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COMPETITIVENESS GAP IN SERBIA'S METALS AND ELECTRONICS INDUSTRY¹

Konkurentski jaz metalske i
elektronske industrije Srbije

Abstract

Despite marked fall in production since 1980, metals and electronics industry plays an important role in Serbia's economy, reflected in its share in employment, export, and gross domestic product. Export in the sector has a sound basis for future growth, where vicinity of EU markets coupled with favorable trade regime since 2000 creates a crucial competitive advantage. Serbian companies are present in the entire spectrum of the metals and electronics value chain from primary to semi-finished to final goods production, albeit mostly with low value added products at the moment. The major competitiveness drawback is that the companies in metals and electronics industry have limited access to finance, which results in insufficient investments in technology and innovation. There is also a skills gap, especially in operating new machinery, and infrastructure limitations with regard to rail and river transport, presenting key challenges to future development.

Key words: *metals, electronics, industry, Serbia, competitiveness, technology, skills gap*

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Note on methodology: The authors of this article have reviewed secondary data and information collected from the public domain, primary and secondary market research, Government organizations and experts in-house sources. Information collected was used to formulate questionnaires for over 40 direct and focus group interviews with sector stakeholders, including manufacturers, associations/clusters, different organizations, government officials and other sector experts. The questionnaires were designed to provide both quantitative and qualitative information and to encourage practical, timely and market-based recommendations from respondents. Field interviews were conducted in several towns in Serbia, namely Belgrade, Novi Sad, Temerin, Loznica and Kragujevac (with additional phone and in person interviews with companies from throughout Serbia including Gornji Milanovac, Cacak, Pozega, etc). The interviewed companies were selected to allow for geographic, product and company size diversity. This article is a result of a larger study supported by the Swiss Import Promotion Program – SIPPO.

Sažetak

I pored naglog pada proizvodnje nakon 1980. godine, metalska i elektronska industrija imaju značajnu ulogu u ekonomiji Srbije zbog svog uдела u zaposlenosti, izvozu i bruto domaćem proizvodu. Izvoz ovih industrija ima dobru osnovu za dalji rast, a blizina tržišta EU i povoljni trgovinski režim uspostavljen nakon 2000. godine smatra se ključnom konkurentskom prednošću. Preduzeća iz Srbije su u širokom spektru prisutna u lancu vrednosti metalske i elektronske industrije kroz proizvodnju primarnih proizvoda, polu-proizvoda i finalnih proizvoda, iako većina proizvoda za sada ima nisku dodatnu vrednost. Najveći konkurentski nedostatak je taj što firme iz metalske i elektronske industrije imaju probleme sa finansiranjem što za ishod ima nedovoljno ulaganje u nove tehnologije i inovacije. I pored mnogih obrazovnih programa visokog i srednjeg stručnog školstva, postoji jaz u osposobljenosti radne snage. Nedovoljna kvalifikovanost radne snage posebno je izražena kod rukovanja novom tehnologijom. Upravo manjak ovih znanja kao i infrastrukturna ograničenja, pre svega kada su železnički i rečni saobraćaj u pitanju, predstavljaju najveće izazove u budućnosti.

Ključne reči: *metalska industrija, elektroindustrija, Srbija, konkurentnost, tehnologija, znanje*

Overview of the metals and electronics sector in Serbia

Following five decades of Communism, and a decade of violent conflict and sanctions that accompanied the break-up of former Yugoslavia, Serbia initiated a democratic transition process with the change of regime in 2000. Economic reintegration in world markets required comprehensive reforms, leading to European Union and World Trade Organization accession. At present, Serbia is an associate member and official candidate for membership

in the European Union (candidacy status awarded in March 2012), benefiting from customs-free trade to the EU for most products since November 2000 (which was solidified by Interim Trade Agreement, an integral part of the Stabilization and Association Agreement signed with the EU as of February 2010), as well as financial and technical assistance from the EU (about 190 million Euros annually). Serbia is also finalizing its WTO negotiations, and it has already (re)joined other relevant institutions such as the UN, Council of Europe, Partnership for Peace, and entered in free trade agreements with CEFTA, EFTA and bilaterally with Russia, Turkey, and other countries. The current government follows the path of economic and social reform centered on transition to free market economy and establishment of EU market standards. Serbia is considered an upper-middle income economy according to the World Bank, with a GDP for 2010 estimated at 39.1 billion USD (5,366 USD GDP per capita) [19]. The total economic growth has declined as a result of the World Economic Crisis, but exports continue to grow at a high rate. The key economic problem is the rising unemployment, surpassing 25% in 2012. According to the World Economic Forum, Serbia ranks as 95 of 142 surveyed countries [22], with respective scores of the Development of institutions 121, Infrastructure 84, Higher education and training 81, Goods market efficiency 132, Labor market efficiency 112, Financial market development 96, Technological readiness 71, Innovation and sophistication factors (10.0%) 118, Business sophistication 130 and Innovation 97. In 2012, increasing public debt is a rising concern, with the government faced with intense pressure to undertake difficult and generally unpopular reforms, including pension reform and public sector restructuring to maintain stability and improve competitiveness. If these reforms are not undertaken, Serbia's growth will stagnate, with risk of future financial insolvency.

