Interreg
Danube Transnational Programme
DanubePeerChains

DanubePeerChains

Integrated capacity building and training programme for DANUBE area labour and business support organisations, local industry and entrepreneurs to enter innovative transnational value CHAINS as PEER-level collaboration partners

Transnational benchmark analysis of labour market conditions incl. identification of qualification and support demand

Deliverable 1.1.3.

INCSMPS – National Scientific Research Institute for Labor and Social Protection

Daniela Pașnicu, Denisa Vasilescu, Amalia Cristescu, Speranta Pirciog, Cristina Lincaru, Vasilica Ciucă, Draga Atanasiu

Data Collected:

Biz-Up, CCIS, ZICER, CPU, PBN, INCSMPS, CLUSTERO, CMAB, DGO, SCSL, Tehnopolis, UB, FITT, MoE

Contents

Introduction

DanubePeerChains has as main objective to empower Labour market Support Organisations (LSO) and Business Support Organisations (BSO) together with their target groups and further local high-potentials in a joint capacity building and training approach to upskill to high-qualified jobs in the Danube region and to gain sustainable recognition as PEER-level collaboration partners in innovative transnational value chains. In particular, the project strives to 1) identify high-potential cooperation fields in digitalized value chains for project target sectors (metal industry, machine building, engineering, electro industry, electronics/robotics, ICT), 2) introduce this innovative approach in collaborative capacity building measures for LSOs/BSOs, and 3) upgrade existing technological and business model oriented trainings by integrating the value chain perspective and adapting them for the qualification demand of Danube area target groups.

Regional mapping of strengths and weaknesses of current know-how of labour and entrepreneurs and future potential, opportunities and threats of regional labour markets in value-chain relevant industries (metal industry, machine building, engineering, electro industry, automation/robotics, ICT) has been performed, identifying relevant regional players and stakeholders as well as existing support instruments and summed up in a transnational benchmark analysis. Transnational benchmark analysis of labour market incl. identification of qualification and support demand (DT 1.1.3) as part of WP1, is one of the prerequisites for the development of the capacity building and qualification measures as well as for strategic project work and thus contributes to all three specific objectives. The transnational benchmark analysis as main result of A.T1.1 will be ready to be discussed at partnership level in SC meeting #1 in Ljubljana as a main reference for further project work. Specific labour market analysis in Activity T1.1 will be operationally managed by WP T1 co-leader INCSMPS, who will also prepare the according templates (D.T. 1.1.1. and D.T. 1.1.2), to be filled in by selected PPs. The project partners that have completed the joint template are from 9 countries (6 ERDF and 3 IPA counties): Austria, Bosnia

and Herzegovina, Croatia, Germany, Hungary, Montenegro, Romania, Serbia, Slovenia.

Regional analyses with focus on Labour market characteristics, upgrading of available regional analyses with focus on labour market characteristics and integration of IPA partner regions. Following a preliminary gap analysis of available studies from synergetic projects, initial labour market analysis will focus: 1) on integration of analysis of IPA partner countries which are currently under represented and 2) on detailed investigation of regional labour market characteristics (available digital skilled labour force, employment situation in target sectors, etc.). Collection of support instruments in place to develop labour markets in digitalization, partners from BSOs and LSOs, each within their scope of activities, will contribute to a cross-institutional overview of already existing funding schemes and non-financial support instruments targeted at strengthening digital transformation of regional industries and upskilling of qualified workers, incl. post-COVID-19 support measures. The country analyses will capitalize on available results from finalized or ongoing Interreg projects: Digitrans (DTP), Smart Factory Hub (DTP) and InnoPeer AVM (CE) “Regional Profiles” and “Benchmarking Study”.

Transnational benchmark analysis is structured in five chapters: 1. Country overview; 2. Detailed investigation of country labour market characteristic; 3. Support schemes and programs strengthening digital transformation and supporting qualification demand; 4.Main projects in place to develop labour markets in digitalization and 5. Main Support Organization and includes qualitative and quantitative studies. The methodology of qualitative studies includes two types of questions: answer scale questions and open- ended questions to identify at country level certain differences, vulnerabilities, opportunities, or comparative advantages. Standard descriptive statistics was used in order the transnational benchmark and the data was summarized using a combination of tabulated description, graphical description and statistical commentary. The main idea of the quantitative methodology consist in three levels of analysis: 1) the analysis of the main indicators, characteristic; 2) ranking of the states according to the selected indicators, characteristic already described and 3) a cluster analysis to build groups of similar countries in terms of economic and labour market performance, COVID indicators, financing schemes and main support organisations (LSOs and BSOs). For the

classification of nine countries by the objectives of the implemented projects it used content analysis (text mining) that is a solution for analyse unstructured data.

Results obtained from the qualitative and quantitative analyses emphasize differences, strengths and weaknesses of current know-how of labour and entrepreneurs and future potential, opportunities and threats of regional labour markets in value-chain relevant industries. In almost all countries the sectors that have seen the most improvement in employees' digital skills are ICT, electro industry electronics/robotics, finance, bank and insurance and trade.We observe a division of the countries into different groups acording to the level of digital competences, mismatch between labor supply and demand of digital skills, involvement of LSOs and BSOs, the speed with which start-ups reach digital maturity within their field of activity and start of the starts-up at digital maturity, intensity of support measures for young entrepreneurs / start-ups. The intensity of collaboration BSOs with LSOs varies between country and in the countries where there is closer collaboration these cooperate mostly to provide start-ups with needed support in the area of human resources (free movement of workers across the labour market and reduce the unemployment rate), internationalization, R&D and policies that can enhance competitive advantage on the market, institution building, cross-border cooperation (joint projects; joint funding initiatives).

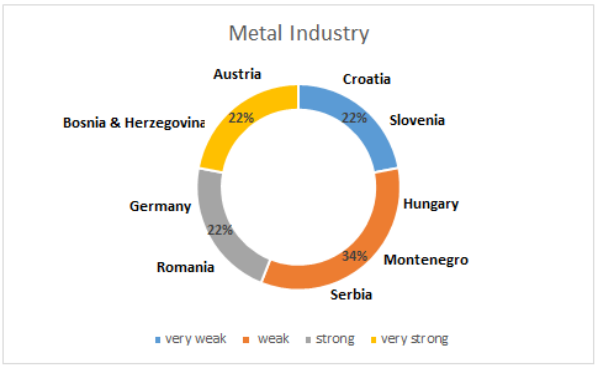
1. Country overview

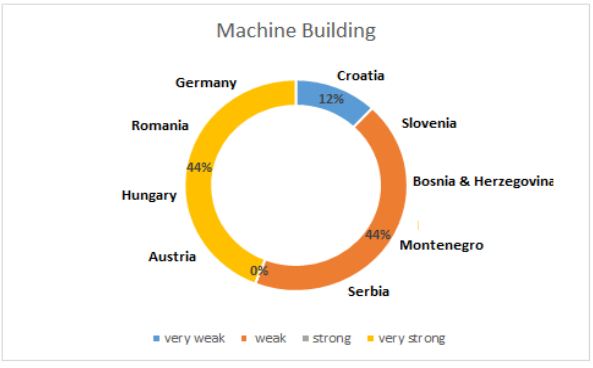
This chapter provides a qualitative analysis of the country background for understanding challenges of digital transformation regarding labour force demand and supply, entrepreneurial spirit, maturity of business digital transformation and of labour force digital skills, support demand, qualification gaps/company demand in target industries of the project.

1.1 Digital transformation across targeted activity sectors

The analysis of the degree of digitalization at the level of industries is very useful in the conditions in which we stand on the brink of a new industrial revolution, driven by new-generation information technologies such as software, cloud computing, big data and data analytics, robotics and 3D printing. They open new horizons for industry to become more adventurous, more efficient, to improve processes and to develop innovative products and services. In this context all countries should support through certain measures and link up private initiatives for the digitisation of industry and related services across all sectors and to boost investment through strategic partnerships and networks.

Digital transformation across targeted activity sectors





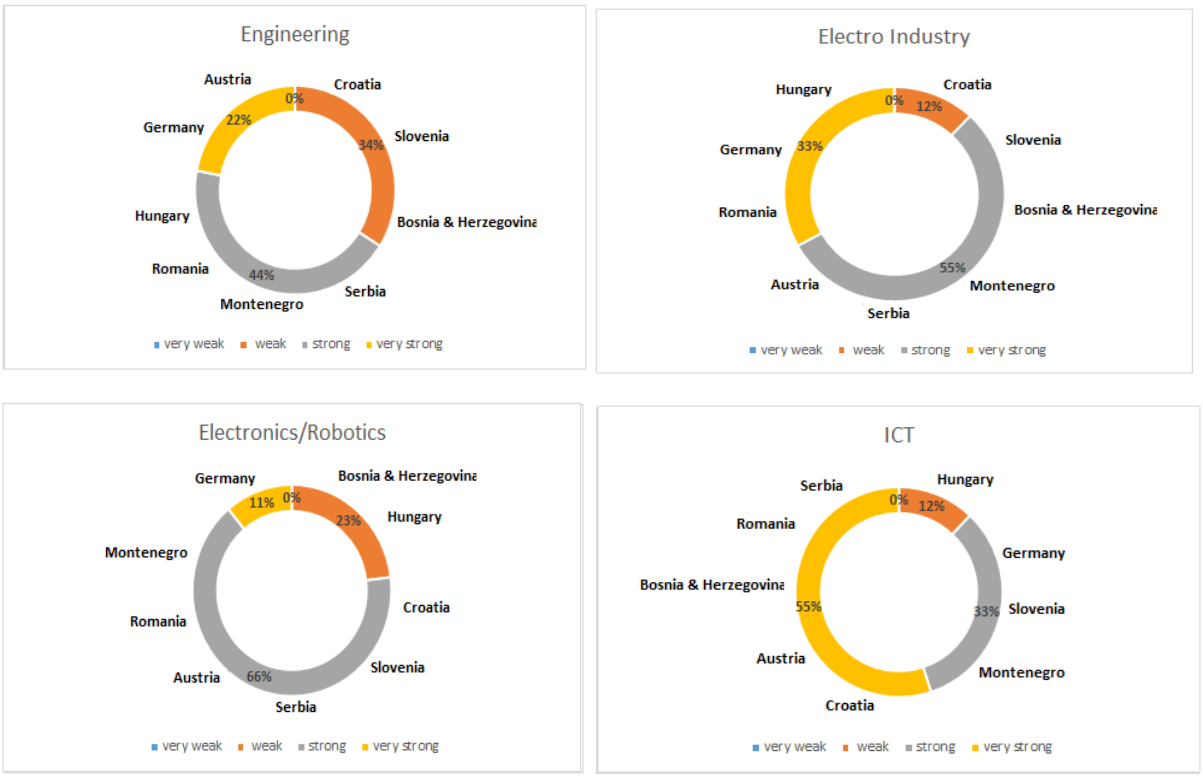


Figure 1.1.1 The development of the following industry sectors from an economic point of view

Analyzing the answers of the nine states regarding how strong some sectors of the industry are from an economic point of view, we can see that the strongest sectors are ICT and Electro industry. Strong sectors are considered Machine building, Electronics / Robotics and Engineering, and Metal industry is a sector considered weaker.

The Metal industry sector is considered to be weak and very weak developed in Croatia, Slovenia, Hungary, Montenegro and Serbia, while in Romania and Germany it is strong, and in Austria and Bosnia & Herzegovina it is considered a very strong sector.

The Machine building sector is considered weak and very weak in Croatia, Slovenia, Bosnia & Herzegovina, Montenegro and Serbia. The sector is very strong in Germany, Romania, Hungary and Austria.

The Engineering sector is considered strong and very strong in six states (Austria, Germany, Romania, Hungary, Montenegro and Serbia), and in Croatia, Slovenia and Bosnia & Herzegovina it is an economically weak sector.

The Electro industry sector is strong and very strong in eight countries, with the exception of Croatia where this sector is considered to be economically weak.

The Electronics/Robotics sector is considered weak only in Hungary and Bosnia & Herzegovina, while in the other seven states it is considered strong and very strong.

The ICT sector is considered strong and very strong in eight of the nine states, Hungary being the state that considers this sector to be economically weak.

At the country level, it can be seen that the strong and very strong economic sectors are:

In Germany (all sectors): Machine building, Electro industry, Electronics/Robotics, ICT, Engineering and Metal Industry.

In Austria (all sectors): Machine building, Electro industry, Electronics/Robotics, ICT, Engineering and Metal Industry.

In Romania (all sectors): Machine building, Electro industry, Electronics/Robotics, ICT, Engineering and Metal Industry.

In Montenegro (four sectors): Electro industry, Electronics/Robotics, Engineering and ICT

In Serbia (four sectors): Electro industry, Engineering, Electronics/Robotics and ICT

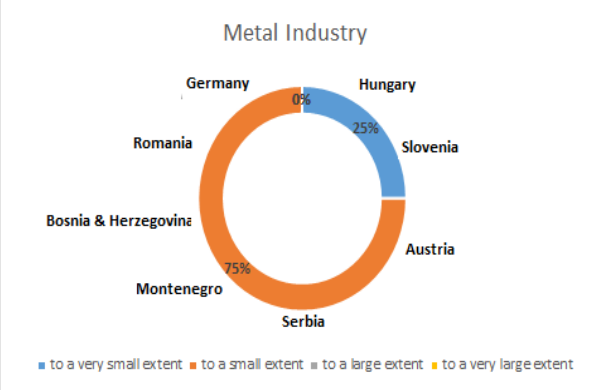
In Hungary (three sectors): Machine building, Electro industry and Engineering

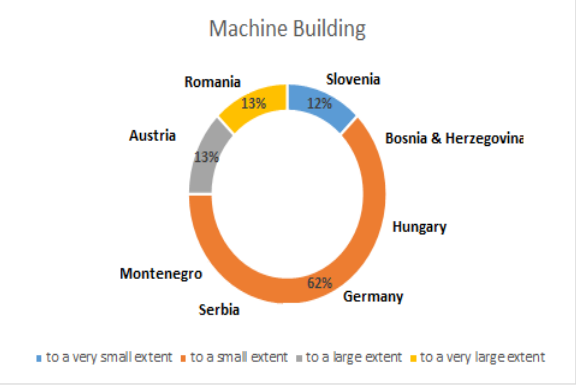
In Slovenia (three sectors): Electro industry, Electronics/Robotics and ICT

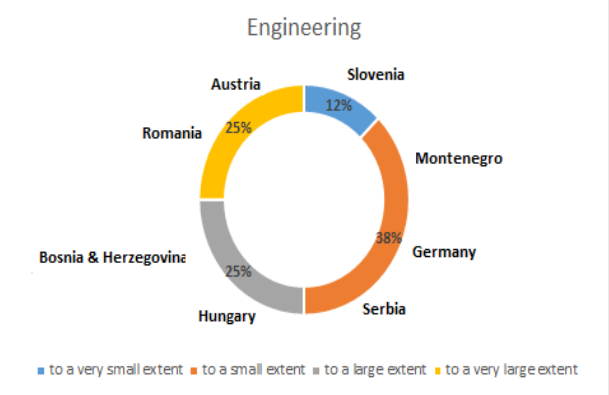
In Bosnia & Herzegovina (three sectors): Electro industry, ICT and Metal Industry

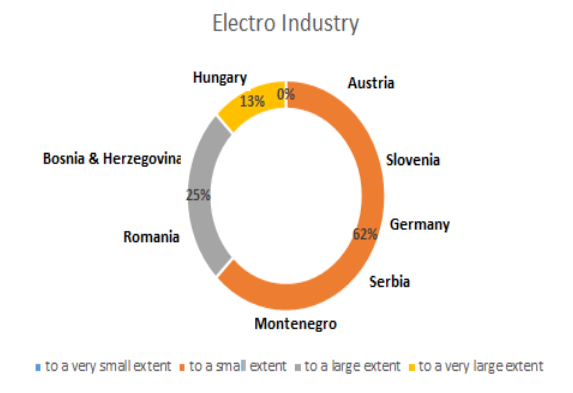
In Croatia (two sectors): Electronics/Robotics and ICT.

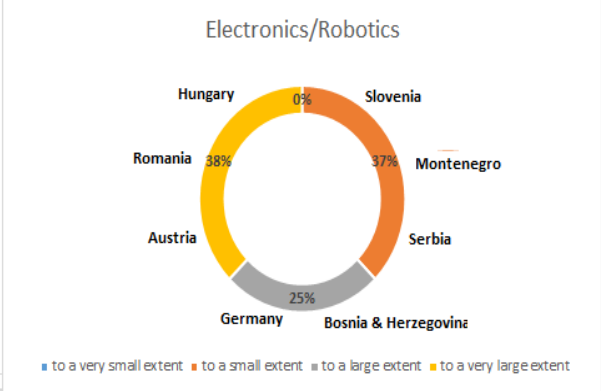
It can be seen that the ICT and Electro Industry sectors are the most developed in eight of the nine analyzed countries.











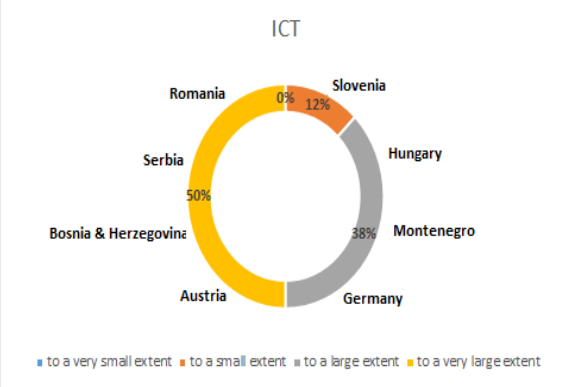


Figure 1.1.2 The extent to which the analyzed economic sectors have reached digital maturity[1]

Regarding the achievement of digital maturity, we can see that the sectors that have reached this maturity to a large and very large extent in most states are the ICT, Electronics / Robotics and Engineering sectors.

In the Metal industry sector, digital maturity is low and very low in all nine states analyzed, being a sector with the potential for the penetration of digitalization and, thus, the development of production and also of productivity.

In the Machine building sector, digital maturity is reached to a very large extent in Romania and to a large extent in Austria, while in the other states it is reached to a small and very small extent.

In the Engineering sector, digital maturity is reached to a large and a very large extent in half of the countries (Austria, Romania, Bosnia & Herzegovina and Hungary), while in other countries it is at a low level.

In the Electro industry sector, digital maturity is reached to a large and very large extent only in Hungary, Romania and Bosnia & Herzegovina. In the other states it is considered that digitalization can still be developed and used in this sector of economic activity.

In the Electronics/Robotics sector, digital maturity seems to be reached to a large and very large extent in five states - Austria, Hungary, Romania, Bosnia & Herzegovina and Germany).

[1] Croatia - No data available

In the ICT sector, only Slovenia considers that digital maturity has been reached to a small extent, while the rest of the countries consider that digital maturity has been reached to a large and very large extent.

At the country level, it can be seen that the digital maturity is reached to a large and very large extent in:

Romania (five sectors): Machine building, Electro industry, Electronics/Robotics, ICT and Engineering.

Austria (four sectors): Machine building, Electronics/Robotics, ICT and Engineering.

Hungary (four sectors): Electro industry, Electronics/Robotics, ICT and Engineering.

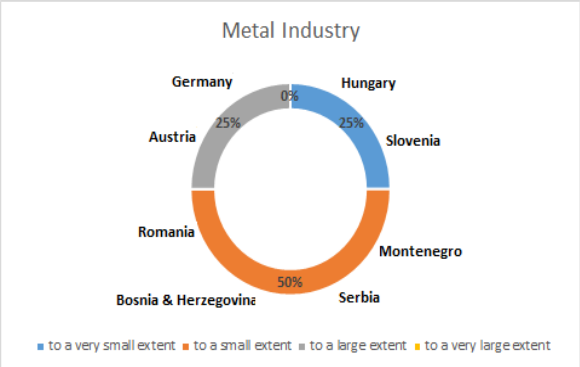
Bosnia & Herzegovina (four sectors): Electro industry, Electronics/Robotics, ICT and Engineering.

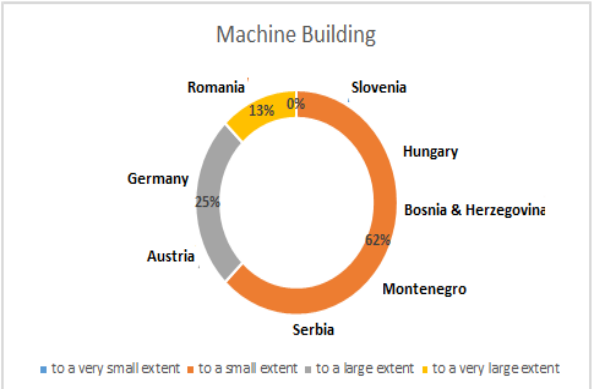
Germany (two sectors): Electronics/Robotics and ICT

Montenegro (one sectors): ICT

Serbia (one sectors): ICT

Slovenia (no sector)





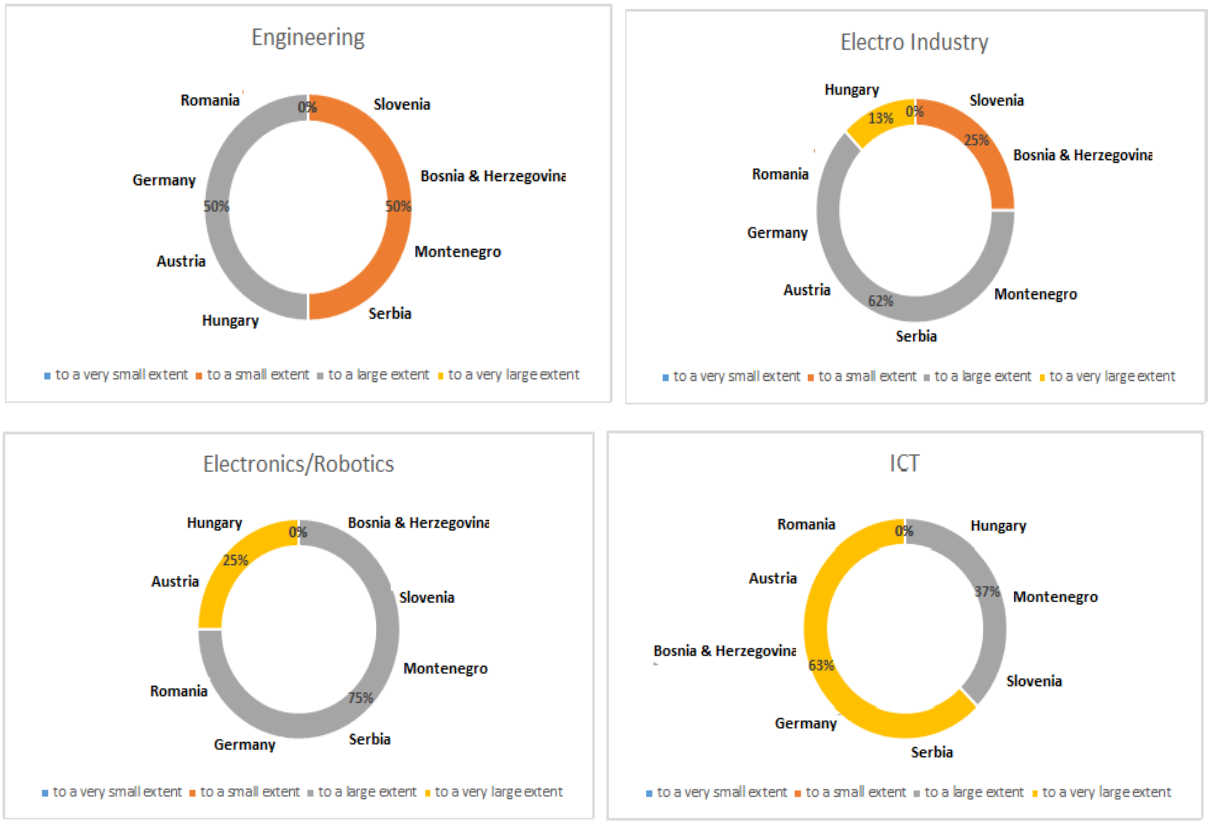


Figure 1.1.3 The extent to which the analyzed economic sectors experienced digital transformation[2]

Regarding the extent to which digital transformation has been experienced, we can see that the sectors that have experienced to a large and very large extent in most states are the ICT, Electronics / Robotics, Electro industry and Engineering sectors.

The Metal industry sector has experienced digital transformation to a large extent in Germany and Austria.

The Machine building sector has experienced digital transformation to a large and very large extent only in three countries - Romania, Germany and Austria.

[2] Croatia - No data available

The Engineering sector is the sector in which half of the countries have experienced digital transformation to a large extent (Romania, Germany, Austria and Hungary), and half to a small extent (Slovenia, Bosnia & Herzegovina, Montenegro and Serbia)

The Electro industry sector in most of the countries has experienced digital transformation to a large extent (Romania, Germany, Austria, Montenegro and Serbia), and only in Hungary has experienced digital transformation to a very large extent.

The Electronics/Robotics sector and ICT sector are the sectors that have experienced digital transformation to a large and very large extent in all the countries analyzed.

At the country level, it can be seen that the digital transformation has experienced to a large and very large extent in:

Austria (all sectors): Metal industry, Machine building, Electro industry Engineering, Electronics/Robotics and ICT.

Germany (all sectors): Metal industry, Machine building, Electro industry Engineering, Electronics/Robotics and ICT.

Romania (five sectors): Machine building, Electro industry, Electronics/Robotics, ICT and Engineering.

Hungary (four sectors): Electro industry, Engineering, Electronics/Robotics and ICT.

Montenegro (three sectors): Electro industry, Electronics/Robotics and ICT.

Serbia (three sectors): Electro industry, Electronics/Robotics and ICT.

Bosnia & Herzegovina (two sectors): Electronics/Robotics and ICT.

Slovenia (two sectors): Electronics/Robotics and ICT.

Relevant competences for digital transformation least developed in industrial sectors[3]

Regarding the relevant competences for digital transformation in industrial sectors we can say that companies, across all sizes, generally have a good overview of technologies, but the problems are related to the implementation and understanding the impact on economic activity.

Analyzing the information provided, we can conclude that all nine states consider that the least development competences for digital transformation are related to Digital technology infrastructure, Digital technology orientation, Digital technology adoption, Digital technology collaboration.

We can also observe some features for some states.

Germany: IT skills, social and emotional skills (communication and negotiation)

Romania and **Bosnia & Herzegovina**: Digital collaboration and training - working together towards common goals (Workshops, Work meetings with digital education experts, Virtual collaboration, Training courses)

Montenegro and **Serbia:** Analytical skills for each type of industry

Slovenia: Power skills, Cyber security skills, Industry 4.0 implementation skills.

The main challenges the targeted activity sectors are facing in the digital transformation process

The main common challenges related to the digital transformation process identified in most of the countries analyzed can be summarized as follows:

[3] Croatia - No data available

Human capital

- insufficient qualification of employees (**Germany**)
- the lack of qualified specialists (**Hungary**)
- the lack of digital skills (**Romania**)
- the lack of employee's motivation (involvement of employees from the start) (**Austria**)
- the lack of expertise to lead digitization initiatives (Slovenia)
- the lack of training on innovation and technology management and digital skills (Romania)

The budget

- high financial costs (Bosnia & Herzegovina)
- high capital costs (Germany, Bosnia & Herzegovina)

Companies' mind-set and culture

- do not understand what digital transformation is (Croatia, Montenegro, Serbia)
- the lack of integration of digitization into the entire company culture (not only in individual departments) (Austria)
- collaboration of R&D departments and institutions of knowledge (Slovenia)
- some business models and business processes of companies are not previously optimized (Montenegro, Serbia)
- technical integration into existing IT system (Germany)

The investment

- in digital transformation process (Slovenia)
- in human and technical capital (Hungary)

The lack of time

- to implement the digital transformation (Germany)
- to see the results of digitization (Austria)

The public policies

- the slow modernization of the regulatory framework by public administration (Croatia)
- public procurement for innovation (Romania)
- participatory methods in innovation governance (Romania)

The main challenges facing the business sectors in the digital transformation process are related to human capital, companies' mind-set and culture, the high financial and capital costs, the investment in digital transformation process, the lack of time to implement and see the digital transformations and the public policies that must support the private environment in the digitization process.

1.2 Digital maturity of the labor force and digital gap on the labour market

Digitalization, like any other type of technological change, will drive the progress of an economy. It potentially increases productivity in general and labour productivity in particular. This implies that either a given output can be produced with less input or with a given input a higher level of output can be achieved. Digital technologies could also trigger product and process

innovations, and push new products to enter the market. At the same time increases in productivity will facilitate lower prices.

Digital maturity of the labor force and digital gap on the labour market

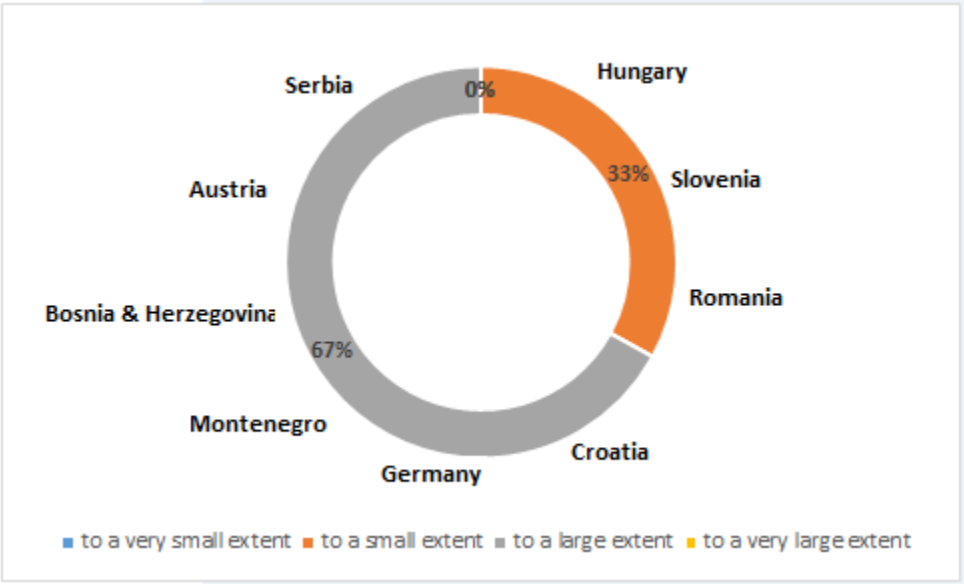


Figure 1.2.1 The extent to which the population is digitally skilled

Regarding the digital competences of the population, we observe a division of the countries into two different groups in which the population is digitally qualified, either to a small extent (Hungary, Slovenia and Romania) or to a large extent (Serbia, Austria, Bosnia & Herzegovina, Montenegro, Croatia and Germany). Thus, we have a smaller group, in which it is considered that the population is qualified in digital skills to a small extent, and here we find Hungary, Slovenia and Romania. Another majority group, consisting of Serbia, Austria, Bosnia & Herzegovina, Montenegro, Croatia and Germany, considers the population to be highly qualified in digital skills.

Demand and supply of digitally skilled labour (deficits)

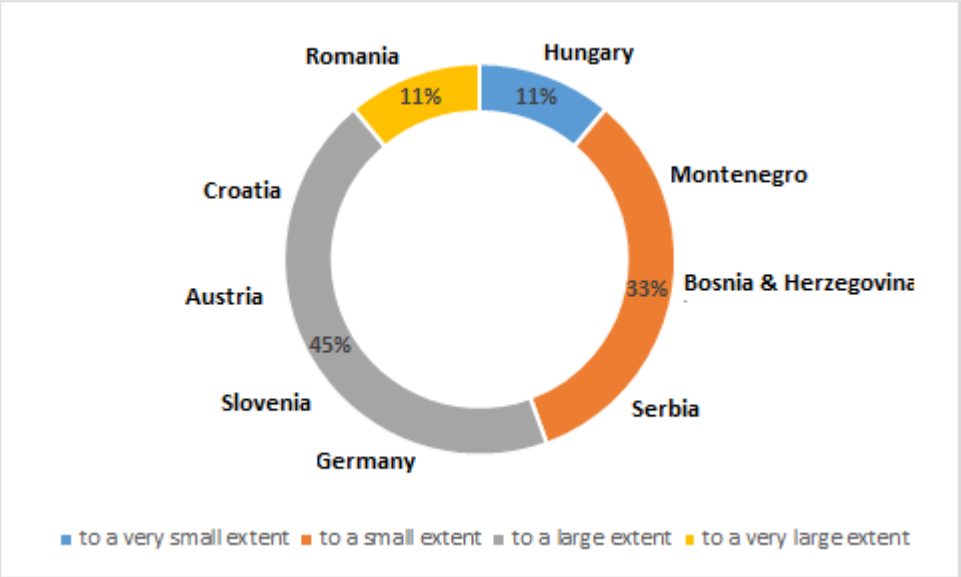


Figure 1.2.2 The extent to which there are mismatches between demand and supply of digitally skilled labour

Analyzing the correlation between the demand and supply of digitally skilled labor at the level of the nine countries analyzed, we notice that there is a group of four countries where the mismatch between supply and demand of digitally qualified labor is quite low (Hungary, Montenegro, Serbia and Bosnia & Herzegovina). There is also a group consisting of Germany, Slovenia, Austria, Croatia and Romania, which consider that there are to a large and very large extent mismatches between the demand and supply of work with digital qualifications. In Romania we have mismatches between supply and demand to the greatest extent, while at the opposite pole is Hungary, where discrepancies exist to a very small extent. **Basically, countries can be divided into two groups. A group of countries where there is a mismatch between labor supply and demand with digital skills to a lesser extent (Hungary, Montenegro, Serbia and Bosnia & Herzegovina) and a group where the mismatch between supply and demand is to some extent higher (Germany, Slovenia, Austria, Croatia and Romania).**

Sector / skills where there are mismatches[4]

The mismatches between demand and supply of digitally skilled labour are generally in the sectors ICT, electro industry, electronics / robotics and engineering. Other sectors are metal industry, machine building (Slovenia), textiles, agro-food, wood & furniture, health, public administration, urban transport (Romania), automation programming and cyber security (Bosnia & Herzegovina).

In almost all countries, the lack of digital and power skills is the main problem of the mismatch between demand and supply of digitally skilled labour.

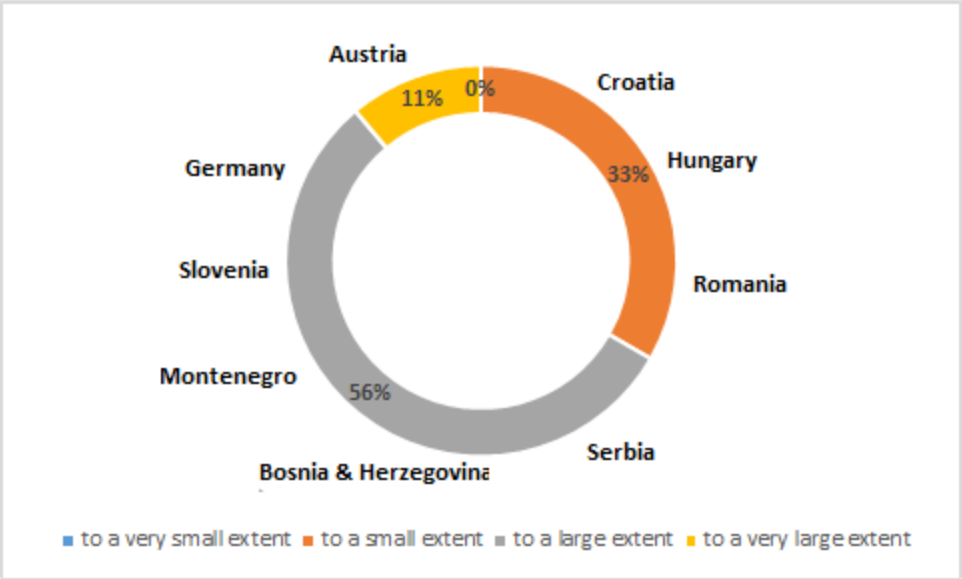


Figure 1.2.3 The extent to which there are trends in the evolution of the population, in terms of digital skills

[4] Serbia, Hungary, Montenegro - No data available

Trends in the evolution of the population regarding digital skills divide countries into two groups. A majority group in which the evolution of the population to acquire digital skills is higher (Germany, Slovenia, Austria, Montenegro, Serbia and Bosnia & Herzegovina), and a group in which the evolution towards the acquisition of digital skills of the population is lower (Hungary, Croatia and Romania). We note that Austria is the only country where the trends in the evolution of the population in terms of digital skills are the highest, while in Germany, Slovenia, Montenegro, Serbia and Bosnia & Herzegovina, trends in the evolution of the population in terms of digital skills are high. The trends are low in only three countries, namely Hungary, Croatia and Romania.

The sectors that have seen the most improvement in employees' digital skills

In almost all countries the sectors that have seen the most improvement in employees' digital skills are ICT, electro industry, electronics/robotics, finance, bank and insurance and trade. Other sectors are tourism and leisure industry (Austria and Montenegro), telecommunication companies (Hungary), creative industries (Romania), transport and logistics (Croatia), machine building (Germany), agriculture (Montenegro).

What makes some sectors more easily trainable or adaptable compared to others?

Sectors which support human resource development, companies with younger and highly-skilled work force which can be trained more easily and understand the concept and importance of digitization, change of position in

value chain and changes in the nature of the business. At the same time the new sectors are already well digitized (digital awareness), have good progress in digital transformation and are close to the customer and open to the foreign market.

In other words, if the sectors are accustomed to modern trends, willingness to improve, with younger and highly-skilled work force and are flexible to changes then these sectors can be more easily trainable or adaptable to digital transformation.

The effectiveness of LSOs in digital maturity of labour force and reducing the labour market digital gap

Services offered by LSOs (Labour Support Organizations)

In almost all countries LSOs offers consulting, financial support, qualification, networking and training to labor demand and labor supply.

In **Croatia** LSOs also offers, for their jobseekers, online services and tools that supports them in job seeking, carrier plan development and searching for the suitable employers.

In **Hungary** LSOs provide IT trainings for beginners.

In **Bosnia & Herzegovina** LSOs provide better working conditions for worker and better job opportunities.

In **Austria** LSOs also offers incentives for structural discrepancies.

In **Montenegro** LSOs provide just minor activities, basic ICT usage trainings - no significant activities in order to reduce the labour market digital gap.

In **Serbia** are varios NGO organisations and initiatives that invite representatives of the companies to take part and advance their skills.

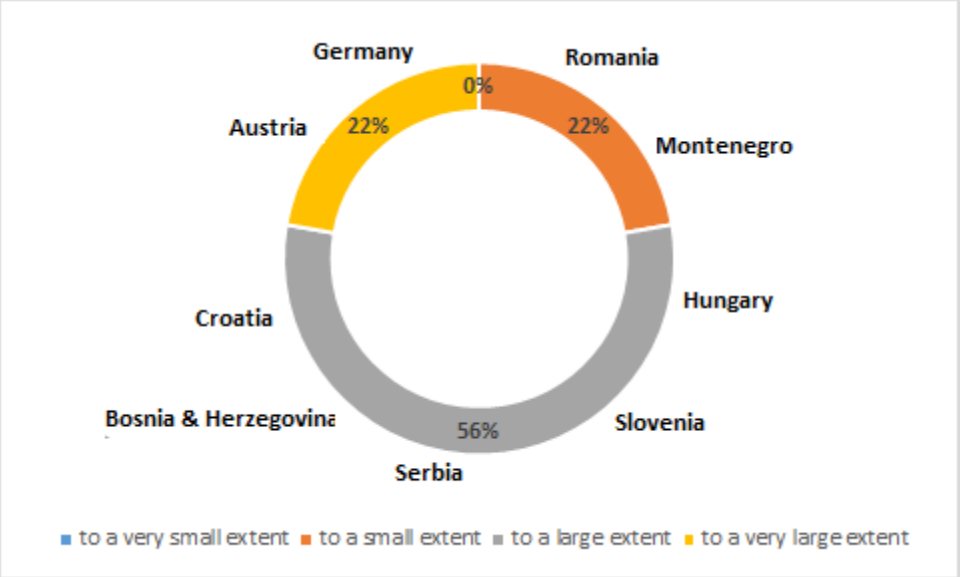


Figure 1.2.4 LSOs (Labour Support Organizations) involvement with the labor market

Regarding the involvement of Labor Support Organizations (LSOs) with the labor market, we can see that in most countries the involvement is made to a large extent (Croatia, Serbia, Slovenia, Hungary and Bosnia & Herzegovina) and to a very large extent in the most developed two states (Germany and Austria). The involvement of Labor Support Organizations with the labor market is lower only in Romania and Montenegro.

Industries that require the most support from LSOs[5]

In most countries the industries that require the most support from LSOs are metal industry, engineering and machine building.

In **Austria** require also the sectors of crafts & trades

[5] Germany and Croatia - Data not found

In **Romania** require also the sectors: textiles, agro-food, wood & furniture, health, public administration, urban transport

In **Bosnia & Herzegovina** require also wood industry

In **Serbia and Montenegro**, apart from ICT sector, all industries are in need of the same support.

What does the support consist of?[6]

In most countries the support from LSOs consisted of consulting, information, financial support, various training offers, placement of employees, qualification and skills development, especially digital skills.

