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For competitive and inovative local economy

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THE METAL INDUSTRY IN BOSNIA AND HERZEGOVINA

Performance and Export Analysis

Implementation of the IPA 2016 Support in the Sector of Competitiveness and Innovation, "Local Development Strategies" Action, Local Self-Government and Economic Development Programme in Bosnia and Herzegovina

Implemented by

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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IMPRESSUM

THE METAL INDUSTRY IN BOSNIA AND HERZEGOVINA -
Performance and Export Analysis

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Jürgen Burks

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Glossary/Acronyms

BEMP	Best Environmental Management Practices
BiH	Bosnia and Herzegovina
bn	billion
BME	German Association for Materials Management, Purchasing and Logistics e.V.
CAD	Computer Added Design
CAM	Computer Added Manufacturing
CNC	Computerized Numerical Control
COVID-19	Coronavirus Disease 2019
CRM	Customer Relation Management
DIN	German Industry Norm
EIB	European Investment Bank
EIF	European Investment Fund
EIHA	European Investment Advisory Hub
EIPP	European Investment Project Portal
ERP	Enterprise Resource Planning
ESI	European Structure and Investment Fund
EU	European Union
GDP	Gross domestic product
GFF	Grant Fund Facility
GTAI	German Trade and Invest
GIZ	Gesellschaft für Internationale Zusammenarbeit
GZS	Slovenian Chamber of Commerce
HR	Human Resources
IATA	International Air Transportation Association
IATF	International Automotive Task Force
ICT	Information and Communication Technology
ILO	International Labour Organisation
IMAD	Institute of Macroeconomic Analysis and Development
ISTAT	Central Statistical Office - Italy
ISO	International Standard Organisation
ITC	International Trade Centre
KPI	Key Performance Index
mn	million
MSB	Micro and Small Business
MSME	Micro, Small and Medium Enterprises

NACE	Statistical classification of economic activities in the European Community
OEM	Original Equipment Manufacturer
OES	Original Equipment Supplier
PDI	Product Diversification Indicator
R&D	Research & Development
SDG	Strategic Development Goals
SME	Small and Medium Enterprise
TA	Technical Assistance
UNDP	United Nations Development Programme
VACSMS	Value Chain for Steel Manufacturing Sector
VDA	Association of the German Automotive Industry

1. INTRODUCTION: EU4BUSINESS

With the aim of strengthening BiH's economy, the EU4Business project stimulates the development of entrepreneurship, export-oriented sectors, tourism and agriculture. The project will be based on a two-pronged approach: a Grant Fund Facility (GFF) complemented by Technical Assistance (TA). Overall, EUR 10 million is available in grants. Final beneficiaries are BiH companies, farmers and entrepreneurs, with a special focus on women and youth.

EU4Business is worth EUR 16.1 million. It is jointly funded by the European Union (EUR 15 million) and the Federal Republic of Germany (EUR 1.1 million). The project is jointly implemented by GIZ, UNDP and ILO, from April 2018 to March 2022.

As part of the Technical Assistance, the project conducts sector and market analyses which can be used for the design of private sector support measures by public institutions and service providers and/or directly for business development by BiH MSMEs.

The purpose of this study is to offer the metal sector in BiH opportunities to enter new markets and/or increase penetration of existing markets.

2. EXECUTIVE SUMMARY

The metal industry is one of the leading industry sectors in BiH. This sector is characterized by a solid human and resource base, as well as a long tradition that allows for the development of diverse activities. This industry has shown vitality in the post-war renewal of production and a readiness for the introduction of modern technologies. Due to an existing tradition and the ex-istence of a quality workforce, technical capacities in moulding and precise casting, cutting, bending, pressing, forming, welding and processing have been updated, which form the basis for the manufacturing and assembly of metal products.

According to the Statistical Classification of Economic Activities in the European Community (NACE), enterprises operating in the metal industry in the broadest sense are defined in classes/codes C24 (Manufacture of basic metals), C25 (Manufacture of fabricated metal products, except machinery and equipment), C28 (Manufacture of machinery and equipment), C29 (Manu-facture of motor vehicles, trailers and semi-trailers), C30 (Manufacture of other transport equipment). In total, according to this classification, BiH has 1233 companies working within the metal industry. More than 70% of these companies produce fabricated metal products, except machinery and equipment. These companies generate the highest sales (EUR 1.26 billion in 2019) and export value (EUR 649 million in 2019) within the metal sector. The products are, for example, metal constructions, cables, wires, chains, springs, metal doors and window frames, locks and hinges, etc.

Despite the high-quality standard and low prices internationally, most companies are subject to strong competition. The reason for this is that most products are largely homogeneous and offer little scope for competitive advantage from a technical perspective. On the other hand, the COVID-19 crisis and the resulting strain on international supply chains have meant that many larger companies have had to structure their supplier relationships on a more regional basis in order to prevent possible supply bottlenecks. Tradition and experience in the metal industry, high product quality, regional proximity to Western European sales markets and corresponding free trade agreements with the EU therefore make BiH increasingly attractive for buyers from Western Europe. Germany is the most important export market for the BiH metal industry. Demand comes from major suppliers or OEMs from the automotive industry, mechanical and plant engineering, the electrical industry and the construction industry. In addition to Germany, Italy (with its strong mechanical and plant engineering sector), Austria (with numerous companies from the construction and automotive industries), and Slovenia (also due to its developed au-tomotive industry) are considered important customers for the BiH metal industry.

The situation in the sales markets of interest to the BiH metal industry is currently strongly in-fluenced by suppliers from China, Russia and the EU. This includes, in particular, the German and Austrian metal industry, which is mainly characterized by medium-sized companies and repre-sents strong competition for suppliers from BiH in the relevant target markets.

A particular deficit of the BiH metal industry is the innovation ability of the companies. Products and services must be adapted to the respective market requirements. Although quality standards are met, there is a lack of modern organizational structures and processes, the introduction of modern production processes, gradual entry into the digital economy and digital networking with customers. Labour cost advantages cannot be maintained in the medium

term if the path to digitization is not consistently pursued. Also, a large number of companies are product-oriented rather than market-oriented. This often results from a lack of understanding of the need to research and adapt to market trends and to act as a solution provider on international markets. The demands on the manufacturing industry are constantly increasing. High product quality and minimum standards in quality management (for example, DIN ISO 9001, etc.) will soon no longer be sufficient to survive in international markets.

Nevertheless, there are opportunities in the most important export markets relevant for the BiH metal industry. In the course of research into export potential, based on an analysis of available and forecast market data, specific product groups were identified where there is an increased demand. These include **aluminium products**, in particular for the construction industry and the automotive industry, **metal grids and metal filter systems**, especially for plant and ventilation construction, the recycling industry and the construction industry, as well as **parts for ball and roller bearings**, especially for machine and plant construction and the automotive industry.

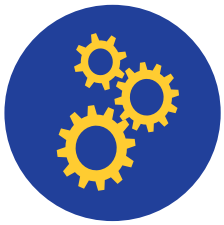
Surprisingly, the COVID-19 pandemic has hit the BiH metal industry less hard than was initially feared. A survey conducted by the author of this study among BiH companies in the metal industry with the aim of determining the mood of the industry showed that only a few companies had to accept losses in sales and earnings due to the pandemic. Some companies even indicated that their earnings situation had improved in 2020. It is possible that the BiH metals industry was able to benefit from the disruption to international supply chains. Many manufacturers and major suppliers in Western Europe source primary products from Asia, especially China. A rapid switch to alternative suppliers also from BiH therefore does not seem unlikely.

However, the data for the target markets of the BiH metal industry clearly show that the industry suffered from a significant decline in sales. The German metal industry alone recorded a decline in sales amounting to almost 9% (sales decline in 2020 compared to 2019). In that same period, Italy suffered a drop in sales of almost 25%. Both the Austrian and the Slovenian metal industry were able to keep their sales largely stable. In principle, industry experts and the relevant industry associations in the target countries assume that the declining economy caused by COVID-19 will recover quickly. Nevertheless, a forecast is difficult and depends essentially on pandemic-related governmental protective measures. Regardless, interviews conducted with international companies in the industry as part of the study revealed that the trend of drastically reducing the supplier base will not continue. The aim is to reduce dependency on a few suppliers and to build up alternative ones. Risk supply chain management (RSCM) is therefore increasingly becoming the focus of potential customer companies of the BiH metal industry. During the research, purchasing strategies of nearshoring were clearly identified as a trend, which opens up new opportunities for BiH companies to invest further in higher value products and to integrate further stages of the value chain into their offer. Of course, as mentioned above, this includes investments in further automation of production as well as the gradual entry into digital production technology, which makes it possible to offer customized solutions at the same or lower variable costs, even for small quantities.

Improving the international competitiveness of the BiH metal industry requires support measures at several levels. These include (see concrete measures in Annex 1):

- improving knowledge of markets, trends and companies in relevant target markets;
- supporting access to potential customers;

- building an image/brand for BiH as an attractive location for sourcing high-quality innovative metal products;
- provision of marketing and sales expertise;
- consulting and support in the area of digital transformation of business processes;
- access to financing opportunities for the modernization of companies;
- networking and exchange of experience between companies through targeted pro-motion of industry clusters;
- cross-industry networking of industry clusters, for example, targeted collaboration between production companies and companies in the ICT industry in the context of digitalization;
- establishment and expansion of international collaborations with companies, associations and universities as well as research and development agencies.



3. METHODOLOGY

Review existing market data, analyses and studies (desk research)
The study was conducted by using a combination of quantitative and qualitative research approaches. The quantitative research was based on secondary data sources. These are databases on companies registered as limited liability companies and joint-stock companies in Bosnia and Herzegovina (BiH)[1] that are classified according to the activities they perform—the NACE classification.[2] Another source of data is the international trade databases,[3] where products that are subject to export (or import) are classified according to the Harmonized System.[4]

Verify conclusions from desk research through interviews with companies from demand side
The interviews were conducted with five international oriented companies from Germany to verify findings and conclusions from the desk research, as well as to verify the provided recommendations. In addition, we carried out an interview with the German Association for Materials Management, Purchasing and Logistics e.V. (BME) (see Annex 3).

Derive recommendations for market entry/market penetration strategies for BiH companies
Based on the data obtained, strategy approaches for market entry and market penetration were developed. On the one hand, the approaches are based on many years of experience in the metal industry and, on the other hand, on proven business promotion approaches for export promotion. Suggestions for strategies and recommendations for action were also made in the course of interviews with experienced industry experts (see Annex 1).

Verify recommendations through interviews with companies from the metal sector in BiH
In order to verify the corresponding strategy recommendations, interviews were conducted with decision makers from twenty BiH companies. The interviews were conducted online and by telephone. For this purpose, a questionnaire was developed in advance (see Annex 2).

[1] Relevant databases within the Bisnode web site have been used: https://www.bisnode.ba
[2] The NACE classification is available at: http://www.export.gov.il/files/EEN/ListNACEcodes.pdf
[3] Relevant databases within the Trade Map have been used: https://www.trademap.org/Index.aspx
[4] The Harmonized Commodities Code Database is available at: https://asycuda.org/en/online-hs/

4. SUMMARY OF THE MOST RELEVANT PRODUCT AND GEOGRAPHIC MARKETS

4.1 METAL COMPANIES IN BIH: SALES VOLUME, MARKET SHARES AND GROWTH RATES

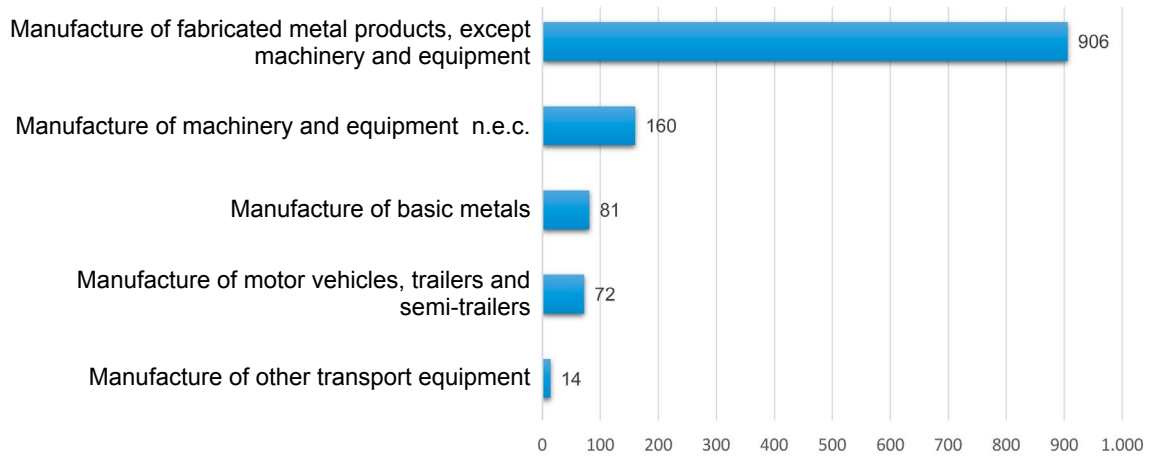
4.1.1 Classification of metal companies

According to the NACE classification, within production (section C), the metal industry includes the production of the following product groups:

- C25 - Manufacture of fabricated metal products, except machinery and equipment
- C24 - Manufacture of basic metals
- C29 - Manufacture of motor vehicles, trailers and semi-trailers
- C28 - Manufacture of machinery and equipment
- C30 - Manufacture of other transport equipment

There are 1233 companies in BiH that produce the abovementioned products. Most of them (906 or 73% to be precise) produce fabricated metal products, except machinery and equipment. There are significantly fewer companies that produce machinery and equipment (160 or 13%); basic metals (81 or 7%); motor vehicles, trailers and semi-trailers (72 or 6%); and other transport equipment (14 or 1%).

Figure 1: Number of companies – BiH metal industry, source: www.bisnode.ba

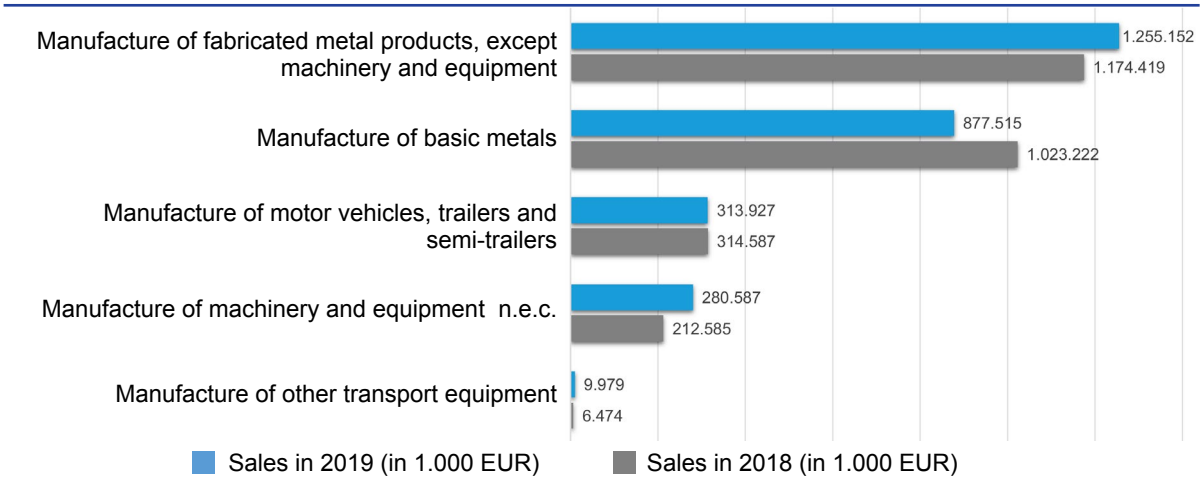


4.1.2 Metal companies in BiH: Sales volume

The total sales value of all product categories in 2019 was EUR 2.737 billion. In 2019, fabricated metal products, except machinery and equipment, had the highest sales value (EUR 1.26 billion or 46%). Also, basic metals had a very high sales value (EUR 878 million or 32%). Sales values of motor vehicles, trailers and semi-trailers (EUR 314 million or 11%) and machinery and equipment (EUR 281 million or 10%) were significantly lower.

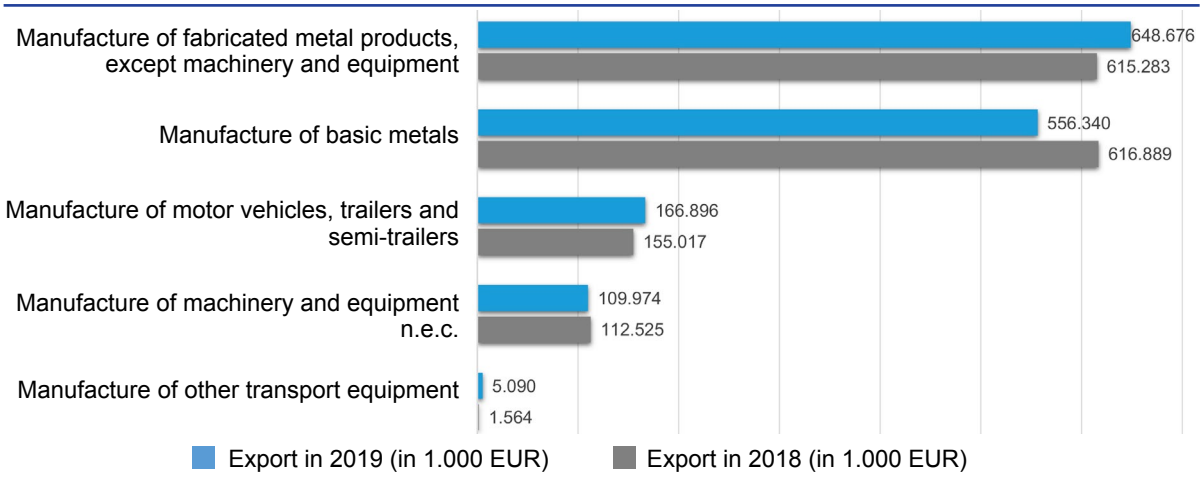
The sales value in 2019 remained at approximately the same level as in 2018 (EUR 2.731 billion), although the structure was slightly changed. In 2019, the sales value of fabricated metal products, except machinery and equipment and the sales value of machinery and equipment increased, while the sales value of basic metals decreased.

Figure 2: Sales value in 2018 and 2019, source: www.bisnode.ba



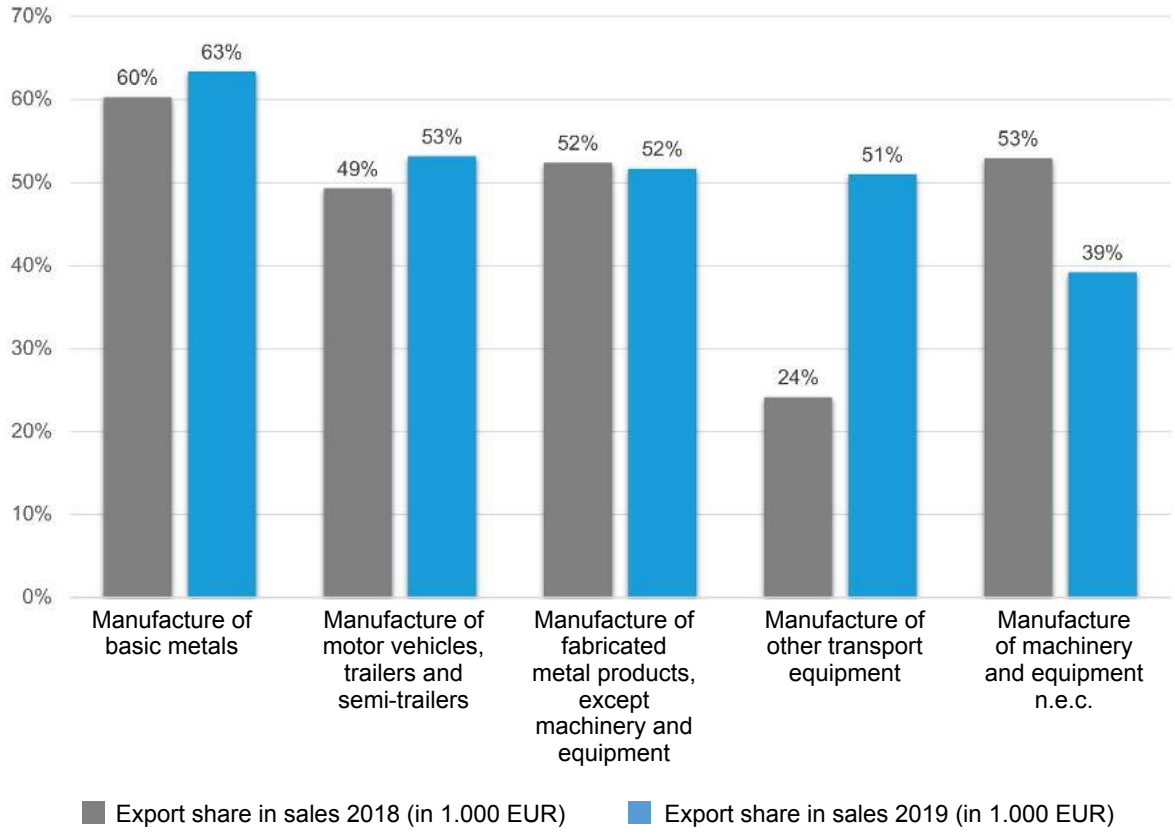
Export data follow the pattern of sales data. The total export value of all product categories in 2019 was EUR 1.487 billion. In 2019, fabricated metal products, except machinery and equipment had the highest export value (EUR 649 million or 44%). Also, basic metals had a very high export value (EUR 556 million or 37%) in 2019. Export values of motor vehicles, trailers and semi-trailers (EUR 167 million or 11%) and of machinery and equipment (EUR 110 million or 7%) were significantly lower. The total export value in 2019 decreased by 1% in comparison to 2018, when it was EUR 1.501 billion.

Figure 3: Export value in 2018 and 2019, source: www.bisnode.ba



The share of export value in sales value is relatively high. It ranges from 63% (for basic metals) to 39% (for machinery and equipment). That share is quite stable for basic metals, motor vehicles, trailers and semi-trailers and fabricated metal products, except machinery and equipment. In 2019, the share of export value in sales value of other transport equipment increased by 27%, while the share of export value in sales value of machinery and equipment decreased by 14%.

Figure 4: Export share in sales - 2018 and 2019, source: www.bisnode.ba

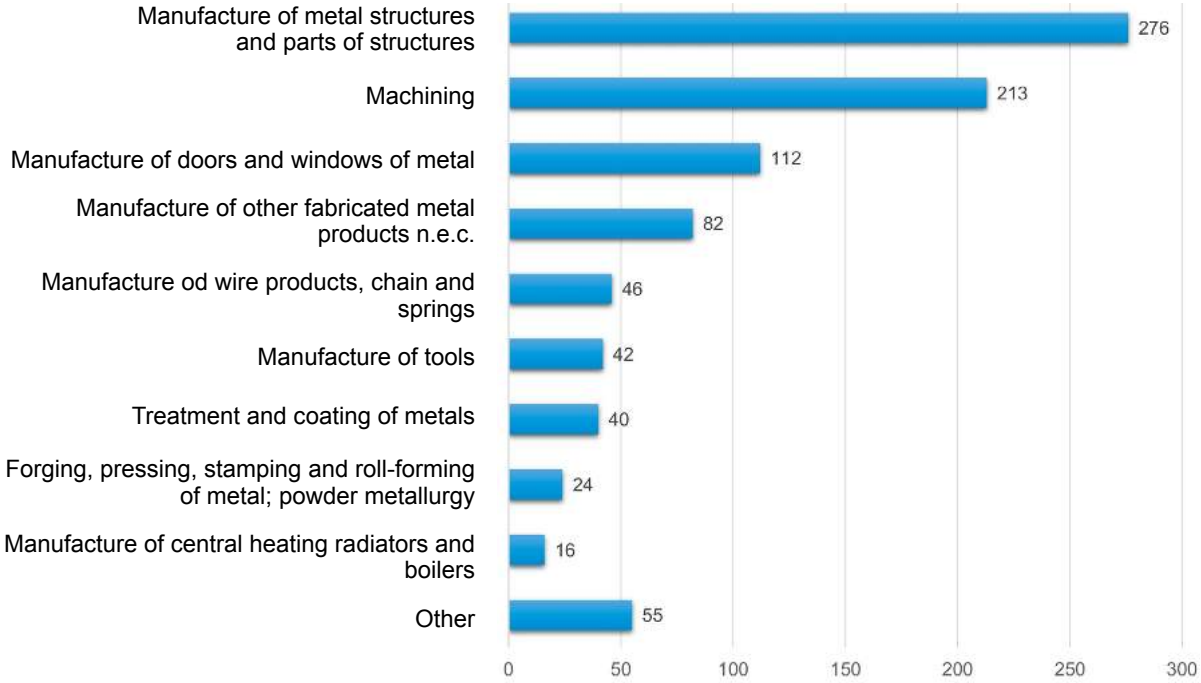


4.2 MANUFACTURE OF FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT (C25)

Around 73% of metal companies from BiH are active in “fabricated metal products (C25)”. These companies generate around 46% of the total turnover of the sectors selected in the previous chapter. The sales value of basic metal products is also significant at EUR 878 million and 32%, but this also includes a large number of companies that focus on metal production (not only on metal processing). The following analysis therefore concentrates on the companies from the “fabricated metal products (C25)” sector. Therefore, the other aforementioned NACE Codes (C24, C28, C29, C30) will not be analysed in detail.

In BiH, there are 906 manufacturers of fabricated metal products, except machinery and equipment. Most of them produce metal structures and parts of structures (276 or 30%), provide machining services (213 or 24%), produce metal doors and windows (112 or 12%), produce other fabricated metal products (82 or 9%), etc.

Figure 5: Number and structure of manufacturers of fabricated metal products, except machinery and equipment, source: www.bisnode.ba



In 2019, the total sales value of all fabricated metal products, except machinery and equipment was EUR 1.255 billion. Metal structures and parts of structures had the highest sales value (EUR 378 million or 30%) in 2019. The sales value of other products/services were significantly lower: machining (179 million or 14%), wire products, chain and springs (131 million or 10%), other fabricated metal products (111 million or 9%), etc. The sales value in 2019 in comparison to 2018, in total, increased by 7%.

Figure 6: Sales value of fabricated metal products, except machinery and equipment, 2018-2019 (without NACE 25.4), source: www.bisnode.ba

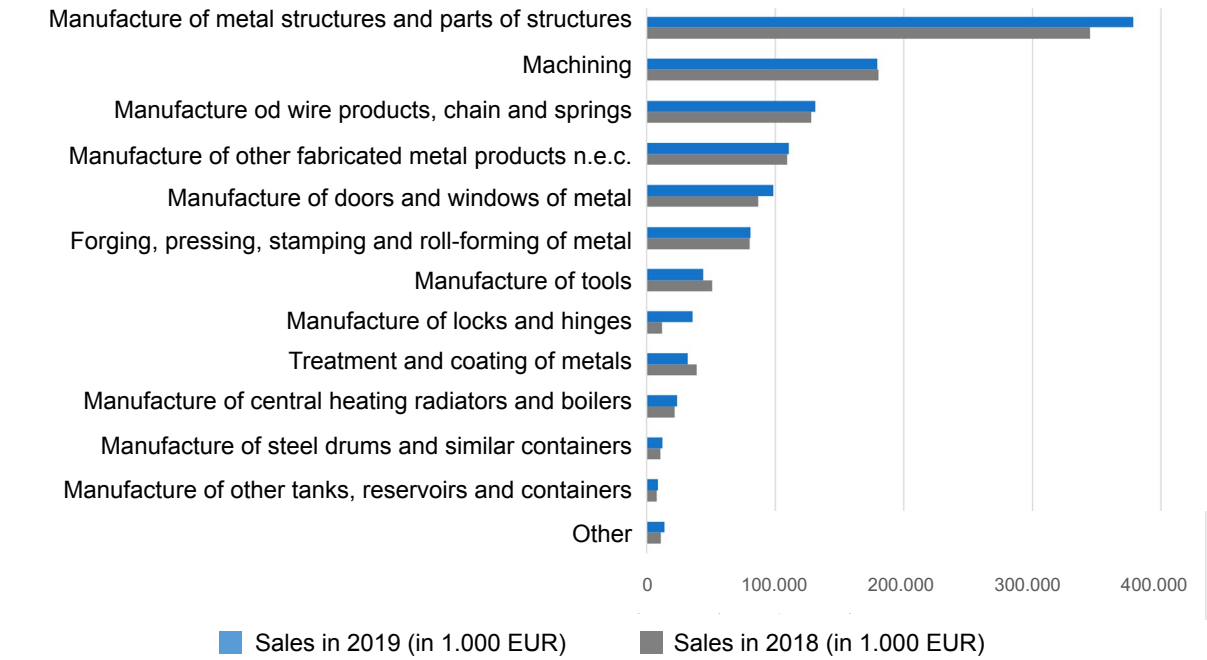
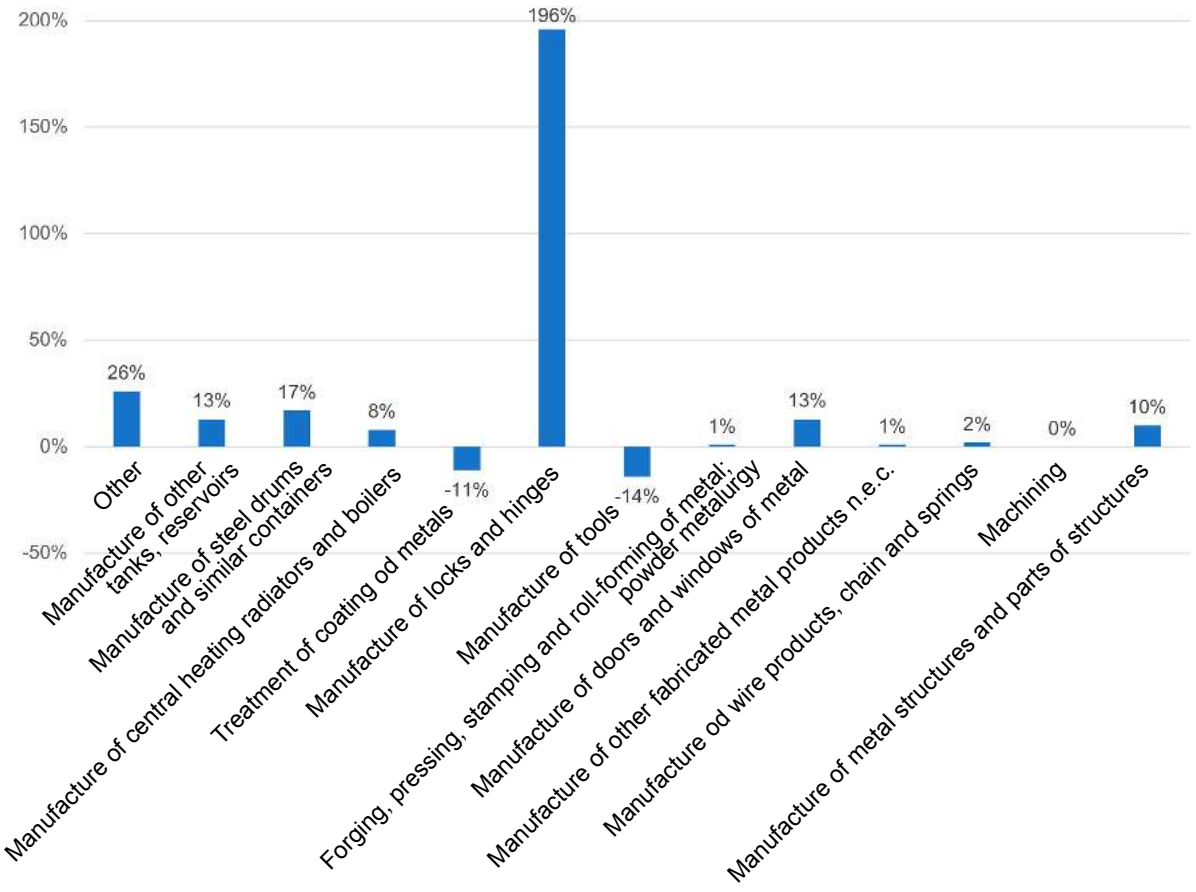
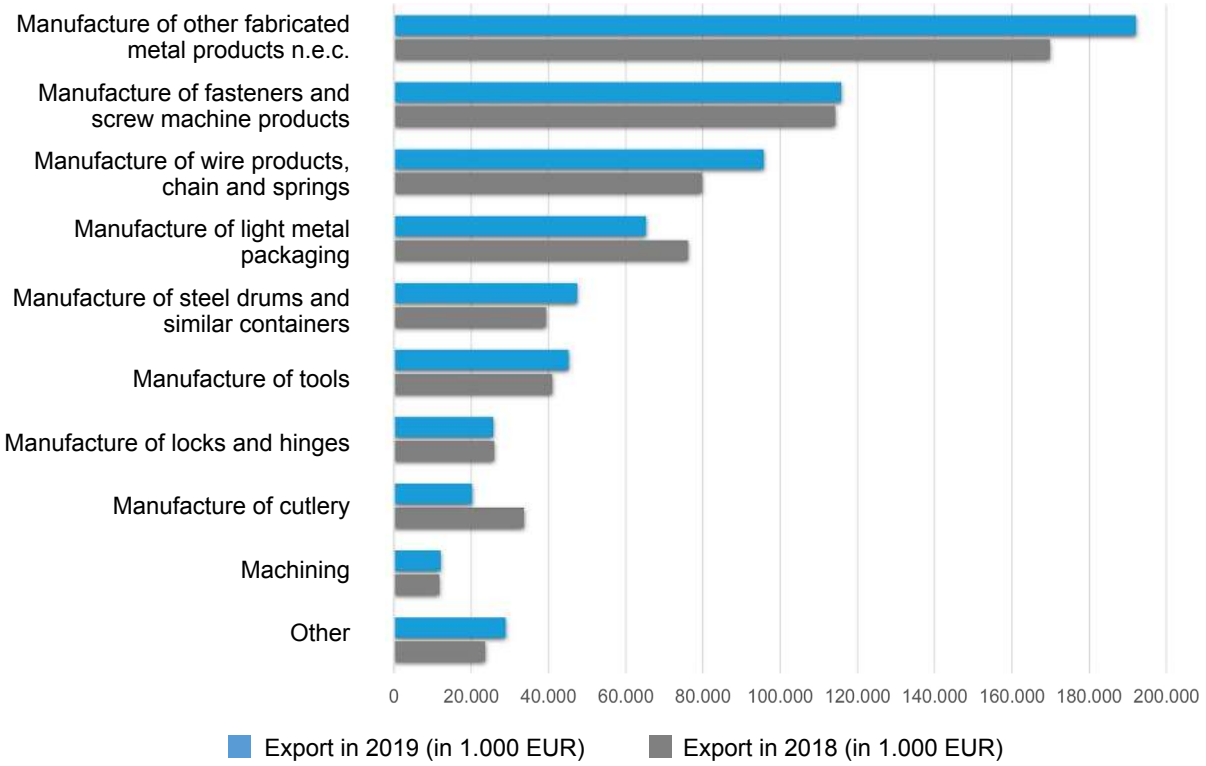


Figure 7: Increase/decrease in sales value, 2018-2019 (without NACE 25.4), source: www.bisnode.ba



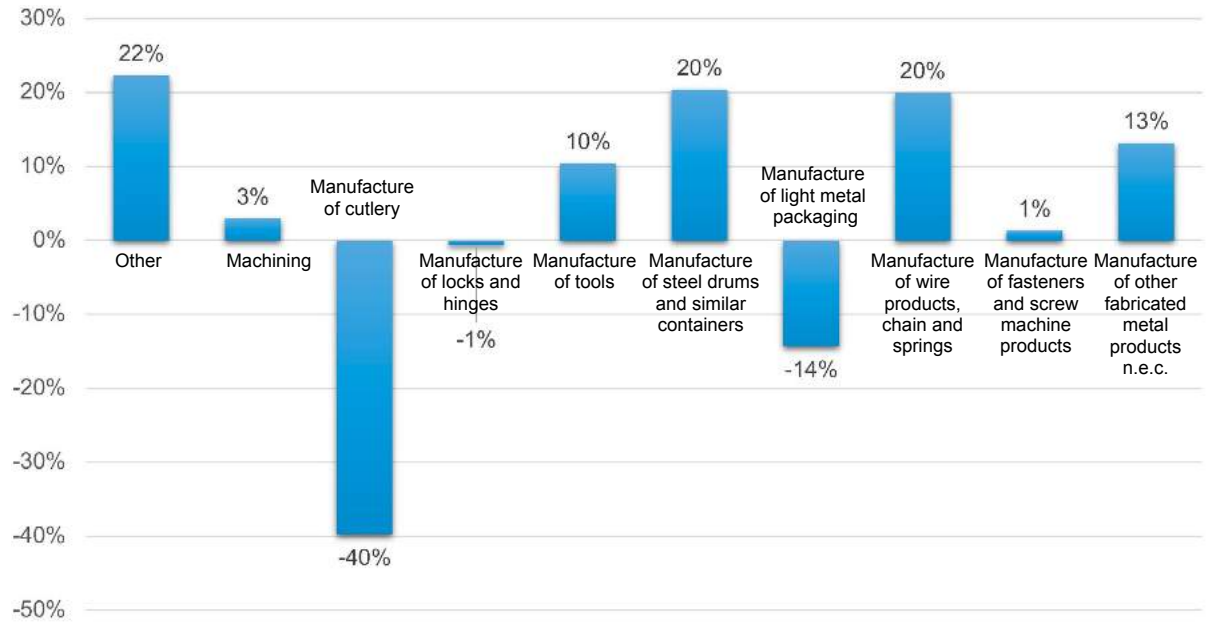
Export data are relatively similar to sales data. The total value of all exported metal products, except machinery and equipment in 2019 was EUR 649 million. In 2019, within this category, other fabricated metal products n.e.c. had the highest export value (EUR 192 million or 30%), followed by fasteners and screw machine products (EUR 116 million or 18%); wire products, chain and springs (EUR 96 million or 15%); and light metal packaging (EUR 65 million or 10%). The total export value in 2019 increased by 5% in comparison to 2018 (EUR 615 million).

