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IMPORTANCE OF THE INDUSTRIAL PRODUCTION SECTOR AND SERBIA'S INCLUSION IN GLOBAL VALUE CHAINS

Značaj sektora industrije i uključenost Srbije u globalne lance vrednosti

Abstract

The share of industrial production in GDP has expressed accelerated decrease for several last decades, while at the same time the sector of services gains an ever-increasing role in the modern society. A general impression is that the process of deindustrialization is an unavoidable global phenomenon. However, the fact that seems to be neglected is that historical observations indicate industrial sector as the pillar of longstanding development and progress, and that its role in overcoming the stages of crisis is of crucial importance, just as showed the episode of COVID-19 pandemic. The modern industrial sector cannot be observed out of the context of international production and trade, which acknowledge and express the final purpose of industrial investments, since they ensure possible overcoming of the national market limits, the achievement of economies of scale in relatively short time, and most importantly – the access to modern technologies. The development of global value chains, i.e. the production fragmentation based on the international division of labour, presents a revolutionary, global phenomenon, which has provided a chance for every country to get included into the process of global industrial production according to its comparative advantages. Serbia takes part in the global value chains owing to its geographic position, respectful human resources/professional staff, infrastructure, and the national openness; however, the implied question is the quality of the participation and what can be done to achieve better results. Can we regard Serbia just as the hub where final products are assembled or there is a considerable value added created in our factories? This paper offers an overview of the subsectors with the highest inclusion in the global value chains, as well as the analysis of their exports, output and gross value added trends, and the parameters of efficiency of investment in the most profitable subsectors. Identifying the areas with low investment efficiency is an important diagnostic tool for decision makers and presents a challenge as regards the adequate allocation of resources leading to

increased profitability of investments and exports. Finally, we present the overview of the developments in ICT sector that is recognized as a valuable chance for Serbia, having in mind its increasing share in GDP, and its significance for the forthcoming process of digitalization and Industry 4.0.

Keywords: *industrial production, global value chains, ICT, digitalization, marginal coefficient of investment efficiency.*

Sažetak

Učešće industrijske proizvodnje u BDP-u ubrzano se smanjuje decenijama unazad, dok istovremeno uslužni sektor dobija sve veću ulogu u modernom društvu. Stiče se utisak da je proces deindustrijalizacije sveprisutan globalni fenomen. Ali zanemaruje se i činjenica da je industrijski sektor, istorijski gledano, nosilac dugoročnog razvoja i napretka i da ima ključnu ulogu u prevazilaženju kriznih epizoda, što je pokazala i epizoda sa pandemijom COVID-19. Savremeni industrijski sektor ne može se posmatrati van konteksta međunarodne proizvodnje i trgovine, koje predstavljaju verifikaciju i krajnji smisao ulaganja u industriju, budući da omogućuju prevazilaženje granica nacionalnog tržišta, postizanje ekonomije obima u relativno kratkom roku, i što je najvažnije, pristup modernim tehnologijama. Razvoj globalnih lanaca vrednosti, tj. fragmentacija proizvodnje bazirana na međunarodnoj podeli rada, predstavlja revolucionaran globalni fenomen, koji je svakoj zemlji dao šansu da se u proces globalne industrijske proizvodnje uključi u skladu sa svojim komparativnim prednostima. Srbija participira u globalnim vrednosnim lancima zahvaljujući geografskom položaju, solidnim kadrovima, infrastrukturi i otvorenosti zemlje, ali se postavlja pitanje kakav je kvalitet te participacije i šta se može učiniti po pitanju postizanja boljih rezultata. Da li je Srbija samo čvorište u kome se sklapaju finalni proizvodi ili se u našim fabrikama ugrađuje i

značajna dodata vrednost? U radu je dat pregled oblasti koje su najviše uključene u globalne lance vrednosti, kao i analiza kretanja njihovog izvoza, autputa i bruto dodate vrednosti, a zatim i parametri efikasnosti ulaganja u najprosperitetnije oblasti. Identifikovanje oblasti kod kojih je efikasnost ulaganja niska predstavlja bitnu dijagnostiku za donosiocel odluka i izazov u smislu adekvatnog usmeravanja resursa u pravcu veće rentabilnosti investicija i izvoza. Na kraju, prikazan je pregled kretanja IKT sektora koji je prepoznat kao velika šansa Srbije, imajući u vidu njegovo rastuće učešće u BDP-u kao i njegov značaj za nadolazeći proces digitalizacije i Industrije 4.0.

Ključne reči: *industrijska proizvodnja, globalni lanci vrednosti, IKT, digitalizacija, marginalni koeficijent efikasnosti investicija.*

Introduction: Deindustrialization as a trend and fragmentation of global production in the context of development capacities of the national economy

Economic restructuring towards the growth of the service sector and its increasing share in GDP, at the expense of industry, is a global phenomenon in the last few decades present both in the developed and less-developed economies. On the one side, it is a realistic consequence of the productivity growth, which further led to the fall in industrial production prices; therefore, its value added decreased in comparison to the value added of the service sector. In addition, the upgraded living standard induced the growing demands for services, which naturally caused the expansion of this sector. The share of Manufacturing in GDP is decreasing in almost all European countries, and simultaneously the employment in this sector is decreasing. In 2010 Manufacturing in the EU countries had the share in GDP of 15% only (the smallest share was registered in the UK – 11%, and the highest in Germany and Italy – 20% and 18.5%, respectively). The process of extensive deindustrialization has taken place in all post-communist countries even from the nineties of the last century. In Serbia the share of Manufacturing in GDP in the last ten years has decreased by 1.9 p.p. (from 15.2% in 2011 to 13.3% in 2020) [2]. In the Western Balkans countries, similar trends were noted in Croatia (from 13.7% in 2011 to 12.2% in 2020) and Romania (from 24.9% in 2011 to 15.4% in 2020). In Bulgaria the share of Manufacturing equals about 13% in the last decade, a moderate growth was recorded in North Macedonia (from 11.4% in 2011

to 12.5% y 2020), while Albania and Montenegro in 2020 recorded the lowest participation of Manufacturing in GDP of 6.2% and 3.7%, respectively.

However, historical observations indicate that the source of economic growth and upgraded living standard has always been a strong industrial sector, since there around capital stock, innovations, productivity and exports are concentrated. The phenomenon of favourable impact of strong industrial sector both in the process of recovery after recession and in further economic development is undoubtful [7]. Real economy is of crucial importance for managing crisis, and the experience of the countries with developed industry (e.g. Germany), showed that they not only overcame crisis more quickly, but their comeback to the pre-crisis development level was sooner. After the global economic crisis of 2008, the interest for industrial revitalization revived, and the European Commission passed the Strategy of reindustrialization (European Industrial Renaissance), which defined as objective the increased participation of Manufacturing in GDP until 2020 from 15% to 20%. General government would have an important role in the process of economic revival, and its supporting measures would help suppress negative market formations that obstruct sound industrial dynamics and development.

The Serbian solid economic results for 2020 – the GDP fall of only -1%, public debt equalling 57.4% GDP and deficit equalling 8.1% GDP – mostly originate from the economic structure with dominant industry, agriculture and construction. Therefore, we may conclude that the resistance of the Serbian economy is grounded on the independence from the sector of services, which was mostly stricken by the pandemic. Generally, as the most important flywheel and transmission vector of industrial production regarded are international trade and fragmentation of production based on international division of labour, namely – global value chains. Participation in global value chains offers unlimited possibilities for the national industry expansion. However, international production has become rather complex, fragmented and globalized, with clear market rules and principles that for interrelated actors offer numerous and unlimited chances as regards the access to markets, but also make them strongly interdependent and sensitive to shocks.