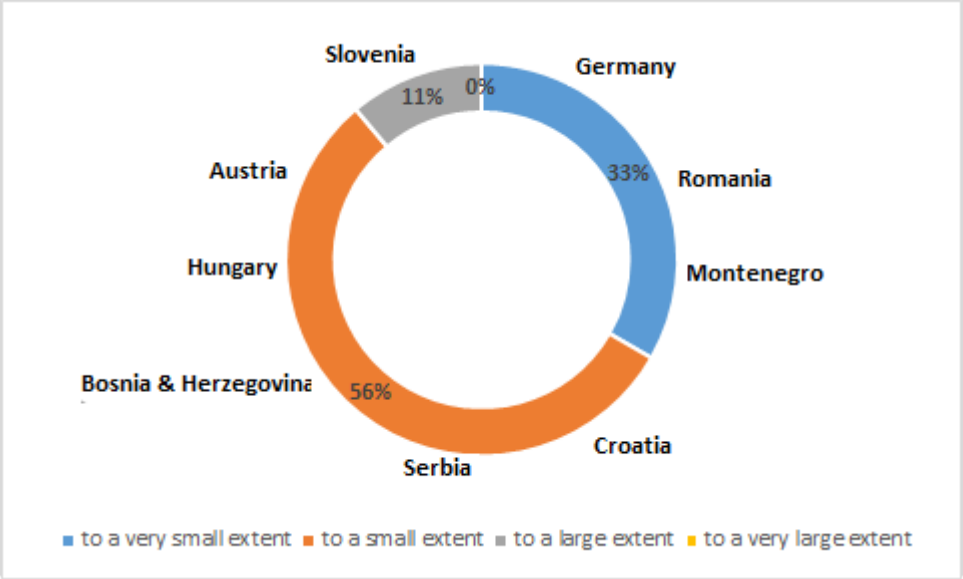


Figure 1.2.5 Variation of support provided by LSOs to industries

The variation in the support provided by Labor Support Organizations (LSOs) at the industry level was quite small in most countries (in eight of the nine countries analyzed). **There is a group in which the support given to**

[6] Croatia - No relevant data available; Serbia – n/a

industries by LSOs varied to a very small extent (Germany, Romania and Montenegro) and a group in which the variation was to a small extent (Croatia, Serbia, Hungary, Austria and Bosnia & Herzegovina). Slovenia is the only country where there have been significant variations in the support given to industries by LSOs.

1.3 Digitalized Business field

In generally digital transformation in business field is the integration of digital technology into all areas of a business resulting in fundamental changes to how businesses operate and how they deliver value to customers. Beyond that, it's a cultural change that requires organizations to continually challenge the status quo, experiment often, and get comfortable with failure. This sometimes means walking away from long-standing business processes that companies were built upon in favor of relatively new practices that are still being defined. During this period in business field the digitization it's a survival issue. In the wake of any crisis, an organization's ability to adapt quickly to supply chain disruptions, time to market pressures, and rapidly changing customer expectations has become critical.

The percentage of SMEs in total enterprises

In all countries the percentage of SMEs in total enterprises is over 99%.

The percentage of start-ups that have been founded 5 years ago or less

The percentage of „new" start-ups that have been founded 1 year ago or less.

The dropout rate within 5 years since founding

For the previous three questions we failed to get an overview because either the answers were missing (n/a) or the answers were very different (percentage or numerical values).

SMEs and start-ups

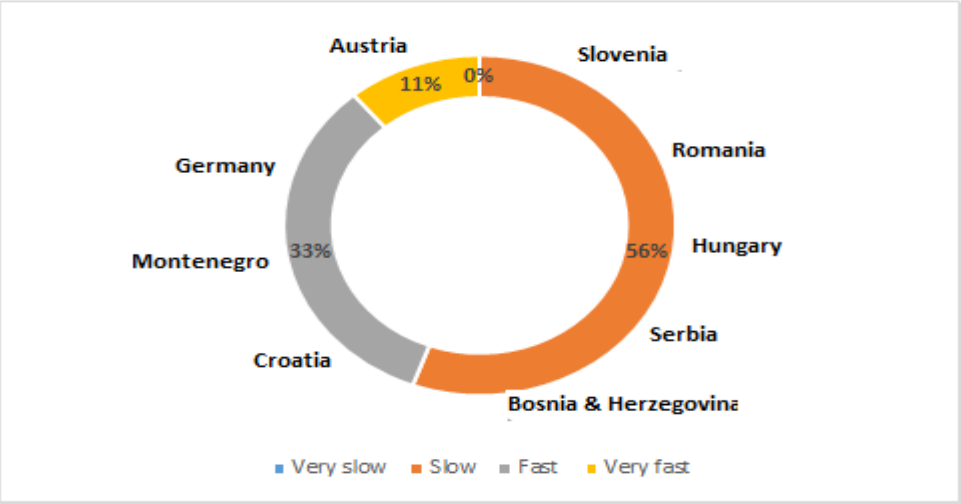


Figure 1.3.1 The fastness with which start-ups reach digital maturity within their field

The speed with which start-ups reach digital maturity within their field of activity is reduced in over half of the countries analyzed. Thus, it is observed that **in Slovenia, Romania, Hungary, Serbia and Bosnia & Herzegovina, start-ups reach digital maturity more difficult. In Montenegro, Germany and Croatia, digital maturity is reached by start-ups faster, while in Austria digital maturity is reached very fast.**

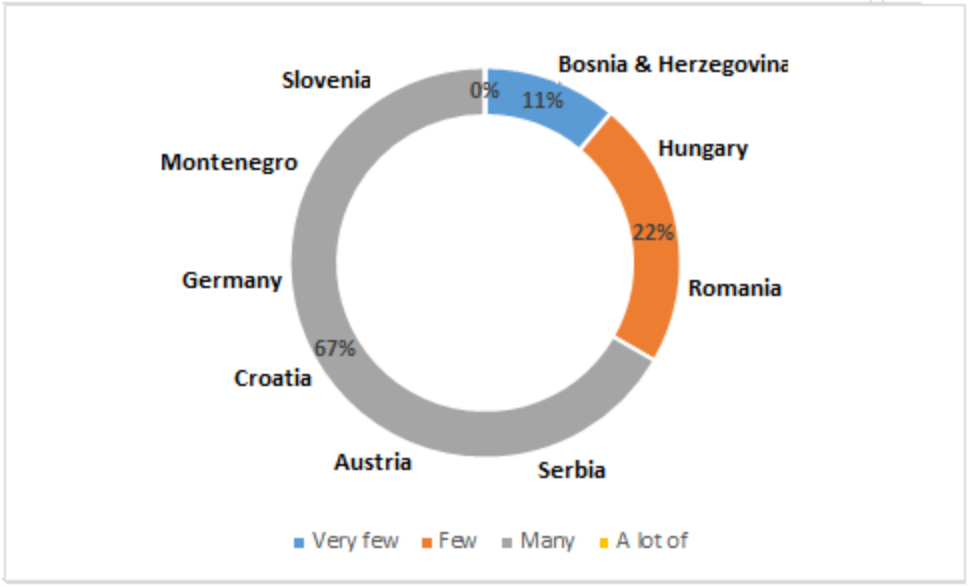


Figure 1.3.2 Start-ups starting at digital maturity

Most of the countries analyzed (over 60%) stated that many start-ups start their business with digital maturity. Thus, **in Slovenia, Montenegro, Germany, Croatia, Austria and Serbia, many of the start-ups start their economic activity having reached economic maturity. In Romania and Hungary, fewer start-ups start at digital maturity, while Bosnia & Herzegovina is the only country with very few start-ups that start working at digital maturity.**

Entrepreneurship environment

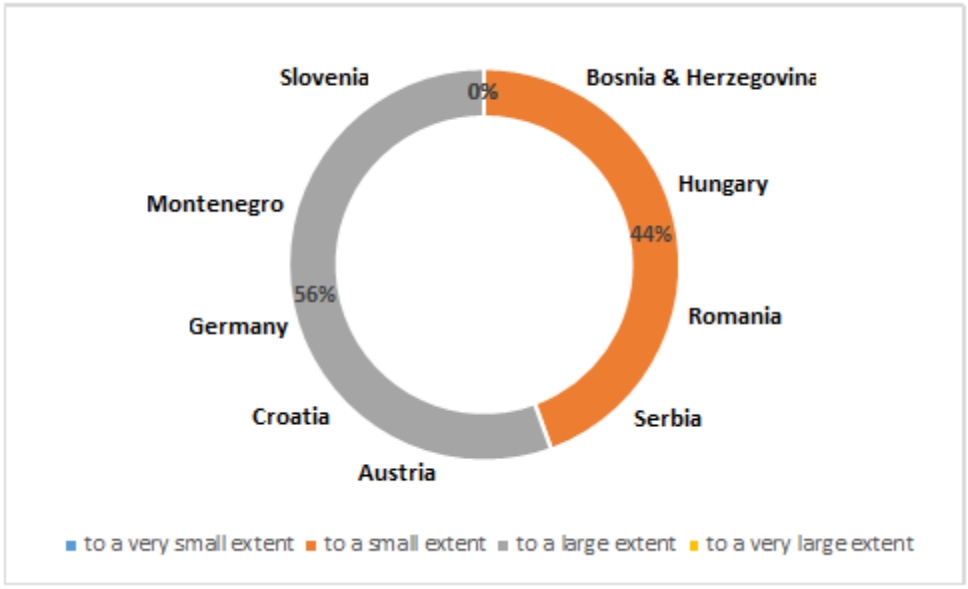


Figure 1.3.3 The extent to which the intensity of support measures for young entrepreneurs/start-ups is assessed

The intensity of support measures for young entrepreneurs / start-ups divides countries into two relatively equal groups. Thus, we can **distinguish a group of countries in which support measures for young entrepreneurs/ start-ups are taken with low intensity (Romania, Hungary, Serbia and Bosnia & Herzegovina) and a group of countries in which support measures have a high intensity (Germany, Austria, Croatia, Montenegro and Slovenia).**

The support measures specific for start-ups

In most countries the support measures specific for start-ups consisted of business consulting and support, grants for entrepreneurship development (for starting startups), helping entrepreneurs access networks, promoting cooperation between researchers and the private sector, mentoring programs, infrastructural support (space and equipment) and some measures to promote research and development.

In **Croatia** support measures for start-ups also included loans at subsidized interest rates, governments job preservation measures, tax relief for research and development projects and feasibility studies.

In **Hungary** government provide discounted tax formats for start-ups.

In **Slovenia** and **Austria** we find some specific measures for start-ups, as well in **Slovenia** - different calls from Slovenian Enterprise Fund, SPIRIT, Technology Park and in **Austria** - Venture-Capital, Business Angels.

In **Montenegro** and **Serbia** the government supports start-ups through a series of measures designed to encourage their development.

In **Romania** the government supports start-ups from public funds.

How effective are the BSOs in this regard?

Services offered by Business Support Organizations (BSOs)

In most countries the services offered by BSOs consist of consulting, promoting investment, issuing guarantees for bank credits to SMEs, administrating R&I grant schemes, co-financing consultancy services and financial support. BSOs also offer professional, technical and educational assistance for starting entrepreneurial projects and companies. BSOs provide business space on very favorable terms, networking and connections with other companies, investors / strategic partners, academic community, education, government and mentoring programs.

In **Bosnia & Herzegovina** BSOs also support preparation of SMEs for access to European Union.

In **Montenegro, Serbia** and **Romania** BSOs also provide different types of events, business incubators and business accelerators.

In **Hungary** BSOs offer digital audits and funds.

In **Austria** BSOs offer to companies settlement consulting and support in dealing with authorities.

Intensity of collaboration with LSOs[7]

In countries where there is closer collaboration (Germany, Slovenia, Austria and Bosnia & Herzegovina), BSOs and LSOs cooperate mostly to provide start-ups with needed support in the area of human resources (free movement of workers across the labour market and reduce the unemployment rate), internationalization, R&D and policies that can enhance competitive advantage on the market, institution building, cross-border cooperation (joint projects; joint funding initiatives).

In **Romania, Hungary** and **Montenegro** the collaboration between BSOs and LSOs is very low.

Industries that require the most support from BSOs[8]

In most countries the industries that require the business support are metal industry, machine building, electro industry and engineering.

In **Croatia** also require business support the accommodation services and catering industry, retail trade, wholesale trade, land transport, food production.

In **Romania** also require business support the textiles, agro-food, wood & furniture, health, public administration, urban transport.

In **Bosnia & Herzegovina** require business support the wood industry.

[7] Serbia – n/a

[8] Montenegro and Serbia – n/a

What does the support consist of?

In most countries the support consist in consulting, research transfer, networking, different types of events, training, contact with investors, incubation, acceleration, internationalization, infrastructural support (space and equipment), financial management.

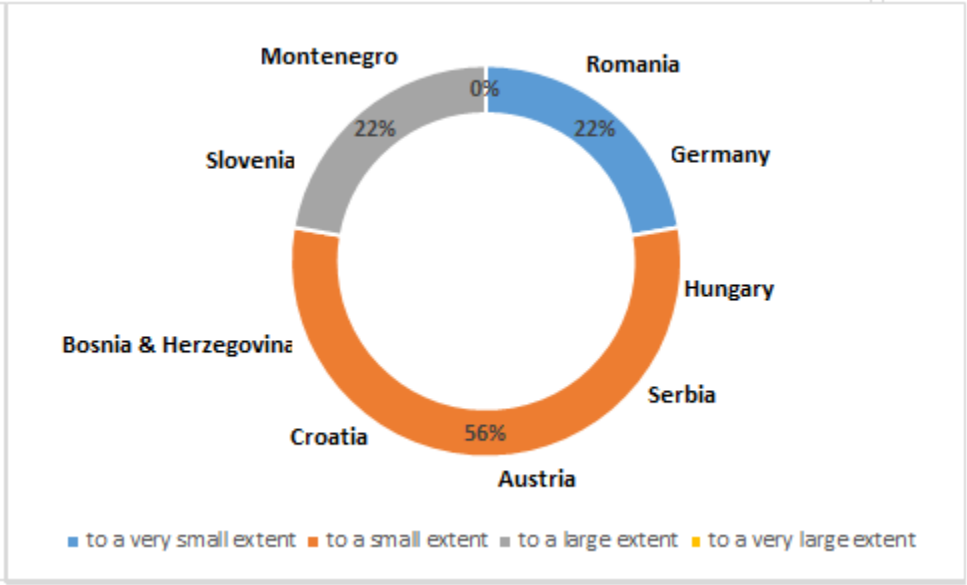


Figure 1.3.4 Variation of support provided by BSOs to industries

In most countries, the support given to industries by Business Support Organizations (BSOs) varies quite a bit. Thus, **the support provided to industries by Business Support Organizations (BSOs) varies to a very small extent in Romania and Germany and to a small extent in Austria, Hungary, Serbia, Croatia and Bosnia & Herzegovina. The variation in support for industries is higher in Montenegro and Slovenia.**

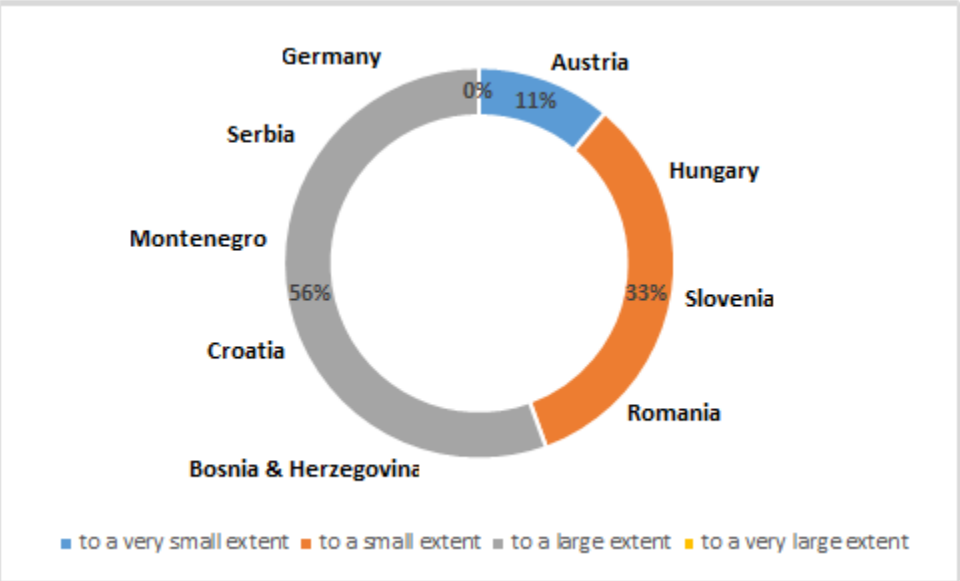


Figure 1.3.5 The extent to which start-ups contact BSOs for support

Regarding the extent to which start-ups contact Business Support Organizations (BSOs) for support and assistance, we note that countries are divided into two groups. **A group of countries where start-ups contact BSOs to a small (Austria) and very small extent (Hungary, Slovenia and Romania) and a group where start-ups turn to BSOs for support to a larger extent (Germany, Serbia, Montenegro, Croatia and Bosnia & Herzegovina).**

1.4 Trading and working with other countries

The trade with other countries is an important factor in raising living standards, providing employment and enabling consumers to enjoy a greater variety of goods. Thus we can say that the trade creates jobs, a lot of jobs depend on trade, and trade is critical to the success of many sectors of economy. Also the trade supports economic growth and business. The most companies that export are small and medium-sized businesses. At the same time the trade supports real manufacturing output. Vast productivity gains relating to increased use of automation and information technologies have helped many

manufacturers retain and in many areas enhance their global competitiveness in recent years.

Industries of focus

The main industries that are prone to international activity

In most countries the main industries that are prone to international activity are ICT, metal industry, machine building (automotive industry, manufacture of motor vehicles) and engineering.

There are also country-specific industries, as follows:

In **Croatia** the food and beverage sector, pharmaceutical production

In **Germany -** the chemical industry

In **Slovenia** - the electronics/robotics, electro industry

In **Austria** – the chemical industry, wood & furniture and food industry

In **Romania –** the chemical industry & plastics, agro-food sector, wood & furniture and textiles sector

In **Montenegro -** the tourism sector

In **Serbia -** the transport industry and the distribution of power equipment

The industries in the region that have the highest potential for success

In most countries the industries in the region that have the highest potential for success are almost the same as the industries that are prone to international activity, ICT, metal industry, machine building.

We also identify some country-specific industries.

In **Croatia -** manufacturing industry

In **Slovenia** - electronics/robotics

In **Germany** – chemicals and transport & telecoms

In **Austria -** engineering

In **Romania** – bio-economy, agro-food and medical services

In **Bosnia & Herzegovina** – wood sector

Potential to participate in global value chains

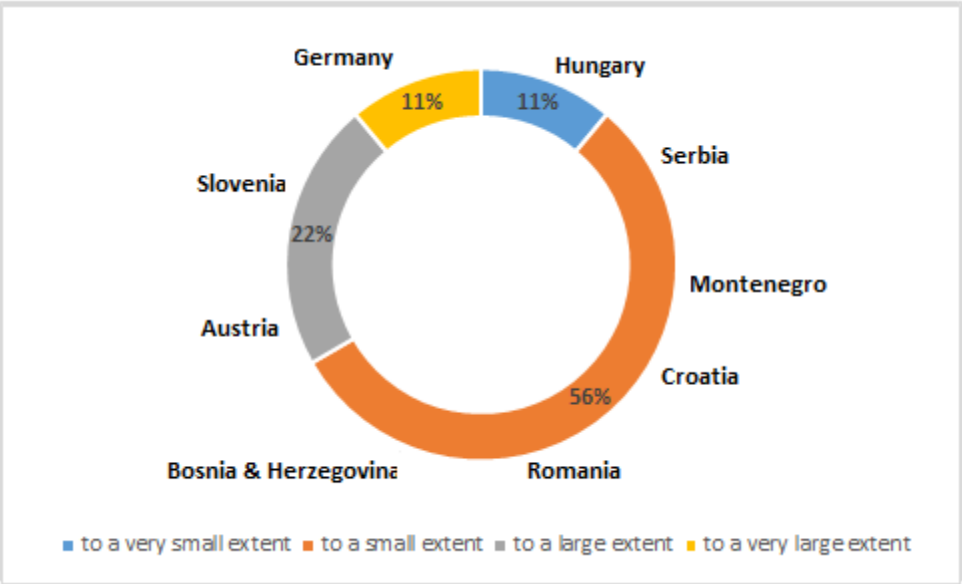


Figure 1.4.1 The extent to which there is sufficient infrastructure to support a GVC (Global Value Chain)

The GVC (Global Value Chain) support infrastructure is sufficiently large and very large in only three countries - Germany, Slovenia and Austria. We note that most countries have insufficient infrastructure to support GVC (Global Value Chain). **Hungary has the weakest infrastructure, and in Serbia, Montenegro, Croatia, Romania and Bosnia & Herzegovina the GVC support infrastructure is sufficient only to a small extent.**

What is included in the supporting infrastructure?[9]

In most countries the support infrastructure includes: locations, IT and communication infrastructure, transport infrastructure, international networking, clusters.

The infrastructure also includes government policies, cooperation between institutions of knowledge and businesses, R&D projects, industrial policy, consulting.

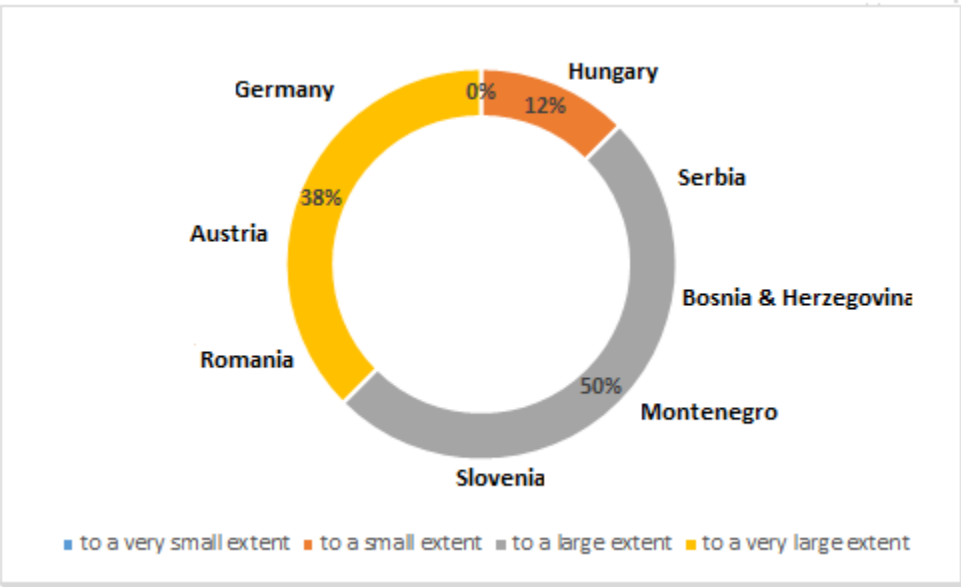


Figure 1.4.2 The extent to which suppliers are reliable in the area[10]

The reliability of bidders in the Danube area is quite high in most countries. **In Germany, Austria and Romania bidders in the Danube area are very reliable, while in Serbia, Montenegro, Slovenia and Bosnia & Herzegovina the reliability of bidders in the area is high. Hungary is the only country where bidders are less reliable.**

[9] Croatia, Hungary and Montenegro – n/a
[10] Croatia - No data available

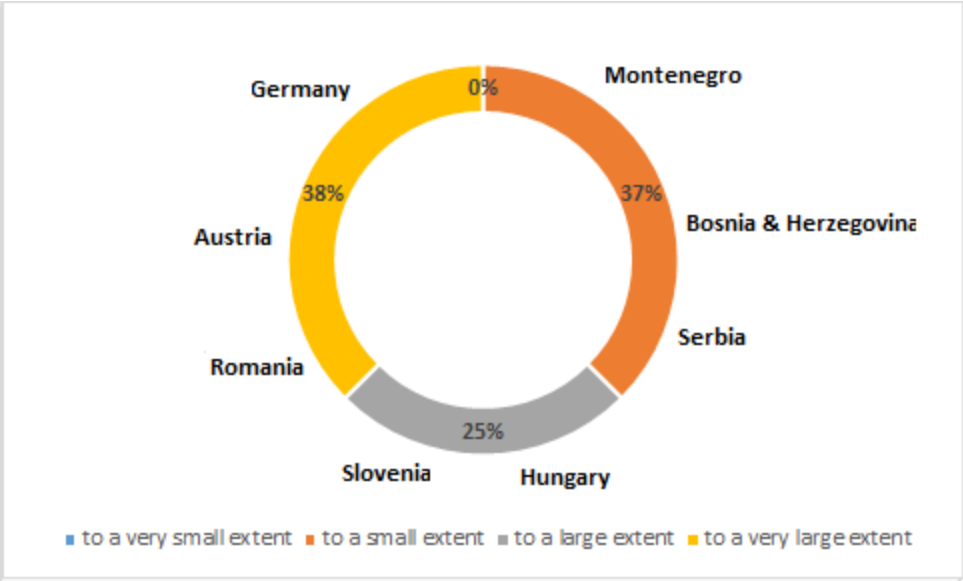


Figure 1.4.3 The extent to which the Danube area currently involved in international trade[11]

Most countries consider the Danube area to be involved in international trade to a large extent. **We note that the member countries of the European Union consider that the area is involved in international trade to a very large (Germany, Austria and Romania) and large extent (Slovenia and Hungary). Non-Europeam Union countries - Montenegro, Serbia and Bosnia & Herzegovina consider the area to have lower international trade links.**

Challenges

The main challenges that industries are facing in the considered regions

[11] Croatia - No data available

The main challenges that industries are facing in the considered regions can also be grouped into:

Human resources - high labour costs and insufficient flexibility of employment (**Croatia and Austria**), skilled labor shortage (**Germany, Romania and Bosnia & Herzegovina**)

Digitalization – low level of digitalization (**Romania, Slovenia**), lack of digital investments (**Croatia**)

Uncertainty of economic and regulatory policies - especially with regards to protection of money transfers and/or intellectual property rights and the lack of information and non-compliance with regulations (**Croatia**), international accounting and foreign laws and regulations (**Montenegro and Serbia**), COVID-19 situation and changes in value chains (**Slovenia**)

Internationalization - language barrier, geographical distances, cultural differences (**Austria, Montenegro and Serbia**), universal payment methods, currency rates and international company structure (**Montenegro and Serbia**)

Measures that could improve the current conditions in order to facilitate international participation

Measures that could improve the current conditions in order to facilitate international participation can be grouped into:

Better information and harmonization with the regulations - national regulations, EU regulations, USA regulations (**Croatia**), closer cooperation and adoption of international economic standards and improvement in EU accession process (**Montenegro and Serbia**)

Involvement of companies - increase in market presence, B2B meetings; showcases of companies in important markets (individual discussions with companies, presentation of products, technology, etc.); market sounding trip; learning journeys (best practice); delegation trips; exhibition presentations (**Austria**) keeping up with digital trends and investing in labor training and better political negotiation (**Bosnia & Herzegovina**), trainings (**Romania**), catering to e-mobility (**Germany**), organization of specific business networks and joint projects (**Montenegro and Serbia**)

Improving framework conditions and the business environment - raising resilience and responsiveness to external factors brought about by global megatrends and unexpected factors (**Slovenia**), building domestic technological competencies by attracting foreign investors and integration into global value chains (**Croatia**), Supporting local industries (**Bosnia & Herzegovina**), technology transfer and innovation and export promotion programs (**Romania**), economic reports for foreign markets; webinars / workshops on different topics; information and networking events, coaching and consulting (**Austria**)

1.5 COVID-19 Situation

As a consequence of the COVID-19 health crisis, and the subsequent global disruptions to aggregate supply and aggregate demand, in all countries the national production is expected to fall during the 2020, and first part of 2021. Different countries and territories are expected to experience divergent recovery paths, with the shape of that path for each location influenced by the interplay between their experience in containing and managing the spread of

COVID-19 and the underlying socio-economic characteristics of each country or territory. It is possible that the trade exposed countries may take proportionally longer to recover compared to less trade exposed states. In other words the longer the pandemic continues, the more damaging it becomes to each economy.

How much was the country affected? (economically - activity sectors and labour market)

The most affected sectors in a positive manner[12]

In all countries the most affected sector in a positive manner are ICT sector. Other sectors positively affected are pharmaceutical industry (**Croatia**), electro industry and electronics/robotics (**Slovenia and Austria**), food industry (**Hungary**), online commerce/trading (**Romania, Montenegro** and **Serbia**), engineering (**Germany**).

The most affected sectors in a negative manner[13]

In almost all countries the most affected sectors in a negative manner are machine building and automotive, tourism / hospitality sector/ leisure industry, food/catering service industry. Other sectors negatively affected are metal industry, electro industry, electronics/robotics (**Hungary, Slovenia and Austria**), textiles, wood & furniture (**Romania**), entertainment industry,

[12] Bosnia & Herzegovina – n/a
[13] Bosnia & Herzegovina – n/a

sports industry, retail stores, transport and forwarding industry (**Montenegro and Serbia**).

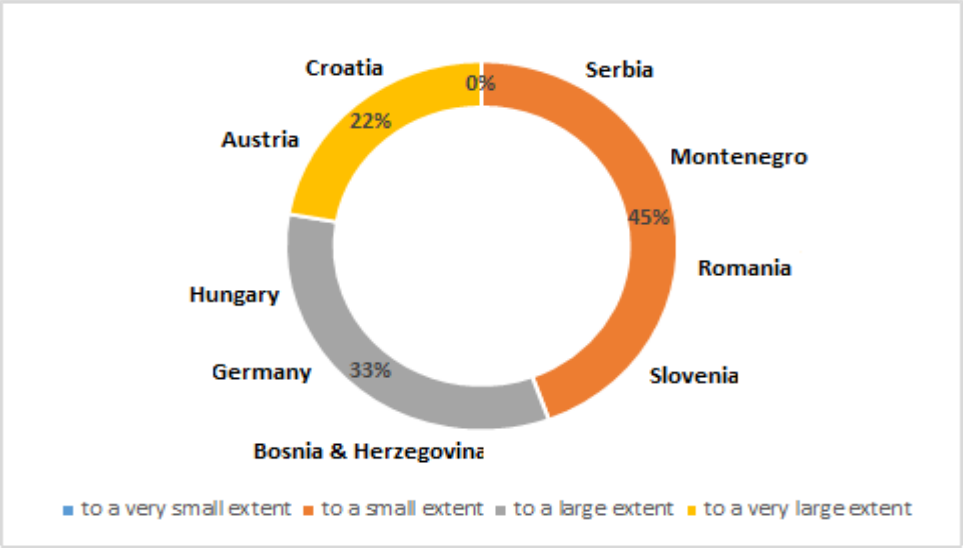


Figure 1.5.1 The extent to which COVID-19 has affected the digitization process

The economic and social situation caused by the COVI-19 virus has also affected the digitization process in over half of the countries analyzed. **The situation of COVID-19 affected the digitization process to a very large extent in Croatia and Austria, while in Germany, Hungary and Bosnia & Herzegovina the digitization was greatly affected. The digitization process was less affected in Romania, Serbia, Montenegro and Slovenia.**

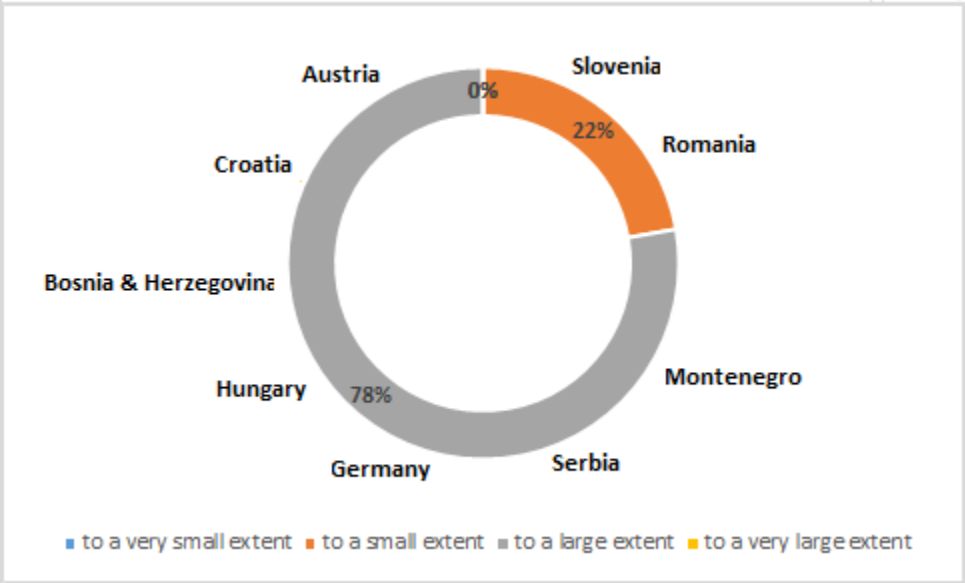


Figure 1.5.2 The extent to which the digital skills of the population have evolved over the COVID-19 period

The COVID-19 period had a positive effect on the digital skills of the population so that most countries considered that during this period these skills developed to a great extent (Austria, Croatia, Germany, Hungary, Serbia, Montenegro and Bosnia & Herzegovina). In Slovenia and Romania, the digital skills of the population developed less during the COVID-19 period.

How digitally matured SMEs were affected by COVID-19?[14]

The effects of COVID-19 on digitally matured SMEs were:

- **Positive** in **Hungary** (because SMEs had a chance to organize their work from home), **Germany** (if SMEs were still able to produce or offer their service), **Austria** (digital processes were available and therefore the transition was easier)

[14] Croatia and Bosnia & Herzegovina – n/a

- **Negative** in **Romania** (due to the reduction in the economic activities), **Montenegro and Serbia** (most of the SMEs were affected by Covid-19, regardless of their digitally maturation)
- In **Slovenia** – the SMEs were affected dependent on sector, so it is hard to answer for all SMEs that are digitally matured.

How non-digitally matured SMEs were affected by COVID-19?[15]

In almost all countries the effects of COVID-19 on non-digitally matured SMEs were negative.

In **Hungary** – the non-digitally SMEs have to face the barriers of the organization of the work during the pandemic situation.

In **Romania** - the non-digitally SMEs were affected negatively due to the reduction in the economic activities

In **Montenegro** - the non-digitally SMEs had major problems in work management, remote work, sustaining the operations.

In **Serbia** - almost all SMEs were affected by Covid19, regardless of their digitally maturation.

In **Austria** - companies hat to implement digital processes in a short time (high costs, lag behind digitally matured SMEs)

In **Slovenia** - SMEs were mostly affected negatively

In **Germany** - Both. Positively – forced to digitize. Negatively – financially under pressure.

[15] Croatia and Bosnia & Herzegovina – n/a

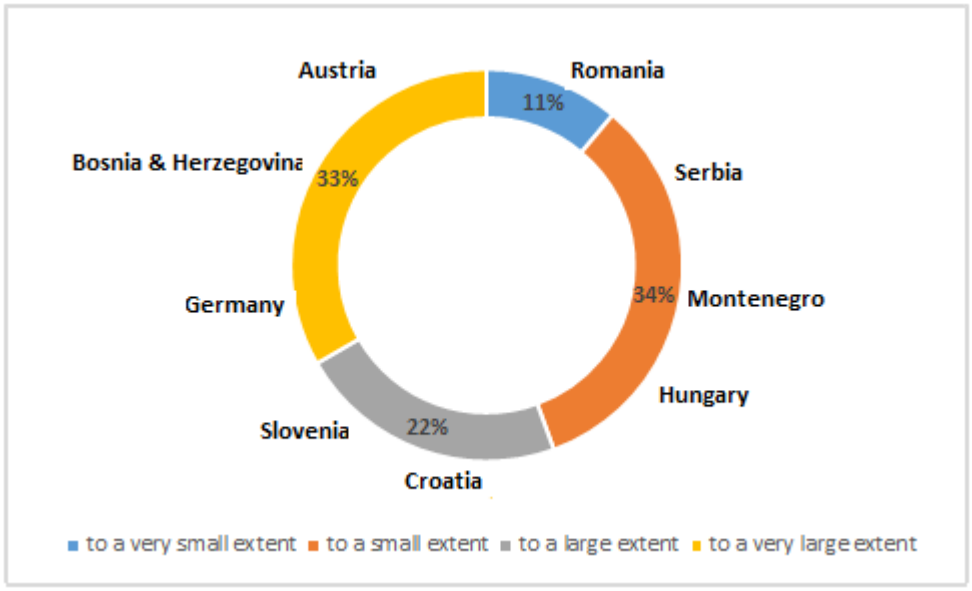


Figure 1.5.3 The extent to which LSOs and BSOs had a higher demand for support during COVID-19

Given the requests for support addressed to the Labor Support Organizations (LSOs) and Business Support Organizations (BSOs) during the COVID-19 period, countries are divided into two groups. **Thus, we have a group of countries where requests for support to LSOs and BSOs have been in large and very large numbers (Austria, Germany, Slovenia, Croatia and Bosnia & Herzegovina) and a group of countries where requests for support were fewer (Romania, Serbia, Montenegro and Hungary).**

What relevant restrictions/measures are in place?

The sectors most affected by COVID-19 restrictions[16]

[16] Bosnia & Herzegovina – n/a

In almost all countries the most affected sectors in a negative manner are machine building and automotive, tourism / hospitality sector/ leisure industry, food/catering service industry. Other sectors negatively affected are metal industry, electro industry, electronics/robotics **(Hungary, Slovenia and Austria),** textiles, wood & furniture **(Romania),** transport sector **(Croatia),** entertainment industry, sports industry, retail stores, transport and forwarding industry **(Montenegro and Serbia).**

The sectors more targeted by the BSO/LSO or governmental support measures under the conditions of COVID-19[17]

In almost all countries the BSO/LSO or governmental measures are targeted to all economic sectors.

In **Croatia** - government measures were mostly used by employers in the sector of accommodation, food and beverage preparation and service, transport and storage.