Figure 8: Value of exported fabricated metal products, except machinery and equipment, 2018-2019, source: www.bisnode.ba



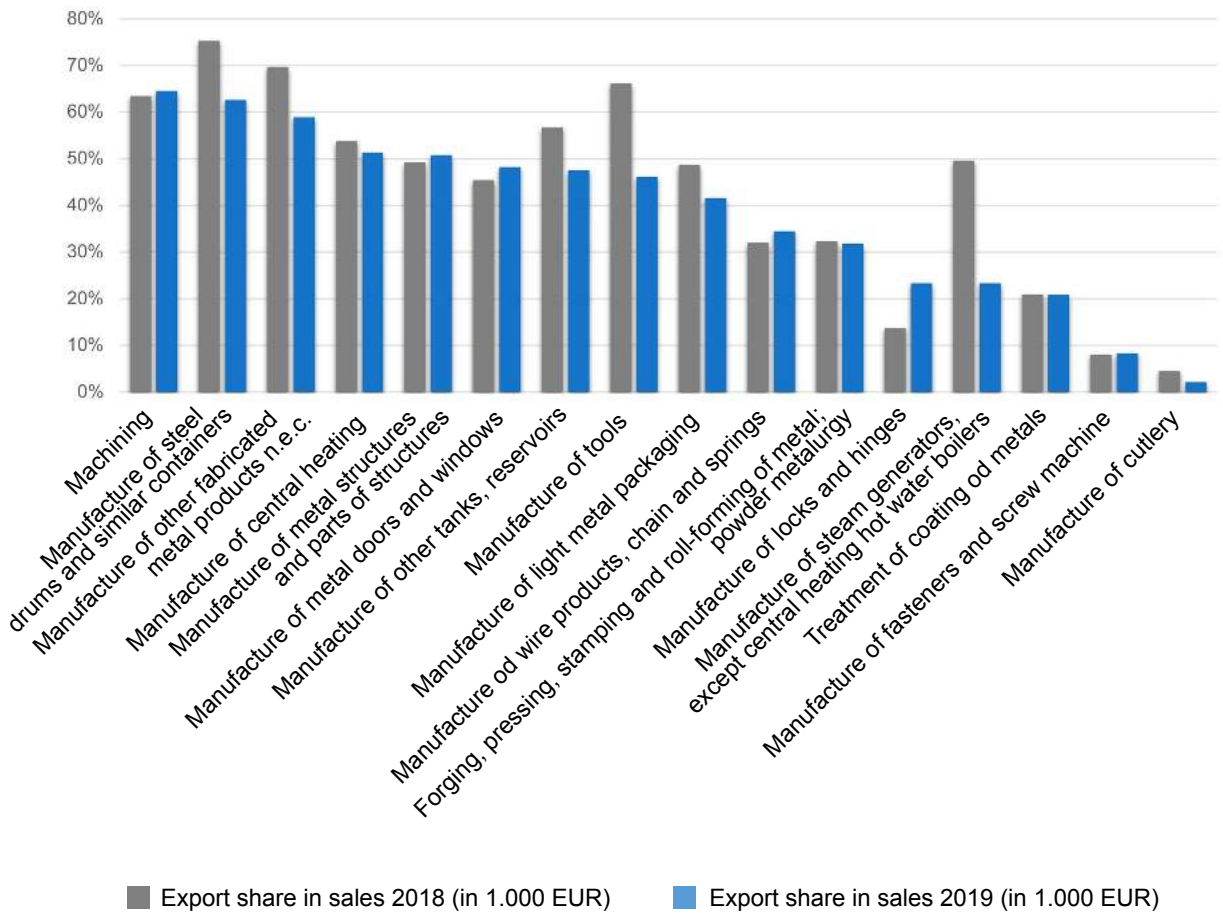
In 2019, in comparison to 2018, the export value of steel drums and similar containers as well as wire products, chain and springs increased by 20%. Conversely, the export value of cutlery decreased by 40% and the export value of light metal packaging decreased by 14%.

Figure 9: Increase/decrease in export value, 2018-2019, source: www.bisnode.ba



The share of export value in sales value in 2019 is high for some product groups, such as machining (65%). It is also quite high for steel drums and similar containers (63%) and steel drums and manufacturing of other fabricated metal products n.e.c. (59%). On the other hand, the share of export value in sales value for some products is extremely low: cutlery (2%), fasteners and screw machine products (8%) and treatment and coating of metals (21%).

Figure 10: Export share in sales, 2018 and 2019 (without NACE 25.4), source: www.bisnode.ba



According to the criteria of revenues in 2019, the top 10 companies/manufacturers of fabricated metal products, except machinery and equipment are: Feal d.o.o. from Široki Brijeg, TMD Group d.o.o. from Gradačac, Ferro-keš d.o.o. from Mostar, Emka Bosnia d.o.o. from Goražde, Alternativa d.o.o. from Sarajevo, Alfe-mi d.o.o from Živinice, Zinkteknik Bosnia d.o.o. from Mostar, Graewe Tadiv d.o.o. from Konjic, TRGOVIR d.o.o. from Gračanica and PIRNAR d.o.o. from Petrovac.

Figure 11: Overview – Sales and export growth of the biggest companies in BiH within the metal sector, source: www.bisnode.ba

Company	Activity code	Activity	Sales revenue 2018 (KM)	Sales revenue 2019 (KM)	Export 2018 (KM)	Export 2019 (KM)	Sales growth (%)	Export growth (%)
FEAL d.o.o. ŠIROKI BRIJEG	C 25.11	Manufacture of metal structures and parts of structures	170 910 130	171 297 893	64 288 722	53 705 217	0.23	-16.46
TMD GROUP d.o.o. Gradačac	C 25.62	Machining	115 389 740	103 106 501	55 992 058	51 521 250	-10.65	-7.98
FERRO-KEŠ d.o.o. Mostar	C 25.93	Manufacture of wire products, chain and springs	62 940 663	67 117 557	42 939 579	47 869 604	6.64	11.48
EMKA BOSNIA d.o.o. Goražde	C 25.72	Manufacture of locks and hinges	17 648 792	64 556 492	1 486 639	14 435 549	265.78	871.02
ALTERNATIVA d.o.o. Sarajevo	C 25.50	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	57 308 835	58 689 482	6 147 752	7 751 893	2.41	26.09
ALFE-MI d.o.o Živinice	C 25.11	Manufacture of metal structures and parts of structures	51 147 607	52 343 904	47 810 096	50 998 877	2.34	6.67
ZINKTEKNIK BOSNIA d.o.o. Mostar	C 25.99	Manufacture of other fabricated metal products n.e.c.	55 463 740	48 253 549	55 242 669	48 244 779	-13.00	-12.67
GRAEWE TADIV d.o.o. Konjic	C 25.93	Manufacture of wire products, chain and springs	36 726 229	43 454 842	5 077 723	6 940 481	18.32	36.68
TRGOVIR d.o.o. Gračanica	C 25.93	Manufacture of wire products, chain and springs	43 862 067	42 873 266	1 409 030	1 134 033	-2.25	-19.52
PIRNAR d.o.o. Bosanski Petrovac	C 25.12	Manufacture of metal doors and windows	29 738 107	37 901 594	29 684 082	37 790 585	27.45	27.31

Feal d.o.o. (https://feal.ba): From its very beginnings, FEAL has specialized in the development of aluminium systems as well as aluminium products and their further processing. FEAL has the most modern equipped production facilities for aluminium extrusion and further processing.

TMD Group d.o.o. (https://tmd-group.ba): TMD Group produce metal parts. The company has an export of 100%. The main export countries are Germany, Austria, Slovenia and Italy. Their customers are world leaders, like Schaeffler group, Benteler, SKF, ICSA, SNR NTN, DUCATI Energia, Zedce, MS hydraulic.

FERRO-KEŠ d.o.o. (no website available): In 2001, Keš founded the company Ferro Keš, which produces reinforcing grids and iron folds. The company headquarters are located in the free zone of Herzegovina in Mostar.

EMKA BOSNIA d.o.o. (www.emka.com): The EMKA GROUP, headquartered in Velbert (Germany), is the world market leader for closures, hinges and seals used in switch and control cabinets for electronics and electrical engineering. In the air conditioning and transport sectors, EMKA is one of the leading manufacturers of closure technology. EMKA has a branch/production facility in Goražde.

Alternativa d.o.o. (https://alternativa.ba): Alternativa is one of the largest manufacturers of thermal insulation boards, roof and facade panels, metal elements for roofs and facades, and metal structures.

ALFE-MI d.o.o. (no website available): ALFE-MI is located in Živinice. The company produces office containers, disposal containers, container modules, and steel constructions.

ZINKTEKNIK BOSNIA d.o.o. (www.zinkteknik.se): Zinkteknik is a company for zinc castings and has plants in Bredaryd in southern Sweden and Mostar in Bosnia. Customers are from Europe and the USA; they mainly belong to the automotive, electronics, telecommunications/IT, construction and mechanical engineering sectors.

Graewe Tadiv d.o.o. (www.graewe.ba): Graewe is located in Konjic. The company produces cold-pressed screws, special metal parts, high-quality fasteners for the metal and automotive industry and for mechanical and apparatus engineering.

Trgovir d.o.o. (http://trgovir.ba): Trgovir is located in Stjepan Polje - Gračanica. The company's production portfolio consists of wire products, waterproofing products and eco pellets. The production plant for wire products is located on a 12 055 m² area.

PIRNAR d.o.o. (https://www.pirnar.ba): Bosanski Petrovac Pirnar is a manufacturer of aluminium and wooden entrance doors. Their newest production plant is located in Bosanski Petrovac on 22 000 m2. Pirnar exports their products to over 30 markets.

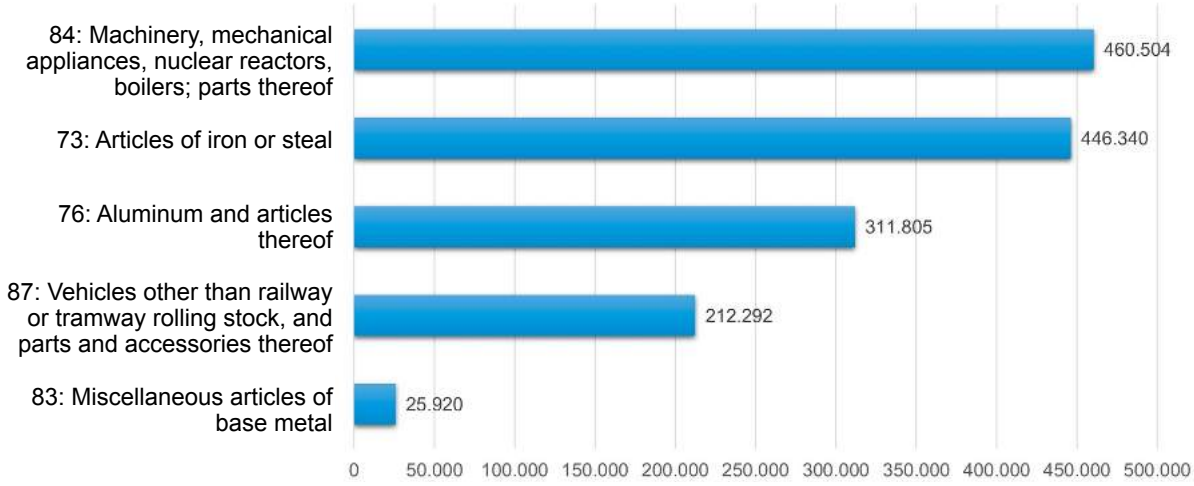
4.3 EXPORT BY PRODUCT GROUP

In order to analyse the export of products from the BiH metal industry, the classification of products according to the Harmonized System was used, where the following groups of products were identified as relevant:

- 73 Articles of iron or steel
- 76 Aluminium and articles thereof
- 83 Miscellaneous articles of base metal
- 84 Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof
- 87 Vehicles other than railway or tramway rolling stock, and parts and accessories thereof

The total value of the above-mentioned exported products in 2019 was USD 1.46 billion. Out of that, the most valuable group of exported products is *machinery, mechanical appliances, nuclear reactors, boilers; parts thereof* with USD 461 million exported value. *Articles of iron or steel* had a very similar export value, with USD 446 million. The exported value of *aluminium and articles thereof* in 2019 was USD 312 million, while the exported value of *vehicles other than railway or tramway rolling stock*, and *parts and accessories thereof* was USD 212 million. The last product group, *miscellaneous articles of base metal*, had the smallest exported value in 2019—USD 26 million.

Figure 12: Exported value by product group in 2019 (in 1000 USD), source: www.trademap.org



We focused on the structure of exports in the following groups:

- 84: Machinery, mechanical appliances, nuclear reactors, boiler; parts thereof
- 73: Articles of iron and steel
- 87: Vehicles other and railway or tramway rolling stock, and parts and accessories thereof

These groups cover most of the NACE classification C25 “Manufacture of fabricated metal products, except machinery and equipment”.

4.3.1 Export structure of the product group Machinery, mechanical appliances, nuclear re-actors, boilers; parts thereof (84)

There are 87 product subgroups within the Harmonized System product group 84 *Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof*. In 2019, the export value of the top 5 product subcategories (8431, 8409, 8482, 8421 and 8466) was USD 288 million, while their share in the total exported value of group 84 in 2019 was 62.61%. The exported value by product subgroups is presented below.

Figure 13: Exported value by the product subgroups in 2019 (in 1000 USD), source: www.trademap.org

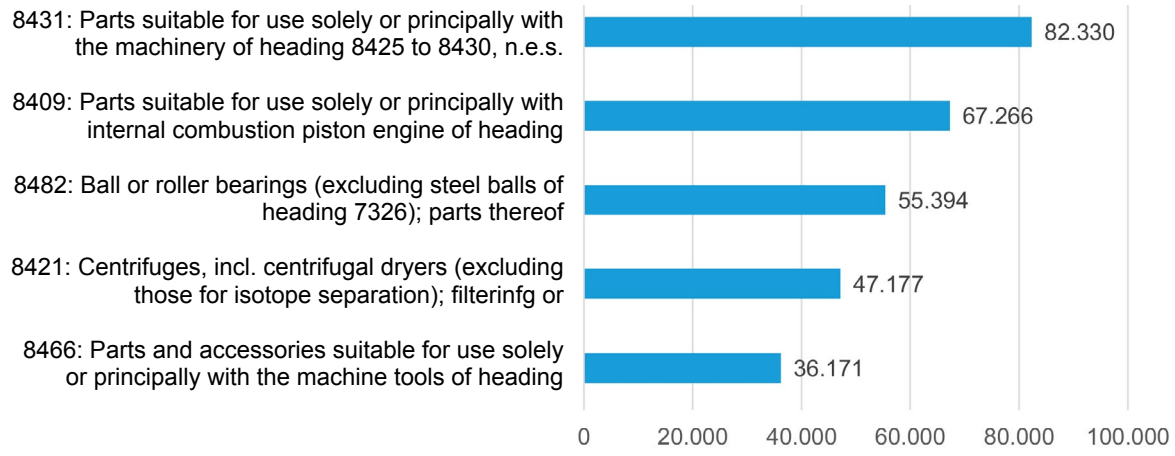


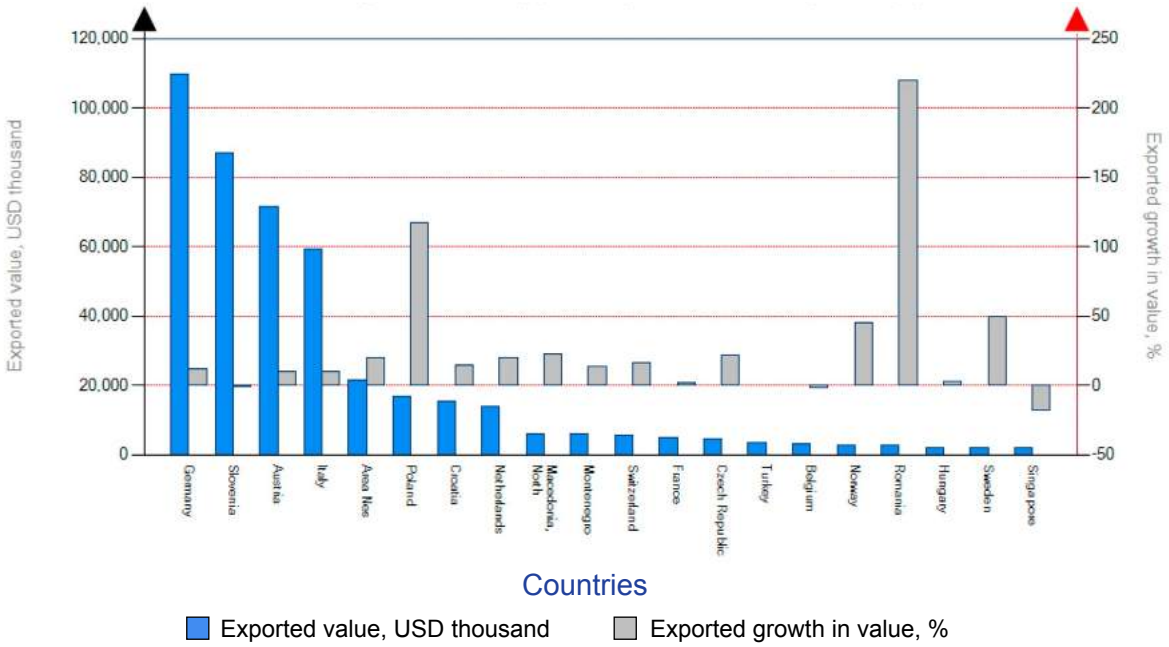
Figure 14: Top 20 export countries for the product group 84: Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof with relevant export data are presented below, source: www.trademap.org

No.	Importers	Value exported in 2019 (USD thousand)	Share in BiHs Exports (%)	Growth in exported value 2015-2019 (%, p.a.)	Growth in exported value 2018-2019 (%, p.a.)
1	Germany	109941	23,9	12	-10
2	Slovenia	87269	19	-1	-11
3	Austria	71509	15,5	10	0
4	Italy	59302	12,9	10	21
5	Area n.e.s. [5]	21527	4,7	20	-6
6	Poland	16983	3,7	117	127

[5] Area n.e.s. (not elsewhere specified) is used in cases where the partner designation was unknown to the reporting country or an error was made in the partner assignment.

No.	Importers	Value exported in 2019 (USD thousand)	Share in BiHs Exports (%)	Growth in exported value 2015-2019 (%, p.a.)	Growth in exported value 2018-2019 (%, p.a.)
7	Croatia	15380	3,3	15	14
8	Netherlands	13783	3	20	14
9	Macedonia, North	6154	1,3	23	55
10	Montenegro	6149	1,3	14	10
11	Switzerland	5756	1,2	16	-12
12	France	5121	1,1	2	-2
13	Czech Republic	4679	1	22	20
14	Turkey	3654	0,8	0	-34
15	Belgium	2974	0,6	-2	5
16	Norway	2732	0,6	45	-22
17	Romania	2683	0,6	220	-20
18	Hungary	2246	0,5	3	39
19	Sweden	2166	0,5	50	42
20	Singapore	2019	0,4	-18	432

List of importing markets for a product exported by Bosnia and Herzegovina in 2019
Product: 84 Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof



4.3.2 Export structure of the product group Articles of iron or steel (73)

There are 26 product subgroups within the Harmonized System product group 73 *Articles of iron or steel*. The export value of the top 5 product subcategories (7308, 7314, 7326, 7318 and 7325) in 2019 was USD 402 million, while their share in the total exported value of the group 73 in 2019 was 90.12%. The exported value by the product subgroups is presented below.

Figure 15: Exported value by product groups in 2019 (in 1000 USD), source: www.trademap.org

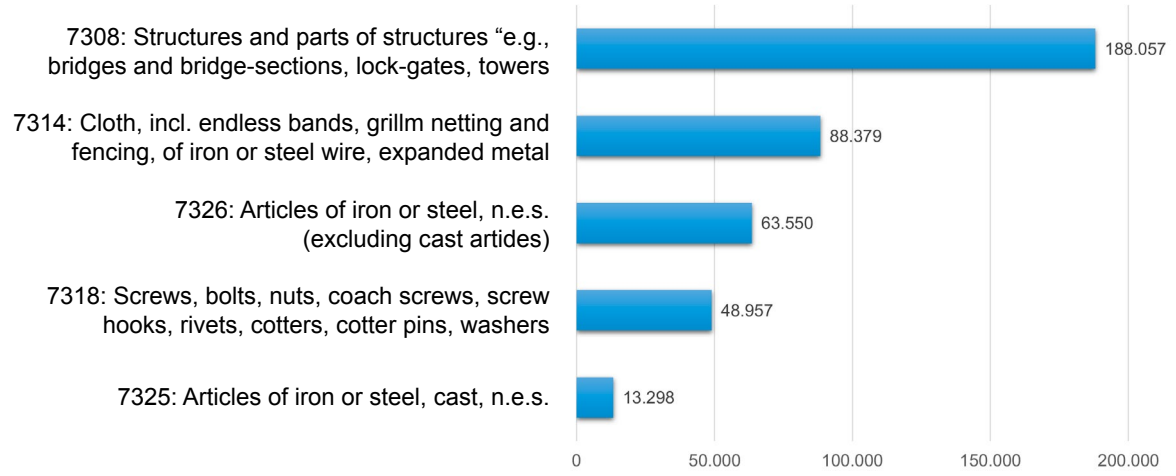
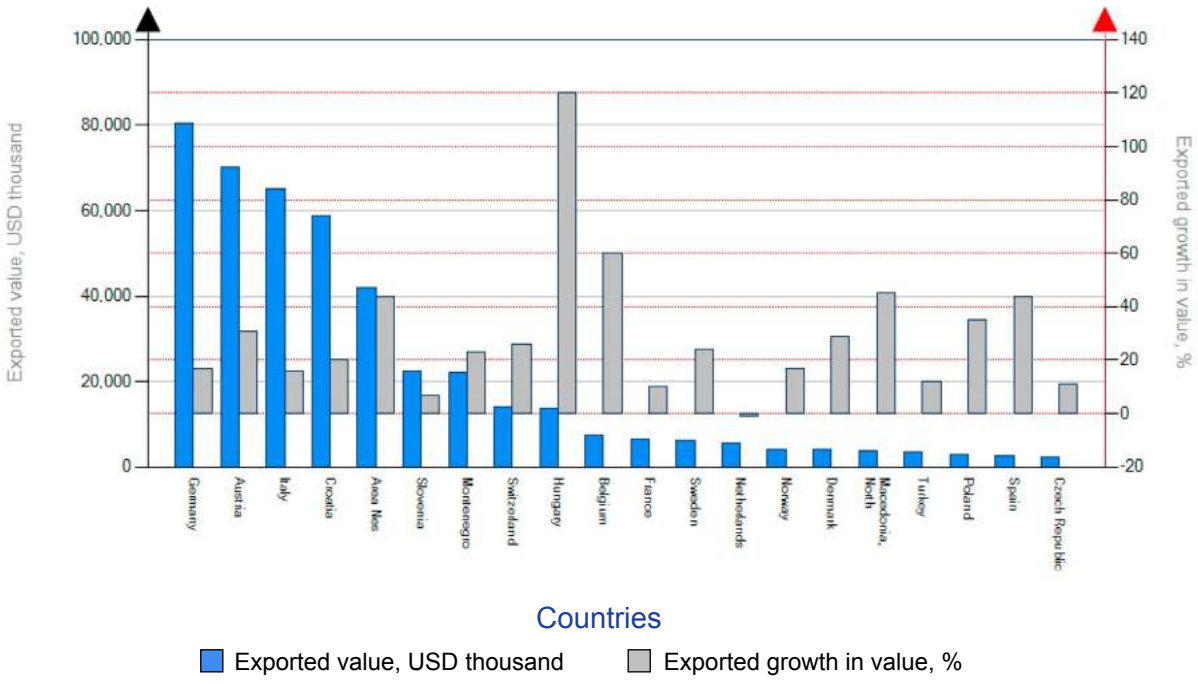


Figure 16: Top 20 export countries for the product group 73: Articles of iron or steel, source: www.trademap.org

No.	Importers	Value exported in 2019 (USD thousand)	Share in BiHs Exports (%)	Growth in exported value 2015-2019 (%, p.a.)	Growth in exported value 2018-2019 (%, p.a.)
1	Germany	80465	18	17	7
2	Austria	70137	15,7	31	9
3	Italy	64960	14,6	16	-12
4	Croatia	58743	13,2	20	10
5	Area n.e.s.	41992	9,4	44	13
6	Slovenia	22528	5	7	-17
7	Montenegro	22013	4,9	23	-12
8	Switzerland	14163	3,2	26	28
9	Hungary	13719	3,1	120	31
10	Belgium	7357	1,6	60	56

No.	Importers	Value exported in 2019 (USD thousand)	Share in BiHs Exports (%)	Growth in exported value 2015-2019 (%, p.a.)	Growth in exported value 2018-2019 (%, p.a.)
11	France	6460	1,4	10	7
12	Sweden	6094	1,4	24	-20
13	Netherlands	5584	1,3	-1	1
14	Norway	4226	0,9	17	50
15	Denmark	4167	0,9	29	2424
16	Macedonia, North	3774	0,8	45	39
17	Turkey	3540	0,8	12	14
18	Poland	3021	0,7	35	15
19	Spain	2754	0,6	44	47
20	Czech Republic	2300	0,5	11	-54

List of importing markets for a product exported by Bosnia and Herzegovina in 2019
Product: 73 Articles of iron or steel



4.3.3 Export structure of the product group Vehicles other than railway or tramway rolling stock, and parts and accessories thereof (87)

There are 16 product subgroups within the Harmonized System product group 87 *Vehicles other than railway or tramway rolling stock, and parts and accessories thereof*. The export value of the top 5 product subcategories (8708, 8716, 8714, 8701 and 8703) in 2019 was USD 205 mil-lion, while their share in the total exported value of the group 87 in 2019 was 96.42%. The ex-ported value by the product subgroups is presented below.

Figure 17: Exported value by product groups in 2019 (in 1000 USD), source: www.trademap.org

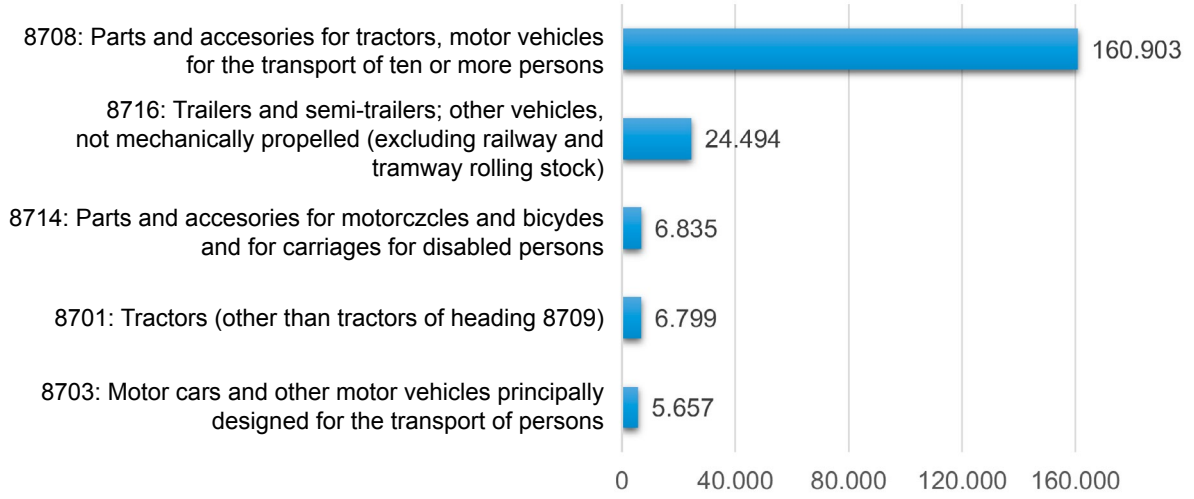
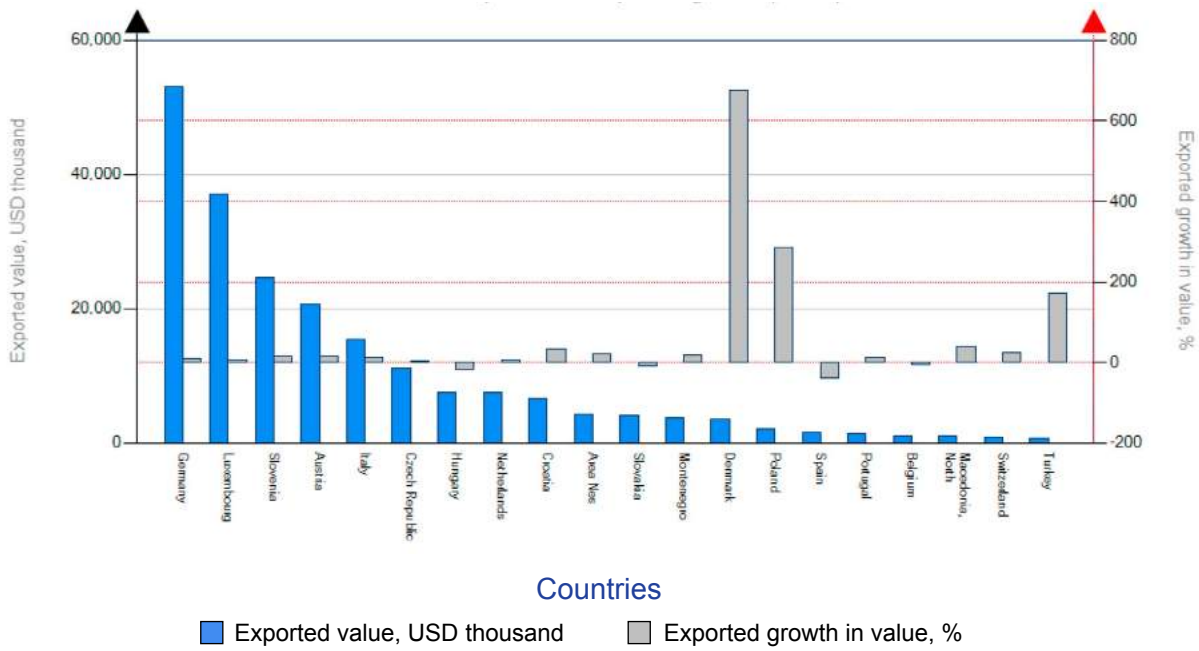


Figure 18: Top 20 export countries for the product group 87: Vehicles other than railway or tramway rolling stock, and parts and accessories thereof, source: www.trademap.org

No	Importers	Value exported in 2019 (USD thousand)	Share in BiHs Exports (%)	Growth in exported value between 2015-2019 (%, p.a.)	Growth in exported value between 2018-2019 (%, p.a.)
1	Germany	53070	25	8	0
2	Luxembourg	37046	17,5	7	-9
3	Slovenia	24705	11,6	14	1
4	Austria	20617	9,7	16	44
5	Italy	15409	7,3	12	-22
6	Czech Republic	11099	5,2	4	10
7	Hungary	7513	3,5	-17	-28
8	Netherlands	7482	3,5	5	-18
9	Croatia	6652	3,1	32	23

No	Importers	Value exported in 2019 (USD thousand)	Share in BiHs Exports (%)	Growth in exported value between 2015-2019 (%, p.a.)	Growth in exported value between 2018-2019 (%, p.a.)
10	Area n.e.s.	4310	2	22	-27
11	Slovakia	4140	2	-10	-33
12	Montenegro	3733	1,8	18	2
13	Denmark	3590	1,7	677	122
14	Poland	2149	1	285	131
15	Spain	1594	0,8	-40	-31
16	Portugal	1379	0,6	11	60
17	Belgium	1098	0,5	-5	-57
18	Macedonia, North	973	0,5	38	68
19	Switzerland	845	0,4	25	-6
20	Turkey	635	0,3	172	184

List of importing markets for a product exported by Bosnia and Herzegovina in 2019
Product: 87 Vehicles other than railway or tramway rolling stock, and parts and accessories thereof



4.4 EXPORT MARKET ANALYSIS

4.4.1 Overview of the main export markets for BiH metal companies

In 2019, *C.25.11 metal structures and parts of structures* (EUR 378 million) and *C.25.62 machining* (EUR 179 million) had the highest sales value within the group *C25 fabricated metal products, except machinery and equipment*. At the same time, *C.25.99 other fabricated metal products n.e.c.* (EUR 192 million) and *C.25.94 fasteners and screw machine products* (EUR 116 million) had the highest exported value within the same product group in 2019.

The total value of exported metal products in 2019 was USD 1.49 billion and it involved the following product groups: *articles of iron or steel (73), machinery, mechanical appliances, nuclear reactors, boilers; parts thereof (84) and vehicles other than railway or tramway rolling stock, and parts and accessories thereof (87)*. The most valuable group of exported products are *machinery, mechanical appliances, nuclear reactors, boilers; parts thereof (84) with USD 461 million exported value, followed by articles of iron or steel (73)* with USD 446 million exported value. The exported value of *vehicles other than railway or tramway rolling stock, and parts and accessories thereof (87)* was USD 212 million. The last product group, *miscellaneous articles of base metal (83)*, had the smallest exported value in 2019—USD 26 million.

Figure 19: Top 10 export countries for the product groups 84, 73 and 87, source: www.trademap.org

No.	84: Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	73: Articles of iron or steel	87: Vehicles other than railway or tramway rolling stock, and parts and accessories thereof
1	Germany	Germany	Germany
2	Slovenia	Austria	Luxembourg
3	Austria	Italy	Slovenia
4	Italy	Croatia	Austria
5	Area n.e.s.	Area n.e.s	Italy
6	Poland	Slovenia	Czech Republic
7	Croatia	Montenegro	Hungary
8	Netherlands	Switzerland	Netherlands
9	Macedonia, North	Hungary	Croatia
10	Montenegro	Belgium	Area n.e.s.

Germany is the most important export market for all product categories, with the highest export value for 2019, followed by Austria, Italy and Slovenia.

The manufacturers of metal products are often grouped together as the metalworking industry. The statistical organizations within the EU subsume establishments in the metalworking industry under branch 25 (NACE Code) “Manufacture of fabricated metal products”. Code C25 covers most of the Harmonized System product groups used above. The entire industry under code 25 is divided into eight sub-sectors: steel and light metal construction, manufacture of metal tanks and vessels and manufacture of radiators and boilers, manufacture of steam boilers, manufacture of weapons and ammunition, manufacture of forged, pressed, drawn and stamped parts, surface finishing, heat treatment and mechanics, manufacture of cutlery, tools, locks and fittings, and manufacture of other fabricated metal products.

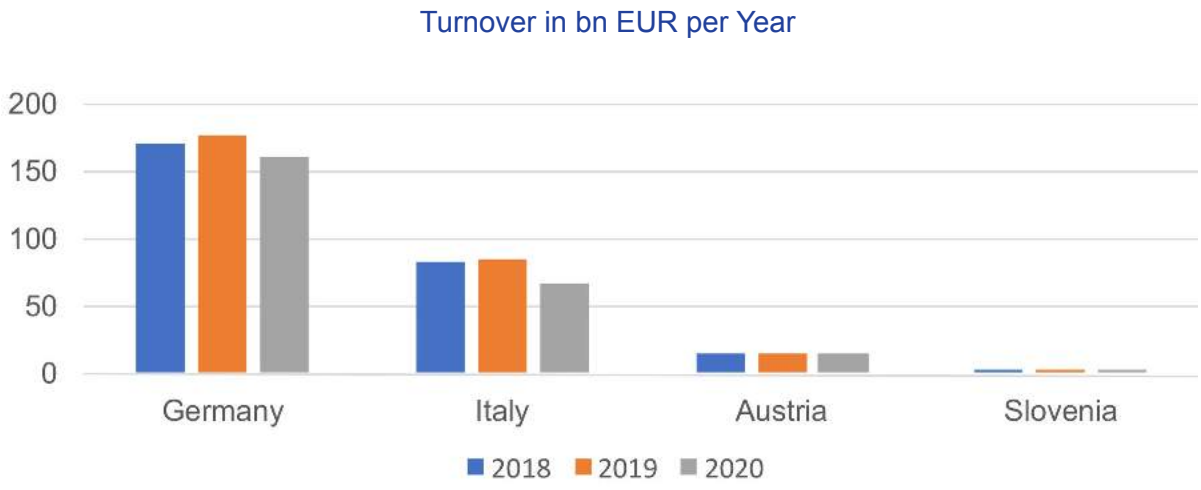
The market size (total turnover) in “Manufacture of fabricated metal products” (NACE C25) are as follows:

Figure 20: Turnover in billion EUR (fabricated metal products – C25 - without 25.4), source: Statista, Federal Statistical Office 2020

Year	Germany	Italy	Austria	Slovenia
2018	169.99	81.86	14.67	3.00
2019	174.82	82.94	14.26	3.00
2020	160.05	66.09	14.26	3.00

The data for Germany show a sales slump of around 8.5% for 2020, after sales growth in 2019 (+2.8%). Italy recorded a moderate sales growth of 1.3% in 2019, but suffered a sales slump of more than 20% in 2020. The Austrian and Slovenian markets are largely constant or show only a slight decline in sales.

