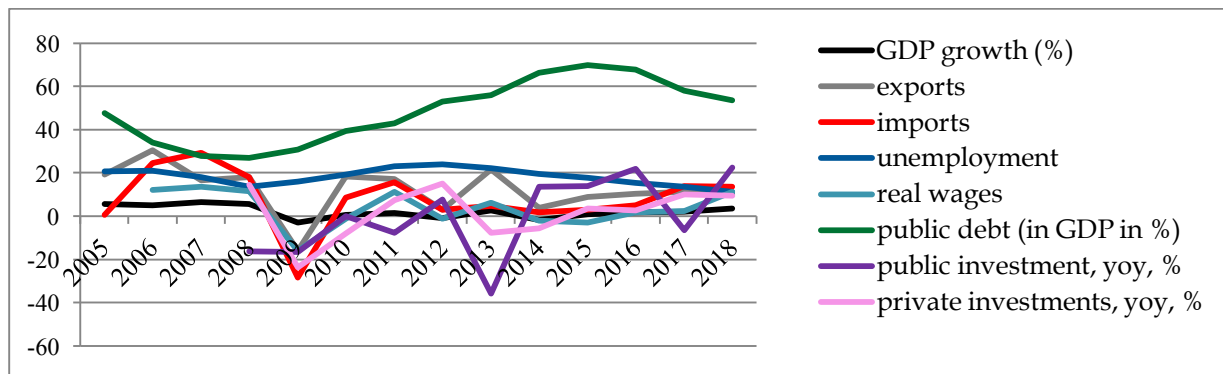


Figure 1: Macro-economic indicators in Serbia in the period 2008-2017.

Source: National Bank of Serbia and SORS data (2005-2018)

The slow and unfinished economic reforms in the post-socialist period have not been able to solve the majority of long-term problems that Serbia has been facing. This has resulted in poor economic development, mainly in the form of *jobless growth*. It also led to an increase in unemployment (earlier up to 20%, now 12%), poverty, slow level FDI, the growing precariat, the impoverishment of the greater part of the population, high share of the “gray” economy, tax evasion, territorial imbalance (2/3 of GDP in the metropolitan areas of Belgrade and Novi Sad), and undermined territorial capital. The economic and social problems, de-industrialization, the impact of the global economic and financial crisis and a lack of modernizing potential led to the deepening of the development gap in Serbia.

There was divergent economic growth from 1990 to 2017, with a loss of one million jobs in the industry a huge brain drain and the *dead cat bounce effects* of economy with a weak *bounce back ability* (the capacity to recover quickly from a setback). There are two phases of economic development: 1) *Transitional economic recession* with a negative GDP (-6,3%) from 1991 to 2000, which characterized the so-called “growth without development” [10], and 2) *Slow recovery after 2000* with the selective and weak restructuring of real economy and different economic growth before and after the global crisis.<sup>4</sup> The growing economy after 2000 was characterized by *jobless growth* as a phenomenon of a growing economy, but without an increase in jobs.

From 2000 until now, there has been a strong diversity in the dynamics of the economic growth: a) *Fast GDP growth* with an average of 5.4% (2001-2008); b)

<sup>4</sup> The global crisis impacted strongly the decrease in GDP; the increase in public debt, low investments, lost jobs, etc. At the end of 19th century “Serbia is the only country in Europe without public debt”, *New York Times* (22, July, 1876)



*Slowdown in growth* after the 2008 global crisis with an average GDP growth of ~ 0.6% in the period 2008-2015 (and very negative - 6% in 2009); c) *Weak recovery of economic growth under prolonged overall crisis* with the GDP growth of 2.8% and 2% from 2016 to 2017, and the expected growth of GDP of 3.5% in 2018. The real Serbian GDP today is around 60% of its level in 1989.