In **Slovenia** - the measures were mostly targeted to manufacturing sectors, service sector

In **Hungary** - the measures were mostly targeted to metal industry, machine building, electronics/robotics, electro industry

[17] Bosnia & Herzegovina – n/a

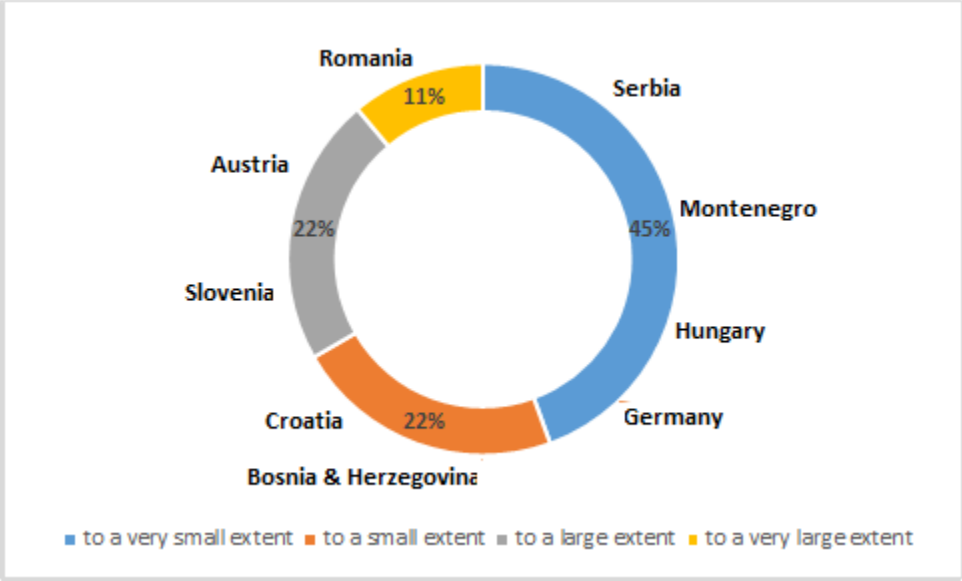


Figure 1.5.4 The extent to which COVID-19 restrictions hindered the development of other sectors

In most countries, the restrictions imposed as a result of COVID-19, at least in the first part of 2020, did not significantly affect other sectors. **In Romania, COVID-19 restrictions affected the other economic sectors to a very large extent, while in Austria and Slovenia the other sectors were affected to a large extent. COVID-19 restrictions have affected to a very, very small extent the other sectors of activity in Serbia, Montenegro, Hungary, Germany, Croatia and Bosnia & Herzegovina.**

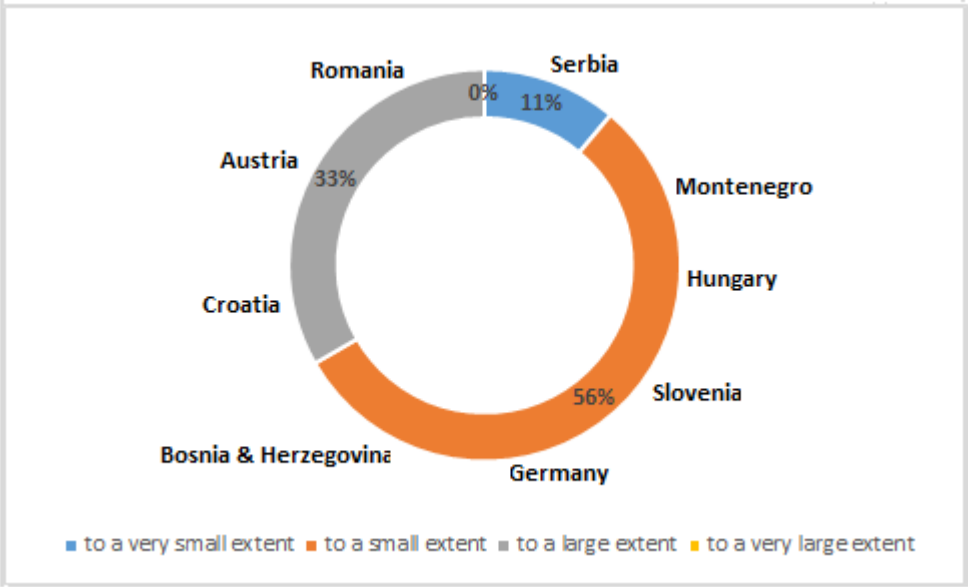


Figure 1.5.5 The extent to which there are measures that promote digitalization in order to facilitate remote work and address COVID-19

Obviously, the COVID-19 crisis has come with many changes in the field of digitalization and remote work. However, we note that **in most of the countries analyzed, measures to promote digitalization to facilitate work from home as a result of COVID-19 were taken in a small (Montenegro, Hungary, Slovenia, Germany and Bosnia & Herzegovina) and very small extent (Serbia). Only in Romania, Austria and Croatia the measures to promote digitalization and facilitate work fromhome have been taken to a greater extent.**

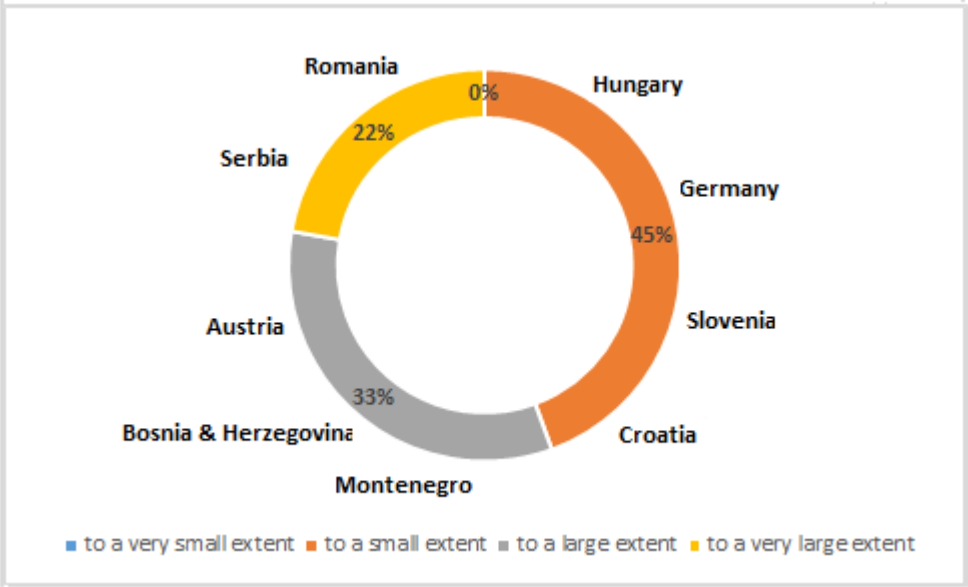


Figure 1.5.6 The extent to which the restrictions affect the BSOs' and LSOs' ability to offer their services

The restrictions of COVID-19 have more or less affected the ability of BSOs 'and LSOs' to provide support and services to those in difficulty on the labor market and in business. Thus, **we identify a group of countries where COVID-19 restrictions have affected the ability of BSOs 'and LSOs' to provide their services to a large extent (Austria, Montenegro and Bosnia & Herzegovina) and to a very large extent (Serbia and Romania). There is also a group of countries in which the activity of BSOs and LSOs has been affected only to a small extent by COVID-19 restrictions (Hungary, Germany, Slovenia and Croatia).**

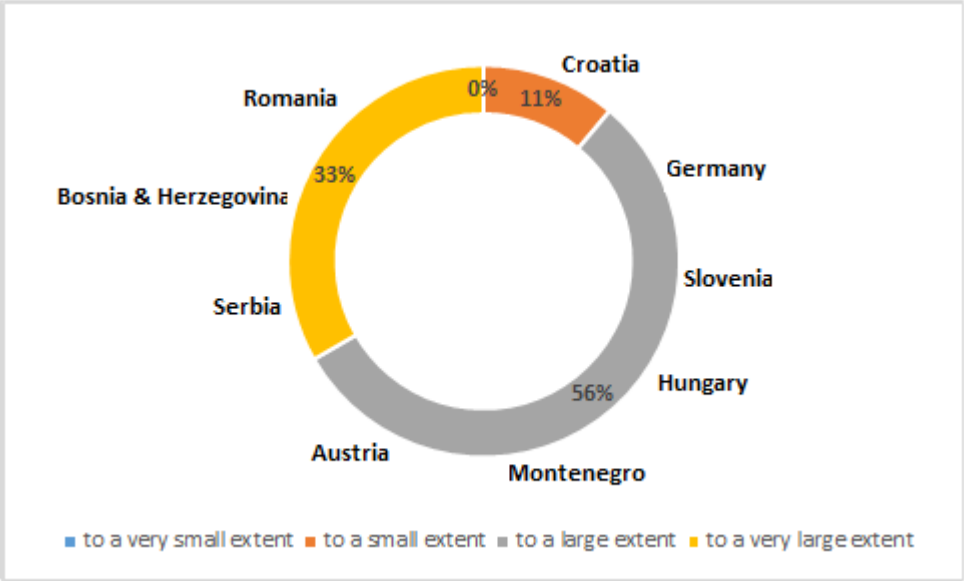


Figure 1.5.7 The extent to which the restrictions affect International Trade across different regions

Obviously, the restrictions imposed as a result of COVID-19 affected international trade and obviously also the Danube area, by reducing trade flows and by decreasing economic activity and thus production. **The vast majority of countries, with the exception of Croatia, considered that the COVID-19 restrictions affected international trade between regions to a large and very large extent.**

Transnational benchmark analysis of labour market including identification of qualification and support demand

2. Detailed investigation of country labour market characteristics

2.1. General labour market indicators

The comparative analysis of the general economic situation, with emphasis on the labour market, for the states included in the study was performed on three levels: first, the analysis of the main macro-economic indicators for the year 2019; then the ranking of the states according to the selected indicators already described; and finally, a cluster analysis was used to build groups of similar countries in terms of economic and labour market performance.

Regarding the *economy dimension and level of development*, four main indicators were selected to describe the nine countries in the project: population's growth rate, rural population (as percentage of total population), GDP per capita and employment in Industry and Services.

In 2019 compared to 2018, the growth rate of the population registered positive values only in three of the nine countries analysed, namely, Germany, Austria and Slovenia. The most significant population declines were registered in Bosnia and Herzegovina, Romania, Serbia and Croatia. This evolution can be explained by a negative natural increase, but also by a more pronounced emigration phenomenon in emerging countries. Thus, we can consider that the developed countries attract the population of less developed states, this phenomenon being specific in the context of globalization and free movement of the population.

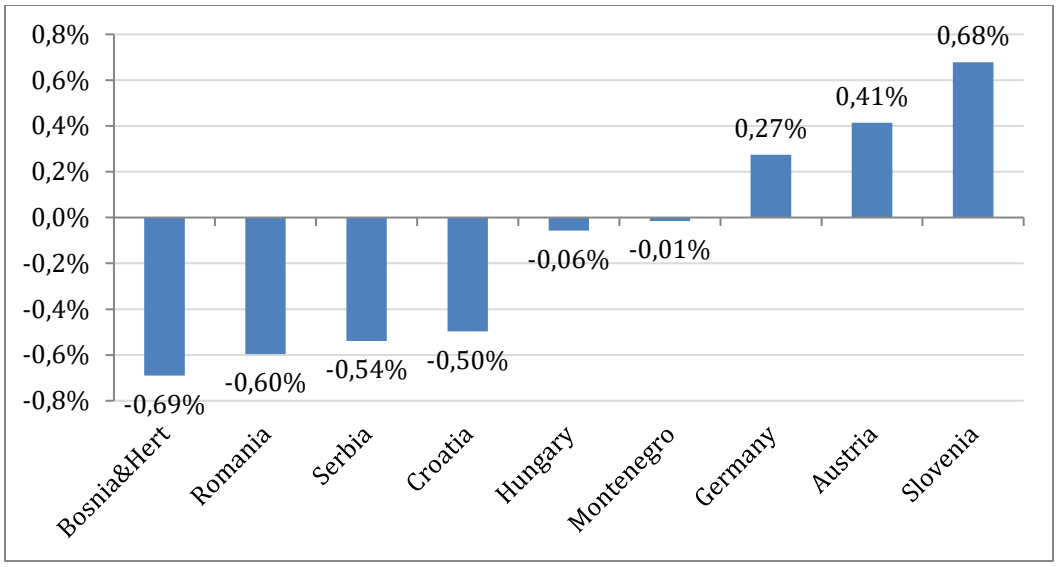


Figure 2.1. Population's growth rate, 2019 versus 2018 (%)

The share of the rural population in the total population registers values of over 40% in six states, namely Bosnia and Herzegovina, Romania, Slovenia, Serbia, Croatia and Austria. Germany and Hungary have the lowest values of the share of the rural population in the total population, values close to the European Union average (29% in 2019). According to economic theories, a higher share of the rural population generally increases the risk of poverty and social exclusion, material depravity and school dropout, especially in emerging countries. In 2019 compared to 2018, the general trend was the decrease of the rural population in total population at the level of all the analysed states.

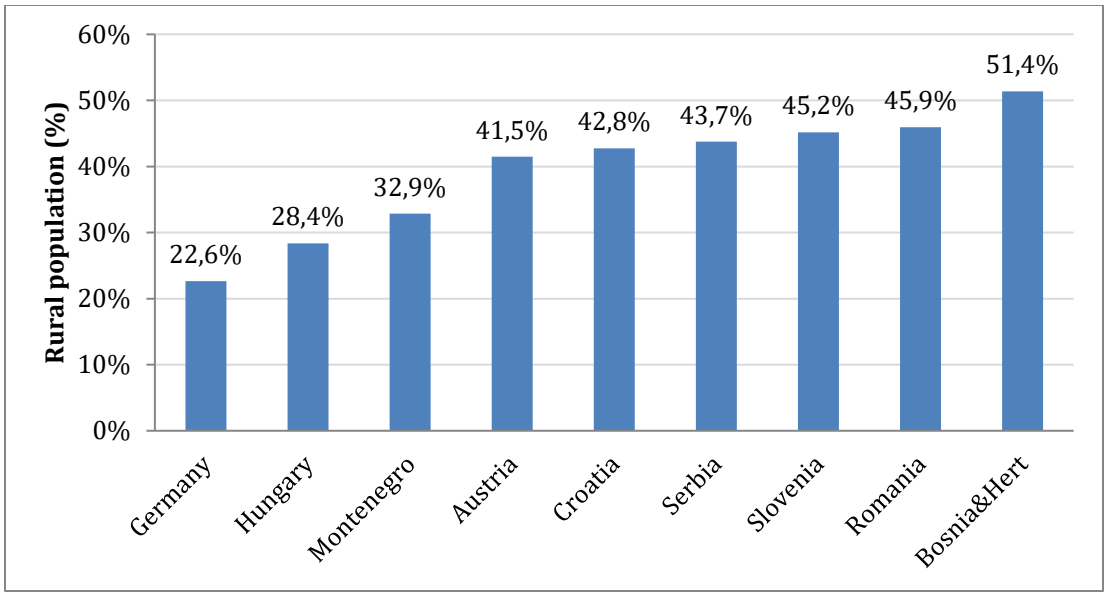


Figure 2.2. Rural population (% from total population), 2019

Depending on the GDP values per capita we can group the analysed states into three groups. The first group consists of Germany and Austria which are developed countries with GDP per capita values of over $50,000. The second group consists of Slovenia, Hungary, Romania and Croatia, with GDP per capita values of over $28,000, and the third group consists of Montenegro, Serbia and Bosnia and Herzegovina, with GDP per capita values below $20,000.

Following the growth rate of the GDP/capita in 2019 compared to 2018, we observe significant increases among the states with lower values of GDP/capita, which supports the catching-up process of these states. The significant growth is also an effect of the growing integration of these states into the European and world market.

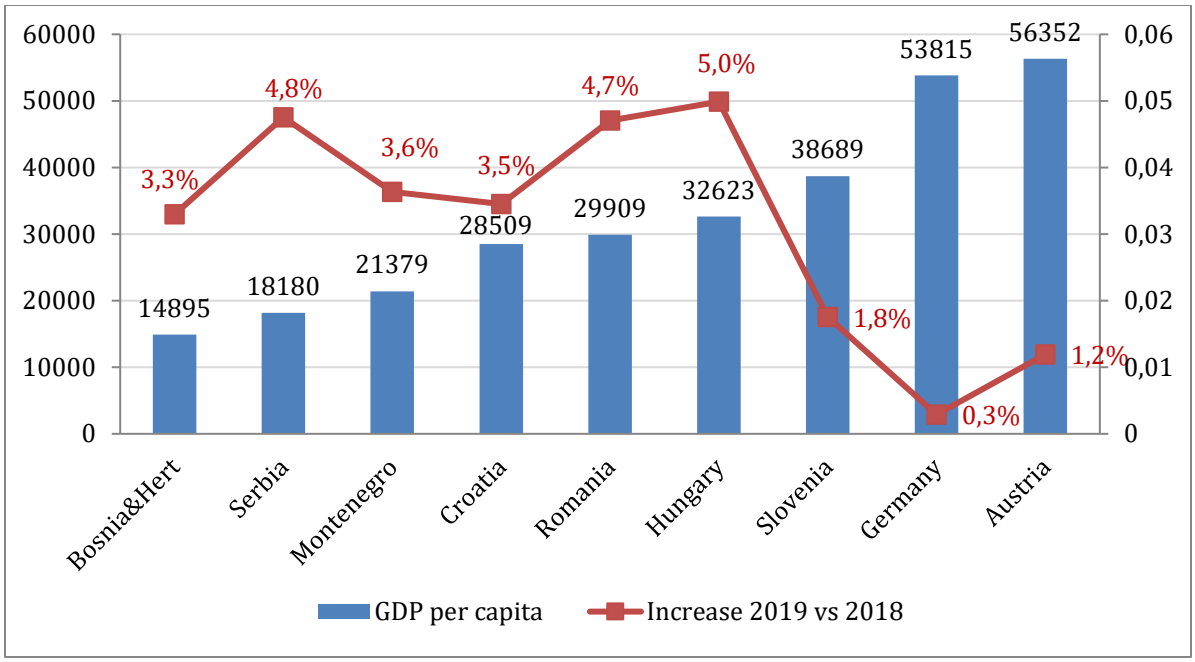


Figure 2.3. GDP per capita in 2019 (in PPP, constant 2017 international $) and the percentage change compared to 2018

The shares of the population employed in the main sectors of economic activity provide information on the type of economy, as well as the types of policies that can be applied for economic development. Obviously in recent years the global trend is to increase the share of the population employed in Services to the detriment of Industry and especially Agriculture.

Depending on the share of the population employed in Industry we can group the states into two groups - those with values over 30% (Slovenia, Bosnia and Herzegovina, Hungary and Romania) and those with values over 20% (Germany, Serbia, Austria and Croatia). Montenegro has the lowest share of the employed population in Industry (19.1%).

Given the share of the population employed in Services we can group the analysed states into three groups - those with values over 70% (Austria, Germany and Montenegro), those with values over 60% (Slovenia, Hungary and

Croatia) and those with value over 50% (Bosnia and Herzegovina and Serbia). Romania has the lowest share of the population employed in Services (48.2%).

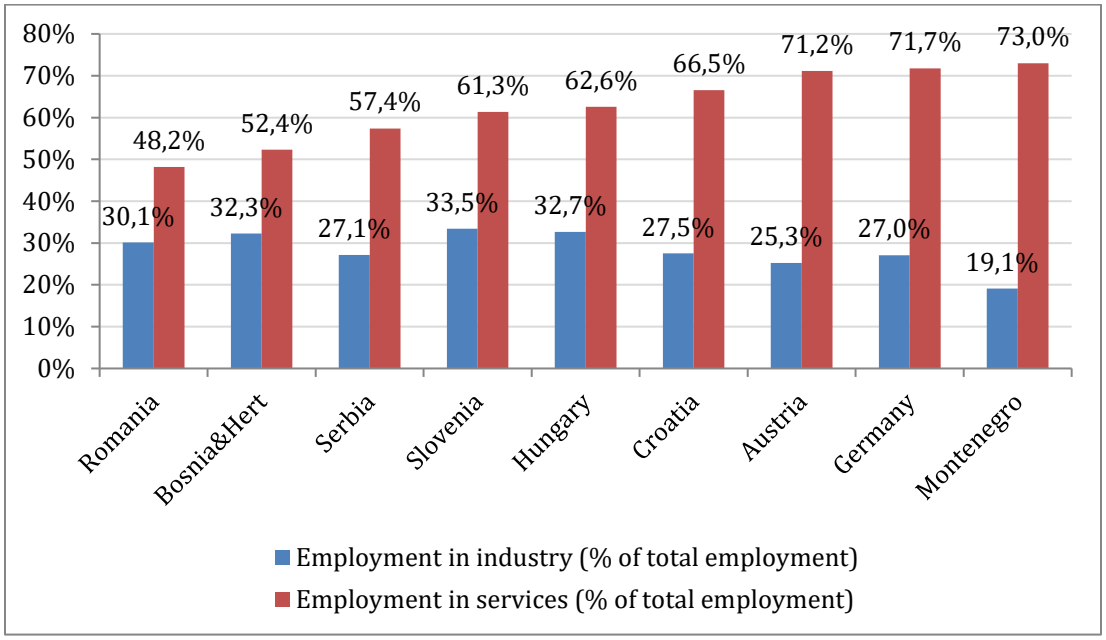


Figure 2.4. Employment in Industry and in Services, 2019

The competitiveness of the economy was assessed using the indicators: exports of goods and services (as percentage of GDP) and GDP per person employed.

The values registered for the exports of goods and services in GDP at the level of the analysed countries show that exports are not necessarily influenced by the size of the economy, but rather by the type of economy, i.e. an economy based on an export of high value-added products. Depending on the share of exports in GDP, there is a group of two states (Slovenia and Hungary) with values over 80%, a group of three states (Croatia, Serbia and Austria) with values over 50% and a group of three other states (Montenegro, Romania and Bosnia and Herzegovina) with values around 40%.

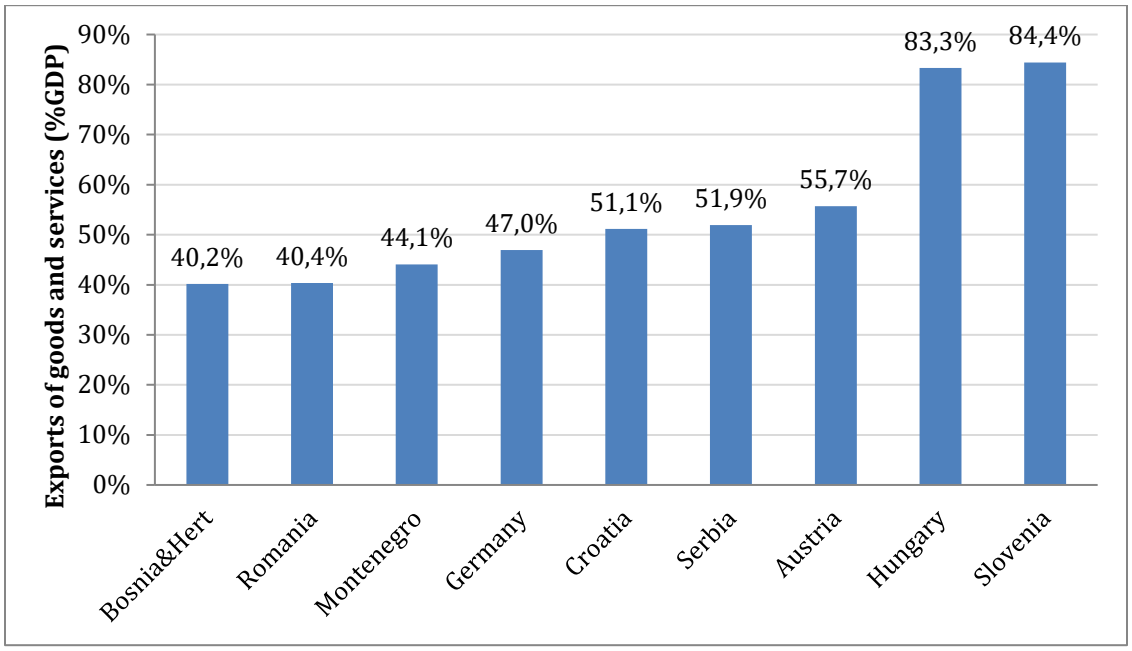


Figure 2.5. Exports of goods and services (%GDP), 2019

The GDP per person employed is an important factor in increasing the added value in the production process and implicitly an important element in increasing the competitiveness of a country. The value of GDP per person employed groups the analysed states in the same categories as the value of GDP/ inhabitant. In the first group we have the developed countries and founding states of the European Union, Germany and Austria, with GDP values/ person employed of over $100,000. In the second group we find mainly emerging economies that joined the European Union after the 2000s, Slovenia, Hungary, Romania and Croatia, with values of over $60,000. In the third group we have Montenegro, Serbia and Bosnia and Herzegovina, emerging states that are not members of the European Union, with values of over $40,000.

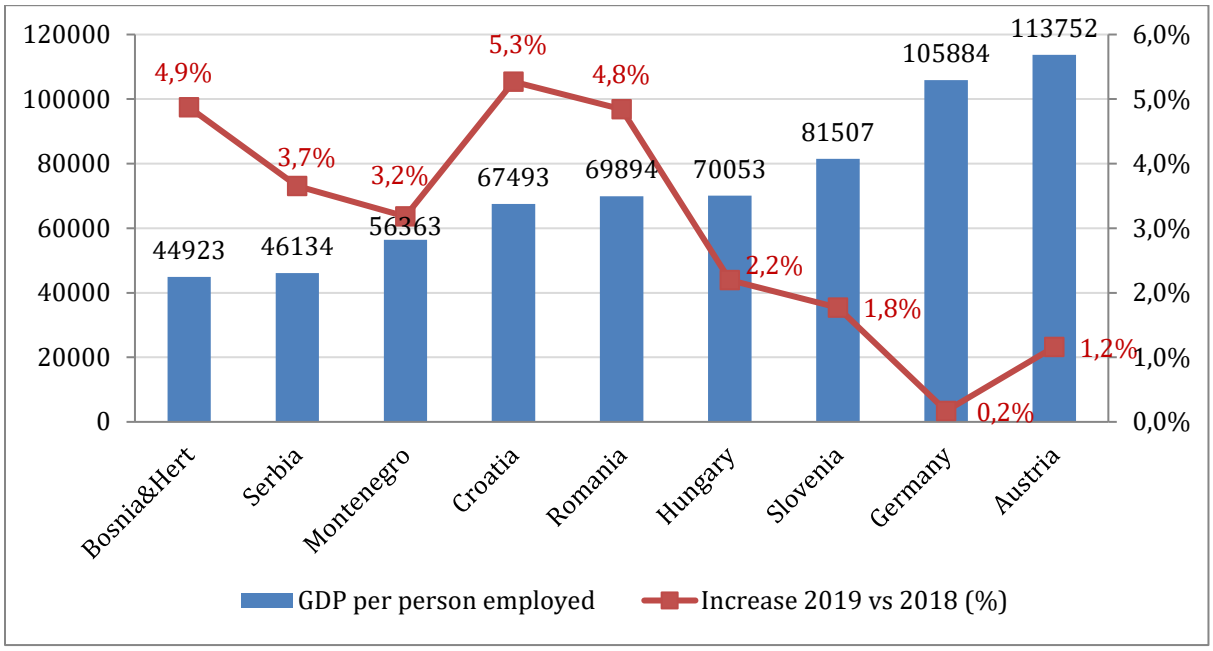


Figure 2.6. GDP per person employed (constant 2017 PPP $), 2019

The ***labour market performance*** of the nine states included in the study was analysed taking into account the following indicators: employment rate, unemployment rate and the share of youth not in education, employment or training (NEET's).

The employment rate is a very important macroeconomic indicator that shows at the level of a country and how the available labour resources are used. The employment rate is an indicator sensitive to the economic cyclicality and depends on the structure of economies. According to ILO employment rate data, the lowest value is in Bosnia and Herzegovina (37.8%), while the rest of the countries analysed can be grouped into two groups. Countries with an employment rate of over 50% (Germany, Austria, Slovenia, Hungary and Romania) and states with an employment rate of over 40% (Serbia, Croatia and Montenegro). Analysing the evolution of the employment rate in the period

2018-2019, we notice that it had a growth trend at the level of the six states out of the nine analysed, with the exception of Romania, Serbia and Bosnia and Herzegovina.

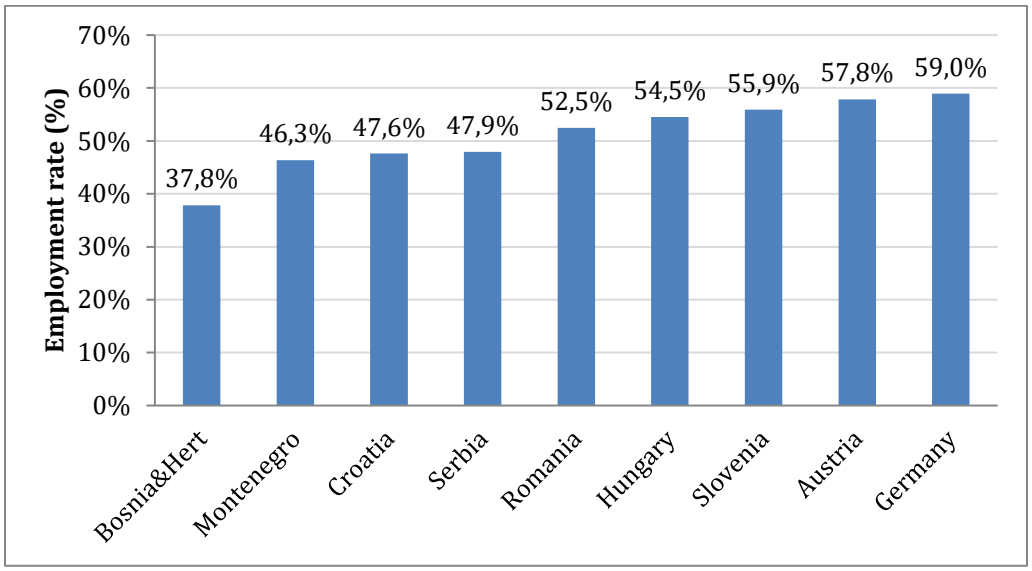


Figure 2.7. Employment to population ratio, 15+, total (%) (modeled ILO estimate), 2019

Being complementary variables, the unemployment rate usually registers the highest values in the states where there are low employment rates. Thus, the highest unemployment rates, according to the ILO data, are recorded in Bosnia and Herzegovina, Serbia and Montenegro. We notice that there is also a group of five states (Germany, Hungary, Romania, Slovenia, and Austria) that register values of the unemployment rate below 5%. The unemployment rate is a very sensitive indicator to changes in economic conditions, and its decrease can be achieved through a comprehensive process of retraining and reintegration into the labour market, even in conditions of digitalization and technologicalization of economic activities.

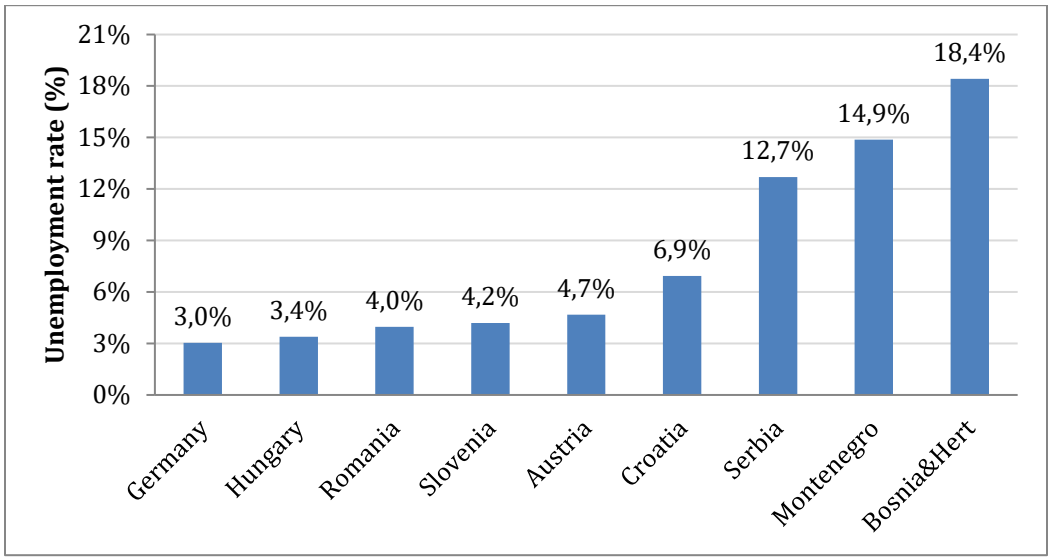


Figure 2.8. Unemployment, total (% of total labour force) (modeled ILO estimate), 2019

The NEET's rate (share of youth not in education, employment or training) is an important indicator of the labour market that provides a range of information on vulnerabilities among young people, unemployment, early school leaving and discouragement of labour supply. In this context, the indicator needs to be given more attention given that young people are generally the most affected by the various changes in the structure of the economy, but also the most open to innovation and digitalisation.

Slovenia registered the highest level of the NEET's rate (21.2%). The other states can be divided into two groups, the group of countries with two-digit NEET's values (between 11% and 17.3%), namely Croatia, Austria, Serbia, Montenegro and Romania, and the group of countries with one-digit NEET's values (between 5.7% and 7.1%) - Hungary, Bosnia and Herzegovina and Germany.

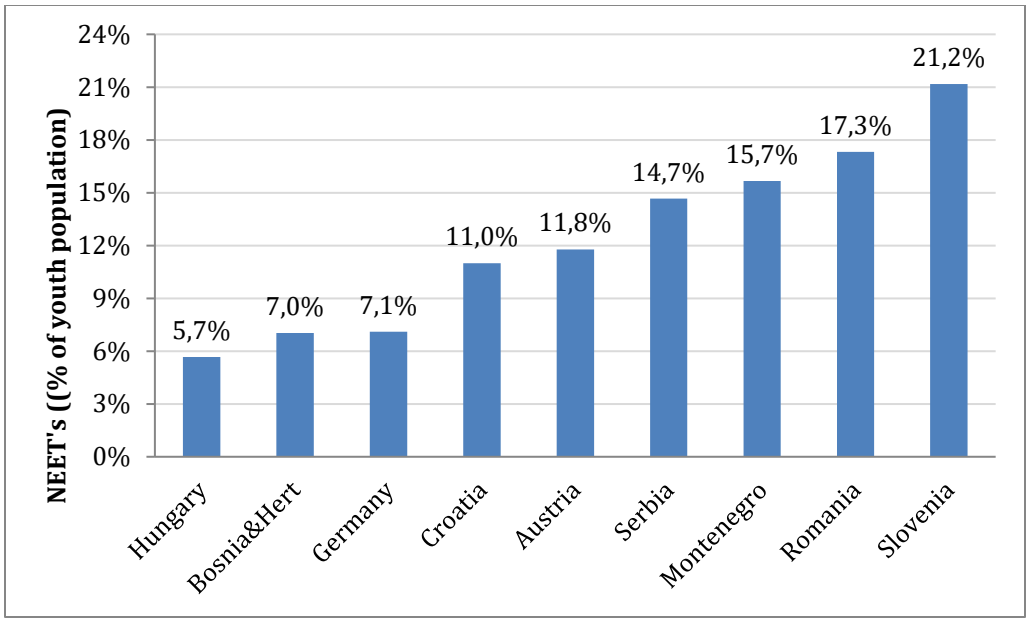


Figure 2.9. Share of youth not in education, employment or training, total (% of youth population), 2019

The second part of the analysis consists in ranking the states according to the performances registered for the indicators described above. Thus, for each indicator, the states were ranked, the position in the ranking was retained, and the total score was obtained by summing the positions in the ranking for all indicators. The best positioned country is the one with the minimum score.

The best ranked country is Germany, with the lowest share of the rural population (indicator of the level of development) and excellent performance on the labour market: the highest employment rate and the lowest unemployment rate among the analysed states. Germany also performed very well in terms of living standards (GDP / capita), productivity (GDP per person employed) and economic model (high share of employees in the services sector).

The next country that stands out is Austria, with maximum levels of GDP/capita and GDP per person employed among the 9 countries included in the study. Austria also records very good values for the employment rate and exports of goods and services (as a share of GDP).

The third country in the ranking is Hungary, with relatively good values of the analysed indicators. The positive situation of young people can be underlined, Hungary registering the lowest NEET's rate.

The next positions in the ranking are held by Slovenia, Croatia, Montenegro, Romania and Serbia, on the last place in the ranking being Bosnia and Herzegovina. Bosnia and Herzegovina was on the last place for 6 of the 9 analysed indicators and on the second lowest for two others. The only indicator for which it registered good performances is the share of youth not in education, employment or training.

Table 2.1. Hierarchy of countries according to labour market indicators

Indicator/Country	DE	AT	HU	SI	HR	ME	RO	RS	BA
Population growth	3	2	5	1	6	4	8	7	9
Rural population	1	4	2	7	5	3	8	6	9
GDP/capita	2	1	4	3	6	7	5	8	9
Employment in Services	2	3	5	6	4	1	9	7	8
Exports (%GDP)	6	3	2	1	5	7	8	4	9
GDP/person employed	2	1	5	3	4	7	6	9	8
Employment rate	1	2	4	3	7	8	5	6	9

Unemployment rate	1	5	2	4	6	8	3	7	9
NEET's	3	5	1	9	4	7	8	6	2
TOTAL	**21**	**26**	**30**	**37**	**47**	**52**	**60**	**60**	**72**

Cluster analysis

For the cluster analysis the following variables were used: rural population (% of total population), GDP/capita, employment in Industry, employment in Services, exports of goods and services (% GDP), GDP per person employed, employment rate, rate unemployment and the share of youth not in education, employment or training. The analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance.

The obtained dendrogram (figure 2.10) allows the clustering of the countries into three groups:

- Group 1: Germany and Austria
- Group 2: Croatia, Romania, Hungary and Slovenia
- Group 3: Montenegro, Serbia and Bosnia & Herzegovina.

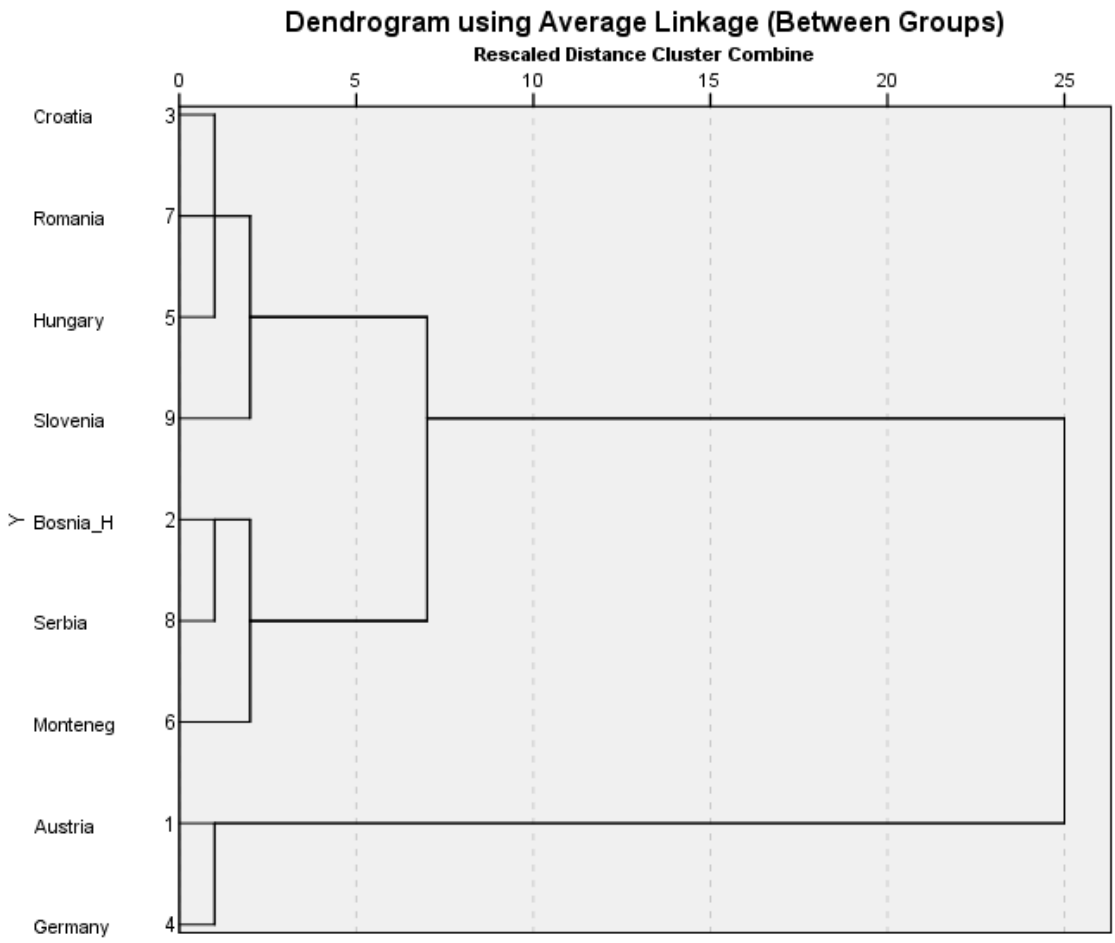


Figure 2.10. Hierarchical cluster analysis

Combining the results obtained from the cluster analysis with those of descriptive statistics discussed above, we can consider that group 1 (Germany and Austria) corresponds to the states with the best economic and labour market performances.

The second group of countries (Croatia, Romania, Hungary and Slovenia) is characterized by average performance, the results recorded for the analysed variables indicating a high level of similarity within the group of countries thus formed and the countries in the other groups.

The third group consists of three states: Montenegro, Serbia and Bosnia & Herzegovina, which recorded relatively more unfavourable values of the indicators compared to the other states included in the analysis.

The results obtained from the cluster analysis are not at all surprising considering the indicators included in the study. Cluster 1 reunites the most developed countries from the 9 analysed countries, the countries in cluster 2 are member states of the European Union, but from more recent waves of integration compared to Austria and Germany, and the countries in cluster 3 are not member states of the European Union, having a lower level of economic and labour market performance.

2.2. Indicators regarding available digital skilled labour force

The analysis of available digital skilled labour force focused on three levels of proficiency: low overall digital skills (L_DS), basic overall digital skills (B_DS) and above basic overall digital skills (> B_DS). No data were available for Montenegro, so it was excluded from the analysis.

The first part of the analysis, the descriptive one, focused on the digital abilities of individuals in general, of people with high formal education, of employees, unemployed, as well as of individuals working in mining or quarrying, manufacturing or other industry.

Bosnia and Herzegovina has the highest percentage of individuals with low overall digital skills (46%). The only other country in which more than two fifths (43%) of individuals have low digital skills is Romania. In Serbia (31%), Hungary (31%), Slovenia (28%) and Croatia (26%), less than a third of individuals have low

digital skills, and this values drops below a quarter in Austria (21%) and Germany (22%).

While more than a quarter of individuals have basic overall digital skills in Germany (31%), Austria (26%) and Serbia (26%), this percentage drops under a fifth in Croatia (18%) and Bosnia and Herzegovina (16%).

Germany and Austria also have the most individuals with above basic digital skills, nearly two fifths (39% each) of the sample. We also see more than a third of individuals with above basic digital skills in Croatia (35%). This percentage lowers to a quarter (25%) in Hungary, a fifth (20%) in Serbia and shrinks to 10% in Romania and 8% in Bosnia and Herzegovina.

In Bosnia and Herzegovina (24% - less than a quarter), Romania (31% - less than a third), Serbia (46%) and Hungary (48%), less than half of individuals have basic or above basic digital skills. The first three of these countries are also the only ones to have more individuals with overall basic skills than individuals with above basic skills. More than half of the individuals in Slovenia (55%), Croatia (53%) and Austria (65%) and more than two thirds (70%) of individuals in Germany have basic or above basic digital level skills.

In terms of percentages, Germany has double the digitally skilled individuals of Bosnia and Herzegovina or of Romania. Looking only at individuals with above basic digital skills, we can see that Germany has almost five times the percentage of users of Bosnia and Herzegovina, almost four times the percentage of users of Romania and nearly double the percentage of Serbia.

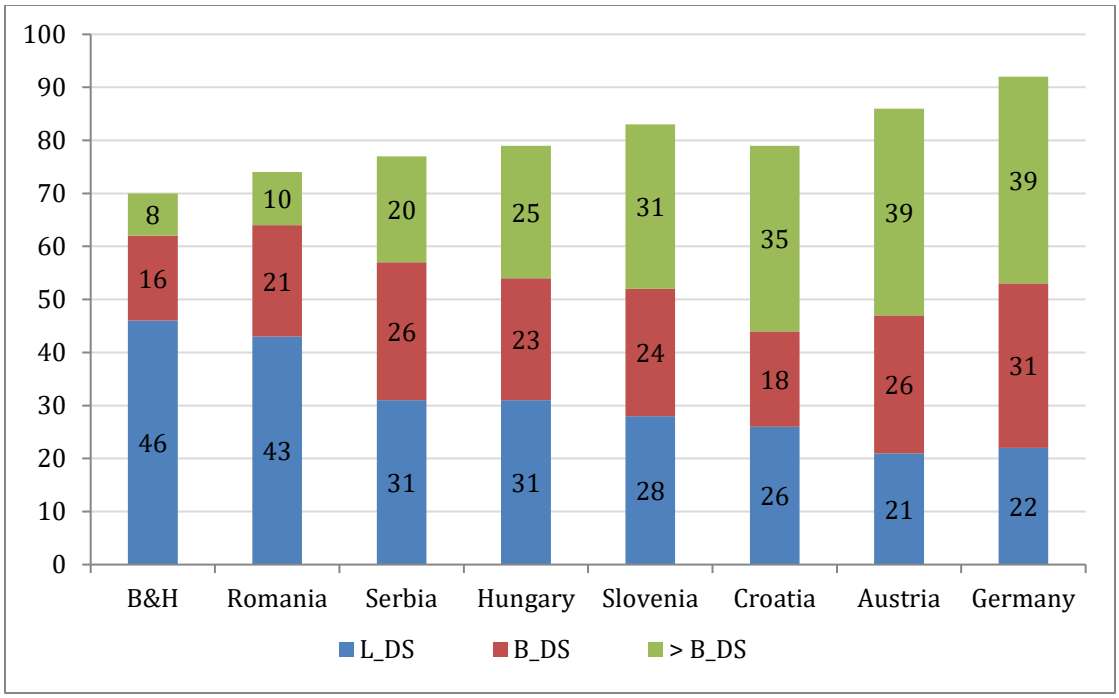


Figure 2.11. Level of digital skills of all individuals in 2019 (%)

Digital skills are higher overall for individuals aged 25 to 64 with ***high formal education***, compared to all the individuals. In all analysed countries, more than a half of the highly educated individuals have basic or above basic overall digital skills and in all countries, other than Bosnia and Herzegovina and Romania, this share raises above three quarters.

