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JEL: L60, O14, O25
DOI: 10.5937/industrija52-57858
UDC: 338.45:66(497.11)
334.732.5:334.716
Original Scientific Paper

The contribution of large enterprises to the manufacturing industry - implications for Serbia

Article history:
Received: 28 March 2025
Sent for revision: 20 April 2025
Received in revised form: 28 April 2025
Accepted: 5 May 2025
Available online: 16 May 2025

***Abstract**: This paper aims to examine the structure of manufacturing of selected European countries by enterprise size and compare it with the structure of Serbian manufacturing to better understand the characteristics of Serbia's manufacturing and provide the answers for the necessary path of future Serbian industrial policy. We used data from Eurostat datasets to calculate the shares of large enterprises in gross value added, employment and exports of selected European countries' manufacturing. Besides that, we calculated the respective shares in the higher technological level branches of chosen European countries, as well as the labour productivity level of total manufacturing. The same shares and indicators are then calculated for Serbia, using data from the Statistical Office of the Republic of Serbia. The results are similar in both European countries and Serbia. However, having in mind that Serbia's manufacturing is characterized by the domination of lower technology level branches, it is necessary for Serbia to improve the technological structure of its manufacturing, which will be possible only with the high share of large enterprises in manufacturing production.*

***Keywords**: large enterprises, manufacturing, technological level, industrial policy*.

Doprinos velikih preduzeća prerađivačkoj industriji – implikacije za Srbiju

***Apstrakt**: Ovaj rad ima za cilj da ispita strukturu prerađivačke industrije odabranih evropskih zemalja prema veličini preduzeća i da je uporedi sa*

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strukturom prerađivačke industrije Srbije kako bi se bolje razumele karakteristike prerađivačke industrije Srbije i pružili odgovori za neophodan put buduće industrijske politike Srbije. Koristili smo podatke iz skupova podataka Evrostata da bismo izračunali učešće velikih preduzeća u bruto dodatoj vrednosti, zaposlenosti i izvozu prerađivačke industrije odabranih evropskih zemalja. Pored toga, izračunali smo odgovarajuća učešća u granama višeg tehnološkog nivoa odabranih evropskih zemalja, kao i nivo produktivnosti rada ukupne prerađivačke industrije. Ista učešća i indikatori su potom obračunati za Srbiju, koristeći podatke Republičkog zavoda za statistiku. Rezultati su slični i u evropskim zemljama i u Srbiji. Međutim, imajući u vidu da srpsku prerađivačku industriju karakteriše dominacija grana nižeg tehnološkog nivoa, neophodno je da Srbija unapredi tehnološku strukturu svoje prerađivačke industrije, što će biti moguće samo uz visoko učešće velikih preduzeća u proizvodnji prerađivačke industrije.

***Ključne reči**: velika preduzeća, prerađivačka industrija, tehnološki nivo, industrijska politika.*

1. Introduction

The manufacturing industry of Serbia, after the beginning of the second wave of transition in Serbia in 2000, went through a very difficult and long-lasting period of restructuring and consolidation. The average yearly growth rate of its gross value added (further in the text: GVA) in the period 2001-2023 (where 2000 is the basis year) was only 2%.[3] Unfavourably, Serbian economic growth in a transition period, as well as in other Western Balkan countries, was built mainly on the growth in services, which is the one of main causes of rapid expansion in small and medium enterprises (further in text: SME) sector (Cerović, 2015). After such a protracted transition and underperforming growth in manufacturing production, one of the main questions that arises is what type of growth is needed for Serbia and, more precisely, is there a need for more productive firms that will be able to act as a backbone of manufacturing, which has shown very fragile growth over the last twenty years.

It is well known that the growth in Serbian manufacturing in the last two decades has been based on the growth in low-tech and medium-low-tech manufacturing industry branches. There is a wide consensus among Serbian economists that for more dynamic and sustainable manufacturing growth, it is necessary to be based on increased production in higher technology

[3] Authors' calculation based on the Statistical Office of the Republic of Serbia data

industries. To see possible ways for achieving an improvement in Serbian manufacturing technological structure, we have to examine the structure of its enterprises by size.

Unlike services, manufacturing is naturally based on large enterprises. Large enterprises provide the positive effects of economies of scale (large fixed costs are easier to cover with large production series, which is especially significant when it comes to research and development costs). Also, they are more capable of international expansion and large investments in additional or new-generation equipment and production lines.

