

THE CHALLENGES OF THE NEW INDUSTRIAL POLICY AT THE THRESHOLD OF THE FOURTH INDUSTRIAL REVOLUTION

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Paper presented at the 7th International Scientific Symposium „EkonBiz: Modern business in the function of the development of the national economy“, Bijeljina, 20-21st June 2019.

Abstract: *The process of industrialization has gone through three stages that have been described as Industrial Revolution. We are currently at the threshold of the Fourth Industrial Revolution that will fundamentally change the way we live and work. We still do not know how this will unfold exactly, but one thing is clear: the answer to it must be integrated and comprehensive, including all stakeholders in global politics, from the public and private sectors to the academic community and civil society. The speed of current technological discoveries compared to previous industrial revolutions cannot be measured. The breadth and depth of these changes affect the transformation of the overall production and management systems. This paper aims to present the main characteristics of Industry 4.0 and describe how they affect the creation of new industrial policies in countries around the world.*

Key words: *Fourth Industrial Revolution, industrial policy, artificial intelligence, globalization.*

1. INTRODUCTION

Industrial policies have become all-pervading. UNCTAD's Global Industrial Policy Survey has shown that, at least 101 economies, in both developed and developing countries (accounting for more than 90 percent of global GDP), have adopted formal industrial development strategies

over the past 10 years. The last five years have seen an acceleration in formulating new strategies.

Apart from that, the new industrial policies are a key driver of investment policy practices. In fact, more than 80 percent of investment policy measures recorded since 2010 are directly integrated into the industrial system (manufacturing, complementary services and industrial industry) infrastructure, and approximately half of them serve industrial policy purposes.

Research has shown that contemporary industrial policies are increasingly complex, address new topics and include a myriad of goals beyond conventional ones relating to industrial development and structural transformation, such as integration into the global value chain, the development of knowledge-based economy, the construction of related sectors with sustainable development goals and competitive positioning for the Fourth Industrial Revolution. Like the revolutions that preceded it, the Fourth Industrial Revolution has the potential to raise global income levels and improve the quality of life of populations worldwide. To date, those who have benefited most from it have been consumers who could afford to enter the digital world; technology has enabled new products and services that increase efficiency and meet our needs. Ordering taxis, booking flights, buying products, paying, listening to music, watching movies or playing games - all of these can now be done remotely. In

the future, technological innovation will lead to the improvements in the supplies, with long-term benefits in efficiency and productivity. Transport, communications and trade costs will decrease, logistics and global supply chains will become more efficient, opening up new markets and boosting economic growth

2. The Fourth Industrial Revolution

The first industrial revolution stems from the introduction of machines into production processes and from the specialization of workers to perform the specific work tasks they have performed consecutively. This transformation led to another mode of production (machine production). Further specialization characterized the second industrial revolution, which led to the third mode of production (mass production), in which the production process was segmented into elementary tasks that low-skilled workers could perform in series. This production system was started by Henry Ford in 1913. This regime provided economies of scale. Homogeneous products were produced on a large scale, which had a low cost but little opportunity for differentiation. During the 20th century, the possibility of product differentiation was introduced into the mass production system by increasing the number of

factories producing different types of products. The first industrial revolution used water and steam to mechanize production. Another used electricity to create mass production. The third used electronics and information technology to automate production. Now the Fourth Industrial Revolution is being built on the Third, a digital revolution that has been going on since the middle of the last century. It is characterized by a combination of technologies that blur the lines between the physical, digital and biological spheres. There are three reasons why today's transformations are not only an extension of the Third Industrial Revolution, but the arrival of the Fourth: the speed, the scope and the impact it is having on the system. The speed of current discoveries has no historical precedent. Compared to previous industrial revolutions, the Fourth is developing at an exponential rather than linear pace. Moreover, it disrupts almost every industry in every country. And the breadth and depth of these changes herald the transformation of entire production and management systems. Compared to previous industrial revolutions, the Fourth is moving at an exponential rather than linear pace. In addition, it reflects on all industries and every country.

Table 2.1. Main Features of Industrial Revolutions

Period	Transition Period	Energy Resource	Main Technical Achievement	Main Developed Industries	Transport Means
1760-1900	1860-1900	Coal	Steam Engine	Textile, Steel	Train
1900-1960	1940-1960	Steam Engine	Internal Combustion Engine	Metallurgy,	Train, Car
1960-2000	1980-2000	Nuclear Energy Natural gas	Computers, Robots	Auto, Chemistry	Car, Plane
2000-	2000-2020	Green Energies	Internet, 3D Printer, Genetic Engineering	High Tech Industries	Electric Car, Ultra-Fast Train

Source: Xu, M., David, Kim, J. (2018), The Fourth Industrial Revolution: Opportunities and Challenges. *International Journal of Financial Research*, Vol. 9, No. 2.