Bosnia and Herzegovina is the only country where the share of highly educated individuals with low skills remains almost the same (43% compared to 46%) and Romania is the only country where this percentage amounts to more than a quarter (28%), although it is much lower than the total 43%. The share of individuals with low digital skills drops to less than a fifth in Serbia (19%) and Hungary (14%) and to under a tenth in the remaining countries, with Croatia having the smallest share of 6%.

Croatia also has the smallest share (19%) of highly educated individuals with basic overall digital skills and the largest share (70%) of individuals with above basic overall digital skills. With the exception of Croatia, for all other countries the share of highly educated individuals with basic skills is less than a third. For this subsample, more than two thirds of the individuals have above basic digital skills in Croatia, around three fifths in Germany (63%), Slovenia (60%), Austria (60%) and Hungary (58%), more than two fifths in Serbia (46%), more than a third in Romania (37%) and more than a quarter in Bosnia and Herzegovina (26%).

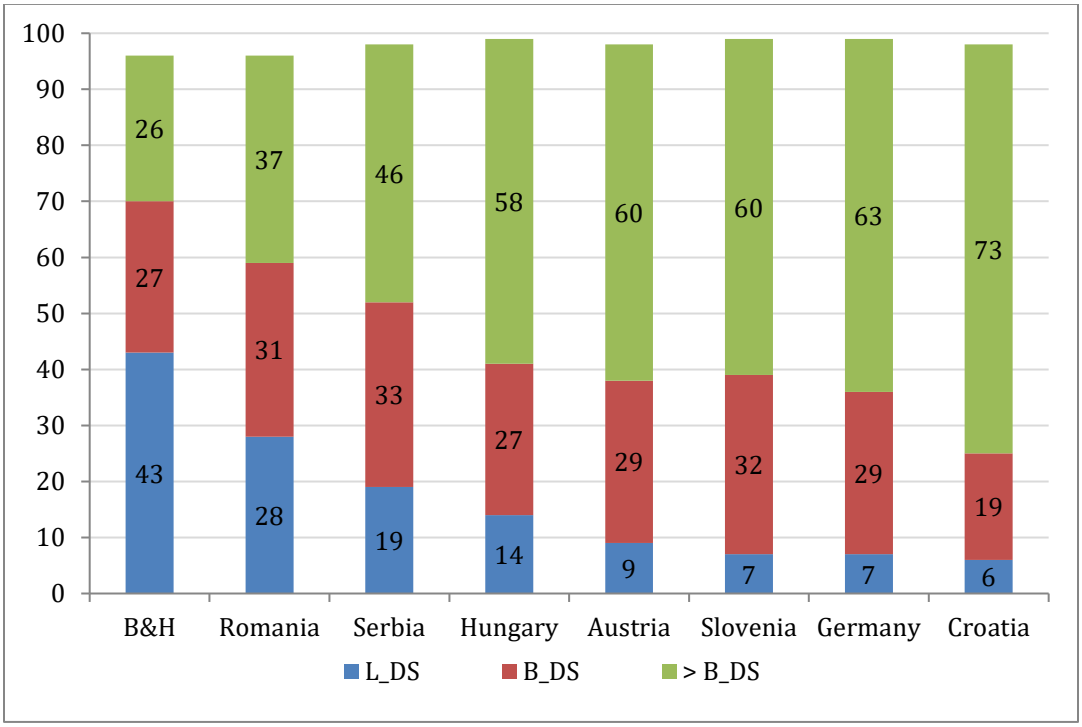


Figure 2.12. Level of digital skills of individuals aged 25 to 64 with high formal education, in 2019 (%)

The level of digital skills of ***employees*** is lowest in Bosnia and Herzegovina, where nearly half of the individuals (49%) have low skills, and in Romania (46%).

More than half of employees have basic or above basic overall digital skills in all countries except for Romania and Bosnia and Herzegovina (41% each). In all of the included countries more than a quarter of employees have basic overall digital skills and in Serbia (35%) and Germany (33%) a third or more. Percentagewise, Romania and Bosnia and Herzegovina each have more than double the share of employees with below basic digital skills that Germany or Austria has (20% each).

Austria, Germany and Croatia have the same share of employees with above basic digital skills – 45%, the highest share, while Romania and Bosnia and Herzegovina each has a share of 15% above basic digital users among employees. Over a quarter of employees in Serbia (29%) and Hungary (32%) have above basic digital skills, while the percentage rises to more than a third (37%) in Slovenia.

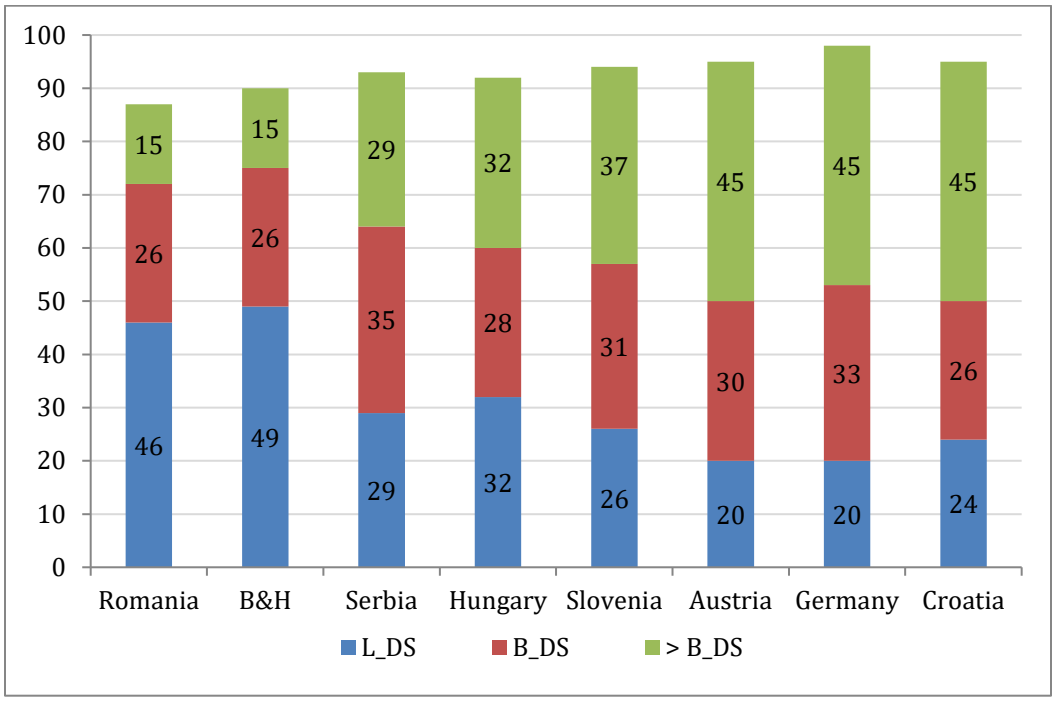


Figure 2.13. Level of digital skills of employees, in 2019 (%)

For the ***unemployed***, we see that the share of individuals with low digital skills reach higher than 50%, this being the case in Romania (55%) and Bosnia and Herzegovina (54%). The percentage of individuals with low skills increases overall, making up more than a third on all the remaining countries other than Germany (30%). Meanwhile, the percentage of individuals with above basic skills decreases, making up less than a third in Austria (31%) and Croatia (27%), a fifth in Germany (20%) and under a fifth in all other countries, the lowest values being observed for Romania (7%) and Bosnia and Herzegovina (4%).

The only countries with about half of the unemployed having basic or above basic skills are Germany (54%) and Austria (49%). Closely behind them is Serbia (46%) with over two fifths of the unemployed. More than a third of the unemployed have basic or above basic digital skills in Slovenia (34%) and Croatia (37%), followed by Hungary (30%). The share in Romania (24%) does not exceed a quarter and in Bosnia and Herzegovina (18%), it does not exceed a fifth.

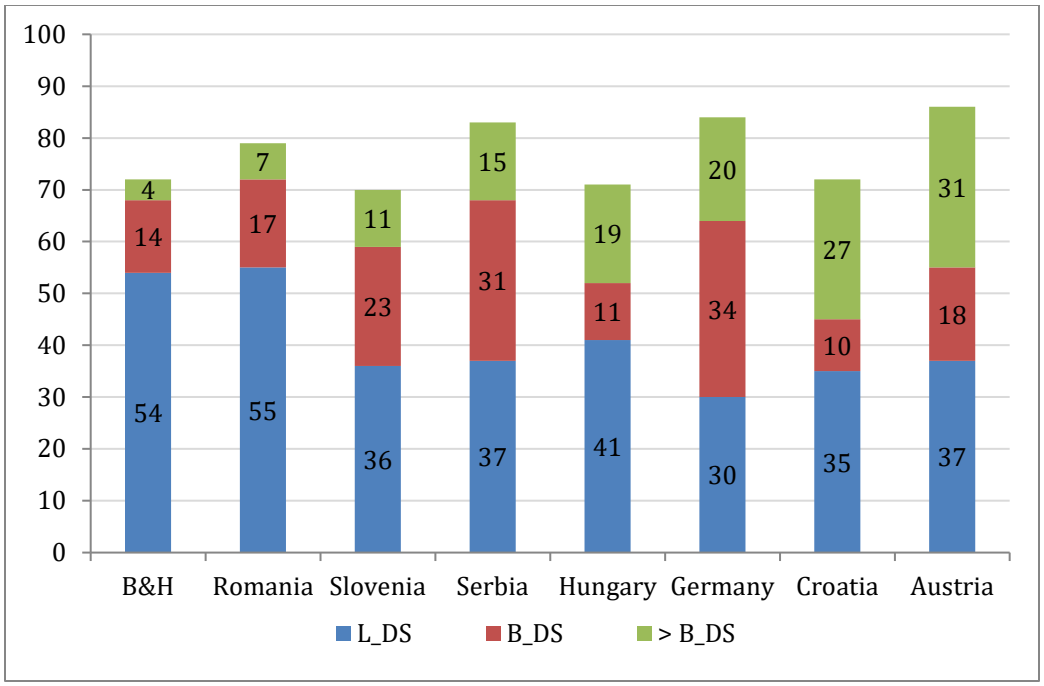


Figure 2.14. Level of digital skills of unemployed, in 2019 (%)

Not much differs when looking at the digital skills of ***individuals working in mining or quarrying, manufacturing or other industry (B+C)***: Germany and Austria have the highest share of individuals with above basic skills (44% each), while Romania (53%) and Bosnia and Herzegovina (59%) have the highest share of individuals with low skills, once again those making up more than half of the country sample.

More than three quarters of B+C employees have basic or above basic digital skills in Germany (75%) and in Austria (72%). Serbia (63%) and Croatia (66%) have similar shares of individuals with basic or above basic skills, amounting to more than half of the employees; however, it is worth noting that the majority of this share consists of individuals with basic skills in Serbia (41%) and of individuals with above basic skills in Croatia (39%). Similarly, more than half of B+C employees have basic or above basic skills in Hungary (55%) and Slovenia (57%),

with the individuals nearly equally divided between the two skill levels. The percentage reduces to around a third for Romania (33%) and Bosnia and Herzegovina (36%).

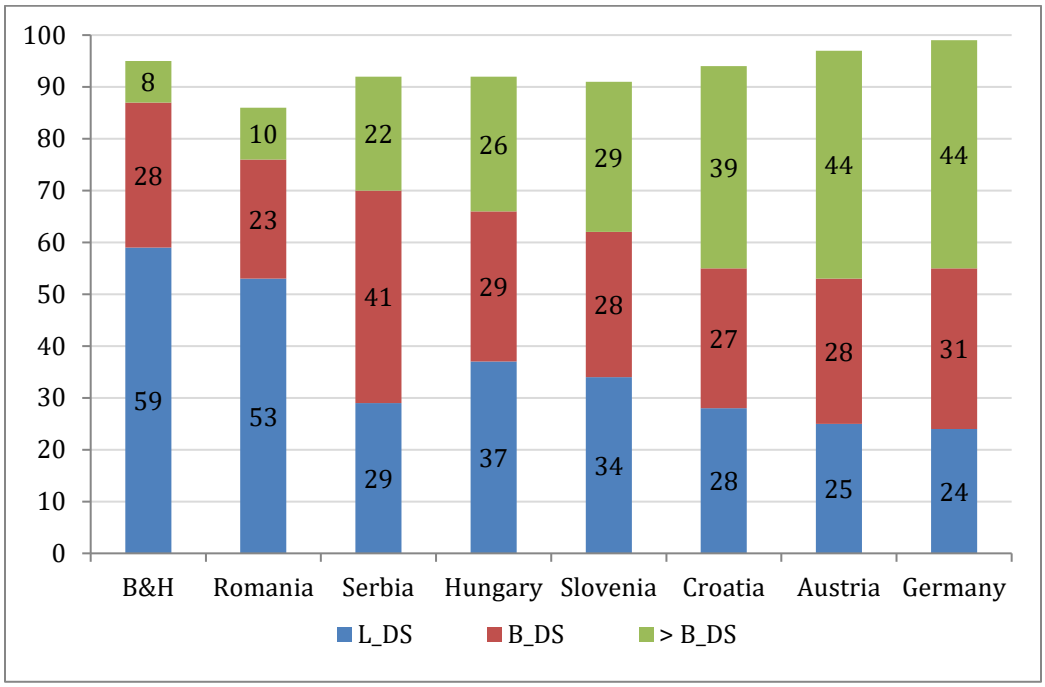


Figure 2.15. Level of digital skills of individuals working in mining or quarrying, manufacturing or other industry (B+C in NACE Rev.2), in 2019 (%)

Based on the previously described five indicators regarding the percentage of individuals with ***above basic overall digital skills***, countries included in the study (with the exception of Montenegro, for which data was not available) received a score and were placed in a **hierarchy**. The resulting rankings for each indicator and the final score are presented in Table 2.2.

The overall best ranked country is Germany, with a final score of 9, as it ranked first on two indicators (All individuals and Unemployed), second on another two indicators (Individuals with high education and Employees) and third on

Individuals working in mining or quarrying, manufacturing or other industry (B+C). Croatia scores second best, with two first placements on indicators Individuals with high education and Employees, a second placement on Unemployed and two third placements on All individuals and Individuals working in B+C, bringing its final score to 10.

Third best ranked is Austria, scoring 11. It places first on the indicator Unemployed, second on All individuals and Individuals working in B+C, and third on Individuals with high education and Employees. Slovenia comes in fourth place and ranks as the fourth on all indicators except for Unemployed, where it comes in sixth. Its final score is 22, precisely double that of Austria, which is to be expected since the top three rankings on all indicators are divided between the first three countries in the hierarchy.

Following Slovenia is Hungary, with a close final score of 24. Hungary is placed fifth on all indicators except Unemployed where is ranked fourth. The sixth country in the overall ranking is Serbia, with a final score of 29. Following the trend of the previous two countries, it is ranked sixth on all indicators except for Unemployed, where it comes in fifth.

Bosnia and Herzegovina is ranked last, with a score of 39. It ranked last on all but one of the indicators, Employees, where Romania has the lowest score. Romania was ranked second to last on all other indicators, having a final score of 36. As can be observed, after the first three ranked, there is almost no variation in the countries' placement across all the indicators.

Table 2.2. Ranking of states according to the above basic level of digital skills registered by different categories of individuals

Country	All individuals	Individuals with high education	Employees	Unemployed	Individuals working in B+C	Total
Germany	1	2	2	3	1	**9**
Croatia	3	1	1	2	3	**10**
Austria	2	3	3	1	2	**11**
Slovenia	4	4	4	6	4	**22**
Hungary	5	5	5	4	5	**24**
Serbia	6	6	6	5	6	**29**
Romania	7	7	8	7	7	**36**
B&H	8	8	7	8	8	**39**

For the **cluster analysis**, the level of digital skills for the following categories of individuals was taken into account:

- *All Individuals*
- *Individuals aged 25 to 64 with low formal education*
- *Individuals aged 25 to 64 with medium formal education*
- *Individuals aged 25 to 64 with high formal education*
- *ICT professionals*
- *Non-ICT professionals*
- *Employees*
- *Individuals working in mining or quarrying, manufacturing or other industry (B+C in NACE Rev.2)*
- *Self-employed, family workers*
- *Students*

– *Unemployed*

The analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance. Montenegro was excluded from the analysis due to lack of data.

First, the cluster analysis was performed for people with ***low levels of digital skills***. No data were available for this level of skills for ICT professionals, so this variable was not included in the analysis.

Based on the results obtained and the dendrogram, it is observed that the eight analysed states are grouped in two clusters:

- Cluster 1: Austria, Germany, Slovenia, Croatia, Hungary and Serbia
- Cluster 2: Romania and Bosnia and Herzegovina.

Romania and Bosnia and Herzegovina stood out as a separate group from the other countries because they recorded particularly high values of individuals with low digital abilities, for all categories of people included in the analysis. To illustrate these differences we will give some examples. Among the unemployed, more than half have low digital skills in Romania and Bosnia and Herzegovina, compared to other countries where the share is lower, the lowest being in Germany (30%). Only in these two countries the share of individuals with medium education who have low digital skills exceeds 50%. In Romania 49% of self-employed or family workers have low digital skills and 43% in Bosnia and Herzegovina, the other countries having shares below 37%, even 24% in Germany. Even among students there is an exceptional situation: in Romania 32% of students have low digital skills, while most countries have extremely low values for this category of individuals, even 0% in Croatia.

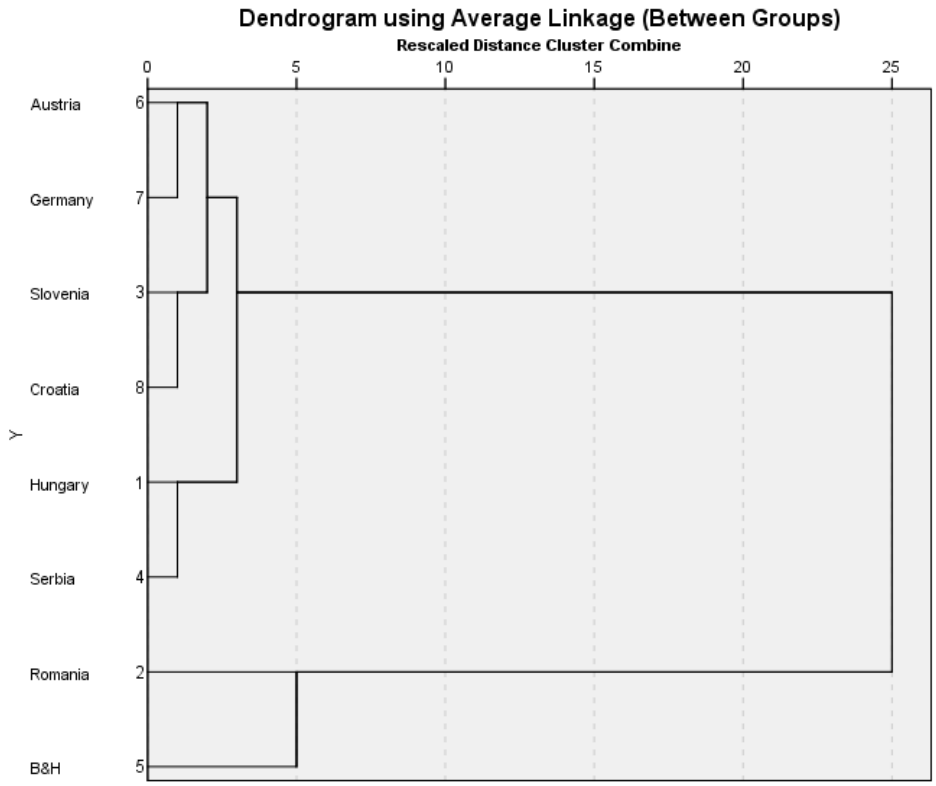


Figure 2.16. Hierarchical cluster analysis for individuals with low overall digital skills

The cluster analysis performed for the ***basic level of overall digital skills*** highlighted the formation of 3 clusters, as follows:

- Cluster 1: Romania and Bosnia and Herzegovina
- Cluster 2: Austria, Germany and Serbia
- Cluster 3: Hungary, Croatia and Slovenia.

Cluster 1, Romania and Bosnia and Herzegovina, is characterized by relatively lower shares of individuals with a basic level of digital skills. For example, among the self-employed and family workers only 14% have basic digital skills in Romania and 18% in Bosnia and Herzegovina, the lowest values among the analysed states. On the contrary, for ICT professionals these countries have the highest shares (30% in Romania and 23% in Bosnia and Herzegovina), the

average for all countries analysed being 19.75%. We would expect this category of persons to have a rather above basic level of digital skills, for this reason the high shares recorded by these two countries stand out.

Austria, Germany and Serbia have similar values for the categories of individuals analysed, for example high shares of individuals with basic digital skills among employees, people with medium education, non-ICT professionals and persons working in mining or quarrying, manufacturing or other industry (B+C).

Hungary, Croatia and Slovenia recorded average values for all categories of analysed individuals.

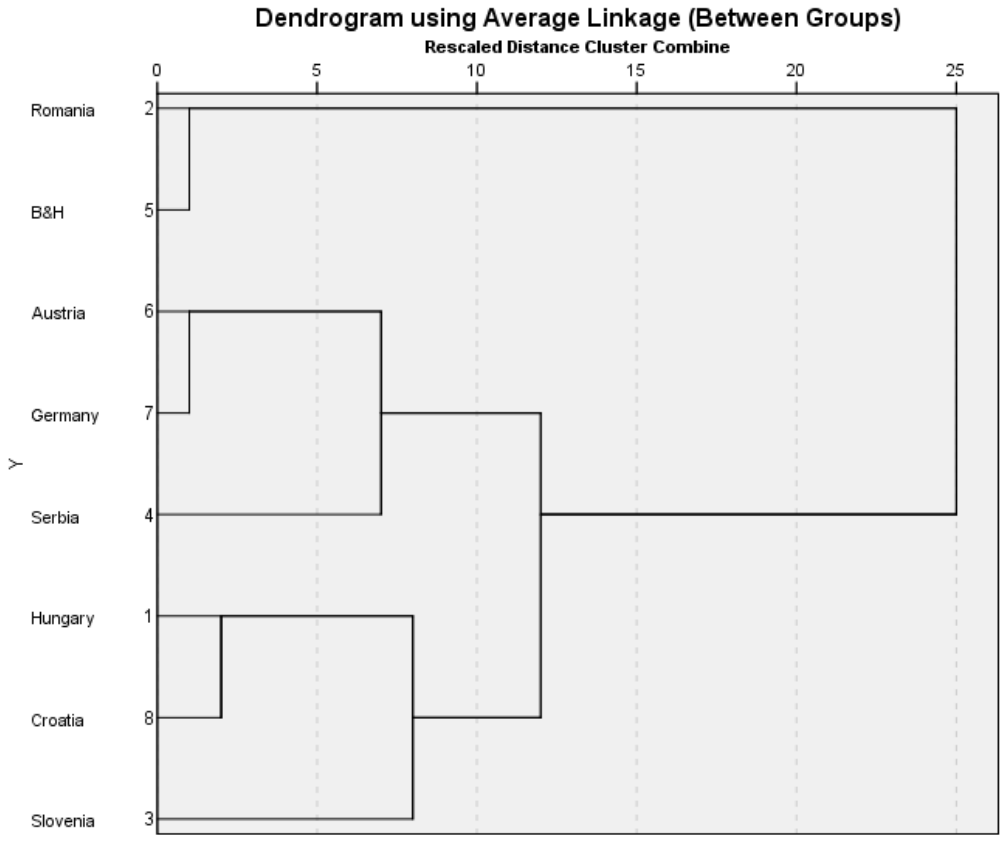


Figure 2.17. Hierarchical cluster analysis for individuals with basic overall digital skills

The cluster analysis performed for the ***above basic overall level of digital skills*** led to the formation of 3 groups of countries:

- Cluster 1: Romania and Bosnia and Herzegovina
- Cluster 2: Austria, Germany and Croatia
- Cluster 3: Hungary, Serbia and Slovenia.

Once again, Romania and Bosnia and Herzegovina stand out as a separate group, this time with extremely low values of the share of people with above basic digital skills. Only 1% of individuals with low formal education have above basic digital skills, the maximum value being 13% in Germany. In Romania, only 2% of non-ICT professionals have above basic digital skills (14% in Bosnia and Herzegovina), the maximum value being 44%. Very low values were also recorded for self-employed and family workers: 3% in Romania and 15% in Bosnia and Herzegovina. Moreover, worrying values are recorded for the unemployed: 4% in Bosnia and Herzegovina and 7% of unemployed people in Romania have above basic overall digital skills. One result that should be highlighted is that only 24% of ICT professionals in Romania have above basic digital skills and 50% in Bosnia and Herzegovina, compared to 91% in Croatia.`

The second group of countries, Austria, Germany and Croatia, is characterized by the highest values of the share of individuals with above basic digital skills among the analysed states. Even among the most disadvantaged individuals, these countries have high values: 31% of the unemployed in Germany, 48% of the self-employed and family workers in Austria, or 13% of low-educated individuals in Germany have above basic digital skills. Also, over 43% of non-ICT professionals in these three countries have above basic digital skills and over 78% of ICT professionals, the maximum of 91% being in Croatia.

The countries from cluster 3 registered average values for the analysed indicators.

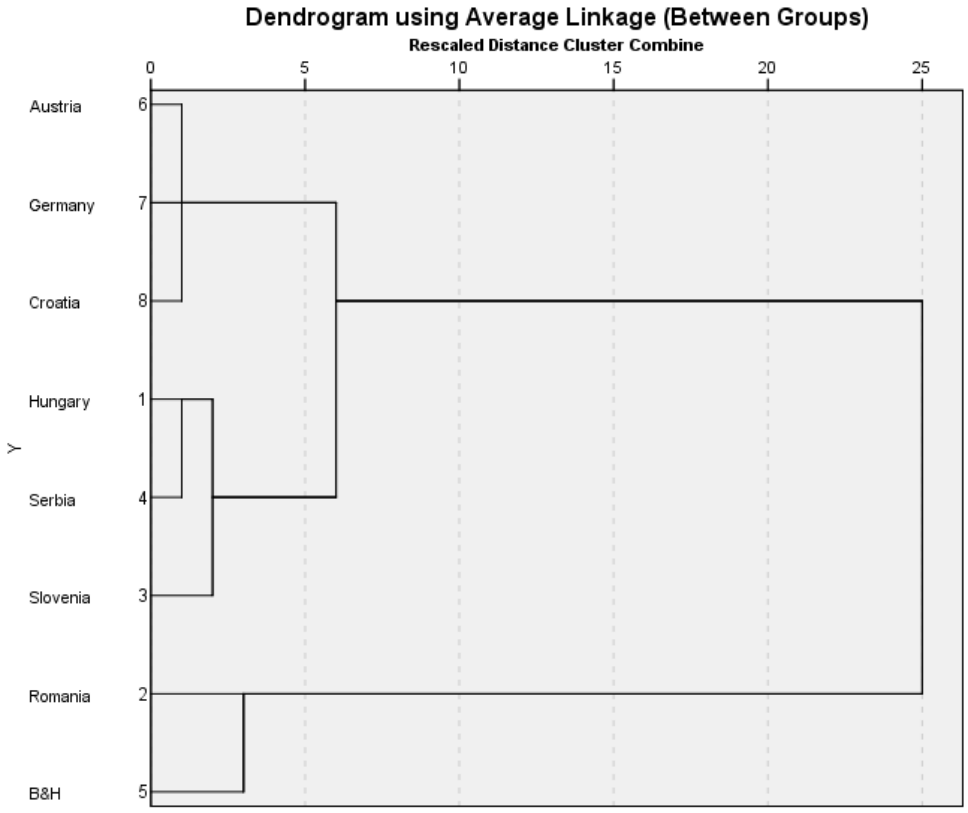


Figure 2.18. Hierarchical cluster analysis for individuals with above basic overall digital skills

2.3. Indicators regarding employment situation in target sectors

Employment and enterprises situation in target sectors, 2017

The target sectors of the project included in the analysis are *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* and *Manufacturing*, the latter being analysed both at a general level and by groups of activities depending on the

technological intensity. The indicators collected for this analysis are: number of enterprises, number of employees, gross value added per employee (thousand euros), growth rate of employment (%) and persons employed per enterprise.

The first two indicators (number of enterprises and number of employees), being absolute indicators, are not recommended to be used to compare states because they depend very much on the size of the country and the population of each country. For example, the analysis of the number of employees in *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* indicates that Germany has 29.7 million people employed in this field, and Montenegro only 182 thousand people. Because the number of employees depends not only on economic performance but also on the population, in the benchmarking analysis we will use relative indicators, such as persons employed per enterprise, to allow comparative analyses.

In 2017, in ***Total business economy; repair of computers, personal and household goods; except financial and insurance activities***, Serbia employed on average the most individuals per enterprise (12.9), closely followed by Germany (11.9). The average number of individuals employed drop below 10 per enterprise for the remaining countries in the study (Austria 8.6, Romania 8.3, Bosnia and Herzegovina 7.7, and Croatia 6.9) and below 5 per enterprise for Hungary (4.8) and Slovenia (4.4). On average, Serbia employs nearly 3 times as many persons per enterprise compared to Slovenia.

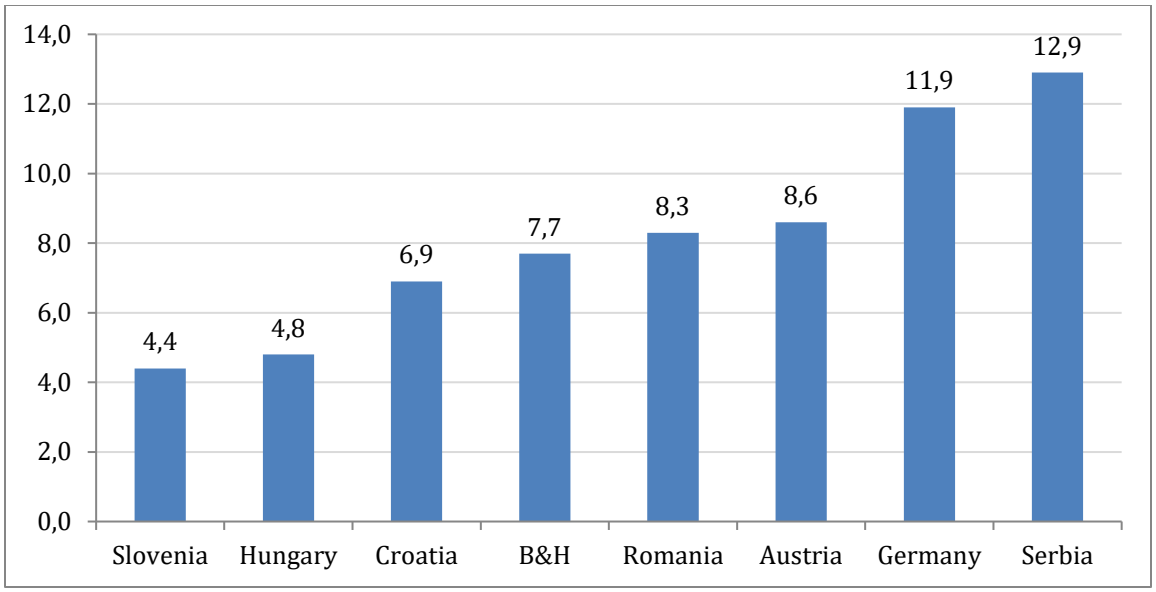


Figure 2.19. Persons employed per enterprise, in Total business economy; repair of computers, personal and household goods; except financial and insurance activities, 2017

As for the situation of employees per enterprises in ***Manufacturing***, we can see that Germany employs by far the most persons per enterprise, 38.9. The second country by this metric is Austria, employing on average approximately 14 people less than Germany did per enterprise – 25.1. The values given for Romania and Serbia are close to that of Austria, 24.4, respectively 22.6, after which the average number of individuals employed per enterprise goes below 15: Hungary 14.9, Bosnia and Herzegovina 14.8, Croatia 13.8 and Slovenia 10.6. Germany had close to four times as many persons employed per enterprise in manufacturing than Slovenia.

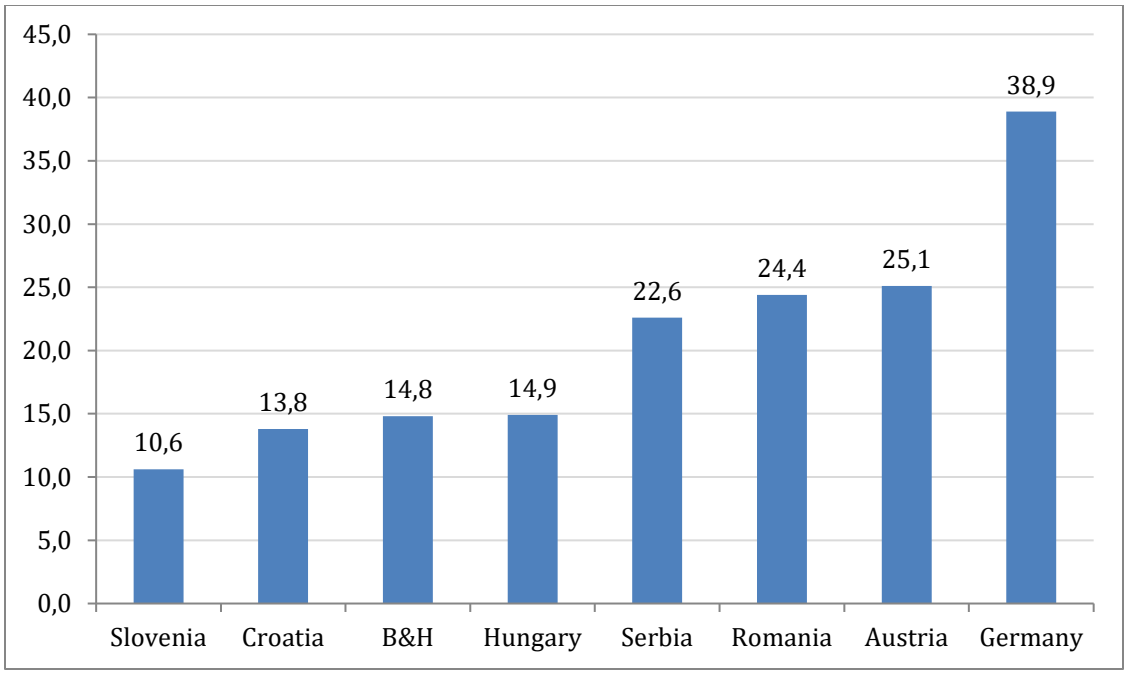


Figure 2.20. Persons employed per enterprise, in Manufacturing, 2017

Only two of the countries, Germany and Serbia have more than a fifth (20.4%, respectively 26.4%) of their enterprises in manufacturing involved in ***medium high-technology manufacturing***. In the rest of the countries the percentage dips under 15%: 13.2% in Austria, 12.3% in Hungary, 10.2% in Croatia and 8.8% in Romania.

It can be seen that Serbia has the highest percentage of enterprises involved in medium high-technology manufacturing, slightly more than a quarter, which is double or more than all other countries, except for Germany. However, Serbia has the second lowest percentage of individuals hired in medium high-technology manufacturing enterprises, slightly less than a quarter (24%), and it is the only case where the percentage of enterprises exceeds that of people hired, although by a small margin.

The smallest percentage is observed for Croatia, less than a fifth (13.7%) of the employees in manufacturing work in medium high-technology

manufacturing. It has a smaller difference between the percentage of enterprises and persons employed (approx. 4%) than all the other included countries, except for Serbia. For Germany, Austria, Hungary and Romania, the percentage of persons employed is at least double that of the percentage of enterprises.

Germany has the highest percentage of persons employed in medium high-technology manufacturing, more than two fifths (41.8%) of those employed in manufacturing. Austria (31%) and Hungary (32%) both have slightly less than a third of persons employed, while Romania (26.3%) has more than a quarter.

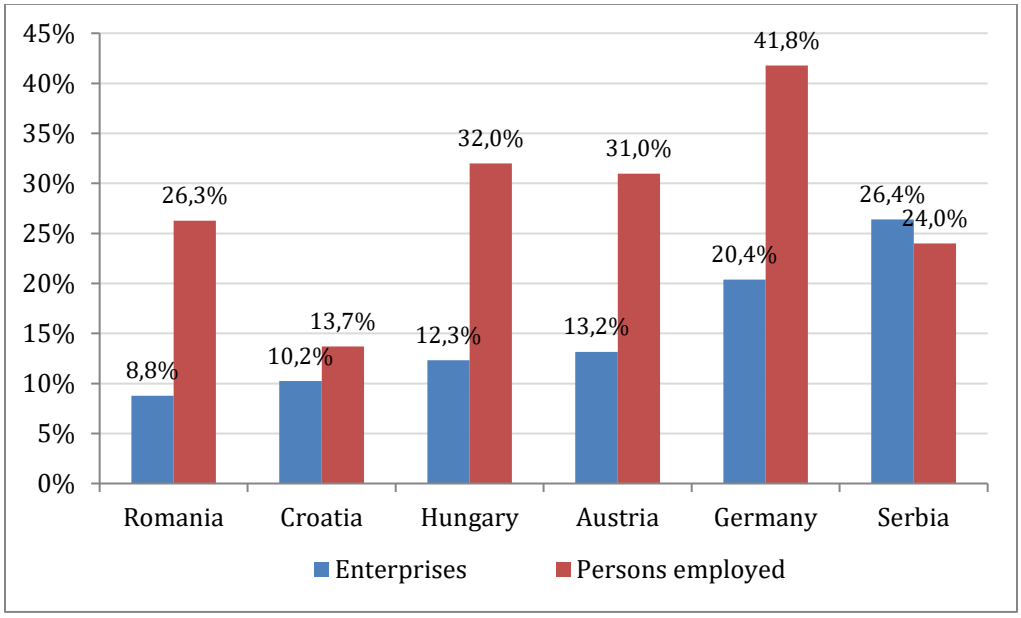


Figure 2.21. Enterprises and persons employed in medium high-technology manufacturing (% from manufacturing), 2017

When looking at the percentage of enterprises in manufacturing involved in ***high-technology manufacturing***, we note some similarities to the data observed for those in medium high-technology manufacturing. The highest

percentage is once again observed for Serbia (5.8%), while the lowest percentage belongs again to Romania (2%). Germany has the second highest rating (4%), followed by Hungary (3%), Croatia (2.9%) and Austria (2.8%). Also similar is the fact that the percentage of enterprises exceeds the percentage of persons employed only for Serbia, which also maintains the lowest percentage of persons employed (3.6%).

The highest percentage of persons employed in high-technology manufacturing is observed for Hungary (9.2%), followed by Germany (7.4%) and Austria (6.1%). The remaining countries have less than 5% of the persons employed in manufacturing working in high-technology manufacturing: Croatia 4.3%, Romania 4% and Serbia 3.6%.

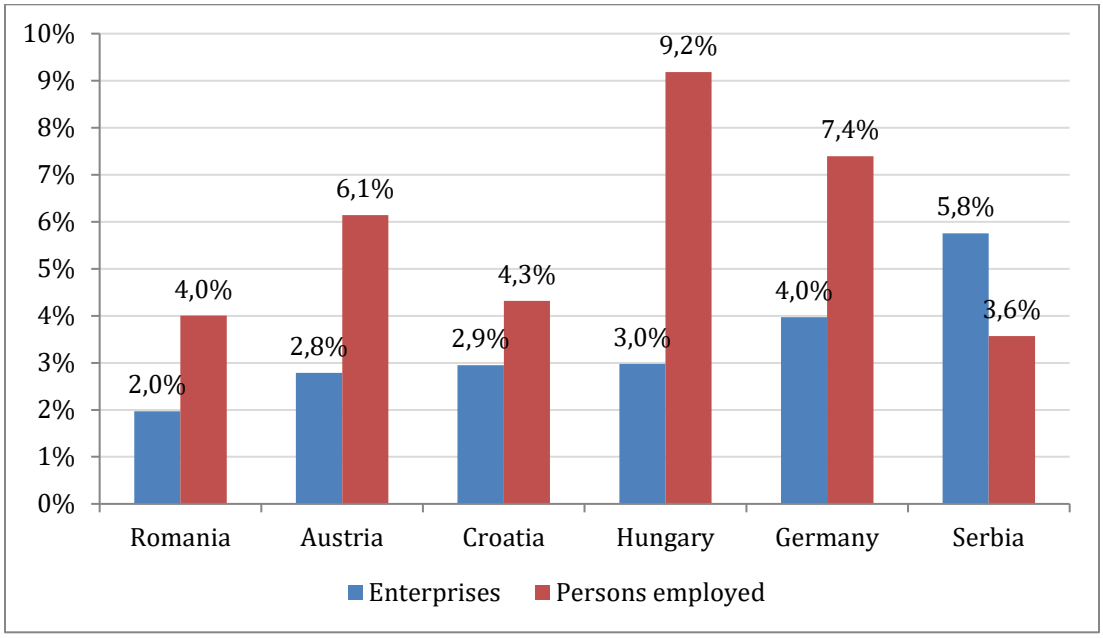


Figure 2.22. Enterprises and persons employed in high-technology manufacturing (% from manufacturing), 2017

It can be observed that the first three countries with the highest percentages in enterprises all have over a third of total enterprises in *medium-low technology manufacturing*: Germany 38.4%, Hungary 37.6% and Croatia 37%. For the remaining countries, the percentage remains more than a quarter, with Serbia having the lowest value of 26.4%, followed by Bosnia and Herzegovina 29%, Romania 29% and Austria 32%.