Serbian metal processing and electronics industry numbered 5,018 companies in 2009² and employed 112,983 people in 2010, exhibiting a steady decrease in employment

2 Note: The SIEPA database contains 206 companies listed in the areas of Metal and Machinery Industry. The actual number of functioning companies is therefore somewhere between 200 and 2000 in this subsector and this would be more indicative of the actual sector activity, especially when considering a high share of micro and small enterprises in the sector.

over the last decade until 2010 when statistics showed a slight increase compared to the previous year. When including weapons manufacturing, which is not analyzed here, total employment in metals and electronics sector in Serbia is 116,000, which is 11.7% of total employment, amounting to 5.9 percent of Serbia's Gross Domestic Product (GDP), with revenue of 5.3 billion dollars in 2011 and exports amounting to 2.7 billion dollars in 2011, which is 22.6% of total Serbian exports (see Figure 1 and Table 1).

Figure 1: Share of metals and electronics industry exports in total Serbian exports, 2011

There is a similar, somewhat larger share of 26% of the industry in the total imports of Serbia.

An analysis of Serbia's export markets identifies Europe as the highly dominant export destination, especially Austria, Italy and Slovenia in the European Union, but also neighboring Bosnia and Herzegovina and Montenegro – and the Russian Federation. Russia is the farthest market, other than Egypt and Israel that are a less significant export destination in terms of current export value. The export focus on the closest EU members and the region indicates market vicinity as a crucial competitive advantage of Serbia, especially considering high transport costs associated with most of the export products.

Table 1: Metals and electronics in Serbia –Trade figures, 2008-2011

Unit: USD million	2008	2009	2010	2011
Imports	7551	5178	4762	5223
Exports	2693	2217	2228	2662
Trade deficit	4858	2961	2534	2661

Source: Serbian Chamber of Commerce – Association of Metal and Electronics Industry, based on data from Statistical Office of the Republic of Serbia, Statistical Yearbook, 2011 [16].

There is a trade deficit in the sector, albeit reduced in the 2008-2011 period as imports are decreasing and exports overall increasing, recovering from crisis-induced fall in 2009 and 2010; export increase is especially apparent in manufacture of electrical equipment for motors and vehicles and electrical household appliances. On the global level, Serbian exports of metal and electronic products represent a fraction of world exports, notably less than one percent of world exports. On a regional level, Croatia is the most successful exporter overall, with Serbia following, and taking the regional lead in copper exports. The countries in the region are well integrated and frequently appear in top twenty suppliers or export destinations for products in the sector. The World Bank considers trade with the EU to be “a key driver of SEE6 (Western Balkans) export performance and overall economic growth.” The EU accounts for 58.2 percent of total exports (2010) with the lion’s share directed to Italy and Germany. Intra-regional trade accounts for about 22 percent of exports of SEE6 economies and is especially important for Serbia and Montenegro [20, p. 7].

As Table 2 demonstrates, micro and small companies dominate metals and electronics sector in Serbia. This has been a steady trend over the last decade, indicating that there are barriers to development of the initial entrepreneurial activity in the sector but that the small and medium size enterprises’ (SMEs) activity provides a platform for growth should constraints – principally in the form of access to finance and technology gap – be overcome.

In the European Union, SMEs also play a significant role in metalworking and metal articles (MMA) industries. “SMEs represent nearly the whole of the MMA sector, 80 per cent of which have less than 10 employees per firm. In terms of output and value added, SMEs in the MMA sector play a much more significant role than they do in the in the EU manufacturing sector as a whole. This stresses the importance of SMEs in the MMA sector and emphasizes the need to understand their business models and competitive environment, since their competitiveness has a major impact on the sector as a whole [3, p. 106].”

The metals and electronics sector in Serbia had reached its peak in the 1980s, and practically collapsed in the 1990s as a result of the violent break-up of the former Yugoslavia and international sanctions that cut off the trade lines and reduced domestic purchasing power. The employment in the sector was however artificially maintained, with most people earning extremely low salaries or not earning any salaries but remaining officially employed. As a result of this unrealistic policy in the 1990s, industry’s imminent fold became associated with the privatization process that was initiated upon regime change in the early 2000s and not with the loss of markets and competitiveness that started with the political and market changes in Europe and then Yugoslavia in the 1990s: “Privatization of the metal sector had a very modest achievement both for the state and for economic development. Even more modest results were recorded in recovery of problematic big companies in metal sector [1, p. 4].” Even experts in the sector claim privatization concept to be the root

Table 2: Number of companies in Serbia – 2009 (latest, 2011 data)

	Total	Micro	Small	Medium	Large
Total	82355	70340	9202	2289	524
Manufacturing	17145	13167	2745	989	244
Manufacturing – Metals and Electronics	5018	3778	844	306	90
Manufacturing of basic metals	271	178	49	33	11
Manufacture of fabricated metal products, except machinery and equipment	1963	1492	343	105	23
Manufacture of machinery and equipment n.e.c	805	591	146	55	13
Manufacture of motor vehicles, trailers and semi-trailers	255	164	38	30	23
Manufacture of other transport equipment	107	68	20	16	3
Subtotal – Metals	3401	2493	596	239	73
Manufacture of electrical equipment	481	347	89	29	16
Manufacture of computer, electronic and optical equipment	1136	938	159	38	1
Subtotal – Electronics	1617	1285	248	67	17