In the current post-socialist economic development of Serbia there are a few types of economies: 1) Post-Fordist economy, 2) creative economy (fast-growing), 3) traditional (non-privatized enterprises), 4) the new private SMEs and privatized former social/state-owned enterprises, 5) “gray” economy, 6) precarious economy, 7) innovative (digital, usually medium hi-tech, low-tech), and 8) off-shore economy. The brief analysis of the current economic development of Serbia has indicated: low total employment rate; slow employment recovery; increase in precarious economies and the precariat; relatively high rate of unemployment; investment growth; slow recovery living standards; positive changes in some indicators (see Figure 1). The important features of economic development are low competitiveness; a new, not fully-established competitive private sector; inadequate level of entrepreneurship; insufficiently developed mechanisms for coordinating policies and strategic projects; weak institutional and technical capacities of the enterprises to accept innovations; limited institutional and human capacities and narrow maneuver possibilities to support the economy.

The current *Strategy of long-term industrial development of Serbia until 2020* was harmonized with the European industrial policy and the EU 2020 Strategy. Although, in Serbia, there are 1,060 different strategic development documents at all spatial levels, an implementable “exit strategy” from the long-term economic problems has not yet been established. This strategy is also important because of the prolonged crisis and grim predictable development prospects. This preparation requires the renewal of strategic research, planning and governance, in accordance with the need of establishing a new global regulatory framework based on the 4IR. Deindustrialization in Serbia led to the problems of increased unemployment, balance of payment deficit and non-sustainable development, which became more serious during the global crisis. The collapse of the industry as the “Achilles heel” of economy was accompanied by weak re-industrialization in several cities in Serbia. During the 1990s, there was a substantial drop of the GDP and industrial growth. On the contrary, from 2000 until the global crisis (2008), Serbian average GDP growth was 5.4%, while the average industrial growth was lower (Figure 2). The decline in industrial growth and employment was deeper than in the other sectors.

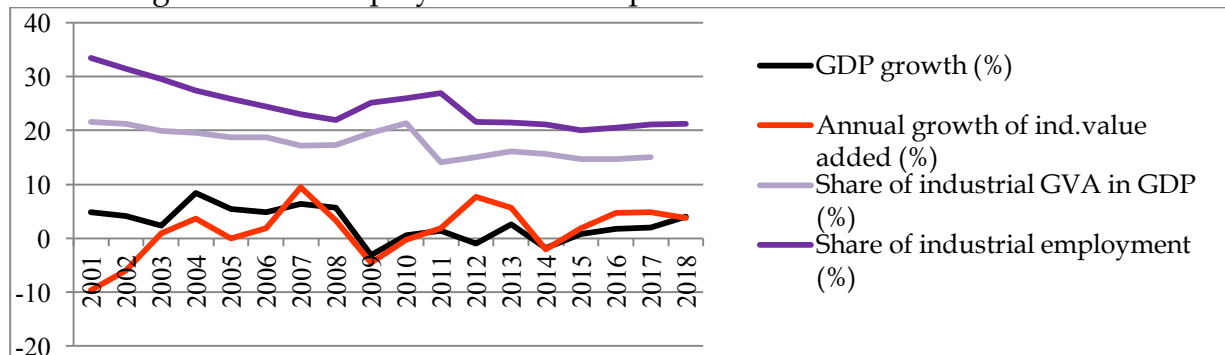




Figure 2: Dynamics of GDP growth, growth of industrial GVA, share of industrial GVA in the GDP and industrial employment (p.a. in %)

Source: National Bank of Serbia (2019)

<https://www.nbs.rs/internet/english/80/index.html>, WB (2019)

<https://data.worldbank.org/indicator/NV.IND.TOTL.KD?locations=RS>,  
Statistical Yearbook of Serbia (2002-2018), Republican Statistical office of RS

Today, 444,888 employees are engaged in Serbian industry. About 19% of the total number of companies is registered in the industry. The majority of them are micro-sized (> 80%). In the creation of the GDP in 2017, the industrial GVA was 15.1% and agriculture 6%, while services have a share of more than 70%. The GVA of industry in the total GDP decreased during the transition (Figure 2) (the average in the EU-28 was 25% in 2017). Additionally, the share of industry in total employment decreased. Development of private SMEs was not fast enough to absorb the increasing unemployment. The SMEs are also the backbone of the European economy (99% of the overall economy) and require huge investment due to the fact that 4IR favors large enterprises or MNEs (due to their substantial concentration of means for the research).