Considering foreign and domestic literature, few previous papers deal with the GVA and the overall contribution of large enterprises to a country's economy, especially manufacturing. In the case of the Czech Republic's economy, large enterprises participated with 44.4% of the total GVA in 2011 (being in first place by share, where medium enterprises were second with a share of 20.8%), and with 30.6% of the total employment over the same year (Damborský & Hornychová, 2014). Although the contribution of micro enterprises was slightly higher (31.8%), when it comes to manufacturing, the share of large enterprises in total employment in 2010 was 41% (Ibidem). In a paper (Stenkula, 2006), it is shown that large manufacturing firms in Germany participated in total manufacturing employment in 2003 with 54.1%, while the lowest share of large firms was in the case of South European countries (Portugal 20.7%, Italy 22.2% and Spain 26.1%). Considering the contribution of large enterprises to research and development activities, for example, it is a fascinating fact that only 246 USA industrial enterprises with 10 thousand or more employees in 2005 had a share of 52% in the total research and development costs of USA industrial enterprises in that year (Rajić, 2011). In the case of European manufacturing firms, large enterprises perform better than small and medium enterprises in both product and process innovations (Vaona & Pianta, 2008). However, some authors found that the productivity growth is negatively correlated with firm size (Claessens, Djankov & Pohl, 1997). Although the SME enterprises are often seen as the engine of transition economies, their growth is also driven by the size of their total assets (Mateev & Anastasov, 2010).

Large and experienced firms have more capacity and resources to increase their internationalisation level. Therefore, the size and age of firms have a highly significant impact on the firms' expansion level in international markets (Çela, Hysa, Voica, Panait & Manta, 2022). The size of enterprises indeed seems to have a significant positive impact on the probability of exporting in the case of both CEE and Baltic transition countries (Cieślik, Michałek & Michałek, 2014). In other papers, it was found that besides firm size,

significant factors of direct export levels are labour productivity and product innovations (Cieślik & Michałek, 2018).

This paper aims to examine the contribution of large enterprises to the Serbian manufacturing industry and compare the results with those in relevant comparable European countries, to recommend the future necessary steps for Serbian industrial policy. Firstly, we will present the manufacturing structure of selected European countries (the large enterprises' shares in gross value added, employment, exports of goods, as well as labour productivity level/rank). Then, we will present the same indicators for Serbia. In case of selected European countries, we will use the Eurostat data, while for Serbia, the Statistical Office of the Republic of Serbia data will be used. This comparison of relevant data will help us conclude the necessary steps for the future Serbian industrial policy. Therefore, the contribution of this study is an in-depth analysis of large enterprises in Serbian manufacturing, which will show the best path for future industrial policy measures.

2. Serbia's manufacturing during transition

Following the period of large-scale privatisation and slow growth in production culminating with the Great Recession in 2008, there was a substantial recovery in Serbia's manufacturing GVA growth rates starting from 2015, which was stopped by the COVID-19 pandemic recession, and the fragile growth continued with the beginning of the war in Ukraine in 2022.

In the first decade of transition, industrial output share in GDP had a significant but negative impact on the economic growth rate, probably as a result of economic structural adjustments. However, in the second decade of transition, the industrial output share seemed to become highly important for improving economic performance, thus suggesting a need for the implementation of industrial policy measures as an integral part of transition countries' reform strategy (Cerovic, Nojkovic & Uvalic, 2014).

For Serbia, the experience of transition in CEE countries is very precious. The CEE countries have built up strong export-oriented manufacturing sectors boosted by foreign direct investment inflows, but they now need to transition to a new growth model that is more innovation-driven, enabled by a comprehensive industrial policy (Zavarska, Bykova, Grieveson, Hanzl-Weiss & Sankot, 2023).

After the initial restructuring and downsizing of the industry sector, CEE transition countries started to recover their manufacturing production. By 1999, the Czech Republic restored its initial share of manufacturing GVA in

total GDP, while Hungary increased that share. In 2000, Hungary and Poland achieved industrial production higher by 50% and 70% respectively, compared to 1990 (Havlik, 2001). Foreign direct investments (further in text: FDI) were the main driving force of CEE countries' industrial restructuring, orientation towards technology-driven industries, and growing export shares of these industries (Havlik, 2003). Foreign affiliates had a superior performance compared to domastic companies when it comes to labour productivity and export orientation, due to their better capital equipment, market position, know-how and the usage of economies of scale (Hunya, 2004). In some papers, it was found that the convergence of the CEE countries and Slovenia was triggered by a surge in investments (1995–2007), which afterwards moderated while the relative importance of institutions increased (Petrović & Gligorić Matić, 2023).

Although South East European countries (further in text: SEE) had a similar reform and transition pattern as CEE countries, with services as the largest sector, these countries received a much smaller FDI amount. As a result, despite only a twenty per cent lower number of inhabitants compared to CEE countries, SEE countries had an overall GDP in the amount of one-third of CEE countries' GDP (Stokovic & Skuflic, 2006). Serbia, like other SEE countries, attracted a much smaller amount of manufacturing FDI, especially in higher technology-level branches. We can see that dynamic growth in CEE countries' manufacturing GVA and exports was driven mainly by large foreign companies, which can use the effects of economies of scale, better equipment and technology, and have a better international market position.

