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Sectoral Study on the Innovative Capacity and Potentials of Companies

Implementation of the IPA 2016 Support in the Sector of Competitiveness and Innovation “Local Development Strategies” – EU4Business project

Authors
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Skraćenice

BIH	Bosnia and Herzegovina
BAM	Bosnian convertible mark, international code
EU	European Union
EU4Business	EU funded Action “Local Development Strategies” in BIH
EUR	Euro, international code
FDI	Foreign Direct Investment
BDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GVA	Gross value added
ICT	Information and Communication Technology
ILO	International Labour Organization
IPA	Instrument for Pre-Accession Assistance
MERFI	Financial Audit Company, Sarajevo
MSME	Micro Small and Medium Enterprises
OECD	The Organisation for Economic Co-operation and Development
UNDP	United Nations Development Programme

INTRODUCTION

This study is one of the activities of the EU4Business project¹, whose main goal is to increase the competitiveness and innovation of the economy in Bosnia and Herzegovina (BIH). The project is financed by the European Union (EUR 15 million) and the Federal Republic of Germany (EUR 1.1 million), and implemented by GIZ, UNDP and ILO in cooperation with domestic institutions. EU4Business is a project that supports the development of the private sector in BIH. The direct beneficiaries of financial support are domestic companies, farmers and entrepreneurs. The project also contributes to the reform processes in BIH and the creation of a better business environment.

This project is a continuation of support for the development of the private sector in BIH and the provision of concrete assistance to small and medium-sized enterprises, farmers and young people who wish to start their own businesses.

GIZ is implementing a part of the EU4Business project aimed at supporting development in the export-oriented sectors, specifically by introducing innovations, improving innovative capacity, and digitising firms, in order to increase their competitiveness in both domestic and foreign markets. Funding priorities will be defined on the basis of the findings of the Sectoral Study on the Innovative Capacity and Potentials of Companies. This sectoral study, as part of the technical support provided by the project, identifies the most relevant needs among the companies.

This study has been structured so that after the first part of the introduction, we have a brief analysis of the macroeconomic context in which BIH is situated. The third part analyses the sectoral structure of the economy in BIH, and the fourth focuses on the selection of the processing industry sector with the greatest potential for improving competitiveness and increasing exports.

After the selection of the sector, in the fifth part of the study a comparative analysis is made according to the criteria of employment, export, profit, gross value added per worker and gross salary, where we can see the links between these selected sectors.

¹ EU4Business project - Action "Local Development Strategies" IPA 2016/037-889.7/Bosnia and Herzegovina/Local Development Strategies

The sixth part enters into a detailed analysis of each sector, analysis and projection of the subsector. The projection also applies to the next five years, until 2022.

Following the projections for each of the selected sectors, the seventh part analyses the export markets for the six countries that constitute BIH's largest foreign trade partners: Germany, Croatia, Italy, Serbia, Slovenia and Austria. The exports of BIH in each of these countries as well as the total markets of these countries are analysed here, in order to capture them in the form of movements in these markets.

The eighth part of the study talks about the innovative capacity of the economy, the general approach, and the characteristics identified as a result of the survey research. The ninth and final part of the study discusses the need to increase the competitiveness and innovation of the selected sectors. The needs of each sector are defined with a view to increasing their competitiveness and innovative capacity. This part also contains recommendations for the public sector in terms of improving the business environment, as well as certain economic support measures.

1. Macroeconomic Context

In the period before the global financial and economic crisis, growth rates in real terms in BIH exceeded 5%. However, the global economic recession has led to a decline in economic activity. After the 3% fall in GDP in real terms in 2009 and two years of crisis, with very modest growth rates, the economy in BIH did not record economic growth in 2012. In 2012, a 1% GDP decline occurred, which is a downward trend compared to the modest 0.8% in 2010 and 1% in 2011. In 2013 and 2014, modest growth was observed.

Table 1. Basic macroeconomic indicators in BIH, 2013-2017

Indicators	2013.	2014.	2015.	2016.	2017.
Nominal GDP (in millions of BAM)	26296.8	27258.7	28540	30389	31332
GDP, nominal growth rate (in %)	2.2	1.9	4.52	3.1	3.3
GDP, real growth rate (in %)	2.5	1.1	3.03	3	3.4
Population (estimate, thousands)	3832	3531	3521	3531	3518
GDP per capita (in BAM)	6862.4	7123	7473	8606	8941
Growth rate of industrial production (%)	6.4	0.2	2.6	4.3	3.1
Number of unemployed	552494	549607	541817	521357	487426
Number of employees	673135	684501	713608	725872	784094
Unemployment rate (official statistics)	45.2	44.5	43.2	41.80	38.33
Unemployment Rate (ILO)	27.5	27.5	27.7	25.4	20.5
Average salaries (in BAM)	827	830	830	838	851
Consumer prices (inflation in %)	-0.1	-0.9	-1	-1.1	1.3
Export of goods (in millions of BAM)	8380.3	8683.8	8987.2	10587.8	11054
Export of goods (growth rate in %)	6.6	3.6	3.5	7.1	3.4
Import of goods (in millions of BAM)	15169.8	16199.3	15851.7	15635.8	18134
Import of goods (growth rate in %)	-0.5	6.8	-2.1	2.8	4.3
Export Import Coverage (in %)	55.2	53.6	56.7	67.72	61

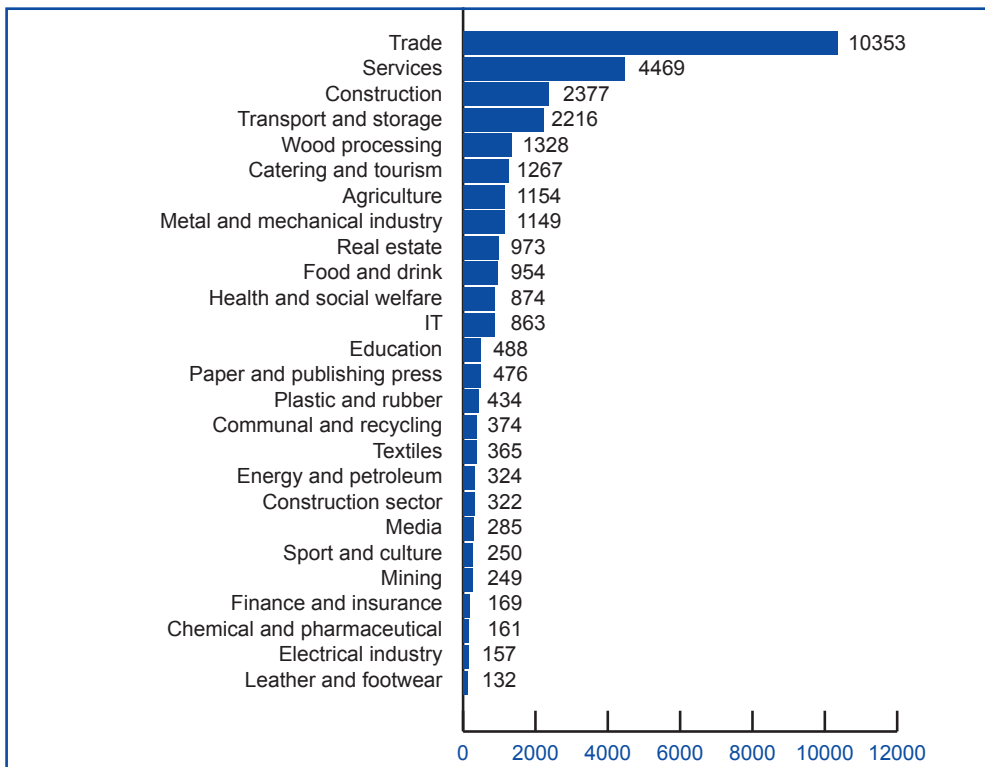
Source: Agency for Statistics of BIH

For 2015, 2016 and 2017, very positive trends were observed in this area. Growth in real terms was significantly higher than in the previous period, and this is the result of a strong economic expansion in the European Union. BIH's economy also recorded significant export growth and productivity growth, but overall economic growth remains below pre-crisis growth rates of over 5%.

2. Sectoral Structure of the Economy in BIH

In BIH, in 2017, there were 32,294 enterprises (companies). Since BIH has about 3.5 million inhabitants, this equates to 9.2 enterprises per 1000 inhabitants. If we compare this average with the average in Croatia, which has about 30 active companies² per 1,000 inhabitants, this reveals the extent to which BIH lags behind. This means that BIH should have at least three times more enterprises in order to approach the level of development of the least developed EU member state.

Chart 1. Number of companies by sector in BIH in 2017



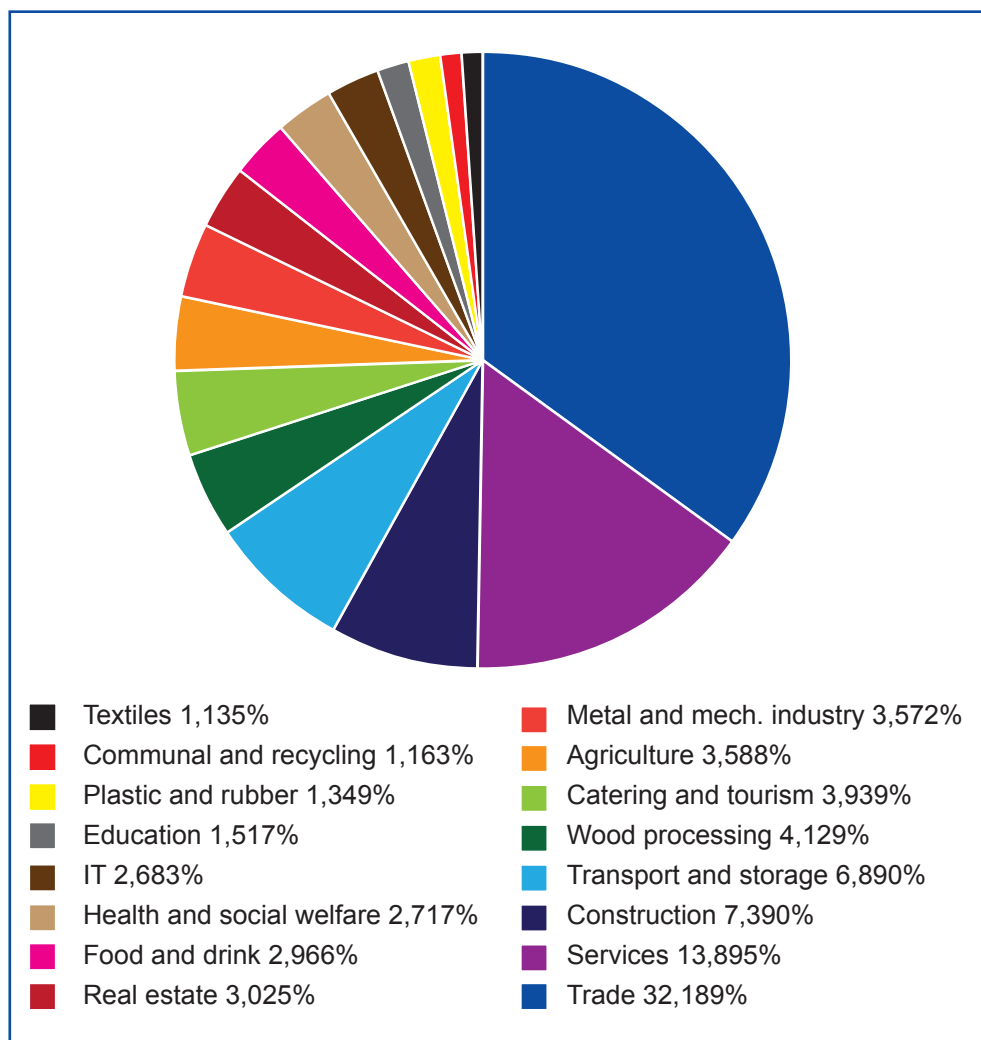
Source: MERFI, Financial Audit Company, Sarajevo

² Central Bureau of Statistics of the Republic of Croatia, "Release", No. 11.1.1./1., 09 May, 2018

As far as the sectoral structure is concerned, 32% of all enterprises are trade companies, followed by the services, construction, transport and wood processing sectors. Only one manufacturing sector appears in the top five sectors according to the number of enterprises.

When it comes to the manufacturing industry, most enterprises are in the wood processing sector (1328), the metal industry (1149), and food and beverage production (954). It is worthy of note that the Information and Communication Technology (ICT) has grown from 613 companies in 2013 to 863 in 2017.

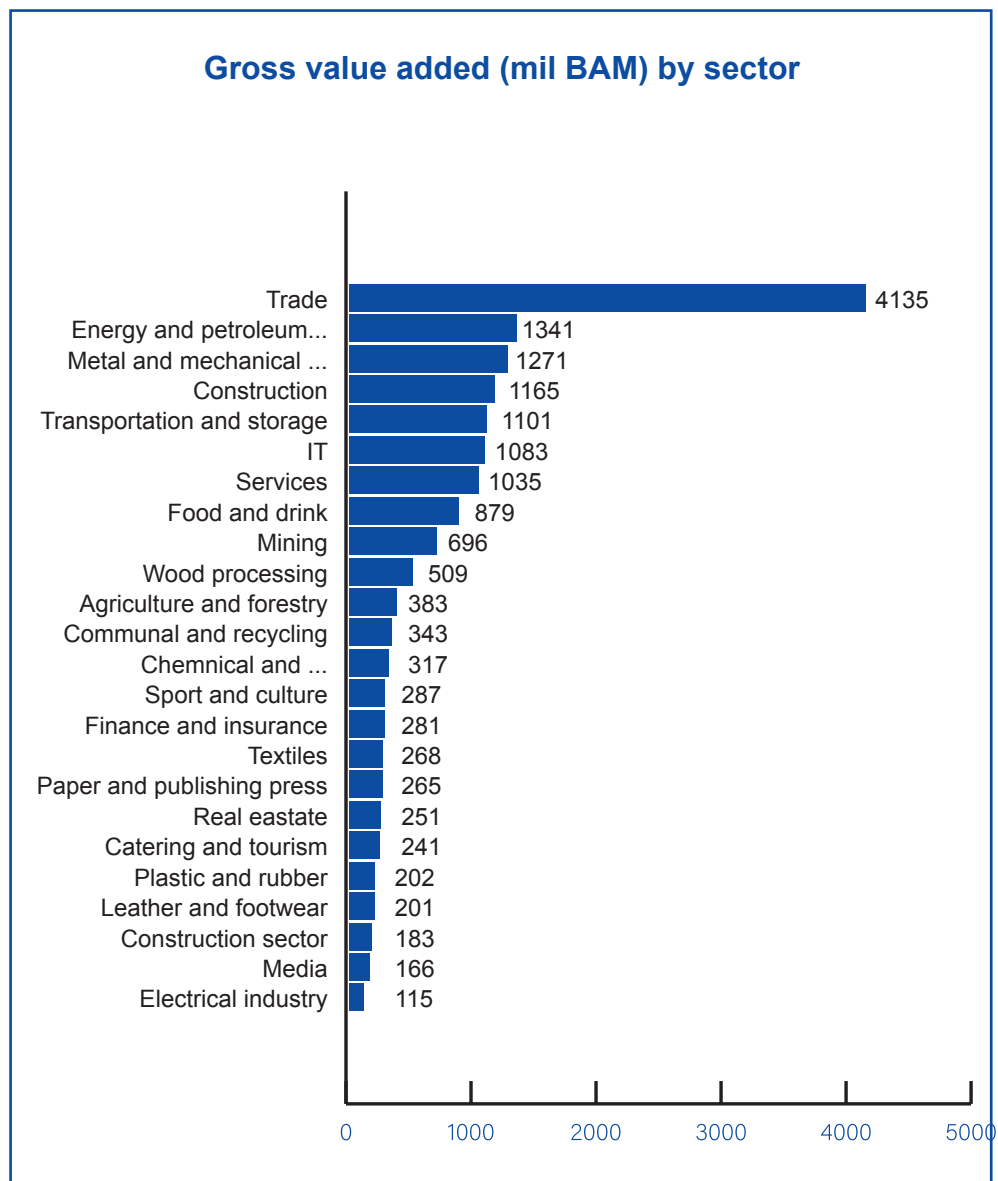
Chart 2. Structure by number of enterprises per sector in BIH in 2017



Source: MERFI, Financial Audit Company, Sarajevo

Data on the sectors with the highest gross value added are contained in Chart 3.