The following chart shows an overview of market development in the aforementioned countries:

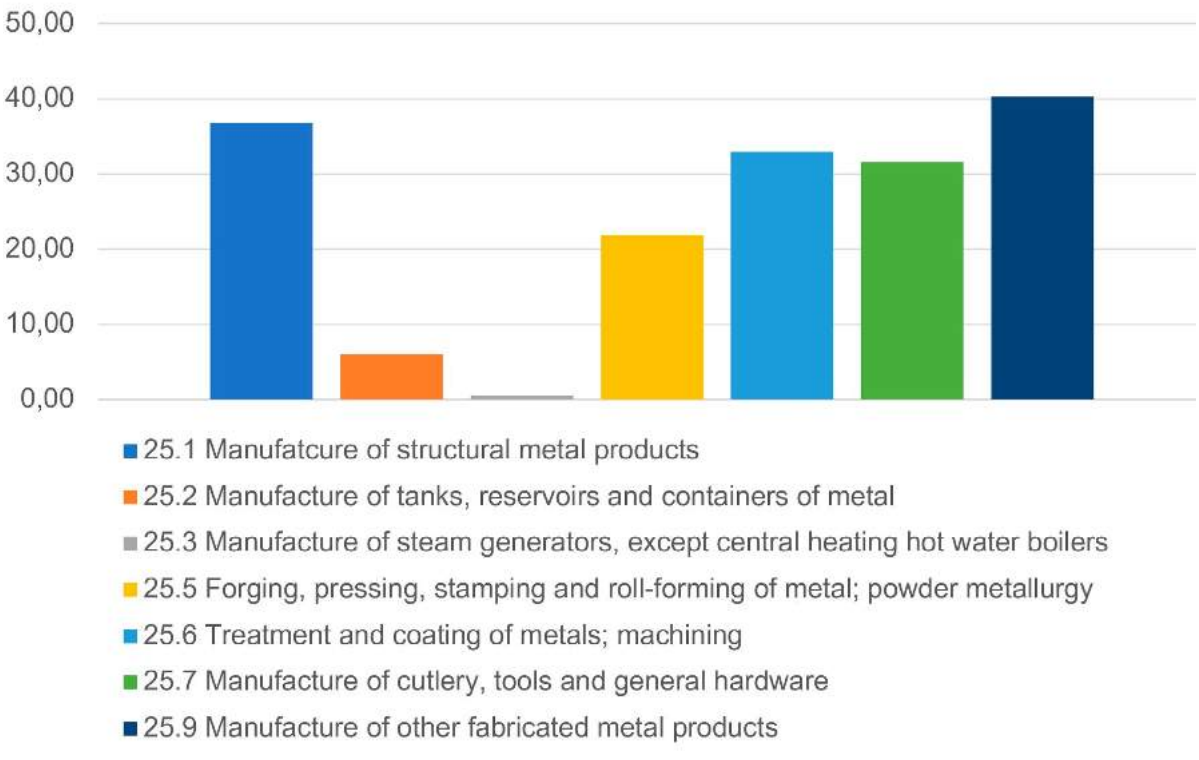


4.4.2 The German market

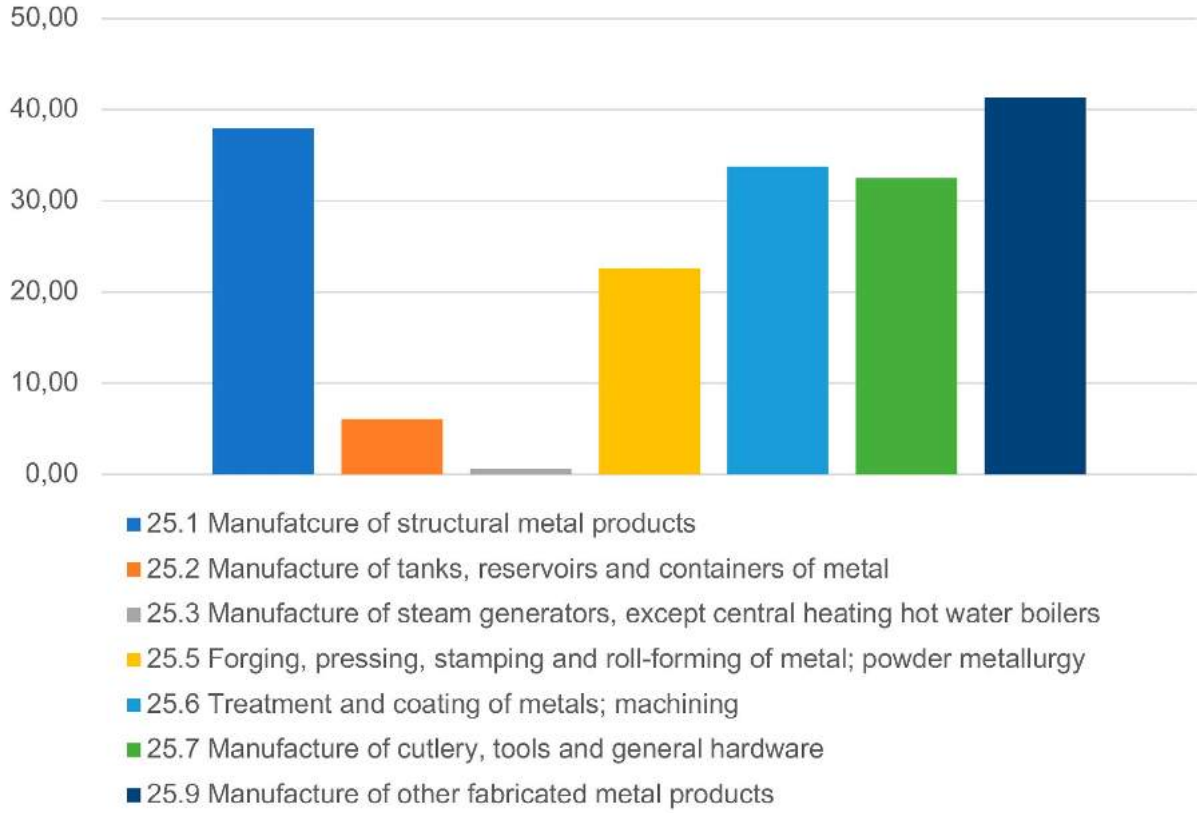
In 2018 and 2019, the turnover of the metalworking industry developed as follows:

Figure 21: The German market 2018/19- turnover in billion (bn) EUR (fabricated metal products – C25 - without 25.4), source: Statista

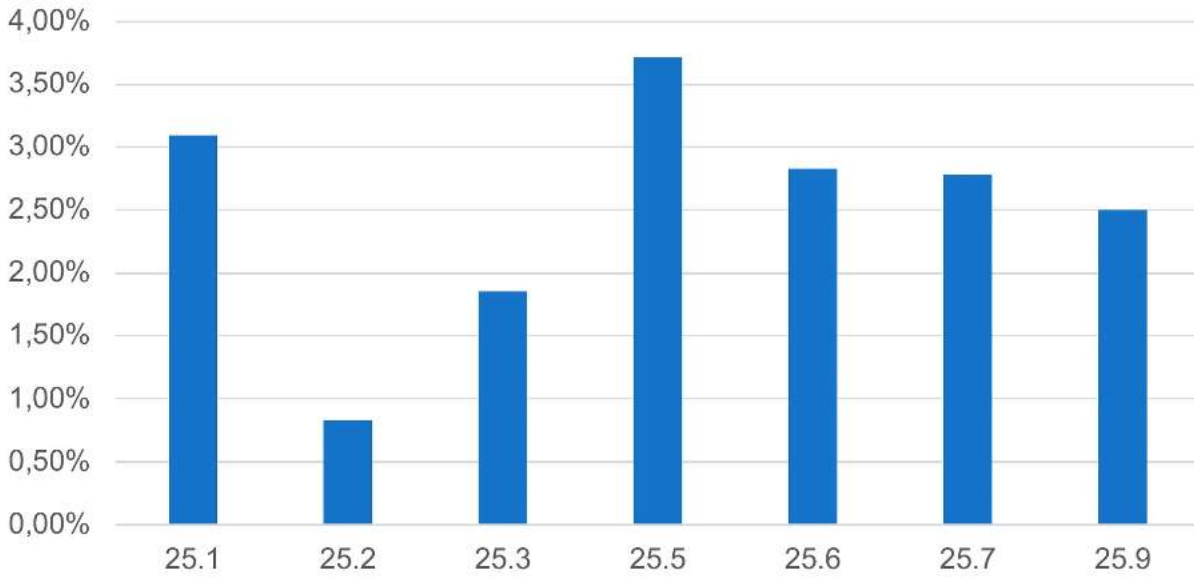
NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2018 bn EUR	2019 bn EUR	Growth bn EUR	Growth in %
25.1	Manufacture of structural metal products	36,80	37,94	1,14	3,10%
25.2	Manufacture of tanks, reservoirs and containers of metal	6,01	6,06	0,05	0,83%
25.3	Manufacture of steam generators, except central heating hot water boilers	0,54	0,55	0,01	1,85%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	21,81	22,62	0,81	3,71%
25.6	Treatment and coating of metals; machining	32,88	33,81	0,93	2,83%
25.7	Manufacture of cutlery, tools and general hardware	31,62	32,50	0,88	2,78%
25.9	Manufacture of other fabricated metal products	40,33	41,34	1,01	2,50%
Total		**169,99**	**174,82**	**4,83**	**2,84%**



Turnover manufacture fabricated metal products Germany
in bn EUR: Year 2019



Growth rates 2019 in %



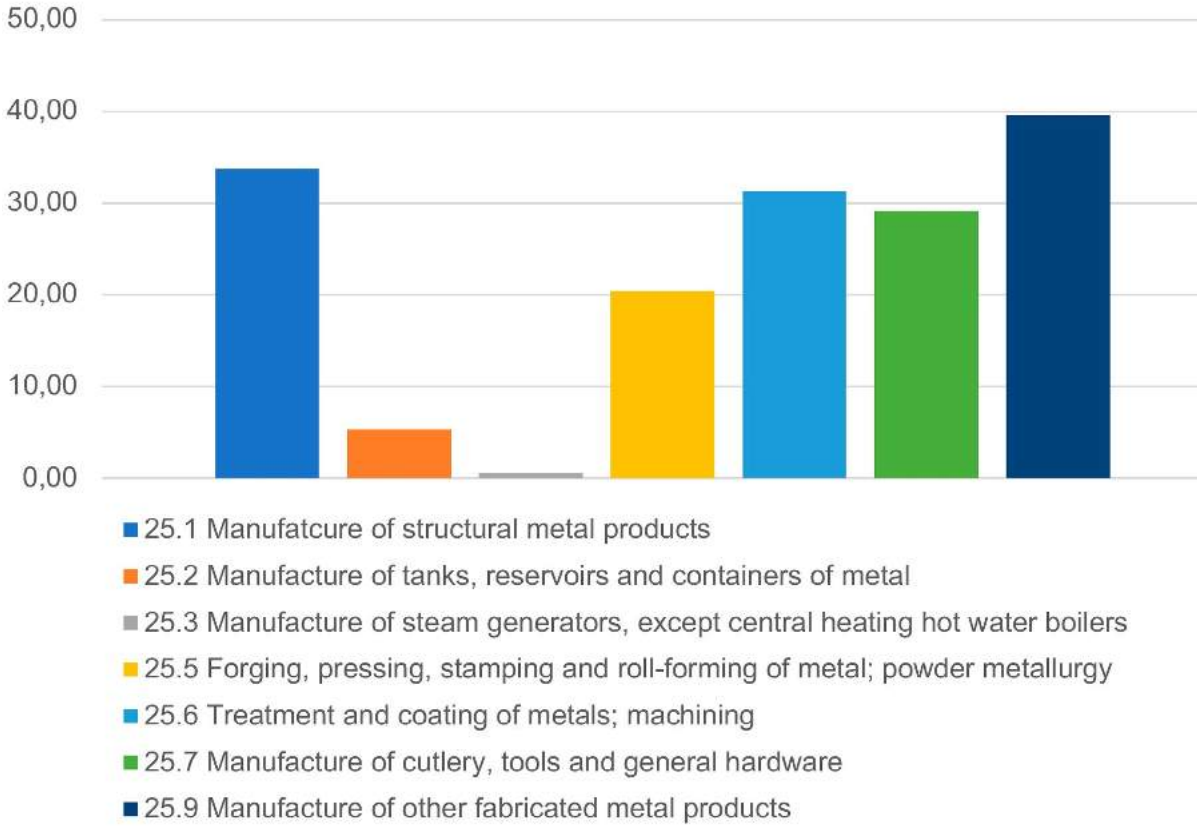
Already in the first quarter of 2020, which was still largely unaffected by reactions to COVID-19, the production of metal processing companies in Germany fell almost 9% below the level for the same quarter of the previous year. The political and corporate health protection measures introduced in March 2020 caused the production of metal processing companies in Germany

to slump by almost 30% in the second quarter. For the first half of 2020, this resulted in a minus of 19.2%. In the course of the second quarter, the industry was able to recover. While in April 2020 the previous year's production had been missed by 35.5%, by June 2020 production was 23.4% below the previous year's value. From April to June 2020, production has thus increased by 19%. In the third quarter of 2020, metal processing companies in Germany increased their production by a good 20% compared to the previous quarter. With this rapid recovery, year-on-year production is still 10.6% below the third quarter and 15.7% below the first nine months of 2019. In the last three months of 2020, it was possible to further lessen the gap from the previous year (despite the renewed restrictions on public life from November 2020) so that an overall decline in sales of about 8-10% could be expected for 2020. The following overview shows the turnover development of the industry for 2020 compared to 2019:

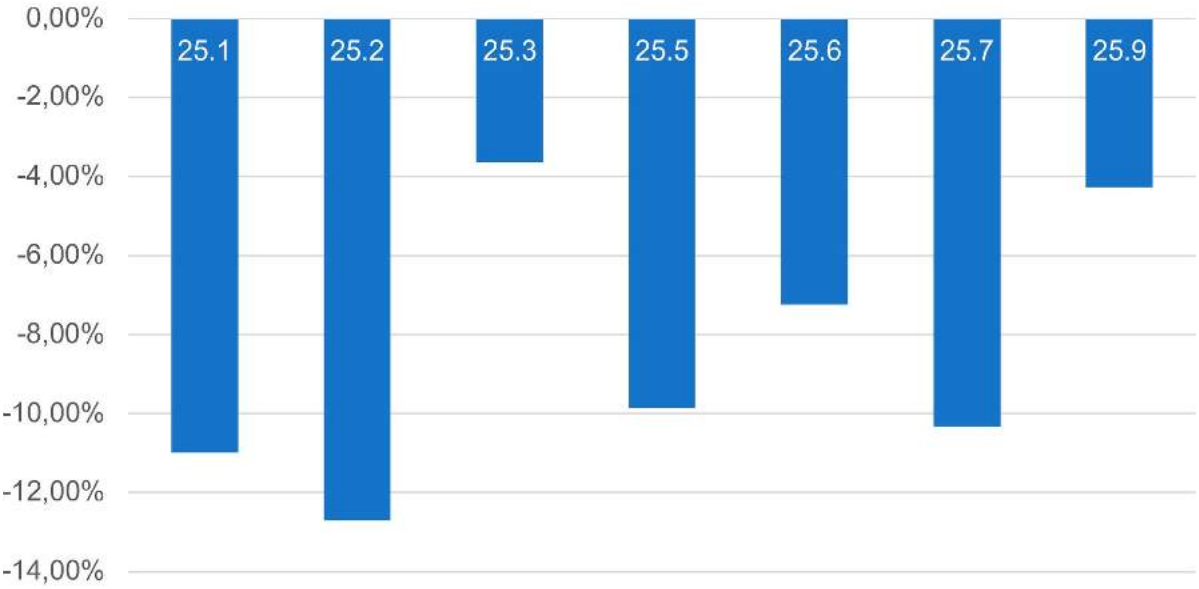
Figure 22: The German market 2019/20 - turnover in bn EUR (fabricated metal products – C.25 – without 25.4), source: Statista

NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2019 bn EUR	2020 bn EUR	Growth bn EUR	Growth in %
25.1	Manufacture of structural metal products	37,94	33,77	-4,17	-10,99%
25.2	Manufacture of tanks, reservoirs and containers of metal	6,06	5,29	-0,77	-12,71%
25.3	Manufacture of steam generators, except central heating hot water boilers	0,55	0,53	-0,02	-3,64%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	22,62	20,39	-2,23	-9,86%
25.6	Treatment and coating of metals; machining	33,81	31,36	-2,45	-7,25%
25.7	Manufacture of cutlery, tools and general hardware	32,50	29,14	-3,36	-10,34%
25.9	Manufacture of other fabricated metal products	41,34	39,57	-1,77	-4,28%
Total		**174,82**	**160,05**	**-14,77**	**-8,45%**

Turnover manufacture fabricated metal products Germany
in bn EUR: Year 2020



Growth rates 2020 in %

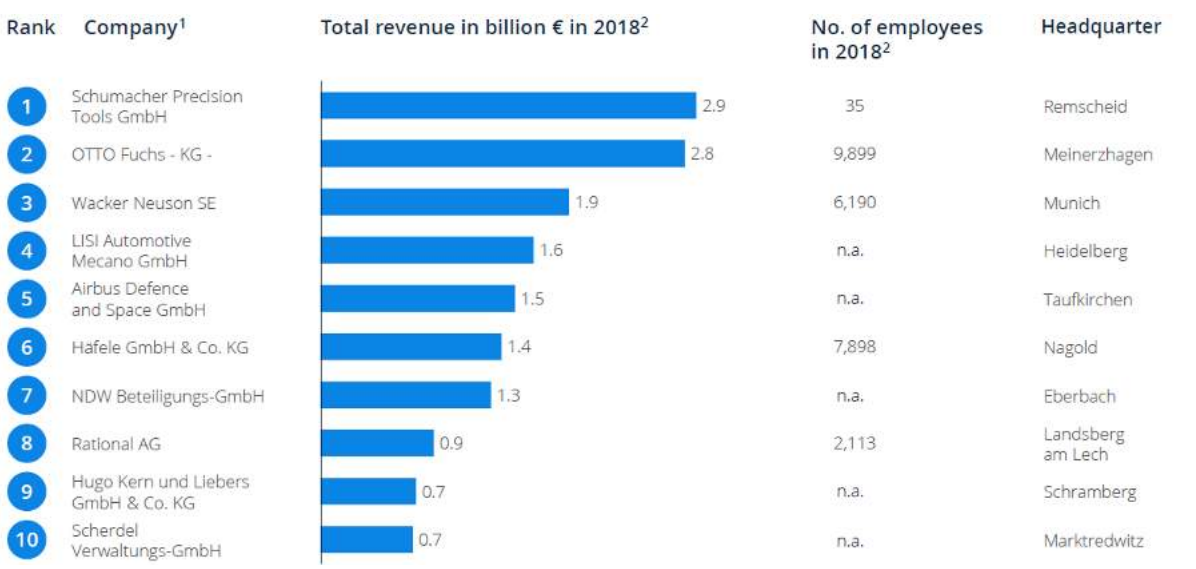


In 2019, the market share of metal products (including articles from iron and steel; aluminium and articles thereof) from BiH on the German market was approximately 0.3% (Federal Statistics Office of Germany).

Sector structure and competition - Germany

According to the Federal Statistical Office (2020), at the end of 2018, there were 43 076 companies in the manufacture of metal products. The sector has significantly more small and medium-sized enterprises than the manufacturing industry as a whole. 80% of companies in the manufacture of metal products have fewer than 100 employees; in the manufacturing sector as a whole this figure is around 72%. Only 2% of establishments in this sector are large enterprises with 500 or more employees (manufacturing industry: 4%). Important companies within the sector are shown in the following chart:

Figure 23: Selected German companies within the branch fabricated metal products, source: Statista 2020



4.4.3 The Italian market

In 2018 and 2019, the turnover of the metalworking industry developed as follows:

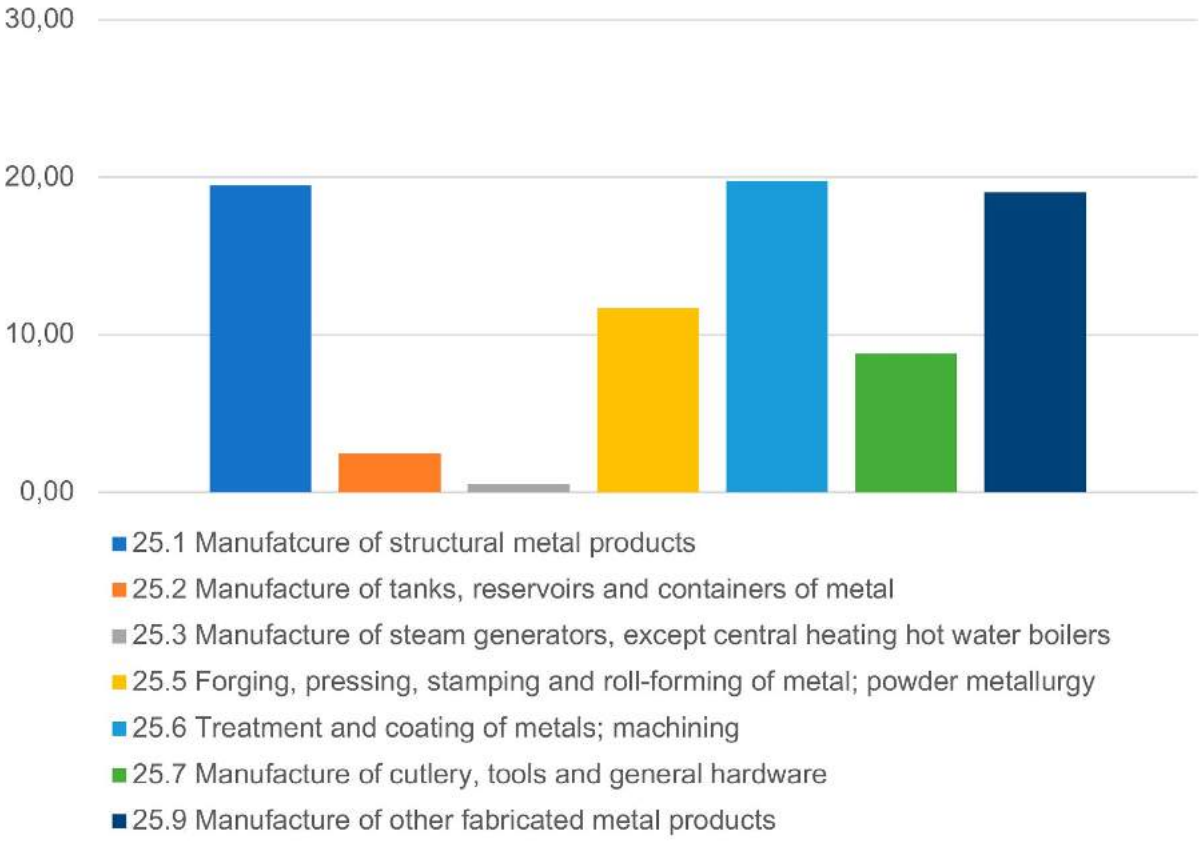
Figure 24: The Italian market 2018/19- turnover in bn EUR (fabricated metal products – C.25 – without 25.4), source: Statista

NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2018 bn EUR	2019 bn EUR	Growth bn EUR	Growth in %
25.1	Manufacture of structural metal products	19,52	19,74	0,22	1,13%
25.2	Manufacture of tanks, reservoirs and containers of metal	2,47	2,49	0,02	0,81%
25.3	Manufacture of steam generators, except central heating hot water boilers	0,53	0,57	0,04	7,55%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	11,72	11,99	0,27	2,30%
25.6	Treatment and coating of metals; machining	19,77	19,98	0,21	1,06%

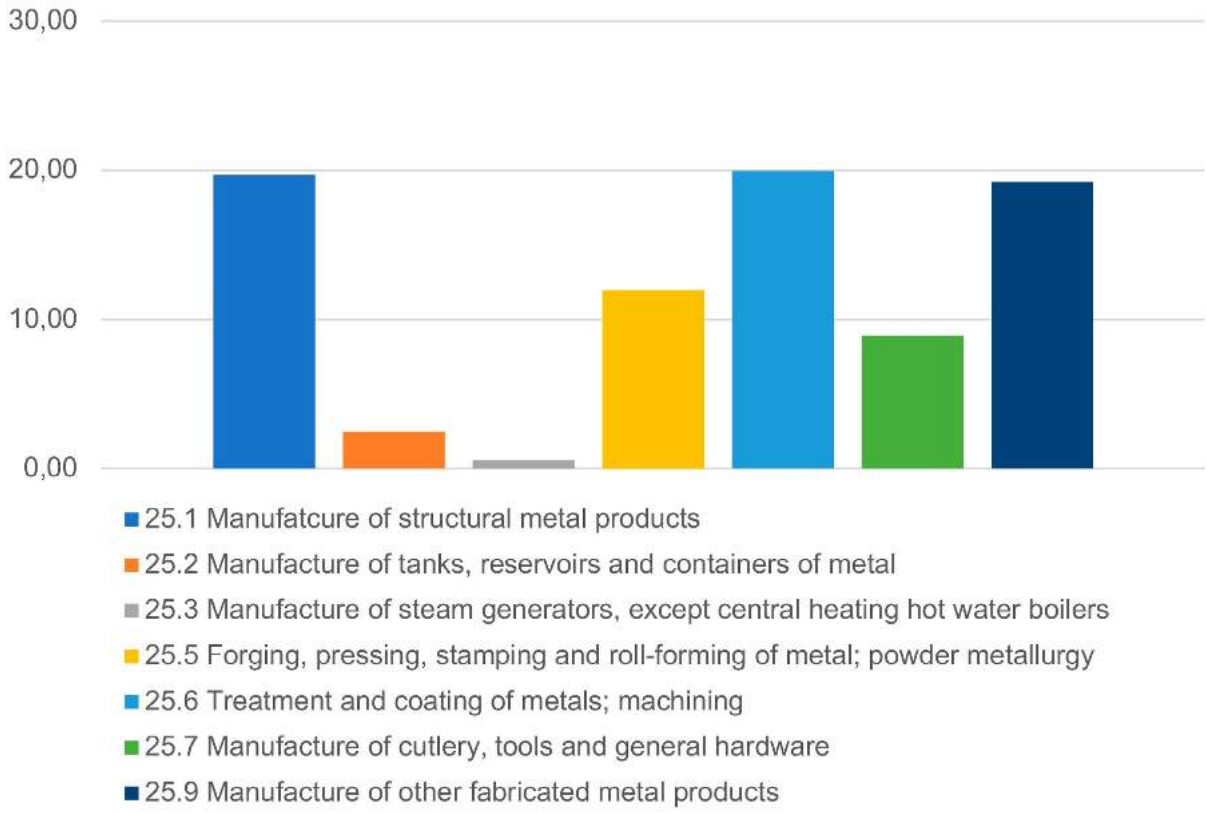
NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2018 bn EUR	2019 bn EUR	Growth bn EUR	Growth in %
25.7	Manufacture of cutlery, tools and general hardware	8,80	8,94	0,14	1,59%
25.9	Manufacture of other fabricated metal products	19,05	19,23	0,18	0,94%
Total		**81,86**	**82,94**	**1,08**	**1,32%**

In 2019, the Italian metalworking industry was able to increase its turnover by around 1.32%. The industry mainly supplies the mechanical and plant engineering sector, which is very strong in northern Italy in particular. Alongside food production, mechanical engineering is Italy's most important industrial sector and even ranked first in terms of manufacturing output in 2018. In official statistics, metal mechanics (broadly defined to include steelworks, foundries, electrical components, transport) accounts for one third of industrial production. Mechanical engineering in the narrower sense (C28) was responsible for around 13.7% of manufacturing production in 2018, with output of 96.5 billion euros. The Italian metalworking industry (C25), among others, also benefited from this development.

Turnover manufacture fabricated metal products Italy
in bn EUR: Year 2018



Turnover manufacture fabricated metal products Italy
in bn EUR: Year 2019



The COVID-19 pandemic has had a strong negative economic impact, especially on the industrial regions of northern Italy.

Growth rates in % 2019

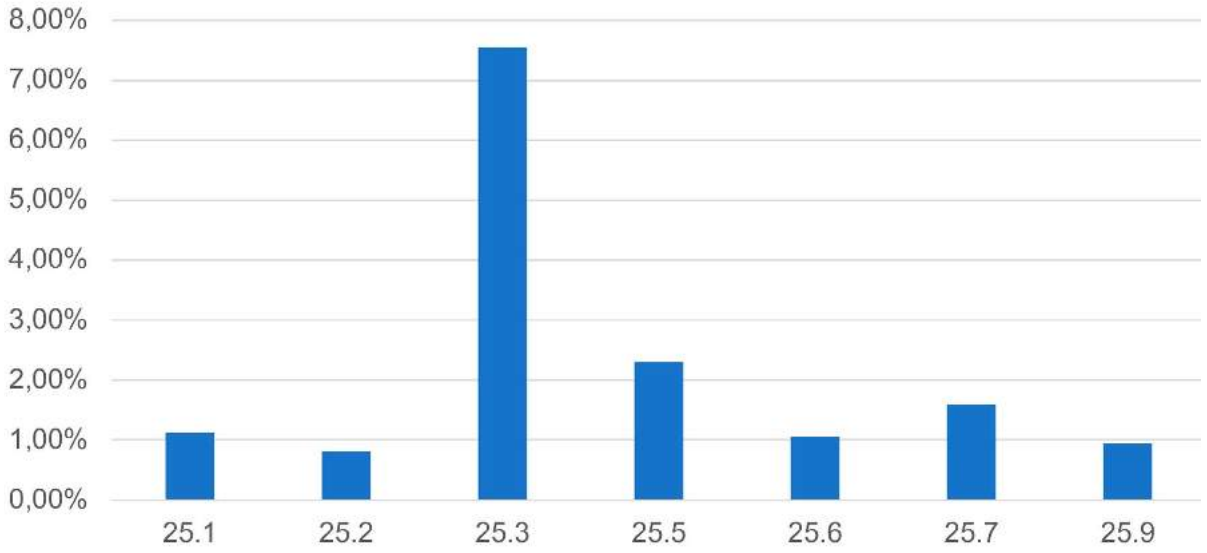
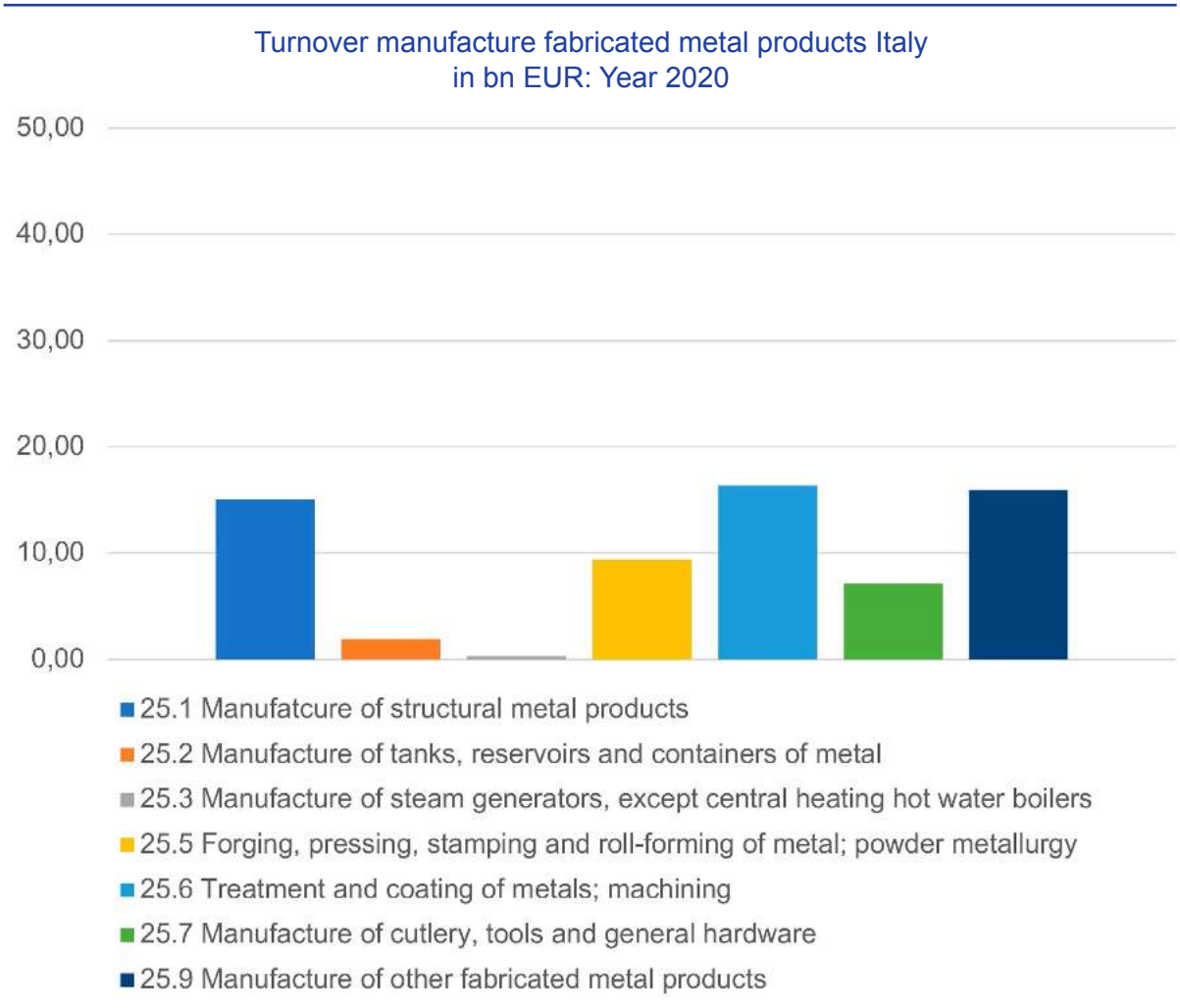
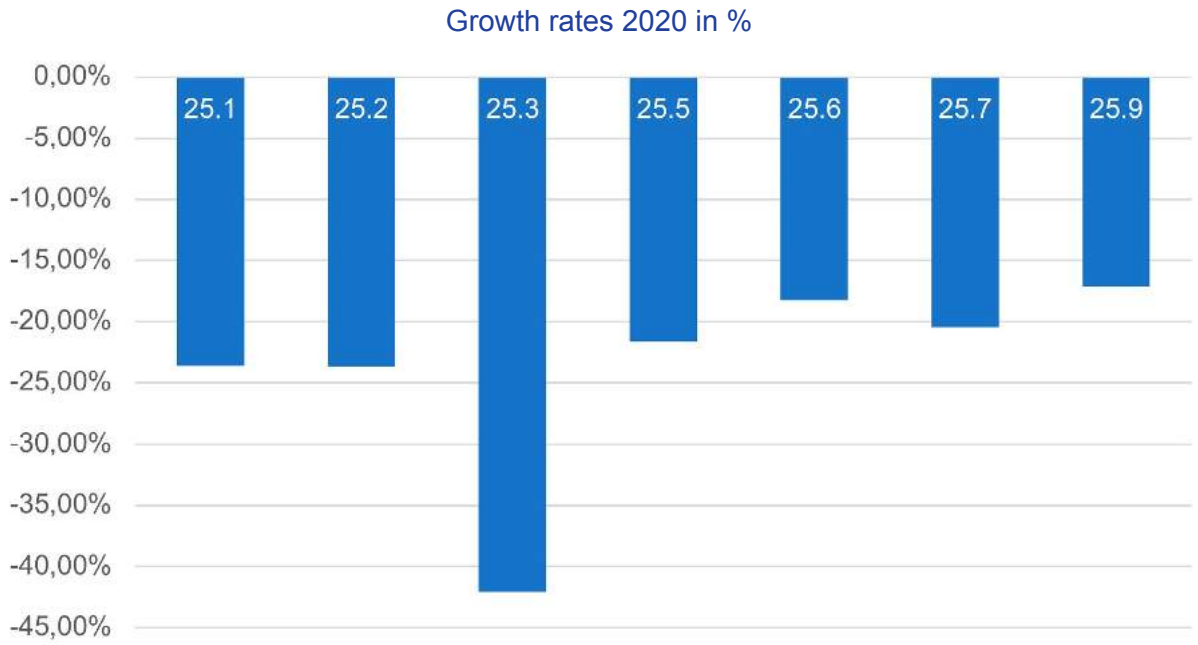


Figure 25: The Italian market 2019/20- turnover in bn EUR (fabricated metal products – C.25 - without 25.4), source: Statista

NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2019 bn EUR	2020 bn EUR	Growth bn EUR	Growth in %
25.1	Manufacture of structural metal products	19,74	15,08	-4,66	-23,61%
25.2	Manufacture of tanks, reservoirs and containers of metal	2,49	1,90	-0,59	-23,69%
25.3	Manufacture of steam generators, except central heating hot water boilers	0,57	0,33	-0,24	-42,11%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	11,99	9,40	-2,59	-21,60%
25.6	Treatment and coating of metals; machining	19,98	16,33	-3,65	-18,27%
25.7	Manufacture of cutlery, tools and general hardware	8,94	7,11	-1,83	-20,47%
25.9	Manufacture of other fabricated metal products	19,23	15,94	-3,29	-17,11%
Total		**82,94**	**66,09**	**-16,85**	**-20,32%**





Sector structure and competition - Italy

Italy is the second largest market within the metal processing industry in Europe and the tenth largest worldwide. Metal processing companies in Italy have adopted production processes that require less investment in construction and maintenance. In the Italian metal industry, there are enterprises of all sizes, including artisans. The COVID-19 pandemic has had a strong negative economic impact, especially on the industrial regions of northern Italy. The greater Milan, Bergamo, Brescia area in particular is a core industrial region of Italy. The industries represented here include mechanical engineering and metal processing, the automotive supply industry, the chemical industry and the electrical, textile and clothing industries. The metropolitan area is also considered the centre of the service sector in Italy. Emilia-Romagna is the centre of the automotive industry (Motor-Valley, Lamborghini, Ferrari, and Ducati) and mechanical engineering. In addition, there are numerous metalworking companies in the region. Besides a limited number of large multinationals, the industry tends to be made up of domestic, smaller firms. As these are generally more vulnerable to the upheavals of the COVID-19 crisis, there is a not insignificant risk that many Italian machinery manufacturers will have to close down or at least reposition themselves.

According to the National Statistics Office, there were 22 494 companies active within the relevant sector in Italy (according to the most recent 2017 figure), employing 468 297 people. About 92% of the firms have less than 50 employees and 59% have less than 12 employees. The number of firms with more than 250 employees was 221. The two major industry associations, Anima and Federmacchine, organise about 1000 firms with about 221 000 employees (Anima) and 5100 firms with about 193 750 employees, respectively, whose total turnover in 2018 was EUR 48.7 billion (Anima) and EUR 49.2 billion (Federmacchine).