3. Research methodology

In this paper, we use the datasets from Eurostat (Enterprise statistics by size class and NACE Rev. 2 activity (from 2021 onwards), 2025) and the Statistical Office of the Republic of Serbia (Annual indicators of business entities, by classes of persons employed, 2025), to examine the structure of GVA, employment, exports of goods and labour productivity by the size of enterprises of selected European countries and Serbia. We will observe the data for total manufacturing and high-tech and medium-high-tech branches separately for representative EU countries.

Countries used in research are: Germany, France (developed "old" EU members and the largest EU economies), Czechia, Hungary (two transition CEE countries), Italy and Greece (two South European "periphery" countries, with an underdeveloped manufacturing sector and high public indebtedness

level). GVA and exports of goods in the Eurostat database are originally given in EUR million, so we calculated the relative percentage share of large enterprises (number of employees >= 250 as size criteria) in total GVA / exports. In case of employment, data are originally shown as a number of persons employed, so we calculated the relative percentage share of large enterprises in the total employment level. Finally, the labour productivity is calculated as GVA per person employed, in thousand EUR (instead of million EUR for easier presentation purposes). Then, we can rank the productivity level by enterprise size.

After that, using the comparative method of analysis, we will observe the same data and indicators for Serbia (i.e. separately for total manufacturing and higher technology level branches). GVA and exports of goods are originally shown in RSD million, so we calculated the relative shares of large enterprises in total GVA/exports. Similarly, we calculated the relative shares of large firms in the total number of employees by industry branches. At the end, we will calculate the labour productivity amount in RSD million, and rank it by enterprise size. By comparing the structure of European economies' manufacturing with the structure of Serbian manufacturing, we will be able to make more precise conclusions about the structural problems of Serbian industry.

4. The manufacturing structure of selected EU countries

The EU debt crisis in 2014 pointed out long-lasting problems in European "South" periphery countries, especially Greece. The main branch of the manufacturing industry in Greece in 2010 was the production of food, beverages, and tobacco products, with a one-third (33.3%) share in total manufacturing GVA, compared with a 13.7% share in the EU (Hermann & Kritikos, 2013).

Large trade surpluses, which Germany achieved with the countries of the European periphery (southern European countries), had their equivalent in growing trade deficits in these countries. The opportunity to reinvest profits in Germany was seen in investing in the non-tradable sector of the economy (e.g. construction), as well as financing further consumption of imported goods and services. Growing trade deficits fueled the growth of credit borrowing and the formation of financial bubbles in credit-oriented economies. The results of such developments were increasing deficits of the current account of the balance of payments and entering into a debt crisis (Bieler, 2019).

The European debt crisis and the slow recovery of the “South” periphery countries reminded the EU of the importance of industrial production and industrial policy. We will show the differences in the manufacturing structure between major European economies and CEE countries on one side and South European countries on the other.

To present the structure of manufacturing production by enterprise size, we will use the most recent Eurostat data from 2022 and 2023. As presented in Table 1, large firms had the largest share in the total manufacturing GVA of selected EU countries in 2022. The highest shares are noticed in the major manufacturing countries, i.e., Germany and France. Relatively higher shares are also observable in transition economies (Czechia and Hungary), in line with previous studies (Damborský & Hornychová, 2014). On the other hand, lower shares are achieved in the case of the European “South” periphery – Greece and especially Italy (where the share of large enterprises is far below 50%).

Table 1. Manufacturing GVA share of large enterprises in total manufacturing GVA of selected EU countries in 2022 (in %)

Country	Share
Germany	74.5
France	72.9
Czechia	59.4
Hungary	69.0
Greece	54.3
Italy	42.2

Source: Authors’ calculation based on Eurostat data

The highest contribution from large enterprises in the manufacturing of EU countries is also observable from their share in total employment in 2023 (previous data). Large enterprises’ share in total manufacturing employment was 61.9% in Germany and 59.8% in France (Table 2). Transition countries recorded somewhat lower results (45.8% in Czechia and 51.6% in Hungary). However, the share of large enterprises is significantly lower in the European “South” periphery countries (below one-fourth in Greece and less than one-third in Italy). These results from the new 2023 data are in line with other authors’ findings (Stenkula, 2006).