An inevitable issue is to determine how the relative position of the national economy and the extent of its participation in global value chains influence the prosperity of companies and of the entire production sector of an economy. Are their capacities for innovations sufficiently advanced and is the division of labour, being the result of fragmented production, of productive character? What agent in the production chain has the most benefits from foreign direct investments, which are directly related to the inclusion in global value chains and multinational production network? The inclusion in global value chains is by all means the key determinant of economic growth but also a required step towards industrialization, and towards targeting certain industries where an economy can be well established for a long term, in accordance with the capacities and possibilities. Inclusion in global value chains assumes also easily achieved status of economies of scale, where local and regional markets are small, and the access to faraway markets is ensured through fragmented production. This is particularly important for developing economies, since thereby provided is the option to gain knowledge through the production process and “learn how to learn”.

Nevertheless, just as any economic decision, so the decision on the country inclusion in global value chains has to be based on the estimation of attractive activities, historical backgrounds, geographic position, and national specific features. Absorption capacities of a country are also rather significant, namely, the labour force knowledge and know-how, and the local infrastructure development level. Finally, as perhaps the major component of the entire process of inclusion in global value chains we need to consider the evaluation of the performance of the sector and companies involved.

Is this the end of the era of global value chains expansion?

The production organization according to the stage of specialization, i.e. production process reallocation to the countries with the lowest labour costs and production expenditures, has achieved its maximum in the period from 1990 to 2008, which is frequently referred to as

the era of hyper-globalization. In other words, then the system of global value chains of production and supply was established and developed. This production process organization followed the integration of the East European countries into the world market (after the Fall of Berlin Wall), simultaneously with the expansion of China and its joining the World Trade Organization in 2001. The development of global value chains came simultaneously with the progress of information technologies, transport services, liberalized trade and globalization, when every country had the option to take part in the production and trade chain in the stage where it finds the best comparative benefits. Thereby upgraded was productivity on all production levels, competition was improved, transfer of knowledge and technologies was ensured, and eventually – achieved was better market supplying and upgraded quality and variety of offers. Higher integration into global value chains stimulates companies to invest into innovation and so generate new ideas and solutions, and in this way gradually become the centre of technological transfer in their surroundings. Hyper-globalization had tremendous effects in social and demographic domain; however, these topics cannot be covered by this study. It is worthwhile noting that poverty reduction was facilitated and that globally the number of the most poverty-stricken people (with consumption below two US dollars daily) has decreased by more than one billion since the end of the last century eighties.

It is estimated that in the period from 2000 to 2008 global value chains made as much as 60% of the world trade. Their expansion was stopped by the economic crisis in 2008, due to the enormous indebtedness of the European Union and escalated insecurity in the global economy, which slowed down the production and trade flows. In this constellation producers estimated the risk of placing products into the market as unprofitable; therefore, the production reduction followed, and risky and faraway destinations became avoided. Similarly, it is estimated that the coronavirus pandemic has caused an increased and lasting insecurity that, along with other factors, will inevitably induce the reduction of global value chains. Namely, due to increased costs and insecurity as regards sales, production displacements into non-resident, faraway

countries have become costly and unsustainable. Besides, in near future expected is increased protectionism and customs duties jump, which frequently follow crisis, and this will make the organization of production into several countries even more complicated and expensive.

Public speculations have already suggested that many developed countries consider and start the process of taking production back to the resident country, with increased adjustments of machinery and robotics that have proved to be less expensive and more efficient than human labour force even before the pandemic, and especially during the pandemic. Robotics and automation, with the costs of their introduction having falling trend ever since the last century nineties, in the future will become even less expensive due to the expected fall or stagnation (on the low level) of interest rates. Coronavirus pandemic has already accelerated these processes and numerous companies were forced to make considerable investments in digital transformation. It is hard to imagine this trend to be stopped, on the contrary – it is expected to become even more dynamic, and simultaneously the production would be taken back to the resident countries, which is expected to cause the strong contraction of global value chains. As some estimations suggest [4], for several years certain subsectors of Manufacturing have been taken back to the resident countries. The leader here is chemical processing industry, which is ranked as “number one returnee” in Germany, Italy, France and USA. Similar trends can be expected for car/automotive industry, the group that is best integrated in global value chains with robotics most represented in the production, so that their further application will be easily resumed.

Western Balkans and global value chains

The Western Balkans countries (hereinafter: WB)¹ in global value chains participate as importers of products from other countries; however, the value added built in the products they export is [3] small and insufficient. In the global production organization process the WB countries mainly function as “assembling centres” where

final products are assembled. Also, instead of being directed towards Germany, which is the EU foreign trade intersection, the WB countries primarily create regional exchange connections, and a few of them are oriented towards Italy (that itself passed through a recession episode and its economy in the last years has been rather volatile, this inevitably being reflected on its foreign trade partners). Based on the results of the IMF survey², implemented on a sample of 66 top importing companies from five WB countries (Albania, B&H, North Macedonia, Montenegro and Serbia), it was determined that most of these companies (46%) function on so-called bottom line in supply chain, i.e. in the production process of *labour intensive* goods with low value added. Therefore, in global value chains these companies are connected with many EU and OECD countries, however they mostly function as importers, i.e. act as final products assemblers. 37% of companies deal with exports of services, and only 18% with the production of high value goods. Regarding the staff qualifications, medium level education is prevailing (51%); as the top issue and limiting factor to increasing exports the companies covered by the survey stated the lack of human resources that could absorb new knowledge and technologies. Following the lack of adequate staff, the factor that has inhibitory effect on the development of global value chains in the WB countries is low level quality and development of legislation and (authorized) institutions. Namely, the lack of respective institutions prevents smooth functioning of investment and commercial arrangements and does not ensure adequate legal assistance and protection for investors. Even the investors present in the WB region as the major obstacles for larger production expansion state the lack of the staff knowledge and skills, apart from political instability, undeveloped traffic infrastructure and institutional problems. Their motivation for the investment in the region is reduced to attraction due to cheap labour, location and tax reliefs granted by the government.

For successful integration in global value chains, it is not enough to have low-paid labour force that will make

¹ IMF here includes Albania, B&H, Kosovo, Montenegro, North Macedonia and Serbia.

² The purpose of the survey was to identify the major obstacles that these companies encounter in the process of inclusion in global value chains, as well as other influencing factors – such as company characteristics, number and quality of the employed staff, etc.

the basis for competition. On the contrary, *productivity and efficiency* need to be upgraded, and that assumes actions on improving quality of institutions, human and physical capital and infrastructure. By way of foreign investments national economy should get included in global value chains; therefore, it is required to ensure a highly professional and efficient institutions, the rule of law, harmonized legislation, and all other arrangements needed for cross-border trade. In addition, to improve competitiveness it is of utmost importance to invest in the education quality, and staff knowledge and skills. Frequently, a country may get stuck in stagnant pitfalls of combining low staff earnings and low productivity and so gradually lose its comparative advantages and get expelled by the present competition. For this reason, the WB countries are permanently induced to implement structural reforms, the importance of which is even more considerable than the standard factors that at first sight mainly influence trade relationships (close location of certain market, common border, linguistic advantages, cultural heritage, etc.). Besides, it is necessary to better explore the possibilities of already existing arrangements, to the effect to include legally binding provisions that would ensure facilitated solving of disputes, property legal protection, and stipulate all other delicate domains of investment processes.

Since the countries of the region are in the process of accession to the EU, by adopting the accession measures they would considerably add to strengthening national institutions and competition. The integration of Serbia, and of the region as well, in global value chains is mostly determined by their EU integration, which is implemented through the Stabilisation and Association Agreement, while the detailed commercial issues are stipulated by the Transitory trade agreement establishing the free trade zone between Serbia and the EU. Serbia is thereby obligated to gradually revoke customs duties on imports of goods originating from the EU, while on the other side by this agreement the EU has acknowledged free access of the goods from Serbia to the EU market [6]. The significance of this agreement is undisputable, since it not only ensured more notable presence of our country in the EU market, but also larger FDI inflow and thereby better integration

in global value chains. Further integration will depend upon the infrastructure development, Serbia's progress towards the EU and political stability.