Figure 26: Important Italian companies within the metal sector, source: GTAI

Company	Turnover 2018	Specific sector
GE Italia	2.7	Turbines and compressors
Danieli & C officine	2.6	mechanical engineering
Brembo SpA	2.6	Brake systems
ABB Italia	2.2	industry automatization
Ali Group	2.2	mechanical engineering
Ansaldo Eneria SpA	1.7	energy
Ariston Thermo SpA	1.6	cooling and heating technology

4.4.4 The Austrian market

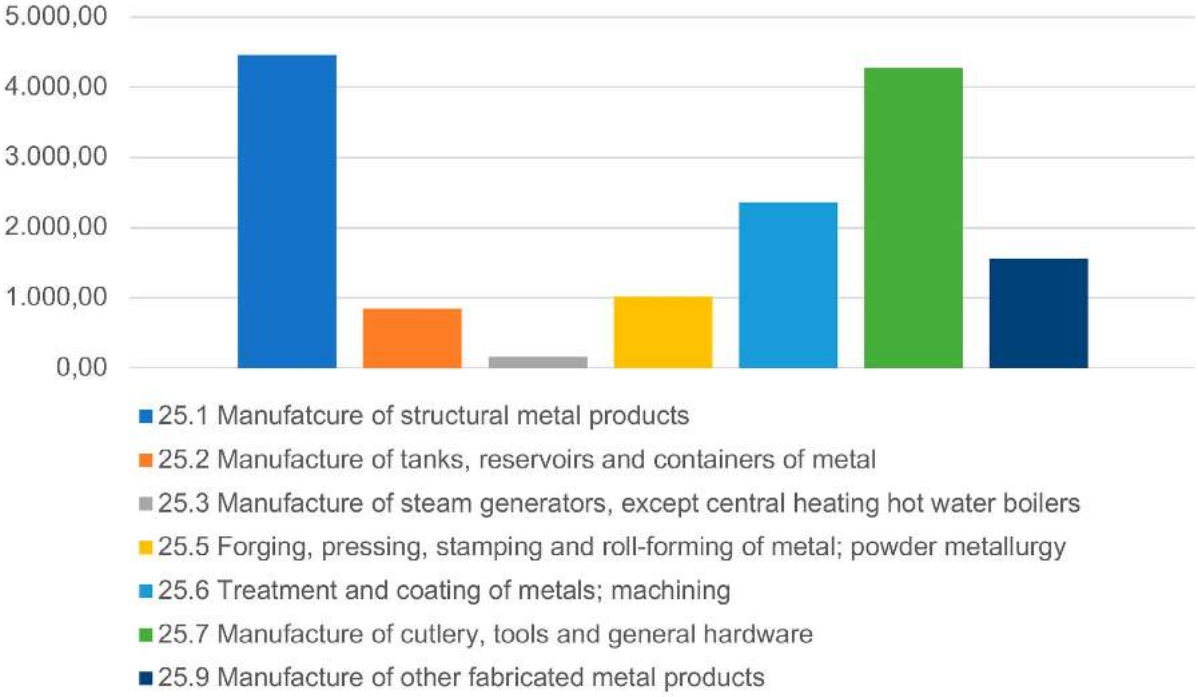
In 2018 and 2019, the turnover of the metalworking industry developed as follows:

Figure 27: The Austrian market 2018/19- turnover in million (mn) EUR (fabricated metal products – C25 - without 25.4), source: Statista

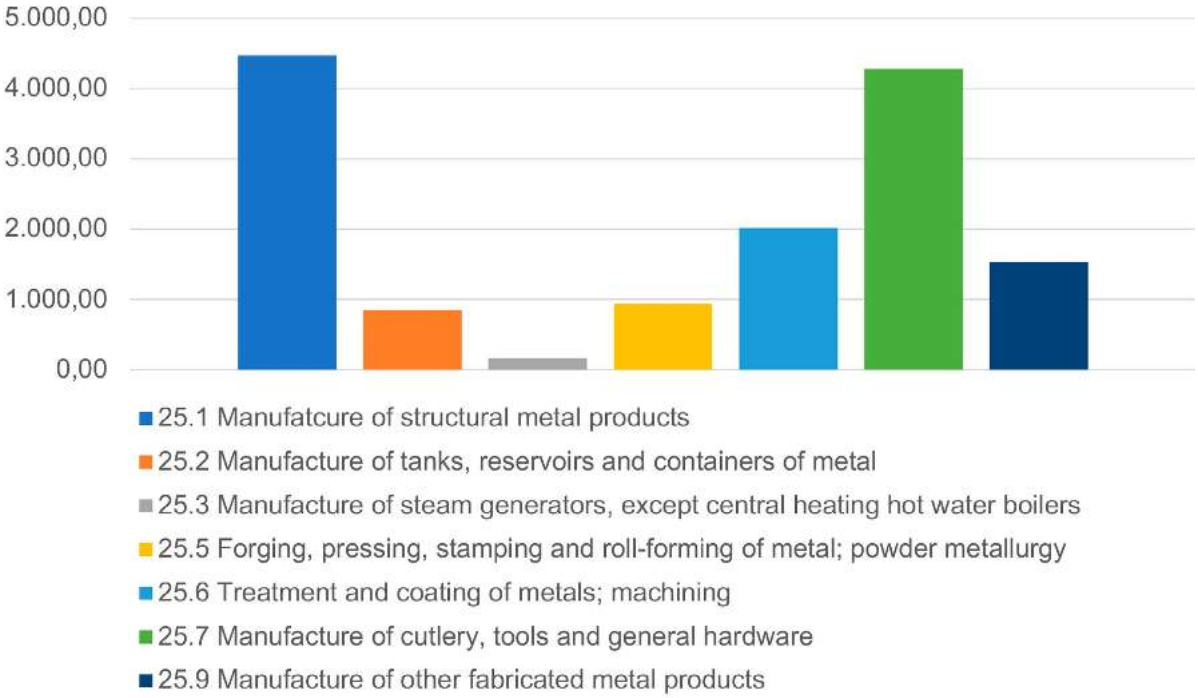
NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2018 mn EUR	2019 mn EUR	Growth mn EUR	Growth in %
25.1	Manufacture of structural metal products	4.457,00	4.476,13	19,13	0,43%
25.2	Manufacture of tanks, reservoirs and containers of metal	844,80	847,01	2,21	0,26%
25.3	Manufacture of steam generators, except central heating hot water boilers	162,30	164,68	2,38	1,47%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	1.014,50	932,84	-81,66	-8,05%
25.6	Treatment and coating of metals; machining	2.360,40	2.016,62	-343,78	-14,56%
25.7	Manufacture of cutlery, tools and general hardware	4.272,60	4.282,03	9,43	0,22%
25.9	Manufacture of other fabricated metal products	1.561,10	1.536,90	-24,20	-1,55%
Total		**14.672,70**	**14.256,21**	**-416,49**	**-2,84%**

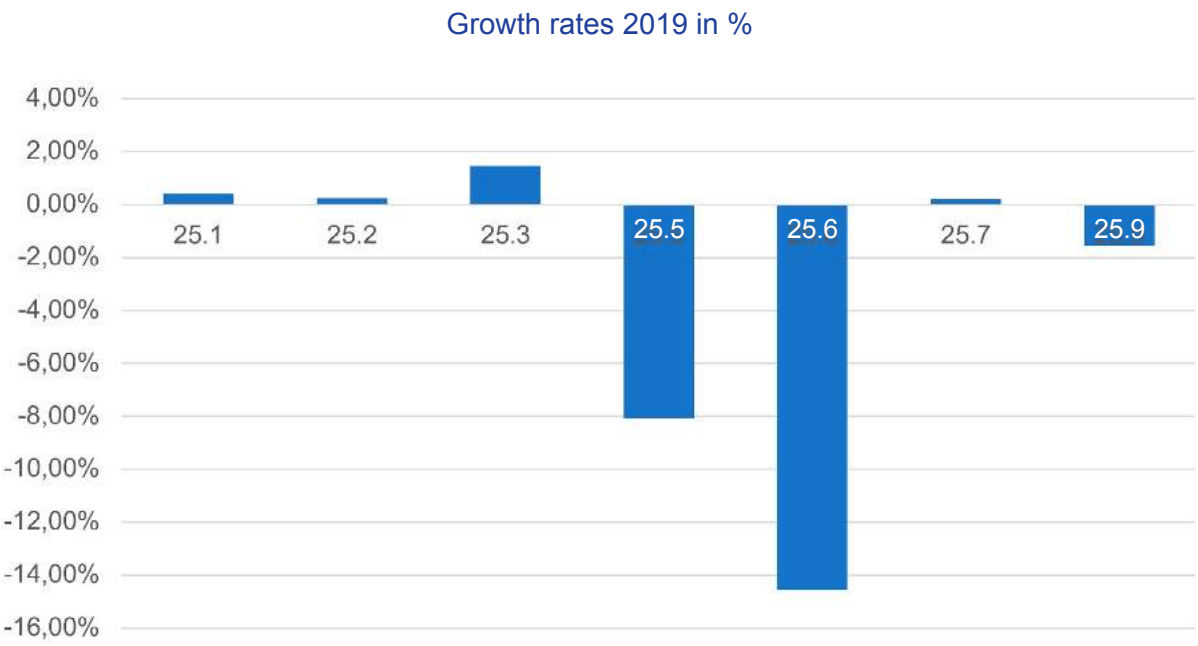
In 2018, the Austrian metal processing industry was able to record a significant increase in turnover. Despite a thoroughly good overall economic situation, however, the sector had to accept a decline in turnover of around 2.9% in 2019. Manufacturers in the field of metal constructions, which represent the sub-sector of the metalworking industry with the highest turnover, were able to slightly increase their turnover in 2019, contrary to the industry trend. The sub-sector “Treatment and coating of metals; machining” had to cope with the strongest decline.

Turnover manufacture fabricated products Austria
in mn EUR: Year 2018



Turnover manufacture fabricated products Austria
in mn EUR: Year 2019



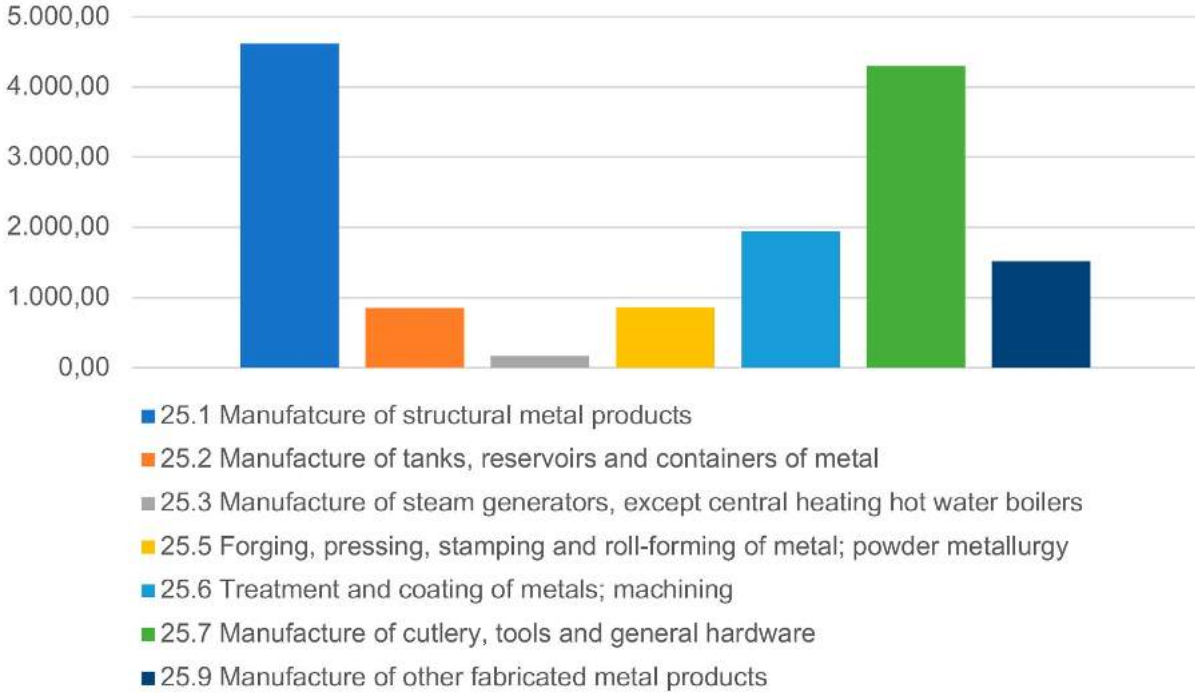


The metalworking industry largely stabilized in the third quarter of 2020 after a sharp setback in the first half of 2020. Preliminary statistical data show that the metalworking industry was largely able to maintain its previous year's turnover and only recorded slight declines. Nevertheless, industry experts assume that after analysing the data for 2020, the decline could be greater than expected. The preliminary estimates for the total turnover of the industry can be seen in the following table.

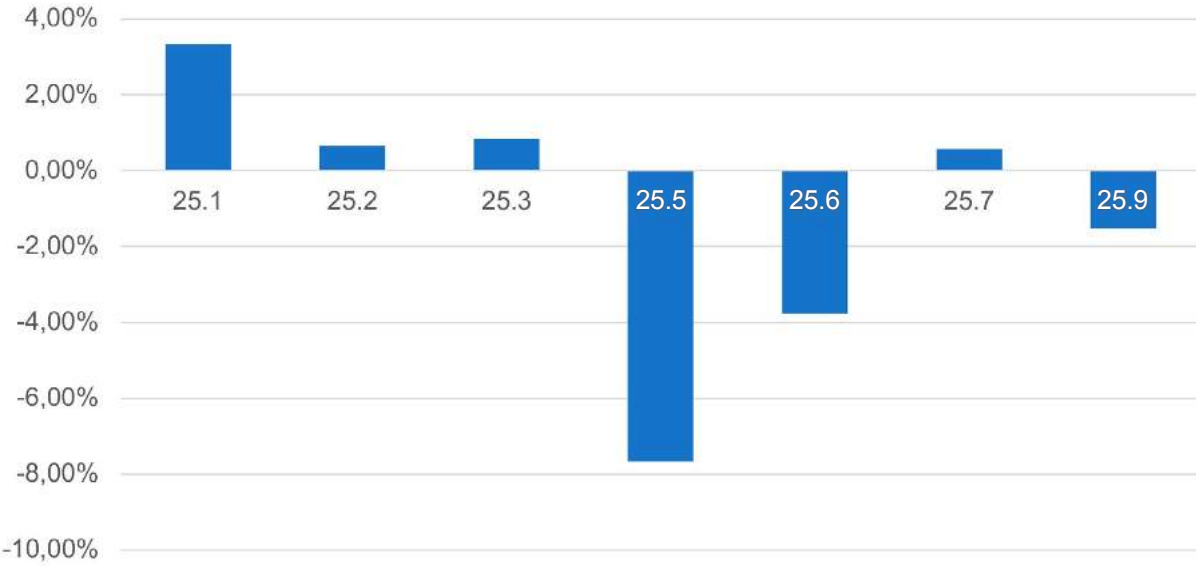
Figure 28: The Austrian market 2019/20- turnover in million (mn) EUR (fabricated metal products – C25 - without 25.4), source: Statista

NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2019 mn EUR	2020 mn EUR	Growth mn EUR	Growth in %
25.1	Manufacture of structural metal products	4.476,13	4.625,75	149,62	3,34%
25.2	Manufacture of tanks, reservoirs and containers of metal	847,01	852,65	5,64	0,67%
25.3	Manufacture of steam generators, except central heating hot water boilers	164,68	166,07	1,39	0,84%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	932,84	861,39	-71,45	-7,66%
25.6	Treatment and coating of metals; machining	2.016,62	1.940,66	-75,96	-3,77%
25.7	Manufacture of cutlery, tools and general hardware	4.282,03	4.306,55	24,52	0,57%
25.9	Manufacture of other fabricated metal products	1.536,90	1.513,60	-23,30	-1,52%
Total		**14.256,21**	**14.266,67**	**10,46**	**0,07%**

Turnover manufacture fabricated products Austria
in mn EUR: Year 2020



Growth rates 2020 in %



Sector structure and competition - Austria

Metal technology represents Austria's strongest sector. More than 3800 companies from the industrial segments mechanical engineering, plant engineering, structural steelwork engineering, metal goods and foundries form the backbone of the Austrian industry. This export-oriented industry consists mainly of medium sized companies; 85% are family-run. These com-

panies are responsible for one quarter of all Austrian exports. The sector benefits from high international competitiveness of individual large leading companies. The close (supplier) links with the industrial growth leaders at home and abroad are also helpful. These are primarily the automotive industry and mechanical engineering. Many companies score points by concentrating on high-quality products and lucrative niches. The following chart shows the ten largest Austrian companies within the metal industry.

Figure 29: The largest Austrian companies in metal sector, source: GTAI, 2020

Largest Austrian companies in the metal industry by net sales in 2019 (in mn. EUR)	
Voest Alpine AG	12.717
Blum Group Holding GmbH	1.892
Plansee Holding AG	1.377
Amag - Austria Metall AG	1.066
Münze Österreich AG	859
Montanwerke Brixlegg AG	795
Berndorf AG	660
Welser Profile Beteiligungs GmbH	636
Neuman Fried. v. GmbH	605
Hammerer Aluminium Industries Holding GmbH	497

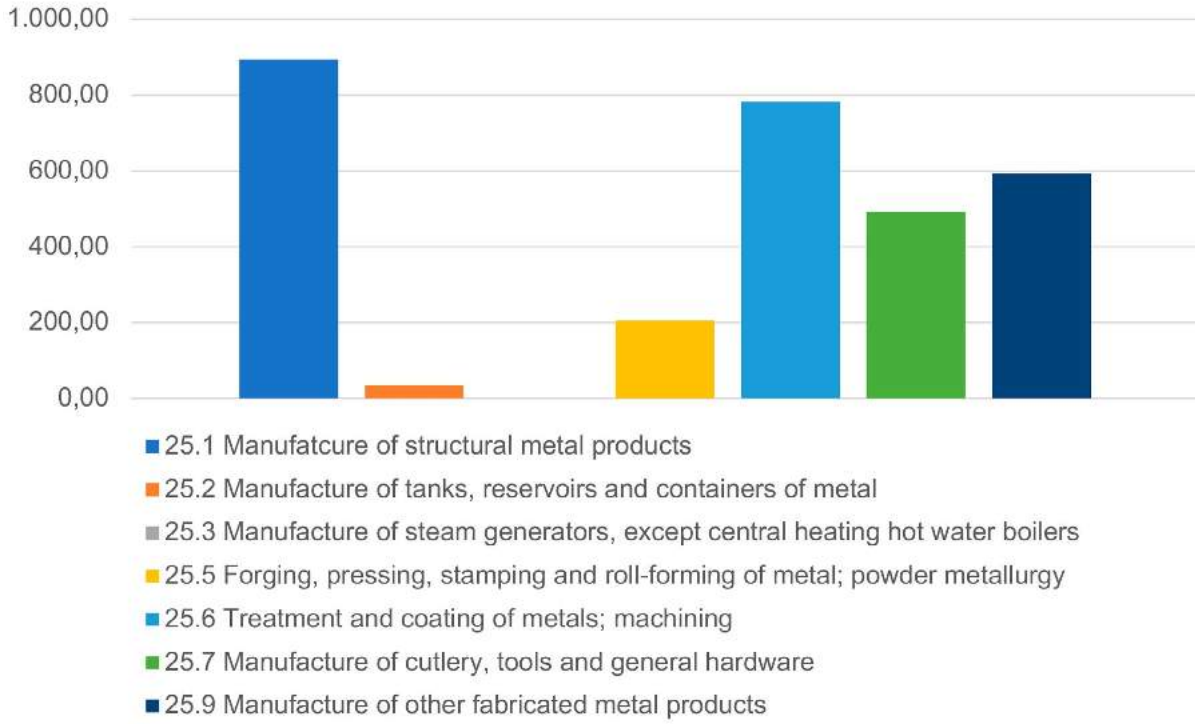
4.4.5 The Slovenian market

In 2018 and 2019, the turnover of the metalworking industry developed as follows:

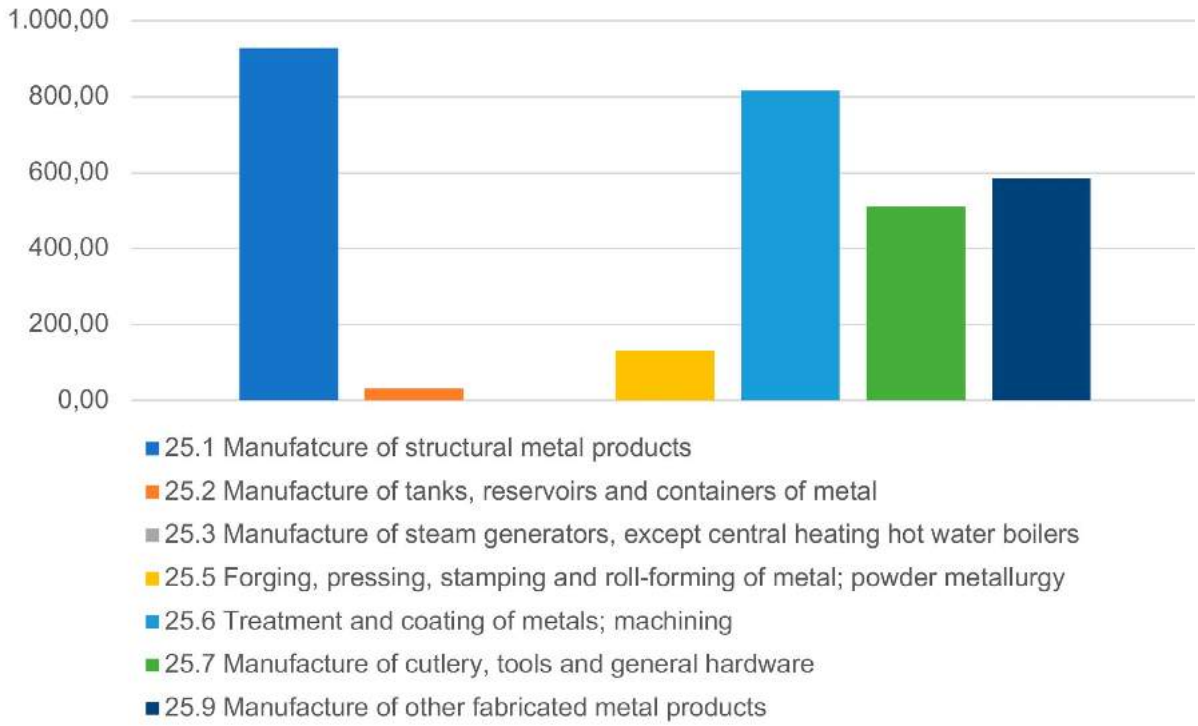
Figure 30: The Slovenian market 2018/19- turnover in mn. EUR (fabricated metal products – C.25 - without 25.4), source: Statista

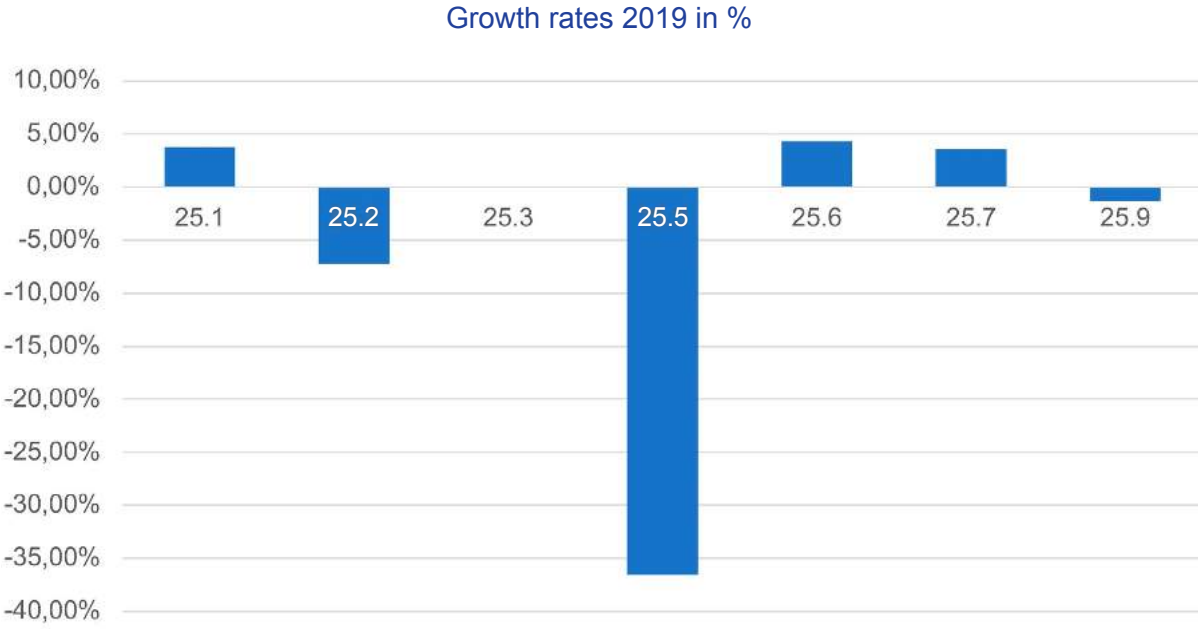
NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2018 mn EUR	2019 mn EUR	Growth mn EUR	Growth in %
25.1	Manufacture of structural metal products	894,65	928,34	33,69	3,77%
25.2	Manufacture of tanks, reservoirs and containers of metal	34,04	31,58	-2,46	-7,23%
25.3	Manufacture of steam generators, except central heating hot water boilers	0,00	0,00	0,00	0,00%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	205,47	130,31	-75,16	-36,58%
25.6	Treatment and coating of metals; machining	782,62	816,26	33,64	4,30%
25.7	Manufacture of cutlery, tools and general hardware	492,82	510,42	17,60	3,57%
25.9	Manufacture of other fabricated metal products	593,23	585,58	-7,65	-1,29%
Total		**3.002,83**	**3.002,49**	**-0,34**	**-0,01%**

Turnover manufacture metal products Slovenia
in mn EUR: Year 2018



Turnover manufacture metal products Slovenia
in mn EUR: Year 2019



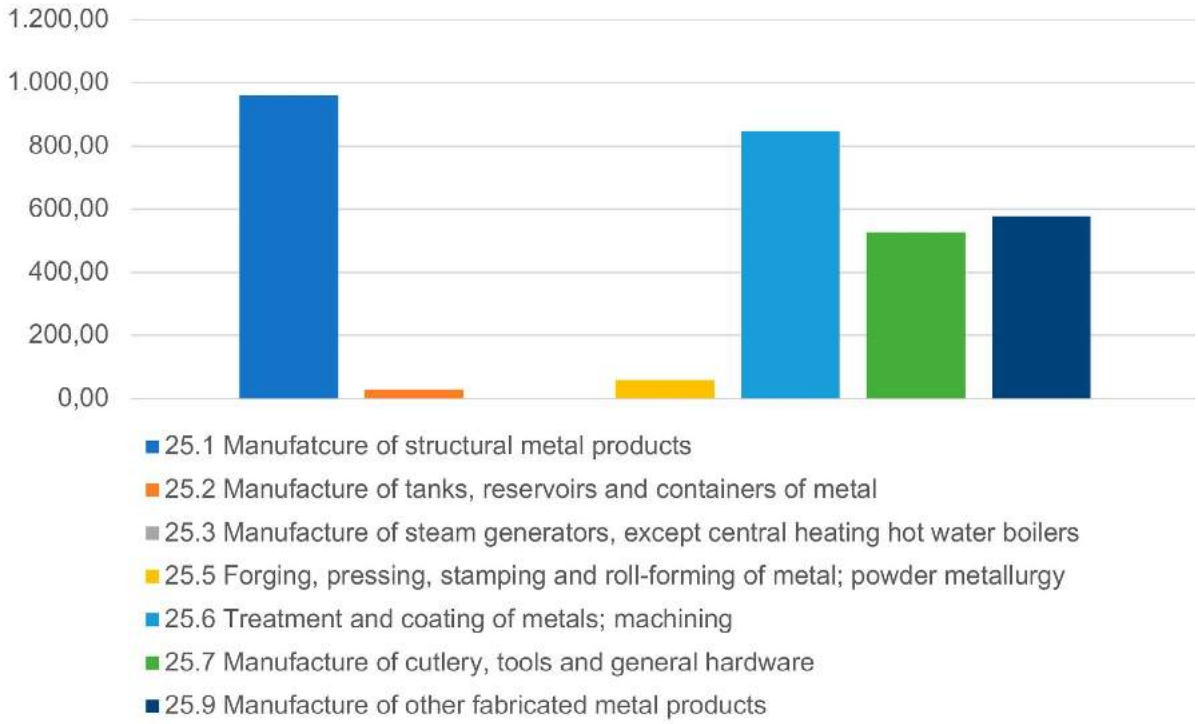


The decline in demand from European car plants and the partly interrupted supply chains initially hit the automotive industry and the large Slovenian automotive supply sector hard. The country's only car manufacturer, Revoz d.d. (Novo mesto; part of the French Renault group), had to stop its assembly lines for a few weeks in early March 2020. Others, such as the component manufacturer Hidria, however, continued to work with reduced production volumes. The preliminary estimates for the total turnover of the industry can be seen in the following table:

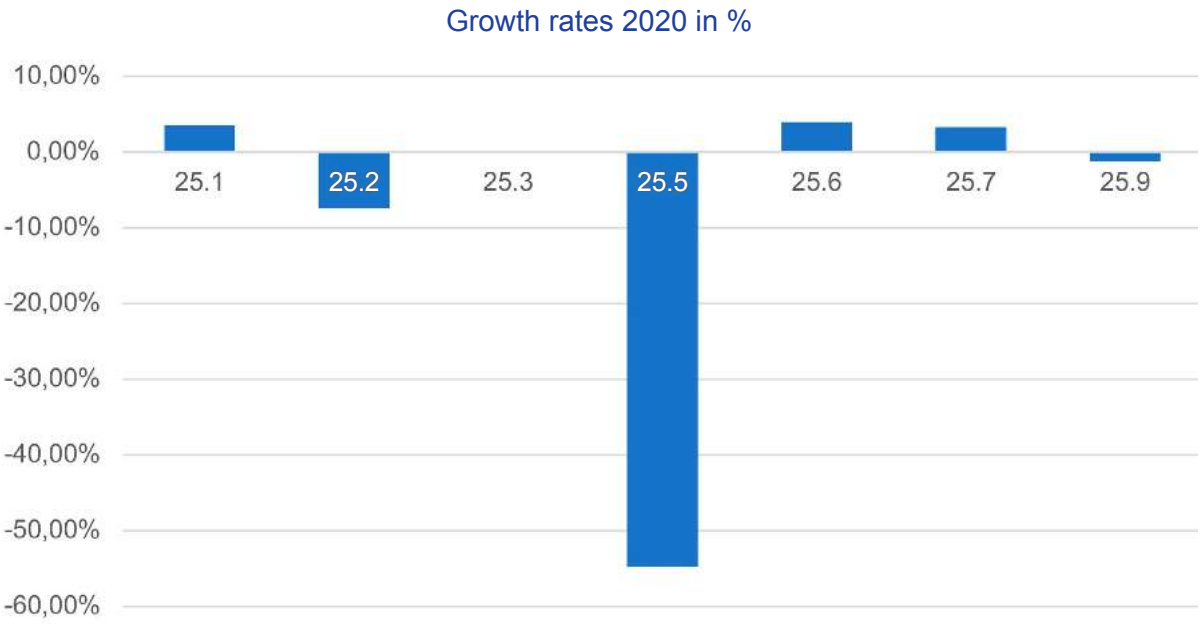
Figure 31: The Slovenian market 2019/20- turnover in mn. EUR (fabricated metal products – C.25 - without 25.4), source: Statista

NACE 25	Manufacture of fabricated metal products, except machinery and equipment	2018 mn EUR	2019 mn EUR	Growth mn EUR	Growth in %
25.1	Manufacture of structural metal products	928,34	960,34	32,00	3,45%
25.2	Manufacture of tanks, reservoirs and containers of metal	31,58	29,24	-2,34	-7,41%
25.3	Manufacture of steam generators, except central heating hot water boilers	0,00	0,00	0,00	0,00%
25.5	Forging, pressing, stamping and roll-forming of metal; powder metallurgy	130,31	58,91	-71,40	-54,79%
25.6	Treatment and coating of metals; machining	816,26	848,22	31,96	3,92%
25.7	Manufacture of cutlery, tools and general hardware	510,42	527,14	16,72	3,28%
25.9	Manufacture of other fabricated metal products	585,58	578,31	-7,27	-1,24%
Total		**3.002,49**	**3.002,16**	**-0,33**	**-0,01%**

Turnover manufacture metal products Slovenia
in mn EUR: Year 2020



The COVID-19 pandemic caused a sharp decline in Slovenia's economic output in 2020: between 6.6% and 7.6%, according to estimates. The economic slump in the EU, especially in Slovenia's neighbouring countries and most important economic partners (Italy, Austria, Hungary and Croatia), has contributed to this. All this has caused domestic and export demand for Slovenian manufactured goods and services to fall. In view of the worsening epidemic situation, economic recovery is not expected to start until the second half of 2021. Contrary to the general trend, the manufacturing sector coped quite well with the second wave of COVID-19 in autumn 2020. However, economic expectations worsened again at the end of 2020 in view of the worsening epidemic situation. Nevertheless, the situation is assessed to be more favourable than in the spring. The metalworking industry was therefore able to largely stabilize its turnover.



Sector structure and competition - Slovenia

Slovenia's machining and metalworking sector holds hope for the future as manufacturers commit to more efficient technology practices and green engineering widely regarded as being near the top of recession-resistant industries. The machinery must be designed and constructed taking into account the results of the risk assessment. As labour productivity has come into sharper focus than ever before, all major manufacturers are working to upgrade facilities and invest in new projects. At this point, the experience and knowledge of employees gives companies an edge through innovative solutions that translate to continuing improvements of manufacturing processes.

Slovenia has a strong automotive industry. This sector contributes about 10% to Slovenia's GDP and more than 20% to exports. In the Slovenian automotive industry, there are more than 100 automotive supply companies in Tier 1 or Tier 2 and more than 600 sub-suppliers from lower tiers of the supply chain. That´s why most of metal companies in Slovenia are working as a supplier or sub-supplier for the automotive sector.

Due to the size of the country, the Slovenian automotive industry and its suppliers are predominantly export-oriented. The Slovenian automotive industry is also becoming increasingly involved in the field of e-mobility. Companies are adapting to the new trend in the automotive industry. This means that automotive suppliers are also developing and manufacturing new products for electric cars and hybrid vehicles. Opportunities for BiH companies can be seen above all in cooperation with Slovenian companies in the automotive supply industry. Slovenia has a very competitive supplier industry, especially in the field of metalworking and toolmaking, but also in the field of automotive interior equipment and electrical engineering.

Figure 32: Important Slovenian companies from the metal branch, source: Invest in Slovenia

Important Slovenian companies from the metal branch - turnover in mn EUR		
Company	**Specific sector**	**mn EUR**
ADK, Hoce	Lifting and Handling Equipment	128
Akers Valji, Ravne	manufacture special tools	23
Arcont, Gornja Radgona	metal constructions	15
CIMOS, Koper - Capodistria	Drive technology	187
CNC P&K, Radlje ob Dravi	automotive supplier	18
Daihan, Varstroj	welding machines	14
GKN Driveline, Slovenske Konjice	Ball bearings	99
Niko, Zelezniki	metal processing	30
Store Steel, Štore	Forging, parts, springs mechanical engineering	120
Talum, Kidricevo	Aluminium parts	290

4.5 MARKET SHARE OF BIH COMPANIES

The following data shows the current share of BiH metal products in selected, most relevant markets:

Germany
Share of relevant products exported from Bosnia in Germany's imports of these products:
- 0.3% for product group 73 - Articles of iron or steel
- 0.3% for product group 76 - Aluminium and articles thereof
- 0.4% for product group 83 - Miscellaneous articles of base metal
- 0.1% for product group 84 - Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof
- 0% for product group 87 - Vehicles other than railway or tramway rolling stock, and parts and accessories thereof

Italy
Share of relevant products exported from Bosnia in Italy's imports of these products:
- 0.9% for product group 73 - Articles of iron or steel
- 0.3% for product group 76 - Aluminium and articles thereof
- 01% for product group 83 - Miscellaneous articles of base metal
- 0.1% for product group 84 - Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof
- 0% for product group 87 - Vehicles other than railway or tramway rolling stock, and parts and accessories thereof

Slovenia
Share of relevant products exported from Bosnia in Slovenia's imports of these products:
- 2.7% for product group 73 - Articles of iron or steel
- 3.9% for product group 76 - Aluminium and articles thereof
- 0.7% for product group 83 - Miscellaneous articles of base metal
- 2.5% for product group 84 - Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof

• 0.5% for product group 87 - Vehicles other than railway or tramway rolling stock, and parts and accessories thereof

Austria

Share of relevant products exported from Bosnia in Austria's imports of these products:

• 1.5% for product group 73 - Articles of iron or steel
• 0.9% for product group 76 - Aluminium and articles thereof
• 0.3% for product group 83 - Miscellaneous articles of base metal
• 0.4% for product group 84 - Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof
• 0.1% for product group 87 - Vehicles other than railway or tramway rolling stock, and parts and accessories thereof

Figure 33: Overview – market share of BiH metal industry in selected markets – in %, source: www.trademap.org

	73 - Articles of iron or steel	76 - Alminium and articles thereof	83 - Miscellaneous articles of base metal	84 - Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	87 - Vehicles other than railway or tramway rolling stock, and parts and accessories thereof
Slovenia	2.7	3.9	0.7	2.5	0.5
Austria	1.5	0.9	0.3	0.4	0.1
Italy	0.9	0.3	0.1	0.1	0
Germany	0.3	0.3	0.4	0.1	0

4.6 EXPORT POTENTIAL FOR BIH METAL COMPANIES

Export potential for BiH metal companies was assessed by using the International Trade Centre (ITC) export potential methodology that quantifies the export potential of a country or region across sectors and markets through an assessment of projected export performance and import demand as well as the bilateral trade linkages between the exporting country and the target market. The analysis identifies those products and markets that remain promising despite the gloomy economic outlook. ITC's export potential methodology computes expected values of trade for each exporter-importer-product combination using information on the exporter's projected supply capacity for a given product, the importer's projected demand for that same product and the ease of trade between the two trading partners. It takes into consideration the most recent Gross Domestic Product (GDP) forecasts to capture the expected evolution of demand and supply capacity.