Note: Micro = up to 10 employees; Small = up to 50 employees; Medium = up to 250 employees; Large = more than 250 employees

Source: Statistical Office of the Republic of Serbia, Statistical Yearbook, 2011, p.190. This data does not include the weapons manufacturing subsector [18].

of the problem and not the end of what had become an unsustainable economic policy:

“Yet, the biggest blow was the privatization concept applied in Serbia in the last decade. The high unemployment is concentrated in specific regions where large state-owned factories once were the sole employers. Due to inadequate privatization processes, most of these companies have decreased productivity and employment, while the new-born SMEs still don’t have the capacity and international competitiveness to compensate for the unemployment created [21].”

While it is certainly true that in many cases the new owners ceased production of facilities that had a higher value as real estate property, most of the large metals and electronics facilities simply were not attractive to investors who had the capital to invest in technology and skills update and the management to reach ever competitive markets of today. Those Brownfield investments that were attractive are success stories of transition, with majority of privatizations going to smaller domestic investors who did not manage to revamp production – and some of the large companies still remaining in government hands in a protracted restructuring process. As noted above, the booming SME sector and increased foreign investor interest are reversing the negative trends, though still far

below the total employment and production values of the 1980s, as shown in Figure 2.

One should underscore that the difficulty in reaching this scale lies in increased global competition and end of a political economy era that guaranteed markets to Serbian companies in the Communist part of Europe or Nonaligned countries. The situation has been further aggravated as a result of the global financial crisis. Moreover, additional layoffs are expected in Serbia’s metals and electronics industry with many state-owned companies still awaiting restructuring, while retaining unproductive employees and creating losses that are burdening Serbia’s economy. These will only in part be counterbalanced by new foreign investments. It is necessary to underline that searching for the solution to overcoming effects of global financial and economic crisis and a new role of the metals sector should be based on the proper interpretation of the two phenomena – transition and reindustrialization [1, p. 7].

In December 2011, the World Bank published Serbia Country Economic Memorandum [19], including an overview of the metals sector that focused on the steel and automotive industry, which summarizes the current state of metals sector development: “As in many other countries, metals sector led the economic recovery as commodity prices soared in response to buoyant demand

Figure 2: Number of employees in manufacturing sector in Serbia, 2001-2010

Source: Statistical Office of the Republic of Serbia, Database, Employment and earnings, 2012 [9].

from emerging markets. According to Serbia Investment and Export Promotion Agency – SIEPA, 16 total metal manufacturing revenues were €1.5 billion in 2010, a significant rebound from €1 billion in 2009 and almost back to the 2008 level of €1.6 billion. Brownfield foreign direct investment (FDI) in the metals industry following the privatizations in the early 2000s helped the industry to retain its position as Serbia’s major exporter. However, the industry has attracted relatively little FDI. At just under €400 million the sector ranks 11th in FDI since 2005. In Serbia, food and beverages, financial services, and telecommunications have attracted the lion’s share of FDI. However, industries which have significant metal components, including electrical and electronics, automotive, and construction, rank higher in terms of investments and the trend is positive for these subsectors.” The latter is validated by a review of foreign investment to Serbia undertaken by SIEPA (see Figure 3).

In the most recent period, there is increasing foreign investor interest in the metals and electronics sector in Serbia, which could be explained by Serbia’s progress in EU accession process (official candidacy status granted in March 2012, rendering the process irreversible and enhancing commitment on both sides), entry of Fiat and some other investors who attract affiliate companies, and

amplified cost-competitiveness reasoning by investors with products where vicinity to EU market is crucial. In the report “Serbia market analysis” it is written that: “As regards foreign investment and industrial cooperation, the following considerations apply: investing in Serbian metal/mechanical industry means acquiring some very important economical benefits such as low labor costs (especially medium skilled labor) and low transport costs due to the geographic proximity. Investing in Serbian production will not only allow a company to access a fast growing local market with a strong and growing request for machineries but will also provide them a further access to the various other markets holding preferential trade agreements with Serbia. As regards industrial collaborations, a lot of opportunities are available especially in the field of sub-contracting agreements. High credit cost, obsolete machineries and lack of western-style management and sales skills, are some of the main reasons why local companies tend to welcome subcontracting agreements [17, p. 7].”

Foreign investors who came to Serbia are already making an impact. Most notably, this is FIAT in the automotive industry but also many other European companies that are almost exclusively export-oriented. It is important to note that “to increase the attractiveness for foreign investors of the sectors policy makers should act

Figure 3: Foreign investments to Serbia by sector, EUR million, 2001-2011

Source: Serbia Investment and Export Promotion Agency – SIEPA, (2012), “Electronics Profile Serbia” [15].

on the following in the area of automotive components: develop regional suppliers by developing collaborative capabilities through linkage programs and addressing information gaps [10, p. 20].”