## **Industrial development in the Fourth Industrial Revolution**

Research regarding the concept of regional innovation systems (RISs) started in the 1990s. This concept has become the core framework within the strategic documents for European economic development from 2013 to 2020. This paper has applied an analytical-cum-conceptual framework for the understanding of the new industrial policy with the ongoing 4IR, which is only an initial step in facilitating the application of a holistic, multidisciplinary and coordinated approach to the making of an industrial strategy. The 3S, rooted on RIS, characterizes a place-based approach to support specific leading activities, and a technology based on regional economic potential for innovation, knowledge, entrepreneurship, i.e. on the prosperous or propulsive regional capacities and assets as factors of a new development. This coincides with the emergence of the 4IR. The 4IR opens new technological options for economic growth, which are important for the making of S3.

The future Serbian industrial strategy should include the current S3 policy and the global principles and requirements of the 4IR. Bearing in mind the contextual factors, the key aims of Serbian industrial strategy (as S3) should be the identification of the strategic areas for intervention, support, and promotion for creating innovative products in several domains and regional areas, and the adaptation of real concepts of industrial development to the 4IR. Our analysis is based on the preliminarily used data-driven approach in a multidimensional framework related to the 4IR and globalization, and the place-based approach that characterizes the S3. The concept of the 4IR includes integration, computer generated product design and the compounding effects of multiple “exponential technologies”, such as artificial intelligence (AI), the Internet of Things (IoT), machine learning, biotechnologies, genetics, nanotechnology, robotics, 3D printing technology for prototyping, and fusion of technology. Future jobs in these sectors are expected to dominate in the



next decades. The 4IR extends the paradigm into the future because many of the current industrial elements will no longer exist (such as fixed and centralized factories, huge number of employed in large enterprises). The most-familiar exponential technology is the increase in computer power. Penprase [11] indicates that the 4IR will place a premium on intellectual capital and incapacity for collective thought. The 4IR involves complete transformation of production, management, and governance [12]. The 4IR has tremendous speed, wide scale, complexity and transformative power in relation to the previous industrial revolutions [13]. This speed can also cause volatility in the financial systems and their possible collapse. A significant role in the 4IR strategy at all territorial levels can be expected from the aggregate and allocative effects of liberalization of the international capital flows, i.e. financial globalization [14] and the unknown effects of new investment platforms. Forty-five percent of all existing work activities will be automated by the currently existing technologies [15]. This will allow the companies to save and create new types of jobs as well.

*Challenges of 4IR* are numerous: greater income inequality; cyber-security; data hacking; risk assessment; potential for disrupting labor markets (automation substitutes the labor, the job market may become increasingly segregated); replacement of workers by machines; low-skilled and low wage jobs will be replaced by digitalization; ethical issues, etc. The specific challenges are disembodiment, artificial intelligence, technological unemployment and use of “responsible innovations” [3]. These challenges are faced with growing ecological constraints and rising economic and social inequality. The improvement of the working, living and social conditions depends on the timely establishment of a new global framework and adjustment of all types of governance: corporate, national, local, and international. Schwab [16] warned that open markets and increased competition produce winners and losers in the international arena, and that it could have a more pronounced effect on inequality at national level. He indicated the growing division between the precariat and the privileged that would be reinforced by 4IR business models, which often derive rents from owning capital or intellectual property. These challenges can be seen as the signs of the setup of a new globalization phase. Wolf [17] argued that increased dichotomy may lead to higher social tensions. Brynjolfsson et al. [18] considered people who create new ideas and innovations to be the most valuable resource, not workers or investors. The fusion of technologies blurs the lines between the physical, digital and biological spheres, and it creates new markets and opportunities for all actors in the innovation [12].