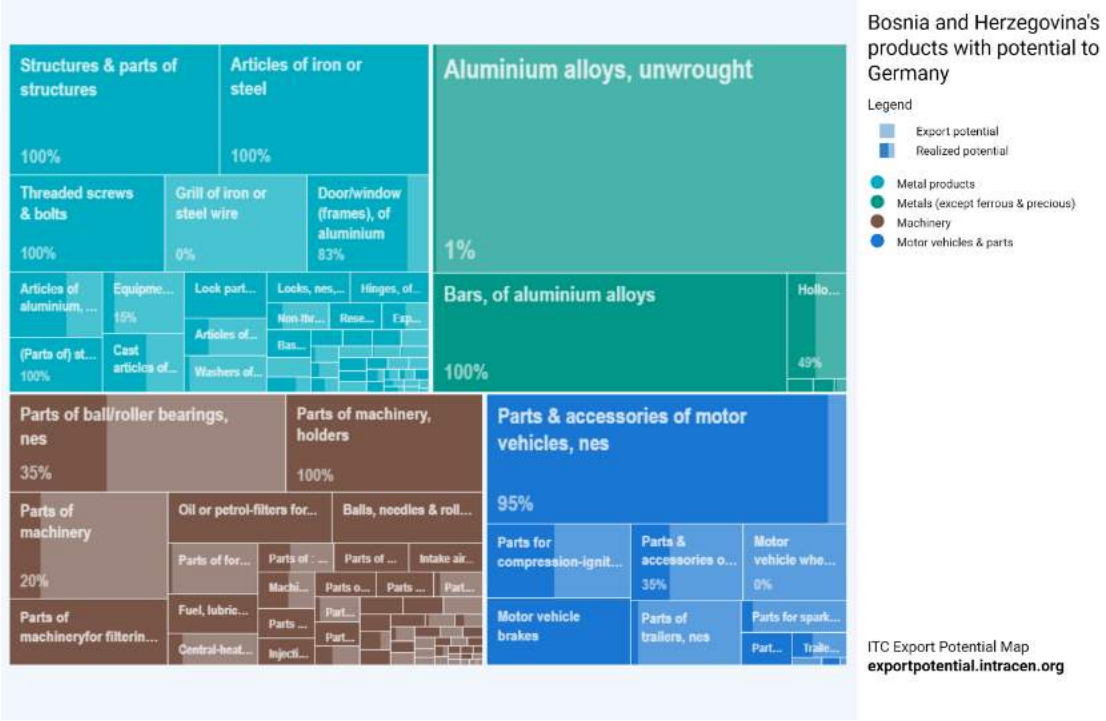
The difference between a country's total export potential and its actual exports (realized export potential) reveals its unrealized export potential. It captures by how much exports could increase within the next five years. Export growth potential can result from two sources: first, future economic growth in the country itself or demand growth in the target market (dynamic, or growth-based export potential), and second, factors that trade advisors may address together with local companies, such as lacking information about the rules and regulations of

the target market or difficulties to comply with them or to meet the (quality) preferences of its consumers (static, or friction-based export potential).

Potential export value of product k supplied by country i to market j, in dollars, is calculated as supply × demand (corrected for market access) × bilateral ease of trade. Supply and demand are projected into the future based on GDP and population forecasts, demand elasticities and forward-looking tariffs. The estimated dollar value serves as a benchmark for comparison with actual exports and should not be interpreted as a ceiling value. In reality, the actual trade value may be below or above the potential value. Export potential is potential export value in 2024 based on projections of supply, demand, market access conditions and bilateral ease of trade, expressed in USD. Realized potential in % is the extent to which export potential has already been utilized.[6]

The German market

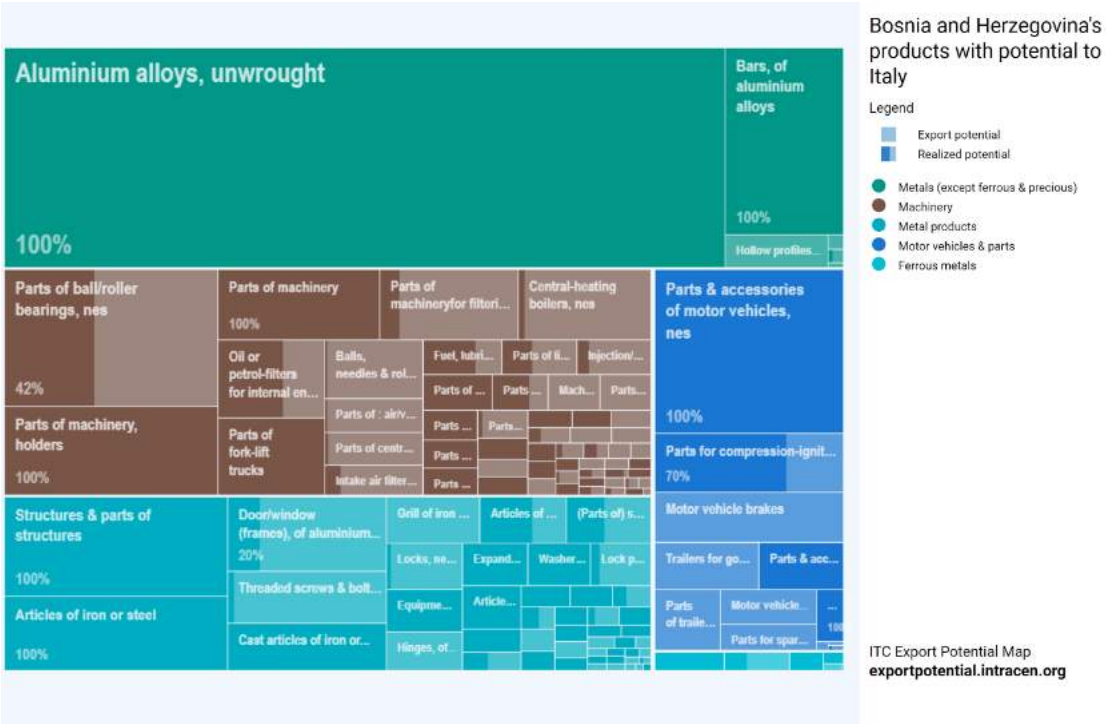
Product groups with the greatest export potential and remaining untapped potential for Germany (within the analysed product groups 73, 76, 83, 84 and 87) are: *760120 Aluminium alloys, unwrought* (export potential USD 52.0 mn, untapped potential remaining USD 51.5 mn), *848299 Parts of ball/roller bearings, nes* (export potential USD 14.9 mn, untapped potential remaining USD 9.6 mn), *843149 Parts of machinery* (export potential USD 9.2 mn, untapped potential remaining USD 7.4 mn), *731420 Grill of iron or steel wire* (export potential USD 7.5 mn, untapped potential remaining USD 7.5 mn), *840999 Parts for compression-ignition internal engine* (export potential USD 5.9 mn, untapped potential remaining USD 3.1 mn), *870829 Parts & accessories of motor vehicle bodies* (export potential USD 4.8 mn, untapped potential remaining USD 3.1 mn) and *870870 Motor vehicle wheels* (export potential USD 4.4 mn, untapped potential remaining USD 4.4 mn).



[6] More information about the methodology is available at: https://exportpotential.intracen.org/en/resources/learning/faq#question5, https://exportpotential.intracen.org/en/resources/learning/glossary and https://umbraco.exportpotential.intracen.org/media/1089/epa-methodology_141216.pdf

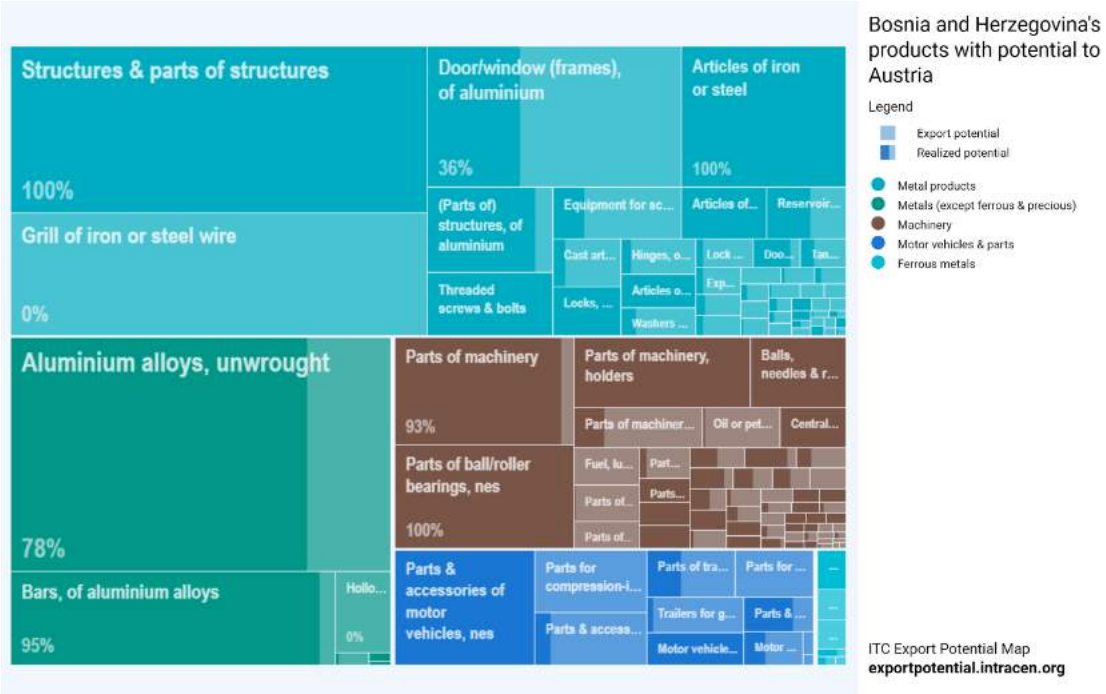
The Italian market

Product groups with the greatest export potential and remaining untapped potential for Italy (within the analysed product groups 73, 76, 83, 84 and 87) are: *848299 Parts of ball/roller bearings, nes* (export potential USD 4.3 mn, untapped potential remaining USD 2.5 mn), *761010 Door/window (frames), of aluminium* (export potential USD 1.8 mn, untapped potential remaining USD 1.4 mn), *870830 Motor vehicle brakes* (export potential USD 1.4 mn, untapped potential remaining USD 1.4 mn), *840310 Central-heating boilers, nes* (export potential USD 1.4 mn, untapped potential remaining USD 1.3 mn), *731815 Threaded screws & bolts* (export potential USD 1.2 mn, untapped potential remaining USD 1.2 mn) and *842199 Parts of machinery for filtering liquids or gases* (export potential USD 1.4 mn, untapped potential remaining USD 1.2 mn).



The Austrian market

Product groups with the greatest export potential and remaining untapped potential for Austria (within the analysed product groups 73, 76, 83, 84 and 87) are: *731420 Grill of iron or steel wire* (export potential USD 16.3 mn, untapped potential remaining USD16.2 mn), *761010 Door/window (frames), of aluminium* (export potential USD 11.3 mn, untapped potential remaining USD7.2 mn), *760120 Aluminium alloys, unwrought* (export potential USD 28.5 mn, untapped potential remaining USD6.2 mn), *840999 Parts for compression-ignition internal engine* (export potential USD 2.2 mn, untapped potential remaining USD 2.2 mn), *730840 Equipment for scaffolding* (export potential USD 2.1 mn, untapped potential remaining USD 1.6 mn) and *760421 Hollow profiles of aluminium alloys, nes* (export potential USD 1.4 mn, untapped potential remaining USD 1.4 mn).



The Slovenian market

Product groups with the greatest export potential and remaining untapped potential for Slovenia (within the analysed product groups 73, 76, 83, 84 and 87) are: *760120 Aluminium alloys, unwrought* (export potential USD 21.7 mn, untapped potential remaining USD 18.8 mn), *730890 Structures & parts of structures* (export potential USD 9.3 mn, untapped potential remaining USD 2.5 mn), 760429 Bars, of aluminium alloys (export potential USD 5.1 mn, untapped potential remaining USD 1.0 mn), *871639 Trailers for good transport, nes* (export potential USD 1.4 mn, untapped potential remaining USD 993.7 k), *730840 Equipment for scaffolding* (export potential USD 639.0 k, untapped potential remaining USD 596.2 k) and *731815 Threaded screws & bolts* (export potential USD 760.5 k, untapped potential remaining USD 551.2 k).

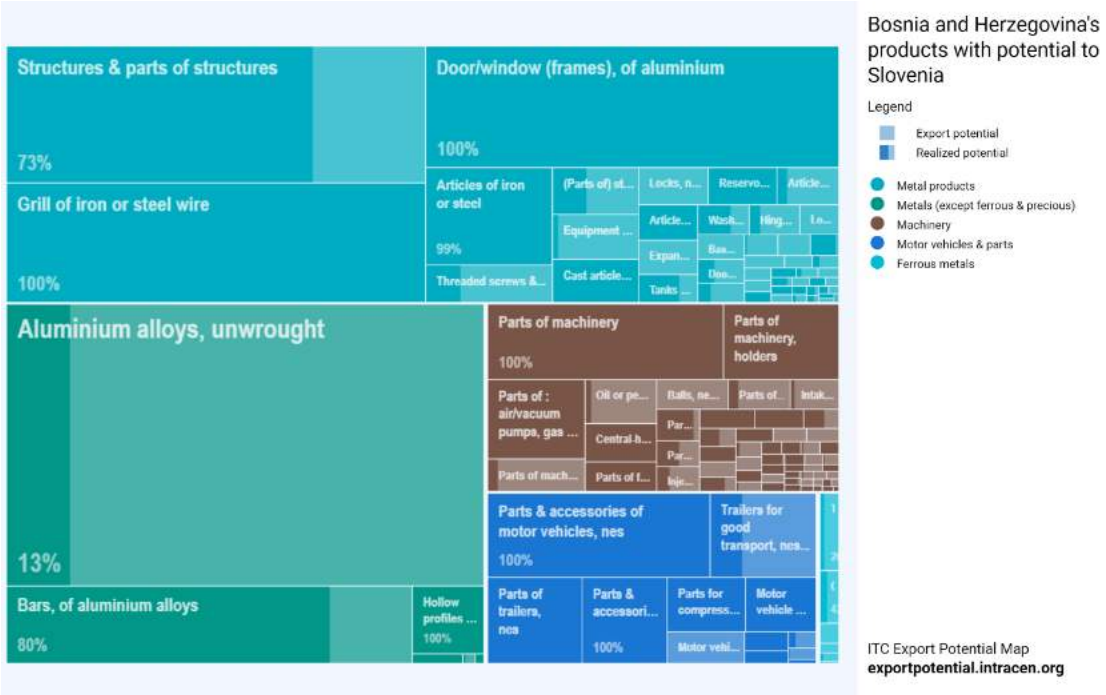


Figure 34: Product groups with the greatest export potential and remaining untapped potential by countries.

	Germany	Austria	Italy	Slovenia
1	760120 Aluminium alloys, unwrought	731420 Grill of iron or steel wire	848299 Parts of ball/ roller bearings, nes	760120 Aluminium alloys, unwrought
2	848299 Parts of ball/ roller bearings, nes	761010 Door/window (frames), of aluminium	761010 Door/window (frames), of aluminium	730890 Structures & parts of structures
3	843149 Parts of machinery	760120 Aluminium alloys, unwrought	870830 Motor vehicle brakes	760429 Bars, of aluminium alloys
4	731420 Grill of iron or steel wire	840999 Parts for compression-ignition internal engine	840310 Central-heating boilers, nes	871639 Trailers for good transport, nes
5	840999 Parts for compression-ignition internal engine	730840 Equipment for scaffolding	731815 Threaded screws & bolts	730840 Equipment for scaffolding
6	870829 Parts & accessories of motor vehicle bodies	760421 Hollow profiles of aluminium alloys, nes	842199 Parts of machinery for filtering liquids or gases	731815 Threaded screws & bolts
7	870870 Motor vehicle wheels			

4.7 MARKET STRUCTURE

To look at the intensity of competition (how competitive/consolidated/dominated the markets concerned are), selected markets were analysed on the basis of the Herfindahl Index. The Herfindahl index is calculated by squaring the share of each country in the selected market and by summing the resulting numbers. The Herfindahl Index (H) ranges from 1/N to one. Example: 3 countries (N=3), the first country has 50% market share, the second and third each have 25% market share. Range of values for the index: [1/N, 1] = [0.33, 1]. Index = (0.5)2+ (0.25)2+ (0.25)2 = 0.375. The United States federal antitrust authorities, such as the Department of Justice and the Federal Trade Commission, use the Herfindahl index as a screening tool to determine whether a proposed merger is likely to raise antitrust concerns. They consider Herfindahl indices between 0.1000 and 0.1800 to be “moderately concentrated” and indices above 0.1800 to be “concentrated”.

Product group 73: Articles of iron and steel

- **For Germany** as an export market, the main competitors (other supplier markets) for this product group are: China (12.8%), Italy (12.3%), Poland (9.6%), etc. The Herfindahl Index is 0.07.
- **For Austria** as an export market, the main competitors (other supplier markets) for this product group are: Germany (43.5%), Italy (9.5%), China (6%), etc. The Herfindahl Index is 0.21.
- **For Italy** as an export market, main competitors (other supplier markets) for this product group are: Germany (27.1%), China (15%), France (6.4%), etc. The Herfindahl Index is 0.21.

Product group 76: Aluminium and articles thereof

- **For Italy** as an export market, the main competitors (other supplier markets) for this product group are: Germany (13.3%), Russian Federation (8.4%), China (7.9%), etc. The Herfindahl Index is 0.05.
- **For Germany** as an export market, the main competitors (other supplier markets) for this product group are: Netherlands (9.5%), Austria (8.5%), Switzerland (7.1%), etc. The Herfindahl Index is 0.05.

Product group 83: Miscellaneous articles of base metal

- **For Germany** as an export market, the main competitors (other supplier markets) for this product group are: China (20.5%), Czech Republic (12.6%), Austria (9.8%), etc. The Herfindahl Index is 0.09.
- **For Austria** as an export market, the main competitors (other supplier markets) for this product group are: Germany (42.5%), France (9.7%), China (7.1%), etc. The Herfindahl Index is 0.21.
- **For Italy** as an export market, the main competitors (other supplier markets) for this product group are: Germany (21%), China (20%), Austria (11.8%), etc. The Herfindahl Index is 0.11.

Product group 84: Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof

- **For Germany** as an export market, the main competitors (other supplier markets) for this product group are: China (17.5%), USA (10.6%), Czech Republic (6.5%), etc. The Herfindahl Index is 0.07.
- **For Slovenia** as an export market, the main competitors (other supplier markets) for this product group are: Germany (19.7%), Italy (13.9%) and China (10%), etc. The Herfindahl Index is 0.08.
- **For Austria** as an export market, the main competitors (other supplier markets) for this product group are: Germany (43.7%), Italy (7.8%), China (7.4%), etc. The Herfindahl Index is 0.21.

Product group 87: Vehicles other than railway or tramway rolling stock, and parts and accessories thereof

- **For Germany** as an export market, the main competitors (other supplier markets) for this product group are: Spain (9.4%), Czech Republic (9.2%), France (8.2%), etc. The Herfindahl Index is 0.05.
- **For Slovenia** as an export market, the main competitors (other supplier markets) for this product group are: Germany (21.6%), France (12.6%), Italy (11.3%), etc. The Herfindahl Index is 0.09.

4.8 DIVERSIFICATION OF PRODUCTS

The Product Diversification Indicator (PDI) uses the Product Space methodology[7] to measure a country's capacity to supply new products. The PDI builds on this supply element by also

[7] More information about the methodology: https://www.researchgate.net/publication/6181618_The_Product_Space_Conditions_the_Development_of_Nations

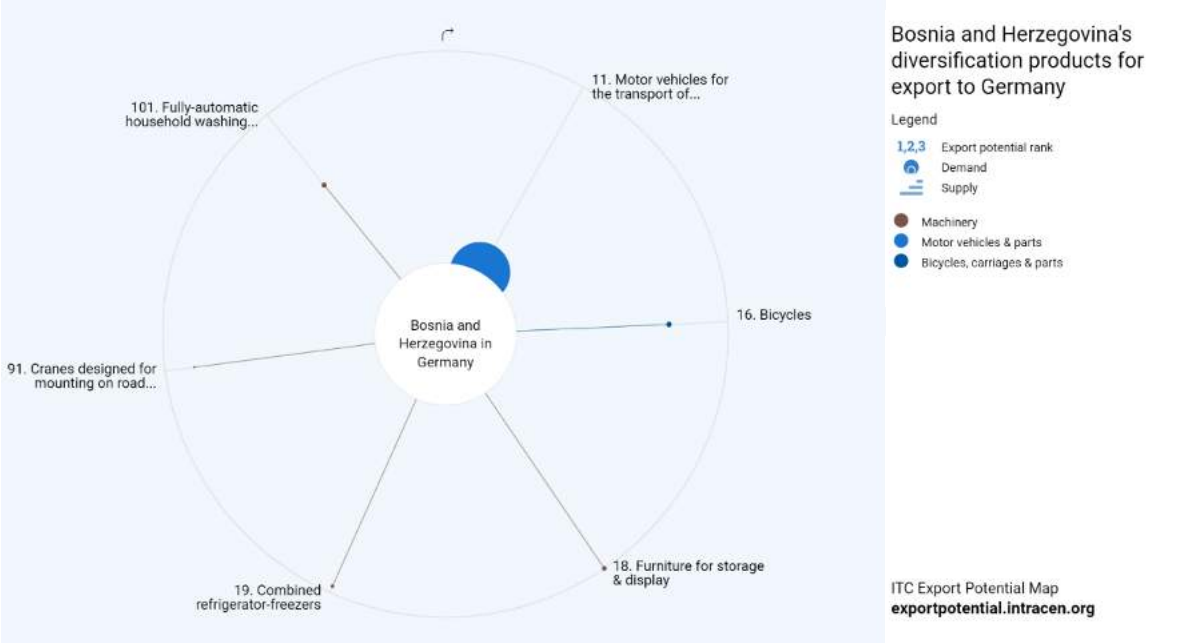
evaluating whether a country has relevant capacities for producing the new products identified. In addition to taking into account supply, the PDI also evaluates the demand for these potential new products and considers the general and specific trade costs of shipping them to target markets.

The Product Diversification Indicator (PDI) relies on a measure called "density" to capture the likelihood of countries to diversify into a new product based on the assumption that these new products require similar capabilities to those already present in the country's export basket.[8]

The German market

Within the analysed product groups (73, 76, 83, 84 and 87), the most attractive product group for diversification (ranked by the likelihood of successful product diversification based on supply, demand and market access conditions) are: *8703XX Motor vehicles for the transport of persons, nes.* Germany's import of this product group is USD 63.9 bn. Other product groups for diversification are: *871200 Bicycles* (with Germany's import of USD 839.1 mn), *841850 Furniture for storage & display* (with Germany's import of USD 590.7 mn), *841810 Combined refrigerator-freezers* (with Germany's import of USD 566.4 mn), *842691 Cranes designed for mounting on road vehicles* (with Germany's import of USD 216.7 mn) and *845011 Fully-automatic household washing machines* (with Germany's import of USD 636.1 mn).

Figure 35: Product diversification – German market



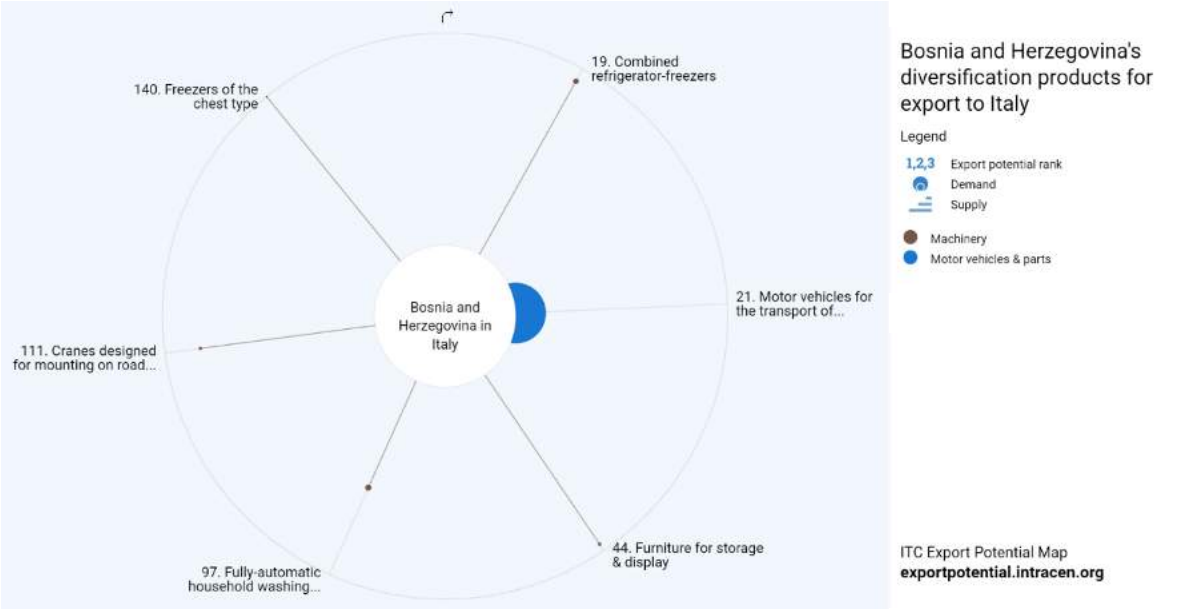
The Italian market

Within the analysed product groups (73, 76, 83, 84 and 87), the most attractive product group for diversification are: *841810 Combined refrigerator-freezers* (with Italy's import of USD 344.4 mn), *8703XX Motor vehicles for the transport of persons, nes* (with Italy's import of USD 30.4 bn), *841850 Furniture for storage & display* (with Italy's import of USD 110.8 mn), *845011 Fully-automatic household washing machines* (with Italy's import of USD 361.1 mn),

[8] More information about the methodology: https://exportpotential.intracen.org/en/resources/learning/faq and https://exportpotential.intracen.org/en/resources/learning/glossary

842691 Cranes designed for mounting on road vehicles (with Italy's import of USD 36.3 mn), *841830 Freezers of the chest type* (with Italy's import of USD 28.4 mn).

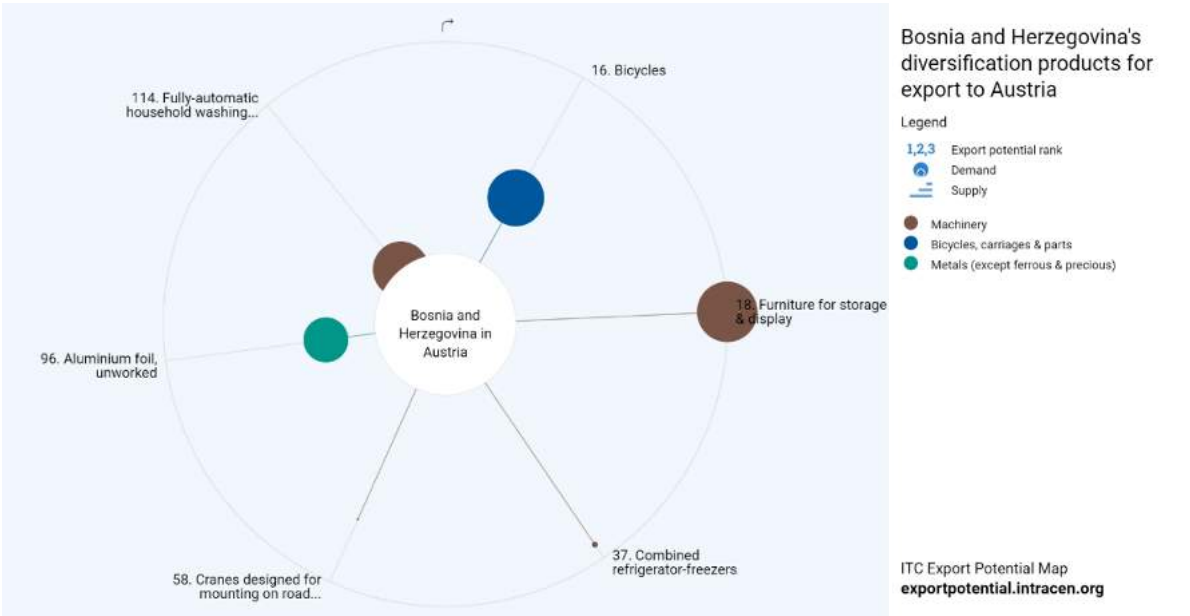
Figure 36: Product diversification – Italian market



The Austrian market

Within the analysed product groups (73, 76, 83, 84 and 87), the most attractive product group for diversification are: *871200 Bicycles* (with Austria's import of USD 163.1 mn), followed by *841850 Furniture for storage & display* (with Austria's import of USD 125.0 mn), *841810 Combined refrigerator-freezers* (with Austria's import of USD 61.0 mn), *842691 Cranes designed for mounting on road vehicles* (with Austria's import of USD 71.6 mn), *760711 Aluminium foil, unworked* (with Austria's import of USD 112.9 mn) and *845011 Fully-automatic household washing machines* (with Austria's import of USD 108.1 mn).

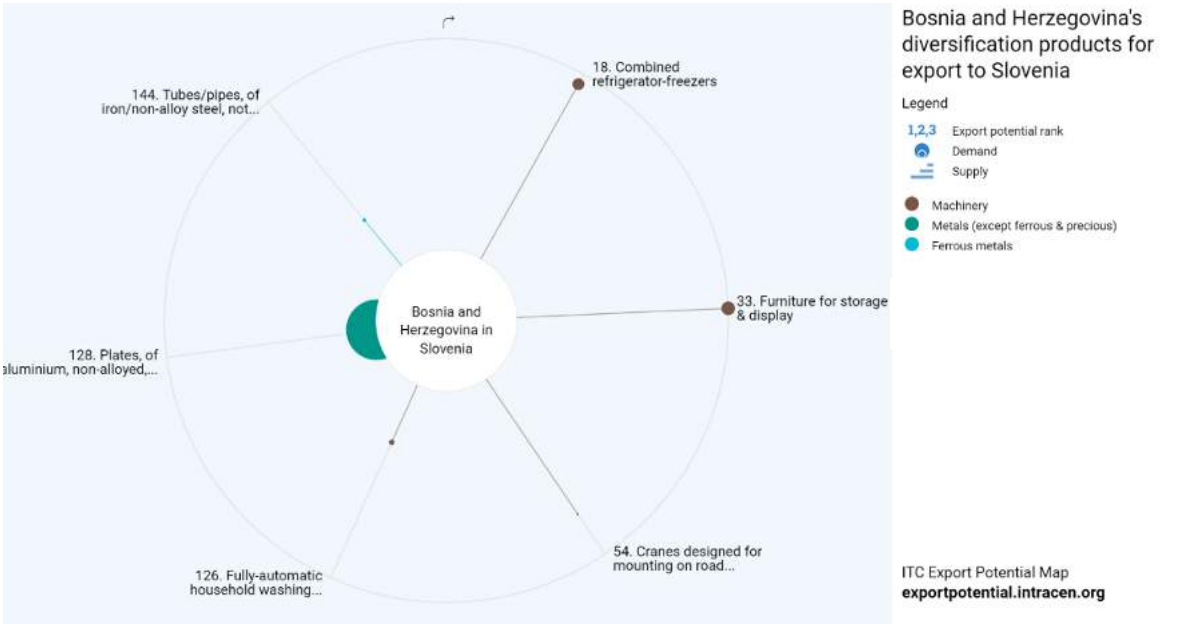
Figure 37: Product diversification – Austrian market



The Slovenian market

Within the analysed product groups (73, 76, 83, 84 and 87), the most attractive product group for diversification are: *841810 Combined refrigerator-freezers* (with Slovenia's import of USD 31.0 mn), *841850 Furniture for storage & display* (with Slovenia's import of USD 19.0 mn), *842691 Cranes designed for mounting on road vehicles* (with Slovenia's import of USD 9.3 mn), *845011 Fully-automatic household washing machines* (with Slovenia's import of USD 19.7 mn), *760611 Plates, of aluminium, non-alloyed, square/rectangular* (with Slovenia's import of USD 57.7 mn), *730439 Tubes/pipes, of iron/non-alloy steel, not cold-reduced* (with Slovenia's import of USD 15.9 mn).

Figure 38: Product diversification – Slovenian market



Overview

The most attractive product group (ranked by the likelihood of successful product diversification) by target market:

Figure 39: Overview – product diversification

	Germany	Austria	Italy	Slovenia
1	8703XX Motor vehicles for the transport of persons, nes.	871200 Bicycles	841810 Combined refrigerator-freezers	841810 Combined refrigerator-freezers
2	871200 Bicycles	841850 Furniture for storage & display	8703XX Motor vehicles for the transport of persons, nes	841850 Furniture for storage & display
3	841850 Furniture for storage & display	841810 Combined refrigerator-freezers	841850 Furniture for storage & display	842691 Cranes designed for mounting on road vehicles
4	841810 Combined refrigerator-freezers	842691 Cranes designed for mounting on road vehicles	845011 Fully-automatic household washing machines	845011 Fully-automatic household washing machines

	Germany	Austria	Italy	Slovenia
5	842691 Cranes designed for mounting on road vehicles	760711 Aluminium foil, unworked	842691 Cranes designed for mounting on road vehicles	760611 Plates, of aluminium, non-alloyed, square/rectangular
6	845011 Fully-automatic household washing machines	845011 Fully-automatic household washing machines	841830 Freezers of the chest type	730439 Tubes/pipes, of iron/non-alloy steel, not cold-reduced

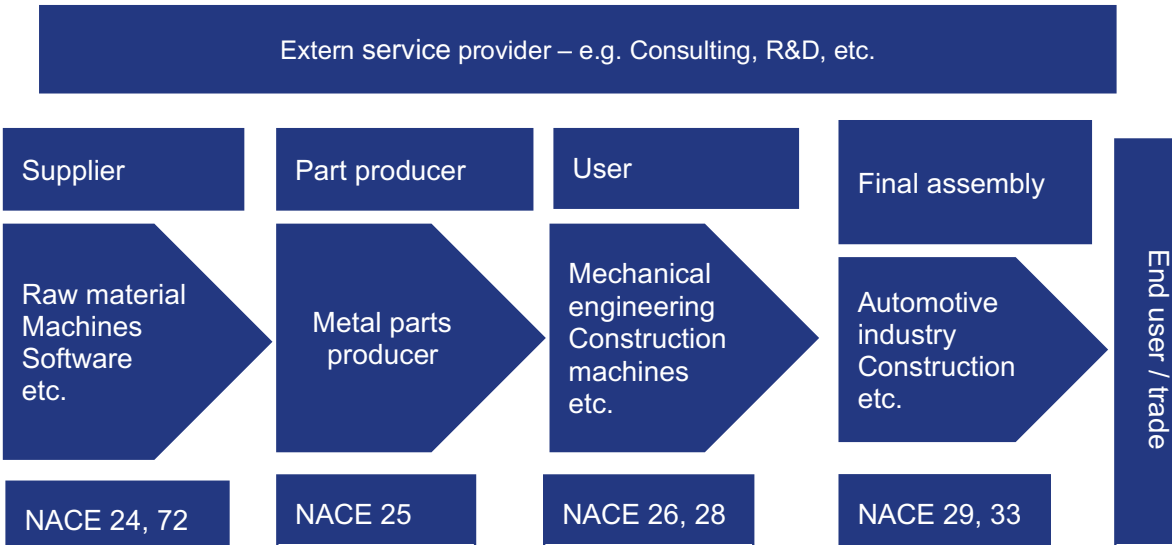
Short summary

- The most relevant export markets for the BiH metal industry are Germany, Italy, Austria and Slovenia.
- The most relevant products with the highest market potential are “aluminum alloys and unwrought” (for Germany and Slovenia); “grills of iron or steel” (for Austria); and “parts for ball and roller bearings” (for Italy).
- The market is technology driven and high-quality and innovative solutions are demanded within the automotive industry, mechanical engineering industry and construction industry.

5. VALUE CHAIN ANALYSES

A value chain is a set of activities carried out by a company operating in a particular industry to deliver a valuable product (a good and/or service) to the market. The analysis of the company value chain usually examines the internal company practices and their optimisation in terms of creating value for customers. Increasing globalisation has led to the relocation of increasingly labour-intensive production steps to “cheaper” countries. In particular, the countries of Western Europe have shifted these more labour-intensive production steps due to significantly higher labour costs. Thus, relocation is a building block for a Western European company to optimise its own value chain. In the metal industry, this often involves the purchase of metal parts (turned, milled, bent, cast, etc.) that are used as subcontracted products in the production of the customer company. Suppliers from BiH produce largely according to the specifications or drawings of the customer company. In most cases, there is no integration into the customer’s product development. Higher-value and thus competitively decisive value-added processes (this can be, for example, a special production or process technology, specific market and customer information, innovations, or similar) are usually not outsourced. Nevertheless, by outsourcing labour-intensive production processes, Western European companies become dependent on their suppliers abroad. Supply chain risk management is therefore an important component for Western European client companies. The COVID-19 crisis and the associated impairment or even partial collapse of international supply chains have led to Western European companies paying more attention to alternatives in procurement and in some cases looking for several nearshoring alternatives in order to be able to compensate for supply bottlenecks on a global level. This is, of course, an opportunity for BiH suppliers and providers, who are still, internationally speaking, favourably priced.

Figure 40: Value chain with the metal sector,
source: Cluster study, Freiraum Ruppiner Land, 2014



The graphic shows the cross-company value chain in which companies in the metal industry are internationally integrated.