Chart 3. Gross value added in BIH in 2017, by sectors (in million BAM)

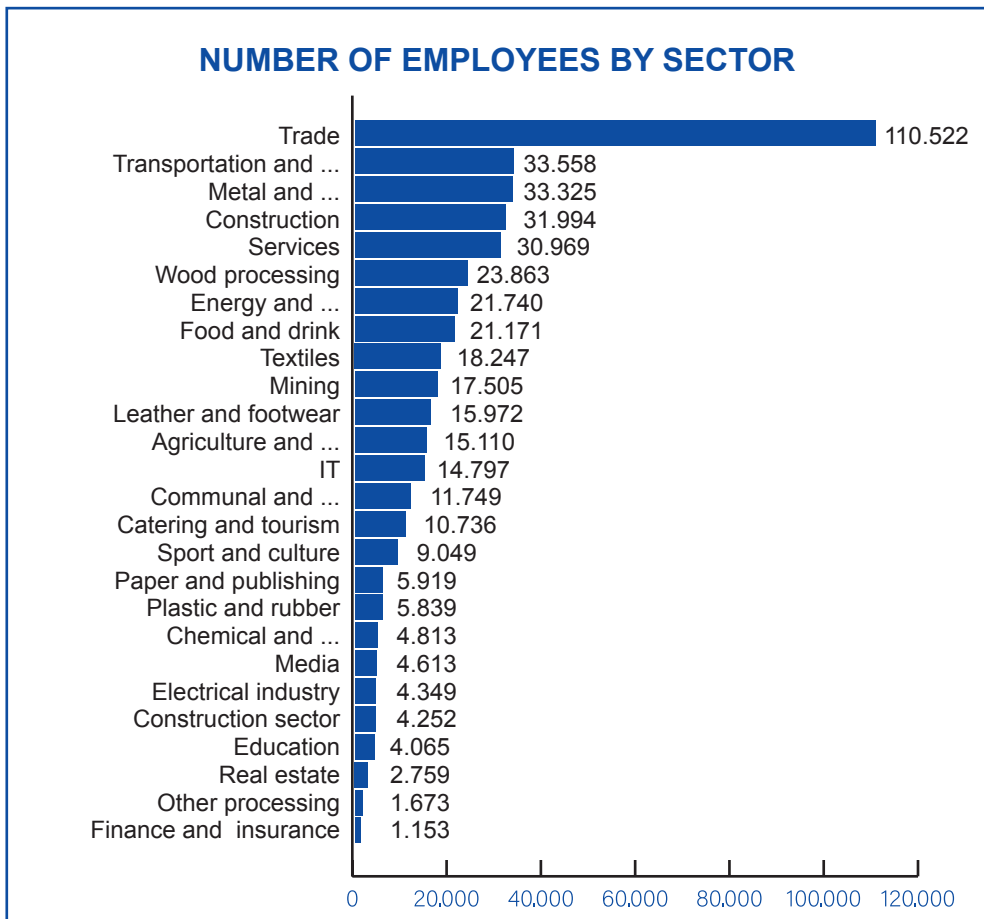


Source: MERFI, Financial Audit Company, Sarajevo

The largest share in the gross added value of the economy is held by trade with 24%, and the second and third are energy production (7.9%) and metal-mechanical industry (7.5%). Other sectors within the processing industry include food and beverage production with 879M BAM and wood processing with 509M BAM.

It is also pertinent to compare the size of each sector by the number of employees in 2017. After trade and transport, in the 3rd position, is the metal-mechanical industry with 33,325 workers, and within the manufacturing sector, both the wood processing sector with 23,863 and the food and beverage production sector with 21,171 employees fall behind these three.

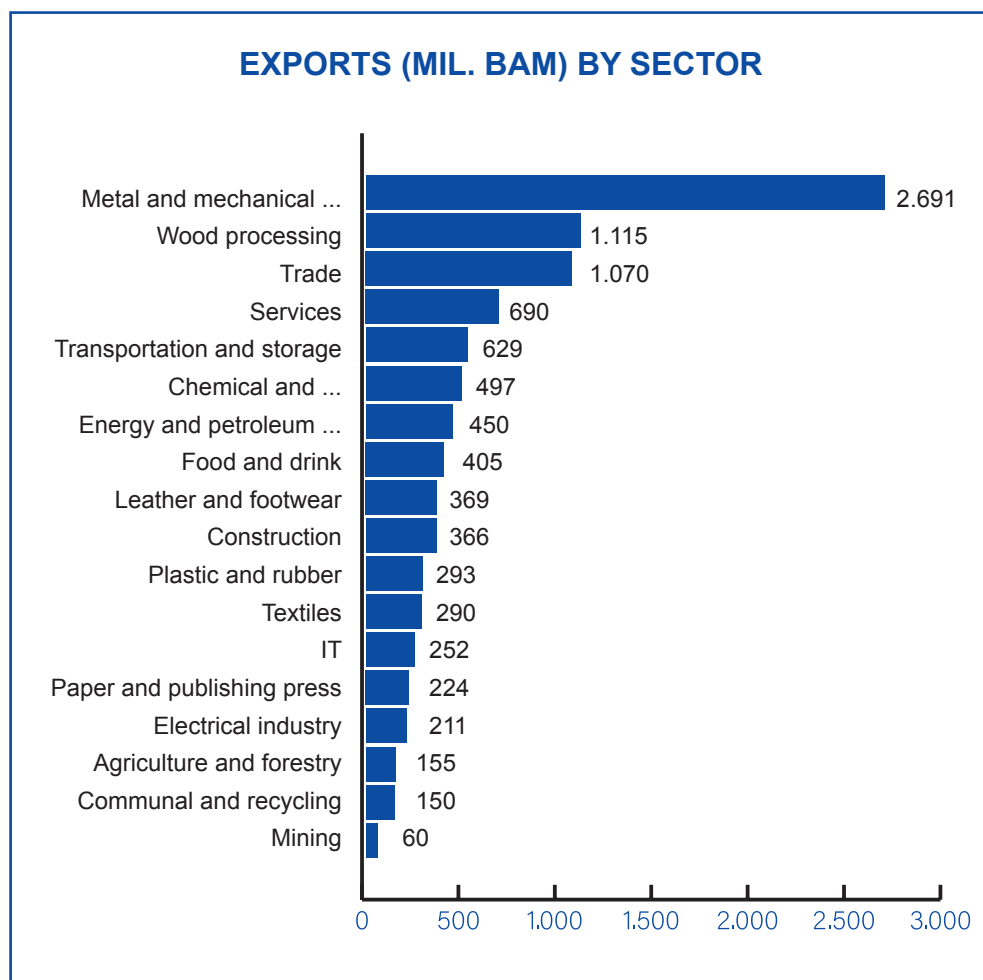
Chart 4. Number of employees by sector, 2017



Source: MERFI, Financial Audit Company, Sarajevo

Data on the sectors with the largest exports are contained in Chart 5.

Chart 5. Exports by sector, 2017



Source: MERFI, Financial Audit Company, Sarajevo

The economy's largest export share is provided by the metal and wood processing industries, followed by trade and services. The transportation sector provides services to foreign clients, and trade takes place with companies that export domestic products mainly from the metal, wood and food sectors. Other significant exporters include energy production, the food industry, and leather and footwear production.

Based on the profit margin data, we can only see if the sector is functioning successfully. So, here we see not only the quantity, but also the quality of their business.

Chart 6. Rate of profit by sector in 2017 (in %)



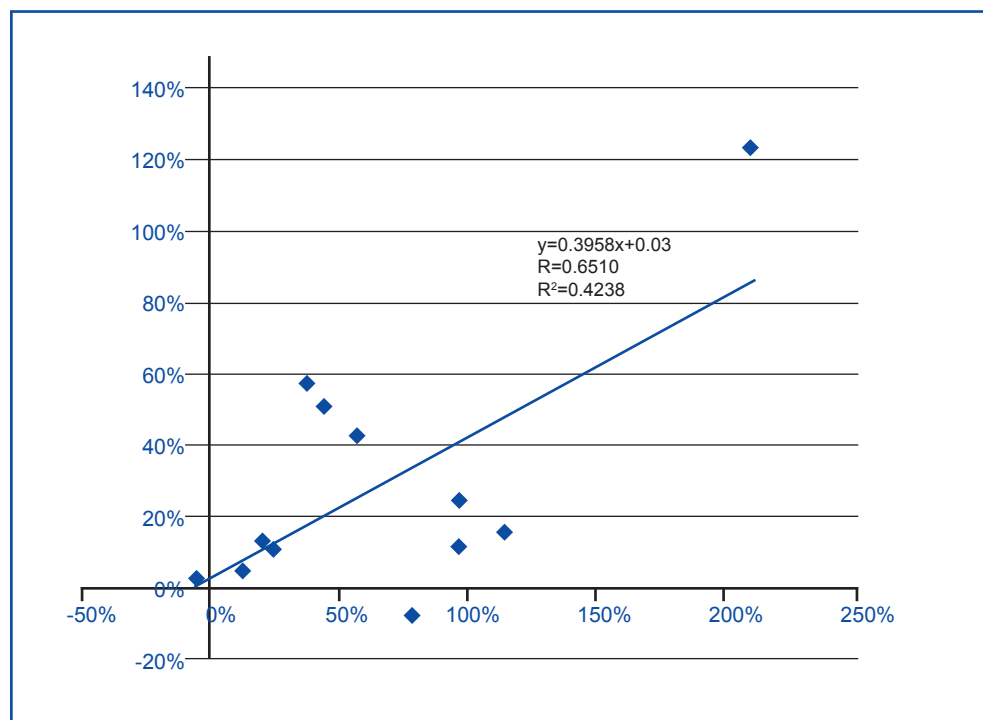
Source: MERFI, Financial Audit Company, Sarajevo

The profit margin is the first of the indicators that tells us about the quality and performance of the operations of certain sectors. We can see that the real estate and finance and insurance sectors have exceptionally high rates of profit. The first of the sectors with “average” rates is services, followed by construction, the chemical and pharmaceutical industry, and ICT sector. Within the manufacturing sector, the most profitable is the production of plastics. It is noticeable that all sectors with positive rates are gaining, which speaks in favour of the fact that the entire economy in BIH is currently in expansion.

3. Selection of the Processing Industry Sector

As we have seen in the previous section, the processing industry is crucial for increasing exports and crucial for increasing employment and salaries in the economy of BIH. This statement is statistically proven by the fact that in the chart below we see a statistical regression between the growth of exports as an independent variable and the increase in the employment as the dependent variable.

Chart 7. Regression and correlation between export growth and employment growth in BIH



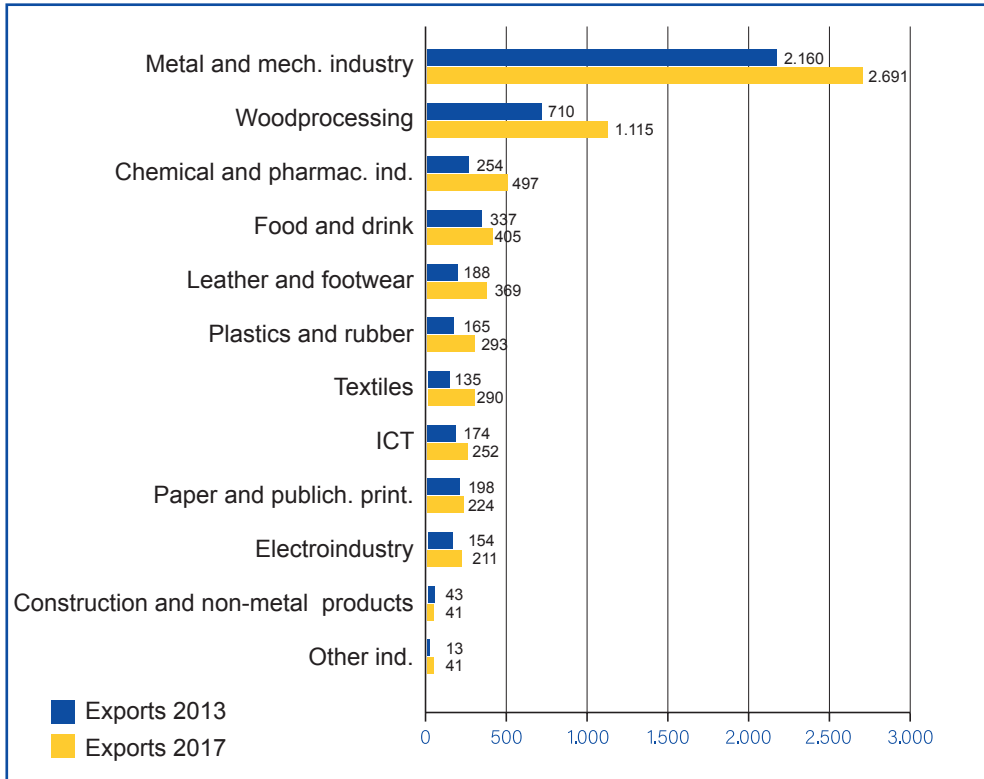
Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

The regression equation, as well as the correlation coefficient R and the determination coefficient R^2 , show a significant correlation between exports and employment: The higher the export value, the higher the employment value. Therefore,

the correlation coefficient R is 0.65 or 65%, and R^2 is 0.42 or 42%, which is a rather significant correlation between these two variables. This suggests that it is useful in BIH to work on increasing exports within the processing industry because this is one of the most important sources of new employment.

Therefore, we will focus on this part of the economy, but in this analysis, we will also include the ICT sector as one of the most dynamic economic sectors.

Chart 8. Exports within the manufacturing industry 2013- 2017



Source: MERFI, Financial Audit Company, Sarajevo

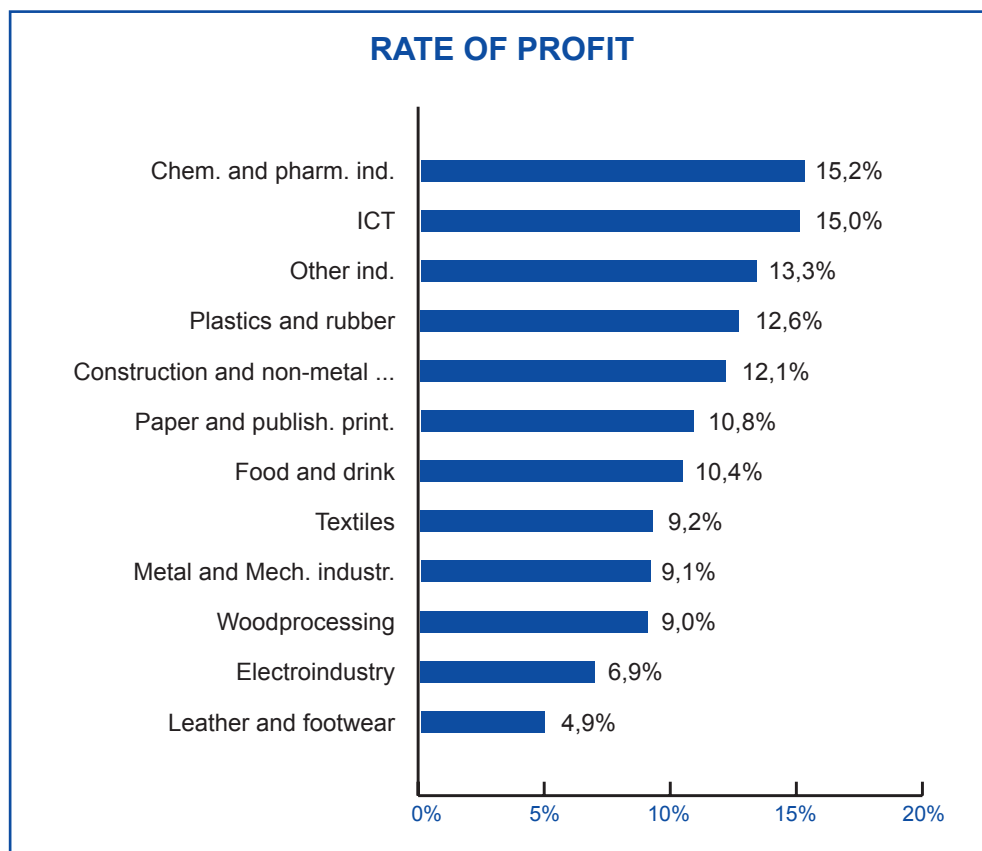
When considering only the manufacturing industry, we see that the metal and mechanical industry is the largest exporter and that it exported 531 million BAM more in 2017 compared to 2013. This means that it displays a high export growth rate of 24.6%. Wood processing is the next largest exporter: Compare its 2013 exports of 710 million BAM to the 1.115 billion BAM it exported in 2017, which is also a rise of 57%.

It is evident that in most sectors we have strong export growth: For example, the plastics processing and manufacturing sector has grown by a very high 78%. In other

sectors, too, we see a similar trend, indicating strong export growth in the period 2013-2017. This growth indicates that each of these sectors has significant export potential, so the key question is which of these sectors, or sector growths, is most useful for the economy and society of BIH.

Next, we will examine the profitability of the sectors of the processing industry in BIH. The chart below displays the profit margins of individual processing sectors, with the information and communication technology sector being key. The first impression is that most sectors achieve a relatively high profit margin. The chemical and pharmaceutical industry is traditionally leading, together with the ICT sector, and both sectors account for around 15%. The pharmaceutical industry is extremely profitable throughout the world, and this is also the case in BIH. The third sector is “Other processing industries”, but in the database we own, this sector is relatively small in size, almost negligible.