Table 2. Employment share of large enterprises in total manufacturing employment of selected EU countries in 2023 (previous data, in %)

Country	Share
Germany	61.9
France	59.8
Czechia	45.8
Hungary	51.6
Italy	28.9
Greece	23.2

Source: Authors' calculation based on Eurostat data

We can also observe data related to the share of large enterprises in total manufacturing exports of goods. The share of large firms in total manufacturing exports in 2023 for the chosen European countries is given in Table 3. In the case of the largest EU economies, as well as transition countries, the contribution of large enterprises in most cases exceeds 80%. On the other hand, in Italy, this share is far lower.

Table 3. Manufacturing exports of goods share of large enterprises in selected EU countries in 2023 (previous data, in %)

Country	Share
Germany	88.7%
France	85.8%
Czechia	76.7%
Hungary	83.9%
Italy	52.0%
Greece	76.5%

Source: Authors' calculation based on Eurostat data

Finally, labour productivity (measured as GVA per worker) structure shows us that large enterprises are by far the most productive, regardless of the European country group. Productivity data for selected European countries in 2022 are shown in Table 4. Large firms in the presented countries are on average 65% more productive than medium firms, 2.2 times more productive than small firms and 3.7 times more productive than micro firms. The productivity level of large enterprises is 44.5% higher than the total manufacturing average, implying that these enterprises are key for dynamic manufacturing growth in European countries.

Table 4. Manufacturing labour productivity of selected EU countries in 2022 (GVA per worker, 000 EUR)

Country	Micro	Small	Medium	Large	Total
Czechia	17.5	30.6	37.4	51.1	39.7
Germany	46.2	59.4	72.7	116.2	96.2
Greece	12.6	29.2	43.6	101.9	45.1
France	37.8	58.9	73.6	104.2	85.8
Italy	36.3	62.9	89.5	119.0	79.7
Hungary	14.0	24.0	32.7	53.5	39.8

Source: Authors' calculation based on Eurostat data

If we observe only data from high-tech and medium-high-tech industries, we can see that the shares of large enterprises are even higher. In Table 5, we can see the very high shares of large firms in high-tech and medium-high-tech manufacturing branches. Large enterprises contributed to the GVA of higher tech levels' industrial branches in 2022, with 85.0% in Germany and 87.1% in France. Shares in transition countries were very high, too – 75.6% in Czechia, and 84.0% in Hungary. These results are expected, as the higher technological level manufacturing branches require high capital investments and relatively higher research and development costs. Therefore, the large enterprise size is especially needed in these branches to deal successfully with high capital expenditures and fixed production costs. In 2022, large German enterprises in these branches had nearly 11 pp higher share than in the case of total manufacturing. France had a 14 pp higher share, Hungary's share was higher by 15 pp and Czechia's by 16 pp.

Table 5. High-tech and medium-high-tech manufacturing GVA share of large enterprises in total high-tech and medium-high-tech manufacturing GVA of selected EU countries in 2022 (in %)

Country	Share
Germany	85.0
France	87.1
Czechia	75.6
Hungary	84.0
Italy	54.0
Greece	N/A

Source: Authors' calculation based on Eurostat data

The contribution of large firms to the total manufacturing exports is also higher if we focus only on high-tech and medium-high-tech branches. In 2023, over 90% of the total exports of these branches in Germany, France, and Hungary came from large enterprises, and over 85% in the case of Czechia. On the other hand, the share is much lower in Italy (59.5%).

Having in mind all the data presented so far, we can conclude that the contribution of large enterprises to the manufacturing of the largest European economies, as well as the transition economies, is crucial. The advantages of economies of scale are particularly visible in higher technological level branches. Low shares of large firms are present only in South European countries, which have underdeveloped manufacturing sectors and large problems with their public indebtedness levels, while some of these countries are largely and traditionally based on small and medium enterprises (Italy).

5. The manufacturing structure of Serbia

The structure of Serbian manufacturing will be presented in the same manner as for the European countries. We will analyse data on GVA, employment, exports and labour productivity, and then compare the results with those from selected EU countries.

As shown in Table 6, large firms contributed to the GVA of manufacturing enterprises in Serbia with 60.8% in 2022. In only five of 24 manufacturing branches, large enterprises are not in first place by GVA amount (marked in Italic). To compare these results with services, we used the largest service industry, i.e., the wholesale and retail trade. We can see that large enterprises' share in the total GVA of this industry in 2022 was only 28.5%, or more than half lower than in manufacturing. Micro enterprises in the wholesale and retail trade have a four times higher share than micro manufacturing enterprises, while micro and small wholesale and retail enterprises together have a 2.8 times higher share than micro and small manufacturing enterprises taken together. These data clearly show that micro, small and medium enterprises are more common and contribute more to the GVA in the services industries, while large firms dominate in manufacturing due to their strength and the nature of manufacturing production.