- **Suppliers** of the metal company are raw material suppliers, providers of production equipment, software, etc. (these are companies, for e.g., defined within NACE C24 – “Manufacture of basic metals or C27 – “Manufacture of electrical equipment”)

- **Customers of the supplier** from the metal industry are in particular companies for further processing (for example, suppliers of the automotive industry, mechanical engineering, the construction industry, medical technology, etc. – for e.g., defined within NACE C26 or C28)

- **Indirect customers** (customers of the customer) are the manufacturers of end products (automotive producer, mechanical engineering, construction, etc. – for e.g., defined within NACE C29 or C33)

Key performance indices (KPIs) are often used in the production industry to analyse which value creation processes should be optimised or even outsourced. In particular, KPIs are used to check how successful certain activities in companies are. All processes in organisations can be controlled using these key performance indicators. With the help of key performance indicators, management and controlling can analyse processes in the company. Through consistent monitoring, processes and measures can be adapted and optimised accordingly, or even outsourced if there is a more optimal option through external procurement.

Depending on the company and the area, different KPIs are used to measure performance. For example, marketing is interested in different KPIs than sales and accounting is interested in different KPIs than logistics or production. Which KPIs are the right ones always depends on which activities are to be checked. The decision to outsource is usually made on the basis of the company’s own production costs for the respective value-added function. Value Chain Analysis is often used to identify opportunities for increased profit through the recognition of more effective cost control, pricing, product positioning and/or distribution strategies. At each node of the value chain, market participants are actively producing goods or offering services, while simultaneously making numerous choices that directly affect their profit margins.

For example, in integrated steel plants, steel is manufactured from basic raw materials like iron ore, coking coal and fluxes like limestone and dolomite. The main production units are the raw material handling plant, coke ovens, sinter plant, refractory material plant, blast furnace, steel melt shops, light and medium merchant mills, wire rod mills, medium merchant and structural mills, special bar and structural mills. In addition to these main production units, there are several auxiliary units like the power plant, engineering shops, oxygen plant, etc. Hot metal produced at blast furnaces is converted into steel through the process of removing impurities in the metal by oxidation. This steel is further refined in secondary refining facilities provided in the steel melt shop. Blooms are produced at the steel melt shop and are converted into various finished products like wire rod coils, rebar, rounds, structural, squarest in various rolling mills. These products are called long products and are used in construction and infrastructure building and manufacturing sectors.

The value chain model with five primary activities and four supporting activities can be used as a generic one. This model cannot be used directly in the steel manufacturing sector due to the fact that the expansion of steel plants has become a continual process for their growth and survival. Due to the nature of the activities, a different version of the value chain for the steel manufacturing sector is developed with five primary activities and six supporting activities. The shape of the Value Chain for Steel Manufacturing Sector (VACSMS) will be the same, but the difference is in some of the activities and their application. The VACSMS with activities is shown in the following figure:

Figure 41: Value chain for steel manufacturing sector, source: Value Chain Model for Steel Manufacturing Sector: A Case Study December 2015, International Journal of Managing Value and Supply Chains 6(4):45-53, Authors: Gvrk Acharyulu, Venkatasubbaiah Kambagowni, Kandukuri Narayana Rao.

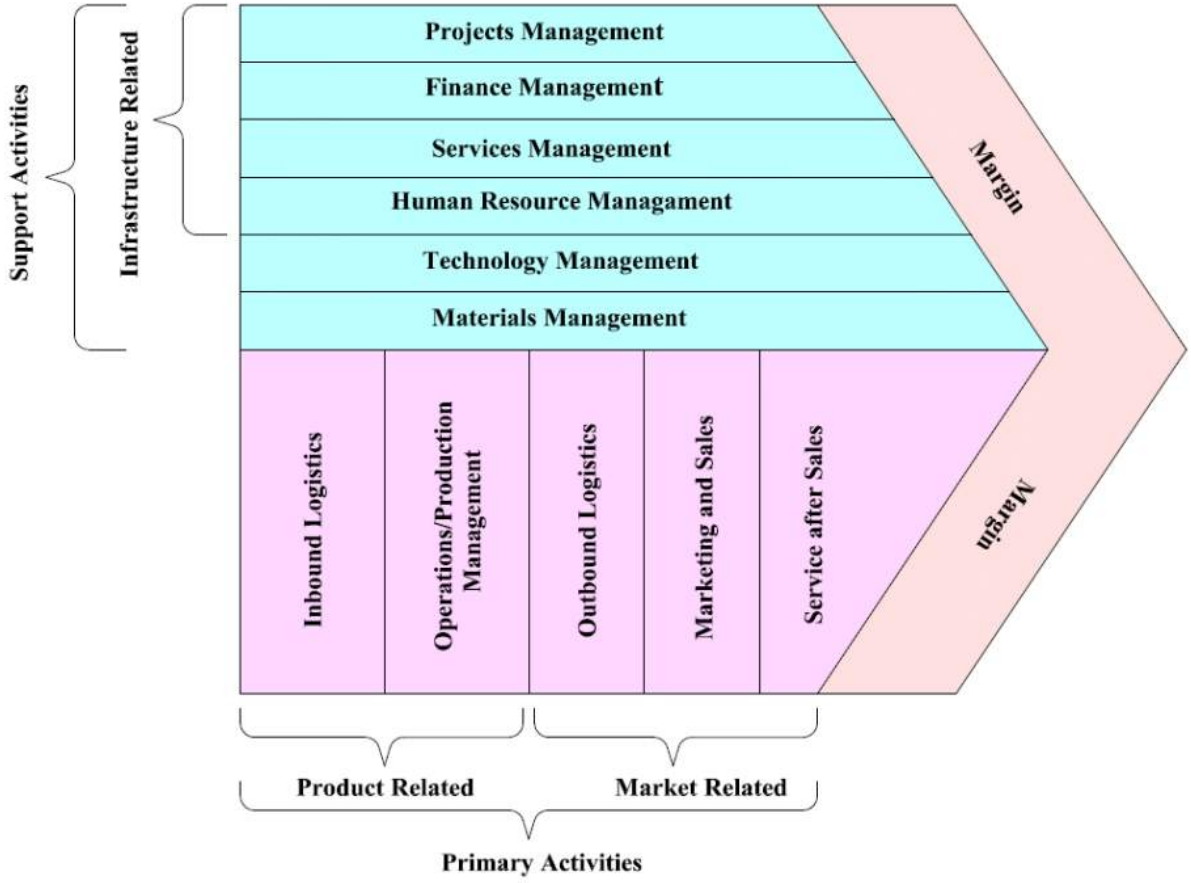


Figure-2: Value Chain for Steel Manufacturing Sector

5.1 VALUE CHAINS OF PRODUCT/GEOGRAPHIC MARKET

5.1.1 Aluminium alloys, unwrought – Germany and Slovenia

Aluminium is the world's second most widely used metal after steel. Its production volume exceeds that of all other nonferrous metals combined. Aluminium is strong, durable, flexible, lightweight, corrosion-resistant, completely recyclable, and a good conductor of electricity and heat. Due to its numerous positive attributes, aluminium has many end users including in the transportation, construction, and packaging industries. Approximately three-quarters of all the aluminium ever produced in the world remains in use today, and the metal is heavily traded on global markets. Unwrought aluminium can be manufactured using either of two forms of production: primary or secondary.

The production of primary unwrought aluminium requires the use of raw materials (bauxite and alumina), while the production of secondary aluminium relies on the collection of old (post-

consumer) and new aluminium scrap, which is remelted into unwrought aluminium. There are important differences between these two types of producers. The aluminium manufacturers tend to be globalized and highly integrated, owning or having interests in production processes ranging from the mining of bauxite (in foreign countries) to the production of unwrought aluminium to the manufacturing of semi-finished products.

Figure 42: Aluminium production chain, source: U.S. International Trade Commission

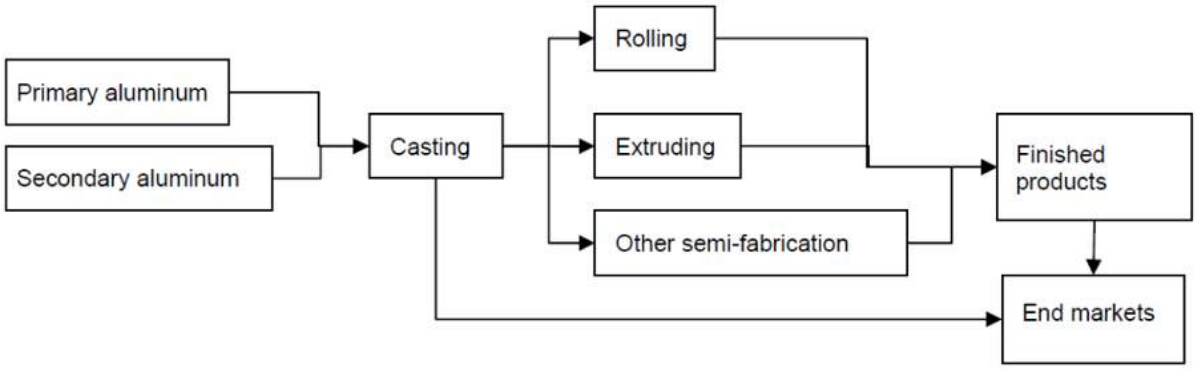
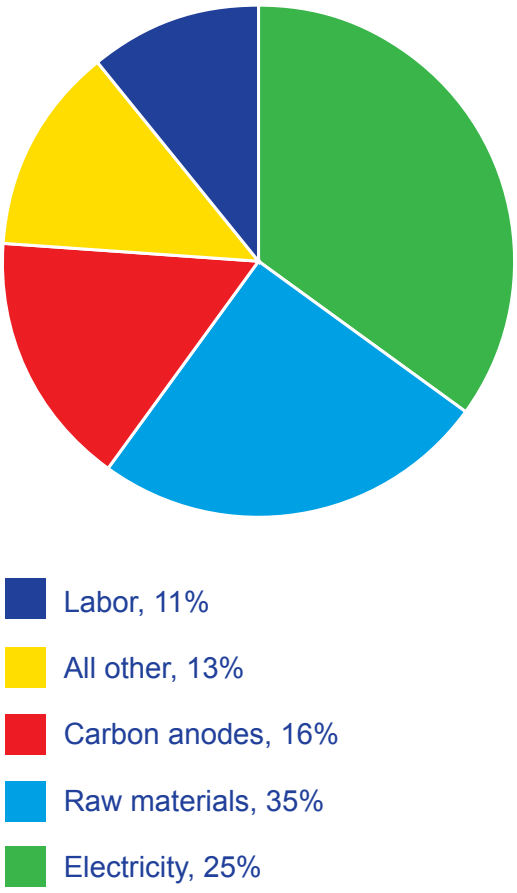


Figure 43: Production costs shares, source: Industry official, interview by Commission staff



The production of aluminium parts and alloys in Germany is subject to high-cost pressure, especially due to higher labour costs but also due to high energy costs. At the same time, the range of applications is expanding. Aluminium is increasingly used in the automotive industry, mechanical engineering and also in the construction industry. According to industry experts, innovative applications such as “high-strength aluminium alloys” have a high potential. Demand is increasing, especially in the automotive industry, where it is important to build vehicles that are as light as possible. In order to compete with steel, the aluminium industry has invested a lot of effort in research and development, with concrete results: ultra-high-strength aluminium alloys now offer a real alternative to ultra-high-strength steels, while at the same time enabling further weight savings due to the lower density of aluminium as a material.

Due to the strong automotive industry in Slovenia, similar trends can be seen there.

There are opportunities here for the BiH metal

industry. However, the prerequisite is always an understanding of customer needs and the areas of application. Manufacturing according to customer specifications is not enough. BiH suppliers must follow the market trend and use possible market niches in these areas.

5.1.2 Grills of iron or steel – Austria

Iron and steel wires are structural elements that have central functions in the industrial, maritime and civil engineering sectors. They consist of several steel wires twisted together to form a structure with enormous mechanical properties that combine axial strength and stiffness with bending flexibility.

However, innovative applications are also possible here. Grids and filter systems made of iron and steel are used in particular in ventilation system construction and the recycling industry, but also in the construction industry.

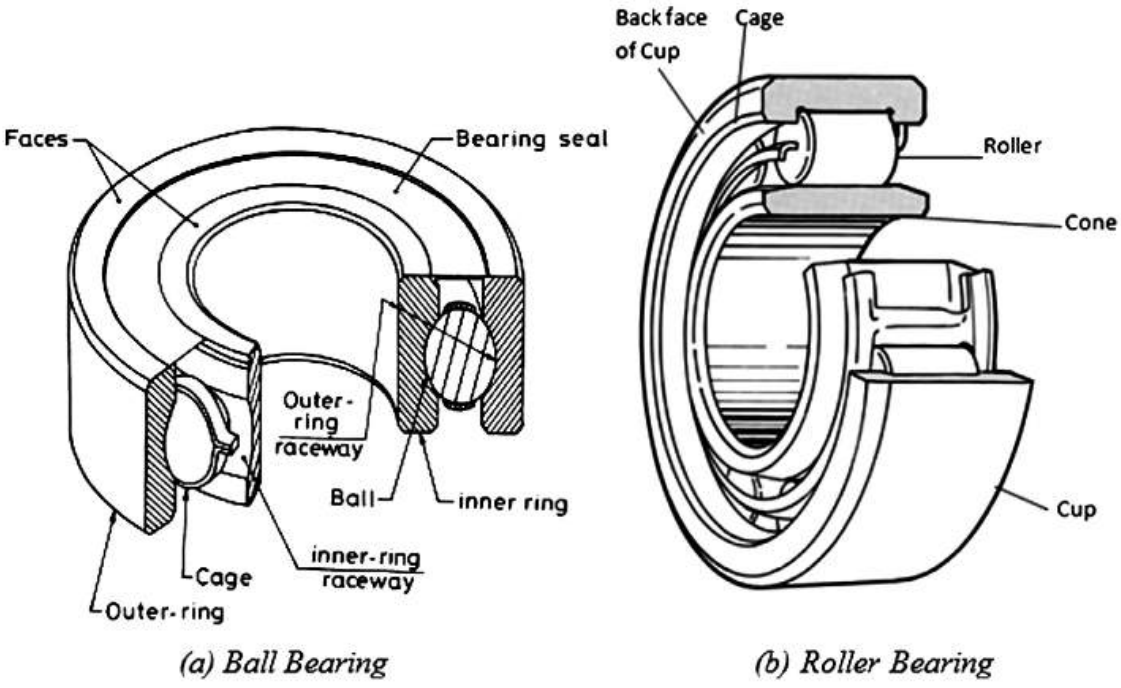
The demand for innovative solutions for filters in the field of ventilation technology is also increasing here. The construction industry, mechanical engineering and the automotive industry, as well as manufacturers of white goods or extractor bonnets are investing in innovative solutions to reduce pollutants.

Austria has a strong industrial base in the target sectors, the automotive, mechanical engineering, construction industry, ventilation system construction and the recycling industry. Here, too, knowledge of innovative applications and customer needs enables BiH suppliers to identify and exploit market niches and increase their own added value.

5.1.3 Parts of ball/roller bearings – Italy

Bearings are an important machine element used in many applications, which include a rotating component. This supports another moving machine element permitting the relative motion between the rolling-element bearings consist of balls or rollers positioned between raceways. Depending on the bearing design specification, the loads acting on the bearing may be angular, axial, or radial. Ball and roller bearing appear to be relatively simple mechanisms but their internal operations are relatively complex. At extreme operating condition of heavy loading, very high speed, and very high or low operating temperature leads to early bearing failure. When design requirements not met that leads to excessive deflection, vibration, high frictional torque and temperature. Mostly the ball and roller bearing failures are caused by interference of the lubricant supply to the bearing or inadequate delivery of the lubricating oil to the raceway contact. .Ball bearings can be divided into three categories, i.e. radial contact, angular contact, and thrust. Radial-contact ball bearings are designed to support radial loads. Angular contact bearings are designed to support a combination of radial and axial loads. Thrust bearings are designed to support axial loads. Roller bearings have higher load capacities than ball bearings for a given size and are usually used in moderate speed heavy-duty applications. The preliminary types of roller bearings are cylindrical, needle, tapered, and spherical roller bearing.

Figure 44: Component of (a) Ball and (b) Roller Bearing, source: source: Rolling element bearing failure analysis: A case study, January 2013, Rakesh Upadhyay TCG life sciences, L.A. Kumaraswamidhas, Md.Sikandar Azam



The demands on ball and roller bearings are constantly increasing. Leading suppliers are also developing solutions to reduce friction and noise and increase load capacity. Suppliers who offer new solutions here have good market opportunities, especially if they offer demand-oriented parts for ball bearing production and cooperate with ball bearing manufacturers in product development. Cooperation must take place along the entire value chain. This includes the requirements of, for example, the mechanical engineering or automotive industries, the manufacturers of ball bearings, who in turn supply the aforementioned industries, as well as the suppliers of ball and roller bearing parts who supply their products to the ball and roller bearing manufacturers.

Italy has a very strong engineering industry and many companies active in the automotive industry. There are good opportunities here for BiH suppliers to develop customer potential with innovative solutions.

5.2 VALUE ADDED CREATED IN EACH STEP

The step-by-step analysis of value chains is exemplified here for heating and boilers as well as for metal parts within the supply chain for the automotive industry. The approach is essentially transferable to other product groups.

5.2.1 Example heating boilers

As example of value chain analysis has been conducted on the segment of metal industry dealing with the production of hydronic heating boilers and stainless-steel water heaters. Hydronic heating boilers use biomass as an energy source. Biomass consists of residues from agriculture and forestry that can be used as fuel for heating. Pellet, as a basic unit in the production of biomass, has a degree of utilization of 95% and its price is competitive with coal, wood or oil fuel. In conventional boilers, which use solid fuel, a large amount of that solid fuel does not turn into thermal energy (because the combustion is not complete and unburned material transforms into ash and smoke as waste). Pellet boilers have electronically controlled and optimized combustion, so the burning process is complete with a good thermal energy and reduced emissions of hazardous gases. Therefore, this method of heating is more economical and environmentally friendly than the existing forms of heating, which use solid fuel or heavy oil fuel. Buying of hydronic heating boilers is subsidized by many EU countries (Slovenia, Austria, Germany, etc.).

The generic value chain of hydronic heating boilers and stainless-steel water heaters is presented in the following figure:

Figure 45: Value chain of hydronic heating boilers – example, source: Value Chain Analysis for hydronic heating boilers and stainless steel water heaters, EDA 2014

Producers design and prepare technical documentation for their products on their own or with assistance of experts from the Faculty of Mechanical Engineering of Banja Luka. Most suppliers are wholesalers from BiH that buy raw materials (sheet metal etc.) from producers located in the Western Balkans and the EU. It is an interesting fact that there are no producers of raw materials for hydronic heating boilers in BiH. The steel factory Arcelor Mittal from Zenica produces steel products that can be used in the construction industry (e.g. reinforcement nets and ferro-concrete), but not for production of hydronic heating boilers and stainless-steel water heaters. Produced hydronic heating boilers and stainless-steel water heaters (for households) are sold to retailers and then to final consumers. Hydronic heating boilers are usually installed by local artisans, while service is provided by producers.

5.2.2 Example metal parts for the automotive industry

The automotive suppliers' value chain consists of producers of metal parts and other components for the automotive industry. Production mainly involves:

- metal precision parts: rings, clamps, pistons, shaft drives, brake discs
- various small parts: springs, screws, pipes, couplings
- components of: ICE engines, gears, transmission and braking systems
- exhaust pipes and control systems, pumps, filters
- housings, cabins, aluminium wheels
- electric car parts and cables
- accumulators and electric car drives
- metal, rubber or plastic components
- textile and leather products
- plastic deformation tools, etc.

Depending on the type of products, the production inputs most commonly involve: steel, grey cast, modular cast, aluminium, zinc and copper.

The automotive suppliers can be classified as follows:

- companies dealing with primary processing (casting, forging, extrusion, stamping, etc.);
- companies involved in final processing (scraping, milling, drilling, grinding, bending, penetration, cutting, welding, etc.);
- companies dealing with surface treatment (chemical treatment, thermal treatment, surface protection and marking of parts).

This automotive suppliers' value chain does not involve a large number of companies (approximately 50 in the entire BiH), but these companies are certainly some of the fastest growing and most developed ones in regard to technology, management and organization. The economic power of automotive industry companies is significant and as such it is one of the driving forces of the BiH economy. A number of BiH automotive companies show sustainable business practices, among which the most prominent ones involve good orga nization and management practices (Lean, 5s, energy efficiency, quality standards), education and training of workforce (CNC, 3D modelling, welding), etc. The value chain is almost entirely export oriented, meaning that only a small share of the metal parts for the automotive industry is placed on the local market. The export volume of the automotive supplier's value chain in the recent years is given in the following table and presented in the graph:

Figure 46: Export volume of BiH automotive suppliers, source: BiH Foreign Trade Chamber

Year	Export volume (mil KM)	Increase (in %)
2011	194	-
2012	211	8.8%
2013	266	26.1%
2014	308	15.8%
2015	322	4.5%
2016	355	10.2%
2017	354	-0.3%
2018	405	14.4%

Suppliers: Nominally, there are both domestic and international suppliers. However, more than 90% of production inputs (raw materials consisting of high-quality steel) are imported. Production inputs are imported, either by BiH wholesalers or directly by companies, since the high-quality materials used in the production are not produced locally.

Buyers: Companies in the automotive value chain are almost exclusively export oriented with an export share of over 80% of their income. Important export markets include: Germany, Austria, Croatia, the Netherlands, Czechia, Luxemburg, Hungary, Slovenia, Italy, Spain, and Slovakia, as EU members, with Turkey being the most important trade partner outside the EU. Buyers are mostly large systems that are highly positioned in the automotive supply chain. Becoming a supplier is a long-term process, which takes at least 2 years of continual cooperation in all aspects.

The German market is the largest single export market for automotive parts, with exports accounting for a quarter of the total BiH automotive industry. The automotive industry is one of the brightest examples of this fast expansion and good innovation supported by cooperation with large European producers where some segments of their outsourcing are given to BiH producers.

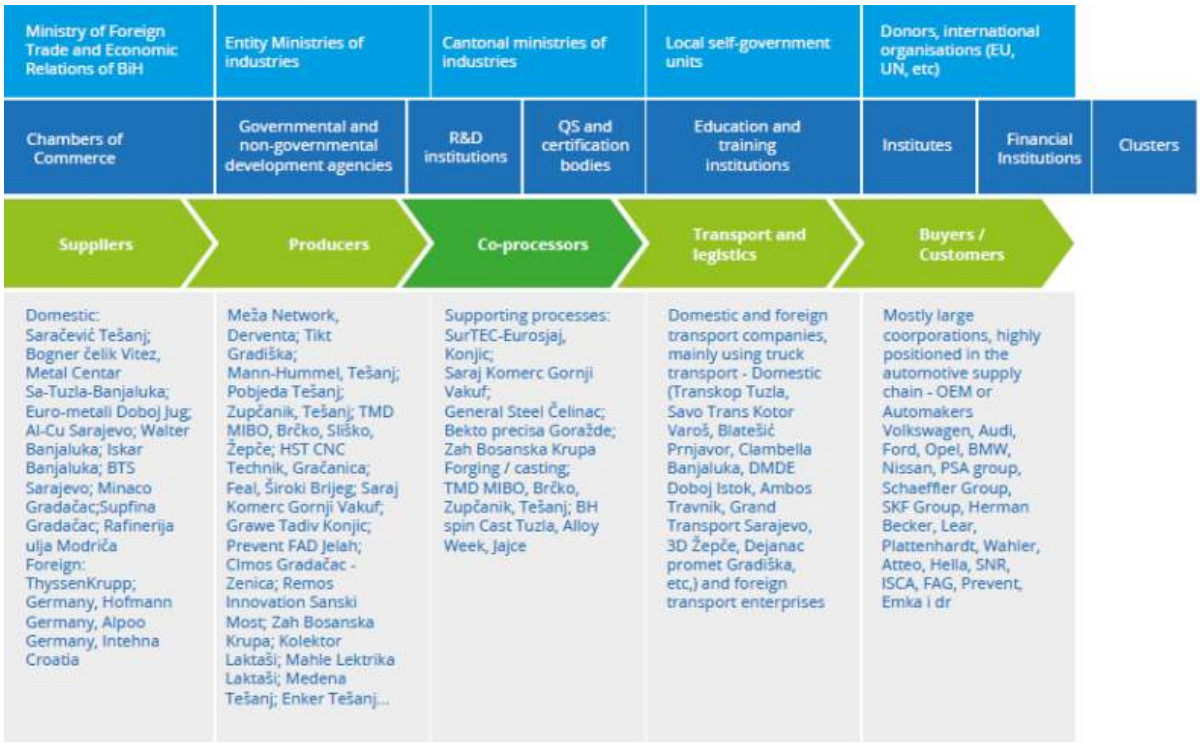
Challenges: There is room to improve cooperation with customers. In some cases, there are issues with payments of receivables and pressure on prices by customers. There is room for improvement in terms of education/training, mostly in the fields of welding, operating on CNC equipment, 3D modelling and marketing/sales. In addition, there is a need to support SMEs in obtaining quality standards. Most companies plan to invest in production facilities and additional production equipment. This provides a solid basis for assisting these SMEs to increase their competitiveness. Probably the biggest challenge relates to the improvement of inter-company connections and collaboration, in order to achieve higher purchase and sales power and improve sector competitiveness.

A typical process in an automotive suppliers' value chain company involves the following:

- importing production inputs from abroad or purchasing it from local traders;
- carrying out technical preparations based on specifications provided mainly by foreign buyers;

- performing internal processing of supplied materials (cutting, bending, milling, grinding, welding, surface protection, quality control, etc.) sometimes outsourcing production segments (e.g. surface treatment) to other local companies, but with key production/processing functions still being kept within the company;
- performing quality control, storage and packaging operations;
- delivering goods to buyers directly, with rare engagement of sales agents or with the use of other sales channels.

Figure 47: Value chain in BiH within the automotive sector,
source: Mapping of the sustainable Development Goals against value chains in furniture and automotive parts sectors, UNDP 2019



The automotive suppliers' value chain normally starts with iron and bauxite mines and foundries. Although such mines exist in the country (as well as the Foundry in Zenica, along with several other smaller foundries), the quality of locally produced metal raw materials barely satisfies the high-quality needs of automotive industry. This is why the producers order raw materials from abroad, directly or through local wholesalers.

In case of special orders, raw materials come directly from the foreign purchasers, who in this case represent buyers as well.

The orders of raw materials are based on contracts and strict instructions and specifications provided from buyers of automotive parts. In the next step, the ordered materials are prepared for production and internally processed in production plants. Some of the processing procedures, such as surface treatment, are outsourced to partner companies in BiH.

In the next phase, the products are tested for quality requirements, stored, packed and delivered to destination markets. The buyers mainly involve suppliers of automotive parts and/or important suppliers of European car producers.

Besides the participating companies and other direct actors, there are a number of other contributors in the automotive parts suppliers' value chain: ministries, local authorities, chambers, development agencies, associations, clusters, institutes, certification and QS institutions, financial institutions, training and education institutions, etc.

5.3 MAIN COMPETITORS – ADVANTAGES AND DISADVANTAGES FOR BIH METAL COMPANIES

5.3.1 General aspects

Local manufacturers do not recognize themselves or their local competitors as leading companies, so only international companies are perceived as leaders. This is despite the fact that the metal industry in BiH is competitive by international standards, both in terms of quality and price. The leading companies create and establish product and business standards that other companies have to follow. In general, there is a great distrust of domestic manufacturers and their products, even though their quality is equal or even better compared to foreign brands (poor branding/reputation of companies in BiH). This is the reason why domestic producers do not sell their products on foreign markets under their own brand name (they use the traders' brand names). Domestic producers have problems finding new markets (customers) and getting access to finance (solvency is often at risk because of problems in collecting debts). Cooperation between producers is not evident. The main priorities for the future are to continue to improve the quality of the products, to increase the scale of production if possible, to maintain good relations with existing customers and to find new ones. Looking at the metal industry as a whole, we can see that most of the companies in the metal industry are quite passive; they wait for potential customers to come with their technical drawings and designs, and ask for the most favourable offer for production in order to offer their services, while the customers always try to find the one among them that offers the lowest price.

A relatively small number of companies have their own products. The quality of their core products is good (or even better compared to the competition).

5.3.2 Competition – unwrought aluminium alloys within the EU

The Russian Federation and Norway are the leading exporters of unwrought aluminium to the EU markets, totalling about 46% of total EU imports. The Russian Federation accounted for almost 38% of the EU's imports of unwrought, not alloyed, aluminium tin 2017, while Norway covered about 43% of the EU's imports of unwrought aluminium alloys. Both the Russian Federation and Norway have reduced their share of total EU imports; this shift has mainly benefitted Mozambique and Iceland for exports of unwrought, not alloyed, aluminium and the United Arab Emirates in terms of exports of unwrought aluminium alloys. The Russian Federation and Norway represent about 30% and 26%, respectively, of the EU's total imports of wire rods.

Figure 48: EU Imports of unwrought aluminium, by country of origin in thousand tonnes, source: Eurostat ComExt database

Country	2000	2005	2010	2015	2016	2017
Russian Federation	1,195	908	795	1,295	1,481	1,476
Norway	1,131	1,551	1,507	1,270	1,362	1,387
Iceland	199	260	828	379	762	870
UAE	108	108	207	564	615	613
Mozambique	12	568	659	492	534	533
India	0	0	4	52	45	220
Bahrain	9	18	126	61	76	132
Egypt	48	82	85	106	119	123
South Africa	24	46	26	69	54	110
Bosnia and Herzegovina	73	132	122	72	105	95
Others	898	752	836	1,131	883	659
Total	3,697	4,425	5,196	5,490	6,036	6,219

In terms of BiH participation in EU imports of unwrought aluminium, this amounted to 73 thousand tons in 2000, 132 thousand tons in 2005, 105 thousand tons in 2016 and 95 thousand tons in 2017. Although the immediate consumers of unwrought aluminium are the producers of wrought aluminium products, the demand for primary and secondary aluminium principally derives from demand for downstream products used in the transportation equipment, packaging, and construction industries. Other important demand factors include the metal's substitutability for other materials and its manufacturing cost.

Unwrought aluminium is an intermediate product and, to meet end market demand, must be transformed into semi-fabricated products, which are then typically further worked into fabricated products. Companies that produce unwrought aluminium either further work the aluminium into a semi-finished product as presented in the table or sell the ingot to a downstream company that will fabricate it. The semi-finished product is then sold to a firm that manufactures the finished aluminium goods (i.e., auto parts, aluminium foil, kitchen utensils, beverage cans, etc.).

Regarding the potential market in Germany and Slovenia, the companies working within the industry can also be identified according to the following table:

Figure 49: Semi-fabricated and fabricated forms of aluminium, source: International Aluminium Institute, Terms and Definitions

Castings	The aluminum casting process is widely used to make automotive parts and accounts for more than one-half of the aluminum used in cars. Other casting applications include parts for other forms of transportation, parts of small appliances, hand tools, lawnmowers, and cookware.
Foil	Foil, like sheet and plate, is produced by passing aluminum between rolls under pressure. Foil is the thinnest of these three products and is 0.0079 inch or less in thickness. Flexible packaging (aluminum foil) and foil containers account for about three-fourths of all foil usage. Foil is also used to back building materials, in electrical capacitors (found in virtually all electrical equipment), and as a heat exchanger in some air-conditioning units and baseboard space heaters.
Powder and paste	Aluminum powder and paste are used in various applications, such as paints and coatings, as well as chemical and metallurgical applications.

Sheet	Sheet (.0006–.249 inches thick), the most widely used form of aluminum, is used in all of the aluminum industry's major markets, such as cans and closures; automobile bodies and tractor-trailers; home appliances and cookware; building and construction (siding and gutters, downspouts and roofing, and awnings and carports); license plates and light bulb bases; boats and printing plates; and highway signs and high-flying planes.
Plate	Plate (.25 inches or more in thickness), like sheet, is made by rolling hot or cold ingot in a continuous motion until the desired thickness is achieved. Plate is used in heavy-duty applications, such as in the aerospace, machinery, and transportation markets. Aluminum plate forms the exterior of jumbo jets and spacecraft fuel tanks. It is also used for storage tanks and containers and provides structural sections for rail cars and large ships, as well as armor protection for security vehicles.
Wire, rod, and bar	Wire, rod, and bar products can be rolled or extruded. Drawn from rod or bar, wire is less than three-eighths of an inch in diameter, whereas rod and bar are larger. Furthermore, rod is round, while bar can have any number of flat sides. Aluminum faces virtually no competition from other metals and is used almost everywhere there is an electrical impulse to conduct, such as in commercial buildings, machinery and equipment, and transportation and consumer durables. Rod and bar are also made into rivets, nails, screws, bolts, and parts of machinery and equipment.
Forgings	A forging is a wrought-aluminum product formed by hammering or pressing heated aluminum between open or closed dies. Forged products include hand tools and hardware (including surgical tools), automobile parts, and aircraft components.

- Examples of **Slovenian companies**: LTH Casting, Impol, Marovt, Iivar, Gorenje (Hisense), Unior, MLM - Mariborska livarna Maribor, MDM (Stainless steel and aluminium products), etc.
- Examples of **German companies**: Power-Cast Zitzmann GmbH & Co. KG, Süddeutsche Gelenkscheibenfabrik GmbH & Co. KG, Gebrüder Burger GmbH & Co KG, Record Metall-Folien GmbH, etc.

Competitive advantages for BiH companies within this product group:

- competitive labour costs,
- developed aluminium production and processing,
- regional proximity to the key markets in Europe,
- subsidies provided by the Ministry of Industry, Energy and Mining for export companies.

Competitive disadvantages for BiH companies within this product group:

- Access to finance, due to bureaucratic obstacles.
- Interest rates on bank loans are very high.
- There is an evident deficit of relevant human resources (engineers, technicians), but their quality is often more problematic than their availability. After they graduate, a lot of engineers leave the country and find jobs in the EU.

5.3.3 Competition – grills of iron or steel - Austria

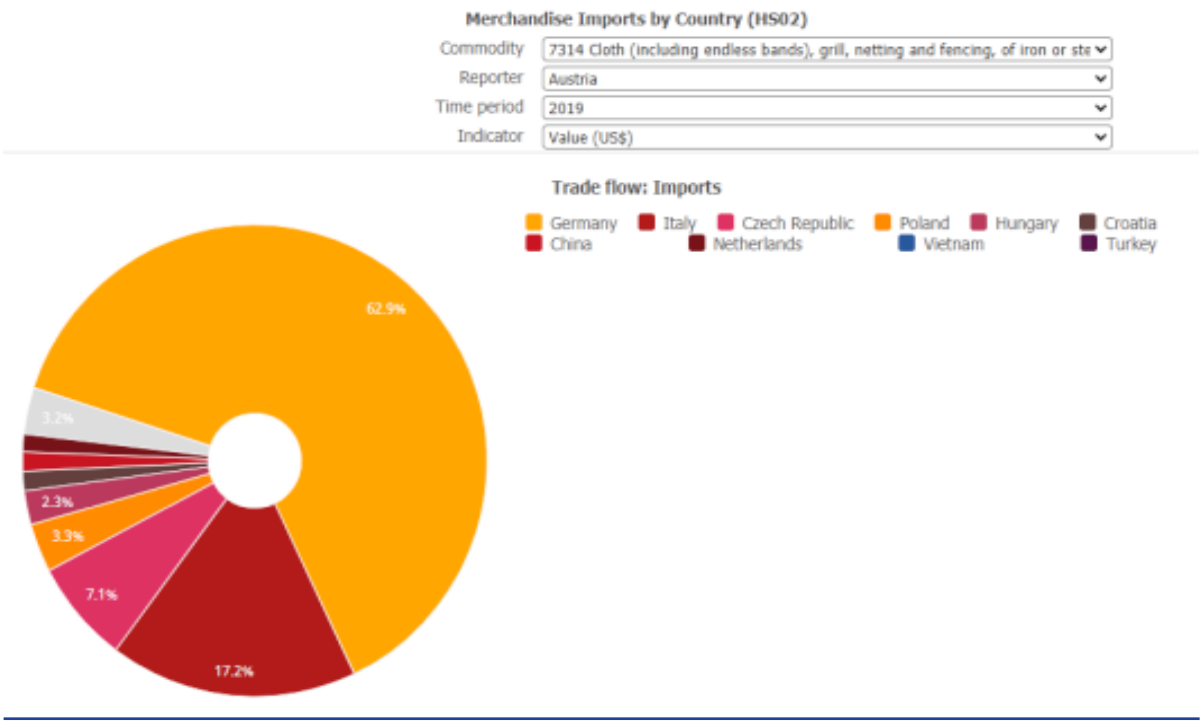
In 2019, the value of imports of the commodity group "grill, netting and fencing, of iron or steel wire; expanded metal of iron or steel" to Austria totalled USD 184 million. The sales of commodity group 7314 to Austria decreased by 3.13% in value terms compared to 2018. Imports of commodity group 7314 "Cloth (including endless bands), grill, netting and fencing, of iron

or steel wire; expanded metal of iron or steel" decreased by USD 5.95 million (the value of imports of commodity group 7314 to Austria was equal to USD 190 million in 2018).

Imports of commodity group 7314 "Cloth (including endless bands), grill, netting and fencing, of iron or steel wire; expanded metal of iron or steel" accounted for 0.104% of the total import flow to Austria (in 2019, total imports to Austria amounted to USD 176 billion). The share of commodity group 7314 in total imports to Austria increased by 0.001 p.p. compared to 2018 (it was 0.103% in 2018 and cumulative imports to Austria were equal to USD 184 billion).

Imports of commodity group 7314 reached 3.55% of total imports of the group to Austria in 2019 (imports of the commodity group to Austria totalled USD 5.18 billion in 2019). The share of purchases of commodity group 7314 in total imports of the commodity group to Austria increased by 0.084 p.p. compared to 2018 (it was 3.46% in 2018, and imports of the commodity group to Austria accounted for USD 5.47 billion).

Figure 50: Importers of grills, etc. to Austria by country, source: trendeconomy.com



Main industries potential: mechanical, electrical, construction, white goods, iron and steel industry, etc.

Examples of **Austrian companies**: Plansee SE, Lumpi-Berndorf Draht- und Seilwerk GmbH, Ulbrich of Austria GmbH, Dr. Anton Pichler GmbH, Zaunteam Tirol Unterland, Haase GmbH.