On the other hand, US Steel, which was the most significant investor in metals production, decided to sell the company back to the government in early 2012 and focus on its other worldwide operations in light of decreasing global demand for steel. This case alone can seriously offset the primary steel production because of the dominant market share of this company and make a highly negative impact on export value if the government does not identify another investor or manages the company relatively efficiently on its own. The case also demonstrates uncertainty linked to global investments in the metal sector.

Analysis of labor productivity – costs, education and skills

Serbian wages in metals and electronics industry have been rising since 2001 but remain cost-competitive in the European framework. Depending on the segment of the industry wages have been about 10% lower than the average wage in Serbia (about 390 Euros) in the categories Manufacture of fabricated metal products, except machinery and equipment and Manufacture of electrical equipment, but substantially higher in other segments of the industry, with almost 60% higher than average wages in Manufacture of machinery and equipment n.e.c. category (see Table 3).

As highlighted by SIEPA's recent research that focused on the electronics segment of the industry, “Serbia's electronics experts and labor are available at most competitive prices in the SEE region. Net salary costs vary from 200€-250€ for new/inexperienced employee and 300€ per month for qualified and experienced personnel,

highly qualified/managerial wages range from 500€-700€ per month [15].”

Serbia's labor productivity, however, is still relatively low compared to the immediate region and Central and Eastern European EU members (see Table 4).

Table 4: Productivity and Unit labor cost comparison

	Worker productivity*(€)	Unit labour costs
Country	Average 2007-09	Average 2007-09
Czech Republic	23,548	0.37
Hungary	20,812	0.42
Poland	18,527	0.36
Romania	12,544	0.38
Serbia	12,837	0.54

Source: Eurostat, Agency for Business Registries, * Value added/worker [5].

Serbia has had a strong university base in mechanical, electrical and other engineering education programs that are a vital ingredient in producing higher value added products in the metals and electronics industry. In addition, there is a network of 317 vocational high schools, many of which specialize in electrical, electronic, mechanical and metallurgical production. However, these educational programs need to be better aligned to the market needs, especially to the use of new technology.

Importantly, since Serbia's reintegration in the European and international community following change of regime in October 2000, Serbian universities have been engaged in a number of curricula development programs, for instance in the framework of the TEMPUS EU Program for university cooperation in Europe. Over 25 projects have been implemented in Serbia with help of other European universities and that aim to advance engineering knowledge and skills. The universities have also benefited from additional EU and international projects, and they have also been undertaking reforms in line with the European-wide Bologna education reform process (for more, see TEMPUS Serbia, <http://www.tempus.ac.rs>).

Table 3: Average salaries and wages in Serbia – February 2012

	Gross	Net
Manufacturing	45706 (416 Euros)	33181 (302 Euros)
Manufacturing of basic metals	51539 (469 Euros)	37022 (337 Euros)
Manufacture of fabricated metal products, except machinery and equipment	39706 (361 Euros)	28828 (262 Euros)
Manufacture of machinery and equipment n.e.c	68068 (620 Euros)	49289 (449 Euros)
Manufacture of electrical equipment	39545 (360 Euros)	28942 (263 Euros)
Manufacture of computer, electronic and optical equipment	53275 (485 Euros)	38337 (350 Euros)

Source: Statistical Office of the Republic of Serbia, Average salaries and wages by 2010 sections [8].

Furthermore, the vocational high schools have also taken active part in the curriculum reform process, often with help of the EU or other donor projects, with German aid agency GIZ acting as one of the leading bilateral donors in this area.

Most recently, the Polytechnic School Kragujevac (www.politehnicka.kg.edu.rs) has received an EU grant leading to the establishment of the “ATC Serbia-Automotive Training Centre for Central Serbia”, with the following partners: UNIBO – Alma Mater Studiorum University of Bologna, Italy; Faculty of Mechanical Engineering of Kragujevac, Serbia; Faculty of Mechanical Engineering of Kraljevo, Serbia; Technical Faculty in Cacak, Serbia; IAL Friuli Venezia Giulia, Italy; and Chamber of Commerce and Industry of Kragujevac, Serbia.

A grant of an even larger scale (€750,000) has been made by the European Union to establish “Technology Transfer and Innovation Centre for Advanced Welding Technologies, Material Science and Application of Engineering Software” at the Gosa Institute in Smederevska Palanka, Serbia, with an aim to reach the following objectives (for more, see <http://www.w-tech.rs>):

- Significantly improved and modernized research, laboratory and training facilities as baseline of delivery a new lab services, quality assurance testing and technical trainings, at the location in Smederevska Palanka;
- Established training programs and tools for facilitation of technology transfer and innovation to metal manufacturing and engineering industries in targeted regions;
- Increased awareness for continuous innovation and technology development and life-long learning in the metal manufacturing and engineering industry of Braničevo and Podunavlje, Central Serbia and South Banat;
- Human resources and competences of min 20 companies, in adopting advanced technologies improved.

The EU has also been instrumental in the establishment of the Vojvodina Metal Cluster and it will continue to play an important role in the development of competitiveness of small and medium enterprises in Serbia.