Chart 9. Rate of profit by manufacturing sector in 2017

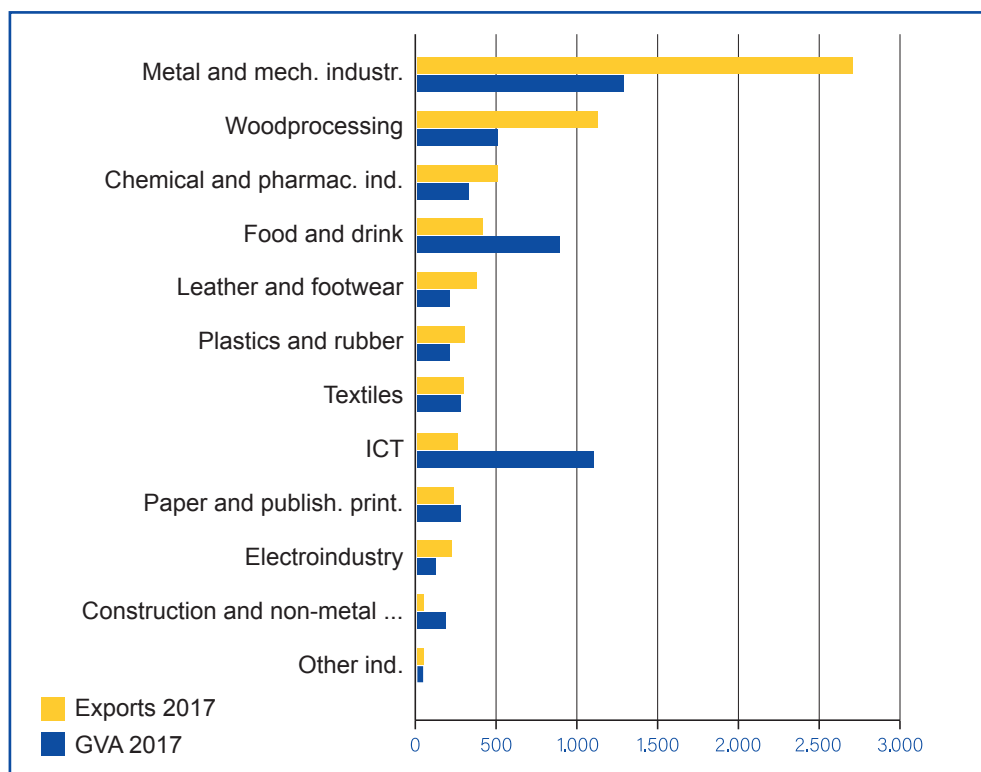


Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

After the first three, the plastics sector follows with a profitability rate of 12.6%. All sectors in this part from 12% to 9% are somewhat profitable, which is very positive to note. The least profitable is leather and footwear, and this is also something that is common; it is a low accumulation branch that is mostly performed by the so-called “lohn jobs”. Lohn jobs represent a special form of inward processing procedure, which is carried out on the basis of a contract concluded between a person as a contractor and a person registered in BH and on the basis of a customs authority’s approval and is carried out for a longer period of time. Authorization of the customs authorities is granted to a person registered in BiH (the holder of the authorization), by which he realizes the right to import goods for the process of their processing and re-exportation in the processed state.³

However, the profitability of all other sectors is satisfactory.

Chart 10. Exports and GVA within the manufacturing industry, 2017.



Izvor: MERFI, Društvo za finansijsku reviziju, Sarajevo

In the chart above we compare the value added generated by the sectors, since value added is crucial for the long-term sustainability of any given sector. In the chart

³ Explanation of lohn jobs, Indirect Taxation Authority BiH

above, we see that again the metal and mechanical industry is the largest creator of value added. The ICT sector was second in 2017. Value added is also relatively high in the food and beverage sector, followed by the wood processing sector, and so on.

As noted above, the key question is which of these sectors, or rather growth in which sectors, is most useful for the economy and society of BIH. For the purpose of this assessment, in addition to export orientation, profitability and gross value added, we also use the criterion of salary level: the higher the salary level in a particular sector, the more useful its export growth and employment level are to society. The methodology used here to measure the performance of the sector is based on the index numbers. For each of the indicators, the average, expressed as index number 1, is measured, and the performance of a particular sector is also measured as a deviation of the sector from the average, which is also expressed by an index number.

Finally, the average, composite index of the sector's consistency is measured, as the average of four indices. Bearing in mind the results of the sectoral competitiveness survey presented in the previous section of the analysis, the following is a list of sectors, ranked by the size of the average composite index of consistency, calculated as the average of four indices: profitability index, GVA index per employee, salary index, and export orientation index. The highest-ranking sectors are those with the highest indices.

Table 2. Indices of competitiveness of the processing industry sector in BIH

	Profitability Index	GVA index per employee	Salary index	Export orientation index	Composite index
Chemical and pharmaceutical industry	1.66	1.83	1.44	3.69	2.16
Metal and mechanical industry	0.99	1.06	1.07	3.77	1.72
Wood processing	0.99	0.59	0.64	3.99	1.55
Leather and footwear	0.54	0.35	0.57	4.74	1.55
ICT	1.64	2.04	1.67	0.82	1.54
Plastics	1.37	0.96	0.75	2.64	1.43
Textiles	1.00	0.41	0.60	3.47	1.37
Electrical industry	0.75	0.74	0.88	2.97	1.34
Paper and publishing press	1.18	1.25	1.09	1.74	1.31
Construction products	1.32	1.20	0.95	0.49	0.99
Food and beverage	1.14	1.16	0.84	0.70	0.96

Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

The table above and the ranking of the composite index of competitiveness show that chemical and pharmaceutical industries, with their high profitability and other characteristics that are also significantly high, occupy the top position. The metal and mechanical industry, as the largest industry in BIH with the largest export value, is in second place, and the third is wood processing.

The chemical and pharmaceutical industry in BIH is an industry dominated by two very large firms, which carry most of the positive trends that we see in the data. These are, in the pharmaceutical industry, “Bosnalijek” from Sarajevo; and, in the chemical industry, the company “SSL” Lukavac. These two firms alone carry almost 40% of revenues, almost two thirds of exports, more than half of the profits, and more than half of the gross value added of the entire sector. Therefore, we will not consider this sector further because these two companies, because of their strength and size, do not require support in increasing competitiveness.

There is another problem with certain sectors. First and foremost, the leather and footwear and textiles sectors are worthy of mention. As shown in the table above, these two sectors have very low salary indices. This is logical, because these are extremely labour-intensive sectors that are in principle based on “lay professions”. These sectors have relatively little potential in terms of productivity growth, growth in value added and salary growth, because their competitiveness is based on low labour costs.

Their potential and benefit to the entire economy and society are much lower than, for example, the metal industry, wood processing, plastics, electrical industry, etc., because they have significantly limited opportunities for salary growth and the growth of living standards for the people working in these sectors. It is important to emphasise that these two sectors, precisely because of this problem, are not significantly useful for the economy of BIH. It is clearly necessary to develop other sectors that have higher potential and growth of value added – above all, both the growth of exports and the growth of salaries – as this is the basis for improving living standards in the country, as well as the basis for combating the increasingly difficult situation on the labour market, where people move abroad due to either unemployment or small salaries.

After eliminating the chemical and pharmaceutical industry, and the footwear and textile industry, these are the sectors with the greatest development potential:

- Metal and mechanical industry,
- Wood processing,
- IT,
- Plastics,
- Electrical industry.

Having defined these sectors, a detailed analysis of trends in the last five years, as well as a more in-depth analysis by subsector within each of these sectors, is now followed.

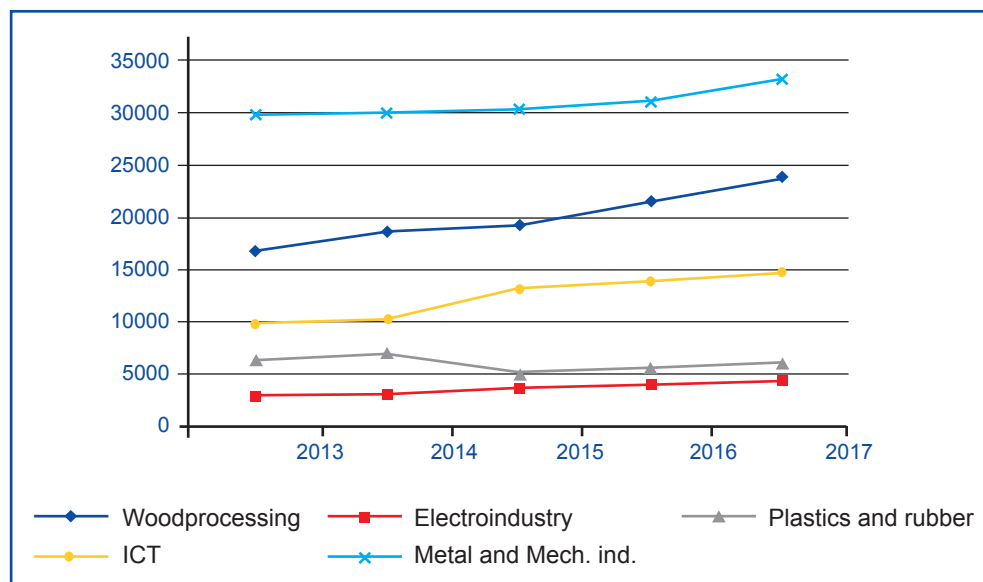
4. Comparative Analysis of Selected Sectors

4.1 Employment

The employment analysis shows that almost all sectors, except plastics, have an upward trend in the number of employees. Hence, there is a growing number of employees in almost all sectors, with the largest number of workers in the metalworking industry, then wood processing industry, etc.

Regarding newly created jobs, the metal industry has grown from 29,937 workers in 2013 to 33,325 in 2017, which means that 3,388 workers have been employed in the last five years in this industry. This difference is even greater in wood processing, which grew by 16,836 workers to 23,863, which means that more than 7,000 workers were employed in this branch of the economy. There is also a need to emphasise the exceptional growth of the ICT sector, which has grown from 9,839 to 14,797 employees, i.e. by almost 5,000 new jobs.

Chart 11. Employment within selected sectors, 2013 – 2017



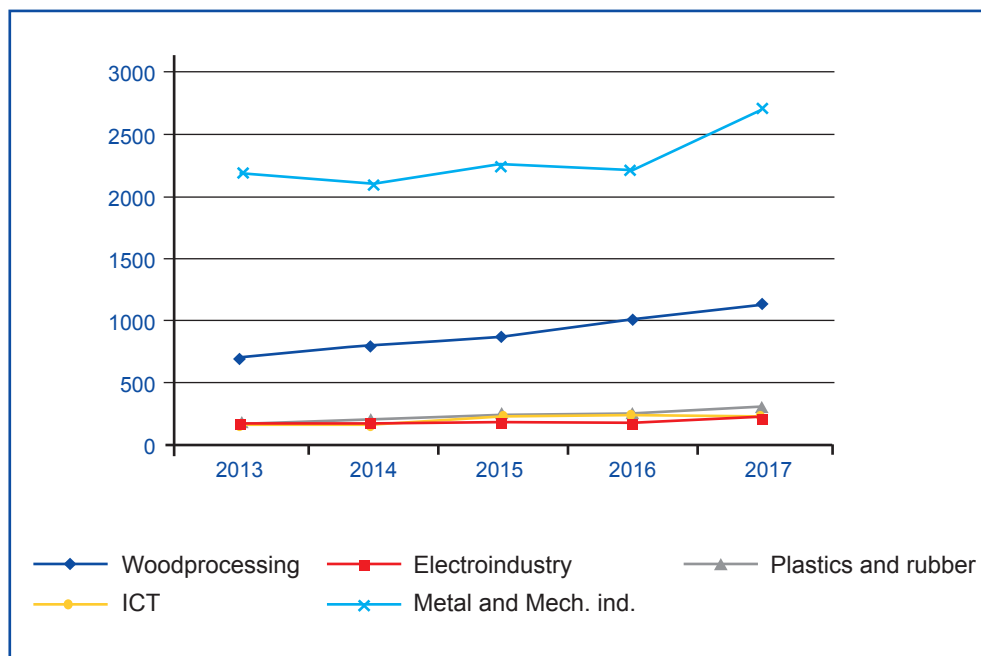
Source: MERFI, Financial Audit Company, Sarajevo

All five selected sectors, in total, created 16,447 new jobs in the last five years. This all represents significant potential, especially when the increased productivity, growth in exports, and salaries growth, are observed.

4.2 Exports

Export is already analysed above, in the section in which the export differences between 2013 and 2017 were demonstrated. However, the chart below shows these trends for selected sectors displaying an obvious upward trend. The largest sector in export is the metal and mechanical industry, and the second largest is wood processing. The remaining three are significantly smaller.

Chart 12. Exports of selected sectors, 2013-2017 (in millions of BAM)



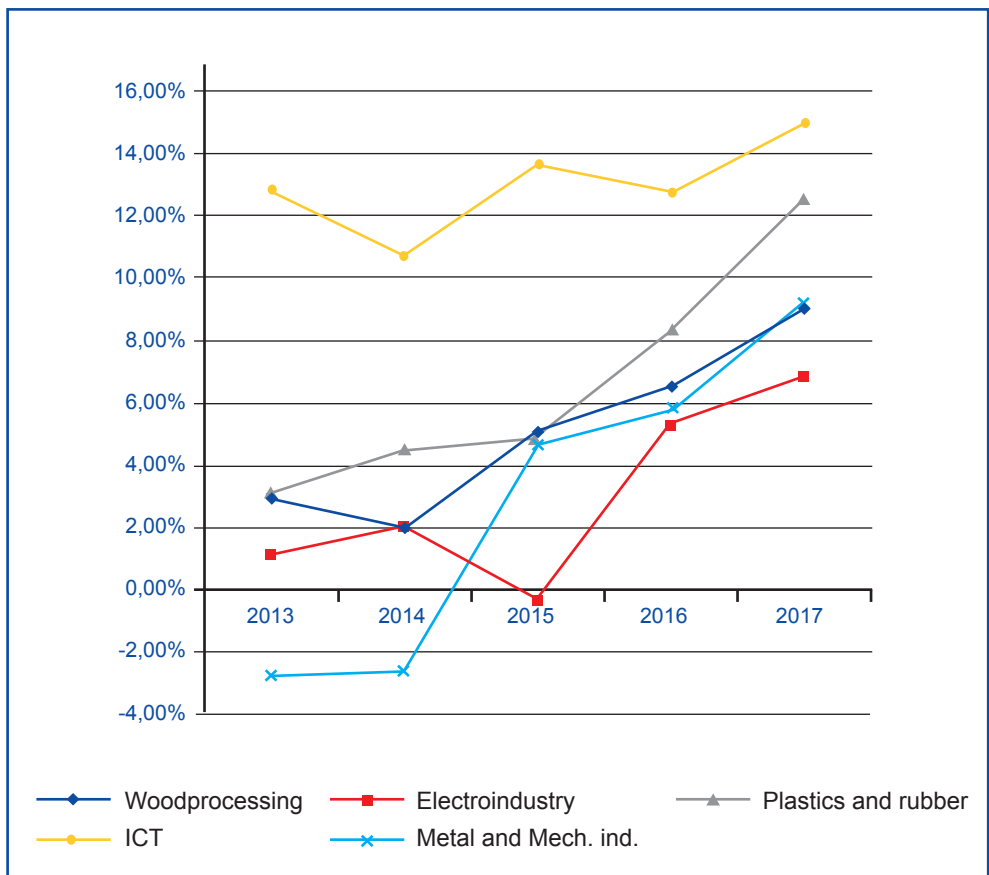
Source: MERFI, Financial Audit Company, Sarajevo

It can be concluded from the foregoing that the exporters and export potential holders in the economy of BIH are the metal and mechanical industry and the wood processing industry, while the other sectors are smaller. According to the qualitative insights that we have received from company interviews, all three smaller sectors are technologically compatible with the metal-mechanical industry above all, but also with wood processing, so that these five sectors can actually represent one technological entity because there is a significant similarity and interdependence between the technologies that they use.

4.3 Rate of profit

The profitability of all five sectors demonstrates a positive trend. The one that stands out in particular is the ICT sector: This sector displays the highest profitability rate, which is to be expected. In 2013 and 2014, the metal and mechanical industry had a negative loss rate, and this is probably the result of the previous crisis, or a recession that had an impact on business. However, after that, a strong and rapid growth in profitability can be observed.

Chart 13. Employment in selected sectors, 2013-2017.



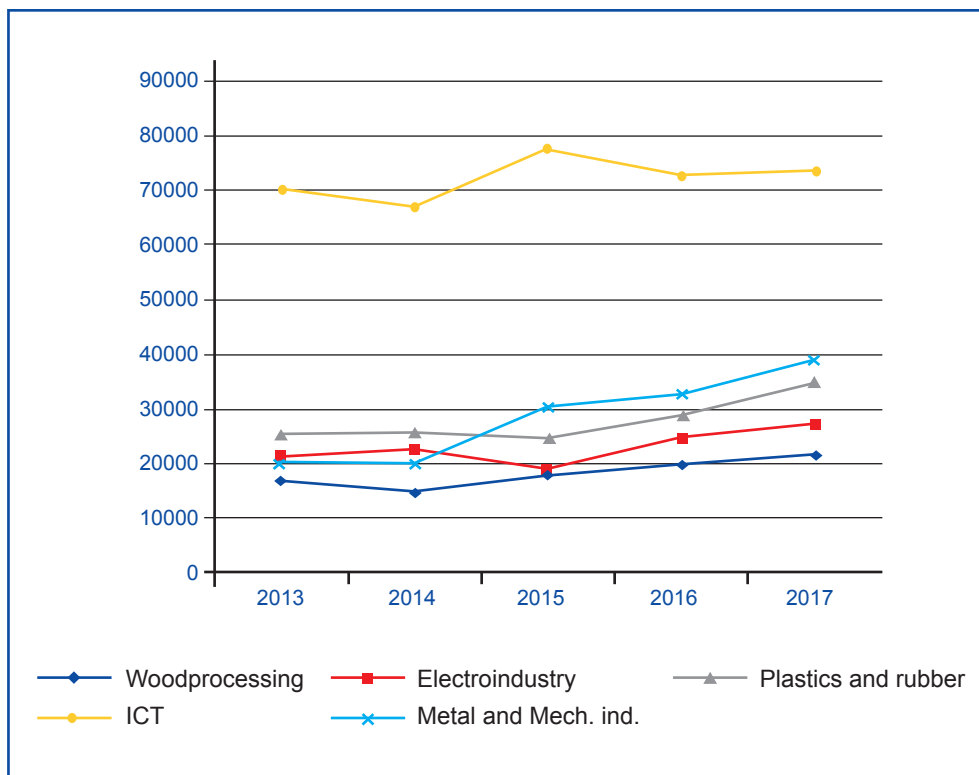
Source: MERFI, Financial Audit Company, Sarajevo

This phenomenon can also be observed in other sectors, with the electrical industry in 2015 displaying a certain decline followed by rapid recovery. The positive conclusion is that all sectors displayed a significant profitability rate in 2017, and profitability is one of the main factors governing the expansion of a company into new business. So as long as profitability is high, we can expect new investments and new jobs.