With the exceptions of Romania (22.9%) and Serbia (24%), all of the countries included have more than a quarter of the people employed in manufacturing working in medium-low technology manufacturing, Austria and Croatia having the highest percentage – 31.5% each. After that, we note 28.4% of persons employed in manufacturing in medium-low technology manufacturing in Germany, 27.5% in Hungary and 26.4% in Bosnia and Herzegovina.

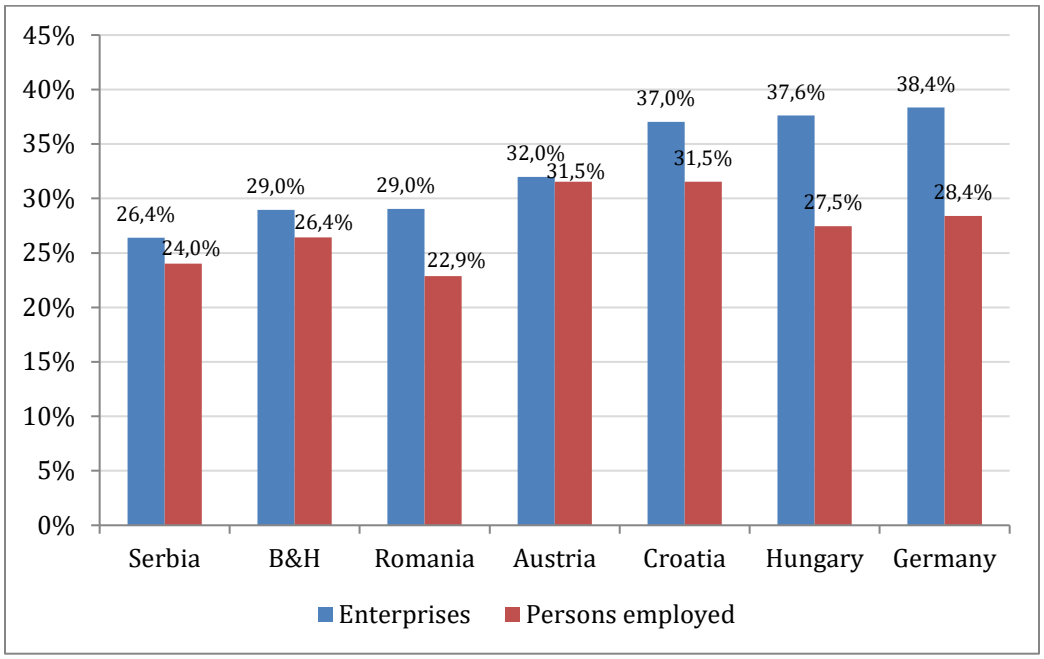


Figure 2.23. Enterprises and persons employed in medium-low technology manufacturing (% from manufacturing), 2017

The largest values for both ***Enterprises*** and ***Persons employed*** can be observed for Bosnia and Herzegovina: over half of the enterprises (64.7%) in manufacturing and of the persons employed (61.4%) in manufacturing are in low technology manufacturing. Croatia has half of the enterprises (49.8%) and half of the persons employed (50.5%) in manufacturing in low technology manufacturing.

Germany has the lowest values in both categories, over a third of enterprises (37.3%) and less than a quarter of persons employed (22.4%) in low technology manufacturing. With the exception of Hungary (47.1%), all remaining countries have more than half of their manufacturing enterprises in the low technology category: Austria 52.1%, Serbia 53.4% and Romania 60.2%.

Only Bosnia and Herzegovina and Croatia have over half of the persons employed in low technology manufacturing. Serbia and Romania have more than two fifths (46.8% each), Hungary and Austria have more than a quarter (31.4% each), and only Germany's percentage drops below a quarter (22.4%).

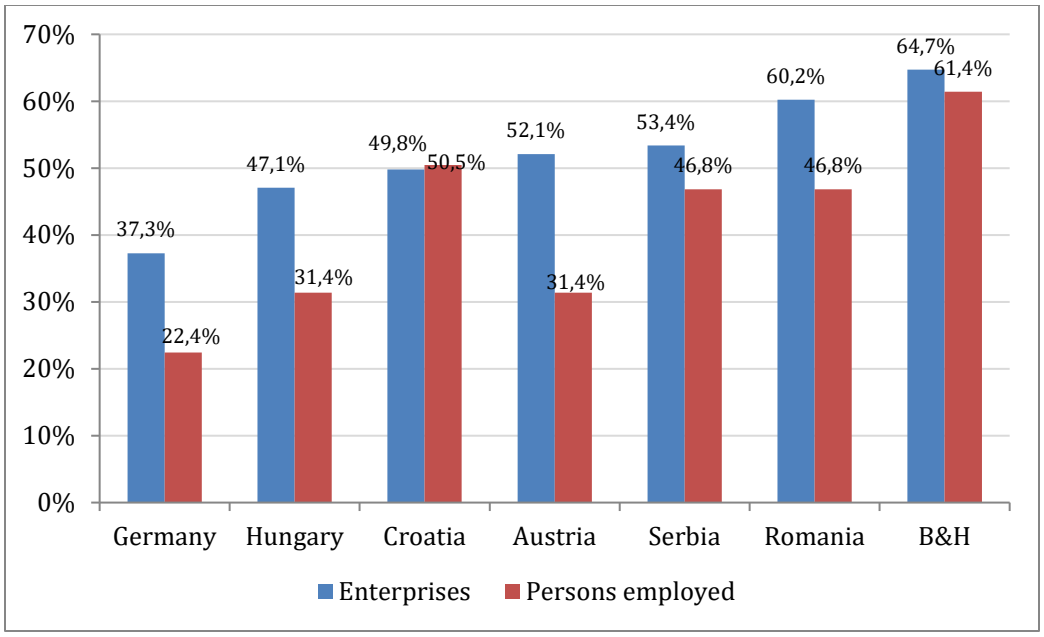


Figure 2.24. Enterprises and persons employed in low technology manufacturing (% from manufacturing), 2017

For the other two indicators analysed, ***gross value added per employee*** and ***employment growth*** in target sectors, there is a lot of information that is missing, making benchmarking analysis difficult. We organized the data in tables and drew some conclusions, within the limits of data availability.

In *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* the highest value of gross value added per employee is registered in Austria (76.4 thousand euros) at a significant distance from the other states for which data were available. The next country is Croatia, with a gross value added per employee of 24.5 thousand euros, whereas the lowest values for this indicator are recorded in Serbia and Bosnia & Herzegovina (15.9 thousand euros).

Austria also stands out in the Manufacturing sector, with a gross value added per employee of 90.9 thousand euros. Bosnia and Herzegovina ranks last, with a value of 13.7 thousand euros for the gross value added per employee.

Regarding the division of the Manufacturing sector by classes of activities according to the technological intensity, we notice that regardless of the intensity level, Austria registers the highest values for the gross value added per employee. Germany follows, with lower values but quite close to those recorded by Austria. Average values of gross value added per employee are observed in Hungary and Croatia. Minimum values are recorded in Serbia for *medium high-technology manufacturing* and *high-technology manufacturing*, in Bosnia and Herzegovina for *medium low-technology manufacturing* and in Romania in *low-technology manufacturing*.

Table 2.3. Gross value added per employee (thousand euro) in target sectors, 2017

Gross value added per employee - thousand euro	Total business economy	Manufacturing	Medium high-tech manufacturing	High-tech manufacturing	Medium low-tech manufacturing	Low-tech manufacturing
Hungary			42.0	53.2	31.2	19.1
Romania	17.1	15.5	21.5	20.9	18.7	10.2
Slovenia						
Serbia	15.9	15.6	21.0	19.6	21.0	13.1
B&H	15.9	13.7			16.7	11.3
Austria	76.4	90.9	103.4	115.0	88.9	75.2
Germany			98.1	111.4	69.2	55.2
Croatia	24.5	23.7		45.8	28.2	
Montenegro						

The growth rate of employment in target sectors was generally on an upward trend, except for the sector *low-technology manufacturing* where

Romania, Germany and Hungary registered a decrease of employment rate and *high-technology manufacturing* where only Germany had a decrease.

In *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* the largest increase in the employment rate was observed in Bosnia and Herzegovina, followed by Slovenia. The lowest increase in employment was registered in Romania.

In *Manufacturing* there are significant increases in employment in Serbia and Bosnia & Herzegovina, of over 6%, low values of employment growth rate being recorded in Romania (0.5%) and Germany (0.7%).

Serbia also stands out in *medium high-technology manufacturing* with an employment growth rate of 6.4%, the lowest values being recorded in Germany and Austria (2.5%). In *high-technology manufacturing* Romania registered the highest employment growth rate (5.3%), while in Germany employment decreased in this field of activity. The highest increase in employment was recorded in the *medium low-technology manufacturing* by Bosnia and Herzegovina (7.4%). As mentioned above, in *low-technology manufacturing* there were also decreases in employment, the largest decrease being recorded in Romania, while the largest increase in employment in this sector was recorded in Bosnia and Herzegovina (5.9%).

Table 2.4. Growth rate of employment in target sectors, 2017

Growth rate of employment (%)	Total business economy	Manufacturing	Medium high-tech manufacturing	High-tech manufacturing	Medium low-tech manufacturing	Low-tech manufacturing
Hungary	1.6	2.5	4.6	4.3	4.8	-0.2
Romania	1.1	0.5	5.0	5.3	1.0	-2.5
Slovenia	4.0	4.0				
Serbia	3.3	*6.2*	6.4	0.6	6.4	3.1
B&H	5.1	6.5			7.4	5.9
Austria	2.6	1.5	2.5	2.5	1.4	0.5
Germany	2.3	0.7	2.5	-0.9	0.0	-1.2
Croatia	2.7	1.7	3.0	0.9	4.0	0.1
Montenegro						

Cluster analysis was not possible due to incomplete data.

The share of SMEs and persons employed in SMEs in total enterprises (table 2.4)

The comparative analysis of the share of SMEs and persons employed in SMEs in total enterprises focused first on the target sectors (*Total business economy; repair of computers, personal and household goods; except financial and insurance activities* and *Manufacturing)*, then on sub-sectors of manufacturing.

Differences between the countries in terms of the share of SMEs engaged in both *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* and *Manufacturing* are very small. For Total business economy, the difference between the highest value (99.84% in Slovenia and Montenegro) and the lowest value (98% in Hungary) does not add up to even 2%. The same can be said for the share of SMEs in Manufacturing, the highest value being 99.40% in Slovenia and the lowest value being 97.64% in Germany. The above table has some data missing for

Montenegro (share of SMEs in manufacturing) and for Bosnia and Herzegovina (share of SMEs in Total business economy).

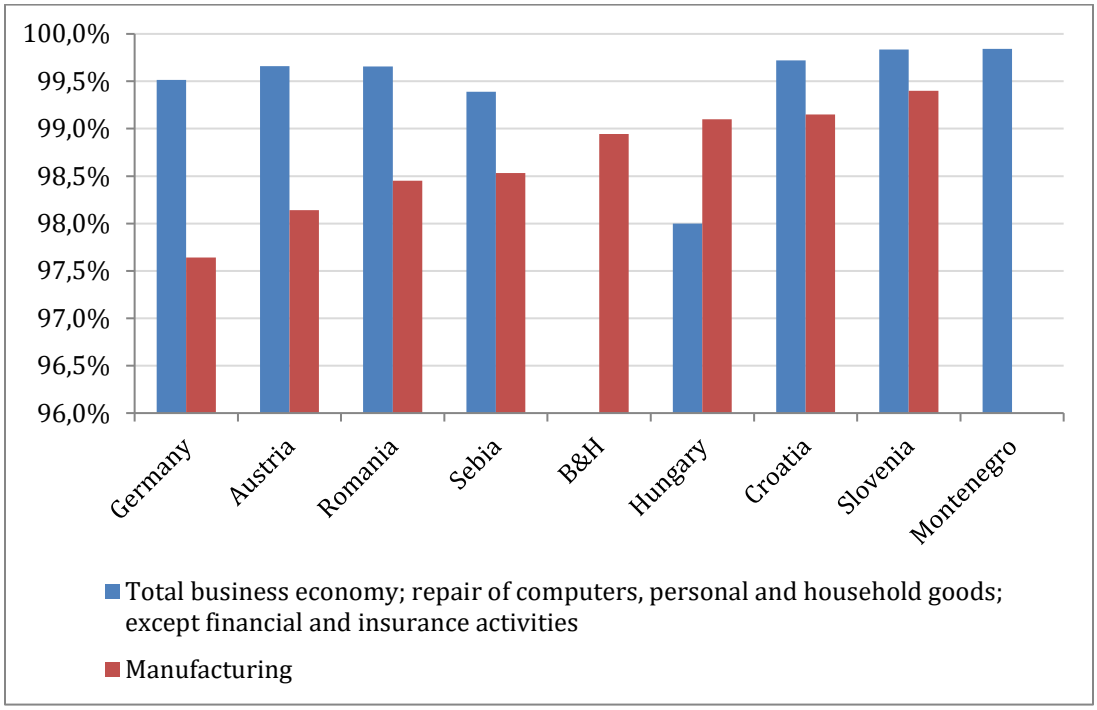


Figure 2.25. The share of SMEs in total enterprises (%), 2017

More noticeable differences can be seen when looking at the share of individuals employed in SMEs. The lowest percentage of persons employed in SMEs in the category of Total business economy is that of Serbia (58.42%), the only value below 60% in this category. The highest values belong to Montenegro (70.05%) and Croatia (72.53%), both with over two thirds of the number of total employees working in SMEs. The lowest percentage of persons employed in SMEs in Manufacturing is that of Germany (44.87%), the only one below 50%. The highest percentages are observed for Croatia (61.37%) and Bosnia and Herzegovina (65.07%). There is, in addition to the already mentioned missing cases for Montenegro and Bosnia and Herzegovina, no

data available for the share of persons employed in SMEs in the category of Total business economy in Austria.

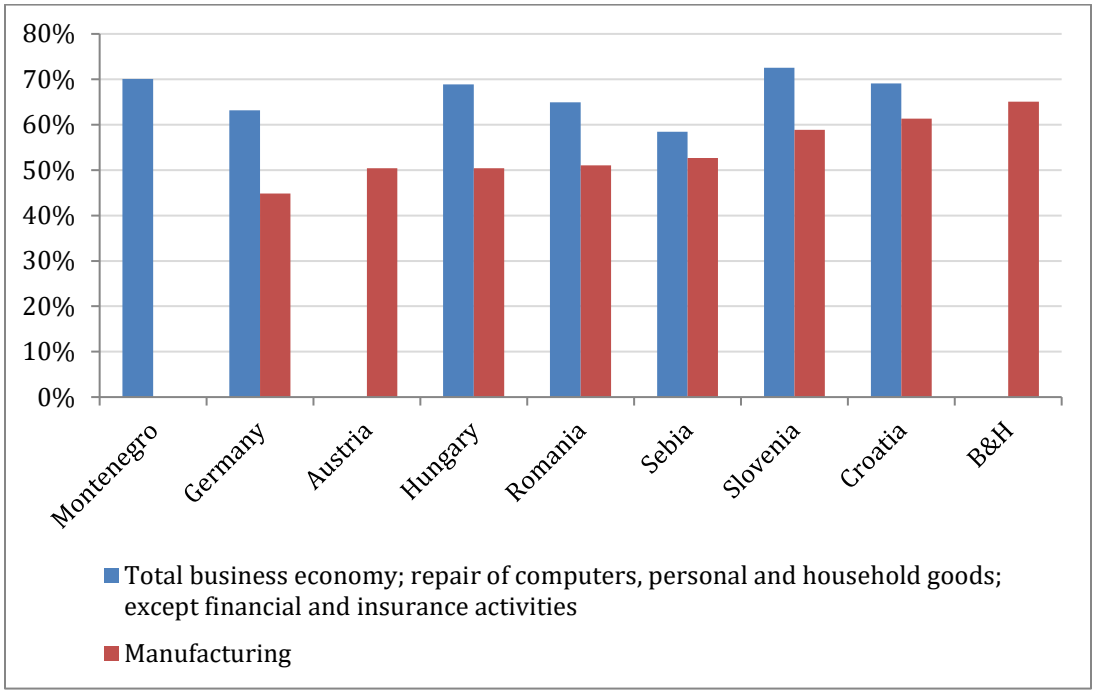


Figure 2.26. The share of persons employed in SMEs (% total employees), 2017

The analysis of the SMEs share in total enterprises from the target sectors indicates that in these fields of activity the SMEs predominate, the registered percentages being generally very high, even 100% in some cases.

In *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* the share of SMEs varies between 98% in Hungary and up to 99.8% in Slovenia, the differences between countries being very small. In *Manufacturing*, the variability is also low, the SMEs share in total enterprises being between 97.6% in Croatia and 99.4% in Slovenia.

The analysis by sub-domains of manufacturing highlights *Manufacture of basic metals*, where in Austria only 72.7% of companies are SMEs compared to Slovenia where 99.8% of companies in this field are SMEs. In *Manufacture of computer, electronic and optical products* all companies in Bosnia and Herzegovina are SME, compared to Croatia which has the lowest share (96.5%). In *Manufacture of motor vehicles, trailers and semi-trailers*, the share of SMEs in total enterprise ranging from 80.7% in Romania to 99.2% in Germany.

The biggest differences are in *Manufacture of other transport equipment*, Bosnia and Herzegovina having a share of SME in total enterprises of only 45.5% compared to 100% in Slovenia.

Table 2.5. The share of SMEs in total enterprises, 2017

Enterprises	AT	BA	DE	HR	HU	ME	RO	RS	SI
Total business	99.7%		99.7%	99.5%	98.0 %	99.8 %	99.7%	99.4%	99.8%
Manufacturing	98.1%	98.9%	99.2%	97.6%	99.1%		98.5%	98.5%	99.4%
Manufacture of basic metals	72.7%	93.4%	95.5%	91.2%	95.2%		94.5%	96.6%	93.5%
Manufacture of fabricated metal products	98.9%	99.1%	99.4 %	98.8%	99.7%		99.3%	98.9%	99.8%
Manufacture of computer, electronic and optical products	97.0%	100.0 %	99.6%	96.5%	98.0 %		96.6%	99.8%	98.8%
Manufacture of electrical equipment	90.9 %	96.0%	97.3%	94.7%	94.7%		93.4%	96.4%	94.9%

Manufacture of machinery and equipment	94.4 %	97.9%	98.6 %	94.6%	98.3%		96.8 %	99.0%	98.9%
Manufacture of motor vehicles, trailers and semi-trailers	89.1%	95.5%	99.2%	87.9%	84.1%		80.7 %	90.0 %	92.7%
Manufacture of other transport equipment	91.2%	45.5%	97.5%	93.1%	97.8%		93.8%	97.3%	100%
Repair and installation of machinery and equipment	99.3%	100.0 %	99.7%	99.3%	99.9%		99.5%	99.3%	99.9%

The cluster analysis was performed based on the values registered for the share of SMEs in total enterprises for the target sub-sectors of Manufacturing: Manufacture of basic metals; Manufacture of fabricated metal products; Manufacture of computer, electronic and optical products; Manufacture of electrical equipment; Manufacture of machinery and equipment; Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment and Repair and installation of machinery and equipment. Montenegro was excluded from the analysis due to lack of data.

The results indicated the grouping of countries as follows:

- Cluster 1: Bosnia and Herzegovina
- Cluster 2: Austria
- Cluster 3: Slovenia, Serbia, Croatia, Hungary, Romania and Germany.

Bosnia and Herzegovina has a different pattern than the other countries because, although in most of the analysed sub-sectors it registered large

shares of SMEs in total enterprises, in Manufacture of other transport equipment only 45.5% of the companies are SMEs, the value being very small compared to the other countries.

Austria stands out from the other countries in that the share of SMEs in total enterprises is relatively lower, with large companies operating in the target sub-sectors to a greater extent than in the other countries analysed.

The third cluster contains the countries with average values, without very big differences between them.

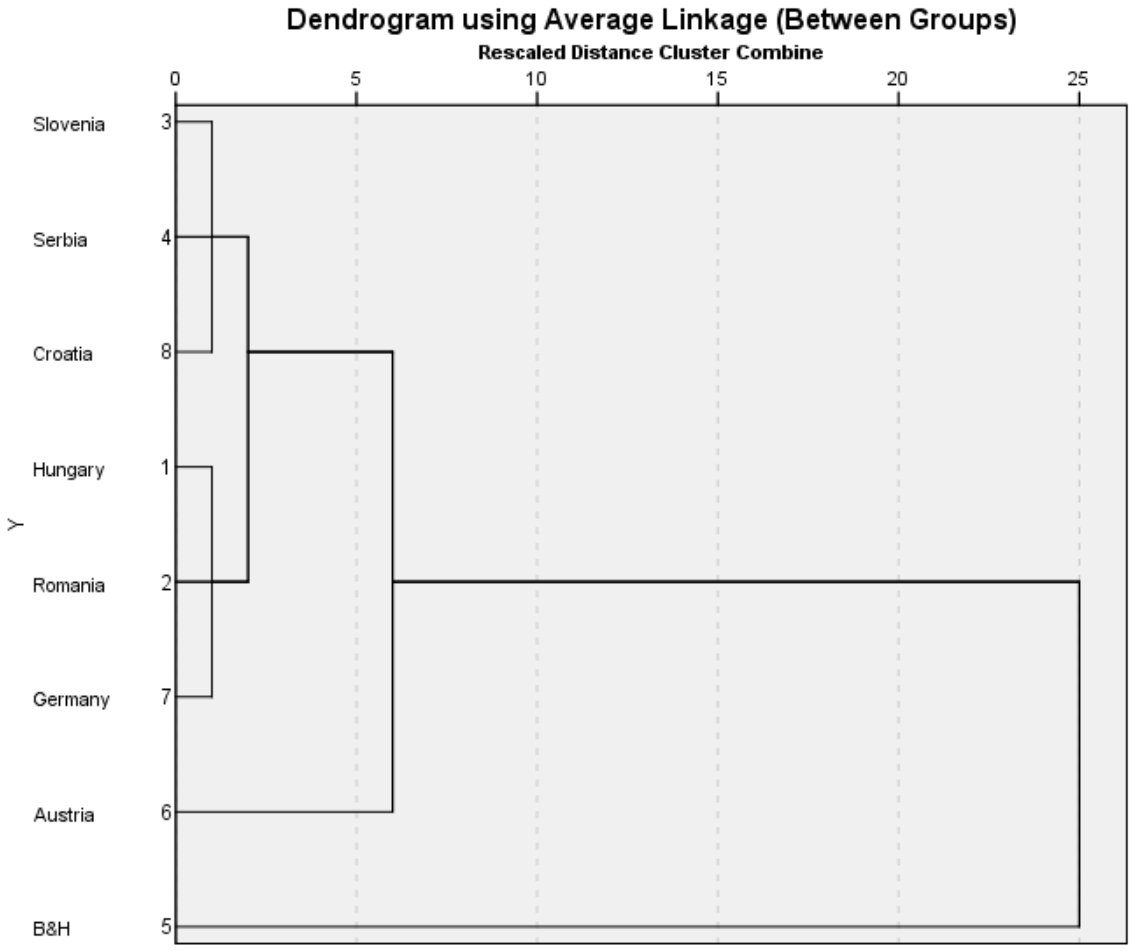


Figure 2.27. Hierarchical cluster analysis for the share of SMEs in total enterprises, 2017, for target sectors in Manufacturing

The analysis *of persons employed in SMEs as a share of total employed persons* indicated a much greater variability between the analysed countries and depending on the target sectors and sub-sectors. Unfortunately, we did not have a complete set of data available, the analysis being performed with this limitation.

In *Total business economy; repair of computers, personal and household goods; except financial and insurance activities* the highest share of employees working in SMEs is registered in Slovenia (72.5%), and the lowest in Serbia (58.4%). For Montenegro we have data only for this sector, the share of employees in SMEs being 70.1%.

In *Manufacturing* the share of individuals employed in SMEs varies between 44.9% in Germany and 65.1% in Bosnia and Herzegovina.

In *Manufacture of basic metals*, the share of employees in SMEs is relatively low, ranging between 16.1% in Austria and 42.5% in Croatia. On average, the largest share of employees in SMEs is registered in *Manufacture of fabricated metal products*, a sub-sector in which 58.5% of employees from Serbia are working in SMEs, and up to a share of 89.3% in Hungary.

Among the analysed countries, Bosnia and Herzegovina stands out, because in *Manufacture of computer, electronic and optical products* and *Repair and installation of machinery and equipmen*t all employees are working in SMEs.

Table 2.6. The share of persons employed in SMEs in total employees, 2017

Persons employed	AT	BA	DE	HR	HU	ME	RO	RS	SI

Total business			63.2%	69.1%	68.9%	70.1%	64.9%	58.4%	72.5%
Manufacturing	50.4%	65.1%	44.9%	61.4%	50.4%		51.0%	52.7%	58.9%
Manufacture of basic metals	16.1%	30.4%	26.8%	42.5%	29.0%		29.1%	24.8%	29.0%
Manufacture of fabricated metal products	65.4%	74.4%	71.1%	72.7%	89.3%		71.5%	58.5%	82.5%
Manufacture of computer, electronic and optical products	41.3%	100.0%	41.5%	46.7%	22.4%		29.7%	90.2%	61.3%
Manufacture of electrical equipment	22.7%	62.4%	31.1%	61.5%	31.2%		30.6%	30.0%	19.8%
Manufacture of machinery and equipment	41.9%	62.2%	37.8%	65.1%	40.7%		42.9%	70.1%	77.8%
Manufacture of motor vehicles, trailers and semi-trailers	21.2%	64.4%	8.2%	69.3%	12.4%		7.0%	14.3%	20.8%
Manufacture of other transport equipment		3.0%	16.2%	38.4%	41.6%		25.9%	59.8%	99.9%
Repair and installation of machinery and equipment	56.6%	100.0%	66.9%	77.5%	80.8%		67.2%	69.0%	60.4%

The cluster analysis was performed using the share of persons employed in SMEs in total employees in almost all the target sub-sectors of manufacturing. *Manufacture of other transport equipment* could not be used as an indicator

in the analysis due to incomplete data. Montenegro was excluded from the analysis due to lack of data.

The obtained results indicate the formation of 4 clusters:

- Cluster 1: Croatia
- Cluster 2: Bosnia and Herzegovina
- Cluster 3: Slovenia and Serbia
- Cluster 4: Romania, Germany, Austria and Hungary.

Bosnia and Herzegovina has a different pattern from other countries because in some sub-sectors all employees work exclusively in SMEs compared to all other analysed countries where this situation was not observed.

Croatia has a relatively low variability in the share of employees in SMEs depending on the analysed sub-sector, thus differing from other countries.

Slovenia and Serbia have high values of the share of employees in SMEs in *Manufactures of other transport equipment as well* as in *Manufacture of computer, electronic and optical products* compared to countries in cluster 4. The differences between these two groups of countries come from the values recorded for sub-sectors, more homogeneous within groups and obviously more different between clusters.

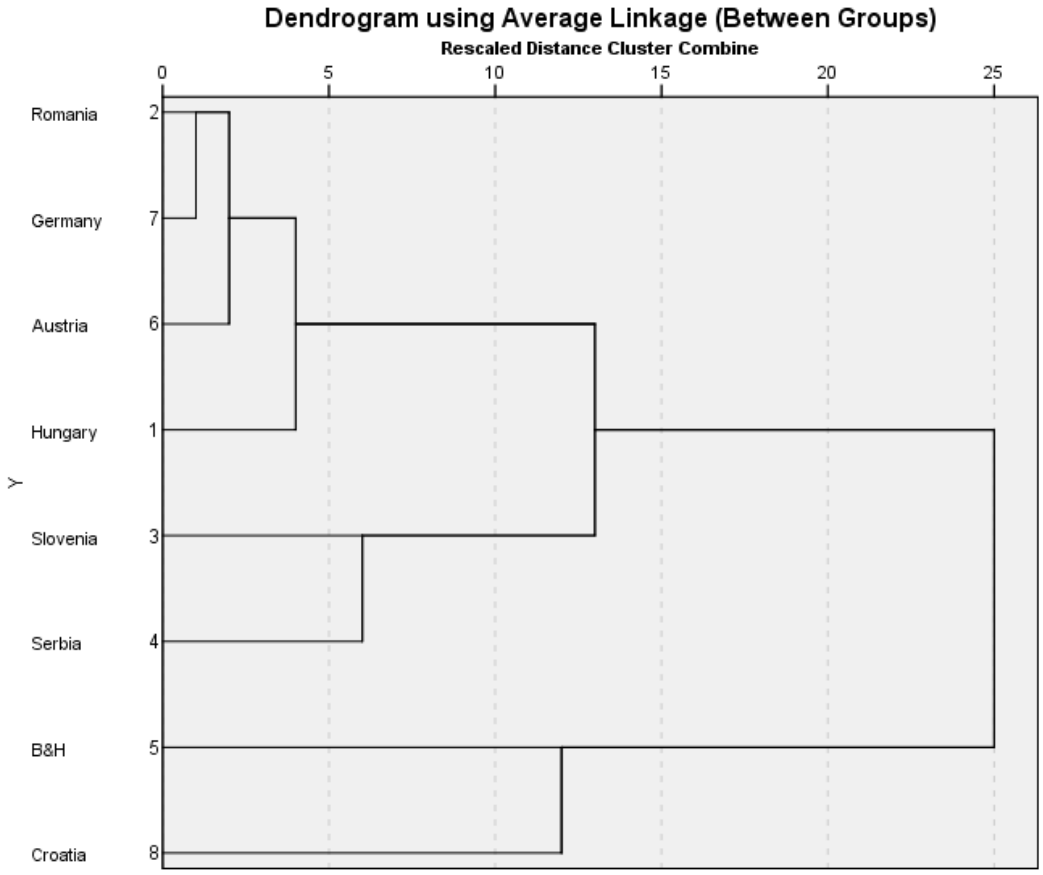


Figure 2.28. Hierarchical cluster analysis for the share of persons employed in SMEs, 2017, for target sectors in Manufacturing

2.4. Digital Training Indicators

To estimate the level of digital training we used as indicator the enterprises that provided training to develop ICT skills of their personnel, 2019 (% of enterprises) the analysis being carried by size of the company and by sectors of activity.

The analysis of companies that provided training for the development of ICT skills of their personnel in 2019 indicated that the share of large enterprises is much higher compared to that of SMEs. There are three groups among the countries in the Danube area. A group formed by Germany, Slovenia and Austria in which we observe the highest percentage of companies that provided staff training for the development/ upgrade of ICT skills both at the level of large companies (between 72% and 81%) and at the level of SMEs (between 17% and 30%). A group consisting of Hungary, Serbia and Croatia in which the percentage of large companies that provided ICT training to the personnel is between 62% and 67%, and that of SMEs between 15% and 27%, and a group consisting of Romania and Bosnia & Herzegovina where we have the lowest percentage of companies that provided training for the development of ICT skills of their personnel, between 30% and 48% in the case of large companies and between 5% and 15% in the case of SMEs.

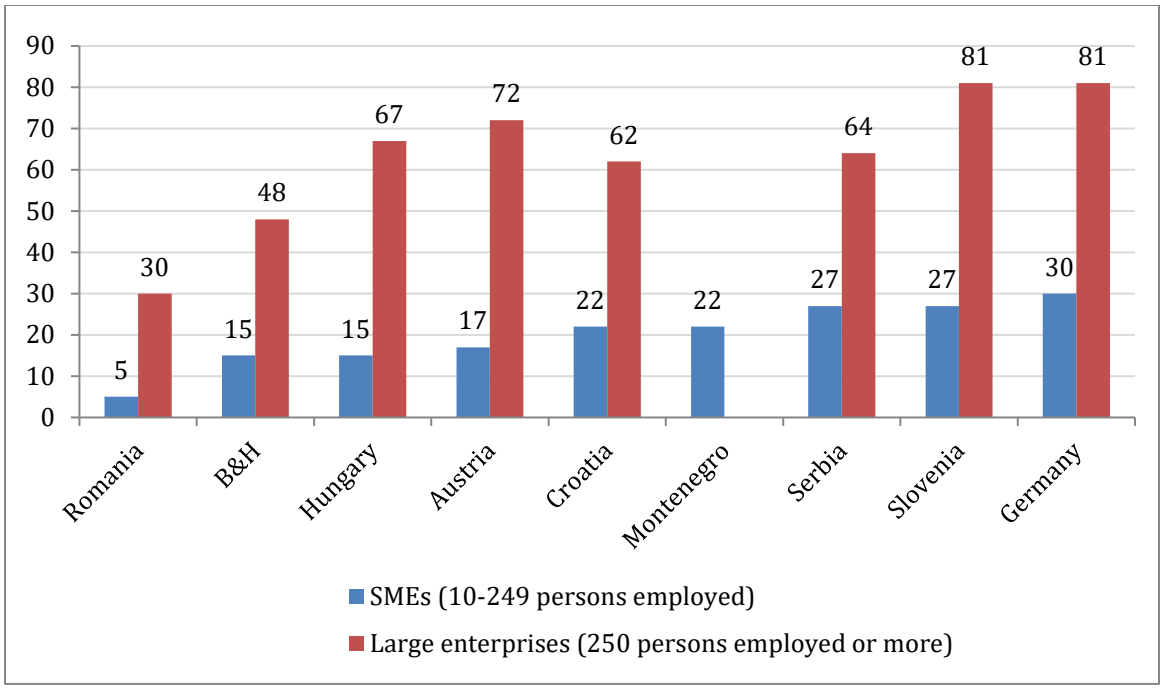


Figure 2.29. Enterprises that provided training to develop ICT skills of their personnel, in 2019 (% of enterprises), without financial sector

Manufacturing firms that provided training for the development of their personnel's ICT skills in 2019 have the highest percentage of the total manufacturing firms in Germany (35%), Slovenia (34%), Austria (27%), Serbia (24%) and Croatia (22%). The lowest percentage of companies in the production sector that provided ICT training to employees are Romania (5%), Bosnia & Herzegovina (13%) and Montenegro (14%).

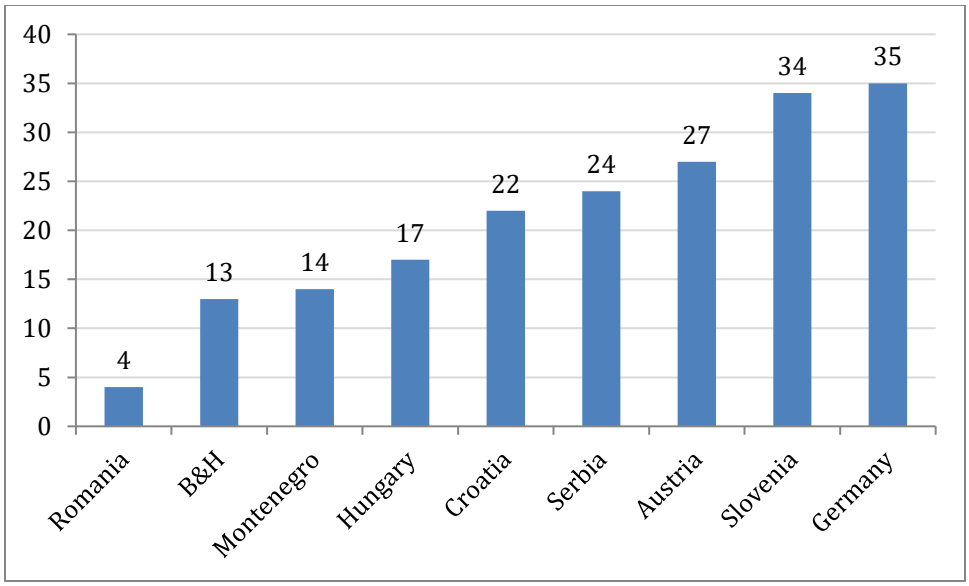


Figure 2.30. Enterprises (10 persons employed or more) that provided training to develop ICT skills of their personnel, in 2019 (% of enterprises), in Manufacturing sector

By types of production sectors we notice that *in Manufacture of furniture and other manufacturing; repair and installation of machinery and equipment* the highest percentage of companies that provided training for the development of ICT skills of their personnel in 2019 are registered in Slovenia (33%), Serbia (33%) and Germany (29%). In *Manufacture of motor vehicles, trailers and semi-trailers, other transport equipment,* the countries with the highest number of companies that offered training were also Slovenia (62%), Serbia (45%) and Germany (45%). In the *Manufacturing of electrical equipment, machinery and equipment* sector, Germany (49%), Croatia (43%) and Slovenia (42%) were the countries with the highest percentage of companies that provided ICT training to employees. In *Manufacture of computer, electronic and optical products*, the highest percentage of companies that supported their staff in developing ICT skills were registered in

Croatia (62%), Serbia (60%) and Germany (51%). In the *Manufacture of basic metals & fabricated metal products excluding machines & equipments* sector, Germany (31%) and Slovenia (31%) register the highest percentage of companies that offered training to develop/ upgrade their personnel in ICT skills in 2019.

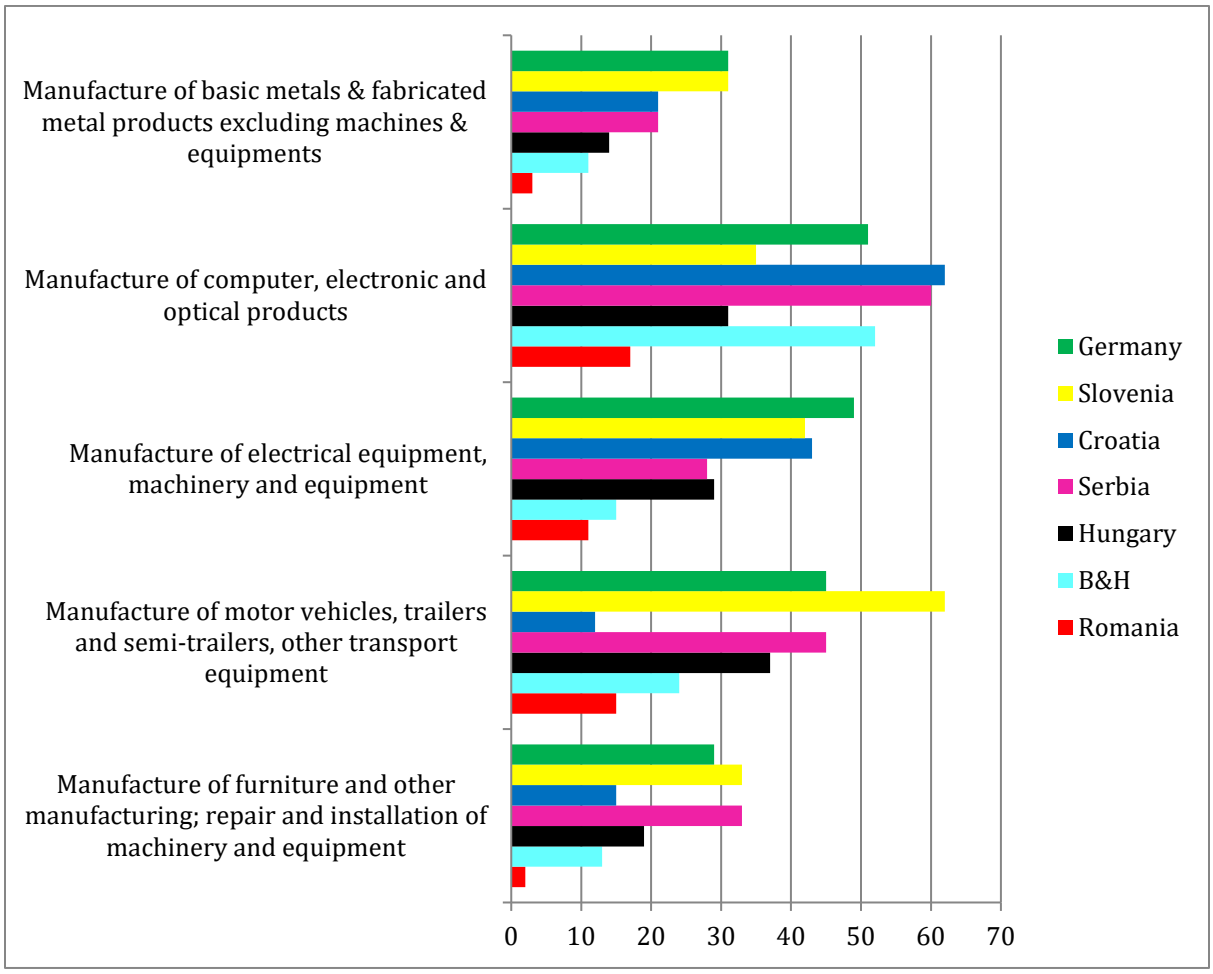


Figure 2.31. Enterprises (10 persons employed or more) that provided training to develop ICT skills of their personnel, in 2019 (% of enterprises)

The cluster analysis was performed using as indicators the enterprises that provided training to develop ICT skills of their personnel in 2019 (% of enterprises) from the following sectors: *Manufacture of basic metals &*

fabricated metal products excluding machines & equipment; Manufacture of computer, electronic and optical products; Manufacture of electrical equipment, machinery and equipment; Manufacture of motor vehicles, trailers and semi-trailers, other transport equipment and *Manufacture of furniture and other manufacturing; repair and installation of machinery and equipment*. Austria and Montenegro were not included in the analysis due to lack of data.