There are also examples of companies taking initiative to advance education and skills. For instance, the Italian Fiat automobile company has opened the Staff Training Academy in Kragujevac, Serbia (where the plant is located) where current and future workers are trained for work according to the latest technological standards on highly sophisticated machines and automobile production equipment. The company signed the Protocol on cooperation with Kragujevac-based Polytechnic School whose students will attend practical classes in the automobile factory, and the Faculty of Mechanical Engineering in Kragujevac. In addition to Fiat, there are other emerging examples of companies cooperating with the education sector to improve education and skills and allow the educational institutions to better respond to market needs, thus also decreasing the company costs for training new workers. One such example is Messer Technogas, which has set up a welding centre for students at the University of Belgrade Faculty for Mechanical Engineering, then expanding cooperation to five Serbian technical universities.

However, despite these efforts there is still an apparent skills gap, particularly in knowledge of operating computer numerical control – CNC machines, as reported by the majority of companies surveyed in this study, which implies that these machines should be purchased and study programs revised. While several interviewed companies participate in trainings in local technical high schools, a more systemic effort needs to be made to resolve the issue. At university level, companies find the greatest gap to be in quality management (with focus on quality control) related to new technologies used in production. It is important to emphasize that “improving human capital by further reforms in the education system remains another priority for growth with positive spillovers to sustaining demand during the crisis. The model simulations showed that relative weakness in human capital explains much of the slower growth performance compared to fast-growing countries. Extending education coverage would also help sustain demand and reduce unemployment among the young during the crisis [11, p. 117].”

Structure of production – steel, copper, aluminum, auto-parts and electronics subsectors

Serbian companies are present in the entire spectrum of the metals and electronics value chain – from primary to semi-finished to final goods production. While large companies dominate primary production, there is increasing SME activity in the semi-finished and final production. Existence of primary production is certainly rendering companies further in the value chain more competitive, with many reporting to be sourcing the majority of their materials locally, though some import materials entirely and this could be either for cost reasons or lack of awareness of potential local suppliers. For the future development of metals industry in Serbia it is important to know that “On an international basis, significant consolidation of the metal industry has been observed in recent years, much of which has occurred through mergers and acquisitions [13].”

The metals industry in particular is dominated by the production of a single steel company (Smederevo Steel mill, previously called US Steel Serbia, has accounted for 50 percent of sector revenues) and the ten largest companies account for over 77 percent of total metal sector revenue [19]. The increasing dismal fate of the Smederevo steel mill will negatively impact 2012 export data, since we already know that while 59 countries reporting to World Steel Association data claimed a decrease of crude steel production amounting to 7.9% year-on-year in January 2012 (3.2% if not including China), Serbia noted 47% decrease in production [23]. Nonetheless, the FIAT investment is expected to bring a substantial increase in export of vehicles, as well as of auto-parts produced by FIAT suppliers who have started relocating or placing part of their production in Serbia.

While the figures in terms of turnover in the steel value chain are large, the majority of the industry is relatively low value added since raw materials are imported, processed, and then exported still in a relatively simple form. Even U.S. Steel was both the largest importer and exporter in the sector. The disappearance of US Steel and entrance of Fiat will have a significant impact on sector export values in 2012. Higher value-added products made from iron and steel, including rods, angles, plates, cast items, tubes, pipes and hollow profiles,

household articles, and radiators, had an export value of \$254 million in 2010 according to the Serbian Steel Association. Other than US Steel, now Steel Mill Smederevo, producers of semi-finished steel products in Serbia are much smaller and produce niche products with higher value-added. Another interesting example is that of Alfa Plam that produces stoves and furnaces, employing 800 people in South Serbia and exporting 60% of its production by selling to wholesalers. The stoves can be fuelled by pellets, hence stimulating clean, renewable energy use (biomass), which is in line with the product greening demands by consumers in the European Union. However, the focus of steel production overall remains on the lower value added part of the value chain [19]. Copper is extracted in Serbia from the RTB Bor mine, which is still in public hands, after unsuccessful privatization attempts and in need of investment and environmental management. Authors *Monthel et al.* emphasize that “copper is the main metallic ore mineral mined in Serbia [7, p. 31].” There is also copper ore production by RTB Bor and other small copper foundries. Primary copper production (flat rolled copper products and tubes) is performed by Majdanpek Factory and Copper Rolling Mill Sevojno (Valjaonica Bakra Sevojno). Intermediate copper production (wire rod, billets, cakes or ingots or semi-finished products, copper sheets) is made by Majdanpek Factory, Cable Factory Jagodina, Cable Factory Zajecar, Fabrika obojenih metala (FOM), Novkabel, Elkok, Komak-M, Metalurg, Vunil, Kepo, Gro-AS, Alka, etc [19]. For example, in 2009 copper ore production increased by about 15% [2]. Copper is an important input in electrical engineering and has uses in renewable energy industry, for example in solar panel production, which could be further explored as a business opportunity by the leading firms in this subsector.