4.4 Gross value added per employee

Gross value added per employee is the basic productivity indicator. In the chart below, we can see that the productivity of these five sectors grew in the period from 2013 to 2017, which is also a positive indicator.

Chart 14. Gross value added per employee within selected sectors, 2013-2017



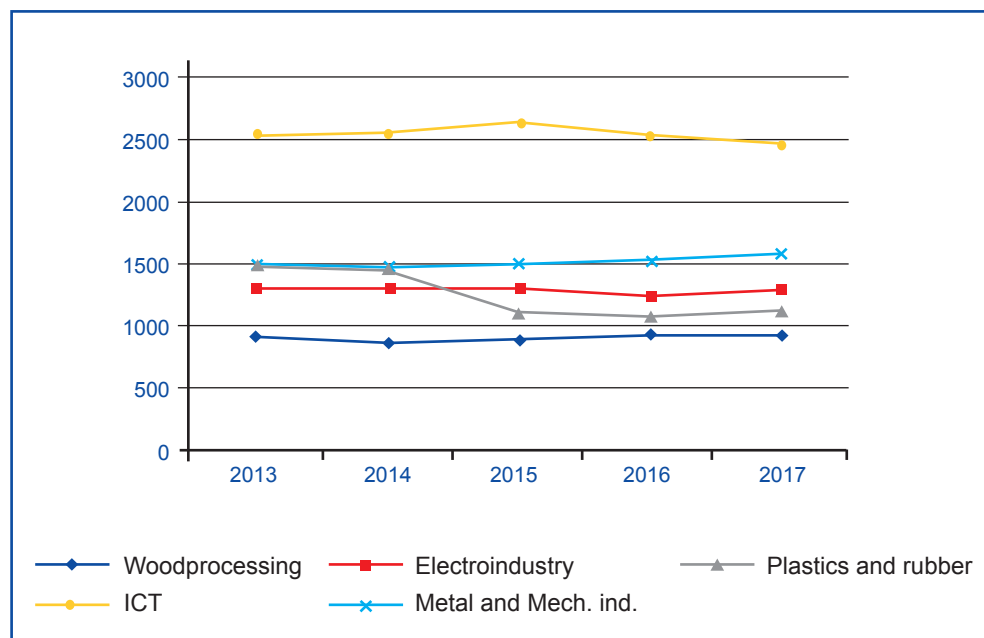
Source: MERFI, Financial Audit Company, Sarajevo

The highest productivity growth of 86.3% in the five-year period was recorded by the metal and mechanical industries, followed by the plastic sector with 35.4%. The productivity of the IT sector grew by only 3.9%; however, this sector also displays by far the highest level of productivity compared to other sectors. The productivity of wood processing grew by 31.7% and the electrical industry by 25%. All this also supports the conclusion that our processing sectors are currently expanding not only in quantitative but also in qualitative terms, because productivity growth is a key element for the long-term growth and development of individual sectors, and for the economy as a whole.

4.5 Gross salary

The analysis of trends in the area of gross salaries has led to surprising conclusions. Hence, in each of the areas we have analysed so far, there is a strong growth – strong growth in exports, strong productivity growth, strong profit growth – however, as regards wages, not only is no growth demonstrated, but in fact some sectors are recording a reduction in gross wages. What does this mean?

Chart 15. Gross wages within selected sectors, 2013- 2017



Source: MERFI, Financial Audit Company, Sarajevo

It means that capital owners, within the context of strong growth of value added, have not increased labour income, but only their income: capital income. In other words, this growth is mostly focused on profit growth. In a situation where labour power as a production factor has maintained the same wage level, and the profit or capital income has demonstrated strong growth, such a trend at the company level leads to an increase in inequality, but also to a situation in which workers are moving towards markets where they are paid more.

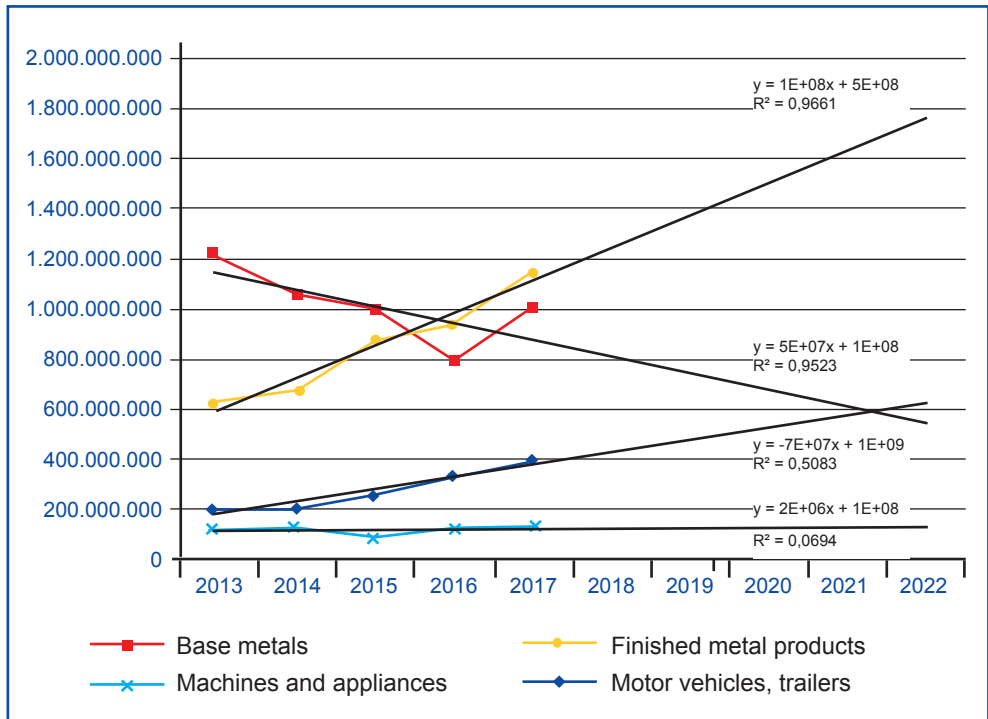
As a result, the significant outflow of labour in the countries of Western Europe is not surprising, because salaries are stagnating or even declining. This is an element that needs to be considered when determining how to aid companies, because salary growth is a key factor for the workforce to remain in BIH. Clearly, there was room for wage growth, but it did not happen.

5. Trends and Projections within Each of the Selected Sectors

5.1 Metal and mechanical industry

The metal and mechanical industry is the first sector to be analysed in detail. This is also the largest and most important sector of the processing industry in BIH. What is most prominent among the subsectors within the metal and mechanical industry is that the export of base metals (predominantly aluminium and iron production) drastically decreased, dropping from 1.2 billion BAM to 1.011 billion BAM in 2017, thus displaying a downward trend.

Chart 16. Projections by subsector: metal and mechanical industry, 2013- 2022



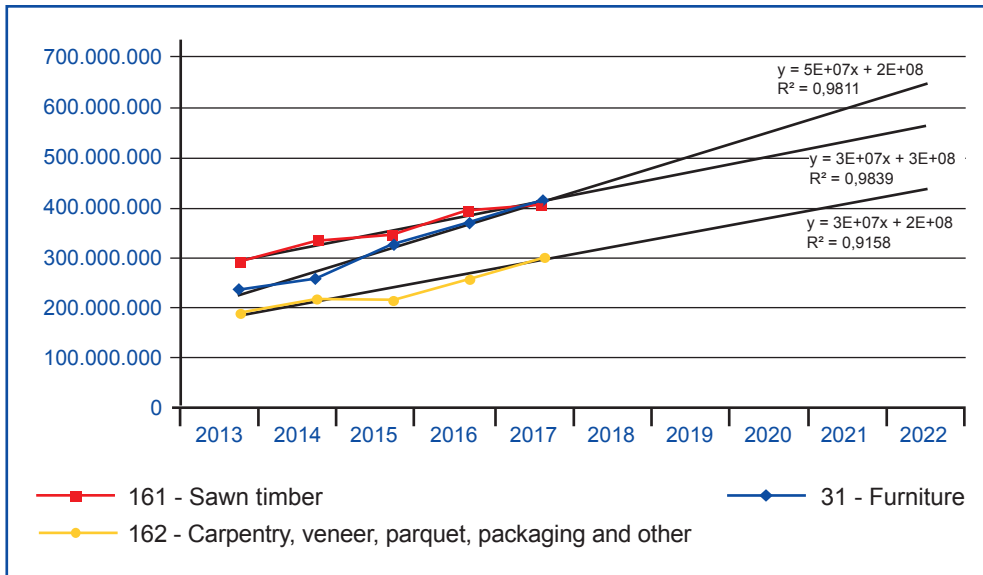
Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

On the other hand, one marked upward trend is the production of finished metal products, whose exports rose from some 627 million BAM in 2013 to 1.149 billion BAM in 2017. This is a significant increase, and over the next five-year period this type of production will, according to the projection, display a growing trend. A less significant, but also noticeable, trend is the export of machines and devices. This production is also smaller in volume than finished metal products and the trend is less pronounced, but still represents a significant production type in terms of export potential. Support for the metal and mechanical industry should be focused on finished metal products, and products related to machinery and appliances, and motor vehicles. Support should not be focused on the production of base metals due to the marked downward trend in this type of production.

5.2 Wood processing

Wood processing is the second largest processing sector by size and importance in the economy of BIH. An interesting trend can be observed in the export projections of certain sub-sectors of wood processing: sawn timber, carpentry and wood elements, and furniture.

Chart 17. Projections by subsector: wood processing, 2013-2022.



Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

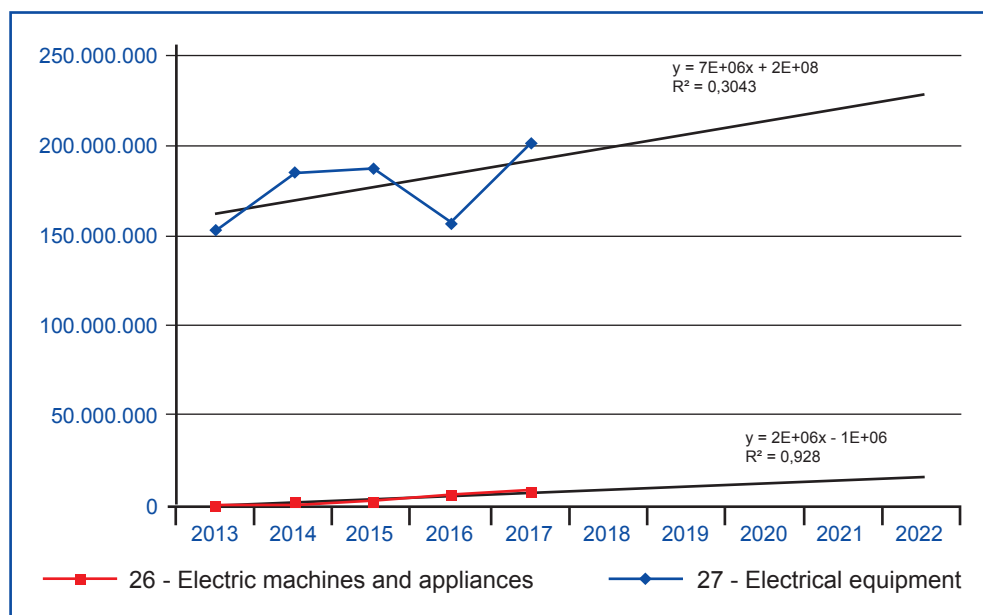
The trend shows that as early as 2017, the production of furniture according to volume of exports approached sawn wood exports, and the trend suggests that within the next five-year period, furniture production will exceed the production of sawn wood as the primary production type. This is a very positive observation, because

the export of sawn wood is highly unfavourable for the economy of BIH, as it eliminates the possibility of generating value added with products such as furniture or other finished wood products. Support in this sector should be focused on the highest possible production of finished goods in order to reduce the share of primary wood processing and export of sawn wood.

5.3 Electrical industry

The electrical industry also recorded significant export growth. The export of electricity turbines is clearly much smaller than electrical equipment but remains one of the other notable upward trends in export growth. For electrical equipment, the decline in exports is evident in 2016, but this figure recovered in 2017, and it is expected that this type of equipment and machinery will be exported in a larger quantity in the next five-year period.

Chart 18. Projections by subsector: electrical industry, 2013-2022



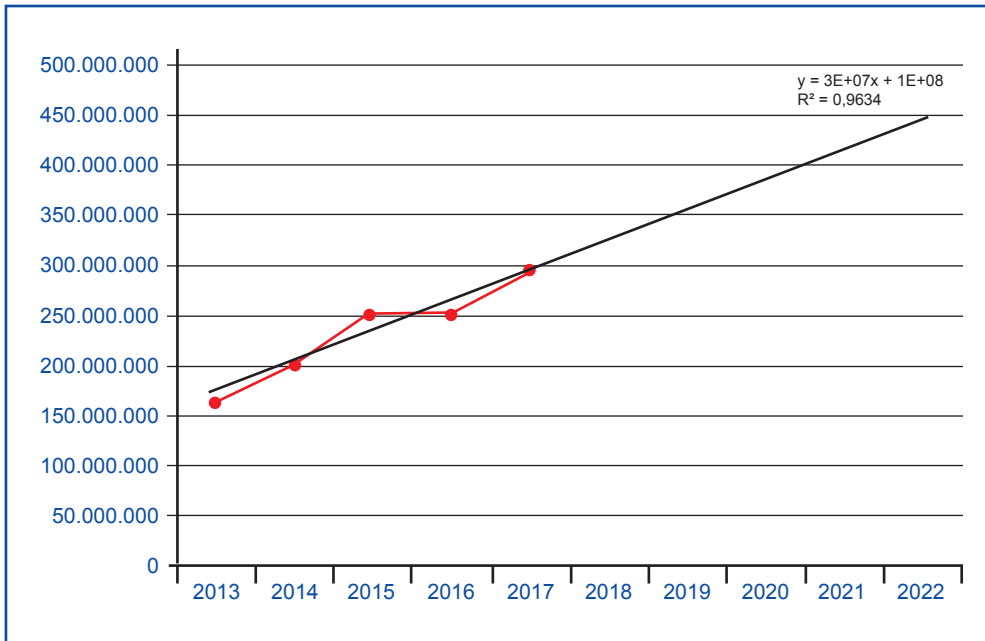
Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

It should be noted that the electrical industry and the metal-mechanical industry are closely related and could be considered as one single sector because the technology, knowledge and skills that are needed for this kind of industry are very similar in many types of production. Although we are observing them separately here, in considering the support measures, it is recommended that the electrical industry be observed together with the metal industry sector.

5.4 Plastics

According to all of the indicators we have seen before, the plastics industry is well developed in BIH. In the chart below, we see very strong growth in exports within this industry over the last five years: Exports almost doubled from 165 million BAM in 2013 to 293 million BAM in 2017.

Chart 19. Projections by subsector: plastics industry, 2013-2022



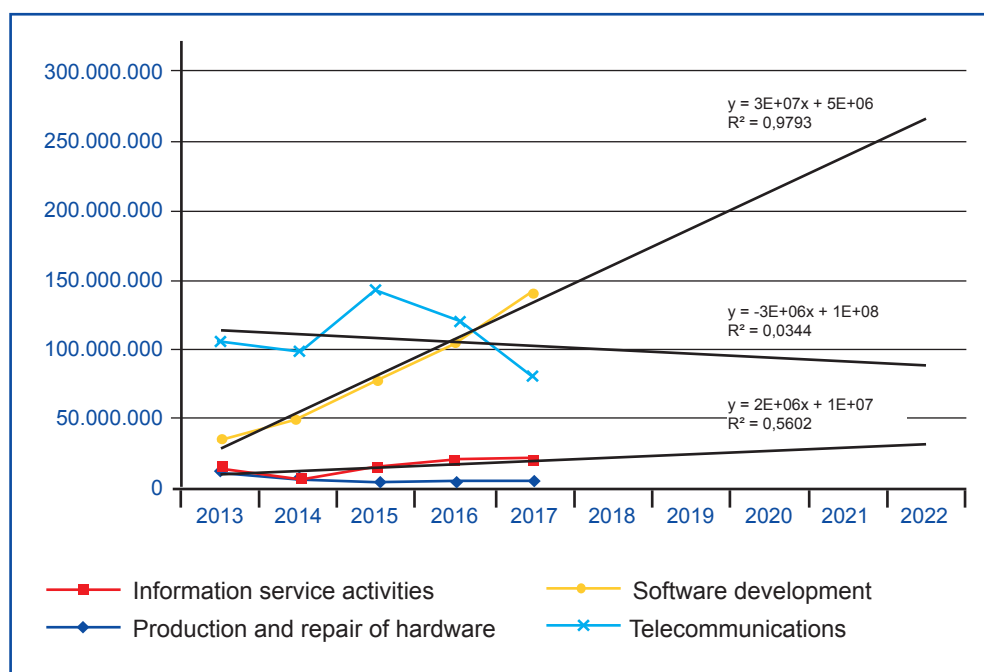
Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

Export growth is expected to continue over the next five-year period, if circumstances remain as they are today. It is also worth emphasising that there is an interdependence between this sector and the metal-mechanical industry, the electrical industry and the wood processing industry, because many of the components and materials used by these industries are made of plastic, and, conversely, the main tools for injection moulding plastic are a product of the metal industry. Hence, the interdependence between these industries is high, and this sector can also be considered somewhat compatible with the main export sectors in BIH.