Competitive advantages for BiH companies within this product group:

- competitive labour costs,
- regional proximity and traditional good relations with the Austrian market,
- subsidies provided by the Ministry of Industry, Energy and Mining for export companies.

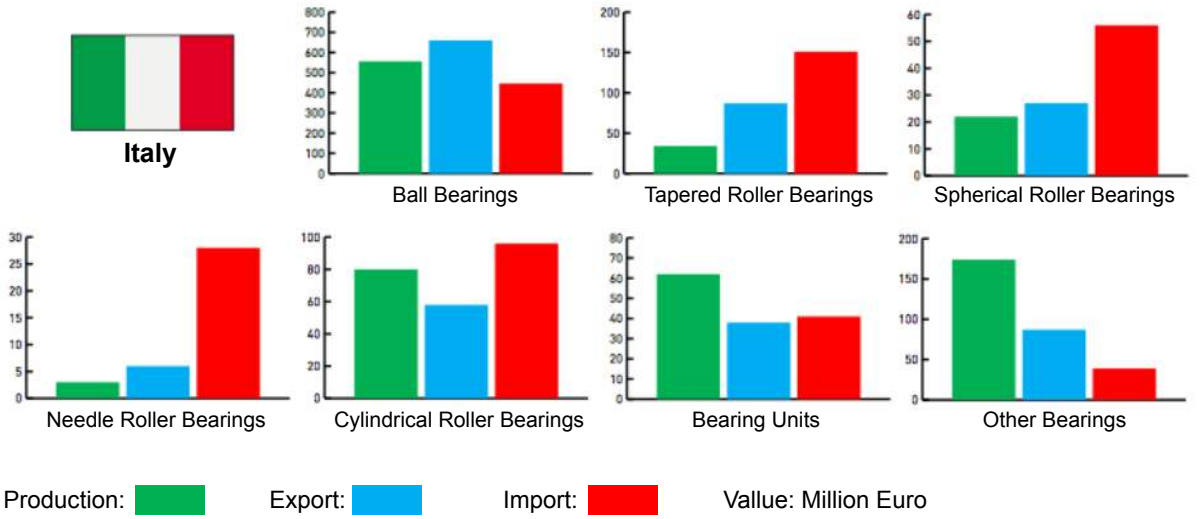
Competitive disadvantages for BiH companies within this product group:

- Access to finance, due to bureaucratic obstacles.
- Interest rates on bank loans are very high.
- Few opportunities to generate competitive advantages (except price advantage), as they are largely commodities.
- There is an evident deficit of relevant human resources (engineers, technicians), but their quality is often more problematic than their availability. After they graduate, a lot of engineers leave the country and find jobs in the EU.

5.3.4 Parts of ball/roller bearings – Italy

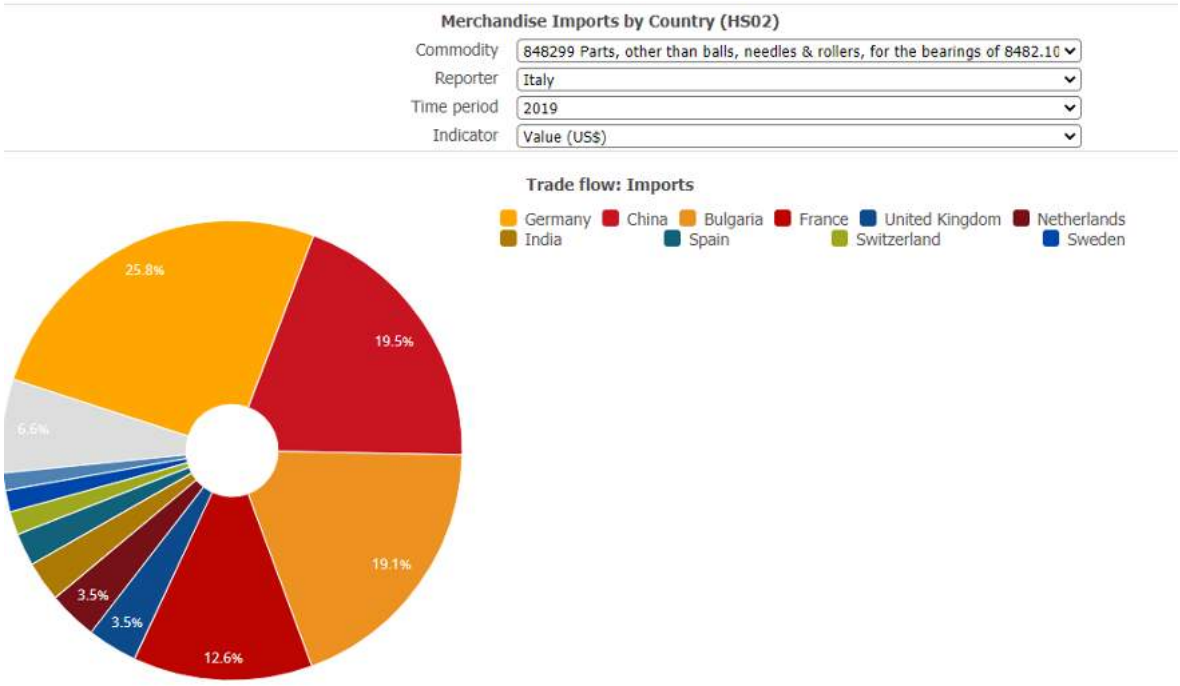
The bearing market is playing a major role within the European industry and can be defined as a solid indicator for the economy. Today, many large and family-owned companies are the key players on the continent, supplying thousands of industrial users active in hundreds of industry segments. The information below includes the import, export and manufacturing of ball bearings, tapered roller bearings, spherical roller bearings, needle roller bearings, cylindrical roller bearings, bearing units and other less common bearing types in Italy.

Figure 51: Import of bearings- Italy, source: European Bearing Industry Import, Export & Production statistics - BEARING NEWS - bearing-news.com



Competitors within the market of ball- and roller-bearings are e.g.: Beeline Engineering Products (UK), Galaxy Bearings (India), General Bearing (USA), Hikari Seiko (Japan), JTEKT (Japan), Mitsumi Electric (Japan), Nachi Brasil (Brazil), National Engineering Industries (India), New Hampshire Ball Bearings (USA), MinebeaMitsumi (Japan), NRB Bearings (India), NSK Brasil (Brazil), NTN Bearing (USA), SKF (Sweden), PT. IKA Wira Niaga (Indonesia), Schaeffler (Germany), Texspin Bearings (India), Timken (USA), Wafangdian Bearing Group (China), Yuhuan Melun Machinery (China), ZWZ BEARING (USA), Bajaj Bearings (India).

Figure 52: Import of parts for bearings- Italy source: trendeconomy.com



Competitive advantages for BiH companies within this product group:

- competitive labour costs,
- regional proximity to the key market in Italy,
- subsidies provided by the Ministry of Industry, Energy and Mining for export companies.

Competitive disadvantages for BiH companies within this product group:

- Access finance, due to bureaucratic obstacles.
- Interest rates on bank loans are very high.
- There is an evident deficit of relevant human resources (engineers, technicians), but their quality is often more problematic than their availability. After they graduate, a lot of engineers leave the country and find jobs in the EU.

5.4 CHANGES IN THE SUPPLY EXPECTED BY BUYERS

The COVID-19 crisis has exposed the fragility of international supply chains. Industries are increasingly asymmetrically interconnected. Value chains have been internationalised to achieve economies of scale. Outsourcing, offshoring and lean production lines, combined with low inventory levels, have made the economy vulnerable to supply chain disruptions and supply shortages. It is thus a trade-off between lower prices of inputs and the increased risk of being

dependent on global supply chains. Structural change in value chains is first in the hands of companies, which need to reassess the trade-off and incorporate negative externalities more. One measure will be to diversify supply chains to increase resilience to production losses of inputs.

While in the past decades the outsourcing of production stages and the sourcing of primary products from abroad were seen as a profitable strategy, the question currently arises in many areas as to how far the associated risks can be justified. These risks are particularly visible in the current situation when foreign suppliers close their operations due to illness or by decree and affect domestic production beyond the extent that results directly and also due to illness from the spread of the virus at home. However, even before the COVID-19 pandemic, there was a growing number of voices that wanted to put dependence on international value chains to the test.

A company survey, conducted by the German "Association for Materials Management and Purchasing" (BME) showed that companies are increasingly using structured risk management to control the supply chain. The COVID-19 crisis led to a rethinking of supply chain risk management (SCRM) in its entirety. Many companies are realizing that there is little transparency in their supply chains. Also, the lack of preparation for a pandemic and its impact may increase the importance of SCRM. The ultimate goal is to minimize the risks of supply bottlenecks as far as possible. There are opportunities for BiH companies, as companies in the relevant target markets are increasingly looking for alternatives to avoid dependence on suppliers from far away (e.g. China).

Short summary

- Innovative market trends in the target sectors of the BiH metal industry need to be followed regularly in order to increase value creation.
- Trends to increase value creation in the identified product/market combinations are:
  - High-strength aluminium alloys especially for the automotive industry with the main target markets potential being Germany and Slovenia.
  - Innovative solutions for the use of grids made of iron and steel exist especially in ventilation system construction, mechanical engineering, white goods, the recycling industry as well as the construction industry with the main target market being Austria.
  - The demands on ball and roller bearings are constantly increasing. BiH suppliers of parts for ball and roller bearings have good chances to add value and win new customers, if they cooperate with end users, ball and roller bearing manufacturers in product development. A target market with potential is Italy.

6. TRENDS AND OPPORTUNITIES IN IDENTIFIED MARKETS

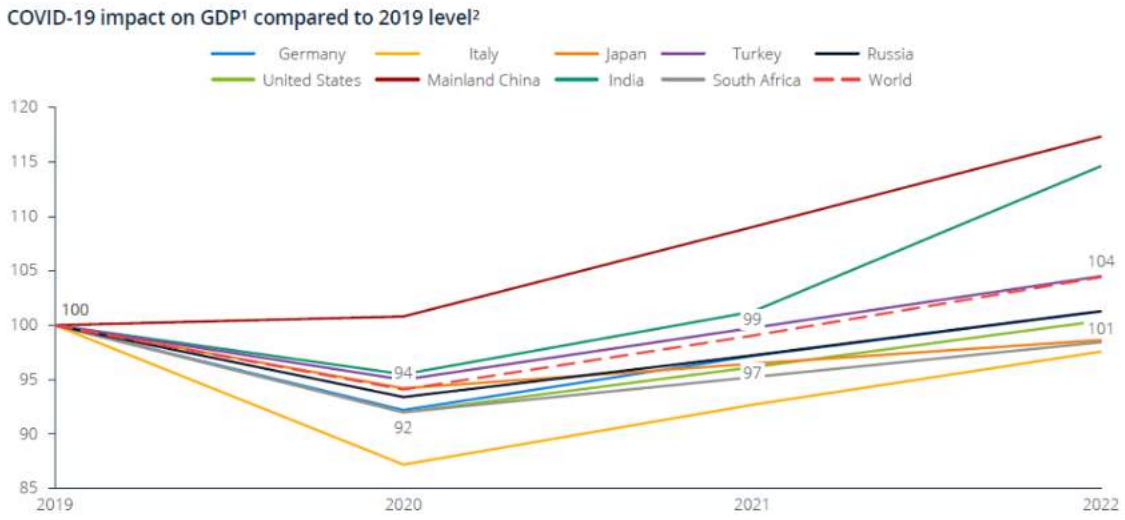
6.1 THE EFFECTS OF COVID-19 IN THE KEY EXPORT MARKETS

Several regional and industry based countermeasures have been and are still being implemented by politicians to control the spread of COVID-19, the pandemic that is projected to force the European economy into a recession. The implementation of/necessity for partial and, in some instances, total lockdowns resulted in the closures of non-essential businesses. During this phase, which began in March 2020 and lasted for several months, businesses generated non-compensable losses. However, the repercussions of the pandemic have varied by region, country, and industry, and COVID-19 is likely to impact GDP growth and unemployment rates in various ways.

Ongoing restrictions have prolonged the recovery phase of the economy, which is estimated to continue until at least the end of 2021. Additionally, the second wave of COVID-19 infections that is likely to arrive in the second half of 2020 increases the level of general uncertainty, making it difficult to predict developments in the upcoming months. Although it is not yet possible to provide specifics for every industry about the overall impact of the COVID-19 crisis, some industry specific developments have already been observed:

- The event and travel industries, as well as the gastronomy industry, have been severely affected. According to the IATA, it is possible that due to COVID-19 related travel bans, the air transportation industry will have to deal with revenue losses of up to EUR 67 billion in revenue and put 5.6 million jobs at risk in 2020.
- The manufacturing industry has suffered heavy losses and can only resume production under special precautions. If social distancing requirements cannot be maintained in production facilities, adjustments will have to be made. Disruptions to international supply chains have the potential to further weaken domestic production.
- Comprehensive digitalization across industries is needed to secure alternative working structures and enable day-to-day business operations.
- Potential risks are posed by declining competition and increasing monopolies, the closing of businesses, rising unemployment rates, a loss of purchasing power, and fluctuating prices.

Figure 53: Impact of COVID-19 on GDP, source: Statista 2020



Germany

At the beginning of May 2020 and in a global comparison, Germany had the seventh-highest number of COVID-19 cases and the eighth-highest number of deaths. The country's mortality rate, however, has been lower than most other European countries with just under 7400 deaths in early May 2020. Even though the number of recorded cases dipped sharply since the end of March 2020, the country has been bracing to tackle the enormous economic impact. With a virtual lockdown in place for several weeks, the German economy is expected to be recessionary at least in the short term. The country's council of economic advisors have predicted that output will decline by almost 5.5% in 2020. Other industry experts such as those at the German Economic Institute have predicted a slump of approximately 10% in 2020 as part of a worst-case scenario estimate. On the brighter side, government advisors surmise that this dip is only temporary, with estimates of a 4.9% growth in 2021. In terms of economic measures, the German parliament has suspended the debt brake that was implemented in 2009 and allowed the country to only assume debt amounting to 0.35% of its GDP. A stimulus package of over EUR 750 billion has been approved to cushion the expected.

In December of the 2020 pandemic year, the metal processing companies were able to achieve a year-on-year increase in production again for the first time, according to preliminary data. This limited the decline in the fourth quarter to 1.2%. This could have been caused by emerging bottlenecks in the supply chains and the associated expectation of rising input material prices, which led to orders being brought forward. Compared to the third quarter of 2020, production increased by 6.4%, according to the German Metal Association. Over the year, output fell by 12.8%.

Austria

In the context of the COVID-19 crisis, production output in 2020 has decresed by almost 20% when compared to 2019. Industry experts also expect a lower level for the current year (2021) than in 2019. In Austria, mechanical engineering in particular has been hit hard. Around 23% of companies are planning massive staff reductions. According to the Austrian

Metal Association, declining orders are the industry's biggest problem. Since the beginning of 2021, incoming orders have shown a slight improvement. Liquidity bottlenecks are declining, but they are still a problem for a quarter of the companies. Business travel is becoming more and more of a problem and has decreased by 60%. Customer contacts and the acquisition of new customers are affected by this. Supply chain bottlenecks remain acute due to COVID-19.

Slovenia

The COVID-19 crisis is making itself increasingly felt in the economy. According to a survey by the Slovenian Chamber of Commerce GZS, 93% of the companies surveyed are struggling with serious problems due to lower demand from home and abroad. In addition, there are interrupted supply chains. Companies are suffering massive losses in turnover.

Some major industrial companies therefore ordered weeks-long production stops already at the beginning of the pandemic outbreak in Slovenia. These included companies that are relevant customers for BiH metal companies, such as the car manufacturer Revoz (Novo Mesto), a subsidiary of the French Renault Group. Temporary closures of their plants in Slovenia were also ordered by the household appliance manufacturers Hisense Gorenje and BSH Hišni Aparati, as well as Magna Steyr. Most of them have since resumed production. However, they are working with significantly reduced capacities.

The Slovenian manufacturing sector coped quite well with the second wave of COVID-19 in autumn 2020. However, economic expectations have worsened again at the end of 2020 in view of the worsened epidemic situation. Nevertheless, the situation is assessed to be more favourable than in spring 2020. According to the Institute of Macroeconomic Analysis and Development (IMAD), this is especially true for small and medium-sized companies in the metal processing industry.

However, according to IMAD, production in the motor vehicle industry remains below the previous year's level. Prolonged delivery times related to global logistics bottlenecks are causing major problems for the sector in particular. In order to maintain and improve their market position, many automotive suppliers want to push ahead with investments.

Italy

In addition to tourism, gastronomy and tour operators, the manufacturing industry has been hit hard by the COVID-19 crisis. The situation is also difficult in the logistics sector and in transport, especially since the most important logistics centre in Lombardy is located in the particularly hard-hit province of Lodi.

According to the German freight forwarder Kuehne und Nagel, delays are to be expected especially in trade with China, despite a gradual normalization in the Asian country. In Italy, the port of Genoa has reopened. Road transport may be delayed due to health checks at the borders. Most manufacturing companies were closed until April 2020.

The automotive industry is being hit at an already difficult time. Fiat Chrysler closed its plants already before the ordered production stop. Pirelli is expecting heavy losses. The mechanical engineering sector, which already suffered a 3% drop in production in 2019, expects an extreme decline in exports in 2020. In the construction industry, which was already weakened before the outbreak of the COVID-19 crisis, the promotion of energy-efficient

and environmentally friendly renovations is to be strengthened again after the end of the protective measures.

Industrial production plummeted already in March 2020 due to the measures taken to contain the Corona pandemic. According to the national statistics office Istat, production fell by 28.4% month-on-month. The slump was even more severe than analysts had feared. On average, they had only expected a decline of 20%.

Lombardy, Veneto and Emilia-Romagna alone account for more than half of Italy's GDP and two-thirds of its exports. Mechanical engineering, the car industry and the metalworking industry partially stopped production in 2020. The agricultural and commercial machinery manufacturer CNH Industrial also temporarily closed its factories. Companies such as Valeo and Whirlpool, a manufacturer of household goods, also recorded huge declines in orders.

6.2 CURRENT BUSINESS AND TECHNOLOGY TRENDS

6.2.1 General trends

Automation

Automation is a trend that is not only prevalent in the metal fabrication industry but in other sectors as well. It has greatly enhanced and simplified the process of cutting and bending sheet metal. Because of this, production operations became more efficient and errors were minimized. Metal fabricators were also able to run their operations without human intervention, enabling them to save significant costs on human resources. Several machines paved the way for automation in the metal fabrication industry, such as CNC machines that only need the instructions from a design file to perform various types of cuts. Some of the cutting mediums employed by these machines include laser, flame, tube laser, plasma, as well as water-jet cutting technology. There is quite a remarkable level of precision with laser cut steel or steel-cut using any of these novel technologies that give it an edge over those cuts using manual operations. Aside from precision, these contemporary cutting technologies also pave the way for cutting complex shapes, all without the need for human intervention. Aside from the machines, another thing that you can watch out for when it comes to automation is the entry of collaborative robots or cobots. Some of these works independently, but these cobots are primarily designed to work with humans. Nonetheless, the use of cobots in the metal fabrication industry is still in its early stages.

Cybersecurity

Another notable trend in the metal fabrication industry is the incorporation of cybersecurity into the machines and the network utilized by these machines. Nowadays, it is crucial to secure the data and processes of manufacturing systems to minimize, if not eliminate, the risk of business disruption. Like any other computer consoles, CNC machines can also be hacked and threatened by malware and other viruses. For this reason, it is important to protect these machines from cyber threats.

3D printing

3D printing is already used in various industries, including the metal fabrication industry, to create prototypes. More and more manufacturers in the industry are willing to invest in 3D printing technology for their businesses. However, it is important to note that metal 3D

printing is very different from the traditional steel fabrication process. This is because, with the latter, metals need to be stamped and bent to produce a required design as opposed to the use of a printed design to come up with a metal prototype.

Enterprise Resource Planning

More and more manufacturers in the metal sheet fabrication industry are now adopting the use of enterprise resource planning (ERP) systems. This is because most of these manufacturers are not limited to providing services to local markets; they have global operations as well. Because of this, it can be quite challenging to oversee the operations of both their local and global plants, and manage their suppliers, as well as source out their materials, without the use of an ERP system. With ERP software in place, metal manufacturers can manage their daily business activities such as accounting, procurement, project and risk management, as well as supply chain operations.

Nearshoring

Another trend that can be expected in the metal fabrication industry is the nearshoring of their manufacturing solutions because this heavily outweighs the benefits provided earlier by outsourcing. Even if outsourced labour costs are significantly lower, there has been an increase in logistics costs. Additionally, these manufacturers also need to prepare against market volatility risks. For these reasons, more and more sheet metal fabrication manufacturers are bringing back their manufacturing capacities into their locality instead of outsourcing them.

In conclusion, the trends illustrated above are only some of the technologies that are expected to become prevalent in the metal fabrication industry in the future. Nevertheless, since technological innovations are constantly emerging, other trends may soon be recognized as well. This is to ensure that the metal fabrication industry will be able to cater to the demands of other industries that heavily rely on it.

6.2.3 Current technological trends – within the defined products groups

Companies from the metal industry are strongly integrated into global value chains. These are usually controlled by the changing demands of the end customers in the supply chain. The metal industry must therefore constantly adapt to changing conditions. The gradual adaptation of the technology used at the production and organisational level enables higher-quality products and services to be offered in the medium term.

Aluminium technology – aluminium alloys – mainly Germany and Slovenia

With global consumption expected to rise to 120 million tonnes by 2025, it is now the second most commonly used metal behind steel. This demand is transforming the reputation of foundries worldwide.

Aluminium production grew by 6% globally in 2017. The driving force behind this boom is the automotive industry, alongside sectors such as aerospace, mechanical engineering and packaging.

As environmental legislation becomes more stringent, there is increasing pressure to reduce fuel consumption and carbon dioxide emissions from vehicles. New, more environmentally friendly vehicles need to be lighter. Therefore, choosing featherweight aluminium instead of the heavier steel for some components makes a lot of sense, especially for large structural components.

Therefore, by 2022, the average car will contain almost 100 additional kilos of aluminium, replacing heavier components. Globally, the use of aluminium in vehicles will double from 12% to 25% of consumption by 2025, equivalent to 30 million tonnes.

The rapid switch from steel to aluminium represents a major opportunity for some foundries and aluminium processing companies. But it is not easy to enter this market. It is difficult to precisely cast and efficiently and consistently finish complex structural aluminium components for vehicle manufacturing. This means that it is always more about quality than quantity, which in turn requires sophisticated and advanced machinery. Companies in the industry need to invest and innovate to take advantage of this opportunity.

Grills of iron or steel – mainly Austria

Grills of iron or steel are used in particular in plant and ventilation construction, machinery and plant engineering, the construction industry and architecture and the agriculture industry.

Mechanical and plant engineering

The development of high-quality filter systems for mechanical and plant engineering is becoming increasingly technically demanding. These systems must offer resilient, functional solutions. An important factor is always purified process fluids, which guarantee the precision and long service life of the machines. This means that process interruptions can be avoided and maintenance costs reduced, which importantly also ensures the quality of the end product. The safety of plants and machines also plays a major role.

Construction industry and architecture

Metal mesh offers exceptional design possibilities, especially for architects, planners and designers. Architectural mesh exists in a wide variety of designs: solid, filigree, flexible, rigid or transparent. Wire mesh is increasingly being used in the construction industry, especially where both appearance and function are important. Areas of application are, for example:

- decorative partition walls,
- wall hangings,
- ceiling suspensions,
- facade mesh,
- interior design.

It is also important to follow the developments on the markets closely and to develop competitive advantages by means of offers tailored to customer requirements, for example for exterior architecture as well as for exclusive trade fair and shop construction.

Agriculture sector

In addition to the increasing demand for filter systems in water management, mesh and wire mesh can be found in numerous other areas of work in agriculture. These include:

- ventilation grids for stables,
- covers for cold frames,
- plant protection grids,
- wire mesh and grids for bird repellent,
- wire mesh for onion boxes,
- mice protection for beehives,
- hydroponic growing trays,
- sieves for sifting feed.

Parts of ball/roller bearings – mainly Italy

Global demand for alignment ball bearings has increased steadily in the past and is therefore expected to continue in the coming years. The precise manufacture of ball and roller bearings is technically demanding. The market is dominated by experienced manufacturers who are constantly working on further development.

Reducing friction while maintaining high robustness is and remains the central task of transmission bearings, regardless of whether they are used in conventional or electrified powertrains. As of recently, bearings can be optimized in a very short time. Investigations on tapered roller bearings have shown that this can result in further friction advantages of up to 20%. Tapered roller bearings in this ultra-low friction design have recently gone into series production in axle drives.

With innovative angular contact rollers, leading manufacturers such as Schaeffler and SKF have developed locating bearings with a load rating that is more than 40% higher than that of a deep groove ball bearing with the same design envelope and low friction. Cylindrical roller bearings with narrow ribs offer a reduction in bearing width of up to 20% or, alternatively, an increase in load rating of up to 27% for the same bearing width. As a result, low-friction locating/non-locating bearing arrangements, such as those required for modern manual, double-clutch and reduction gearboxes for electric axles, can be implemented even more frequently than before.

In the case of electric drives, there is a trend toward increasing speeds, which means up to 30% higher speed characteristics for the bearings. Reliable bearing arrangements for these high-speed drives can only be achieved with bearings that are characterized by high manufacturing accuracy in conjunction with specially developed greases, seals and cages. Manufacturers have developed modular systems that offer suppliers from BiH the possibility of supplying standardized subcomponents. Opportunities are here the supply of blanks for ball bearing production, especially bearing housings, not incorporating ball or roller bearings and plain shaft bearings

6.2.4 Organizational changes are needed

Most companies in the BiH metal industry focus on production. Active sales with their own sales staff often do not take place. The companies see themselves as production companies and not as solution providers for the customer. The deep understanding of customer requirements can be used to develop new innovative market-oriented products. This requires the collection of specific customer data that enables sales to build lasting and resilient customer relationships. Systematic collection of customer data useful for sales and product development is rarely done. **CRM systems** that are meaningfully linked with administrative software tools are hardly used.

Online-based systems that form an interface to the customer are also largely not used. The possibilities for customers to transmit production data (part dimensions, CNC files, etc.) via an online interface, which are automatically linked to production planning and merchandise management, can optimize processes. These requirements are placed on metal companies by customers particularly in mechanical and plant engineering, and especially in the automotive industry.

Changes can also be expected in the area of customer service. The increased use of **on-**

line-based visualization systems (augmented reality, virtual reality). Particularly in areas where design and innovative solutions are important (e.g. the construction industry and architecture, the automotive industry), the use of these technologies is increasingly demanded.

Traceability is becoming increasingly important for many customers in the automotive industry or in mechanical and plant engineering. Traceability means the identification and traceability of manufactured products. With the help of clear labelling, the origin of an end product can be traced back through the entire supply chain to the individual component. In the event of a defect in an end product, clear identification enables the source of the defect to be quickly isolated.

6.2.5 Ability to add value to fabricated metal products

Fabricated metal products (NACE C25) is a key industry, with large backward and forward linkages. The main inputs, for example, are sourced from the basic metals industry. It sells its product to a wide range of other industries from the motor vehicles industry, other transport equipment, machinery or electrical equipment to the repair sector. The value added multiplier is large and ranges in the middle field. It has a pronounced domestic value added component. The fabricated metal products sector is a medium-sized industry in the European Union in terms of production, but a large industry in terms of value added and employment. It has the second highest SME-intensity (74% of turnover generated by SMEs).

Investment needs with respect to intra value chain collaboration apply to all subsectors of the fabricated metal products sector. However, co-engineering might apply mostly to the “subsector manufacture of structural metal products (NACE 25.1)”, since structural metal products are often further applied in other products, thus allowing for co-engineering. In the case of the reuse and recycling of coating powders, the relevant subsector of the fabricated metal products sector would be the subsector “treatment and coating of metals and machining” (NACE 25.7).

Within the European Union, about 30% of value added is generated in Germany (the reason for this is the level of automation, high investments in innovative product development), followed by Italy (15%), France (12%), the United Kingdom (10%), and Spain (6%). The countries most specialized in the sector (i.e. measured by the share of machinery in total manufacturing value added) are Czechia, Estonia, Spain, Croatia, Italy, the Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia and Sweden (above 10%). The EU value added multiplier ranges around 0.8 and is smaller only for a small range of countries.

Raw material and metal scrap (post-consumer and industrial) are inputs for the production of semi-fabricated metal products, preceded by basic metal processing such as mineral processing, smelting and refining. Semi-fabricated metal products include semi-finished casting products such as ingots, blooms, billets and slabs or coils, sheets, strips, pipes and tubes that need further processing before being a finished good. The fabricated metal products sector turns these semi-fabricated metal products into a wide range of products such as structural metal products, tanks, reservoirs and containers of metal, steam generators, weapons and ammunition, cutlery, tools and general hardware. These products are then delivered as end products or semi-finished products for clients, which can be consumers or other industries, depending on the type of product and the business model of companies. When zooming into the fabricated metal products segment, one can identify different steps that lead to the manufacturing of fabricated metal products. The first element of this value chain is the design of products, processes and infrastructure. The manufacturing or assembly of the products is

conducted in many different ways, including forging, pressing, stamping and roll-forming of metal and powder metallurgy. The products are then treated and coated in order to improve the hardness of products, prevent corrosion or decorate the products. Finally, the waste generated in the manufacturing processes is processed.

Co-engineering and use of Best Environmental Management Practices are important areas for investment across and between value chains

The sector is characterized by several challenges regarding sustainable production and the use of Best Environmental Management Practices (BEMPs), including the need for increasing material efficiency and the valorisation of by-products and waste. An important channel through which these challenges can be met is promoting cross-value chain collaboration. In the context of the fabricated metals case, both co-engineering and waste reuse and recycling as BEMPs were identified to be in need of investment, where these investments were identified to be of a coordinated nature both intra and inter value chain, respectively.

In order to facilitate the process of co-engineering, investments that support collaboration amongst partners are needed. This investment need arises from the necessity to collaborate with complementary partners, and benefits the process of bringing a product to market, and a process to fruition that would otherwise be hampered without cooperation. In addition, co-engineering to streamline production and reduce waste requires shared infrastructure especially for SMEs. Thus, investments are needed to facilitate cooperation through shared facilities, i.e. R&D facilities. Finally, a lack of awareness of Best Environmental Management Practices and the consideration of environmental impacts in design and the role that co-engineering can play shows the investment need in research and development.

Another very specific example is the reuse and recycling of waste from the powder coating process. The economic viability of the reuse and recycling of powder coatings waste depends on quality of the waste and the type of collaboration. The problem however is that the waste streams need to be large enough for the collection and transport to become economically interesting. It is difficult to achieve industrial cooperation on the collection of the waste. Investment needs therefore lie in promoting reuse and recycling systems for powder coatings from the fabricated metal products sector in order to apply this BEMP.

Investment needs are well distributed across Europe

When analysing the geographical dimension of the investment needs, it is necessary to zoom into the relevant subsectors of the fabricated metal products sector. Detailed information can be obtained using data from the Annual detailed enterprise statistics for industry. The first investment need, on intra value chain co-engineering, cannot be specified towards a specific subsector, since this is an industry-wide opportunity. One could state however that investment needs are located in regions where there is a high concentration of SMEs working in the fabricated metal products sector. A straightforward measure is the number of enterprises. The number of enterprises were specifically high in Germany (21445), Poland (17470), Italy (14891), the United Kingdom (13319), Slovakia (12942) and Czechia.

The second investment need, on inter value chain reuse and recycling and more specifically the reuse and recycling of coating powders, can be analysed using data on the subsector “treatment and coating of metals and machining”. The largest share of this sector in terms of value added in manufacturing total is noted in Slovakia (4.6%), followed by Switzerland

(3.8%), Finland (3.7%), Slovenia (3.6%) and the United Kingdom (3.6%). One could state that there might be an opportunity for investment in the new Member States, given the relative importance of the subsector in this region, and the fact that a recycling network for coating powders is in its infancy and only to a limited extent established in Western Europe.

With respect to the nature of the investment needs it has been noted that the fabricated metal products sector has a pronounced domestic component. This implies that these companies are embedded in a network of suppliers and clients that is mainly of a regional or national focus. This in turn stresses the importance of regional solutions and cross-border solutions for neighbouring regions. This is reinforced by the fact that transport costs put a limit to the distance that it is economically beneficial to collect the coating powder.

Coordinated solutions allow for greater reach and reduced environmental impacts

In order for firms to co-operate in a co-engineering process, a clear advantage needs to be shared by the firms in their network, which is not always guaranteed. Network facilitation can be through shared platforms managing co-engineering practices in order to organize and manage open innovation with regards to fabricated metal products. A network should also ensure that complementarities of companies need to come together. Facilitation of asset exchange is indeed another point for improvement in open innovation. Until now co-engineering and open innovation is mostly done at the firm level, based on close personal relationships or shared visions. Through network management and facilitation, SMEs can share in the same vision and overcome some of their personal hurdles.

SMEs face a challenge in co-engineering related to a lack of infrastructure. This can be solved through shared physical structures funded through public-private financing in infrastructure for shared innovation. The Open Manufacturing Campus presents such an example where open innovation occurs. Such facilities are able to support SMEs that do not have the necessary facilities to develop a shared product. Finally, in order to deal with the investment need towards Best Environment Management Practice (BEMP) and specifically co-engineering, research and development funding would be a solution to tackle with the lack of awareness and available information. Indeed, consideration of the environment remains a challenge and thus joint investment in pre-competitive research could be a solution to improve environmental impact considerations.

In the field of reuse and recycling of powder coatings, the solutions to the investment needs aim to support better valorisation of the powders. One such solution includes more R&D funding dedicated to the development of new applications for recycled coatings. Such R&D projects should involve intermediaries processing coating powder caste, as well as well as research partners from across the EU and potential customers (i.e. “value chain R&D projects” including several partners from across the value chain). In addition, a networking tool can facilitate cooperation and promote exchanges between different actors in the value chain. Lastly, the number of plants where high value added recycling takes place is at this moment limited. Yet, for large scale deployment of coating powder recycling more plants spread around the EU would be needed. When a batch of powder coating waste is generated far away from such a recycling plant but close to an incinerator (which are much more widespread), transport costs will steer the choice in favour of incinerating.

Joint investment programs powered by the EU investment promotion instruments

In order to integrate these investments into the Juncker Plan (plan presented by Jean-Claude Juncker, President of the EU Commission until November 2019, with five scenarios for the future development of the EU), and thus ensure that the need for improved BEMPs in the fabricated metal products sector are met, different actions could be foreseen. In the case of co-engineering, support for collaboration in co-engineering could make use of the European Investment Project Portal (EIPP) and the European Investment Advisory Hub (EIAH) in order to assist different companies in working together through a joint investment programme. With regards to shared physical structures for co-engineering, public funds could be made use of in order to mobilize additional private investment and give credit protection to the financing provided by the EIB and EIF. In order integrate the third coordinated investment option on research and development of co-engineering, the use of complementary actions such as Horizon 2020, EFSI and the ESI could be envisaged. Developing an appropriate funding mix between grants and financial instruments would be ideal.

With respect to the integration of the suggestions on waste reuse and recycling under the Juncker Plan, actions regarding research and development on coating powder valorisation could include the use of Horizon 2020, EFSI and ESI as well as national and regional support and a funding mix between grants and financial instruments as well as EIAH. For the investment need on the network on coating powder valorisation the EIPP and the EIAH could be used for integration of a joint investment program under the Juncker Plan in order to better facilitate exchanges amongst waste producer and potential users. Finally, improving the geographical coverage of recycling plants for the improved waste reuse and recycling in the fabricated metal products sector could benefit from the use of public funds in connection with the EIB and EIF as well as private funds and the EIAH and its advisory services. Facilities are especially necessary in order to facilitate recycling and lower transport costs.

The main obstacles are finding high value added applications and stemming the competition from incineration. The main obstacle is finding high value added applications for the recycled coating powder. Finding these applications involves investing in R&D and finding/convincing potential customers from a broad range of sectors to open up for recycled materials (from which the properties but not always the exact content is 100% known) as input to their business processes.

Another obstacle is the competition stemming from incineration, which is a cost-effective way to get rid of powder coatings, and draw a significant amount of waste powder from the market. In addition, also transport costs can hinder the business case of valorising coating powder. Especially when waste powder is produced much closer to an incinerator than to a recycling plant, incineration will be preferred by the waste producer. Furthermore, the quality of waste powders suppliers to the recycling intermediaries is not always good, also depending on the country where it is produced.

6.3 POTENTIAL FOR UTILIZATION AND EXPANSION OF LOCAL KNOW-HOW – CORRESPONDING BUSINESS INNOVATION, TECHNOLOGICAL ADVANCEMENTS

The purpose is innovation in a micro and small business (MSB) metallic frames manufacturing process located in BiH. Innovation has been recognized as a key element affecting the growth and transformation of industries, and the rate of entry, survival and growth of firms. Looking back at the last 25 years of research on these issues, one has to recognize that progress has indeed been impressive at both the empirical and the theoretical levels.

In the sectoral systems tradition, industries have been interpreted as systems in which actors are related and interact in various ways and whose actions are strongly influenced by their learning processes, competences and institutions. In this frame, the notion of sectoral systems of innovation is a useful tool for examining innovation in a sector. In this framework, innovation and industry evolution could be seen as the outcome of learning processes by firms and by individuals, based on a specific knowledge base which characterizes the industry. Competitive and cooperative relationships among actors do matter tremendously: they are of market and non-market type, formal and informal, and take place in specific institutional settings, some of which are national while others are specific to the sector. Change and transformation does not refer only to products and processes, but also to actors, links, institutions and knowledge itself. Compared to the industrial dynamics approach, this view points to a richer and more articulated set of dimensions. In sum, during its evolution, an industry changes its structure, where the term structure means not only market structure, but also the network of relationships (competitive and cooperative, market and non-market, formal and informal) among actors that affect innovation and performance in an industry.