The significance of large enterprises is especially visible in branches which are characterised by large investments in fixed assets and equipment. Examples are the production of oil derivatives (share of large enterprises in total GVA 99.2%), manufacture of basic metals (90.2%), pharmaceutical industry (89.3%), etc.

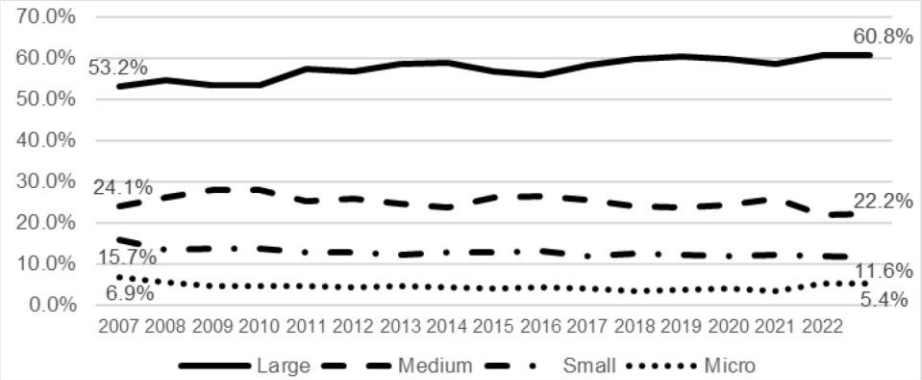
Table 6. Serbian manufacturing branches' GVA structure by enterprise size in 2022, compared to wholesale and retail trade (in %)

Industry NACE Rev2.	Large	Medium	Small	Micro
C - Manufacturing	60.79	22.19	11.63	5.39
10 Manufacture of food products	51.20	29.14	13.46	6.20
11 Manufacture of beverages	70.72	12.48	12.37	4.43
12 Manufacture of tobacco products	76.52	22.66	0.80	0.02
13 Manufacture of textiles	51.74	31.83	12.86	3.57
14 Manufacture of wearing apparel	56.69	22.80	13.39	7.13
15 Manufacture of leather and related products	50.94	37.72	8.55	2.79
16 *Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials*	*3.64*	39.35	38.12	18.89
17 Manufacture of paper and paper products	47.37	37.56	10.47	4.60
18 *Printing and reproduction of recorded media*	*0.00*	42.47	31.82	25.72
19 Manufacture of coke and refined petroleum products	99.18	0.38	0.40	0.04
20 Manufacture of chemicals and chemical products	68.39	20.19	9.12	2.29
21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	89.32	6.85	2.90	0.93
22 Manufacture of rubber and plastic products	55.62	25.15	13.82	5.41
23 *Manufacture of other non-metallic mineral products*	*32.38*	48.88	12.72	6.02
24 Manufacture of basic metals	90.18	6.18	2.59	1.05
25 Manufacture of fabricated metal products, except machinery and equipment	33.07	33.00	23.28	10.64
26 *Manufacture of computer, electronic and optical products*	*14.37*	46.31	22.20	17.11
27 Manufacture of electrical equipment	72.96	15.48	8.38	3.18
28 Manufacture of machinery and equipment n.e.c.	34.76	30.73	25.03	9.48
29 Manufacture of motor vehicles, trailers and semi-trailers	89.70	8.73	1.42	0.16
30 *Manufacture of other transport equipment*	*25.77*	50.39	18.52	5.33
31 Manufacture of furniture	42.86	31.70	17.83	7.62
32 Other manufacturing	27.53	18.83	26.98	26.66
33 Repair and installation of machinery and equipment	30.55	21.66	29.20	18.59
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	28.48	23.65	26.29	21.58

Source: Authors' calculation based on the Statistical Office of the Republic of Serbia data

Large enterprises' GVA share had a significant rising trend in the period 2007-2022 (Fig. 1). These firms increased their share by 7.6 pp over the observed period. All other firms' size categories recorded a decrease in share, which is most notable in the case of small enterprises (decrease of 4.1 pp).

Figure 1. Serbian manufacturing GVA structure by enterprise size in the period 2007-2022 (in %)



Source: Authors' presentation based on the Statistical Office of the Republic of Serbia data

It is interesting that if we look at the structure of large enterprises' GVA in 2020, we can see that 57.3% of large enterprises' GVA came from originally socially owned enterprises[4]. Nearly one-third or 29.0% of GVA was the share of originally foreign private enterprises, while the share of originally domestic private enterprises was only 13.7%. The curiosity is that 73.5% of originally foreign private enterprises' GVA was created in only 3 branches: the automotive industry, production of electrical equipment, and textile industry. More than four-fifths (83.9%) of originally domestic private enterprises' GVA was concentrated in five branches, with a majority share of these enterprises in only one branch. Finally, originally socially owned enterprises had a majority stake in 14 branches (7 branches over 90%)[5].