Serbia's integration in global value chains

To clearly understand what production activities fall in the category of global value chains, the best way is to consider them in the context of cross-border interaction. To this effect, four types of production are distinguished [8]: first, where value added is produced within the borders of a national economy and is absorbed by the domestic market; second, where a complete product is manufactured in one country and is exported as a final product to another country (this is a traditional trade type); third, where a product is manufactured in one country and is exported as semi-product to another country, which will incorporate its value added during the process of its finalization; and fourth, where value added is incorporated in a product several times in each of the countries that imports it as semi-product and then exports it further, all the way to its complete finalization. Therefore, the third and the fourth type of activity fall within production activities covered by global value chains.

The inclusion in global value chains can be presented as the sum of amounts of imported inputs that take part in the production dedicated to exports, with the added amount of exporting intermediate products incorporated in the exports of other countries. In global value chains imports have equally significant role as exports, because of the fact that by purchasing technologically advanced inputs (capital-intensive products) for domestic companies ensured are increased productivity and access to new technologies. The processing of these products is sophisticated as well and entails high value added, thereby stimulating intense integration of domestic companies in global value chains. Therefore, imports that insure to companies (functioning on a higher level of technological further processing, i.e. creating more value added) to incorporate technologically advanced inputs into their products can also be regarded as a stimulus to exports of the same companies since their production quality and competitiveness are upgraded. The positive role of imports is undoubtful in this case, in contrast

to labour-intensive companies and sectors that carry out product assembling, and where imports are unproductive and in value far higher than exports. However, to make use of the benefits of imports, a complex business paradigm needs to be designed, assuming adequate capacities, but in the first place adequately educated labour force able to absorb and apply new knowledge and technologies. In this case imports act as multiplier of exports and may be regarded as ensuring economic growth model grounded on exports.

In March 2021, the Vienna Institute for International Economic Studies released the results of the survey on the WB countries' integration in global value chains [5], based on input-output tables, where it is possible to see in detail the share of the foreign value added incorporated in the total exports of goods and services of a country (backward linkages), as well as the share of the domestic value added incorporated in domestic exports and the foreign country's exports (forward linkages). With its better integration, a country will have more value added integrated in its exports; namely, foreign countries will use its value added in their production process (and in their exports).

Expectedly, all six countries covered by the study (Serbia, Albania, North Macedonia, Montenegro, B&H, Kosovo*) show a larger share of incorporated foreign value added in their exports than is the share of their value added in foreign exports. *Forward linkages* are in all countries on the level of about 10% of the total exports, while *backward linkages* are different and vary from 12.2% in Albania to 33% in North Macedonia (data for 2018). To avoid simplified interpretation of these results it should be noted that the more an industry is developed – the more it uses inputs where foreign value added is incorporated.

According to the survey results, in Serbia we registered the largest share of foreign value added in the total exports in six divisions of Manufacturing:

- Manufacture of motor vehicles, trailers and semi-trailers,
- Manufacture of electrical equipment,
- Manufacture of rubber and plastic products,
- Manufacture of basic metals,
- Manufacture of machinery and equipment n.e.c,

- Manufacture of chemicals and chemical products.

This came as expected since these Manufacturing divisions express the highest dynamics and expansion in the last few years and use considerable amounts of foreign inputs in their production process. Simultaneously, these are the divisions where the highest share of domestic value added in exports was recorded, indicating that productive sectors are in question where imports are used in a productive manner for the purpose of exports growth and not only regional centres carrying out final processing and product assembling.

These six mentioned divisions that are best integrated in global value chains, in 2020 recorded the top value of exports of goods expressed in euros³:

- Manufacture of motor vehicles, trailers and semi-trailers – EUR 1.74 billion,
- Manufacture of electrical equipment – EUR 1.69 billion,
- Manufacture of rubber and plastic products – EUR 1.50 billion,
- Manufacture of basic metals – EUR 1.24 billion,
- Manufacture of machinery and equipment n.e.c – EUR 1.07 billion,
- Manufacture of chemicals and chemical products – EUR 1.01 billion.

In 2020 these six divisions participated in the total exports of goods with 48.4% (43.2% in 2010) and in the exports of manufacturing with 53.9% (49.9%). At the same time, these are the only divisions (apart from Manufacture of food products) with the individual exports in 2019 and 2020 found on the level of about EUR 1 billion.

In 2019 related to 2010⁴, all six divisions achieved considerable export growth: Manufacture of motor vehicles, trailers and semi-trailers – 761%, Manufacture of electrical equipment – 242%, Manufacture of rubber and plastic products – 248%, Manufacture of machinery and

³ Precisely, the largest exports value was noted for Manufacture of food products (EUR 1.79 billion), but it is not important for the present study since this is a division without a considerable share of incorporated foreign value added in its exports or a considerable share of domestic value added in foreign exports; namely, it is not integrated in global value chains.

⁴ The comparison 2019 to 2010 was carried out for the sake of compatibility with the comparison of data on the trends of GVA and output, where the last available data come from 2019.

equipment n.e.c – 275%, and Manufacture of chemicals and chemical products – 97%. However, for a major part of them exports growth was more expressive than the growth of total exports and the exports growth of Manufacturing that in the ten-year period equalled 132% and 138%, respectively.

However, even though the exports of the mentioned six divisions have expressed strong growth and they may be regarded as the moving force of the Serbian exports industry, the linear increase of output and value added has not followed (see Table 1 and Figures 1-3).

Anyhow, in the last ten years for all six divisions GVA growth has been recorded: the largest for Manufacture of motor vehicles, trailers and semi-trailers (162% in 2019 when compared to 2010) and Manufacture of rubber and plastic products (62%). Apart from Manufacture of basic metals, each of these division increased its share in the GVA of Manufacturing: in the first place Manufacture of motor vehicles, trailers and semi-trailers (by 2.3 p.p.) and Manufacture of rubber and plastic products (by 2.1 p.p.).

However, after gaining the top value for certain divisions value added started to decrease (Manufacture of motor vehicles, trailers and semi-trailers) or stagnate (Manufacture of electrical equipment). Regarding *Manufacture of motor vehicles, trailers and semi-trailers*, from 2013 value added and output have been continually decreasing. In the same period, after achieving the top value in 2013, exports firstly recoded moderate fall and then new growth, which all the way until 2019 remained average values (about EUR 1.9 billion annually). A similar trend was notable for *Manufacture of electrical equipment*: namely, exports of this division have recorded average annual growth of about 14% in the ten-year period, while at the

same time output has recorded moderate growth, and GVA has stagnated. These movements, i.e. discrepancy among output/GVA and imports, can be regarded as increased input costs, i.e. increased value of imports component that exceeds the growth of produced value added, or as increased exports from the stocks. Namely, even though these are the most productive exports sectors, where imports are productively used for the purpose of exports growth, incorporated value added still notes moderate measures, and worryingly – has falling trend.