5.5 Information and communication technologies sector

The ICT sector shows significant export variations between individual subsectors. By 2016, telecommunications constituted the largest share of exports of the ICT sector. According to the data in the chart below, there is a strong and pronounced growth in software production, with hardware-related information services and activities being much lower in terms of exports and demonstrating trends of either modest growth or decline.

Chart 20. Projections by subsector: information and communication technology, 2013-2022



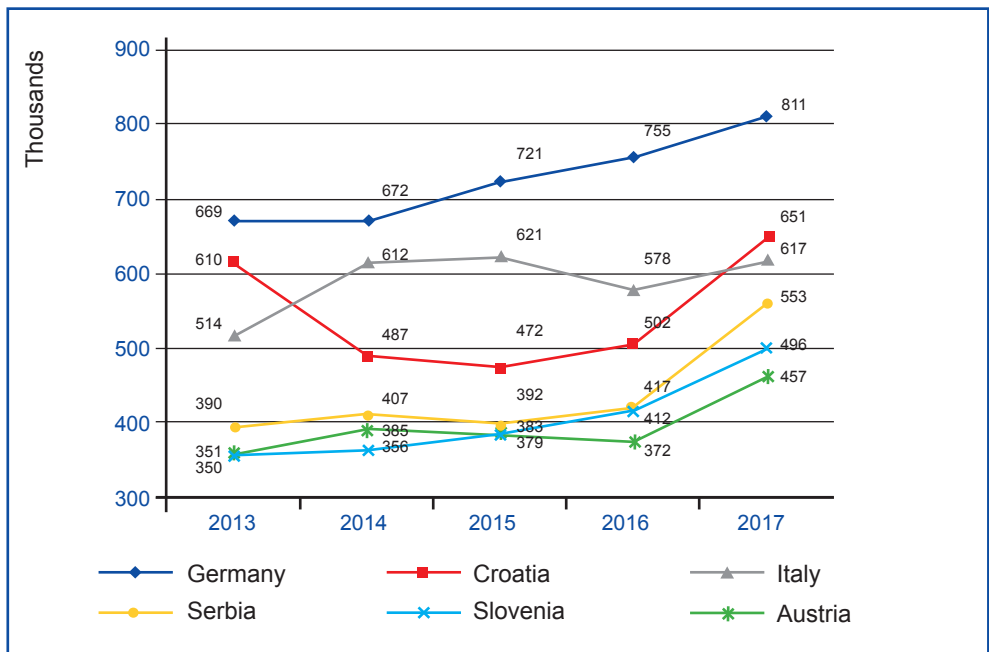
Source: MERFI, Financial Audit Company, Sarajevo, and author calculations

Here is necessary to emphasise the importance of this sector to other sectors with export potential. ICT sector is today one of the most important factors in improving competitiveness and productivity. The dynamic development of this sector in BIH is a good basis for the improvement of products, production processes, marketing, organisation, finance, and other company functions in other sectors.

6. Export Market Analysis

In the analysis of export markets, the markets exported by the economy of BIH, we focused on six partner countries constituting the largest export destinations. These are: Germany, Croatia, Italy, Serbia, Slovenia and Austria. As shown in the chart below, BIH's largest exports went to Germany, in 2017 amounting to 811 million EUR. These exports can be observed to be growing significantly, indicating significant export growth from 669 million EUR in 2013 to 811 million EUR in 2017.

Chart 21. Exports from BIH to countries, the most important foreign trade partners, 2013-2017



Source: Trend map based on UN Comtrade data

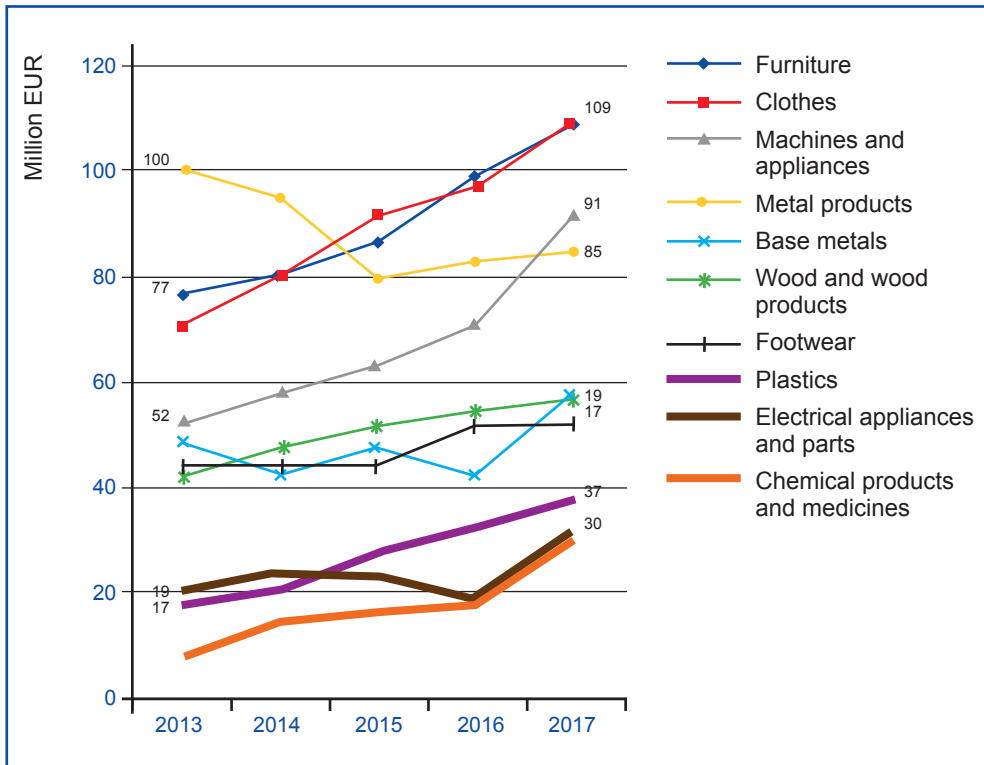
The second in 2017 is Croatia. We see that in all these years, except first and last, Croatia had lower exports than exports to Italy, but that last year it amounted to 651 million. The third is Italy: exports to Italy grew from 2013 to 2015, in 2016 it declined,

and again in the 2017 renewed growth is observed. There is also a lower level of exports to Serbia, Slovenia and Austria, which range from 450 to 550 million in 2017. What is characteristic for these countries is that for all three there is a trend of growth of exports from BIH to those countries. However, in order to properly analyse these export markets, one must enter the structure of exports from BIH to each of these countries.

6.1 Market analysis of Germany

According to the data in the chart below pertaining to exports of BIH to Germany, we see that the largest share in the category of furniture is 109 million EUR in 2017, and this category is displaying a growth trend. Clothing is very close to the level of exports. The next category, which is also significant, is that of machines and devices, whose exports are growing strongly. What is unexpected is the category of finished metal products, whose exports to Germany fell from 100 million EUR in 2013 to 85 million EUR in 2017.

Chart 22. Exports from BIH to Germany, 2013-2017 (million EUR)

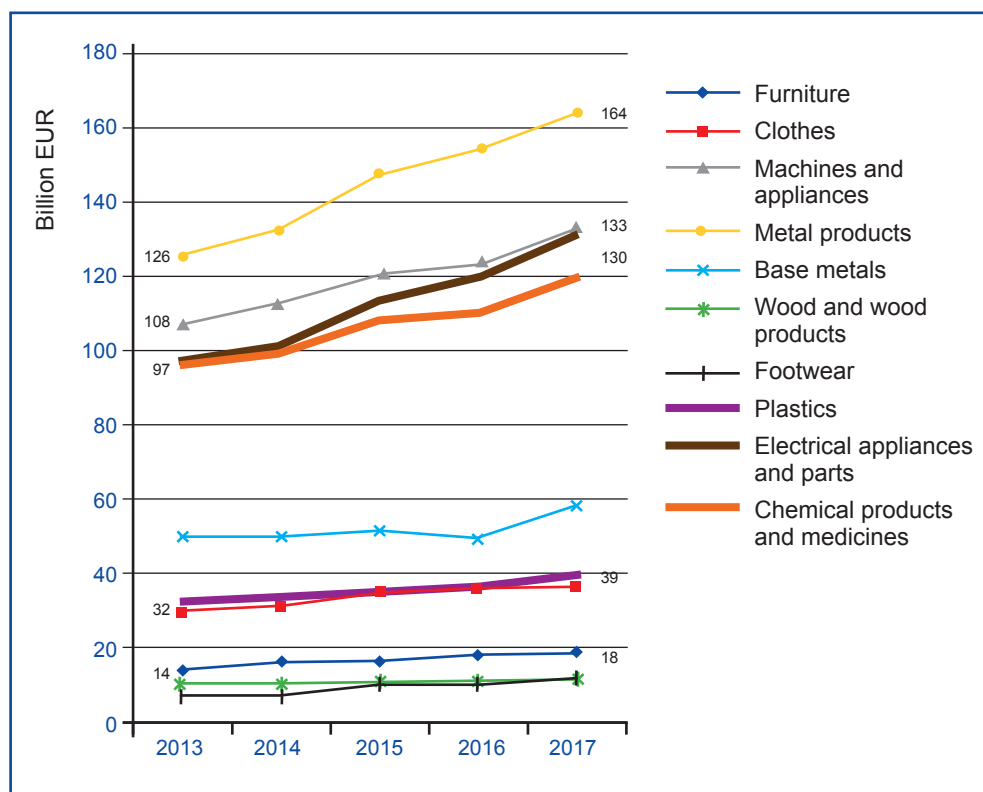


Source: Trend map based on UN Comtrade data

One other trend is also evident. Wood and wood products take a significant position in products that are of interest to our research, plastics also display an upward trend, and in 2017 BIH exported 37 million EUR in plastic products to Germany. BIH exports about 30 million electrical devices and parts. These are the primary export products to Germany. Having this information in mind, it is very important now to analyse the German market for these products, as this will provide insight into the demand for these products in the German market and reveal some opportunities.

When we analyse the German market for these products in the chart below, we can see that in 2017 Germany imported 164 billion EUR worth of finished metal products and that imports have grown over the past five years. If we compare this immediately with BIH's decline in exports of metal products, we see that there are huge opportunities that have not been harnessed. The fact that imports of metal products in Germany are rising, and BIH's export of metal products to the same market is declining, means that BIH's metal industry does not adequately respond to market demands in Germany.

Chart 23. Total imports into Germany by select product groups 2013-2017 (billion EUR)



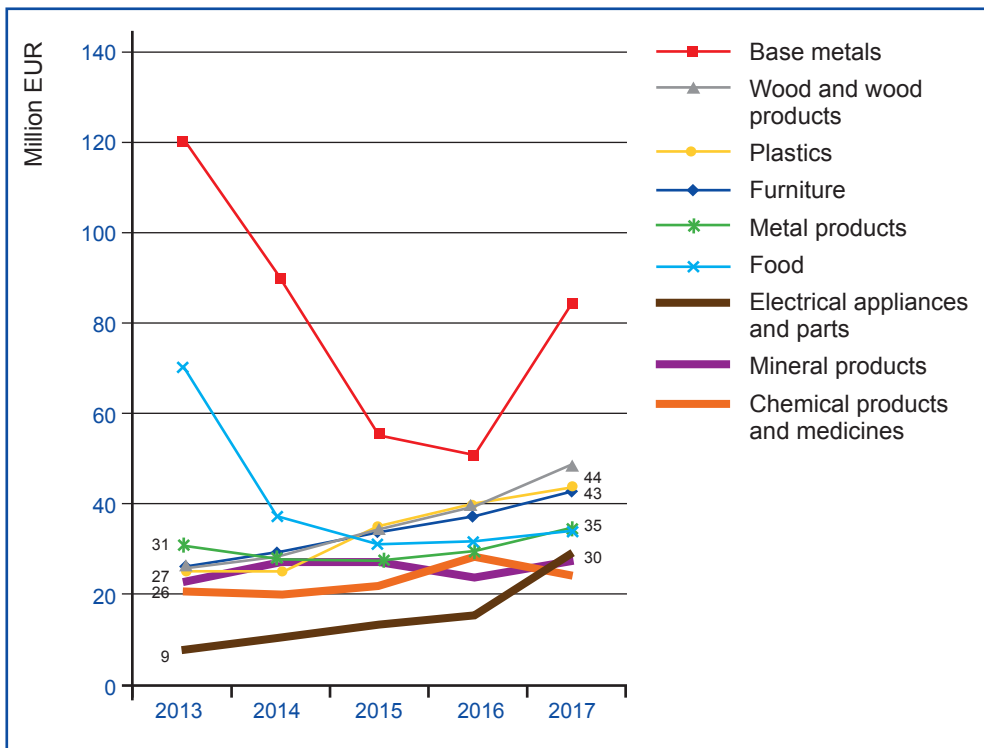
Source: Trend map based on UN Comtrade data

One thing that provides particular opportunities is the size of individual markets in Germany and other European Union countries. All of these markets are measured in hundreds of billions of euros as opposed to BIH exports, which are measured in hundreds of millions. Looking at developments in the German market, all these markets in Germany are displaying growing trends, and this is an opportunity for all BIH's export sectors. What is crucial is that BIH's firms adapt to the requirements of these markets to increase the export of their products.

6.2 Market analysis of Croatia

In total exports from BIH to Croatia, the category of mineral oil products and petroleum products dominates. About 204 million products of this category are exported to Croatia. In the chart below, we will not show the movement of exports of these products because this export is drastically higher than the export of others and disturbs the possibility of visual representation of other sectors. For other sectors, we see that, after mineral fuels, the key category is base metals and we see a significant drop in exports of base metals.

Chart 24. Exports from BIH to Croatia, 2013-2017 (million EUR)

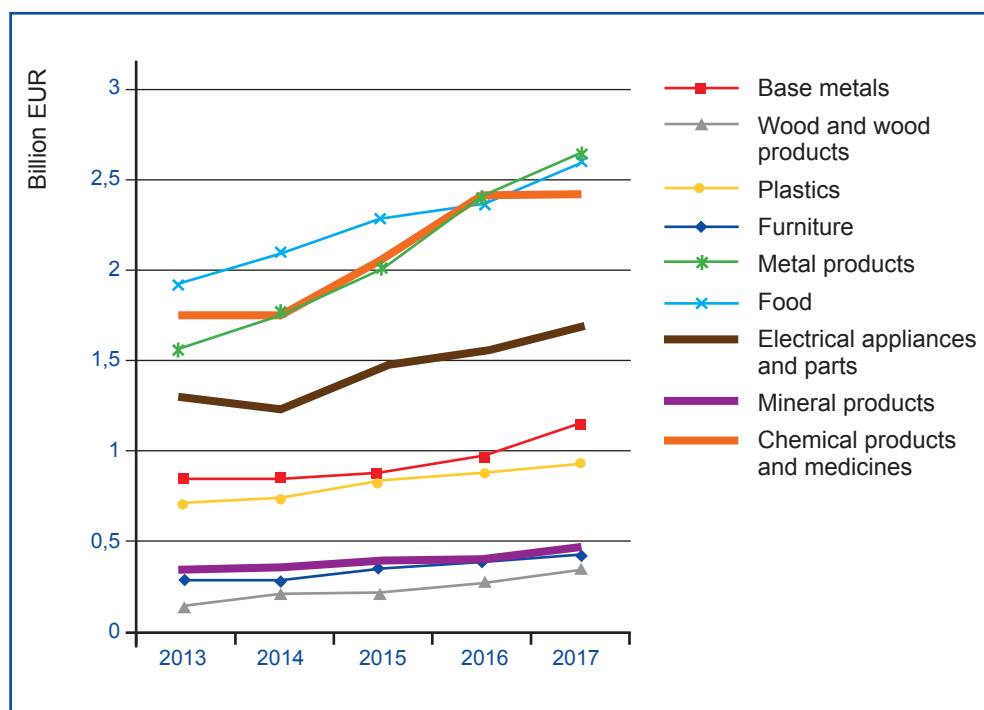


Source: Trend map based on UN Comtrade data

The categories displaying growth are furniture, metal products, plastics, and electrical appliances and parts. All these types of products recorded an upward trend in exports from BIH to Croatia.

Regarding the total import of products to Croatia, not counting mineral fuels and oil derivatives which comprise the largest category, we see that the largest level of imports are in metal products, which now stand at 2.6 billion EUR in 2017, and that imports displayed very high growth. This reveals a favourable situation with regard to metal products. Food and chemical-pharmaceutical products are the next most widely imported to Croatia. After that, from the sectors that are in our focus, we have electrical devices where, in 2017, about 1.7 billion EUR were imported into Croatia.