*The concept of 4IR* imperatively includes increasing the knowledge intensity of value creation and a growing innovation-driven economy, which requires new global norms, standards, and policies. It will shape the future development, education, economy, and society by highly dynamic, digitized, dematerialized, individualized, disruptive manufacture and service industry processes. The future technologies have to fulfill a social purpose - improvement of living conditions. WEF [19] has defined the tipping points at which the technologies of the 4IR will become widespread enough to create massive societal change. These tipping points include the proliferation of 4IR technologies to levels where they make significant impacts on lives, quality of living, the business environment, employment, consumer





expectations, product quality, different stakeholders and non-state actors, organizational, urban and social innovation. Although the 4IR will bring deep and rapid changes to the society, in all economic sectors, and everyday life, the exact impacts of such technologies are still unknown, unexplored, unpredictable, and uncertain. The 4IR should respond to different political and social tensions that would be caused by a rapid spread of technological innovations. Furthermore, what is emphasized here is the paradox of those technologies that simultaneously increase the democratization, but also further centralization of wealth, political power and influence. For example, the specific and very important issue is the relation between autonomy, free will, and genetic vs. social determinism, as well as the preservation of freedom, human rights and consumer rights. The nature of social relations and interactions – nation, society, social media, social groups, individuals and global world, as of all their identities, values and loyalties are shifting rapidly due to globalization. Understanding the new 4IR technology is vital, especially in developing countries. The 4IR have to emphasize the dependence of each developmental issue to global scales and social, economic, financial, physical and environmental dimensions of a problem. There are globally diversified markets with “hundreds of thousands of transactions and information exchanges take place at the speed of light within the space of a microsecond” [20].

The 4IR requires strong transformations in the system of education everywhere. The societal changes from the 4IR will require greater capacity for ethical and intercultural understanding, adaptation to all issues raised by technologies and their disruptions to society [11]. The education for 4IR should include a strong integration of ethical thinking, intercultural awareness and critical thinking into the application of exponentially developing technologies. The 4IR highlights adaptability, self-directed learning and thinking, updating skills and knowledge. The education strategy for the 4IR should include a deep consideration of the global, human and spatial conditions, the ways in which new technologies and shifting economic power impact on people at all socio-economic and territorial levels, and the threats that exist within an interconnected world. The 4IR will foster interpersonal skills and promote the interdisciplinary and global agenda (in different contexts), as the hallmarks of future 4IR workplaces. The key hallmark of the 4IR is exponential growth, rapid changes and various social, economic, financial and other uncertainties. Education and a new institutional framework should be developed to respond to the changes, the complexity and volatility of employment.

### **Main expected shifts in 4IR and production platforms**

In the 4IR, we can expect the transformation from the existing mainly vertical form of asset ownership toward the establishment of horizontal production platforms. The platforms can be classified in different ways, but usually are as informational and physical. The first one includes data sharing, while physical platforms foster the sharing of physical assets by handling the technologies and flows at lower costs. There are several kinds of production platforms, e.g. *regional platforms for sustainable manufacture; community-based on-line platform* (access to products and services to all or just to citizens); *production and distribution chains; investment platform; digital platforms*



of marketing, sales, and distribution (for producers and competitors with easy access due to the improvement in the quality and price of products); *consumer platforms*; *co-working or freelancing platforms* (freelance jobs for entrepreneurs and “work-from-home” workers); *peer-to-peer lending platforms* (companies for individual lending of money to other individuals). The investment platform includes the facilities which pool risk projects by territory or sector; share risks; attract investors and unlock funding of individual projects. The platform combines sources of funding.