The key industry player in the aluminum subsector is Impol Seval, an aluminum rolling mill in Sevojno, near Uzice employing 660 employees with an annual turnover of €100 million and 95% exports to EU, Russia and the intermediate region. The second lead firm is Nissal Nis producing rods, wires, tubes and profiles as intermediate aluminum products. The third leading firm is US-owned Ball Packaging, which produces cans but does not source raw material from Serbia. They supply the local beverage industry and export 85% to the Southeast Europe region.

Serbian automotive industry has been revamped with the entry of one of globally significant OEM players, Fiat. Fiat has brought in Tier-1 suppliers (about 15 expected) and invited other auto-suppliers to relocate to Serbia. Several have followed Fiat thus far while local Serbian SMEs are attempting to comply with Fiat standards. Many of the new auto-suppliers are presented in the electronics industry regional concentration mapping presented below. The World Bank discusses in detail Tier 1, Tier 2 and Tier 3 supplier base in Serbia and potential newcomers [19] and this will not be reviewed in greater detail in this study [10].

Regional concentration of metal manufacturing and lighting and electrical equipment clusters was undertaken by the European Union-funded project Support to Enterprise Competitiveness and Export Promotion (SECEP) in Serbia, concluding that the metal manufacturing industry is located throughout Serbia, with heavier concentration in Central Serbia (around Kragujevac), Nis, Pozega, Belgrade and parts of Vojvodina province [12]. The lighting and electrical equipment manufacturing industry is more geographically concentrated, especially around university centers in Belgrade, Nis and Novi Sad [12]. Serbian Investment and Export Promotion Agency – SIEPA has mapped the electronics cluster, focusing on foreign investments in the sector that have a significant positive impact on Serbia's exports. The map demonstrates the importance of Corridor X highway where the vast majority of these companies are located with some exceptions such as Gorenje's investment in Valjevo where it received substantial financial investments or Brownfield investments that were originally located elsewhere in Serbia [15].

While steel industry subsector is facing the challenge of reduced global demand, copper and aluminum subsectors have potential for further growth. However these products tend to be low value added products such as primary metal products (e.g. plates, sheets) or products with limited engineering process, such as cables. The overlap of metals and electronics appears to have most potential such as electronic parts made of copper, with increased activity in automotive subsector but also some unexplored potential in renewable energy (e.g. solar panels production).

Electronics industry is experiencing intensive development, as summarized by SIEPA's most recent

publication on the sector: "The growing Serbian electronics industry is a thriving, export-oriented sector that only figures to grow with the recent influx of foreign direct investment. Relative to 2008 and 2009, exports from the industry in 2010 grew by 15% and 44%, respectively. The 2009 economic crisis gap was surpassed swiftly in 2010 and, with new export-oriented projects such as first Panasonic factory in Serbia, exports are expected to flourish further. Between 15 and 20 electronics companies export more than €1 million per year. Many – such as Eaton Electric, ATB Sever, Gorenje, and Yura Corporation – are foreign-owned. On the other hand domestic brands are led by Fabrika Akumulatora Sombor, produce the globally-recognized "Black Horse" car starter batteries. One of the advantages of Serbia is the local production of high quality copper in mines of the Bor region. This enables highly-developed production of wires and cables. Leaders in the field are Polish-owned TF Kable and Serbian companies Kablovi Jagodina and Novkabel. Recognizing this potential, Korean company Shinwon constructed their brand new wire factory in City of Nis in 2011 [15]."

While iron and steel have traditionally had the highest export values (with a notable decrease in 2009 due to global crisis), electrical and electronic equipment has demonstrated the most significant increase in value from 2006 to 2011, demonstrating a shift in the sector structure, as shown in Figure 4.

Figure 4: Serbian export of metals and electronics industry products, 2006-2011

Source: ITC [6].

If we compare the structure of exports within the metals and electronics industry, electrical and electronic equipment is gaining an increasing share in total Serbian exports, while iron and steel have a reduced share, while the total value of exports is growing. This is expected to continue in the future, both as a result of improved competitiveness in electronics and reduced global demand for steel (see Figures 5a and 5b).

One of the reasons for low export value in international context is that among the top ten Serbian export products,

four that were from metals and electronics industry all constituted metal production, reiterating the relatively low value added presented in the Table 5.

Access to finance

Larger companies in the metals and electronics industry have significant liabilities and continue to be at high risk in terms of reaching the required level of competitiveness. Smaller companies are increasingly finding niche markets

Table 5: Serbia's top export products 2004-2008 (SITC 3-digit code)

Rank	SITC Code	Title	Value (average) US\$
1	673	Flat-rolled products of iron or non-alloy steel, not clad, plated or coated	684,670
2	682	Copper	315,495
3	625	Rubber tires, tire flaps, and inner tubes for wheels of all kinds	204,682
4	058	Fruit, preserved, and fruit preparations (excluding fruit juices)	194,482
5	684	Aluminium	176,527
6	893	Plastic articles, n.e.s.	167,649
7	061	Sugars, molasses, and honey	162,253
8	851	Shoes	159,942
9	674	Flat-rolled iron or non-alloy steel, clad, plated, or coated	151,832
10	571	Ethylene polymers in primary forms	134,902

Note: n.e.s. stands for Not Elsewhere Specified

Source:[19].