Chart 25. Total imports into Croatia, by select product groups 2013-2017 (billion EUR)



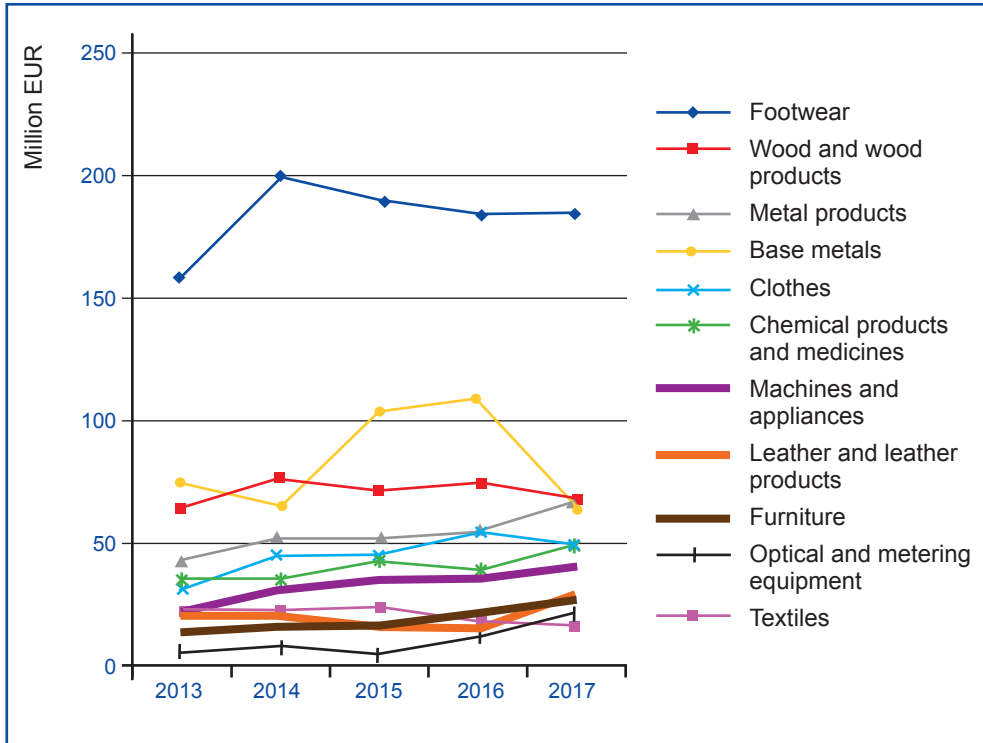
Source: Trend map based on UN Comtrade data

The next are base metals, which are not of particular interest to us, followed by plastics, of which Croatia imports about 900 million EUR. What is also of interest for the economy in BIH is furniture with 438 million EUR of imports into Croatia. These are all markets that present many opportunities with BIH's exports to Croatia, measuring in tens of millions, and imports are several hundred million for each type of goods, which opens opportunities in this market.

6.3 Market analysis of Italy

Most of the exports from BIH to Italy consist of shoe exports. These are mostly “lay jobs” performed by enterprises, amounting to 185 million EUR. Another observation is that the base metal sector is making significant investments in Italy, as well as wood and wood products. The first sector we will focus on is the export of metal products.

Chart 26. Exports from BIH to Italy, 2013-2017 (million EUR)



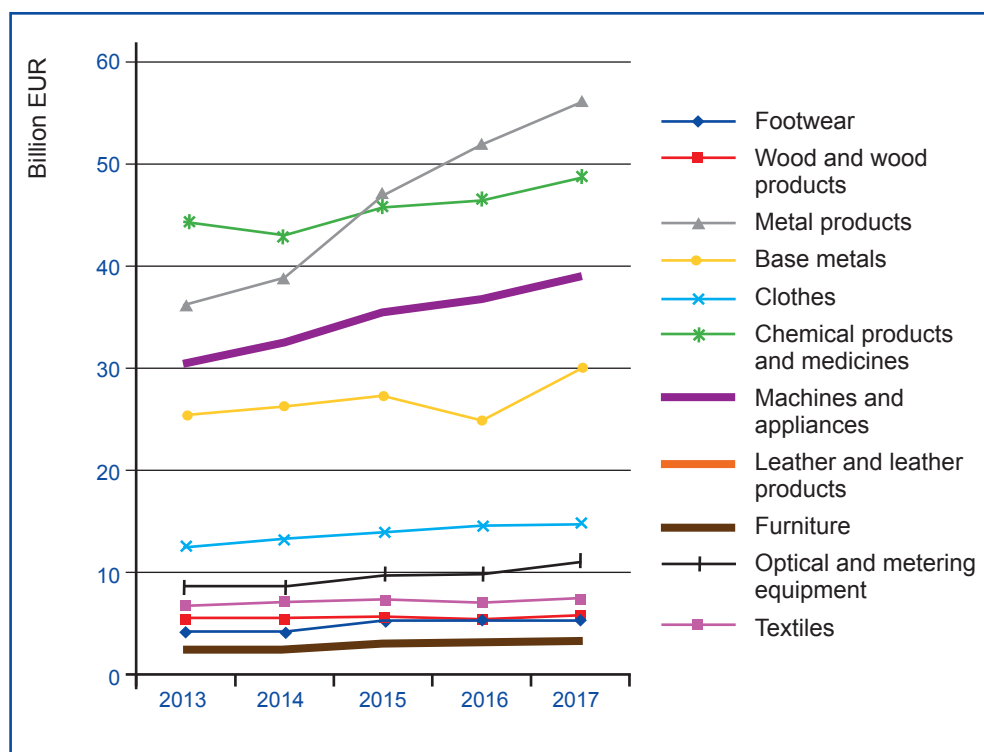
Source: Trend map based on UN Comtrade data

BIH exports around 65 million EUR in metal products to Italy, and there is a slight increase from 44 million in 2013 to 65 million EUR in 2017. The following product category also belongs to the metal-mechanical industry, in this case machines and devices. BIH exports this kind of product to Italy in the amount of 40 million EUR. Furniture exports stand at approximately 27 million with a rising trend, in this category and also in the above-mentioned categories.

When we look at the Italian market, we see that the import of metal products to Italy is very high and amounts to around 56 billion EUR in 2017. Since BIH exports to

Italy 65 million metric products, 56 billion EUR is a huge market. Evidently, BIH is not sufficiently exploiting the opportunities offered in this and other already mentioned markets. Italy, as one of the product categories to which this research focuses, imported 39 billion EUR last year, and BIH participated with 40 million.

Chart 27. Total imports into Italy, by select product groups 2013-2017 (billion EUR)



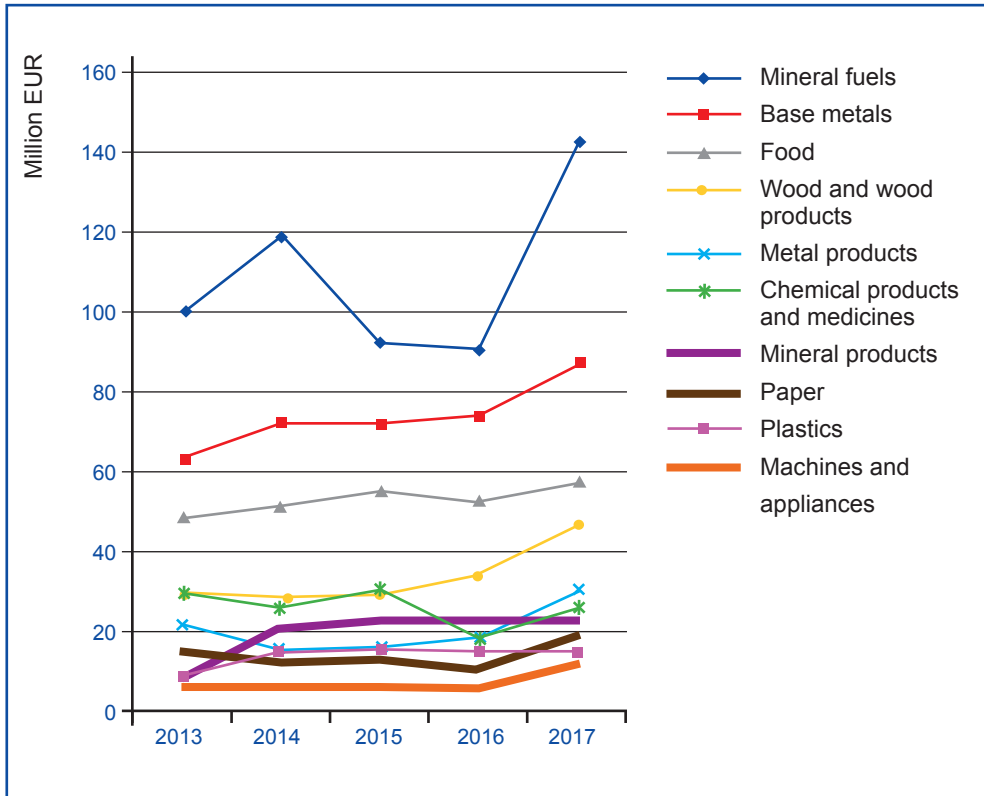
Source: Trend map based on UN Comtrade data

It must be emphasised that imports of these metal products, machines and devices have recorded significant growth in the Italian market, and this is an opportunity that can be used. Regarding furniture, where BIH in the Italian market generates around 27 million in 2017, total imports to Italy amount to about 3.4 billion EUR. So, these relationships tell us that there are significant opportunities for BIH's economy to win the market, particularly in countries with large markets such as Italy, but above all Germany and other major European Union countries.

6.4 Market analysis of Serbia

Exports from BIH to Serbia are primarily in sectors that are not in the focus of this research. The main categories of products exported to Serbia are mineral fuels, basic metals, food and wood as well as wood products.

Chart 28. Exports from BIH to Serbia, 2013-2017 (million EUR)

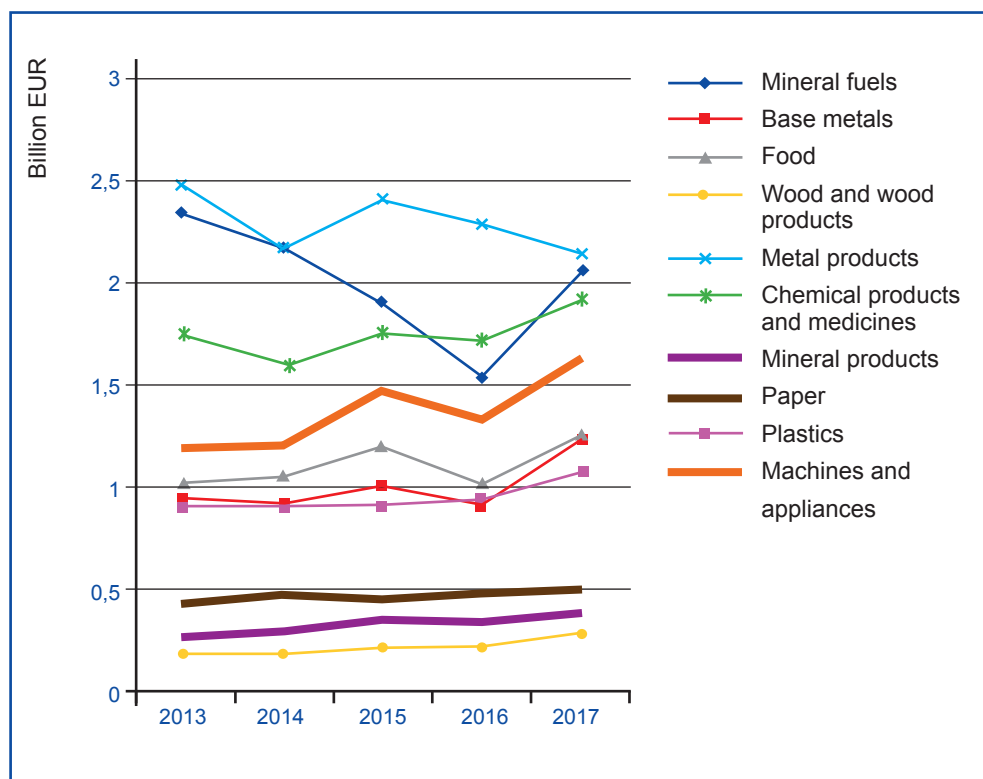


Source: Trend map based on UN Comtrade data

Types of products that are in the focus of our research – metal products, plastics, machines and devices – are relatively small in export quantity, particularly in relation to other countries. This type of export is not particularly large and generally ranges from 11 to 20 million EUR for 2017.

The categories of products imported into Serbia include metal products, in the amount of over 2 billion EUR, followed by machines and appliances at above 1.6 billion, and plastics, which also amount to about 1 billion.

Chart 29. Total imports into Serbia by select product groups 2013-2017 (billion EUR)



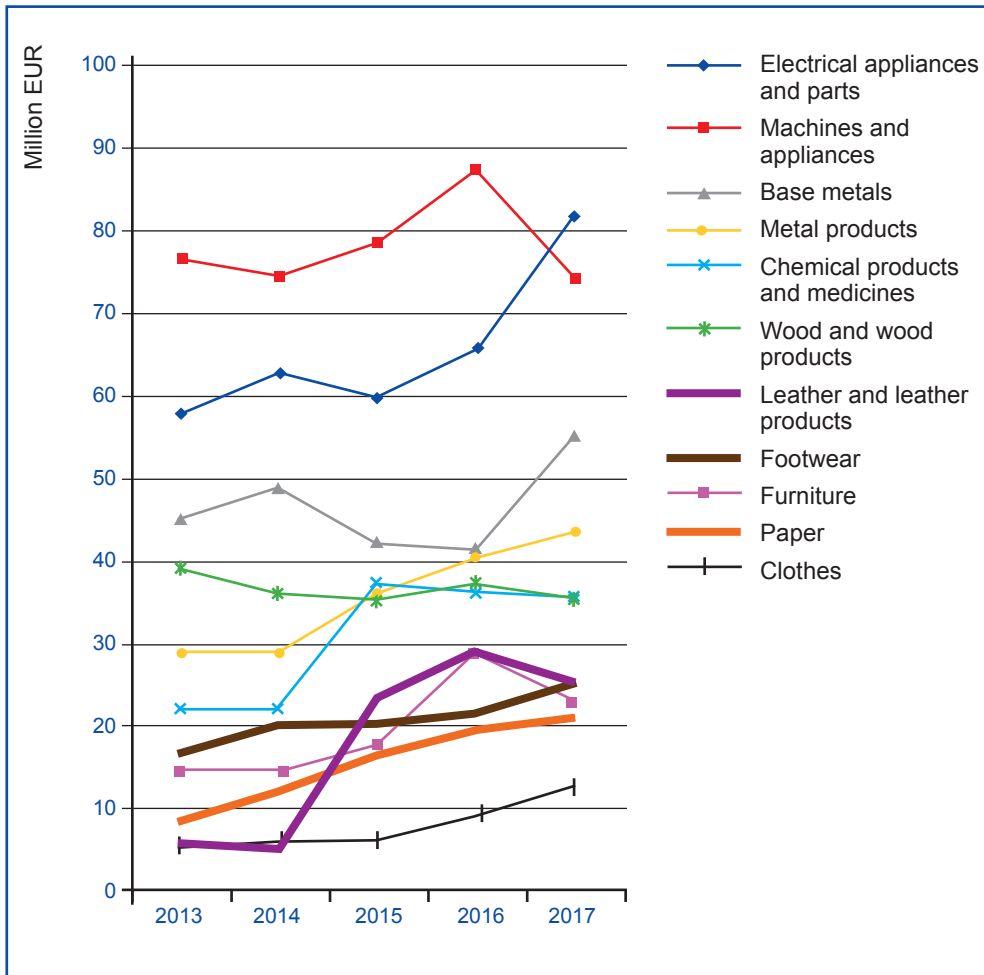
Source: Trend map based on UN Comtrade data

Quantities measured in billions and above indicate that this market is still large enough for BIH to increase its exports, especially in sectors where it has a competitive advantage.

6.5 Market analysis of Slovenia

Exports to Slovenia are based on several product groups – the largest group is machines and appliances, as well as electrical appliances and parts, with values ranging from 75 to 80 million EUR. Metal products are also a significant export product from BIH to Slovenia, reaching the value of 44 million EUR in 2017. For those categories of products that are in the focus of our research, analysis suggests that the lowest export is in furniture, in the amount of 23 million EUR.