However, for some divisions the growth of exports is accompanied by an adequate growth of value added, and vice versa. For example, *Manufacture of rubber and plastic products* has registered faster growing GVA compared to output, and in the ten-year period exports have increased by 248%. Similar trends have been seen regarding *Manufacture of chemicals and chemical products* and *Manufacture of machinery and equipment n.e.c.*

Regarding other Manufacturing divisions, the case of *Manufacture of food products* should be noted (see Figure 4). Namely, individually considered this division has been creating the largest share in GVA of Manufacturing for several last years (about 19% on average, in the observed ten-year period). Also, its participation in Industrial production is ranked at the second place (15.6% in 2019, directly following the section Electricity, gas, steam and air conditioning supply with the share of 16.7%). Therefore, the exports of Manufacture of food products division holds the high second place in the Serbian exports: 10.5% in 2019, immediately after the exports of Manufacture of motor vehicles, trailers and semi-trailers division that recorded the share of 12.4%. This is traditionally highly represented industrial division in the Serbian economy. However, in

Table 1: Real trends of output, GVA expressed in RSD (value chain-linked volume measures) and exports; growth rates, 2019/2010, %

Divisions of the Manufacturing section	Output	GVA	Exports	Share in GVA of Manufacturing, change 2019/2010, p.p.
Manufacture of rubber and plastic products	56.6	61.8	247.7	+2.1
Manufacture of chemicals and chemical products	14.3	15.3	96.7	+0.8
Manufacture of motor vehicles, trailers and semi-trailers	127.2	162.0	761.5	+2.3
Manufacture of machinery and equipment n.e.c	27.5	26.9	247.9	+0.4
Manufacture of electrical equipment	35.4	21.7	242.1	+0.2
Manufacture of basic metals	-2.0	8.7	33.6	-0.3

Figure 1: GVA movements, 2010-2019, value chain-linked volume measures, reference year 2015, RSD million

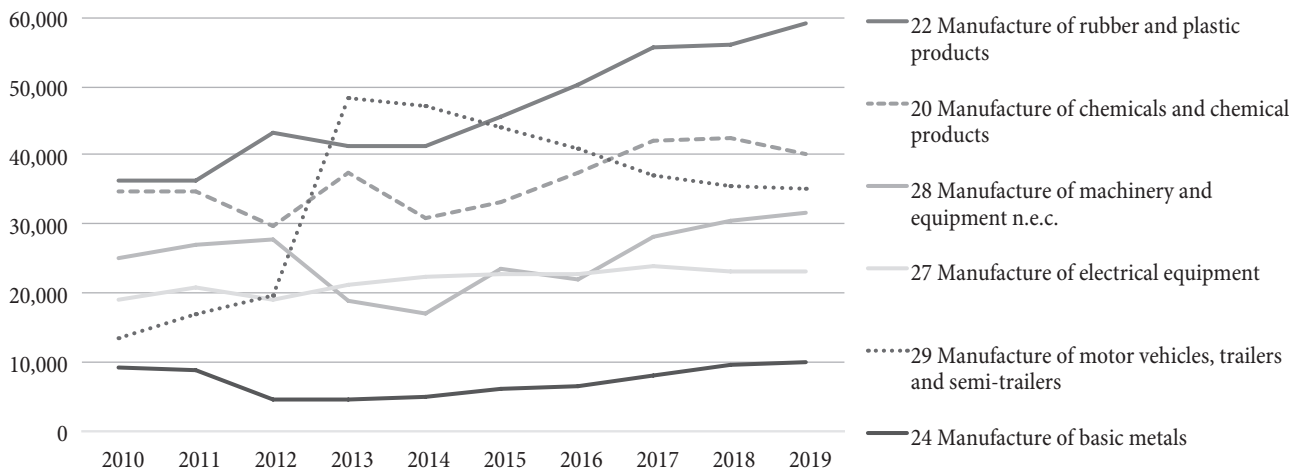


Figure 2: Output movements, 2010-2019, value chain-linked volume measures, reference year 2015, RSD million

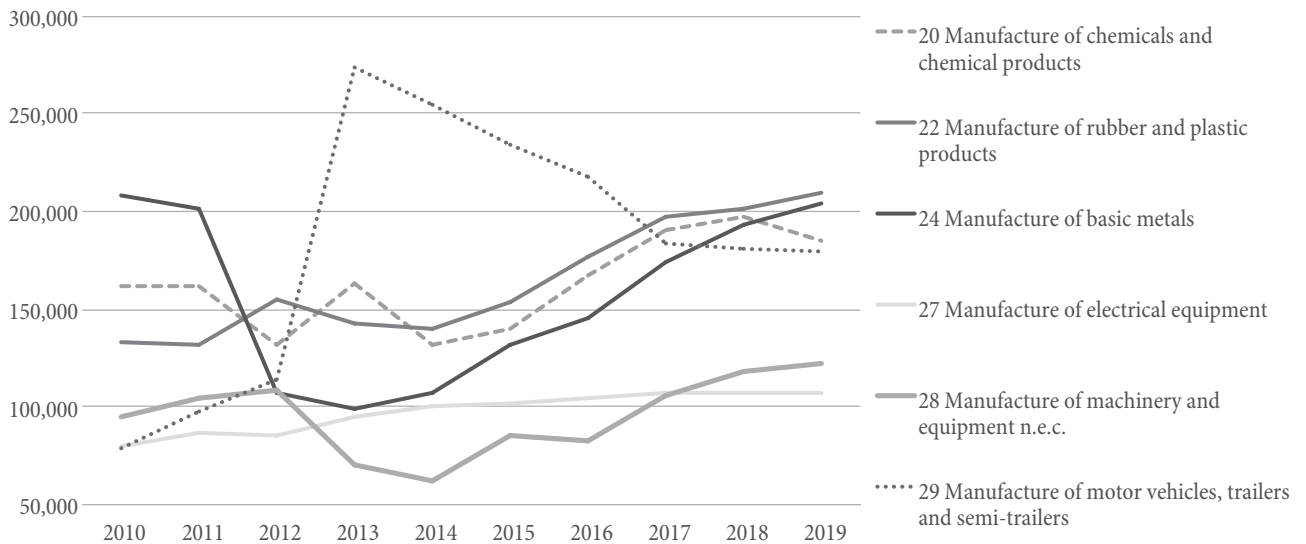
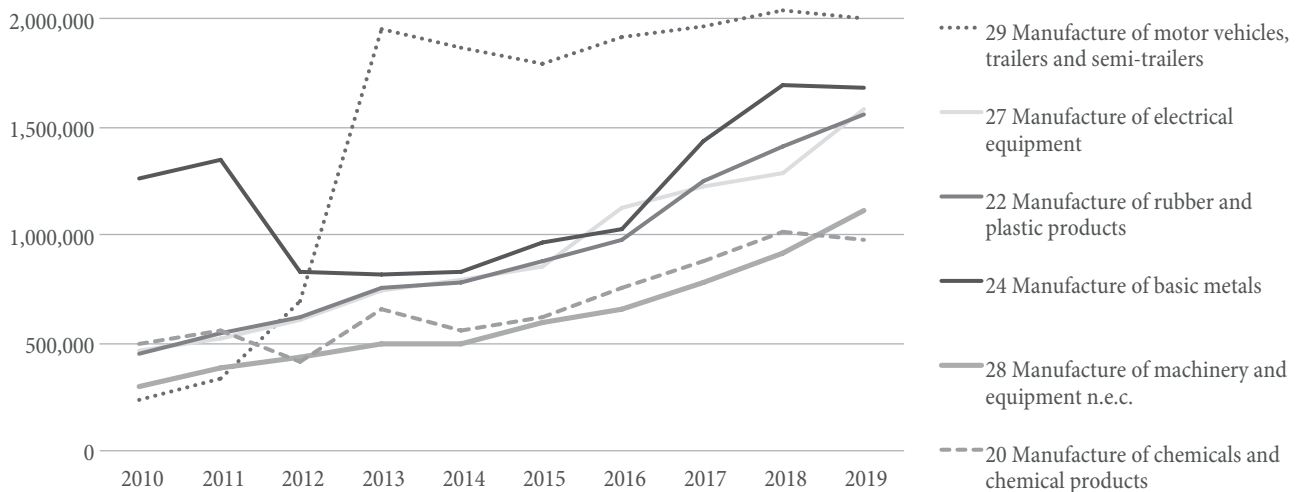


Figure 3: Exports movements, value in EUR thousand, 2010-2019



2019 the GVA of this division was by 1.7% lower than in 2010. In the same period, the output decreased by 5.9%, and production physical volume by 4.4%. So, observed from the point of production and value added, Manufacture of food products expresses extremely negative trends, while simultaneously its exports still record growth. An explanation here is that the Serbian Manufacture of food products is found blocked between uncovered domestic demands (that are covered from imports) and growing demands from the surrounding countries. This is the reason why in time it has become reoriented from the domestic to the foreign market, while simultaneously its structural propulsion has continually decreased, which the negative GVA trends confirm. Obviously, the most represented is the manufacture of products recording low value added, while the measures higher processing level are rather moderate. In addition, even though in the last ten years the consumers' preferences have changed in favour of

foreign products, domestic products are neither by price nor quality competitive to foreign products. Unfavourable dynamics of the movements of this industrial division is by all means a disputable issue; however, the worrying trends of the GVA fall indicate possible lagging behind in applying modern technologies in production processes.