Leading researchers have argued that the Fourth Industrial Revolution will shape the future through influences on governments and jobs. People have no control over technology or the disruption that comes with the Fourth Industrial Revolution. However, what we can foresee are the potential opportunities that come with it: 1) lower barriers between inventors and markets, 2) a more active role for the artificial intelligence, 3) integration of

different technics and domains (fusion), 4) improved quality of life (robotics) and 5) the connected life (internet). The development of digital technologies, along with other key advanced technologies, is changing the way we design and produce products and related services, and thus the way we market them and create value from them. Due to advances in technology, in the field of Internet of Things (IoT), 5G technology,

cloud computing, data analytics and robotics, products, processes and business models are changing across sectors, with the shift of global value chains leading to the emergence of new industrial patterns. The forthcoming challenge for the industry is to take full advantage of these digital capabilities, which will later lead to an overall increase in living standards. (COM (2016) 180 final (2016). Digitising European Industry, Reping the full benefits of a Digital Single Market.

Brisel: European Commission. Page. 2.) As digital technologies consisting of hardware, software and network components become increasingly sophisticated and integrated, their impact on society also increases, and their role in the global economy becomes increasingly important. The World Economic Forum provided a forecast of the changes expected by 2025 and the likelihood of their realization.

Table 2.2. Changes Forecast by 2025

	%
10% of people wearing clothes connected to the internet	91.2
90% of people having unlimited and free (advertising-supported) storage	91.0
1 trillion sensors connected to the internet	89.2
The first robotic pharmacist in the US	86.5
10% of reading glasses connected to the internet	85.5
80% of people with a digital presence on the internet	84.4
The first 3D-printed car in production	84.1
The first government to replace its census with big-data sources	82.9
The first implantable mobile phone available commercially	81.7
5% of consumer products printed in 3D	81.1
90% of the population using smartphones	80.7
90% of the population with regular access to the internet	78.8
Driverless cars equalling 10% of all cars on US roads	78.2
The first transplant of a 3D-printed liver	76.4
30% of corporate audits performed by AI	75.4
Tax collected for the first time by a government via a blockchain	73.1
Over 50% of internet traffic to homes for appliances and devices	69.9
Globally more trips/journeys via car sharing than in private cars	67.2
The first city with more than 50,000 people and no traffic lights	63.7
10% of global gross domestic product stored on blockchain technology	57.9
The first AI machine on a corporate board of directors	45.2

Source: World Economic Forum. (2019). *Deep Shift Technology Tipping Points and Societal Impact*. WEF: Geneva, p. 7.

3. Challenges of New Industrial Policy in the Coming Period

Over the last decades, industrial policy literature has been steadily increasing (Rodrik, 2004, 2008; Chang, 1994, 2010; O'Sullivan, 2013; Bianchi and Labori, 2006, 2011; Bailei, 2010; Stiglitz and Lin, 2013; Noman and Stiglitz, 2016). The literature is primarily empirical, analyzing the industrial policies implemented by developed countries at

different periods to derive recommendations for developing countries (Amsden, 1989; Vade, 1990; Lall, 2006; Cimoli et al., 2009).

The meaning of the term „industrial policy“ has changed a lot over time. Until the 1980s, it was about state intervention policy, direct government control of a large part of the manufacturing apparatus, and a set of public actions aimed at limiting market size and controlling productive

organizations. The period during the 1980s and early 1990s was a period of gradual decline in state intervention in which the concept of industrial policy was almost satanized by supporters of liberal economic policy. Today, the term industrial policy refers to policies implemented by a large number of institutional entities with the aim of stimulating the creation of firms, favoring an increase in their number, promoting innovation and competitive development in the context of open law (Savić, Lj., Lutovac, M. (2017). New Concept of Industrial Policy in the European Union. *Economic Ideas and Practice, No. 25*, Faculty of Economics, Belgrade, p. 6.). Given that one of the causes of structural change is international trade, industrial policies are sometimes called policies that "defy" the country's comparative advantage and develop their "latent" advantages. It should be noted that these definitions include measures that are not specifically (or only) directed at industry or production. Industrial policy can actually target other sectors from which the government expects high growth potentials, such as non-traditional agricultural products or high value-added services such as software development. For Rodrick,

industrial policy aims to "encourage specific activities and promote structural change. (Savić, Lj., Lutovac, M. (2019). Industrial policy and state incentives in Serbia. *Business Economics*. Belgrade: Serbian Association of Economists. Str. 261.) They also include vertical policies targeting specific industries but to a lesser extent. A review of industrial policies over time indicates that recent policies rely heavily on an expanded range of support measures and instruments aimed at improving infrastructure, education and training, enterprise development, cluster and link building, entrepreneurship, innovation, access to finance and social policies. This reflects a shift in the scope of industrial policies, compared to those previously used in the context of import substitution. Significant economic, technological and political changes that have taken place in the world economy have caused in firms the need for restructuring and adapting to new market conditions. Thus, new industrial policies span the range that encompasses inclusion in the global value chain, a knowledge-based economy and sustainable development principles. In the we see the evolution of industrial policy