Based on the results obtained, three groups of countries can be formed:

- Cluster 1: Slovenia, Germany and Serbia
- Cluster 2: Romania, Hungary and Bosnia and Herzegovina
- Cluster 3: Croatia

The countries from the first cluster are characterized by large investments in the development of employees' ICT skills. In some sectors the share of companies that support employee development is very high: 62% of enterprises from Germany in the *Manufacture of motor vehicles, trailers and semi-trailers, other transport equipment* sector provided training to develop ICT skills of their personnel in 2019 and 60% from the enterprises in Serbia in the *Manufacture of computer, electronic and optical products* sector.

On the contrary, the second cluster contains the countries with the smallest contributions to increasing employees' ICT skills. Romania ranks last, with only 2% of companies in *Manufacture of furniture and other manufacturing; repair and installation of machinery and equipment* that provided training to develop the ICT skills of their personnel in 2019 and only 3% in the *Manufacture of basic metals & fabricated metal products excluding machines & equipment* sector.

Croatia has demarcated itself from these two clusters because the results are mixed. In some sectors many companies invested in employee development (for example in *Manufacture of computer, electronic and optical products* 62% of enterprises provided training to develop ICT skills of their personnel), and in other sectors investments have been very small: in *Manufacture of motor vehicles, trailers and semi-trailers, other transport equipment* only 12% of companies have provided training to employees, in this sector Croatia being on the last place among the analysed countries.

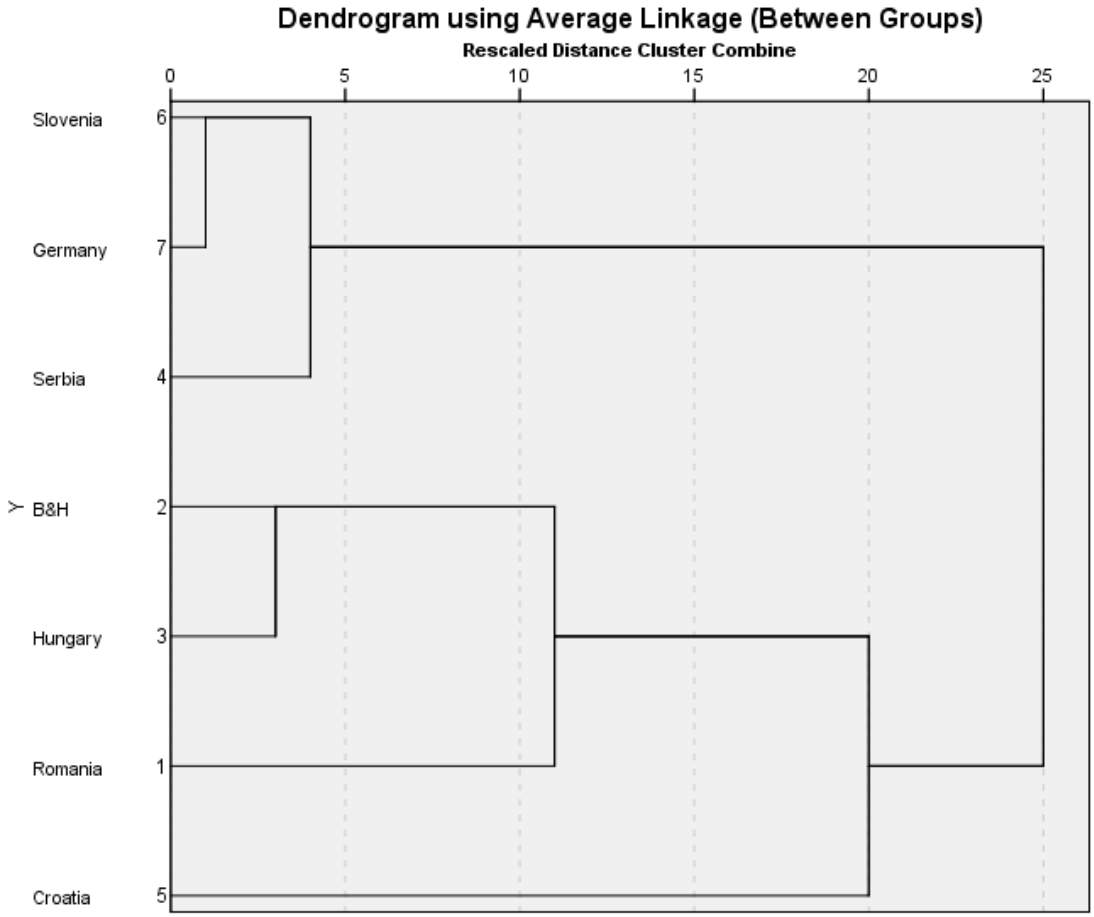


Figure 2.32. Hierarchical cluster analysis for the share of enterprises that provided training to develop ICT skills of their personnel in 2019, by target sector of Manufacturing

2.5. Covid-19 labour market indicators

The Covid-19 pandemic had a major impact on all economies. We tried to quantify the impact of the pandemic using the most important indicators of economic activity and labour market: GDP/capita, employment, job vacancies, unemployment rate and the share of young people aged 15-24 neither in employment nor in education and training (NEETs). The analysis was performed for the first and the second quarter of 2020, as a percentage change compared to the same period of the previous year.

For the countries in the Danube area, the Covid-19 impact on the economic activity is much more obvious in the second quarter of 2020. In the second quarter of 2020 all analysed countries registered decreases in GDP compared to the same period of the previous year. The most significant decreases in GDP were registered in Montenegro (-21.8%), Croatia (-17.6%), Hungary (-15.3%), Slovenia (-11.2%) and Romania (- 10.6%). In the first quarter of 2020 compared to the first quarter of 2019, only Austria (-2.6%) and Hungary (-0.7%) had slight decreases in GDP.

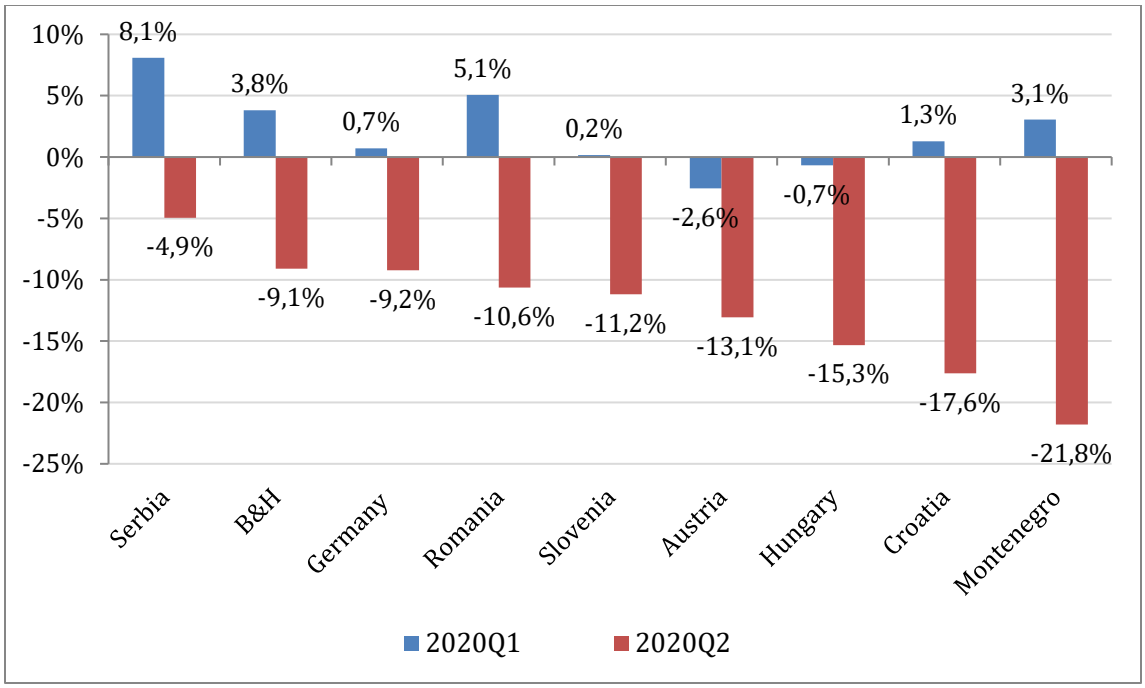


Figure 2.33. Gross Domestic Product, percentage change compared to the same period of the previous year (%)

The Covid-19 crisis also left its mark on employment, especially in the second quarter of 2020 as economic activity decreased. We note that, in terms of employment, the most affected countries in the Danube area, in the second quarter of 2020 compared to the same period of the previous year, were Hungary (-5.6%), Austria (-4%) and Romania (-3.2%). In the first quarter of 2020 compared to the first quarter of 2019 only Hungary recorded decreases in employment, all other states for which there were data available, had positive developments of this indicator.

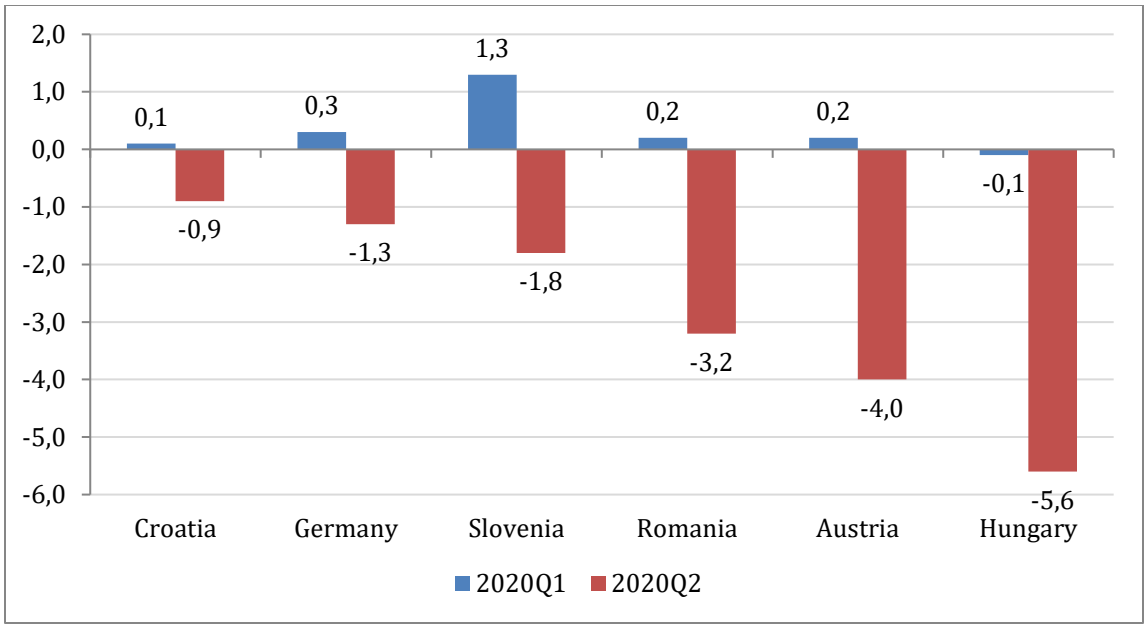


Figure 2.34. Total employment, percentage change compared to the same period in previous year (based on persons)

Clearly, together with the restrictions imposed by the Covid-19 crisis, which have led to a decrease in the economic activity, the number of job vacancies has fallen sharply. The decreases are significant in both the first quarter of 2020 and the second quarter of 2020, compared to the same periods of 2019. We note that in the second quarter of 2020 the largest decreases in job vacancies were registered in Croatia (-50.4 %), Slovenia (-39.9%), Romania (-37.9%) and Germany (-35.7%). In Hungary in the second quarter of 2020 job vacancies decreased by 26.2% compared to the first quarter of 2019, and in the first quarter of 2020 they had a higher decrease compared to the first quarter of 2019 (-27.7%).

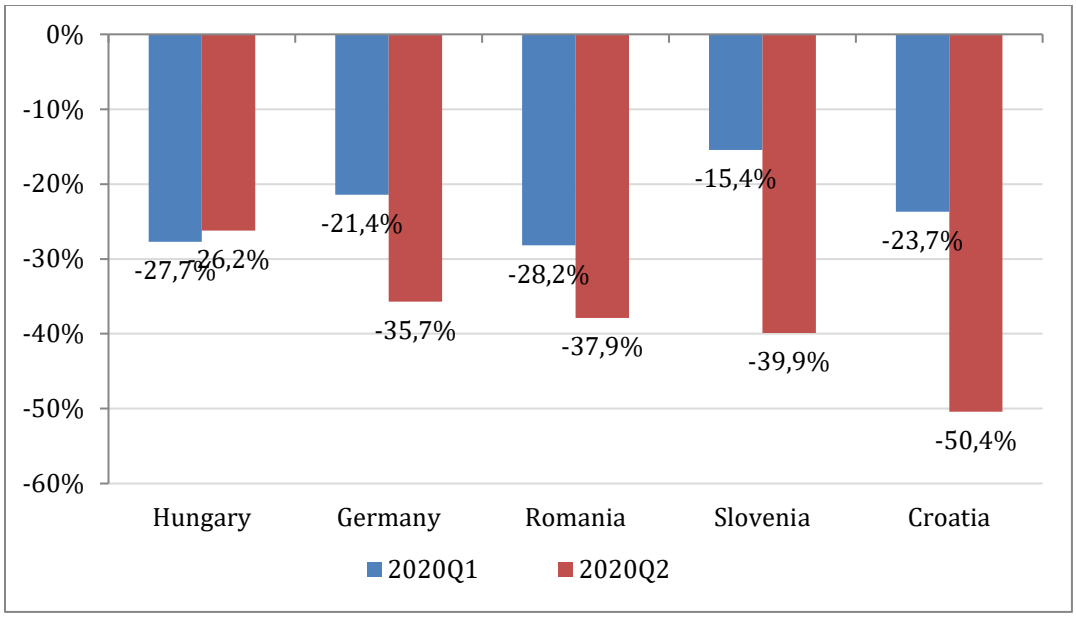


Figure 2.35. Number of job vacancies, percentage change compared to the same period in previous year (%)

The unemployment rate registered significant increases in the Danube area, especially in the second quarter of 2020 compared to the same period in 2019. Thus, in the second quarter of 2020 compared to the second quarter of 2019, in Romania we have the largest increase in unemployment (42.1%) from the group of analysed countries. In the same comparative period, in Hungary the increase was 35.3%, in Austria 24.4% and in Slovenia 23.8%. Serbia is the only country to register a decline in unemployment rates in 2020 in the first and second quarters compared to the same quarters of 2019 (-21.2% in Q1 and -27.5% in Q2).

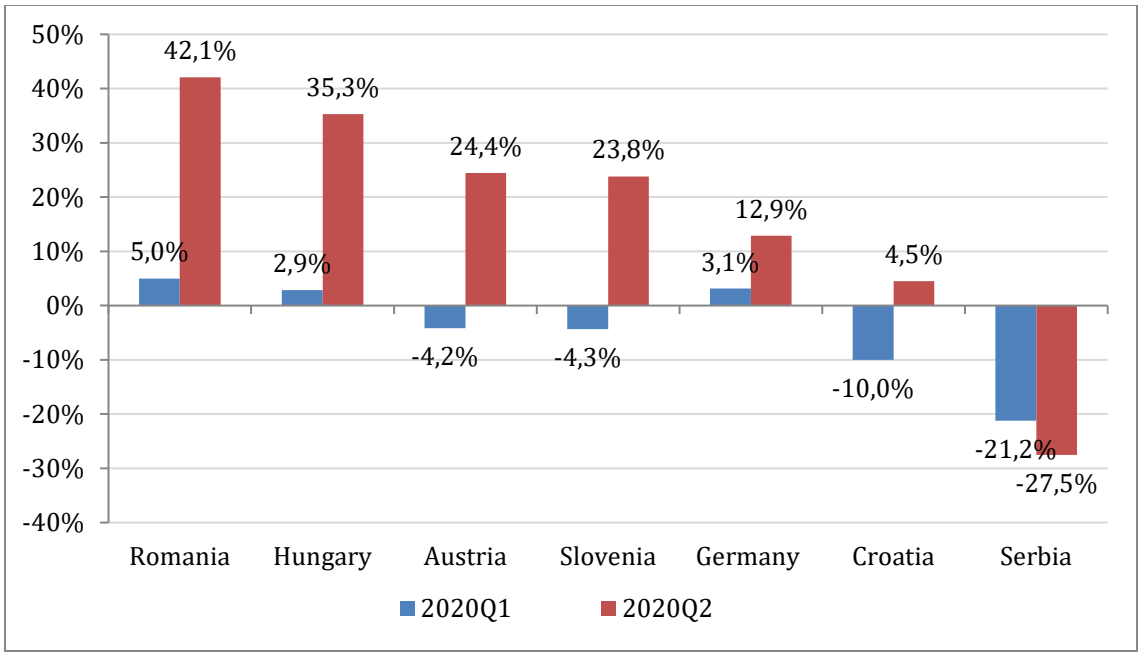


Figure 2.36. Unemployment rate, percentage change compared to the same period in previous year (%)

The number of young people neither in employment nor in education and training increased significantly in the first period of 2020 due to the restrictions imposed by the Covid-19 crisis, especially as the demand for work decreased drastically and education went online. We note that in the second quarter of 2020 compared to the same period in 2019 the number of NEETs increased the most in Austria (50%), Slovenia (38.1%) and Croatia (18.3%). Decreases in the number of NEETs were registered in Romania (-2.7%) in the second quarter of 2020 compared to the same period in 2019 and in Croatia (-7.9%) in the first quarter of 2020 compared to the first quarter of 2019.

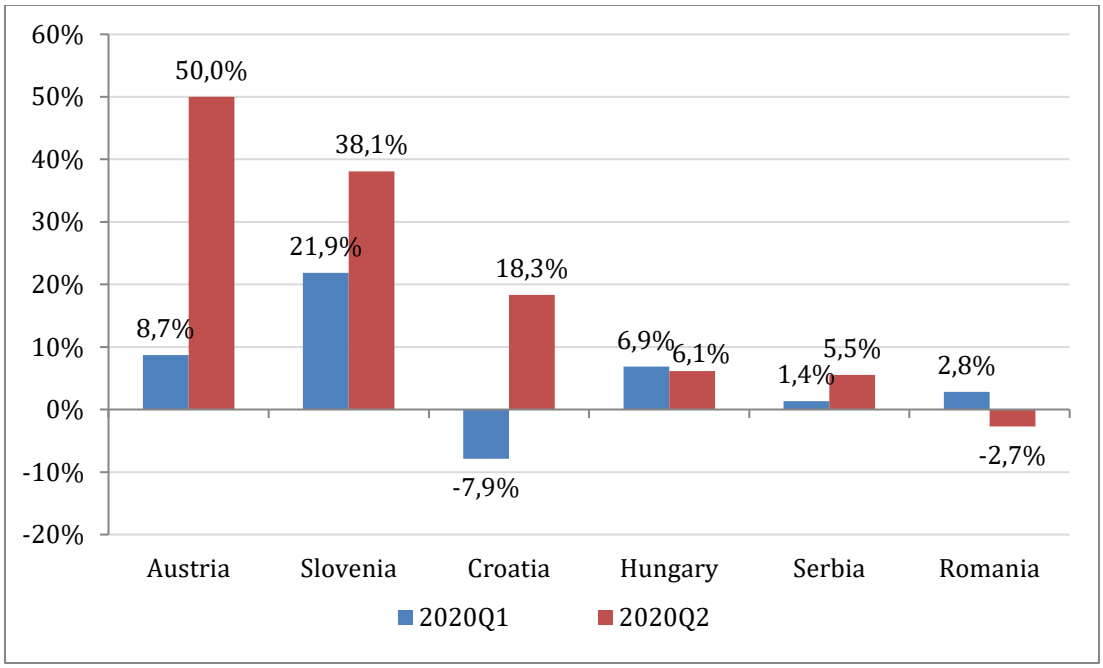


Figure 2.37. Young people aged 15-24 neither in employment nor in education and training (NEET), percentage change compared to the same period in previous year (%)

Cluster analysis

The cluster analysis was difficult to perform due to lack of recent data. Thus, only 7 countries were included in the analysis (Montenegro and Bosnia & Herzegovina were excluded due to insufficient information) and the classification of countries was made taking into account only two indicators: GDP/capita and unemployment rate, percentage change in the second quarter of 2020 compared to the same period of previous year.

Even with these shortcomings, the results indicated interesting and different patterns among the analysed states. According to the dendrogram, we could consider a division into 3 clusters:

- Cluster 1: Serbia
- Cluster 2: Hungary and Romania

- Cluster 3: Austria, Slovenia, Germany and Croatia

Serbia stands out separately from the other states included in the cluster analysis because it is the only one that recorded a decrease in the unemployment rate in the second quarter of 2020 compared to the same period of previous year.

Hungary and Romania were the countries most affected by the Covid-19 pandemic, the analysed macroeconomic indicators registering a significant deterioration, especially in the labour market area, the unemployment rate increasing alarmingly in the 2nd quarter of 2020 compared to the 2nd quarter of 2019.

Austria, Slovenia, Germany and Croatia suffered an average damage due to Covid-19 pandemic, the biggest shortcomings being in terms of economic development: GDP/capita registered major decreases in the second quarter of 2020 compared to the same period of the previous year.

3. Support schemes and programs strengthening digital transformation and supporting qualification demand

Chapter 3 provides a cross-institutional overview of already existing funding schemes and non-financial support instruments targeted at strengthening digital transformation of country industries, upskilling of qualified workers and Post COVID19 support measures.

The digital economy has deeply impacted the financial services sector by enabling new internet-based banking and investment business models with lower cost of operation that have significantly widened the reach among

consumers. Moreover, digital payments have opened many new opportunities for both small- and medium-sized enterprises and citizens.

Digital transformation approaches outside the public sector are changing citizens' expectations of governments' ability to deliver high-value, real-time digital services. In response to the changing expectations and triggered by supranational agreements, governments are changing their mode of operation to improve public service delivery, be more efficient and effective in their designs, and achieve objectives such as increased transparency, interoperability, or citizen satisfaction. However, beyond the availability of consultancy reports, there is little systematic insight into the way that public administrators themselves are currently defining digital transformation in their own day-to-day practices, how they are approaching digital transformation projects, and what their expected outcomes are.

Benchmarking is usually considered to be a process of seeking out and implementing best practices at best cost. The basic principle of benchmarking consists of identifying a point of comparison, called the benchmark, against which everything else can be compared. *Qualitative Benchmarking* is one method of peer benchmarking that involves using subjective/non-data system sourced data for benchmarking purposes. When dealing with qualitative goals, what successful performance looks like for that specific goal needs to be defined, which may require a mix of situations like: better adapting to change, working collaboratively, using UE public funds etc.

The main source of funding for high-speed broadband development projects are: (1) national public founds (2) regional public founds 3) private founds and (4) mixt.

Public founds enable economic and social improvement and are available at local, regional and national government levels, as well as at EU level.

At EU level, the *European Structural and Investment Funds (ESIF)* are available which include:

- The *European Regional Development Fund (ERDF)* aims to strengthen economic and social cohesion in the EU by correcting imbalances between its regions.
- The *European Agricultural Fund for Rural Development (EAFRD)* aims to support rural areas of the EU to meet the wide range of economic, environmental and social challenges.
- The *European Social Fund (ESF)* aims to support jobs and employment opportunities for all EU citizens.
- The *Cohesion Fund (CF)* aims to reduce economic and social disparities and to promote sustainable development.
- The *Connecting Europe Facility (CEF)* together with the *European Investment Bank (EIB),* is specifically dedicated to the goals of the Digital Single Market, the Digital Agenda for Europe and to support the strategic objectives of the European Gigabit Society Strategy. The *Connecting Europe Broadband Fund* provides equity and quasi-equity to smaller-scale, higher-risk broadband projects, which do not have sufficient access to financing, in (under-served) suburban and rural areas.

The private founds can be accessed for investment funds that provide equity or debt financing as well as hybrid solutions (mezzanine funding). Investment funds seeking a stable return on investment and may focus on safe, tangible assets such as high-capacity broadband infrastructure:

- Banks, investment funds and private equity investors may be interested in providing early-stage financing, looking for a higher risk premium and an exit between 3 and 7 years once the business is established.
- Infrastructure funds, pension funds and other institutional investors may invest in established infrastructure from the above after 3-7 years and seek long term investment at lower interest rates.

3.1. Financial environment

- financial instrument, guarantees, loans, etc.

In this subchapter, the countries described the national/ regional instruments used at micro and macroeconomic level.

Considering the typology of the answers, we tried to make a unitary analysis and as conclusive as possible at the level of the nine countries. The analysis of the information provided was performed in the first stage by giving points at the level of each country according to two important criteria, namely, the type of the funding sources for the project and the diversity of the financial instruments used.

According to the first criterion, that of the typology of the financing sources, the score was given by counting the types of financing sources used, thus, the points given were: 1- national public funds 2 - regional public funds, 3 - private funds, 4 - mixed sources

According to the second criterion, that of the diversity of the financial instruments, the score was given by summing the types of financial

instruments, thus, 1- grants, 2- subsidies, 3- government-guaranteed loans, 4- loans with interest subsidy, 5- capital of risk.

Following the analysis of the answers provided in this subchapter and based on the points given to the two criteria, we obtained scores at the level of the nine countries. Based on these scores, we performed a clustering. The analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance.

The obtained dendrogram allows the clustering of the countries into three groups:

- Group 1: Montenegro, Croatia, Bosnia & Herzegovina and Hungary
- Group 2: Austria
- Group 3: Slovenia, Romania, Germany and Serbia

In the first group of countries consisting of Montenegro, Croatia, Bosnia & Herzegovina and Hungary, the funding sources of the instruments were only from public funds (they collected 1 point at the first criterion), and the financial instruments had a lower diversity (they collected 2-3 points at the second criterion). Within these countries, the sources of financing of the national/ regional instruments came from a single direction (public funds), and the financial instruments were obviously also reduced.

The second group consists only of Austria, which scored 3 points on the criteria for funding sources and 2 points on financial instruments. Austria practically reflects an average situation at the level of the two criteria used in giving the scores.

The third group of countries consists of Slovenia, Romania, Germany and Serbia, countries that have accumulated 2-3 points in terms of funding sources, and the diversity of funding sources has been higher, registering 4-5 points in

the second criterion. This group of countries is the one with the highest diversity in terms of both the first criterion (sources of funding) and the second criterion (funding instruments).

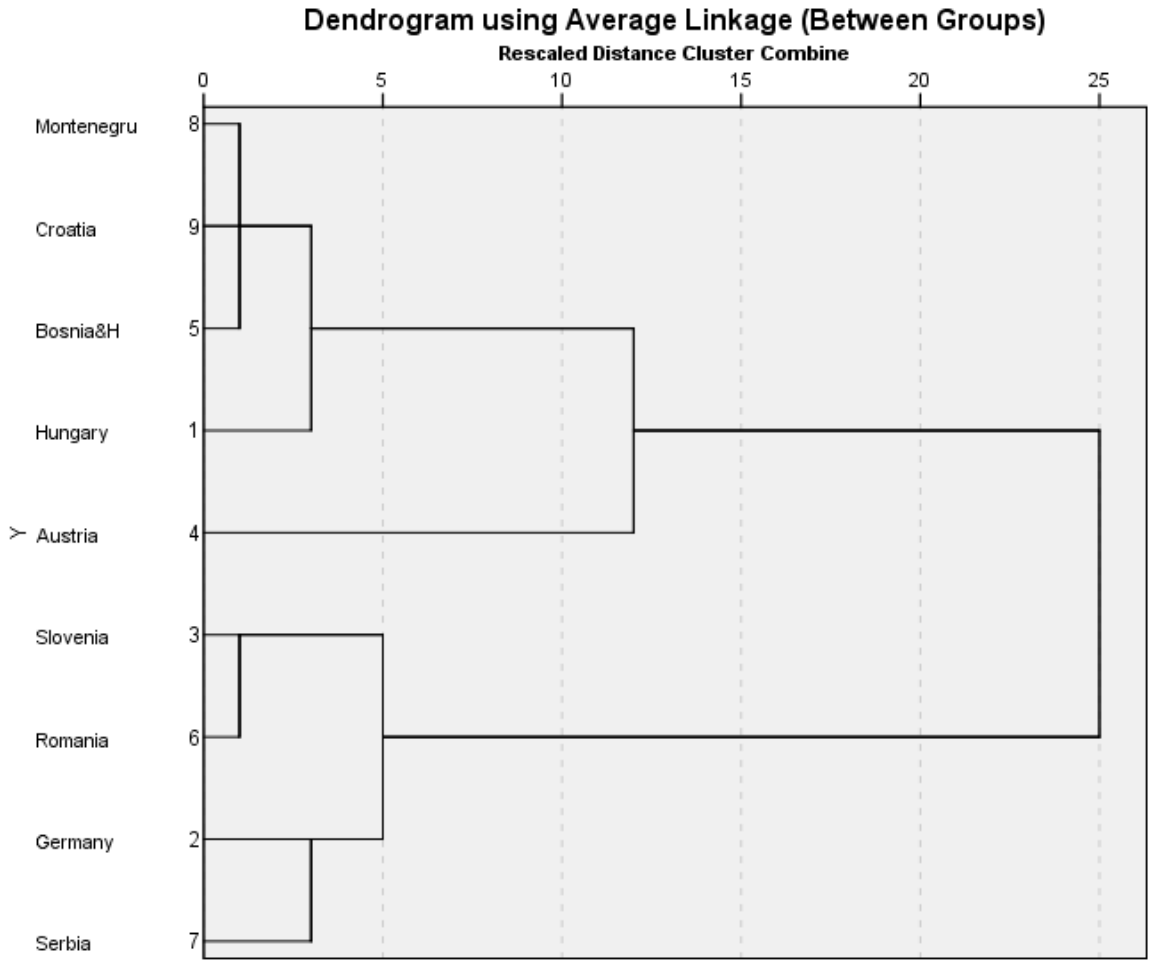


Figure 3.1. Hierarchical cluster analysis

3.2. Supporting Measures

- support measures targeted at strengthening digital transformation of regional industries, upskilling of qualified workers) –European Union Programs, Europe 2020 flagship initiative, Cohesion policy (ERDF, ESF, CF)

In this subchapter, countries presented information on support measures aimed at strengthening the digital transformation of regional industries and improving the qualification of workforce on digital issues.

Given the diversity of existing measures and programs in each country, we decided to use a multi-criteria methodology through which we can obtain unitary and comparable information. In this context, we decided to evaluate the support measures on the basis of four criteria related to the existence of certain types of programs through which these measures were taken, namely:

1. Existence of programs to stimulate digitization
2. Existence of programs to support the development of SMEs
3. Existence of regional programs to support SME development and digitization
4. Attracting European funds for SME development and digitization programs

Based on the four criteria and the identification of the answers provided, the countries received 1 point for each evaluation criterion if the answer was affirmative (the existence of programs on the criterion was confirmed) or 0 points if the answer was negative (the existence of programs on the criterion was not confirmed).

Based on these accumulated points, a clustering was performed. The analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance.

The obtained dendrogram allows the clustering of the countries into two groups:

- Group 1: Bosnia & Herzegovina and Montenegro

- Group 2: Austria, Croatia, Slovenia, Romania, Hungary, Germany and Serbia

According to the information provided, in the first group we did not identify the presence of any program to implement support measures to strengthen the digital transformation of regional industries and improve the qualification of the workforce on digital issues.

The second group identified the presence of at least two types of programs that supported digitization at the industrial level, including workforce. Germany, Austria and Romania stated the presence of digitization consolidation programs for all four criteria included in the clustering.

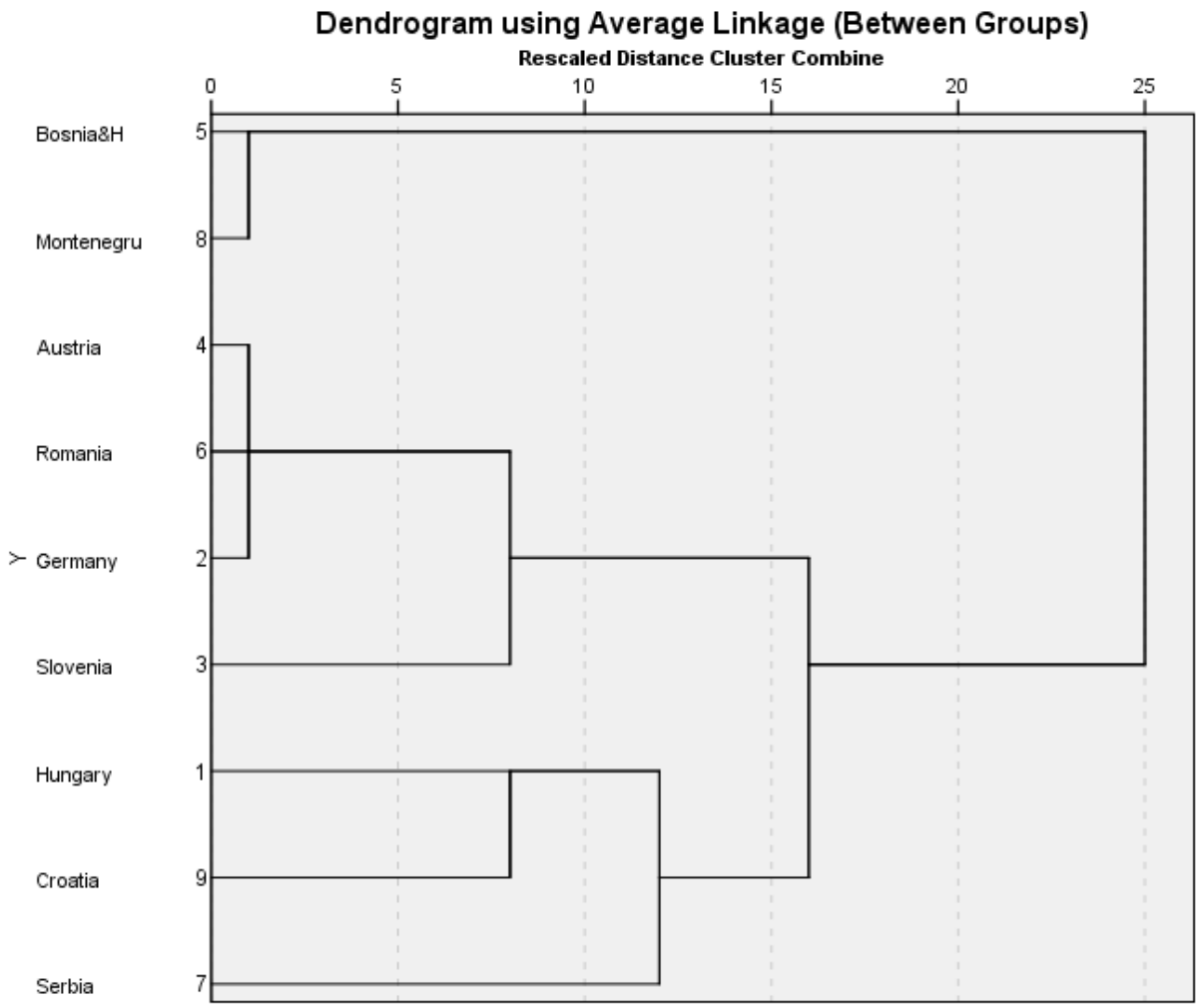


Figure 3.2. Hierarchical cluster analysis

3.3. National/regional schemes supporting digital transformation (business and labour)

The analysis made in this subchapter focuses on the identification of projects in the field of digital transformation. Based on the data collected, an analytical evaluation was developed according to the following criteria:

- Experience in implementing programs/measures (the scores reflect the experience in implementing these programs: 0 = not implemented; 1 = implemented in 2020; 2 = implemented in 2019; 3 = implemented in 2017; 4 = implemented in 2015; 5 = implemented before 2015)
- The volume of the allocated budget
- The objectives of the interventions: SME development, infrastructure development, e-government, digital skills education, research-innovation. The scores reflect the importance of the financed field: 1 = digital skills education, 2 = research-innovation; 3 = digital infrastructure; 4 = SMEs and entrepreneurship
- The number of organizations involved in implementation: points are given depending on the number and diversity of organizations involved
- The type of beneficiary: companies, SMEs, population, research. The scores reflect the degree of importance as follows: 1 = research, 2 = companies, 3 = SMEs, 4 = population
- Number of projects.

The scores given to the countries for each criterion allow a quantitative evaluation, being thus used in the cluster analysis. The volume of the allocated budget could not be taken into account the information is not consistent for all countries: for some projects the total amount is specified, for other projects it is the value of the allocation/projects. The cluster analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance.

The results of the cluster analysis allowed the classification of the analyzed countries into 3 groups:

- Cluster 1: Austria
- Cluster 2: Germany and Slovenia
- Cluster 3: Montenegro, Croatia, Serbia, Romania, Bosnia & Herzegovina and Hungary

Austria stands out because it registered a very high score for the criteria number of projects and type of beneficiaries compared to the other countries. Along with these two criteria, Austria ranked first for the number of organizations involved in implementation and experience in implementing programs/measures criteria, for the objectives of the interventions criterion being on the second position.

Germany and Slovenia are characterized by a large number of projects, experience in implementation, and relatively high scores for the objectives of the interventions and the type of beneficiaries.

The countries in cluster 3 obtained relatively lower scores on the considered criteria, by comparison with the other countries.

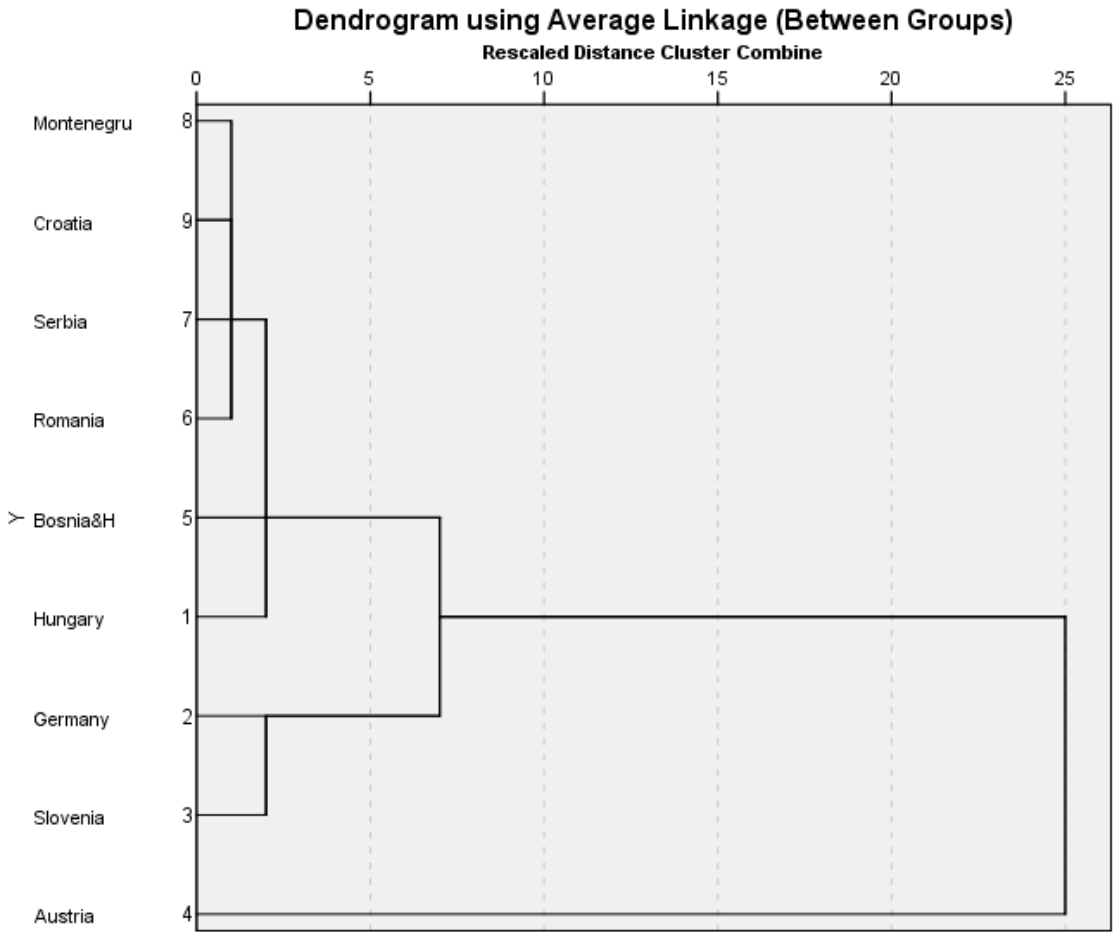


Figure 3.3. Hierarchical cluster analysis

3.4. Post COVID19 support measures

Identification of national/ regional instruments and measures on labour market and economy as reaction at Covid 19.

In this subchapter we tried, based on the information provided by each country, to identify national/ regional instruments and measures on the labour market and the economy in response to Covid 19. The analysis did not include the volume of the project budget because there was not enough information

offered, and where there was information we found that the values were disproportionate at the country level.