Figure 5a and 5b: Structure of Serbian metals and electronics industry exports in 2006 and in 2011

Source: ITC, Trade map- trade competitiveness map, www.trademap.org [6].

and present the biggest growth potential but need investments in technology to accelerate growth. However, access to finance is the principle limitation of small and medium enterprises, most notably because high collaterals are required and the banking system is not very open to project finance based on projected business plans. This conclusion is based on interviews with companies in the sector and it is also confirmed by World Bank findings:

“While credit to the private sector in Serbia is generally low (40 percent of GDP compared to the OECD average of 160 percent, Croatia’s 65 percent, and Bulgaria and Hungary’s 80 percent), large companies in the metals industry do not appear to have a problem accessing capital. Nine of the 11 top companies have long-term loans ranging from 10 percent to 48 percent of their total assets. However, SMEs may have more difficulty obtaining credit. According to the Global Competitiveness Report, Serbia ranks 99th out of 139 in terms of affordability of financial services and 91st in terms of ease of access to loans. One apparent problem is that loans require nearly full collateralization, generally of real property. Moveable property, even commodities like metal, cannot typically be used as collateral. Companies in the industry are also wary about supply chain financing [19, p. 81].”

Figure 6: Age of machinery in Serbian metal and electronics companies

Source: Analysis based on survey conducted for the purpose of SIPPO study of the metals and electronics industry in Serbia, April 2012

Production technology is linked to both skills, as discussed above, and ability to finance new equipment.

Foreign investors play an important role in upgrade of technology while domestic small and medium enterprises report continued investment in machinery (about 8-20% of total annual revenue). The following graph, based on interviews with 25 companies in the sector, reveals the age of machinery to be between 5 and 10 years old for most companies; nonetheless, since most of the interviewed companies are exporters data for other companies is expected to be poorer (see Figure 6).

Unfortunately this investment is accompanied by relatively low investment in research and development of 1-2% of total revenue for most interviewed companies, with higher investment in innovation reported by electronics companies (7-10%). All the interviewed companies without exception consider technology to be very important. Interviewed companies demonstrate a high degree of flexibility in producing small series within a short time period, which is an important competitive advantage.

The most significant cost input in metal processing are raw materials that can reach over 60% of total cost, as reported by interviewed companies, while labor costs becomes a factor only in more sophisticated mechanical engineering products (labor cost share increases from as low as 5-7 to 20-30%) and this is where Serbia could explore competitive advantages based on experience in the sector and a certain level of skills that is at substantially lower cost compared to Western Europe or other developed countries that compete in this subsector.

Serbian small and medium size companies complain to be paying higher than world prices for imported raw materials, which could be explained in part by smaller quantities imported and poor railway and river infrastructure but could be further explored as an issue. In addition, the weak quality infrastructure system, still not harmonized with EU requirements, allows for unfair competition of products with lower quality that continue to be imported exploiting the system loopholes. At the same time, Serbian SMEs have to send their products for final testing to laboratories in the European Union in order to export to this market, which increases costs of product development.

Transport infrastructure is limited since most companies cannot rely on the limited river transport

or poor railway service and therefore use transport by trucks, which is a more expensive means of delivery for mostly heavy products where transport costs have a high impact on cost competitiveness. For those companies that are obliged to use rail transport, such as rolling mills for example, limited number of locomotives and inability to reliably track wagons create additional problems in ability to deliver in agreed deadlines. Importance of access to highways is demonstrated by new investors locating almost exclusively close to the Corridor X highway. Finally, for those who need to be in vicinity to cargo airports Belgrade and Nis are two primary locations. The Government of Serbia is currently investing in infrastructure improvements to Corridor X highway, ring road around Belgrade and bridges in Belgrade where there is most traffic. Railway restructuring and improvements are also planned, in part with support from European Bank for Reconstruction and Development.

Interviewed companies report sufficient supply of energy and admit prices to be inexpensive. Nevertheless, as of January 2013 an independent regulatory agency will regulate electricity prices and it is expected that they will increase and that the Government will be under pressure to implement a more targeted social policy to assist those citizens who cannot afford market electricity pricing rather than subsidize the price across the spectrum. Finally, one should note that in order to obtain energy, many companies in Serbia, including those in metals and electronics industry, have been forced to invest in electricity stations and other local energy infrastructure that then became government property. Generally, Serbia is energy dependent on Russia as most countries in Europe, though with highly developed own source of hydro-energy.

These factors combined lead to an unfavorable value added structure in Serbian manufacturing sector, as shown in Table 6.

To summarize, there is a technology gap (principally in machinery) which, combined with accompanying skills gap, is preventing improved competitiveness of Serbian companies in metals and electronics industry. Access to finance, however is the greatest limitation, with most finance institutions implementing only finance based on certain collateral (real estate) rather than project finance. This problem is preventing further investment in technology and innovation. Poor railway infrastructure and limited use of river Danube are also constraining factors. Highways remain the key transport route and they are of relatively good quality, hence garnering most foreign investment around key highway corridors (namely Corridor X).