Chart 30. Exports from BIH to Slovenia, 2013-2017 (million EUR)

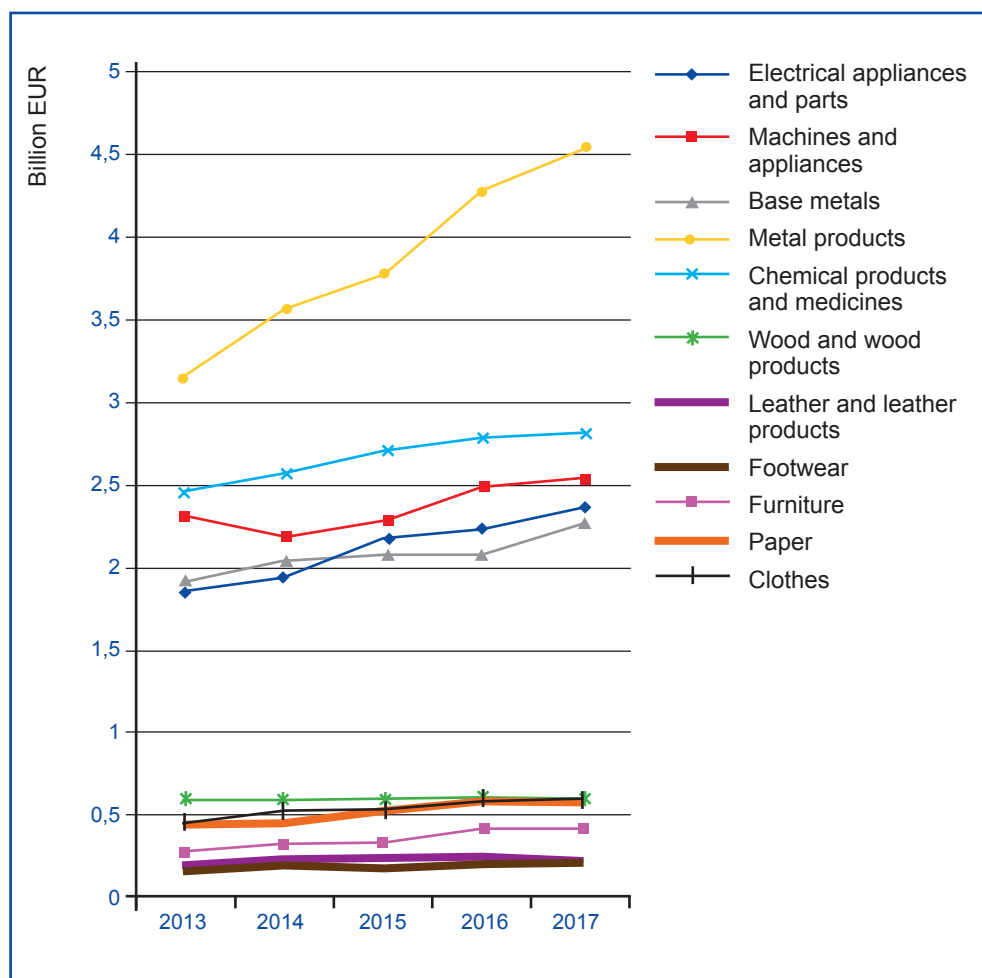


Source: Trend map based on UN Comtrade data

Although the total exports to Slovenia are lower than exports to Serbia, BIH still exports value-added products, such as electrical devices, machines, and finished metal products, meaning that this market for BIH is more important than the Serbian market.

On the entire Slovenian market, we can see that the greatest imports are in metal products, and that this type of import displays strong growth. In 2017, Slovenia imported 4.5 billion EUR in metal products, while over the same period BIH contributed 43 million.

Chart 31. Total imports into Slovenia by select product groups 2013-2017 (billion EUR)



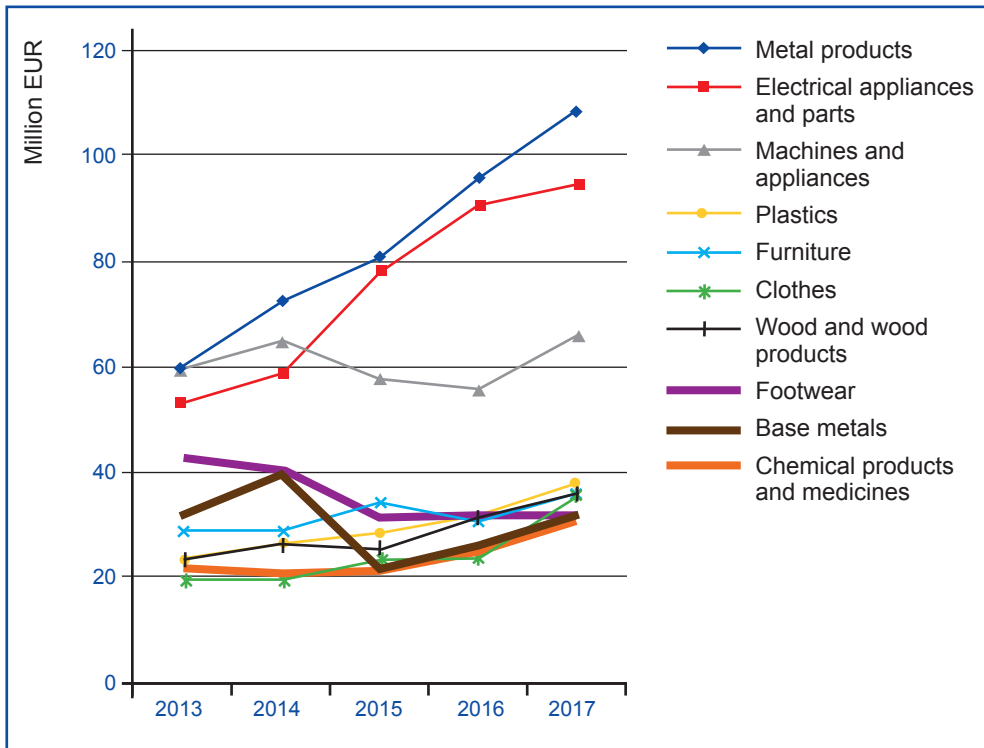
Source: Trend map based on UN Comtrade data

Hence, this market presents significant opportunity; however, it is also evident that BIH, and its metal and mechanical industry, are not capitalising fully on this opportunity. In addition, Slovenia imported about 2.5 billion in machines and devices, and about 407 million in furniture, suggesting that this country is a significant market, of which BIH utilises relatively little.

6.6 Market analysis of Austria

In Austria, BIH imports approximately 108 million EUR of finished metal products, and it must be emphasised here that this type of export from BIH to Austria is experiencing strong growth: an increase from 60 to 108 million in the observed five-year period. The second group of products are electrical devices and parts: also a category of products that is in focus of our research, and BIH exports about 94 million EUR of these products to Austria.

Chart 32. Exports from BIH to Austria, 2013-2017 (million EUR)

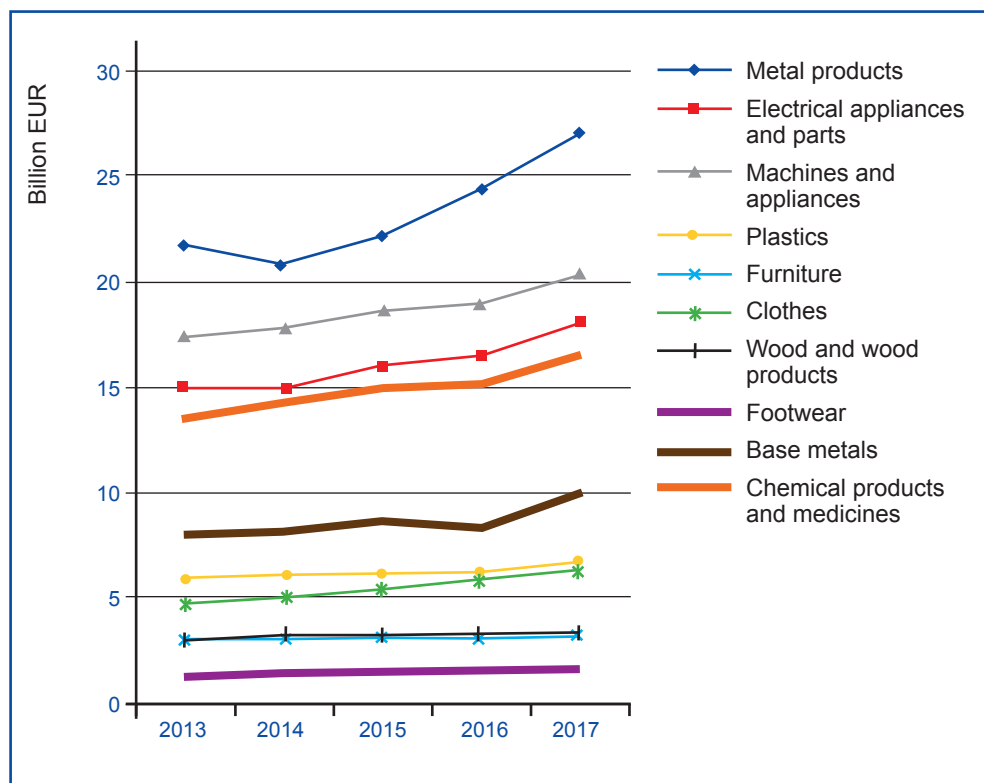


Source: Trend map based on UN Comtrade data

According to the value of exports, the following are machines and devices for 66 million, plastics with 38 million and furniture with 36 million. All of the products that are in our research focus are very important exports to Austria, and Austria is a significant market for these products.

When we take into account the whole Austrian market, we can conclude that it is very large, especially in relation to the Croatian and Serbian markets: Austria imports about 27 billion EUR in metal products, of which BIH contributes 108 million.

Chart 33. Total imports in Austria, by select product groups 2013-2017 (billion EUR)



Source: Trend map based on UN Comtrade data

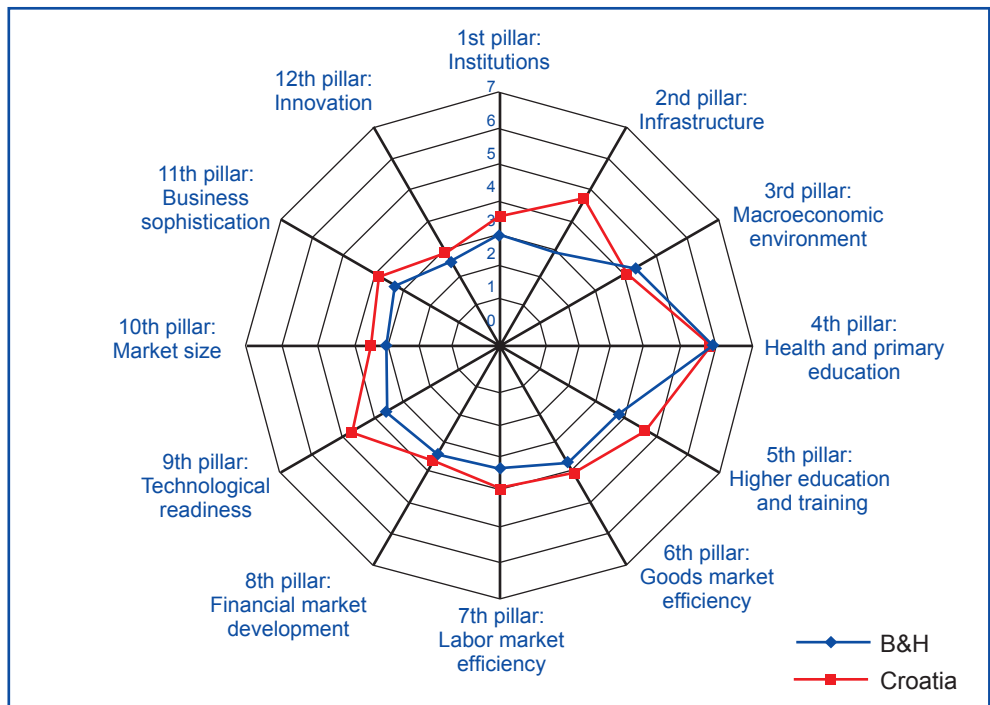
Austria imports about 20 billion in machines and appliances, and about 18 billion in electrical appliances. Hence, this is a huge market that is not being fully utilised by BIH, nor is any of the other markets we have analysed so far.

7. Innovative Capacities of the Economy in BIH

7.1 A general aspect to innovative activities in BIH

Innovations have a significant effect on productivity in enterprises, economic branches, and the country as a whole, and represent a key factor in economic development. What is crucial is BIH's ability to systematically create, adopt, expand and apply knowledge in new ways to solve problems and to meet the needs of individuals and society as a whole. Innovation can take the form of technical changes, such as the development of products and services, as well as through changes in processes and organisations, such as organisational, managerial and marketing innovation, and process recovery.

Chart 34. Twelve indicators of competitiveness, BIH and Croatia, 2017



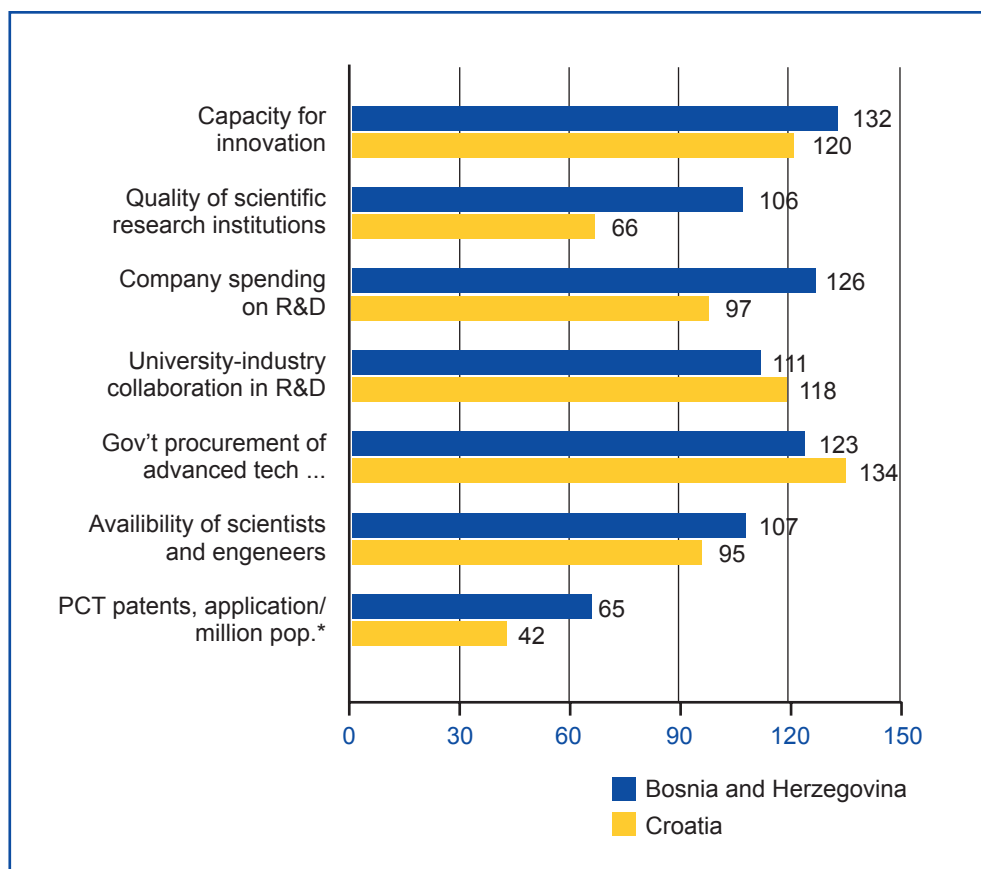
Source: Global Competitiveness Index

While the importance of raising the competitiveness and innovation of the economy is still not coming to the forefront of public policy in BIH, EU Member States (including candidate countries such as Serbia, Macedonia and Montenegro) and the OECD conduct comprehensive reforms in a wide range of innovation policies to accelerate and increase competitiveness. The extremely low position of BIH on the scale of the innovative sub-index of the World Economic Forum (123rd place/142 countries, 2017) supports the fact that these activities are very neglected in BIH.

The chart 34. indicates the position of BIH and Croatia – as a neighbouring country and as the least competitive EU country.

The chart 34. shows a significant lag in BIH’s competitiveness, compared to Croatia. The only two areas where the two countries’ situations are relatively similar are the macroeconomic environment and health and primary education. In all other fields,

Chart 35. Positions of BIH and Croatia, Innovation, 140 countries, 2017



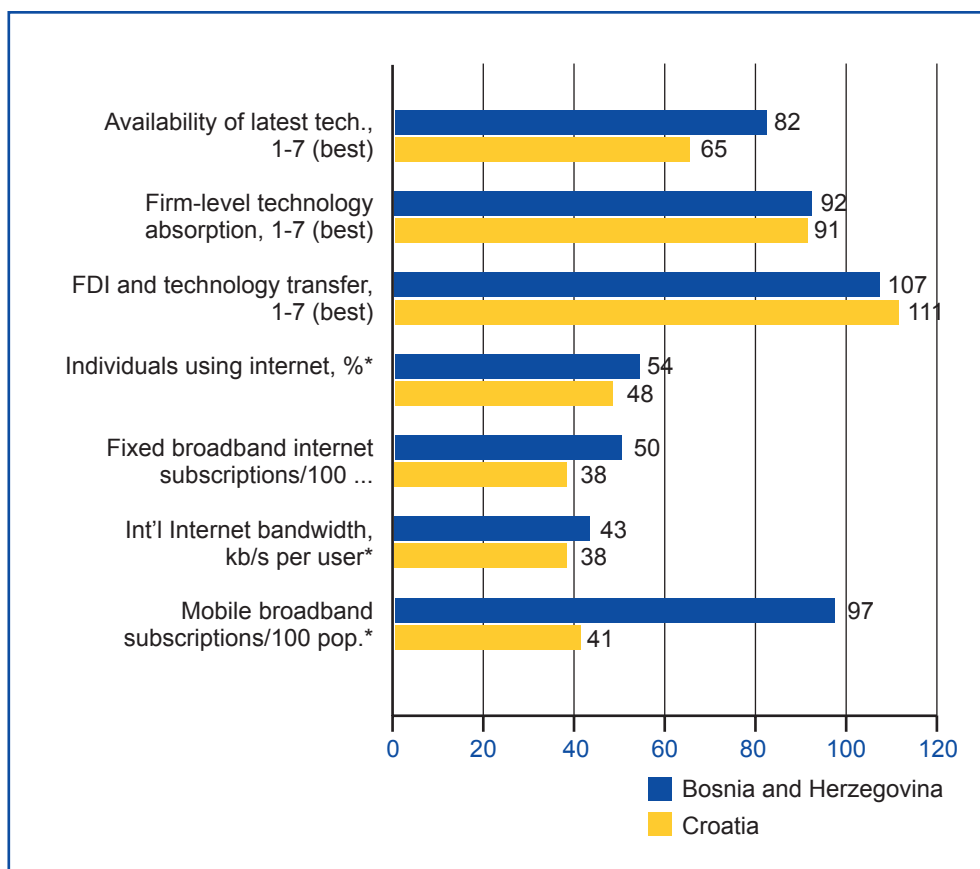
Source: Global Competitiveness Index

BIH significantly lags behind.