The 4IR production platforms should facilitate companies to meet new market demands by mixing digital and physical assets, as well as various producers, owners and consumers. The platforms provide the connection between them based on digital infrastructure, e.g. machine learning cloud-based platform for prediction, projections, demand forecasting and optimization of inventory, by different categories of products, countries, supply channels and distribution. The entry of 4IR production platforms will transform the products, ways of creating values and services. The main expected shifts include [21]:

1. *Transformation from ownership of assets toward orchestration.* Manufacturers will rely on the ability of the platform outside the company to create innovative products, which are opposed to the traditional possession and effectiveness of large business assets. It is expected that skills have to be transferred from the management of large companies toward the agile orchestration of smaller pressures on companies.
2. *From linear flows to the networks.* Consumers are not only seen as end-users of the product, but also as actors in the supply chain, from defining the products to their delivery and services. The roles between the suppliers, manufacturers, distributors and consumers will become more blurred.
3. *From the highly established control toward reduction of power.* Shifts in the management of key performance indicators (digital control, command) toward decentralized, less powerful teams that allow agile decision-making and behavior.
4. *From the internal rate of return (IRR) toward funding venture capital.* Traditional corporate IRR based on access to venture capital investments in stages can be transformed to the strategic opportunity cost without new business models.

The bases for the development of 4IR production platforms are trust, reeducation and data security. In addition, for the production platforms it is necessary to have new regulations, research, digitalization, IT infrastructure, fast Internet access, IT security, as well as the transformation of all education levels toward new skills (IT, software, programming, cloud-computing). The implementation of the production platforms should help companies to: effectively react to the growing demands of the consumers; increase new supply chains; harmonize labor and asset capacities with the rapid changes in market realities, and have more sustainable impacts in the supply chains. Regional platforms for sustainable manufacture should offer support to new products and new collaborations for competitiveness and sustainable growth.

### **Some recommendations and conclusions**

Without growing industrial technologies economic competitiveness would be impossible anywhere. The development of the 4IR and future-oriented regulatory policy is needed with the “extra-territorial” dimension of data (“cyber-world”), but



with clear economic performance, social responsibility and sustainability as well. This is different from the existing regulation, which has territorial boundaries. The existing processes and institutions cannot be functional for a new development, because society mainly is not ready for change. Institutional redesign is essential for the 4IR, i.e. a new global framework for planning and governance of a new economy. This includes: 1) a new approach of the new economy to playing “games” (non-zero-sum logic games vs. zero-sum games); a zero-sum game is a strictly competitive game, while non-zero-sum game can be either competitive or non-competitive, 2) faster development of governing and control mechanisms (“over a distance”) in terms of a fully-networked society and support of a “zero-friction” society (by high technology, ICT), and 3) improving neo-institutional and other theories. Development 4IR means avoiding the dichotomies (open trade and protectionism; technology development and jobs; growth or equity) over the developmental policies that favor “and” over “or”, allowing parallel implementation of various interests. The new technology can help in the solving of conflicting interests and priorities, achieving trade-offs, and harmonizing new values that are a part of 4IR. In conclusion, we point to the complexity of a new global framework for the future industrial development based on the 4IR and S3, especially in a post-socialist context [22]. This context implicates unpredictable economic trends, impacts and consequences at all territorial levels. A new Serbian economy should support industrial modernization, competitiveness and transformation in accordance with the requirements of the 4IR, and real possibilities for their implementation [23]. Consistent with globalization and 4IR, a new industrial policy of Serbia would be a vehicle for overcoming the crisis and supporting a more sustainable development. One example can be the Chinese “Belt and Road Initiative”, which should increase the development activities, and bring extremely large changes to the nations involved (also for Serbia) – potentially as the regional coordinated framework or platform to an innovation-led growth. Serbian industrial structure can be slowly and partially upgraded. The paradigm of the 4IR includes support to the innovative, hi-tech, green, low-carbon and circular economies. For the preparation of Serbian S3 in line with an innovation-led growth, should apply the “resilient” concept of reindustrialization because of the possible and expected implications such as the *de-growth*, *sacrificed growth*, *deceptive growth*, and *jobless growth*. Also, Serbia and SEE countries have adopted a common SEE 2020 Strategy with the focus of the mainstream economics on digitalization and hi-tech in their service sectors, without industrial development [24]. It remains a conundrum how SEE countries can achieve fast growth in the global race, especially among industries.

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