Table 3.1. Evolution of Industrial Policy

	Until the 1970s	1980s–1990s	Modern industrial policies	
			2000s and ongoing	Recent/emerging themes
Key features/ themes	<ul style="list-style-type: none"> Industrialization and structural transformation 	<ul style="list-style-type: none"> Stabilization, liberalization, laissez faire 	<ul style="list-style-type: none"> Knowledge economy GVCs 	<ul style="list-style-type: none"> NIR Sustainable development
Policy goals	<ul style="list-style-type: none"> Creating markets, diversification 	<ul style="list-style-type: none"> Market-led modernization 	<ul style="list-style-type: none"> Specialization and increased productivity 	<ul style="list-style-type: none"> Modern industrial ecosystem development
Key elements	<ul style="list-style-type: none"> Import substitution Infant industry protection Sector development Gradual and selective opening to competition 	<ul style="list-style-type: none"> Limited government involvement More horizontal policies FDI opening Exposure to competition 	<ul style="list-style-type: none"> Targeted strategies in open economies Enabling business environment Digital development (IT) and ICT diffusion Participation in global production networks FDI promotion combined with protection of strategic industries SME support Skills development 	<ul style="list-style-type: none"> Technical capabilities development Innovation in production (OT) Learning economy SDG sector development Public-private knowledge/tech development institutions Acquisition of foreign technology Entrepreneurship development
Policy environment	<ul style="list-style-type: none"> High political legitimacy for national development strategies 	<ul style="list-style-type: none"> Low political legitimacy for interventionist development strategies Limitations to policy space through international commitments 	<ul style="list-style-type: none"> Regained legitimacy for national development strategies Moderate policy space in selected areas 	<ul style="list-style-type: none"> More policy space in new fields More emphasis on inclusiveness

Source: UNCTAD (2018). World Investment Report 2018, Investment and New Industrial Policies. United Nations: New York and Geneva. p.130.

Recently, digital transformation has been the technological driver of modern industrial policies. An increasing number of countries are adopting policies explicitly linked to the new industrial revolution - the implementation of new digital technologies. Faced with the challenges of digitalization, all industrial sectors can take advantage of digital technologies for professional markets such as automotive and energy, healthcare, telecommunications equipment, business software and advanced manufacturing. In some areas, progress has to be made, in particular in the area of small business investment in ICT, digital consumer product offerings and web services. The high-tech sectors in Europe are at a relatively advanced stage when it comes to the introduction of digital innovation, with much of the non-tech industries still lagging behind.

A framework needs to be established in order to coordinate national initiatives in the field and relevant policy measures, including investments in digital innovation and infrastructure, accelerating the development of ICT standards, examining regulatory conditions and adequate workforce, including the acquisition of new skills. The same challenges and opportunities apply in the area of eGovernment and enhancing the role of the public sector.⁶

The goals of industrial policy have started to include the goals of sustainable development. They are reflected in the regulatory framework in which industrial firms operate, and in the choice of sectors that industrial policy will support. Some countries have explicitly focused on the sectoral development of a new, clean energy industry. New industrial policy incorporates sustainable development goals linked to inclusive growth and the impact of advanced manufacturing technologies on employment. Inclusive and sustainable industrial development is included in the global development agenda and the role of industrialization as a driver of development is emphasized.

Goal 9 (*Sustainable Development Goal-SDG9*) refers to: „Building adaptable infrastructure, promoting sustainable industrialization and fostering innovation.“⁷

⁶ COM (2016) 180 final (2016). Digitalization of European Industry, Harnessing all Benefits of the Digital Single Market. Brussels: European Commission, p. 2-3.

⁷ <http://www.rs.undp.org/content/serbia/sr/home/sustainable-development-goals.html>, accessed on 5.9.2019.

CONCLUSION

The main characteristic of modern economic growth is continuous industrial upgrading and structural changes. Industrial upgrading and diversification are essential for development. They gradually enable developing countries to align with developed countries and create the conditions for better jobs, poverty reduction and a better standard of living. To facilitate upgrading in these sectors, developing countries should use industrial policy to improve their industrial production and reach global supply chains by relying on strategic sectors.

We have recently entered the era of the Fourth Industrial Revolution, which differs in speed, scope, complexity, compared to previous revolutions. As the industrial revolutions ranged from the mechanization of production in the first industrial revolution, through mass production in the second, to the automation of production in the third, the standard of living of most people around the world has greatly improved.

Undoubtedly, the technological advancement stemming from the latest industrial revolution has the potential to further improve every aspect of our lives in far greater extent than all three previous industrial revolutions put together. The fourth industrial revolution brings with it a variety of challenges that must be overcome, from income inequality, cyber security and ethical dilemmas. It will transform the way we live, work and interact with one another. Understanding new technologies and its potentials are critical for all nations, especially for the developing countries.

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Web sites:

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SUMMARY

A new approach to looking at industrial policy is to be seen in the coming time, which may be termed the fourth industrial revolution. The process of reviewing industrial policy should embrace global trends, taking into account the results of the academic community so far, as well as the practical management of top management of public, private and other forms of organization in the economy of very heterogeneous countries in terms of development, human and natural resources, capital, etc. The fourth industrial revolution, therefore, should also appreciate the high speed of new technological breakthroughs, from developed countries to developing countries seeking their place in the global economy of the world.