Innovation is one of the most important indicators of competitiveness for the World Economic Forum. In the long term, standard of living can only be improved by innovation. Although less developed countries can still improve their productivity by adopting existing technologies or making improvements in other areas, for those who have reached the level of innovation-led development, this is no longer enough to increase productivity. Companies in these countries must create and develop top-tier products and processes to maintain competitive borders.

BIH is here at a low level. According to the majority of criteria, BIH is between 100th and 140th place. In most areas, Croatia ranks higher, especially in the quality of scientific and research institutions. However, insufficient investment in research and development, especially by private sector, and insufficient number of quality scientific

Chart 36. Positions of BIH and Croatia, technological competence, 140 countries, 2017



Source: Global Competitiveness Index

ic and research institutions, are not a good basis for further development of the BIH economy to products and services with higher added value.

It is important to measure the agility with which the economy adopts existing technologies to improve the productivity of its industry. In today's globalised world, technology is increasingly becoming an important element of progress and competitiveness. ICT sector have evolved into the "general purpose technologies" of our time, given the significant expansion in other economic sectors and their role as an effective infrastructure for commercial transactions.

According to these data, it is clear that there is a lack of technological transfer from foreign investors in BIH, and it is known that foreign direct investment (FDI) often plays a key role among the main sources of foreign technologies. Also, domestic companies operating in BIH do not have sufficient access to advanced technologies. According to the criteria related to the use of the Internet, both BIH and Croatia are relatively well placed.

Successful functioning of the support innovation of the economy is limited by the great lack of connectivity between enterprise and the scientific research community, unsatisfactory scientific research (in terms of patents and publications), an exaggerated emphasis on scientific research in the public sector, the aging of the scientific research population and its connection with "outflow brains", poor funding, and out-dated funding approaches.

7.2 Enterprises and innovations - survey results

Enterprises are the main drivers of innovation everywhere in the world. However, our enterprises spend little on research and development. Business research and development expenditures in BIH are about 0.07% of GDP, compared to 2% of GDP for the European Union and an average of 0.32% for candidate countries in 2016. Innovations are rarely present in BIH at the enterprise level: only in a relatively small number of isolated cases. Of the 25 companies surveyed during this survey, only 6 had some kind of innovation at the level of BIH - only 24% (a survey of the BIH Statistics Agency on a sample of 5,457 companies shows that 40% of enterprises have innovative activity, but it is assumed that these activities are new at the company level, not at the level of BIH). These few successful examples show only the innovation potential of BIH, not the systemic use of the country's cognitive values.

The demand for research and development services and innovations seems weak, partly because companies are struggling to maintain their position in international markets, in the face of harsh competition from other countries. Only 4% of research

staff is employed in the private sector. Cases of company interaction with the national scientific research system are rare. The survey we conducted shows that companies have almost no support from the public sector, and according to research by the BIH Agency for Statistics, less than 2% of enterprises are developing new technologies in cooperation with state scientific research institutions, instead either developing new technologies internally (34%), in cooperation with other companies (19%) or with foreign experts (33%), or come to them through licenses (10%).

Most of the companies we interviewed are in positions that are not well suited to innovating in their products and services. A significant portion of them are relatively low in the value chain, producing parts and components that are then used by their partners abroad to create final products: even those that produce finished goods often sell these to foreign partners who place them on the market as their own products, under their own brands.

Most of these enterprises expanded their capacities: They introduced new machines in production and worked towards improving the production process and training employees. However, this cannot be regarded as an innovation because it is innovation at the company level, and this is not something that first appears in BIH.

All of these changes made by enterprises were mainly based on customer demands, both in terms of quantity – order extension – and in terms of quality improvement. Some of the companies are working to conquer certain products because the customer has asked for such a part or product in order to expand the offer, and there are also requirements to raise product quality by introducing more advanced technologies.

As far as promotion itself is concerned, most often they do it by themselves, sometimes with the help of experts from the region and abroad. The problem in the implementation of technological changes is most often the lack of available professional assistance to enterprises. As far as funding for the improvement of production is concerned, enterprises do this mainly from their funds, through financing from loans, and with the support of foreign partners. Some were beneficiaries of international project grants.

It was especially emphasised that public sector assistance is at a very low level. Enterprises note that financial assistance is relatively small, and that the expert assistance provided by public institutions is insufficient and inadequate. The opinion of people from companies surveyed in this study is that state scientific research institutions yield little economic importance (which is contrary to their positive assessment of individual scientists, which companies often engage in the application of new technologies).

This is supported by the fact that the average productivity of our scientists (the number of articles published in scientific journals per thousand inhabitants in BIH is 0.19)

ranges from one fifth to one tenth of the average for highly developed countries. As for patents, the average of highly developed countries is about 200 patents per million inhabitants, while the average in BIH is 1.67 patents per million inhabitants. The almost complete disconnection between scientific research and business associations, further hampered by the weak demand for innovation by companies, does not indicate a bright future for our innovative achievements and competitiveness.

Particular attention must be paid to the problem that firms point out as the most current, which is the reduction of the workforce and, especially, of professional staff. This problem is reaching proportions that not only compromise the company's competitiveness and innovation, but, sometimes, their survival.

7.3 The role of the public sector

Gross domestic expenditure on development and research in BIH is very low. Total resources for scientific research in BIH amounted to only 0.22% of GDP in 2015. For comparison, in the United States, gross domestic expenditure on scientific research is 3% of GDP. In other OECD countries, it stands at an average of 2.3% of GDP, in the countries of the European Union 1.9%, and for the candidate countries for the European Union 0.7%. Even if the actual funds intended for research and development of the private sector are higher than those stated in the official data for BIH, the expenditures for scientific research in our countries are much lower than the average of the European Union and the OECD country.

In BIH most of the funds for scientific research come from the budget (about 88%), for research conducted almost exclusively by state institutions (universities and scientific research institutes). For comparison, in OECD countries this share is 29%, in the EU countries 34%, and in the candidate countries for EU membership an average of 56%.

Most of our scientific research capacities are concentrated in higher education and other state institutions. There are essentially two types of state scientific-research institutes in BIH:

- Higher education research institutes. These mainly deal with basic research and provide the scientific-research basis for university education, doctoral studies and serve for the scientific improvement of university staff.
- National research institutes. Established with the aim of implementing applied research and experimental development activities of importance for our economy and culture, and for the development of industry, state authorities and other institutions.

The current situation in this area is not unknown to many experts involved in on-going discussions on how to proceed, especially in the public and private sectors.

Indeed, many of our experts are familiar with these issues and deeply understand the existing options of such a policy. But it seems that problems arise in consensus and leadership – either from the public sector or from the business community – in order to move forward. For such an innovation-oriented strategy to succeed, it must be implemented in an environment characterised by the following elements:

- **Inclusion and partnership.** A crucial step is to build confidence in a large coalition of stakeholders – including the business community and educational and research institutions – before the public sector. As enterprises become the main clients of scientific and research work, they will be a key factor in shaping scientific and technological priorities through public funds.
- **Networking.** Moving forward requires many common actions. Networks that include different communities at all levels will increasingly become the drivers of the knowledge economy. The expansion of networks will need to take place within and between municipalities and cities outside of BIH, through research centres and enterprises and among educational communities in BIH and abroad, through effective access to ICT. The networks will have to be developed at the local and the state level, crossing the borders of states, across the borders of the Western Balkans, the European Union, and beyond those borders. With the expansion of networks that will be led by interest communities with the help of an ever-increasing access to ICT, old boundaries (physical, political, psychological) can become irrelevant.
- **Changing the mind-set.** Moving towards the innovative knowledge economy requires a change in the way of thinking. From an enterprise, it requires the ability to systematically transform knowledge into products and services – and into profit. It requires governments to create and support opportunities, by challenging conventional policies and integrating partners to increase competitiveness. It also requires greater readiness and the ability to share information with the public, putting emphasis on public service rather than controlling the public, and supporting the development of a national and inclusive dialogue that creates social cohesion and trust. Finally, the greatest challenge for the academic and research community could be precisely the requirement to audit their own roles and approaches, in line with the advancement towards the position of providers of knowledge services in response to the demand of the economy and the population.

8. The Needs of Selected Sectors in Increasing Competitiveness and Innovation

8.1 Metal-mechanical and electrical industry needs

8.1.1. Market

- Support of research into market opportunities and requirements in the EU (especially the German market for products within the metal and electrical industries)
- Supporting events for meeting of domestic companies and potential foreign partners
- Visits to fairs
- Support for direct linking and promotion of companies with foreign customers / partners
- Supporting companies in introducing standards and product certifications

8.1.2. People

- Building partnerships between faculties of mechanical and electrical engineering, and enterprises
- Initiating changes in companies' programmes and practices, product development support, problem solving by faculties for companies
- Support training for CNC operators and developers
- Support for welding certifications
- Support for the building of partnerships between adult education institutions and enterprises
- Support for the building of partnerships between vocational schools and enterprises
- Consulting in human resources management

8.1.3. Technology

- Support for training for engineers and students (CAD / CAPP / CM SolidWorks)
- Improvement of production processes (5S, LEAN, KAIZEN - initial training and consulting)
- Support and equipment maintenance
- Organisation of events for the exchange of experience and knowledge for directors
- Improvement and professionalisation of company management
- Support for the acquisition of key equipment
- Acquisition of investment capital

8.1.4. Digitalisation

- Support in software tools for product design - CAD / CAPP / CM SolidWorks
- Support for ICT solutions for product development (rapid prototyping, 3D equipment, etc.)
- Support in digital tools enabling more efficient procurement processes
- Support in ICT sensor-based production control and real-time optimisation of process parameters
- Support in the automation of production processes
- Support in using online market channels to sell products

8.2 Wood processing and furniture production needs

8.2.1 Market

- Support for the use of available market information (current customer requirements, trends at important fairs, the Internet, etc.) to improve existing products and develop new ones
- Support to establish and strengthen ties and exports with EU companies
- Support for direct linking and promotion of companies with EU partners

- Support to companies in the introduction of standards and product certifications

8.2.2. People

- Initiating cooperation and supporting joint activities between faculties of mechanical engineering and technology and enterprises
- Initiating cooperation and supporting joint activities between vocational schools and enterprises
- Initiating cooperation and supporting joint activities between centres for pre-qualification of adults and enterprises
- Open the possibility of consulting in human resources management
- Support for the training of engineers and technicians (CAD / CAPP / CAM SolidWorks and other technologies)

8.2.3. Technology

- Support for the procurement of key equipment
- Training and consulting on the acquisition of investment capital
- Support for the procurement of equipment for development and technical preparation of production
- Support the strengthening of cooperation between faculties and companies
- Training and consulting in organising production (LEAN, KAIZEN, etc.)
- Training and consulting in organising production in specific areas (e.g. varnishing, etc.)
- Training and consulting on selected topics (according to company requirements)

8.2.4. Digitalisation

- Support in software tools for product design - CAD / CAPP / CM SolidWorks
- Support for ICT solutions for product development (rapid prototyping, 3D equipment, etc.)
- Support in the automation of production processes
- Support in using online market channels to sell products

8.3 Plastic industry needs

8.3.1 Market

- Supporting the procurement of available market data that will provide timely information to potential customers of plastic products in BIH and the EU.
- Specialisation of companies in the region and more aggressive approach to market research.
- Support for the identification of final and complementary products for domestic and EU markets.
- Supporting events to meet domestic companies and potential foreign partners.
- Visits to fairs.
- Support direct linking and promotion of companies with foreign customers / partners.
- Support for the clustering method of organisation and further networking, cross-sectoral cooperation, and cooperation between organisations and institutions in order to build competitiveness and economies of scale in the offer abroad.
- Creating a value chain through the identification of recognisable regional products with export potentials.

8.3.2. People

- Support for specialised training and fast re-training in 3D CAD / CAM / CAE technology, focusing on new materials, technological procedures, and product design and tools.
- Creation of fast business education programs based on the needs of companies that are specifically related to the following areas: marketing, sales, and human resource management.
- Organise events for the exchange of experience and knowledge between companies.
- Supporting joint activities between centres for re-qualification of adults and enterprises
- Supporting joint activities between vocational schools and enterprises
- Consulting in human resource management.

8.3.3. Technology

- Procurement of new equipment.
- Production orientation based on new composite materials (mixing of plastic, wood, metals, ceramics and other materials) with the use of existing equipment and technological processes.
- Introduction and use of quality management systems, especially standards that are in the preparation phase, as well as preparing companies on the norms that will be prescribed by these standards.
- Reviewing the establishment of centres of excellence in quality, in cooperation with European institutions.

8.3.4. Digitalisation

- Support in software for advanced 3D CAD/CAM design
- Support in equipment for advanced folding and surface treatment using 3D technologies
- Support in equipment for plastic deformation using 3D technologies
- CAD / CAM system integration
- Support in the automation of production processes.

8.4 Information and communication technology sector needs

8.4.1 Market

- Systemically provide support to the sector for entering the foreign market (obtaining market information and linking with foreign partners, promotion of companies abroad, cooperation with the diaspora, support for the presence of trade fairs)
- Co-financing the quality system certification and intellectual property protection
- Solve the technical barriers for the emergence of this sector on the domestic market (for example, the Tax Administration of Republic of Srpska for avoidance of double taxation is not recognised abroad because BIH is a signatory to the contract, which

makes our businessmen less competitive)

- Stimulate exports of this branch in view of its contribution to total exports
- Attracting and opening development centres of well-known foreign IT companies.

8.4.2. People

- Pre-qualify other professions (geodesists, biologists) in order to gain the knowledge necessary for the market (geoinformatics, bioinformatics)
- Introduce an ICT study programme in the faculties of electrical engineering, as well as other technical or related faculties
- Increase the number of classes in high schools for ICT with an adequate programme
- Redefine the scholarship system
- Strengthen the professional IT staff of the faculties themselves, as they become a “bottleneck” of development (strengthening the educational staff vertically, bringing guest professors for critical disciplines that are becoming global trends, and that are poorly studied here)
- Establish a two-year study program for those who will be required directly to a non-academic marketplace), where it is also necessary to develop quality study programs for other types of business needs (academic studies)
- Establish a system of regular communication between the academic community and the economy.

8.4.3. Technology

- Tax relief for the purchase of equipment
- Establish institutes in electrical engineering and other technical and related faculties, as a legal entity, so that they can engage in research work on a commercial basis
- The expansion of optical internet and the introduction of 4G and 5G networks
- Adequate Internet coverage for the entire territory of BIH and its citizens.

8.5. Recommendations for the public sector

- Reducing the taxation of labour

The total burden of taxes and contributions in the coming period will be reduced to the levels observed in 2008. The key reason for this measure is the lack of labour due to workers going abroad because of low salaries. A significant increase in salaries, as a way of retaining one category of population, is possible with the help of the state.

- Support for employment

Incentives for newly created jobs through a project to support employment with the World Bank and other sources.

- Reform of the Employment Service of Republika Srpska and cantonal employment services

These services should be in full function of mediation in the employment and implementation of active employment policy measures. Rescind the recording of persons who are actively seeking work separately from those who are on the record and for the exercise of other rights and transfer the right to free health insurance to health insurance funds. Employers provide lists of unemployed, and unemployed workers who refuse to work will be deleted from the records.

Employment services should, in cooperation with the careers service of schools (pedagogues, psychologists and social workers), also carry out professional orientation tasks. Promotion of occupations should be done by the service, and each school need to have a person in charge of assisting in the choice of occupation.

- Incentives for the introduction of new technologies

Tax incentives or other incentives.

- Incentives for reinvestment

Amendments to the Profit Tax Law in the part referring to the release of taxation of reinvested earnings.

- Education reform

Secondary education

Create a policy for high schools in accordance with the needs of employers.

Invest in equipping secondary schools through the launch of a special program,

which will jointly finance the public sector, employers, local communities, donors.

Strengthen practical teaching through the ability to pay students undergoing traineeships with employers, with a contract between the school and the employer.

Changing the method of scholarship for high school students (through a special focus on defective professions, the result of education, the return of scholarships, and the harmonisation of scholarships from different levels).

Higher education

Establish the concept of governance, organisation and activities of the university with the aim of significantly engaging universities in the development of science, technology and economy.

Determine the economic feasibility of individual faculties and perform reorganisation, in accordance with the needs of the economy and society.

The enrolment policy is essentially changed through greater involvement of higher education institutions in terms of realistic analysis when it comes to planning enrolment and creating new study programs.

Change budget funding such that only those study programs that are necessary for the labour market are financed, leaving the rest to the higher education institution on the decision - whether they will perform for self-financing students or will cover the costs of their performance with their own income.

Innovate study programs with a clear differentiation of academic and professional studies and align them with the needs of the labour market.

Increase the number of practical lessons in all study programs.

- Support for raising the professional competencies of businessmen

In cooperation with academic communities, as well as international institutions, launch support programs for small and medium-sized enterprises in order to improve administrative knowledge (in the areas of human resource management, finance, market research, marketing, social responsibility and cooperation with the community, environmental awareness, etc.) with the ultimate goal of raising competitiveness, accelerating development, preparing for the replacement of generations, and internationalisation of domestic enterprises.



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