The methodology aimed at an analytical evaluation of the information based on five general criteria. At the level of each criterion, we gave points according to the defining characteristic elements. The criteria considered in the cluster analysis were:

• the existence of COVID-19 research programs. The values given were 1 - if there were programs and 0 - if there were no programs.

• the objectives of the interventions, which generally aimed at SME development, infrastructure development, e-government, digital skills education, research-innovation. At this criterion, the points given took into account the importance of the funded field, so we gave 1p - to the field of education for digital skills, 2p - to the field of research-innovation, 3p - to digital infrastructure and 4p - to SMEs and entrepreneurship.

• the type of beneficiary, namely, companies, SMEs, population and field of research. The points given were: 1p for research, 2p for companies, 3p for SMEs and 4p for the population.

Based on these points and the accumulated values, a clustering was performed. The analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance.

The obtained dendrogram allows the clustering of the countries into three groups:

- Group 1: Romania, Croatia, Serbia, Austria and Bosnia & Herzegovina
- Group 2: Slovenia, Montenegro, Hungary and Germany

The countries in the first group are characterized by a higher diversity both in terms of the type of beneficiary and in terms of the intervention objectives

targeted by the instruments used. At the same time, within these countries we have a larger number of implementing bodies. Austria and Bosnia & Herzegovina have the highest scores on the intervention objectives. Both Austria and Serbia have the best scores on the diversity of beneficiary types.

In the second group, according to the information provided, we have less diversity in the three analysis criteria used. Germany is the country in this group that has the most intervention objectives, according to the score obtained.

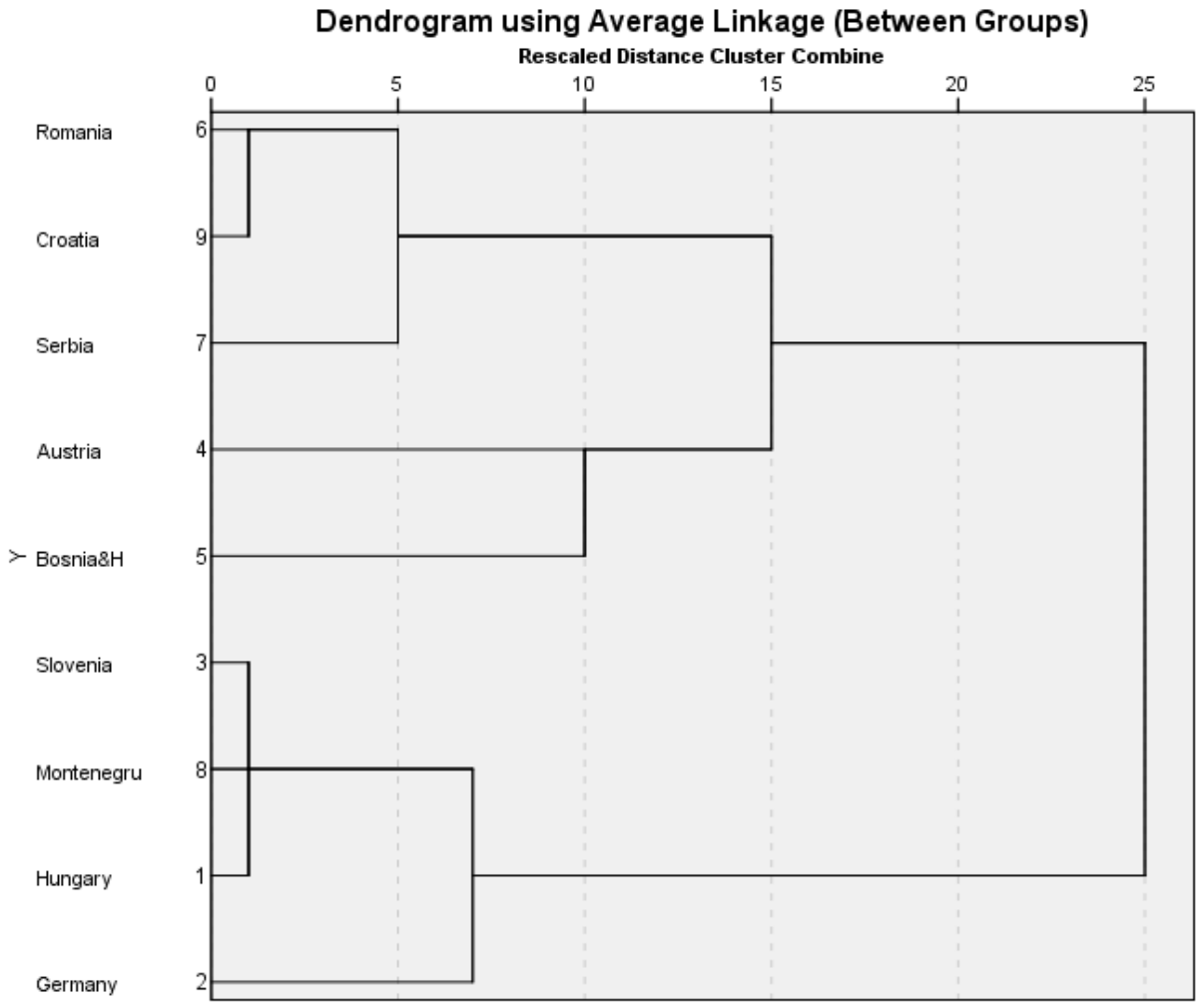


Figure 3.4. Hierarchical cluster analysis

4. Main projects (EU / national / regional) in place to develop digital transformation of regional industries and upskilling of qualified workers

4.1. Projects addressing digital transformation of regional industries

Content analysis (text mining) can be a solution for unstructured data. In the present case, the main goal was the classification of nine countries by the objectives of the implemented projects.

As for the working methodology, various techniques specific to content analysis could be mentioned, for which the input is (unstructured) text data.

The source of the information used in the present study is the set of objectives, as they are defined at the level of each country, representing detailed descriptions of the projects' objectives. In this area of content analysis, a collection of documents is called a corpus. For our case, nine corpora were constructed, one for each country. The text extraction analysis was achieved using the R libraries tm, tidytext and quanteda, through various methods: analysis of key-words frequency (word frequencies and wordclouds), analysis of classifying key-words by country (hierarchical cluster and k-means cluster), analysis of similarities and differences between the objectives (cosine similarity and keyness indicator), the LDA method (Latent Dirichlet allocation), and analysis of the relationships between words (n-grams method).

The LDA method is subject modeling method which estimates both the set of words that is associated with each subject and the set of subjects found in the document.

Text analysis uses concepts such as corpus, documents, token, types and sentences. In this study, the projects' objectives are the documents, the corpus is represented by countries, and the words of the objectives are the tokens. Unique words in the documents are the types, while the size of the tokens refers to the total number of words used.

The final result is given by a matrix, known as a document-term matrix, made up of numerical values representing words frequency. The rows represent the documents, while the columns represent the tokens.

The first step in the text extraction analysis involves data cleaning through specific procedures: removing whitespaces, removing punctuation marks, symbols, numbers, conjunctions and prepositions (stop words), and transforming upper case letters into lower case letters.

The table below (**Fig.1.**) shows the structure of the original data after this preliminary step, showcasing the number of unique words (types), the total word count (tokens), and the number of phrases for each country.

Text	Types	Tokens	Sentences	Textno
Hungary	536	1364	31	01
Germany	176	302	6	02
Slovenia	240	433	11	03
Austria	37	50	1	04
Bosnia & Herzegovina	51	74	2	05
Romania	222	398	7	06
Serbia	132	231	4	07
Montenegro	35	43	2	08
Croatia	64	82	2	09

Fig. 1. The distribution of unique words and total word count by country

Analyzing the objectives of the projects from the perspective of unique words total words ratio, Montenegro, Croatia followed by Austria occupied the first places.

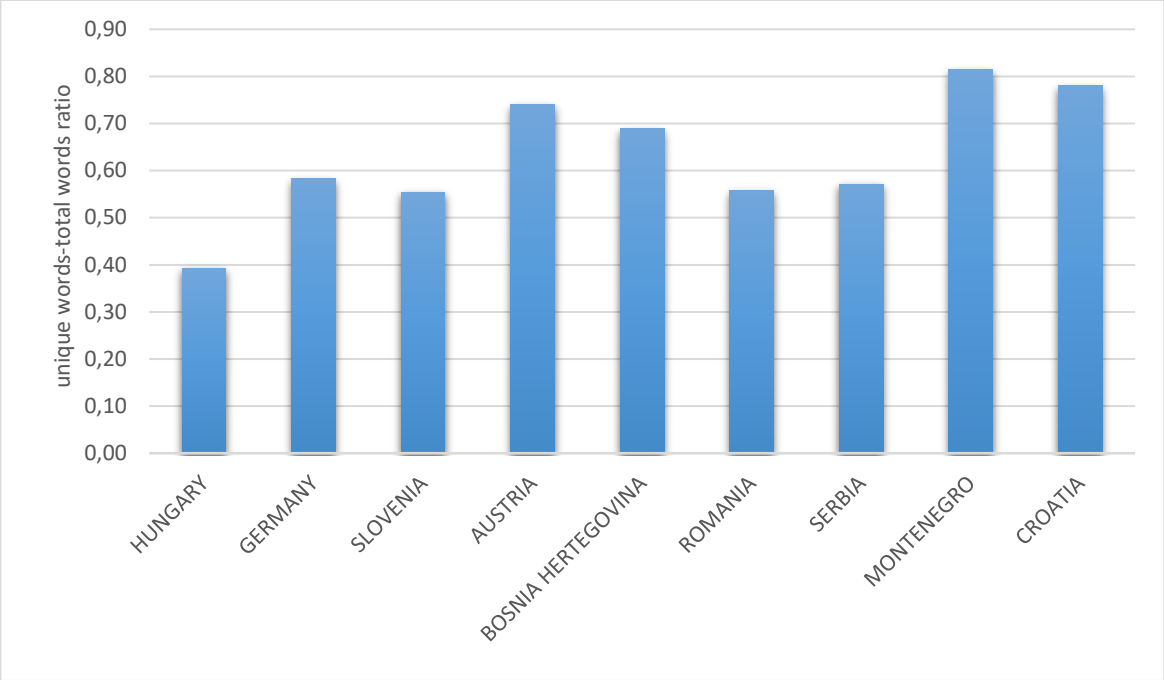


Fig. 2. The ratio of unique words to total words from the objectives, by country

During the clean-up process of the analysis, irrelevant words, which lacked informational value for the investigation, such as will, 3 5, 2, S, 4.0, I4.0 were eliminated.

Thus, the final collection of documents was used to identify the most relevant words, but it was also employed in clustering the countries by the projects' objectives.

Figure 3 shows the most important results obtained by using wordclouds – a visual instrument meant to identify the most frequently used words in the projects' objectives and which uses the top 30 words found after taking into account all of the countries. Figure 5 shows the distribution of the top 50 words for each of the countries, except for Bosnia, Montenegro and Croatia, for which keywords couldn't be identified, and Austria, where the only identified keyword was "DIGITAL".

Figure 4 shows the distribution of keywords for Romania, Serbia, Hungary, Germany, Slovenia, and Austria. We observe thus that “digital” was the most frequently used word for the objectives of all countries taken together, while the words distribution by country give us an imagine of the specific keywords. For the group formed by the nine countries (**Fig.5.**), the words “digital”, “innovation”, and “project” all play an important role within the objectives of the analyzed projects, while the distributions by countries showcase the differences. As such, within projects from Hungary, the words which best describe the objectives are “innovation”, “project”, “smes”, and “manufacturing”, while for Germany the word is “smes”. In Slovenia, the objectives can be characterized by “development”, “project”, and “objectives”, while in Serbia by “project”, “support”, and “digital”. Romania is best described through “innovation”, “development, and “data service”.

Fig. 3.Top 30 words wordcloud (all countries): authors’ analysis

oy country: authors' analysis

Hungary

Germany

Slovenia

Romania

Serbia

Fig. 5. Wordclouds for each country: authors' analysis

By analyzing the correlations of the three keywords "digital", "innovation", and "project", it can be noted that "digital" is more strongly correlated with "development", "transformation", and "smes", while "innovation" correlates with "main", "increase", "support", and "enabling", as showed in **Fig.6**.

The analysis of word similarities and distance **(Fig.7.)** highlighted that Romania is most similar to Hungary and, in terms of distance, related to Montenegro

The empirical results of the LDA analysis (**Fig.8.**) most relates topic 1, “digital”, with “support”, “services”, and “technologies”, and most relates topic 2, “innovation”, to “smes”, “region”, and “manufacturing”, removing common words.

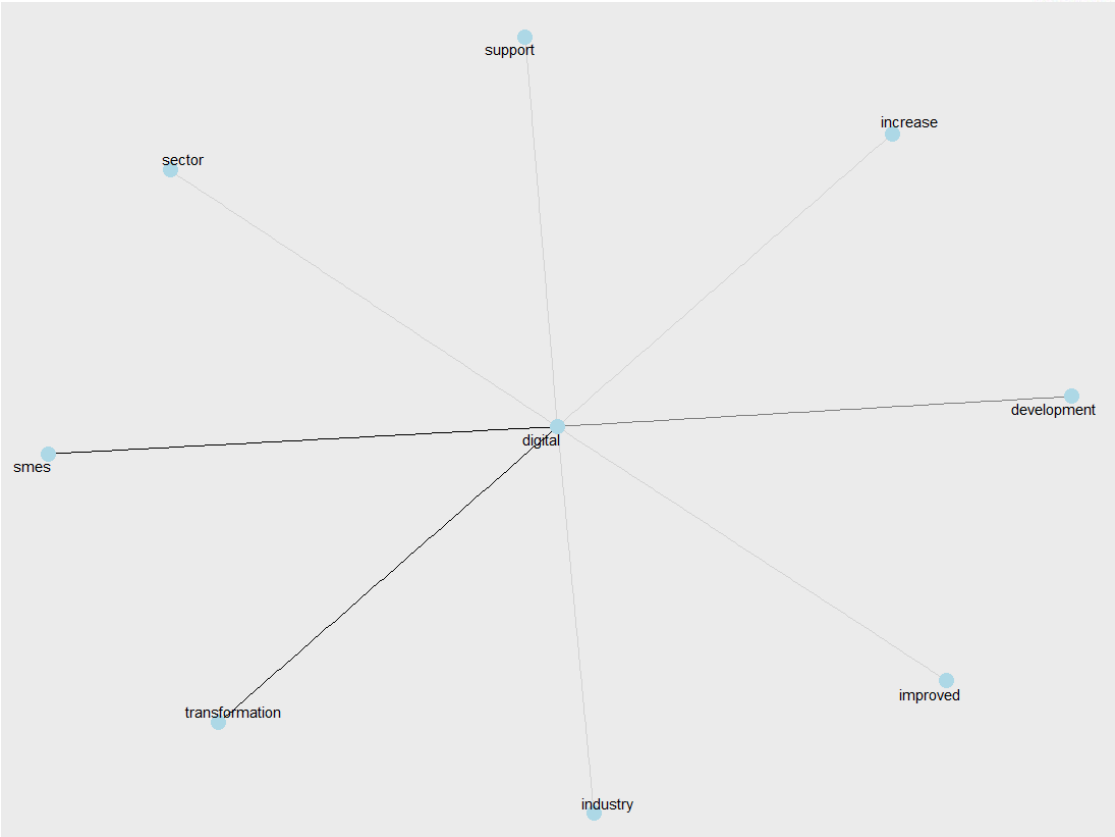
The word interconnection analysis (**Fig.9.**) highlights that the strongest ties are in “digital”, “transformation”, and “main objective”, but also “medium sized enterprises”.

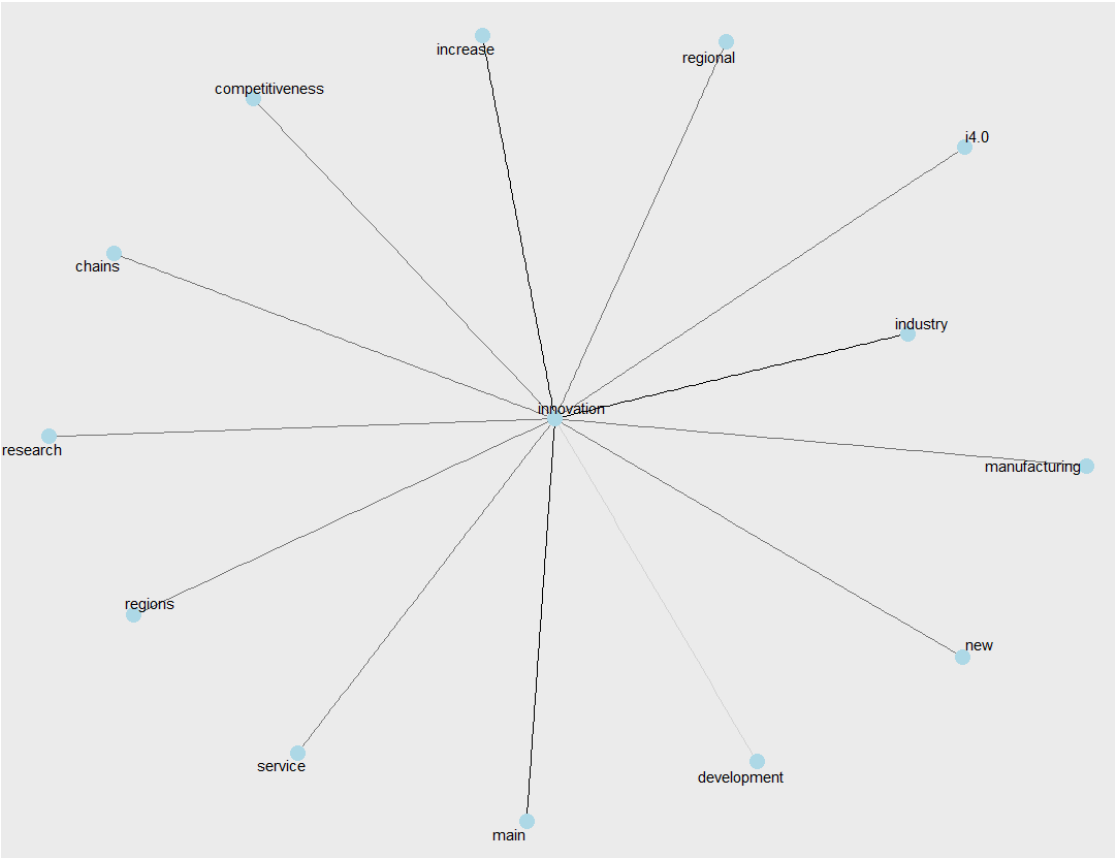
Two classification techniques were employed to classify the countries by the projects’ objectives, a hierarchical one and a non-hierarchical one based on k-means clustering, which requires the a priori assignment of the number of clusters. In our case, the designated number of clusters was three. The empirical results have been consolidated, as clusters proved to be similar for both of the methods (Fig.10). Thus, the hierarchical cluster highlighted three country clusters:

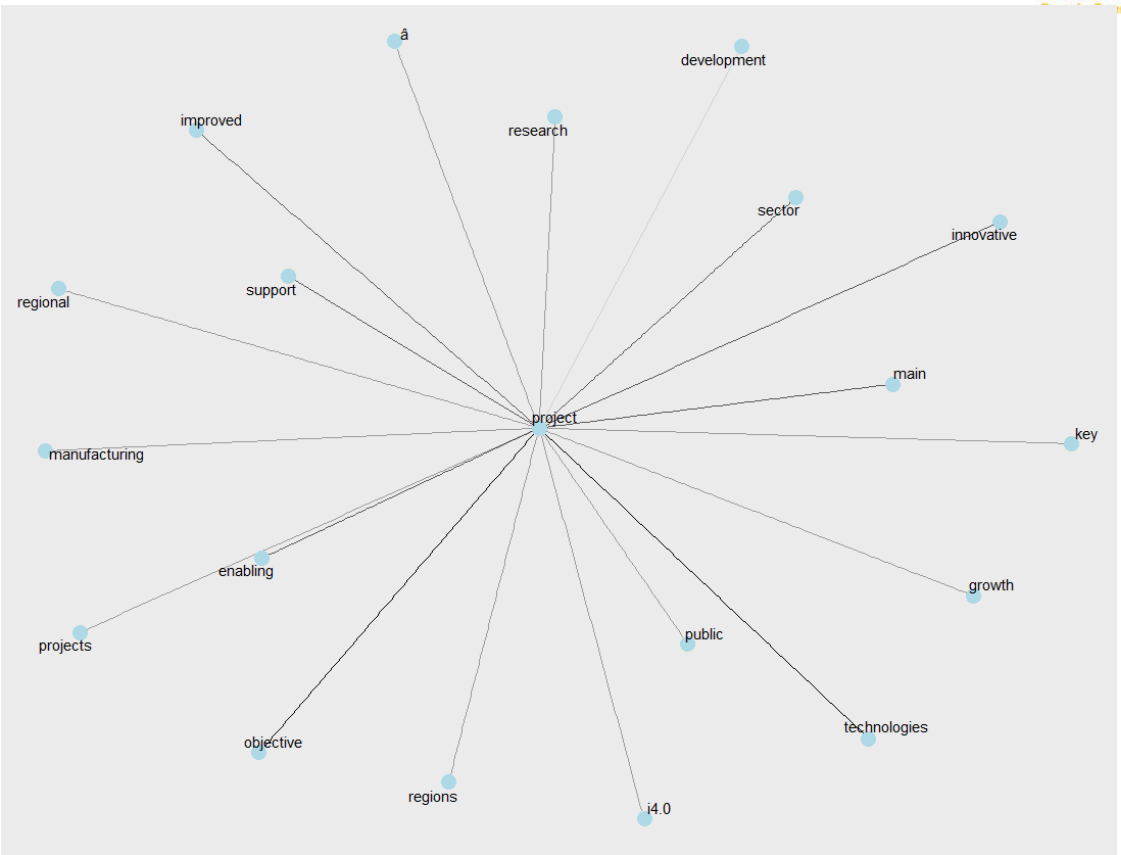
- ✓ Hungary forms a separate cluster;
- ✓ Serbia, Croatia, Bosnia and Herzegovina, Austria, and Montenegro group into one cluster;
- ✓ Slovenia, Germany and Romania form a separate cluster.

Based on the k-means clustering analysis results, the following classes were obtained:

- ✓ Hungary forms a separate cluster;
- ✓ Croatia, Bosnia and Herzegovina, Austria, and Montenegro group into one cluster;
- ✓ Slovenia, Germany, Serbia, and Romania form a separate cluster.

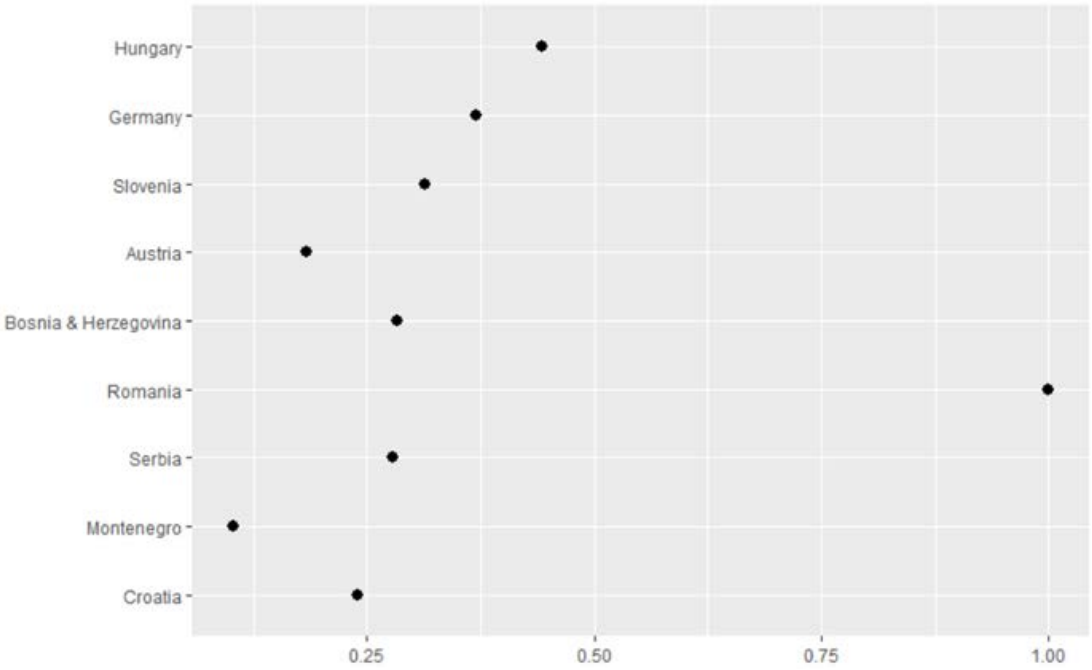

support
increase
sector
development
digital
smes
improved
transformation
industry


increase
regional
competitiveness
i4.0
chains
industry
innovation
research
manufacturing
regions
new
service
development
main



Note: Shown correlations exceed the 0.5 threshold

Fig. 6.Visualization of correlations with the terms “digital”, “innovation”, and “project”



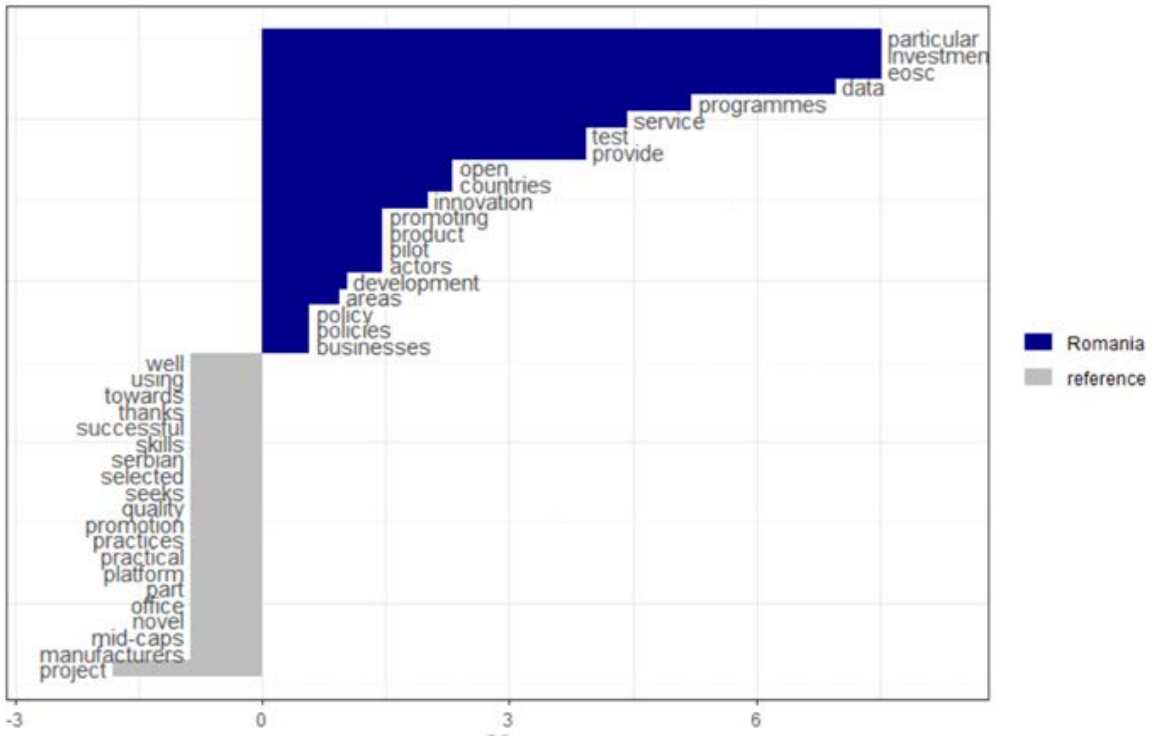
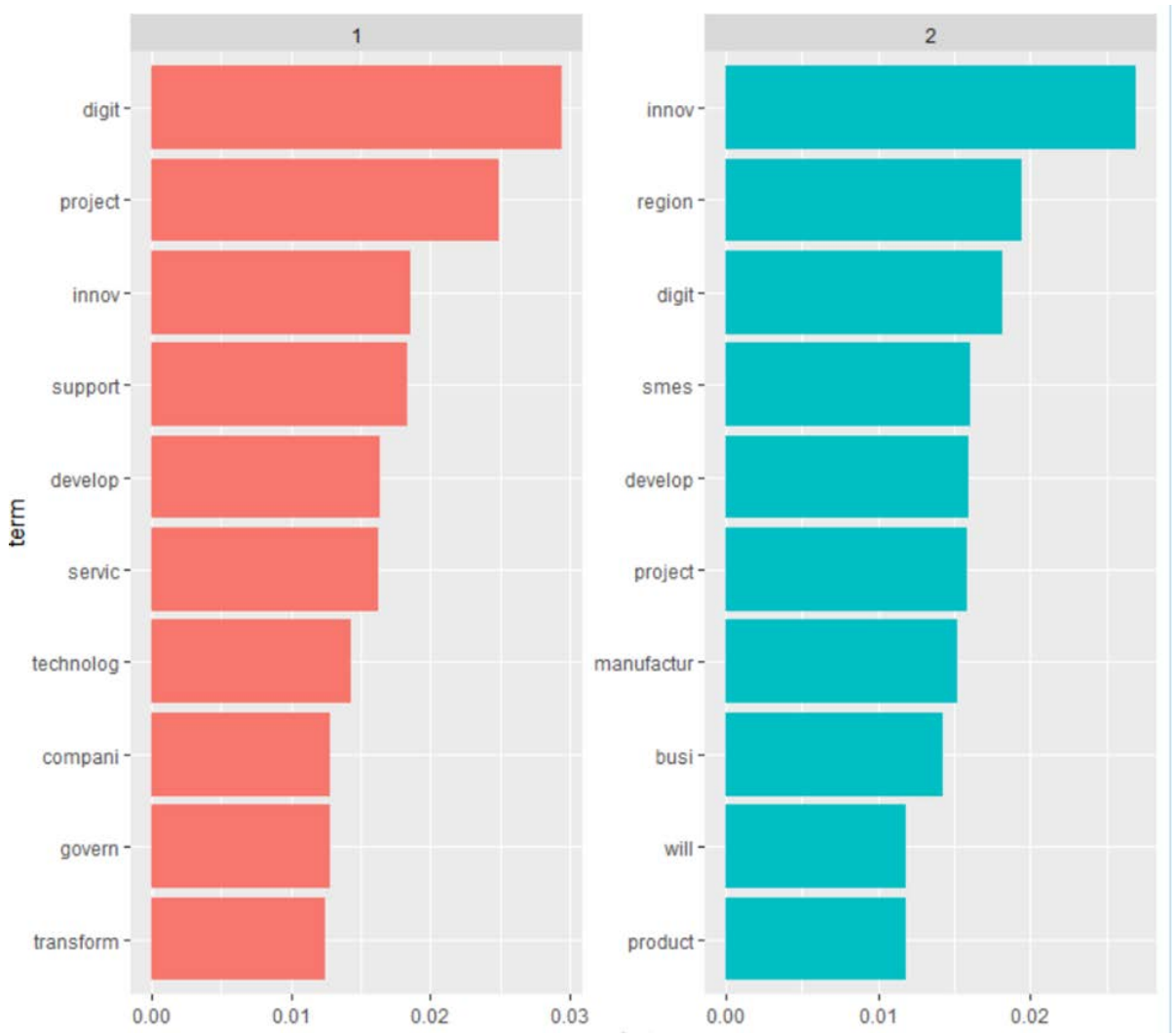


Fig. 7. Word and text similarity and distance analysis



Topics 1 and 2 – 1 digital, 2 – innovation

Fig. 8. LDA empirical results

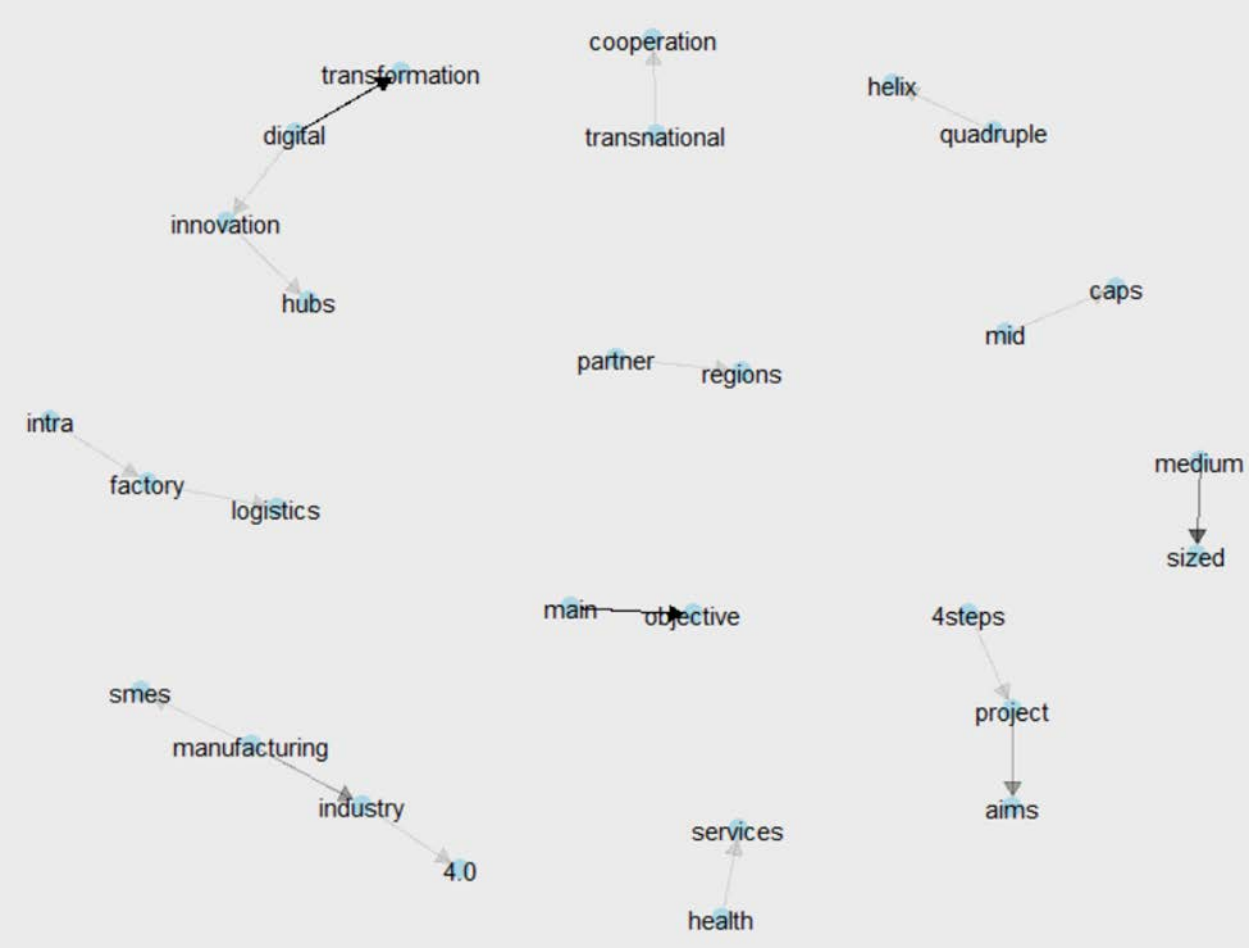
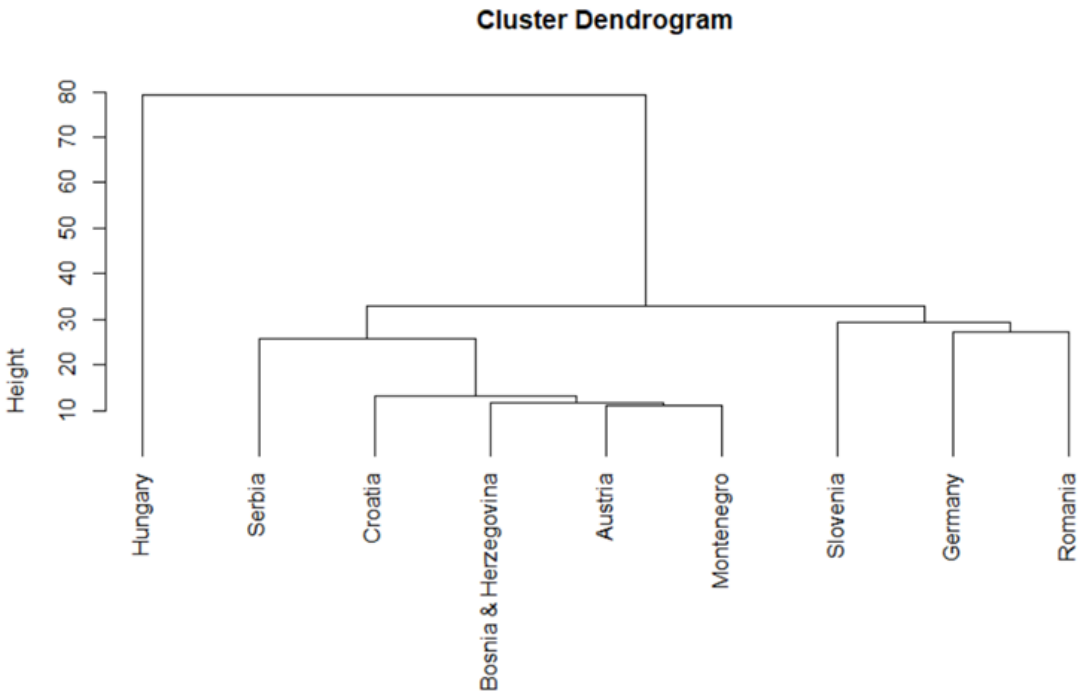
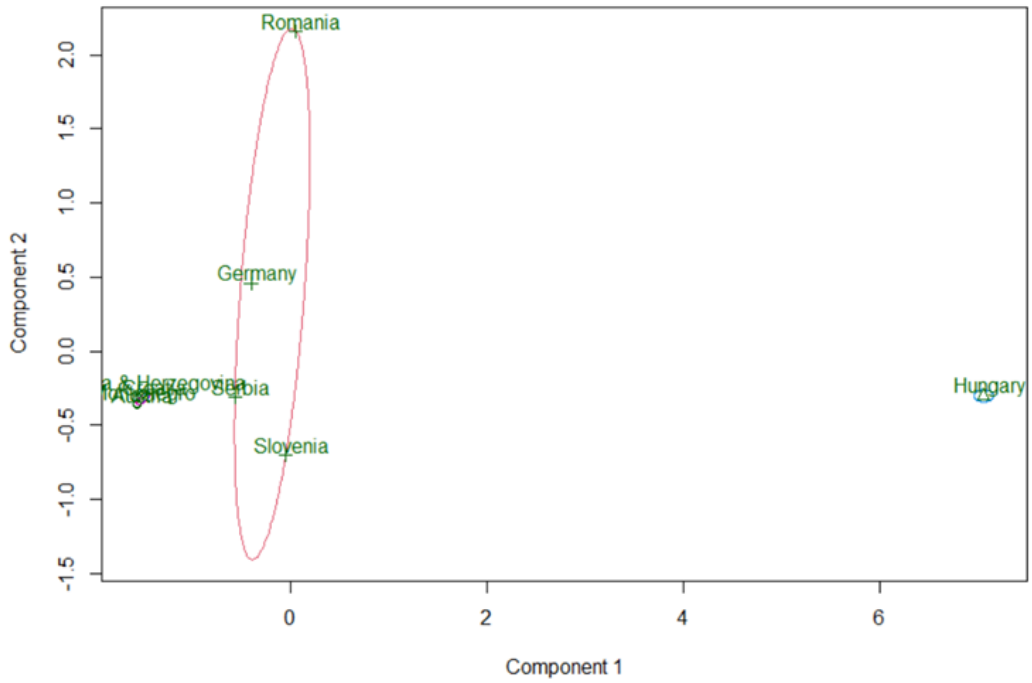


Fig. 9. Word relationship analysis



Hierarchical clustering results



Non-hierarchical clustering results (k-means clustering)

Fig. 10. Empirical results of cluster analysis

4.2. Projects addressing upskilling of qualified workers

The table below (**Fig.1.**) shows the structure of the original data after the data cleaning step, showcasing the number of unique words (types), the total word count (tokens), and the number of phrases for each country.

Text	Types	Tokens	Sentences	Textno
Hungary	222	402	12	01
Germany	196	350	6	02
Slovenia	25	31	1	03
Austria	49	64	3	04
Bosnia	28	33	1	05
Romania	198	365	9	06
Serbia	106	162	4	07
Croatia	36	44	1	08

Fig.1. The distribution of unique words and total word count by country

Analyzing the objectives of the projects from the perspective of unique words total words ratio, Bosnia Hertegovina, Croatia followed by Slovenia occupied the first places.