The analysis of innovation, industrial dynamics and industry evolution has witnessed major progress. The process of innovation can be grouped in two different but related traditions: one (older) which may be called industrial dynamics, the other (more recent) which can be labelled sectoral systems evolution. In both these traditions, contributions at the empirical, appreciative, econometric and formal modelling levels have greatly advanced the understanding of innovation, industrial dynamics and the different evolution of industries. In particular, the main part of the paper is centered on the point that a full understanding of the relationship between innovation and the evolution of sectoral systems has also to cope with a finer grained analysis of knowledge, actors, demand, networks and institutions. And coevolution is a major challenge for both approaches.

In the future both traditions will start to converge. The industrial dynamics tradition will open up to include some elements of the sectoral systems tradition. At the same time, the sectoral systems approach will attempt to be more quantitative in its analyses by trying to use new longitudinal database on several actors, networks and demand more extensively.

This is so because both traditions have followed a methodology that identifies empirical regularities, stylized facts or puzzles that need to be explained, develops appreciative theorizing, conducts quantitative analyses and then builds formal models, which in turn feed-back to empirical analyses in terms of tests, insights and questions.

Where those approaches may still diverge, however, is interdisciplinary. While the industrial dynamics tradition is focused mainly on economic dimensions, the sectoral systems tradition claims that in the realm of innovation and the evolution of industries, research needs to be

interdisciplinary. It means that the full understanding of topics such as innovation and the evolution of industries require the integration of economics, history, sociology, technology, management and organization. And interdisciplinary means eclecticism and openness to new contributions from different fields of research. The impacts on the suppliers of the mechanical and automotive industries and the architecture of the entire industry have changed.

Topics for Structural Change / Transforming Metal and Automotive Industry

- Engineering/Technical Issues:
  - digitalization of value creation process
  - autonomous cars
  - connected cars | network infrastructure | digital services

- Globalizations/Business model:
  - global platform strategies
  - local content/regional value
  - change in CRM and services

In the area of the impacts on the mechanical and automotive supplier industry, the main characteristics are:

- worldwide service support,
- smart factory services/engineering topics/digitalization,
- augmented reality solutions.

And the main impacts on the field of architecture as an industry are:

- more work volume, more chances and new business opportunities,
- need for more IT specialists and software engineers/developer for customer related solutions.

To realize this transformation, the process of exchanging experience between companies as part of a systematic “knowledge management” should be established and expanded. Manufacturing companies have similar experiences, processes and problems. In order to meet the challenges of digital change and to organize a regular exchange of experience, the bundling/clustering of companies is necessary. Experience has shown that there are reservations about the exchange of experiences, especially among medium-sized companies within a sector, since there are significant competitive relationships here. Today, however, small and medium-sized enterprises must think far beyond their own company and in terms of synergy effects instead of competitive categories. The targeted establishment and expansion of industry clusters, therefore, make sense in order to accelerate the process of digitalization. BiH already has several regional and local cluster initiatives (e.g. Metal Cluster at the University of Mostar, as well as several initiatives by local and regional chambers) that could take on the role of a platform for the exchange of experience.

Although BiH has numerous innovative ICT service companies, most of them work for foreign customers. Initiatives should be launched here to support the development of innovative start-ups from the ICT environment. Supporting corporate networks and clusters also makes sense

in the ICT business environment. The ICT association Bit Alliance is already an industry association for the ICT industry. The initiation of cross-cluster events by bringing together cluster initiatives at the production industry level with industry associations from the ICT sector can contribute here to supporting the digital transformation process of manufacturing companies.

6.4 POSSIBILITIES FOR COOPERATION WITH RELEVANT LOCAL/ REGIONAL/INTERNATIONAL PARTNERSHIPS AND PLATFORMS

Collaborative partnerships offer the opportunity to develop, transfer and/or implement innovative outputs and/or engage in intensive dissemination and exploitation activities of existing and newly developed products or innovative ideas in different areas relating to the metal industry. In this study we will consider two categories of possible cooperation with relevant local/regional/international partnerships:

- partnership with companies in the local/regional/international area, and
- partnership in a platform.

Partnership with companies

Business partnering is the development of successful, long term, strategic relationships between customers and suppliers, based on achieving best practice and sustainable competitive advantage. In the business partner model, HR professionals work closely with business leaders and line managers to achieve shared organizational objectives. In practice, the business partner model can be broadened to include members of any business function, for example, Finance, ICT, HR, Legal, External Relations, who act as a connector, linking their function with business units to ensure that the technical, or functional, expertise they have to offer is placed within the real and current concerns of the business to create value. The benefits can be:

- Reduction of general costs: business partnering can be cheaper and more flexible than a merger or acquisition, and can be employed when a merger or acquisition is not feasible.
- Business partnering increases “competitive advantage”. The direct benefits of business partnering consist in greater competitive advantage through cooperation (the co-operative advantage) and even better opportunities of revenue, occupation and investment in the sector of application.
- Business partnering creates not a traditionally-based solidarity or “organic solidarity”, but a rational form of “mechanic solidarity”. Partnering takes a new approach to achieving business objectives. It replaces the traditional customer-supplier model with a collaborative approach for achieving a shared objective. Essentially, the partners work together to achieve an agreed upon common aim whilst each participant may still retain different reasons for achieving that common aim.

Practically, for the BiH companies from the metal industry, partnership with the local/regional/international area can be realized:

- as a supplier of local/regional/international OEMs of big manufacturing companies;
- companies that can best be described as original equipment suppliers (OES), as they work in direct contact with metal or vehicle manufacturers to provide parts for the production lines, and often in turn use smaller sub-suppliers;
- small to medium-sized businesses that produce components mainly for the after-market (replacement parts) or operate as sub-suppliers;
- making a joint-venture with international companies, with production facilities located in BiH due to the low-cost efficiency.

At the same time, the collapse of international supply chains due to the pandemic offers good opportunities for BiH suppliers, provided they are willing to invest in new technology and know-how, in order to adapt to the new requirements.

Partnership in a platform

Partnerships support a wide and flexible range of activities in order to implement innovative practices, promote development and modernization of organizations, and support policy developments at the European, national and regional level. Strategic partnerships can be of different sizes, and adapt their activities accordingly. In simplified terms, partnerships enable participating organizations to gain experience in international cooperation and to strengthen their capacities, but also to produce high quality innovative deliverables. Companies that are willing to make partnership in the platforms need to participate in a cluster association, chamber of commerce, citizens' associations etc.

In that case, the cluster organization can also make local/regional/international partnerships with other cluster organization in order to create benefits for their members. As mentioned above, there are several examples of clustering in BiH. The Metal cluster at the University of Mostar bears mentioning again here. The section below provides ideas on the types of activities that can be carried out within a strategic partnership for either promoting a cross-sectoral cooperation or addressing the following:

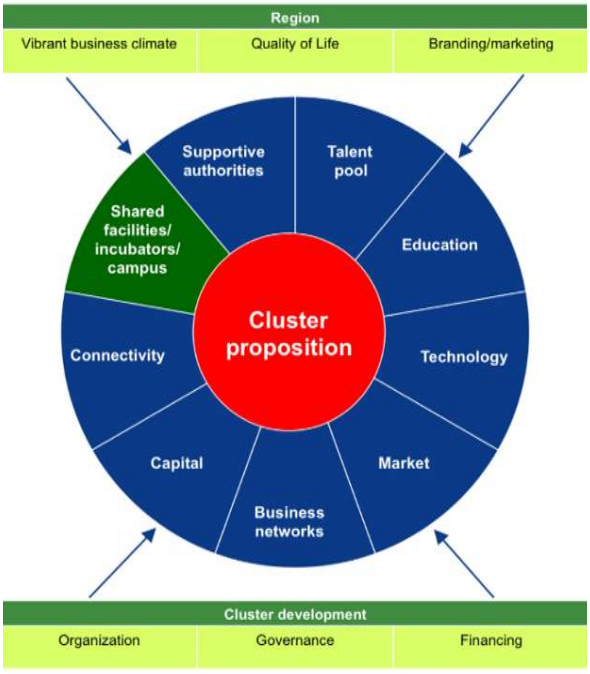
- organizing joint fairs, B2B meetings, round tables, study programs, etc.;
- learning, teaching, training;
- transfer of know-how, transfer of technologies;
- project-based collaboration, peer-learning, workshops, virtual laboratories, virtual collaboration spaces;
- capacity building and networking activities;
- elaboration and implementation of strategic cooperation plans;
- information, guidance, coaching and counselling activities;
- surveys, comparative analyses, evidence-gathering, studies of real-life cases;
- definition of qualitative standards and competence-based/occupational profiles;
- more domestic or mix of domestic and international companies to produce one single product and that product can be placed on third markets.

Clusters, chambers, and associations as business networking are different yet linked initiatives. Business networks are agglomerations of interconnected companies and associated institutions. Firms in a business network produce similar or related goods or services and are supported by a range of dedicated institutions located in spatial proximity, such as business associations or training and technical assistance providers. Networks are alliances of firms that work together towards an economic goal. They can be established between firms within clusters but also exist outside clusters. Networks can be horizontal and vertical. Networks can be classified as:

- **Horizontal networks** are built between firms that compete for the same market, such as a group of producers establishing a joint retail shop.
- **Vertical networks**, particularly supplier development schemes, are alliances between firms belonging to different levels of the same value chain, such as a buyer assisting its suppliers for upgrading.

Clusters, chambers, associations, etc. and their innovation actors are an important lever in this approach. Industrial excellence tends to be concentrated regionally and specialized clusters and business networks provide an opportunity for SMEs to better access innovation sources and new geographic markets.[9]

Figure 54: Cluster proposition, source: BCI Global – Innovation and Cluster Development



A closer cooperation between business network organizations (that manage joint activities, facilitate networking and provide or channel specialized and customized business support services to specific groups of SMEs) and technology centres improves the business environment for SMEs and maximizes synergies, as both types of organizations give SMEs better access to innovation support and funding. This can lead to a cross-fertilization process and contribute to a wider spreading and diffusion of R&D results and innovation excellence, strengthening European leadership in industrial value chains and at the same time fostering regional economic convergence. Such closer interregional collaboration among regional clusters, technology centres and universities around specific industrial activities can open up new opportunities for SMEs across all regions in Europe. SMEs in less developed or less

[9] http://bookshop.europa.eu/en/the-concept-of-clusters-and-cluster-policies-and-their-role-for-competitiveness-andinnovation-pbNBNA23591/

innovative regions or clusters have the chance to increase their relative industrial competence, innovation uptake, productivity and value added, and through these improvements take their sector and cluster to a higher competitive positioning. Simultaneously, SMEs in more competitive regions or clusters can take advantage of new innovation sources and greater demand, expanding the value creation along value chains. This approach enables more and better matching of innovation solutions, on the one hand, and challenges, on the other hand, amongst actors from different regional clusters thus enlarging the scope for joint business projects and value chain linkages, which are often underexploited. Regions that are able to master complexity by combining the strengths of different innovation actors (e.g. through fostering cross-sectoral collaboration within their region and with other regions) can open up new avenues and opportunities in niche markets and thus emerging industries are normally more economically resilient and show dynamic growth. Being anchored in dynamic regional clusters of related industries and being integrated in global value chains at the same time is the key to success in order to be able to benefit from industrial transformation changes.

Even more than larger firms, SMEs depend on external sources of information, knowledge, know-how and technologies in order to build their own innovative capability and to reach their markets. Although different types of SMEs have different needs, all must be connected to the most prolific sources of new knowledge and expertise, either directly or through multi-layered networks that link highly innovative firms to others at the regional, national and global level.

Key policy recommendations for Bosnian-Herzegovinian companies for partnership in a platform:

- **Improve SMEs access to information about networking opportunities**
  This will require co-operation among all stakeholders (including SME associations, public agencies and intermediary organizations) to correct deficiencies in existing sources of information. Strengthen international linkages between national and regional hubs of relevant information flows.

- **Participation at fairs**
  This means more companies can participate at a domestic or international fair with a common stand, under one representative name, such as “The Bosnian-Herzegovinian Metal Industry”.

- **Organizing B2B or similar types of events**
  This means that companies can organize domestic or international B2B meetings in one business network (e.g. Metal cluster B2B events) between more business networks (e.g. Metal and ICT Cluster B2B events), as domestic or international networking (e.g. Bosnian, Macedonian, German, Austrian Metal clusters B2B events or mix including ICT clusters or others).

- **Special business events**
  The network association can organize special business events for members that can teach them about the new modern trends in their sector as well as invite some re-nominated companies for matchmaking.

- **Increase participation of SMEs in research networks and technology markets**
  This includes greater SME involvement in existing (regional, national and global) public-private partnerships that connect science to innovation.

- **Support the emergence and maintenance of innovative business networking**
  Help local actors implement strategies from the cluster, chamber, association, etc., primarily through schemes to stimulate collaboration between public and private research institutions, improve the availability of market information and strengthen co-operation among firms, for instance in the fields of market intelligence, design and branding, and technological and human resource development.

- **Identify and promote best practice policies which support company innovation through cluster/networking development**
  Encourage exchange of experiences at the national and international levels, especially regarding governance structures and evaluation of cluster initiatives.

- **Enhance SME awareness and knowledge of all elements of the intellectual property system**
  These include patents, trademarks, industrial designs, utility models, trade secrets, copyright and related rights, plant varieties and non-original databases. Improve the teaching of intellectual property rights at universities and training institutions for entrepreneurs, engineers, scientists, designers and business managers.

- **Strengthen the integration of intellectual property issues in programmes and policy initiatives aimed at fostering innovation in SMEs**
  This will require greater interaction between intellectual property offices, SME support institutions, business associations, and national, regional and local governments.

- **Preparation of one product under one identify name (e.g. “Metal Bosnian” products)**
  Companies from several business networks (metal cluster, ICT chamber of commerce, automotive association) will produce one join product in the supply chain under one name that they will deliver to other geographic markets (Austria, Germany, Slovenia, Italy, etc.).

Focus should be on what companies need to do and, even more importantly, on how it is to be done, based on their competitive strengths and considering all the changes that are happening on the relevant markets as well as current trends and opportunities (as described previously) and how support from various sources (donors/government) can be helpful.

BiH companies from the metal industry need to develop marketing as an activity in their company in order to be recognized as a potential supplier or partner to companies from the geographic markets of Slovenia, Germany, Austria, Italy etc. They need to carry out complete market research based on secondary data in order to identify the geographic markets. They need to prepare company profiles, presentations, improve web sites, creating profiles on B2B social networks (e.g. LinkedIn and Xing), and support participation (or even only visits) to relevant international fairs and online B2B meetings.

Another important topic is the implementation of quality management standards, like DIN ISO 9001, 14001 (environmental quality norm), IATF 16949 (quality management system for the automotive industry), technical standards (e.g. CE mark - Self-declaration by the manufacturer that its products comply with the applicable EU requirements set out in the Community harmonization legislation) for relevant export products as well as improving business processes (e.g. LEAN, Six Sigma, Kaizen, etc.) in order to improve competitiveness required from the customers/partners.

Bosnian companies need to improve their competitiveness in the areas of digitalization, implementing IT solutions for improving their production and adapting the production with

new equipment regarding the Industry 4.0., as well as continual investment in new equipment, technologies, transfer of know-how and education of employees, in accordance with the requirements from customers and all in order to be more competitive on the geographic markets.

A challenge for Bosnian metal companies is development of a new products and the possibility of several companies producing one product in the value/supply chain under one name to export to the geographic markets.

All of these needs correlate with access to finances. Therefore, companies should get support from the government or donors who want to develop this sector in BiH through the transfer of knowledge and experience:

- how the companies should apply to EU projects to access the finances needed for the development of the companies;
- how the companies can manage financial activities with the local/domestic banks;
- how the companies can use cheap credit lines to support their development;
- how the companies can have stable cash flow.

On the other hand, if the companies have adequate finances, all of the aforementioned activities can be realized by local consulting companies that have good experience with managing activities in the metal sector and foreign experts who will work directly on certain issues in the companies, in order to adapt to the needs of customers. It is also possible that customers from Germany, Slovenia, Italy or Austria are willing to develop their suppliers from Bosnia by providing support with their personal capacities in order to have suppliers with good know know-how and modern equipment from the best-cost (low-cost) country located close to the customer.

Short summary

- As a result of COVID-19, almost the entire Eurozone has fallen into economic recession.
- Supply chains in the manufacturing sector, especially those of the target customers important to the BiH metal industry, have been severely impaired or have even collapsed.
- As a result, many manufacturers are concentrating on reducing their dependence on a few suppliers.
- Nearshoring of supplier products is gaining in importance.
- Increasing requirements for suppliers to adapt to digital business processes.
- Digital networking between manufacturers and suppliers is gaining in importance.
- Organisational changes within the companies are needed (optimisation of business processes).

7. MARKET ENTRY/ PENETRATION STRATEGIES

7.1 GENERAL ASPECTS OF A NEW MARKETING STRATEGY FOR BIH METAL COMPANIES

The metal processing industry is of great importance for the BiH economy and it has a long tradition of enabling sustainable development of various value-added businesses, in particular, those that are export-oriented. According to the economic strategy set by the BiH government, the metal industry is a strategic industry with comparative advantages. The government supports both foreign and local investors to establish new companies or to transform existing companies to produce higher value-added products, using domestic semi-finished products.

The global crisis has particularly affected the metals sector because it is export-oriented. Export orientation has become the solution for many companies that are trying to reutilize and upgrade their former capacities. In spite of significant imports as well, the trade balance for the sector as a whole is positive.

The manufacturers of basic metals are large firms (mostly private), producing:

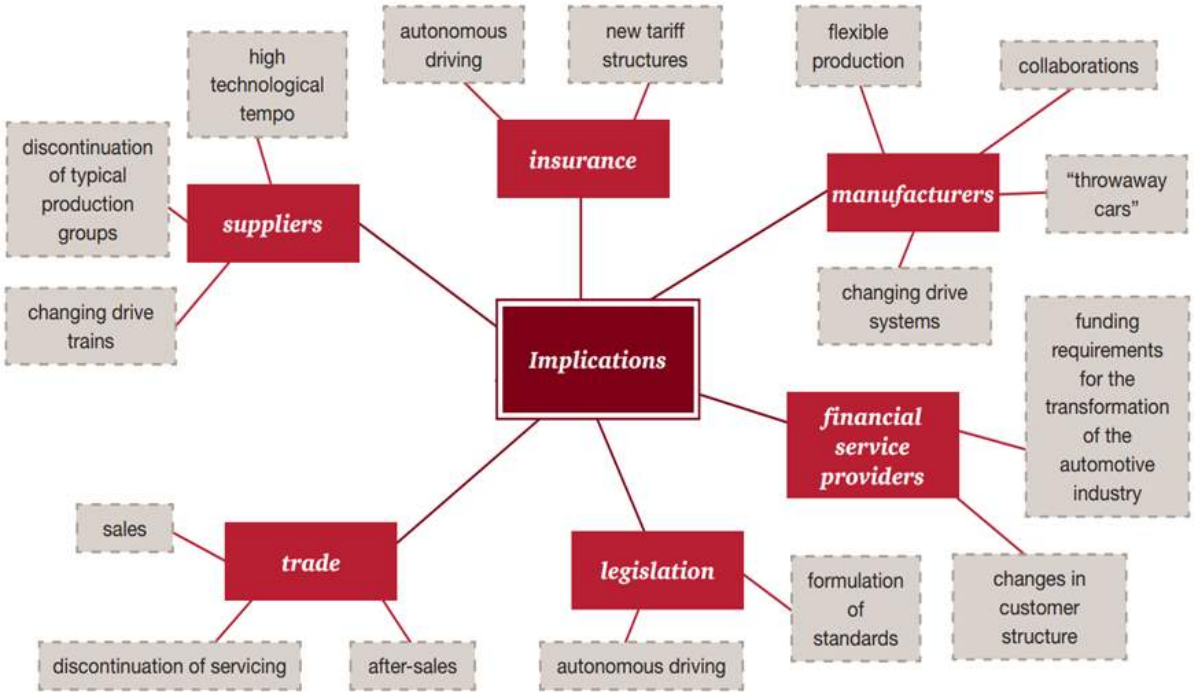
- basic iron and steel, ferro-alloys and aluminium;
- basic precious and non-ferrous metals, etc.;
- large range of different products (sheets, bars, tubes, strips, etc.).

Medium-sized and small companies are more specialized and customer-oriented, characterized by higher stages of metal processing and by manufacturing of various metal products, such as:

- casting of metals (grey and ductile iron, aluminium, brass, etc.);
- forging, pressing, stamping and roll forming of metal;
- treatment and coating of metals;
- precision turning, milling, forming;
- manufacturing of pressure vessels - boilers, heat exchangers, condensers, columns, etc.;
- manufacturing of steel structures;
- manufacturing of components and parts for the automotive industry, etc.

The value chain effects on the metal industry are presented in the picture below:

Figure 55: Value chain effects on metal industry, source: presentation during the Automotive Conference SEE 2019 in Belgrade)



The impacts on the mechanical and automotive supplier industry and the architecture of whole industry changes are:

Impacts on the mechanical and automotive supplier industry:

- worldwide service support
- smart factory services/engineering topics/digitalization
- augmented reality solutions

Architecture of whole industry changes:

- more work volume, more chances and new business opportunities
- need for more IT specialists and software engineers/developers for customer related solutions

Topics for structural change/transforming of the metal and automotive industry are:

- Engineering/technical issues:
  - digitalization of value creation process
  - autonomous cars
  - connected cars | network infrastructure | digital services
- Globalization/business model:
  - global platform strategies
  - local content/regional value
  - change in CRM and services

7.2 DETAILED ASPECTS OF A NEW MARKETING STRATEGY

- **Digitalisation – a mega-trend that must be adopted**

With regard to the internal organisation, as well as the organisation of cooperation with customers, there is a clear trend towards digitalisation, as already described elsewhere. COVID-19 has further accelerated this trend. The long-term competitiveness of the BiH metal industry will depend above all on making the inter-company processes in the supply chain faster and more efficient. This will only succeed through the use of modern software technologies that also enable digital data exchange with customers. The BiH metal industry still has a lot of catching up to do in this area. It is important to use the competences already available in BiH. There are ICT networks and clusters in the Banja Luka region and in Mostar that can help modernise the BiH metal industry. Appropriate networking at the cluster level would be promising here.

- **Quality management and optimisation of business processes**

There is also a need for many companies to catch up in the area of quality management and compliance with corresponding international norms and standards. The topic of quality management will therefore continue to be a component of support for the BiH metal industry. This also affects internal organisation because quality management and optimisation of production and business processes are not only important to meet customer requirements, but are also a prerequisite for implementing digital solutions in the company. Only process optimisation makes it possible to go down the path of digitalisation.

7.3 MARKETING STRATEGY - FINDINGS

- **Development of a unique selling proposition**

A market penetration strategy is normally defined as a growth strategy to extend the market share on well-known markets with the current product. Regarding structural change, this option is very difficult to realize for BiH metal companies. By using this strategy, the companies will stay in a cut-throat competition. It is better for BiH companies to follow the technological change and to build up a preference strategy step-by-step by developing a “Unique Selling Proposition”.

This means that companies must research and analyse technological developments in their individual product areas in detail. It is advisable to establish and expand development partnerships with client companies. Using the example of product groups with the highest export opportunities described in the previous chapters, clear technology trends could be identified.

In addition, development partnerships with universities, research and development agencies as well as regional companies in the sector are a good idea. It would also be possible, for example, to establish industry alliances. Approaches to this have been developed in recent years at the University of Mostar. A metal cluster was founded here in 2019 under the leadership of the Faculty of Mechanical Engineering. Both the university and the cluster

have numerous national and international partnerships with other universities. This network structure must be used to pick up on current technology trends.

- **Optimisation and adaptation of the marketing-mix**

In addition, the marketing mix should be adapted to the strategic goal “preference strategy”, as the building of a Unique Selling Proposition. This requires the use of modern marketing instruments in direct and indirect sales. Although many companies already have a multi-lingual, well-designed website, there is a lack of strategic use of social media marketing instruments. New visualisation techniques such as virtual reality, augmented reality, etc. are hardly used. With regard to the defined target markets, it is also advisable to produce marketing materials and websites in the language of the target country.

Short summary

As a result of COVID-19, almost the entire Eurozone has fallen into economic In the long-term, the BiH metal industry can only maintain or expand its market position if the companies adapt their current strategies to the demands of the markets. Up to now, the market success of BiH metal companies has mostly been based on good product quality at favourable prices. Differentiation in terms of products and services from international competitors is not sufficiently developed. The BiH metal industry is therefore in need of a qualified workforce that will migrate abroad, so that in the medium-term wages will also have to rise and with them the supply price. The way out is the gradual development and expansion of technology-based products with simultaneous optimisation of business processes.
Therefore, the core elements of a successful marketing strategy for BiH metal companies are:

- development of a “Unique Selling Proposition”,
- optimisation of production and business processes,
- quality management systems,
- using of a modern marketing-mix.

ANNEX 1 RECOMMENDATIONS

(1) Information/Awareness raising

Most BiH metal companies are product-orientated. For the most part, they do not focus on market trends in the metal industry. Companies must become solution providers. Therefore, they have to improve their knowledge about market trends. Possible actions, which could be organized by economic development agencies, chambers of commerce, etc. could be:

- online/print publications and studies about market trends within the metal industry,
- (online) events, conferences, expert discussions,
- trainings (webinars) on technology trends, digitalisation, using new software, process optimisation, quality management, etc.

(2) Demonstration

Seeing best practice solutions is a good opportunity to demonstrate success by adapting to market changes. A good example is the “learning factory” at the University of Mostar, but also other projects in foreign countries. Therefore, study trips to visit companies with “best practice solutions” could be an option.

(3) Trainings in marketing

Most BiH companies do not have their own marketing departments with specialized staff. Business development management, marketing strategy, customer relation management are often not a priority for BiH metal companies. Therefore the offer of special training could be a good opportunity to upgrade the marketing skills of metal companies. This includes:

- market research,
- marketing strategy training,
- customer relation management,
- sales training,
- online and social media marketing.

(4) Technical trainings

As a precondition to adapt to market trends and to optimise production processes, a special training concept for (more) technical orientated training must developed. This includes:

- quality management systems (ISO Standards 9001, IATF 16949, etc.),
- Lean Production, 5S, Kaizen, Six Sigma, etc.,
- software trainings (CAD/CAM, ERP, CRM, etc.),
- introducing technical standards (e.g. CE norm, etc.).

(5) Consulting services

Experience shows that trainings must be accompanied by professional advice. Therefore, the following consulting services must be provided:

- individual export potential analyses,
- consulting in optimisation of business/production processes,
- implementation of digitalisation projects,

- marketing and sales support, especially coaching for sales and marketing staff,
- advice in preparation of (customer) audits.

(6) Support to get market access

To get up-to-date information about markets and to know potential customers, it is helpful to develop/extend the following activities:

- (online) B2B Events (buyer meets supplier),
- participation in (online) fairs,
- establishing a joint sales office in key markets (at least in Germany),
- development and implementation of an online export information portal (similar to GTAI – www.gtai.de).

(7) Networking (exchange of experiences)

Establishing national and international business networks is important to developing BiH metal companies. This includes:

- establishing of enterprise networks along the supply chain (vertical and horizontal),
- connecting established metal-cluster initiatives with ICT clusters (in BiH there are several established cluster initiatives within the ICT sector and the metal industry),
- development of an ICT service community (establishing topic-oriented working groups).

(8) Implementation/financing

Currently there are not enough opportunities for BiH metal companies to finance individual projects. Interest rates in BiH are very high in comparison to Western Europe. Furthermore, opportunities for investment promotion (to interest potential foreign investors) must be used. The following measures must be improved:

- financial support and project development,
- helping to find appropriate grants (e.g. from the EU),
- consulting service in project financing,
- investment promotion with special focus on the metal industry.

(9) Sustainable service development – economic development institutions

It is important to establish and expand a local service infrastructure for metal companies. This can be done through targeted support of local business development institutions. The following measures would make sense here:

- train-the-trainer workshops for employees of business development institutions,
- analysis and optimization of the services offered by business development agencies for metal companies,
- advice on optimizing the organizational and operational structure of business development agencies.

(10) Implementation of an international brand strategy for the BiH metal sector

The implementation of an industry marketing concept can be useful for attracting both potential buyers and investors in the metal industry in BiH. “Metal made in BiH” as a common brand for the BiH metal industry could be implemented, provided that appropriate marketing actions are carried out. The bundling of information and communication activities has the goal of providing strategically important target groups with information about the Bosnian metal industry, to establish new cooperation and business contacts, as well as to promote the “Bosnia and Herzegovina” image and brand as a location for high quality metal products and an attractive investment location.

ANNEX 2 INTERVIEWS WITH BIH METAL COMPANIES

Short summary of interviews with BiH metal companies:

The conclusion from the realized interviews is that companies have an interest in and a positive response to almost all the activities that were proposed by the author as a possibility for market entry/penetration of BiH companies in the geographic markets of Germany, Italy, Austria and Slovenia. The last part of the interviews was about the positive influence on the metal sector in BIH of companies entering new markets and/or to increase penetrations of the existing ones. Five of twenty interviewed participants answered these questions. Below are their answers:

- BiH attest of products to be valid for EU
- direct access to EU founds for purchasing new equipment,
- new foreign investment companies that will develop domestic/local companies,
- better communication between companies, cooperation in associations and clustering,
- direct access to EU founds; preparation of EU projects; support and information about EU projects.

Review of market entry strategies through interviews with BiH companies

The purpose of this study is to offer the metal sector in BiH opportunities to enter new markets and/or increase penetration of existing markets. The questionnaire is designed to gather solid information to provide policymakers and economic development stakeholders with a basis for developing effective support measures. The questionnaire was filled out by 20 companies from the BiH metal sector via phone/online interviews. Filling out the questionnaire took about 10-20 minutes. The results will only published in an aggregated version.

The questionnaire is divided into four parts:

- General information about the participants;
- Short/brief explanation of the study, with the main the goals for receiving feedback information from the companies;

- General questionnaire information - strategies-activities for market entry/penetration by BiH companies in the geographic markets with the options:
  - I totally agree,
  - I agree,
  - I disagree,
  - I completely disagree.

- Comments from the participants, comments/information about the positive influence on the metal sector in BiH, in order for the companies to enter new markets and/or to increase penetration of existing markets.

The following companies participated in the interview:

- ALPRO, Vlasenica (www.alpro.ba)
- ARMAKO, Prnjavor (no website available)
- E* ****S (company do not want to be mentioned in the study)
- ENKER, Tešanj (www.enker.ba)
- HERCEG, Srebrenik (https://dooherceg.ba)
- Hidraulika Flex, Laktaši (https://hidraulikaflex.com)
- INOX Ajanovic, Jelah (https://inox.ba)
- MAHLE, Laktaši (www.mahle.com)
- METAL CLUSTER (at the university of Mostar - http://fsre.sum.ba)
- METAL (https://metal-teslic.com)
- METALAC MBM, Derventa (no website available)
- MIVIKO, Posušje (https://www.miviko-cables.com)
- PLAMINGO, Gracanica (www.plamingo.com)
- Pobjeda, Tesanj (http://pobjeda-tesanj.com)
- SIK STEEL CONSTRUCTION, Mostar (www.sik.ba)
- TDM GROUP, Gradačac (www.tmd-group.ba)
- TIKT, Gradiska (www.tikt.de)
- TOPLING, Prnjavor (www.topling.com)
- TT Kabeli, Široki Brijeg (www.ttcables.com)
- VENDOM, Laktaši (www.vendomdoo.com)

The results from the interviews with 20 persons from the companies are shown in the table below:

Figure 56: Questionnaire/interview with BiH metal companies

Questions/rates	I totally agree	I agree	I disagree	I completely disagree
1. Marketing: market research (for individual companies), based on secondary data, in order to identify the most attractive markets and importers - potential buyers and their contacts, preparing company profiles, improving web sites, creating profiles on B2B social networks (e.g. LinkedIn and Xing), support participation (or even only visits) to relevant international fairs and online B2B meetings.	13	7		
2. Opening a regional branch office located in Germany that will represent BiH companies (in Germany, Austria, Slovenia and Italy), in order to attract new markets, R&D, transferring of know-how and helping BiH metal companies to participate at fairs located in the mentioned countries.	8	9	3	
3. Implementation of ISO Standards (9001, 14001, IATF 16949) required from the customers.	18	2		
4. Introducing technical standards (e.g. CE mark) for relevant export products	17	2	1	
5. Improving business processes (e.g. LEAN, Six Sigma, Kaizen…) in order to improve competitiveness	16	4		
6. New product development (or improving existing products)	8	11	1	
7. Possibility of several companies producing one product in the value/supply chain under one name and export to other geographic markets.	5	12	3	
8. Digitalization – IT solutions for improving production (and whole business) planning and management.	14	5	1	
9. Investment in new equipment, technologies, transfer of know-how and education of employees in line with requirements from customers.	13	7		
10. Using a foreign consultant and experts that will work directly with the companies in order to open a new market and develop their companies and capacities in line with customers' requirements.	11	7	2	
11. Organizing advance training for employees in the areas of: management, financing, purchasing, logistics, production, quality, etc.	9	11		
12. Adapting BiH company's production to the industry 4.0.	10	9	1	
13. Access to financing for the purpose of normal cash flow in order to realize activities (investments in new equipment, participation at fairs, B2B meetings, etc.)	13	5	2	

ANNEX 3 INTERVIEWS WITH INTERNATIONAL COMPANIES

(Concerning their view on the current market situation in the metal industry – requirements for potential supplier)

As part of the study, a number of German companies were also interviewed regarding their assessment of market developments in the metal sector. The focus of the interviews was on the requirements that international suppliers of metal products must fulfil in order to be considered as a supplier. A total of 5 companies and the BME were interviewed.

Below is a brief profile of the companies interviewed and a summary of their responses:

Gerima GmbH, St. Wendel (Germany),
Quality management and purchasing Department

The company is active in the development and production of chamfering machines, which are used in mobile crane, rail vehicle, container and ship construction as well as in plant and pipeline construction. The main application is the preparation of welding bevels for optimum weld seam preparation. Other areas of application include the preparation of optical chamfers, functional chamfers and edge rounding for subsequent painting or coating. The pipe cutting and chamfering machine is used to cut thick-walled pipelines in explosive areas such as oil and gas platforms and other EX-protected areas.

Potential supplier products:

- high-precision turned and milled parts in small quantities,
- services in metalworking and surface treatment of metals.

The company was only slightly affected by the COVID-19 crisis. Subcontracted parts are mostly procured within Germany.

To open up new markets, metal companies from BiH should invest more in modern production technology. The knowledge of the application of the supplied parts must be understood also on the part of the supplier. Therefore, it is not only the price that is important, but also delivery reliability, dependability and knowledge about the application of the supplied parts. A representative office or a direct contact person would be desirable.

Atlas Copco, Essen (German),
Marketing Department

Atlas Copco is a global industrial company headquartered in Sweden. Atlas Copco employs around 39 000 people worldwide. It is headquartered in Stockholm, Sweden. The company

has customers in more than 180 countries. As a technology-driven company, Atlas Copco offers mainly:

- vacuum and pollution control solutions, especially vacuum pumps,
- industrial tools and assembly systems.

As a global company, there were sometimes shortages of supplier products.

From the company's point of view, the following is important for BiH metal companies:

- concentration on market-oriented special applications,
- high level of engineering know-how,
- guarantee of quality and delivery reliability,
- quality management systems.

Bühler Technologies, Ratingen (Germany),
Purchasing Department

Buhler is a medium-sized company with about 150 employees. Its main area of activity is measuring and control equipment for fluids and gas. The company has a low vertical range of manufacture and is therefore globally networked in procurement.

No information was provided regarding supply bottlenecks or sales declines in the context of the COVID-19 crisis. The annual purchasing volume amounts to around EUR 12 million. The following products are supplied:

- stamped- bent parts,
- turned and milled metal parts,
- metal housings,
- screw fittings,
- filters/ filter elements.

Goals in purchasing are:

- quality (supplier must have an appropriate management system),
- security of supply,
- technical understanding of the products used,
- possibilities for cooperation on product development level,
- traceability of supplied parts.

Minimax GmbH & Co. KG, Bad Oldesloh (Germany),
Purchasing department

Minimax is among the world's leading brands in fire protection. Today's Minimax Viking Group generates annual sales of EUR 1.7 billion and employs 9300 people worldwide. Headquartered in Bad Oldesloe, Germany, the group maintains several of its own research, development and manufacturing facilities. Whether in automotive plants, power stations, logistics centres,

and office and administration buildings, data centres or on ships wherever fire hazards arise, Minimax supplies customized solutions and is also available with a comprehensive range of services after the fire protection system has been installed.

The area of responsibility of strategic purchasing extends far beyond optimal supplier and conditions management. Intensive procurement market research, combined with intelligent material bundling and supplier-dependent innovation, is the basis for success. Minimax has been working with many suppliers for several decades.

Expectations of suppliers:

- a consistently high standard of quality,
- concepts that are competitive and market-oriented,
- competence, flexibility and reliability,
- the best service and reliability,
- innovation readiness
- compliance with all legal requirements, especially in the areas of occupational health and safety and environmental protection, as well as compliance with the Corporate Guidelines.

Stabilus GmbH, Koblenz (Germany),
Purchasing Department

Stabilus is one of the world's leading companies in gas springs for the automotive and the mechanical engineering industry. The company employs around 6000 people worldwide.

The following supplier products are in demand: high-precision turned/stamped parts, e.g. spindle, brackets, welded tubes, die cast parts.

Requirements for BiH metal companies:

- quality management system (at least DIN ISO 9001),
- technical understanding of the products used,
- consistently high product quality.

Association of Materials Management, Purchasing and Logistics e.V. (BME),
Eschborn (Germany)
Department for International Affairs

The German Association of Materials Management, Purchasing and Logistics e.V. (BME) is the trade association for buyers, supply chain managers and logisticians in Germany and continental Europe. The association currently has more than 9000 members.

According to the BME, future business models will be increasingly based on information and communication technologies such as social media, big data and networked systems such as Industry 4.0. The formerly clear-cut industry affiliation of companies is dissolving. This is transforming existing supplier structures into cross-industry partner networks. As a result, the design and management of new, cross-industry partner networks is becoming an increasingly critical success factor for companies. The resulting challenges require rethinking almost all areas of the company involved in external value creation.

EU4Business project in Bosnia and Herzegovina
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