The results of the linear regression model with trend, applied with the aim of examining the relationship between the GVA and exports movements in the seven mentioned divisions, mainly confirmed the expectations (Table 2). Namely, as regards the exports and GVA of Manufacture of food products no significant statistical relation exists, just neither for Manufacture of electrical equipment. For both divisions there exists high statistical significance between the trend movements and exports, i.e. the entire variability of exports movements can be explained by trend function, and not by GVA variation. Therefore, GVA does not grow with exports growth, which is understandable,

Figure 4: Manufacture of food products, trends of exports, output and GVA, 2006-2019; left side scale – exports, value in EUR thousand; right side scale – output and GVA, value chain-linked volume measures, reference year 2015, RSD million

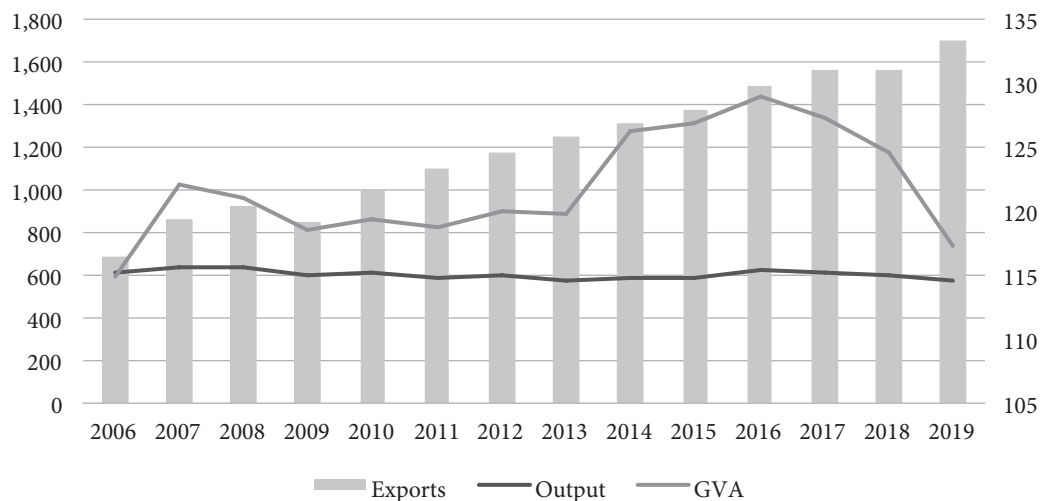


Table 2: Results of linear regression model with trend

Exports - divisions of the Manufacturing section	The regression coefficient GVA to exports	R ² (coefficient of determination)
10 Food products	2.27	0.94
20 Chemicals and chemical products	13.39 ***	0.93
22 Rubber and plastic products	13.89 ***	0.96
24 Basic metals	193.84 ***	0.93
27 Electrical equipment	-3.79	0.94
28 Machinery and equipment n.e.c	8.10 ***	0.94
29 Motor vehicles, trailers and semi-trailers	37.55 ***	0.94

Notes: *** Marked is statistical significance on the level of 1%.

because of the general feature of these industries with low processing level. For other five divisions, the model confirmed high interdependence between the GVA and exports movements.

Economic efficiency parameters of the Serbian Manufacturing section

Considering the fact that the gained GDP level represents the key determinant of the overall economic progress and the most adequate measure of the social wellbeing, finding the optimal way to achieve long-term rising GDP movement creates the grounds for all macroeconomic analyses and objectives. To this effect, investments are expressive as the key lever of the economic progress dynamics, in all their quantitative and qualitative manifestations. Only the quantitative, i.e. physical volume of investments cannot be seen as the measure of progress; however, this is the *contribution to production* that results from the increased production capacities. Therefore, for the purpose of planning and taking economic decisions it is desirable to examine the level of profitability of capital investments and in this way to recognize new potentials for growth and progress.

The transmission of investments in an economy is carried out through investment in machinery, equipment, software, etc. on the one side, which can increase production capacities of certain sectors; and investment in infrastructure, building constructions, etc. on other side, which upgrades social wealth and simultaneously is a prerequisite for the efficiency of all other investments observed on long-term basis. Therefore, by strategic direction of resources and reallocation of capital through investments it is possible to influence economic restructuring in order to achieve economic optimization. However, to create a sound starting point for making decision on effective investment, in the first place it is needed to review the variants in investment efficiency by certain industrial divisions.

As the main indicators defining and measuring the success of investments by various economic activities used were conventional macroeconomic indicators, such as capital coefficient and economic efficiency of investments, both in their average and boundary form, while marginal capital coefficient presents the relation of investments and GDP

increase, and marginal coefficient of investment efficiency is reciprocal expression of marginal capital coefficient.

With the aim of understanding more clearly the movements of economic efficiency of investment in Serbia in the last decade, in Table 3 we offered a comparative overview of the mentioned indicators by the divisions of the Manufacturing section for the years immediately after the great economic crisis (2010-2014), as well as for the five-year period where recorded were the first results of the implemented fiscal consolidation aimed at achieving macroeconomic stability and initiating a new investment cycle⁵ (2015-2019).

When as an indicator of the capital investment efficiency observed is the movement of marginal coefficient of investment efficiency in the last decade in Serbia, we can conclude that the section of Manufacturing shows rising investment efficiency (0.11) in the period 2015-2019 when related to the period immediately after the great economic crisis (0.04). Further on, regarding the share of divisions in the GVA of Manufacturing, the following facts are notable:

- Manufacture of food products, expressing the largest share in the GVA of Manufacturing (18.8% on average in the observed ten-year period), at the same time is found at the bottom of the rank list by investment efficiency (-0.07). Moreover, marginal coefficient of investment efficiency decreased in the period 2015-2019 when related to the period 2010-2014, from 0.07 to -0.07; thereby Manufacture of food products moved down by 10 standings on the rank list of investment efficiency of Manufacturing divisions – from the position 10 to the position 20. Even though Manufacture of food products because of its relative importance strongly influences the entire Manufacturing section, its efficiency on the whole even increased owing to the upgraded business profitability in the 15 divisions.
- The divisions: Manufacture of tobacco products, Manufacture of basic metals, Manufacture of

⁵ In the period 2015-2019, fixed investments grew at the average annual rate of about 10%, while their cumulative growth equalled about 64%. The share of fixed investments in GDP increased from 15.9% in 2014 to 22.5% in 2019, i.e. by almost 7 p.p.