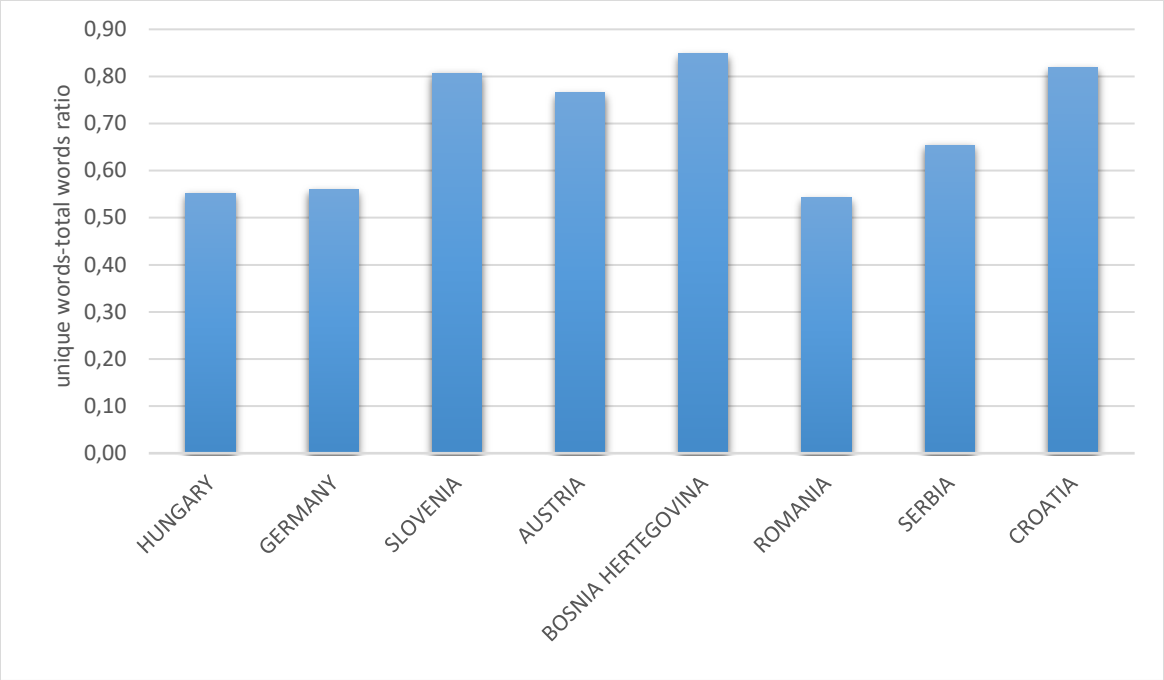


Fig. 11. The distribution of unique words from the objectives, by country

Furthermore, during the clean-up process of the analysis, irrelevant words, which lacked informational value for the investigation, such as will, 4.0, I4.0 were eliminated. In the case of Slovenia, the objective is the same for all four of the projects and so only one description was retained.

Thus, the final collection of documents was used to identify the most relevant words, but it was also employed in clustering the countries by the projects' objectives.

Fig.3. shows the most important results obtained by using wordclouds – a visual instrument meant to identify the most frequently used words in the projects' objectives and which uses the top 30 words found after taking into account all of the countries. **Fig.5.** shows the distribution of the top 50 words for each of the countries, except for Slovenia, Bosnia, Austria and Croatia, for which keywords couldn't be identified, and Serbia, where the only identified keyword was SUPPORT.

Fig.4. shows the distribution of keywords for Romania, Serbia, Hungary, and Germany. We observe thus that “older employees” was the most frequently used word for the objectives of all countries taken together, while the words distribution by country give us an imagine of the specific keywords.

Fig.3. Top 30 words wordcloud (all countries): authors’ analysis

Fig.4. Top 50 words wordcloud by country: authors' analysis

For the group formed by the eight countries (**Fig.5**), the words „support", „digital", and „employment" all play an important role within the objectives of the analyzed projects, while the distributions by countries showcase the differences.

As such, within projects from Hungary, the words which best describe the objectives are „avm", "ce" „project", and „main", while for Germany the words are „education" and „training and data". Austria is characterized through „employees", „digital", while Serbia is mostly described by „support". Romania

is characterized by employment, new companies, market and Bosnia Hertegovina by improve and Slovenia by older employees.

Hungary

Germany

Austria

Serbia

Romania

Croatia

Bosnia Hertegovina

Slovenia

Fig.5. Wordclouds for each country: authors' analysis

By analyzing the correlations of the three keywords “support”, employees”, and „digital”, it can be noted that “support” is more strongly correlated with “training” and “innovative”, while ”employees” correlates with “prepare”, “regional”, and “skills”. Meanwhile “digital” has a strong correlation with “manufacturing” and “qualification”, as shown in **Fig.6**.

The analysis of word similarities and distance (**Fig.7.**) highlighted that Romania is most similar to Germany, and, in terms of distance, related to Croatia.

The empirical results of the LDA analysis (**Fig.8.**) most relates topic 1, “support”, with “improve”, “project”, and “avm”, and most relates topic 2, “employee”, to “education”, “training”, and “companies”, removing common words.

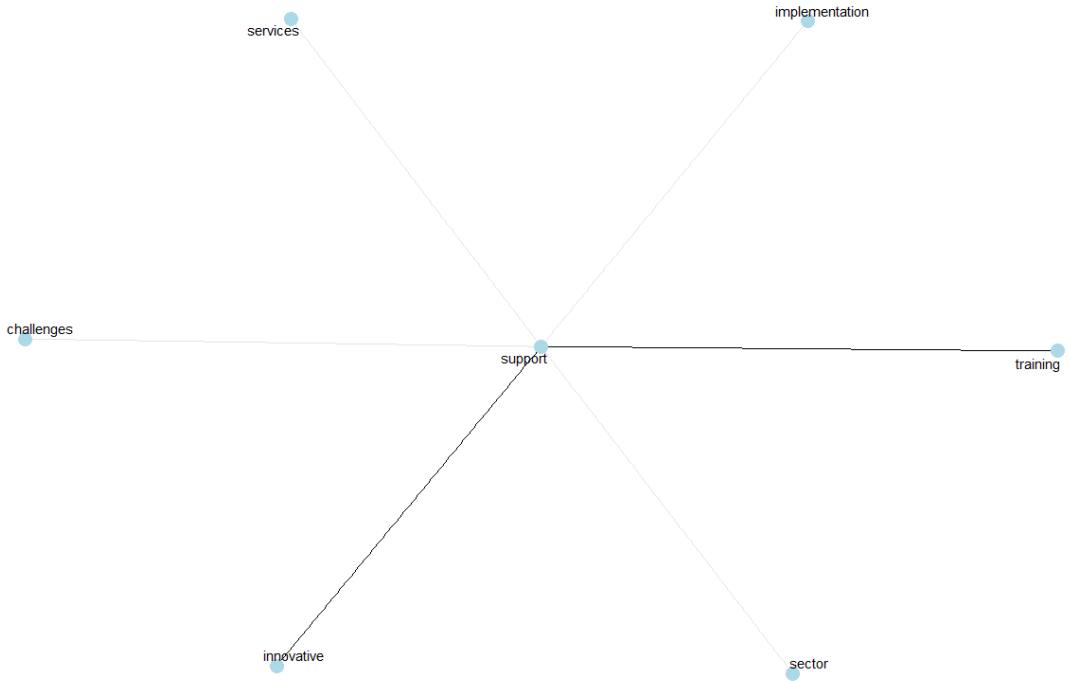
The word interconnection analysis (**Fig.9**) highlights that the strongest ties are in “labour market”, but also in “continuing education”.

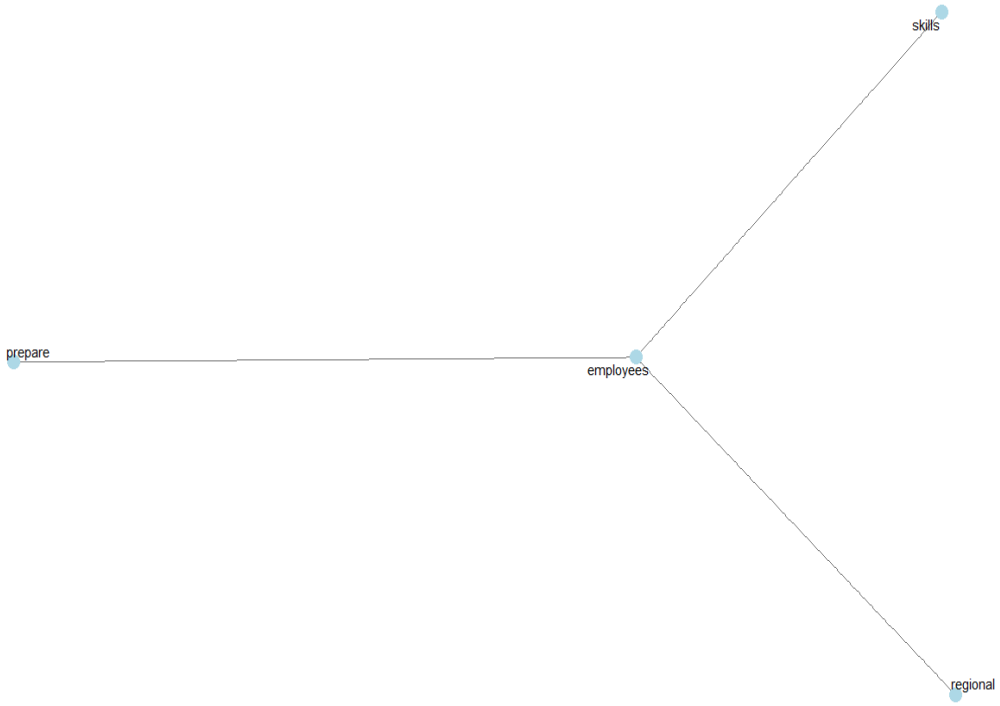
Two classification techniques were employed to classify the countries by the projects’ objectives, a hierarchical one and a non-hierarchical one based on k-means clustering, which requires the a priori assignment of the number of clusters. In our case, the designated number of clusters was three. The empirical results have been consolidated, as clusters proved to be similar for both of the methods (**Fig.10.**). Thus, the hierarchical cluster highlighted three country clusters:

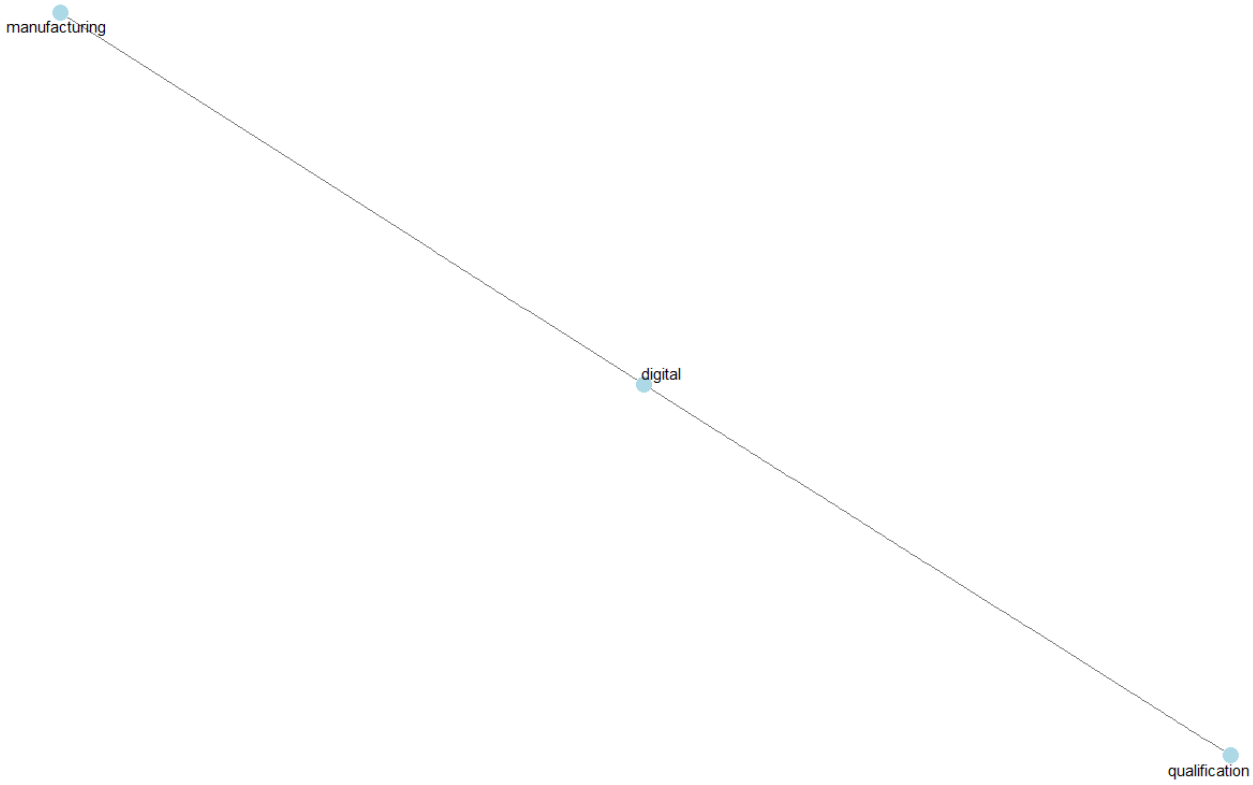
- ✓ Slovenia, Serbia, Croatia, Bosnia and Herzegovina, and Austria group into one cluster;
- ✓ Germany and Romania form a separate cluster;
- ✓ Hungary forms its own cluster.

Based on the k-means clustering analysis results, the following classes were obtained:

- ✓ Croatia, Bosnia and Herzegovina, Austria, Slovenia, and Serbia group into one cluster;
- ✓ Germany and Romania form a separate cluster;
- ✓ Hungary forms its own cluster.


services
implementation
challenges
support
training
innovative
sector


skills
prepare
employees
regional



Note: Shown correlations exceed the 0.5 threshold

Fig. 12.Visualization of correlations with the terms “support”, “digital”, and “employees”

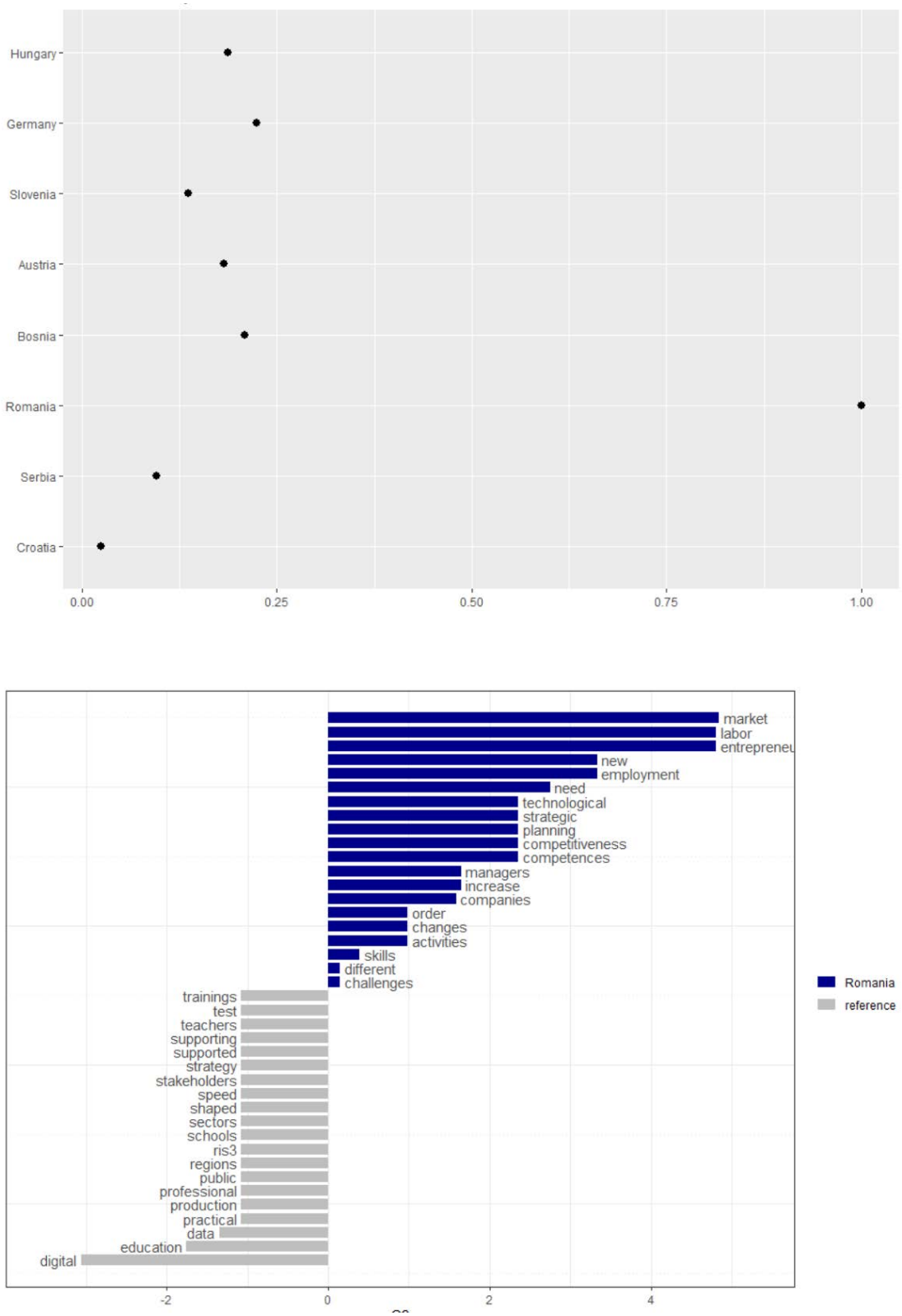
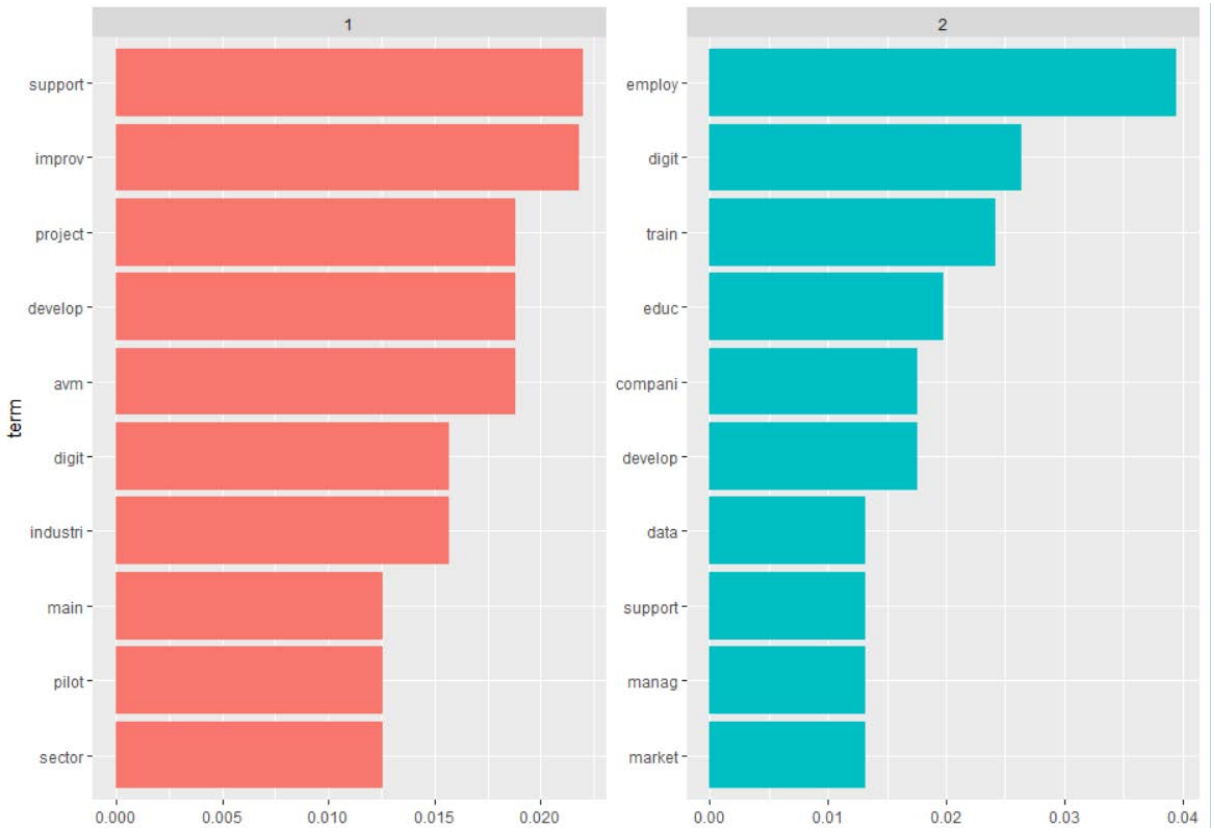


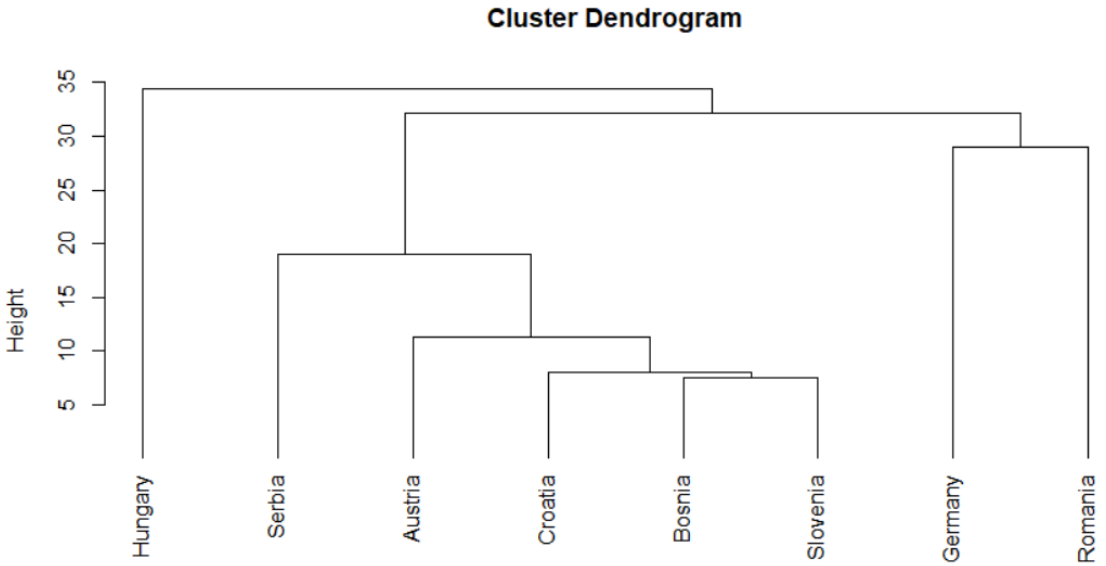
Fig. 13. Word and text similarity and distance analysis



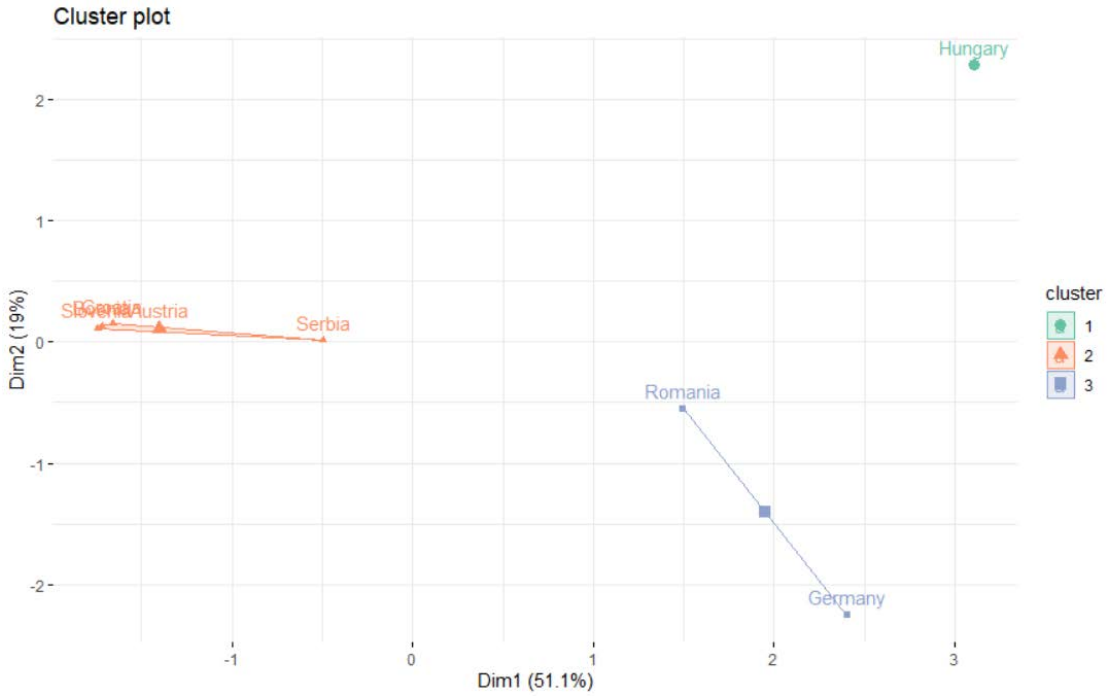
Topics 1 and 2 – 1 support, 2 – employees

Fig. 14. LDA empirical results

Fig. 15. Word relationship analysis



Hierarchical clustering results



Non-hierarchical clustering results (k-means clustering)

Fig. 16. Empirical results of cluster analysis

5. Main Support Organization

Chapter 5 provides a list at LSO/BSO level for identification of capacity building needs.

5.1. LSOs (Labour Support Organizations)

In this subchapter we intended to identify LSOs (Labour Support Organizations) in order to have an image regarding the coverage of the consolidation needs of these organizations. The methodology used considered giving points according to three criteria. Thus, the criteria considered were the level of decentralization of institutions, the type of organization and the existence of a labour market support organization. At the first criterion, numerical values were given depending on the territorial level at which the organizations operate, namely 1 - NUTS 2, 2 - NUTS 1 and 3- NUTS 0. By type of organization, points were given to cover the organizations, so 1p - national public authority, 2p - regional public authority, 3p - sectoral agency. The existence of LSOs was marked with 1, and the non-existence with 0, at the level of each country. It should be noted that all countries analyzed stated that they have LSOs. Based on these points and the accumulated values, a clustering was performed. The analysis was performed in SPSS, using the method Hierarchical cluster, Between-groups linkage, Squared Euclidean distance.

The obtained dendrogram allows the clustering of the countries into three groups:

- Group 1: Croatia
- Group 2: Montenegro

- Group 3: Austria, Germany, Slovenia, Romania, Hungary, Serbia and Bosnia & Herzegovina

Based on the clustering, we notice that most countries (group 3) have the same defining elements at the level of Labour Support Organizations. All countries in this group have a fairly high territorial decentralization of organizations and most LSOs are public organizations. In a separate group we find Croatia, which is distinguished from the largest group of countries by the fact that it has the largest number of Labour Support Organizations (LSOs) of the nature of NGOs. In another group we find only Montenegro in view of the lack of more diverse information about LSOs.

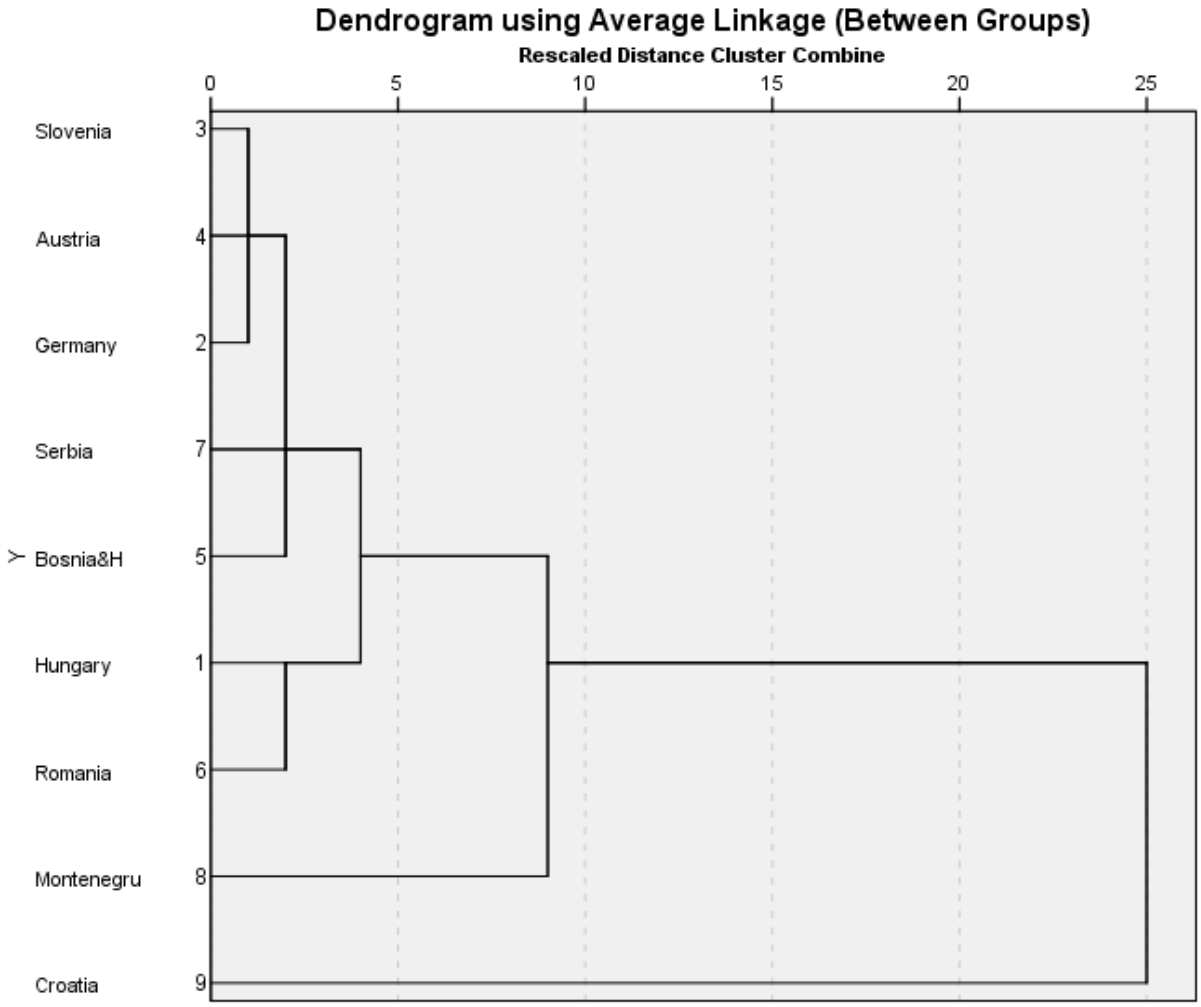


Figure 5.1. Hierarchical cluster analysis

5.2. BSOs (Business Support Organizations)

The analysis in this subchapter focuses on public support instruments and services provided by Business Support Organizations (BSOs) using the information filled in by each country regarding the institutions and organizations operating in this field.

The benchmark methodology was built on the following criteria:

- Level of decentralization – each country received points depending on the territorial level at which the organizations operate: 3 points for NUTS 2, 2 points for NUTS 1 and 1 point for NUTS 0.
- Type of public organization (1 - national public authority, 2 - regional public authority, 3- sectoral agency)
- Private organization: this criterion analyzes whether there are private support organizations in the analyzed countries (1 = yes, 0 = no).
- NGO: criterion built to see if there are non-governmental organizations for business support in the states included in the study (1 = yes, 0 = no).
- Existence of BSOs (1 – BSOs exists, 0 - BSOs does not exist)

Based on these five criteria, a cluster analysis was performed in SPSS, the results obtained indicating the classification of states into 4 groups:

- Cluster 1: Austria, Romania and Slovenia
- Cluster 2: Germany and Bosnia & Herzegovina
- Cluster 3: Croatia and Montenegro

- Cluster 4: Serbia and Hungary

The countries in the first cluster are characterized by public support organizations at the regional level, a medium level of decentralization and the presence of non-governmental business support organizations.

Germany and Bosnia & Herzegovina also have medium level of decentralization, but the Business Support Organizations in these two countries are only national public authorities. There are no public organizations or NGOs for this purpose.

The third cluster, Croatia and Montenegro, stands out through Business Support Organizations at NUTS 2 level. Also, in these countries there are no private organizations or NGOs in this field.

Finally, Serbia and Hungary are characterized by national public Business Support Organizations at NUTS 2 level, as well as NGOs that aim to support business.

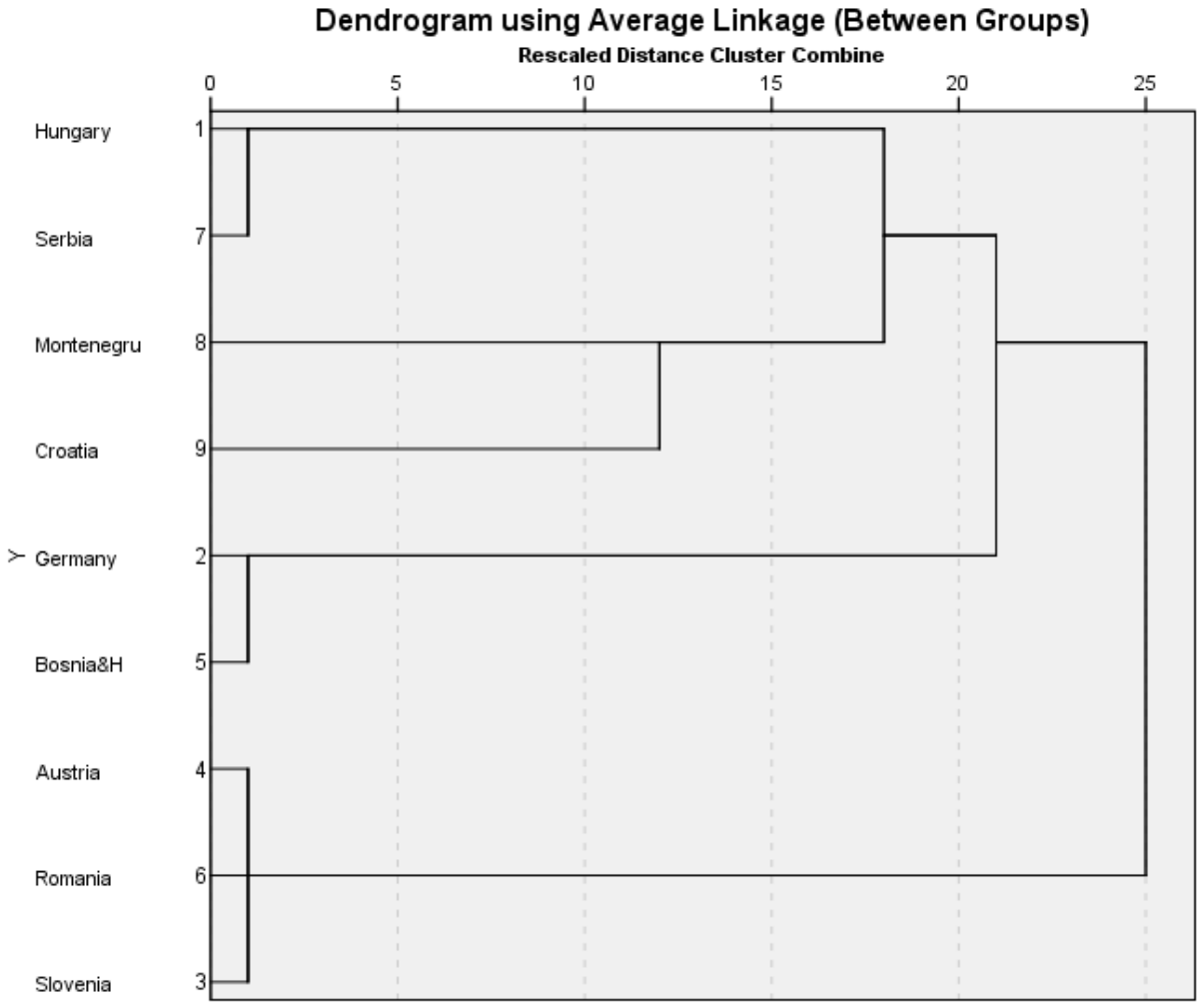


Figure 5.2. Hierarchical cluster analysis

Conclusions, implications and recommendations for Danube Region

1. Digital transformation maturity of industries and labour

The Danube area presents heterogeneity across the main economic indicators, but also some common trends. Regarding the achievement of digital maturity, we can see that the sectors that have reached this maturity to a large and very large extent in most states are the ICT, Electronics / Robotics and Engineering sectors. The digital skills and competences of the population have followed different evolutions and they are at different points, with the most improvement seen in the above-mentioned sectors (ICT, electro industry, electronics/robotics) which makes them front runners for the fields that could support GVCs. While some countries are improving faster than others, almost all the countries are still facing the mismatch between labor supply and demand due to the lack of digital and power skills. The percentage of manufacturing firms that provided training for the development of their personnel's ICT skills of the total manufacturing firms, varies in the 9 countries from 35% to 5%.

One important discrepancy across the 9 considered countries is the status of the labour market. The total score for general labor market indicators according to the performances registered for the all indicators used for economy dimension and level of development, the competitiveness of economy and labor market performance was the basis for ranking the states and varies from 21 (the best performance) to 72. Looking at the main 3 characteristics, we have observed that the economy dimension and level of development suggested huge differences in the GDP per capita varying from 20 thousand dollars to 50 thousand dollars, while the population

employed in Services varies from 70% to 48%. Regarding the share of exports in GDP, as a proxy for international activity, we find values from 80 to 40%. In order to obtain a long lasting GVC, we need to take into account, isolate the differences in labour market performance and level of development of the labour market and devise a policy to reconcile them. The *labour market performance* was analysed taking into account the indicators: employment rate, unemployment rate and the share of youth not in education, employment or training (NEET's). There are differences between countries: the ILO employment rate varies between 50% and 39%; the ILO unemployment rate varies from 3% to 18,4%; The NEET's rate varies from 5,7% to 21,2%. These variations illustrate the need for capacity building of LSO and specialists/entrepreneurs' trainings adapted to the specific conditions from each country.

The percentage of individuals with low overall digital skills varies between 46% and 22%, basic overall digital skills between 31% and 16% and above basic digital skills between 39% and 8%, basic or above basic digital skills between 70% and 24%. Digital skills are higher overall for individuals aged 25 to 64 with high formal education, compared to all the individuals. In all analysed countries, more than a half of the highly educated individuals have basic or above basic overall digital skills and, in majority of analysed countries, except two of them, this share raises above three quarters.

When talking about the trading potential of the Danube regions, the same industries mentioned in this chapter have been identified as having the highest potential for success namely, ICT, metal industry, machine building (automotive industry, manufacture of motor vehicles) and engineering. While there are some country specific industries which are

extremely developed, the fact that they are not uniform across the Danube region takes them out of the target group for GVC. An important aspect of international trade is the support infrastructure, which seems to be sufficiently developed in only 3 out of the 9 countries, which is consistent with the previous observations. Furthermore, better information and harmonization with the regulations, involvement of companies, improving framework conditions and the business environment could strengthen the collaboration between the Danube region and pave the way to future GVCs in the Danube area.

2. Support organizations LSOs and BSOs

While we have seen that the LSOs in almost all countries offer consulting, information, financial support, various training offers, placement of employees, qualification and skills development, especially digital skills, but their involvement on the labor market varies in very high degree across different countries. Furthermore, the industries that require the most support from LSOs are metal industry, engineering and machine building, which seems consistent across 8 of the 9 considered countries.

In most countries the services offered by BSOs consist of consulting, promoting investment, issuing guarantees for bank credits to SMEs, administrating R&I grant schemes, co-financing consultancy services and financial support. BSOs also offer professional, technical and educational assistance for starting entrepreneurial projects and companies. BSOs provide business space on very favorable terms, networking and connections with other companies, investors / strategic partners, academic

community, education, government and mentoring programs. While the industries that require the most business support are the metal industry, machine building, electro industry and engineering, there is in this case a high variance across the distribution of these services across different countries.

The intensity of collaboration BSOs with LSOs varies between countries. As a result, we have seen that in the countries where there is closer collaboration these cooperate mostly to provide start-ups with needed support in the area of human resources (free movement of workers across the labour market and reduce the unemployment rate), internationalization, R&D and policies that can enhance competitive advantage on the market, institution building, cross-border cooperation (joint projects; joint funding initiatives).

Unexpected, maybe, the main challenges facing the business sectors in the digital transformation process are related to human capital, companies' mind-set and culture, the high financial and capital costs, the investment in digital transformation process, the lack of time to implement and see the digital transformations and the public policies that must support the private environment in the digitization process. As a result, devising an educational program for the labour force and businesses that would pave the way for digital training, the sectors could be accustomed to modern trends, willingness to improve, with younger and highly-skilled work force and should be more flexible to changes, be more easily trainable or adaptable to digital transformation.

3. COVID-19 Situation

While the COVID pandemic has affected the world economy to a degree that is still hard to comprehend, we have observed that in all countries the ICT sector has been the most positively affected. It is needless to say that GDP, employment and number of job vacancies has dropped across all countries. On the other hand, the COVID-19 period had a positive effect on the digital skills of the population so that most countries considered that during this period these skills developed to a great extent.

There is a huge variance across the type of measures that each country has considered during the COVID pandamic, but what is interesting is that the ability of LSOs' and BSOs' to provide their support and services to those in difficulty has been affected differently. As a result, it might be interesting to look at these measures and isolate the ones that enabled the support organizations to continue their work in this time of need, rather than hinder them.

Experienced barriers, traps and difficulties in conducting of benchmark analyses

The main challenges that we have face throughout the project are related to data. First of all the data quality was not consistent across all countries. Since one of the contributions is extending the existing analysis to IPA partners, we had to come up with new methods and proxies in order to thoroughly create the benchmark.

Going into the technical aspects, some of the parameters reported by the countries were extremely different in magnitude, which made analysing them impossible from a practical point of view. As a result, we had to focus on designing a ranking system that would still take into account the discrepancies between countries while still yielding practical results than could be used in further applications.

Lastly, open ended questions were essential to complete the benchmark. On the other hand, the curse of these types of questions is that they are not prone to being analysed the standard way. Therefore, we had to consider methods, such as text analysis, to extract the main idea from the answer and add it to our benchmark.