If we, on the contrary, have a look at the size structure of enterprises by their original ownership form in 2020, it can be seen that large enterprises contributed 77.5% of the total GVA of originally socially owned enterprises. A similar share was in the case of originally foreign private enterprises (74.0%).

[4] Authors' calculation based on data from Serbian Business Registers Agency
[5] Ibidem

A quite opposite result is observed from originally domestic private enterprises, where the share of large enterprises in total GVA was just 23.3%[6]. The conclusion from this observation is that the majority of large enterprises come from privatized enterprises, followed by foreign enterprises founded as a result of greenfield investments. Originally private enterprises, founded by domestic investors, in the vast majority didn't succeed to arise to a large size. Manufacturing demands large investments in equipment and technology, and in many cases efficient production provided by large scale of production, which is often a very hard task for domestic investors.

Large enterprises' GVA in high-tech and medium-high-tech branches had a strong rising trend and increased their share in total GVA of these branches from 46.1% in 2007 to 69.3% in 2022. Therefore, the share of large firms in high-tech and medium-high-tech branches' GVA in 2022 was 8.5 pp higher than in total manufacturing. In 2022, the shares were especially high in the automotive and pharmaceutical industries (over 89%), the manufacture of electrical equipment (nearly 73%), and the chemical industry (68%).

The structure of manufacturing employment in 2022 by size of enterprises is given in Table 7. The share of large firms is 46.7%, the highest share among the groups of firms by size and more than two times higher than medium enterprises - the firm size group with the second highest share. Medium enterprises participate in total employment with 22.0%, small enterprises with 16.3%, while the share of micro firms is 14.9%. Again, to compare shares in manufacturing employment with those in services, we also presented data for the largest service industry, i.e., the wholesale and retail trade. As we can see from Table 7, micro firms' share in total employment of wholesale and retail trade is 42%, while the share of large firms is only 25.2%. therefore, we can again see that micro, small and medium enterprises are dominant in services' employment.

[6] Authors' calculation based on data from Serbian Business Registers Agency

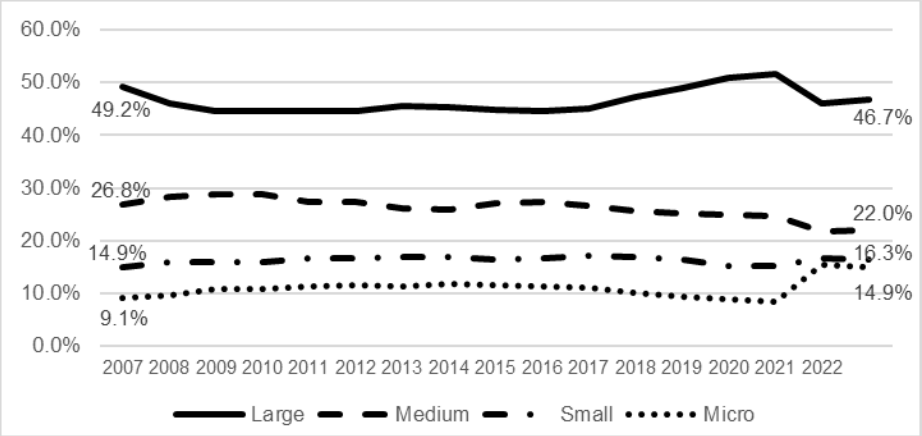
Table 7. Serbian manufacturing branches' employment structure by enterprise size in 2022, compared to wholesale and retail trade (in %)

Industry NACE Rev2.	Large	Medium	Small	Micro
C - Manufacturing	46.73	22.02	16.33	14.92
10 Manufacture of food products	31.36	26.94	21.84	19.86
11 Manufacture of beverages	39.23	25.93	14.81	20.03
12 Manufacture of tobacco products	63.47	31.55	4.55	0.43
13 Manufacture of textiles	53.31	21.25	13.19	12.26
14 Manufacture of wearing apparel	53.14	17.29	16.67	12.89
15 Manufacture of leather and related products	53.27	29.36	11.74	5.63
16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	3.87	23.50	35.28	37.35
17 Manufacture of paper and paper products	25.43	33.18	21.20	20.19
18 Printing and reproduction of recorded media	0.00	28.63	30.19	41.18
19 Manufacture of coke and refined petroleum products	74.54	14.26	7.89	3.30
20 Manufacture of chemicals and chemical products	46.66	24.41	18.12	10.82
21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	83.98	8.90	5.40	1.72
22 Manufacture of rubber and plastic products	43.19	27.41	15.96	13.44
23 Manufacture of other non-metallic mineral products	27.45	27.34	22.10	23.11
24 Manufacture of basic metals	81.58	11.41	5.04	1.97
25 Manufacture of fabricated metal products, except machinery and equipment	33.08	26.41	21.67	18.85
26 Manufacture of computer, electronic and optical products	17.38	37.30	17.91	27.41
27 Manufacture of electrical equipment	74.88	15.05	5.91	4.15
28 Manufacture of machinery and equipment n.e.c.	29.57	29.82	25.29	15.32
29 Manufacture of motor vehicles, trailers and semi-trailers	91.92	6.06	1.25	0.77
30 Manufacture of other transport equipment	15.29	56.49	17.97	10.25
31 Manufacture of furniture	34.41	27.21	21.57	16.80
32 Other manufacturing	15.83	12.43	22.33	49.41
33 Repair and installation of machinery and equipment	33.27	23.05	18.01	25.67
G - Wholesale and retail trade; repair of motor vehicles and motorcycles	25.15	13.95	18.92	41.98