Conclusion

Ernst & Young survey has identified Southeast Europe, including Serbia, to be the most attractive manufacturing destination in Europe.³ The main competitive export advantages of the Serbian metals and electronics companies are as follows:

- Ability to connect engineering with production for higher value products and provide low cost highly skilled labour input;
- Short period from order to delivery;
- Capability to produce small orders;
- Efficient transport and logistics linkages;

3 Eight countries in Southeast Europe were included in the 2008 Ernst & Young Southeast Europe Attractiveness Survey, and these are Romania, Bulgaria, Greece, Turkey, Croatia, Bosnia and Herzegovina, Cyprus, and Serbia.

Table 6: Value added structure, 2009

	Value added at factor costs		Personnel costs		Gross operating surplus
	mill. RSD	%	mill. RSD	%	Mill. RSD
Total manufacturing	1280553	100	680695	100	599858
Manufacturing of basic metals	2983	0,2	13486	2,0	-10503
Manufacturing of fabricated metal products, except machinery and equipment	29992	2,3	21544	3,2	8448
Manufacture of electrical equipment	12677	1,0	9635	1,4	3042
Manufacture of machinery and equipment n.e.c	14115	1,1	12331	1,8	1784
Manufacture of computer, electronic and optical equipment	13184	1,0	6870	1,0	6315

Source: Statistical Office of the Republic of Serbia, Statistical Yearbook, 2011 [18, p. 187].

- Favorable trade regime and long industry tradition.

These advantages, also termed opportunities, should be countered against constraints, notably:

- Access to finance;
- Skills gap in engineering and computer-controlled operation of machinery;
- Low level of product development;
- Low level of certification;
- High level of customs and trade regulations red-tape;
- Infrastructure limitations with regard to rail and river transport;
- Relatively low level of supply chain integration.

Larger companies in the metals and electronics industry have significant liabilities and continue to be at high risk in terms of reaching the required level of competitiveness. Smaller companies are increasingly finding niche markets and present the principal growth potential but need investments in technology to accelerate growth. However, access to finance is the principle limitation of small and medium enterprises, most notably because high collaterals are required and the banking system is not very open to project finance. The outstanding structural challenge relates to privatization of remaining state enterprises and domination of one large company in the steel industry which was re-nationalized (purchased back from the investor) in 2012 as a result of increasing global competition in steel industry derived from reduced demand.

Serbia's small and medium size producers throughout the economy, this industry included, further complain about increasing government charges (local charges such as a charge for publicly posting company name or a charge for urban city land have risen manifold in a move by local governments to fill the budget gaps; employment contributions continue to be high, impeding further employment and rendering costs relatively high compared to most neighboring countries), complicated customs procedures (significant amount of paperwork, difficulty in re-exporting procedures). Most small and medium size companies have not received any assistance but some exporters have benefited from trade fair subsidies and other marketing and technical assistance by the Serbian Investment and Export Promotion Agency (SIEPA),

Serbian Export Credit and Insurance Agency (AOFI), and rare donor projects that are assisting the private sector, as well as employment subsidies that the Government of Serbia introduced to counter rising unemployment and attract additional private investment. Generally, company managers, especially those in small and medium size sector, state to have insufficient support and increasing burden from the government. In terms of assistance, they are seeking good agents and direct contacts with buyers and distributors rather than general attendance in trade fairs without such prepared meetings. Certification is another important constraint because it often requires investment in technology and because it is product-specific and requires a higher level of awareness and knowledge of standards. Nonetheless, it should be noted that general company ISO certification is often sufficient for exports for many products. Some products like auto-components for example have more demanding certification requirements.

A look at the requirements for automotive component suppliers gives a good answer as to the opportunities in the overall metals and electronics industry. These are: quality control; on-time delivery; cost reduction; order lead time; synchronization of production; product design, forecasting and planning; flexibility in product configuration and distribution; just-in-time delivery of complete modules; inventory reduction; coordination of supply chain activities, and material-resource planning [10, p. 112]. These requirements can be met with increased investment in technology, innovation and skills, which can be facilitated with improved access to finance and (re)training buttressed by systemic education reform. Improved infrastructure (completion of Corridor X and railways renovation in particular) and a more integrated supply chain, with increased cooperation in the sector, can also be viewed as catalysts for metals and electronics industry development. A review of Serbian imports of products in the industry demonstrates an overlap that should be further explored to determine reasons for importing the same type of product that is exported and to examine the potential for import substitution, but also noting that the importing markets are generally at higher level of technological development, including USA, Japan

and Korea – and increasingly cost competitive China, none of which appear on the list of Serbia's export destinations.

While employment in metals and electronics industry has been shrinking over the last decade in Serbia, a large concentration of small companies demonstrates new sources of growth of production and exports, usually based on management experience in former large state enterprises and competitive pricing with ability to promptly deliver small orders of engineered metal or electronic components. There are also emerging strong subsectors in production of cables, medical devices and stoves and furnaces. Finally, the foreign investment inflow to Serbia is becoming more significant in the past two years, particularly in automotive and electronic industry, creating another premise for bridging the competitiveness gap.

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