Table 3: Comparative overview of Manufacturing business efficiency parameters by economic structure in two observed periods

Divisions of the Manufacturing section	2010-2014				2015-2019			
	Rank by investment efficiency within Section C	Marginal coefficient of investment efficiency	Share in GVA of Manufacturing, %	Average GVA real growth rate, %	Rank by investment efficiency within Section C	Marginal coefficient of investment efficiency	Share in GVA of Manufacturing, %	Average GVA real growth rate, %
<i>C - Manufacturing</i>	-	<i>0.04</i>	-	<i>0.8</i>	-	<i>0.11</i>	-	<i>2.4</i>
10 Manufacture of food products	10	0.07	18.9	1.3	20	-0.07	18.7	-1.5
11 Manufacture of beverages	12	-0.03	4.5	-0.5	18	0.02	4.3	0.4
12 Manufacture of tobacco products	13	-0.05	0.7	-1.0	4	0.42	1.3	9.8
13 Manufacture of textiles	20	-0.56	1.9	-3.5	5	0.41	1.9	5.0
14 Manufacture of wearing apparel	4	0.20	3.9	1.8	15	0.07	4.0	0.8
15 Manufacture of leather and related products	21	-0.91	1.9	-4.1	21	-0.11	1.4	-2.3
16 Manufacture of wood and products of wood, except furniture	6	0.18	2.1	4.3	24	-0.40	2.3	-3.5
17 Manufacture of paper and paper products	1	0.29	2.8	5.5	7	0.27	3.1	6.1
18 Printing and reproduction of recorded media	11	0.06	2.2	0.4	19	-0.04	1.6	-0.8
19 Manufacture of coke and refined petroleum products	9	0.10	7.8	5.7	16	0.03	7.4	1.1
20 Manufacture of chemicals and chemical products	8	0.11	4.6	2.6	12	0.19	5.7	5.2
21 Manufacture of basic pharmaceutical products	2	0.28	2.4	4.9	9	0.25	2.4	5.2
22 Manufacture of rubber and plastic products	7	0.11	6.4	2.8	8	0.26	8.1	7.4
23 Manufacture of other non-metallic mineral products	14	-0.08	4.1	-1.5	10	0.19	4.2	3.9
24 Manufacture of basic metals	15	-0.10	1.0	-7.3	11	0.19	1.1	15.3
25 Manufacture of fabricated metal products, except machinery	17	-0.23	13.6	-2.1	6	0.32	11.3	5.9
26 Manufacture of computers, electronic and optical products	23	-1.30	2.9	-10.5	23	-0.24	2.1	-2.8
27 Manufacture of electrical equipment	3	0.26	3.1	5.8	17	0.02	3.4	0.6
28 Manufacture of machinery and equipment n.e.c.	19	-0.52	3.6	-9.1	2	0.81	4.0	13.2
29 Manufacture of motor vehicles, trailers and semi-trailers	5	0.20	4.8	27.7	22	-0.16	5.7	-5.8
30 Manufacture of other transport equipment	24	-3.36	1.0	-24.3	3	0.48	0.5	7.1
31 Manufacture of furniture	22	-1.20	2.7	-7.3	13	0.14	2.2	3.8
32 Other manufacturing	16	-0.16	1.0	-2.3	1	1.23	1.6	16.5
33 Repair and assembling of machinery and equipment	18	-0.49	2.1	-8.8	14	0.14	1.6	3.0

* The data on investments on the level of divisions of economic activities are provided from *Annual survey on investments in fixed assets of the Republic of Serbia*, which covers legal entities only.

For practical reasons, investments and the respective production growth were observed for the same period, i.e. calculated was the marginal capital coefficient for the same period. By following the relations of relevant aggregates in a longer period, partly neutralized were delayed effects that resulted from the time gap between the realization and activation of certain types of investments, so that technological marginal coefficient was not considered.

other non-metallic mineral products, Manufacture of machinery and equipment n.e.c, and Other manufacturing – recorded increased business profitability and simultaneously the largest share in the GVA of Manufacturing. Considerable progress was noted for all divisions, especially expressive for Other manufacturing, the division which increased its efficiency from -0.16 to 1.23 units, and then its

share in the GVA of Manufacturing from 1% to 1.6%; simultaneously, on the rank list of efficiency it “made a jump” from the position 16 to the top (number one) position. Good results are notable for Manufacture of tobacco products that moved from the position number 13 to number 4, then for Manufacture of rubber and plastic products where the profitability was increased from 0.11 to 0.26 units and the share

in the GVA of Manufacturing from 6.4% to 8.1%, and for Manufacture of machinery and equipment n.e.c. (moving up from the position 19 to the position 2 on the rank list of efficiency).

- Certain divisions increased investment efficiency but decreased the share in the GVA of Manufacturing: Manufacture of beverages, Manufacture of fabricated metal products, except machinery, Manufacture of other transport equipment, Manufacture of furniture, Repair and assembling of machinery and equipment. As a consequence of negative growth rates from the previous period, investment does not produce results immediately and to certain extent the effect of investments in fixed assets overflows to the forthcoming period, since all mentioned divisions considerably increased the GVA growth rate in the period 2015-2019, i.e. passed from the negative to the positive business zone in the last five-year period.
- In certain cases, the coefficient of marginal efficiency may be regarded as an indicator of serious problems that an industry division encounters. This is applicable to already mentioned Manufacture of food products, however, also to Manufacture of motor vehicles, trailers and semi-trailers, where efficiency fell from 0.20 to -0.16 units, and the average GVA real growth rate from the high value of 27.7% fell to -5.8%. Manufacture of electrical equipment also recorded a notable fall of investment efficiency (from 0.26 to 0.02 units), and simultaneously – a slowed GVA growth rate – from the average 5.8% in the period 2010-2014 to 0.6% in the period 2015-2019. Negative results are also recorded for the division Manufacture of wood and products of wood, where efficiency decreased from 0.18 to -0.40 (fall on the rank list from the position 6 to the position 24). Efficiency decrease in these divisions is a warning signal of lagging in applying modern technologies in production processes, which could have unfavourable repercussions for economic dynamics if we consider that investments in these divisions do not return through increased value added, but on the contrary induce its fall.

The average interdependence of the GVA real growth and the investment performances in Manufacturing is shown

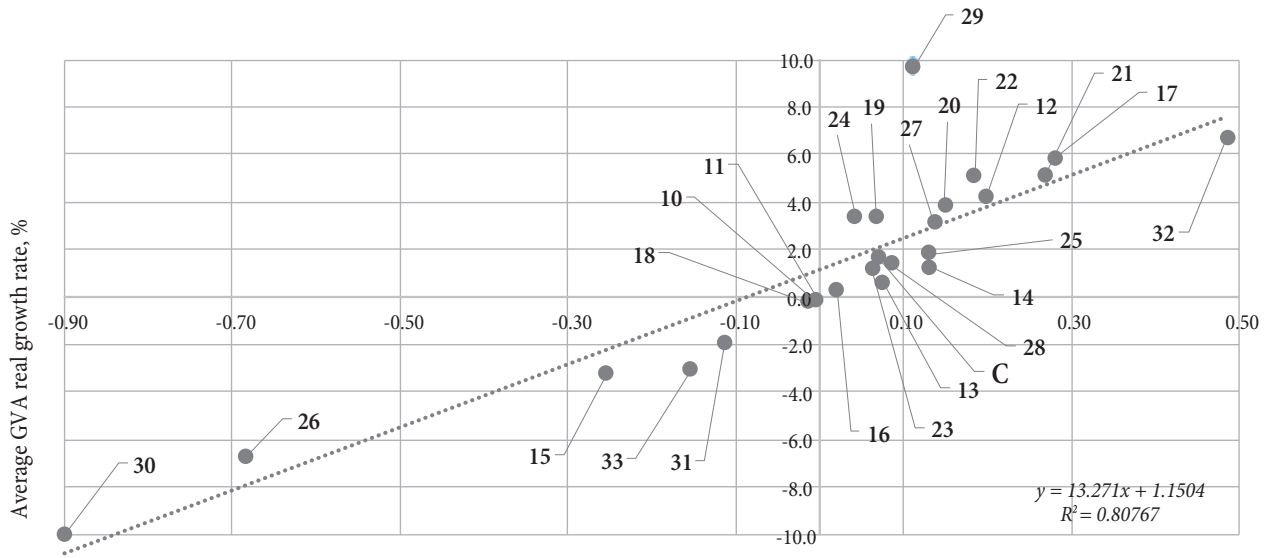
in Figures 5 and 6 for the periods 2010-2019 and 2015-2019. The interdependence of these two variables undoubtedly indicates the real growth rate that can be gained through certain pace of investment. By comparative observation of these two diagrams, we can note the movement of efficiency coefficients value in various Manufacturing divisions in the last five-year period related to the whole period of observation, i.e. the grouping of the observed features around higher values on the scale of efficiency.