Source: Authors' calculation based on the Statistical Office of the Republic of Serbia data

If we observe the manufacturing employment shares of enterprises by size in the period 2007-2022, we can see that there is an observable decreasing trend in the share of large and medium enterprises, while small and especially micro enterprises have increased their contribution levels (Fig. 2).

Figure 2. Serbian manufacturing employment structure by enterprise size in the period 2007-2022 (in %)



Source: Authors' presentation based on the Statistical Office of the Republic of Serbia data

Participation of large enterprises in total high-tech and medium-high-tech branches' employment is much higher than in the total manufacturing, and it rose from 56.7% in 2007 to 70.8% in 2022.

In Table 8, we can see the shares of large firms in total Serbian exports by manufacturing branch in 2023. Large enterprises in 2023 contributed more than 70% in total manufacturing exports and, of 24 branches in total, only five branches had a share lower than 50% (marked in Italic).

Table 8. The share of large enterprises in Serbian manufacturing branches' export in 2023 (in %)

Manufacturing industry	71.44%
10 Manufacture of food products	54.23%
11 Manufacture of beverages	77.30%
12 Manufacture of tobacco products	91.85%
13 Manufacture of textiles	65.20%
14 Manufacture of wearing apparel	72.41%
15 Manufacture of leather and related products	71.30%
16 Manufacture of wood and of products of wood, except furniture	*4.43%*
17 Manufacture of paper and paper products	69.24%
18 Printing and reproduction of recorded media	*10.17%*
19 Manufacture of coke and refined petroleum products	91.73%
20 Manufacture of chemicals and chemical products	74.41%
21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	95.22%
22 Manufacture of rubber and plastic products	69.53%
23 Manufacture of other non-metallic mineral products	62.71%
24 Manufacture of basic metals	84.39%
25 Manufacture of fabricated metal products, except machinery and equipment	47.05%
26 Manufacture of computer, electronic and optical products	51.03%
27 Manufacture of electrical equipment	80.64%
28 Manufacture of machinery and equipment n.e.c.	49.20%
29 Manufacture of motor vehicles, trailers and semi-trailers	90.43%
30 Manufacture of other transport equipment	64.53%
31 Manufacture of furniture	50.33%
32 Other manufacturing	60.65%
33 Repair and installation of machinery and equipment	3.65%

Source: Authors' calculation based on the Statistical Office of the Republic of Serbia data

The contribution of large enterprises in high-tech and medium-high-tech branches' exports is higher by 9.6 pp compared to the total manufacturing and amounted to 81.0% in 2023. Two branches from this group had a share higher than 90% (Manufacture of basic pharmaceutical products and pharmaceutical preparations and Manufacture of motor vehicles, trailers, and semi-trailers), while only one branch had a share lower than 50% (Manufacture of machinery and equipment n.e.c).

Finally, we can observe the differences in labour productivity levels by the size of enterprises. Total manufacturing productivity in 2022, measured as GVA in RSD million per worker, is presented in Table 9. Large firms are about 29.2% more productive than medium firms, 82.4% more productive than small firms, and 3.6 times more productive than micro firms. Large enterprises' productivity level is 30.2% higher than the total manufacturing average, and these enterprises are the only enterprise group with a productivity level

significantly above the total manufacturing average (medium enterprises' productivity level is almost the same as the total manufacturing average, being only 0.8% higher).

Table 9. Labour productivity of Serbian manufacturing in 2022 by enterprise size (GVA per worker, million RSD)

Large	Medium	Small	Micro	Total
3.32	2.57	1.82	0.92	2.55

Source: Authors' calculation based on the Statistical Office of the Republic of Serbia data

Based on all presented data, it can be concluded that Serbian manufacturing production is, like in most European countries, mostly based on large enterprises. The share of large enterprises in manufacturing GVA in Serbia is very similar to Czechia and somewhat lower than Germany, France and Hungary. A similar pattern can be observed for the share of large enterprises in total employment. Serbia's share of large firms in total employment is close to the share of Czechia and Hungary, while somewhat lower than Germany and France. The share of large enterprises in total exports of goods in Serbia is lower than in all other observed countries, except Italy. Although the contribution of large enterprises to the Serbian exports of goods is the highest among size classes of enterprises, there is still a space for improvement, if we take into account data from other observed countries. Finally, the most productive firms in Serbian manufacturing are large enterprises, the same as in the relevant European countries.

Therefore, we can make a clear conclusion that large enterprises in Serbian manufacturing are the best performing, although with somewhat lower performance levels than the most advanced EU countries. The overall level of large enterprises' performance in Serbia is largely comparable to the level in transition CEE countries.

However, unlike CEE countries, the technological structure of Serbian manufacturing is characterised by the domination of lower technological level branches. Therefore, the main task for the future Serbian industrial policy should be the improvement of manufacturing technological structure, which will be based on large enterprises, capable of large investments in new technologies and an increase in production efficiency.

The institutional environment in Serbia during the transition was unfavourable for dynamic growth in manufacturing, driven by new, young enterprises. It was characterised by the domination of subsidies for FDIs in lower tech level

branches, to create of large number of new jobs, but with low salaries. At the same time, the macroeconomic environment is characterised by a chronically overvalued domestic currency and large difficulties in financing investments in manufacturing. One of the main issues in this area is the non-existence of a development bank, which exists even in Germany as a developed EU country.

6. Conclusions

Serbian manufacturing had a very hard development path during the second wave of transition, starting after 2000. Its average GVA growth per year in the period 2001-2023 was only 2%. To see the possible way for more dynamic manufacturing growth, we have to more closely examine the structure of its enterprises. Firstly, we needed to examine the structure of European manufacturing enterprises. The major European economies, i.e. Germany and France, are characterised by the high domination of large enterprises in their manufacturing GVA. It is also a characteristic of the most advanced transition countries, while the somewhat lower shares are present in the case of South Europe periphery countries (Greece, Italy, Spain, and Portugal) due to their underdeveloped manufacturing and domination of small and medium enterprises in their economies.

A similar conclusion may be derived when it comes to the shares of large firms in employment and exports of EU countries, as well as labour productivity levels. Especially high shares of large enterprises are observed in high-tech and medium-high-tech branches.

Using the comparative method of analysis, we compared the observed data with the data for Serbian manufacturing. Serbian manufacturing is also characterized by the clear domination of large enterprises in its GVA. The share of large firms in GVA also showed a strong rising trend throughout the 2007-2022 period. Large enterprises also dominate in total employment level, although the increasing share of small firms is present, confirming their important role when it comes to the overall employment levels in the economy.

Regarding the participation in total manufacturing exports of goods, we can see that, again, the large enterprises have a leading role in the total exports amount. Their share is even higher in the exports of high-tech and medium-high-tech branches. Finally, we can conclude that the labour productivity level of total manufacturing is the highest for large enterprises.

As we can see from the analysed data, in both EU countries and Serbia, large enterprises have a dominant role in manufacturing production. Their advantages related to the economy of scale and the higher capability of

dealing with high investment costs are closely related to the industrial way of production.

However, the Serbian manufacturing is characterised by many institutional issues, especially when it comes to the industrial policy. Instead of the promotion of higher technology branches' production, Serbia's industrial policy was oriented towards new FDIs in lower technology branches, with the aim of creating a large number of new jobs. Besides that, the macroeconomic environment in Serbia during the transition has been unfavourable for a dynamic growth in manufacturing, driven by the establishment of new enterprises. Many problems were present, like the chronically overvalued domestic currency, difficulties related to the investments financing, the non-existence of a development bank, etc.

The main problem of Serbian manufacturing, unlike most developed European countries, is the small share of high-tech and medium-high-tech branches in total manufacturing. As we saw from the analysis of European countries' data, higher technology branches demand a highly dominant share of large enterprises, capable of large investments in new technologies and an increase in productivity level. Therefore, the only possible path for Serbian manufacturing is a strong increase in the share of higher technology branches in total manufacturing production, which will be backboned by large and strong companies in these branches, capable of large investments in know-how and an increase in production efficiency.

Limitations of this study are related to the too narrow time focus. We performed only descriptive analysis, but for more detailed conclusions, a comprehensive econometric analysis is needed, which will be focused on a longer period. Future research in this area should be oriented toward performing a more detailed time-series analysis, based on relevant data for Serbia and comparable European countries.

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