The favourable economic climate of the achieved macroeconomic stability and the new investment cycle in last five-year period were reflected through positive business performance of the section of Manufacturing. The increased effectiveness of the engaged capital input in the process of production generated a dynamic growth, so the newly created value of the total Manufacturing in the years observed was increased in real terms at the average interannual rate of 2.4% (by 1.6 p.p. faster if compared to the previous period). Almost three times increased production effectiveness of the invested capital when related to the observed post-crisis period, indicates not only the increased value of the investments volume, but also the upgraded qualitative business level gained through advancing technological component of the entire section, which is the fundamental, if not even of crucial importance premise of longstanding sustainable growth and development.

For the initially mentioned six divisions that are the starting point of this study (Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of electrical equipment; Manufacture of rubber and plastic products; Manufacture of basic metals; Manufacture of machinery and equipment n.e.c.; Manufacture of chemicals and chemical products) confirmed was a close relationship existing among inclusion in global value chains, investment profitability, and GVA and exports growth. Namely, in four divisions the effectiveness of investments was considerably increased:

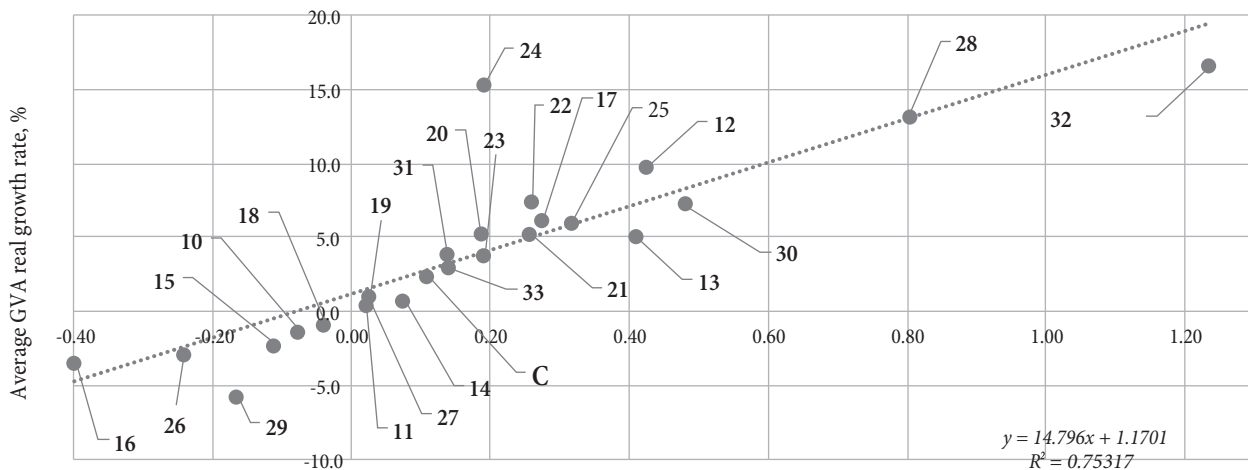
- Manufacture of chemicals and chemical products: from 0.11 to 0.19
- Manufacture of rubber and plastic products: from 0.11 to 0.26
- Manufacture of machinery and equipment n.e.c.: from -0.52 to 0.81

Figure 5: Investment efficiency in Manufacturing section, 2010-2019



Marginal coefficient of investment efficiency (MEI)

Figure 6: Investment efficiency in Manufacturing section, 2015-2019



Marginal coefficient of investment efficiency (MEI)

Note: In diagram given are the codes of the Classification of activities for the respective economic divisions of the Manufacturing section*

- * 10 Manufacture of food products
- 11 Manufacture of beverages
- 12 Manufacture of tobacco products
- 13 Manufacture of textiles
- 14 Manufacture of wearing apparel
- 15 Manufacture of leather and related products
- 16 Manufacture of wood and products of wood and cork, except furniture
- 17 Manufacture of paper and paper products
- 18 Printing and reproduction of recorded media
- 19 Manufacture of coke and refine petroleum products
- 20 Manufacture of chemicals and chemical products
- 21 Manufacture of basic pharmaceutical products
- 22 Manufacture of rubber and plastic products
- 23 Manufacture of other non-metallic mineral products
- 24 Manufacture of basic metals
- 25 Manufacture of fabricated metal products, except machinery
- 26 Manufacture of computers, electronic and optical products
- 27 Manufacture of electrical equipment
- 28 Manufacture of machinery and equipment n.e.c.
- 29 Manufacture of motor vehicles, trailers and semi-trailers
- 30 Manufacture of other transport equipment
- 31 Manufacture of furniture
- 32 Other manufacturing
- 33 Repair and assembling of machinery and equipment

• Manufacture of basic metals: from -0.10 to 0.19, with the simultaneous growth of their GVA and exports. On the contrary, for the divisions Manufacture of electrical equipment and Manufacture of motor vehicles, trailers and semi-trailers investment efficiency decreased: in the first from 0.26 to 0.02, and in the second from 0.20 to -0.16, while at the same time their GVA growth rate also noted

fall, just as the absolute GVA amount expressed in value chain-linked volume measures.

However, for both divisions exports are still on the increase, which suggests that Serbia exports products with low value added and that the share of input in production is larger than the newly created value. Meanwhile, an option is to export stocks from the previous period, which also

indicates lagging and problems in production. Anyhow, these are the divisions that on long-term and medium-term basis present temptations for economic policy makers; since being capital intensive, they present the backbone of the Serbian exports sector. Therefore, the capital resources flows need to be adequately directed so to achieve the division restructuring towards higher investment and exports profitability.

Importance of exports of services and ICT sector evolution in the Serbian GDP

It is worthwhile stressing that the most rapidly growing capital efficiency in the entire economy was recorded for the sector of services, so-called professionally creative activities. A new progress paradigm, with the key elements being creativity, knowledge, originality, know-how, etc., recognizes these activities as potentially the major source of economic prosperity. Even the concept of growth and progress is changing, and the modern allocation of investments is directed towards increasing the share of intellectual property in the structure of fixed assets (software and R&D as the main composite elements), this inducing a powerful progress of activities where these resources are relatively more represented. Computer programming, Information service activities, and Scientific Research and Development reach the value of marginal coefficient of efficiency exceeding 1, which means they generate high GDP growth rates. Besides, these activities through the secondary expansion (of other economic activities) may become progress generators for the entire economy; therefore, investment in these divisions presents investment in future and should be the key point of clearly profiled development strategy.

Unlike other WB countries, where the growth of exports of services mainly results from the development of tourist trade (Albania and Montenegro), in Serbia the exports of services is grounded on the exports of information technologies, financial and business services – namely the sections (CA) that are not traditionally of exporting kind. The Serbian exports of IT services from 0.5% of GDP in 2007 reached the value of 2% of GDP in 2016, where Serbia got positioned as the regional focal point of the IT

services production and exports. The initial moment was when in 2005 Microsoft development centre (MDCS) was established in Serbia, which attracted numerous eminent foreign IT companies in Serbia. Another important step was the introduction of the subject *Informatics* as compulsory in primary schools, as well as the increased entry quotas at IT university faculties by 20%. Thereby, the graduate students from these faculties (making more than one quarter of all graduates) established the critical mass of informatics talents.

With assistance from the EU and the World Bank, in 2011 the RS government established the Investment fund for financing start-up high-risk projects supporting science and technology innovations. Eventually, IT professionals and companies were granted tax reliefs and other fiscal benefits. So, administrative measures and assistance were shown as stimulative and productive in maximizing comparative benefits within the ICT sector.

In the period from 2010 to 2019 the share of the ICT sector⁶ in the Serbian GDP increased from 3.6% to 4.7% (see Figure 7). At the same time, within the entire ICT sector the most expansive notable was the division 62 – Computer programming, consultancy and related activities, which reached the share of 2.05% GDP in 2019 (in 2010: 0.81%). The GVA of this division grew at an average annual rate of 11.9% in the period observed, while the GVA of the entire ICT sector grew at an average annual rate of 5.4%.

Moreover, based on the preliminary data of the SORS survey on structural business statistics/SBS, it could be noted that in 2020 the ICT sector expressed resistance to negative macroeconomic situation; namely, the quarterly

6 ICT sector according to the international definition (Eurostat, OECD) is composed of the following business activities/industries (NACE Rev. 2):

- ICT Manufacturing
- 26.1 Manufacture of electronic components and boards
- 26.2 Manufacture of computers and peripheral equipment
- 26.3 Manufacture of communication equipment
- 26.4 Manufacture of consumer electronics
- 26.8 Manufacture of magnetic and optical media
- Wholesale of information and communication equipment
- 46.5 Wholesale of information and communication equipment
- ICT services
- 58.2 Software publishing
- 61 Telecommunications
- 62 Computer programming, consultancy and related activities
- 63.1 Data processing, hosting and related activities; web portals
- 95.1 Repair of computers and communication equipment

Figure 7: ICT sector share in GDP of the Republic of Serbia, 2010-2019, %

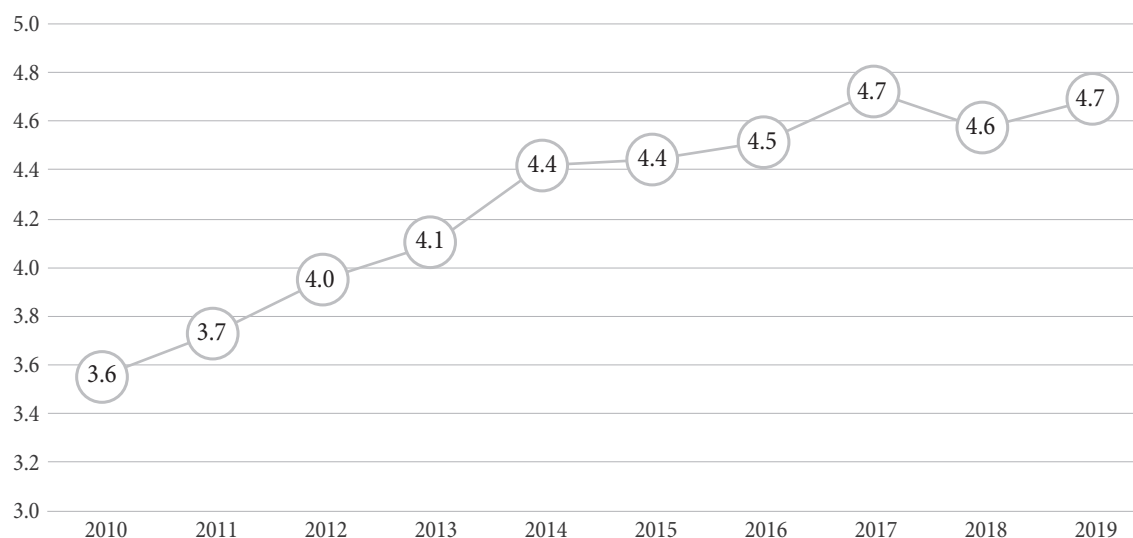


Table 4: ICT sector – registered employment, changes by quarters, %: 2020 to 2019*

ICT sector – total and components	Changes, %			
	1st qtr. 2020/ 1st qtr. 2019	2nd qtr. 2020/ 2nd qtr. 2019	3rd qtr. 2020/ 3rd qtr. 2019	4th qtr. 2020/ 4th qtr. 2019
ICT sector – total	9.2	12.1	11.2	11.5
ICT Manufacturing	7.6	8.8	4.1	0.1
Manufacture of electronic components and boards	16.5	9.2	-0.3	5.7
Manufacture of computers and peripheral equipment	3.7	9.9	6.3	2.9
Manufacture of communication equipment	6.3	8.5	7.8	4.5
Manufacture of consumer electronics	2.1	-3.1	0.8	-1.8
ICT Services	9.3	12.4	11.8	12.4
Wholesale of information and communication equipment	16.0	8.4	13.8	20.0
Software publishing	1.8	-1.3	-3.2	1.2
Telecommunications	0.9	3.6	7.6	10.0
Computer programming, consultancy and related activities	13.0	17.1	13.7	13.3
Data processing, hosting and related activities; web portals	22.6	24.0	20.1	18.2
Repair of computers and communication equipment	-5.3	-4.4	0.7	4.2

Source: Survey on registered employment, based on a combination of data from the Central Register of Compulsory Social Insurance (CROSO) and the Statistical Business Register (SPR).

data indicate that the ICT sector share in GDP gained the robust values of 5.4%, 5.6%, 5.1% and 5%, respectively by quarters 2020. According to the current estimations, this could imply that the ICT sector in 2020 even increased its share in GDP.

These movements are also backed up by the data on the ICT sector registered employment, which increased in 2020 when related to 2019 (see Table 4). Since the coronavirus pandemic accelerated the implementation of the 4th industrial revolution and “new normality” would be grounded on digitalization and automation, Serbia has a good chance in the post-pandemic period to resume the

positive trend of the ICT sector evolution, and to make the best use of the comparative advantages in this domain.

Conclusion

The appearance and development of global value chains enormously reshaped the economic relief and at the same time provided a chance for the countries that earlier had been on the margin of the global economy to ensure their position in the new international division of labour and make use of it as a chance for development. Following the outbreak of 2008 global economic crisis their contraction

started, which is expected to go on as a consequence of the coronavirus pandemic. The process of “returning” production to their resident countries has already lasted for years and most probably will be accelerated, due to the sense of insecurity ruling the global economy, as well as because of the fall of prices of robots that proved to be an adequate substitute for human labour in certain industries’ divisions. Serbia earned its standing in the global fragmentation of production and trade owing to its favourable geographic position, inexpensive inputs, relatively stable macroeconomic environment and solid education of the labour force. Serbia’s exports results and integration in global value chains are most prominent in six Manufacturing divisions – Manufacture of motor vehicle and trailers, Manufacture of electrical equipment, Manufacture of rubber and plastic products, Manufacture of basic metals, Manufacture of machinery and equipment n.e.c., and Manufacture of chemicals and chemical products. Even though the exports are on the increase, the value added/GVA growth in certain divisions show falling trends (Manufacture of motor vehicle and trailers, Manufacture of electrical equipment), which may indicate unfavourable status in global value chains (at their bottom line), where value added is not created and only products’ assembling is carried out. Considering Manufacture of food products, traditionally highly represented in the Serbian exports and production, in the ten-year period – from 2010 to 2019 – it recorded the fall of value added. This division also has extremely low investment efficiency, which further indicates its deeply rooted structural problems. The implications of the process of global value chains reduction for Serbia will depend upon the economic ambience, macroeconomic stability and investment in productive and attractive

activities. However, in the future the Serbian economy has good chance to ground the entry into new markets on the progress of its ICT sector, which offers a solid platform for the development, having been structured for several last years. During the pandemic and in the post-pandemic period this sector, along with industry, has expressed its considerable resistance to shocks; therefore, public administration measures need to be directed towards its further expansion.

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