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Study of the Business Environment & Innovation Potential of the Former Yugoslav Republic of Macedonia

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Executive Summary

Nowadays, the only source of competitive advantage of nations is the innovation potential of their economies; however, innovations are not only limited to organizational and industry level; they are also sought in the way countries govern and strengthen their economies. In light of this understanding, the study on the business environment and the national innovation potential of the former Yugoslav Republic of Macedonia, explores the macro and micro determinants of country's innovation potential in the period 2010-2017. Findings indicate that in the researched period, the country has been a remarkable innovator in governance. The many innovations in governance, however, had small impact on the macro and micro determinants of innovations.

In the period 2010-2017, the country made a progress in two areas considered as its strengths: (1) Exports of medium and high technology products; and (2) Introduction of a low taxation system. At the same period, there has been a remarkable improvement in the following weaknesses:

- An increase in the size of the population (25-34 years) with completed tertiary education;
- An increase in the rate of broadband penetration;
- A decline in the unemployment rate from 37% to 25%;
- A change in the structure of the employment as the new employment was generated in the higher value added sectors;
- A Fund for supporting Innovations was established; however, there still is a need for an actual infrastructure of BSOs, Centres for TT and similar for supporting SMEs.

Unfortunately, the period also marks a deterioration in country's previous strengths, mainly:

- The low inflation in 2015 became a deflation, and indicates that the output is below the actual capacity of the economy;
- The strong ranking on the Doing Business Report deteriorated in 2017 due to increase in bureaucratic procedures;
- The trend of ageing of the population accompanied with a decrease in the quality of education among the active workforce negatively affects the available human capital;
- There is a decline in the non-R&D expenditures of the businesses due to the poor investment activities in the past couple of years.

The period also marks deterioration in the following weaknesses:

- Poor buyer sophistication which decreases the demand for innovative and quality products and locks SMEs in price wars with cheaper and low quality imported products;
- Declining trend of new doctoral students which despite growth in absolute numbers is declining in relative numbers and indicates that the nation is not generating researchers at the required pace. The low number of doctorates in the area of natural sciences and engineering is an additional burden;
- Declining trend of SMEs investing in Lifelong learning for their employees;
- Declining employment in knowledge-intensive activities;

- Declining exports of knowledge-intensive services;
- Decrease in absolute numbers of SMEs working in the innovative sectors of the economy and which have introduced product, process, marketing, or organizational innovations along with SMEs innovating in-house.

Identified recommendations aim at improving both, the macro and micro determinants.

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1 Introduction - former Yugoslav Republic of Macedonia

1.1 Location, Population, and Political System

Located in the central part of the Balkan Peninsula, the former Yugoslav Republic of Macedonia is a small landlocked country with an area of 25 713 km2. The country is neighboring Albania (on the West), Bulgaria (on the East), Greece (on the South), Serbia (on the North) and Kosovo (on the North). The configuration of the terrain is mainly mountainous, while the Vardar River, which flows into the Thessaloniki Bay, stretches across the entire length of the country.

There are 2,06 million inhabitants in the country, of which 64% are Macedonians, 25% Albanians, 4% Turks, 3% Roma, and the rest are other nationalities. The official and most widespread language is Macedonian, with the Albanian as second official language.

The current territory of the former Yugoslav Republic of Macedonia became an autonomous state in 1944 and a part of the Federal Yugoslav Republic of Yugoslavia. With the breakup of Yugoslavia in 1990s, the country gained its independence in 1991 and began existing as an independent state. Due to disagreements with Greece, the former Yugoslav Republic of Macedonia is admitted in the United Nations with the temporary name i.e. "Former Yugoslav Republic of Macedonia" (1993). Since 1995, the country is a member of the Council of Europe and has also become part of the NATO Partnership for Peace. In 1996, the country established full diplomatic relations with the EU, and in 2001 a Stabilization and Association Agreement with the EU was signed. Since 2003 the former Yugoslav Republic of Macedonia is a member of the World Trade Organization, and since 1993 a member of the World Bank and the International Monetary Fund. The former Yugoslav Republic of Macedonia is as well member of CEI, EBRD, FAO, IAEA, IFC, IMF, Interpol, ISO, OSCE, UNESCO, WHO and other international organizations.

The former Yugoslav Republic of Macedonia is a republic with a multiparty parliamentary democracy, and a political system divided on legislative, executive, and judicial powers. The main political, administrative, and economic center of the Republic, is Skopje, a home of 668.518 citizens. The former Yugoslav Republic of Macedonia has 84 municipalities; the number of populated areas is 1776, out of which 34 are cities.

1.2 National Economy and Competitiveness

The former Yugoslav Republic of Macedonia strategically works on its economic development and the creation of a favorable business environment. The country has a long-term macroeconomic stability and low inflation (in average is 2% in the past ten years), balanced public finances with low budget deficit and a stable exchange rate with the euro. In the past couple of years the reforms implemented in the labor market, along with active employment programs, decreased the unemployment rate from 36% in 2010 to 25% in 2017. The dominant economic sectors are: agriculture, food processing industry, metallurgy, textile industry, production of automotive parts, construction, chemical industry and ICT.

At the moment the nature of the national competitive advantage is based on the low cost of the labor. The same is not sustainable at the long run. In contemporary world of interconnected economies, liberalized markets and technological developments, national economies need to develop competitive advantage based on innovations and knowledge. Similar to the competitiveness of companies, the competitiveness of nations cover the whole process of creating an added value in the production of goods and services under free and fair conditions at the global markets with a goal of maintaining and increasing the real income of citizens on the long run (OECD 2005). The word itself states that the term is always analyzed in regard to other economies, i.e. the competitiveness of one economy is relative to the performance of other economies, while the term performance is always explored at the level of productivity (Global Competitiveness Report 2017). From there "the scope of the competitiveness of one economy is sum of institutions, policies, and factors which determine the level of productivity of one country" (GCR 2017).

At the moment, the former Yugoslav Republic of Macedonia is ranged at the 68th position from 138 economies by the global competitiveness index in 2016 (GCR 2017). It is a country led by factors of efficiencies, based on a cheap labor force. This type of a competitive advantage cannot be sustained on the long run because of the current context of the global economy accompanied with the intensive liberalization of labor markets and with the ever more intensive automation of business processes. This is why the country and all its stakeholders need to focus on developing a competitive advantage based on more sustainable factors as are the innovations and knowledge.

2 Methodology

2.1 Research Goal and Objectives

The main goal of the study is to provide a detailed analysis of the business environment and innovation potential of the former Yugoslav Republic of Macedonia, with an aim to provide a good starting point in identification of the main strengths and weakness of the country with specific recommendations for their improvement in the future. The study is prepared under the project BMP1/1.2/2370/2017 "InnoPlatform" financed by the Transnational Cooperation Programme "Balkan-Mediterranean" 2014-2020.

The main objectives of the Study are:

- To assess the current structural environment covering economy, growth, stability, business enabling environment and the socio-economic environment in order to understand the current enabling, and or limiting macro environment for innovations in country;
- To assess the innovation potential at macro and micro (organizational level) in order to identify the strengths and weakness of the national economy when it comes to its innovation potential;
- To explore these strengths and weakness over a specific period of time (2010-2017) in order to understand whether there have been improvements, or deterioration; and

- To provide a comprehensive analysis and recommendations structured in a way which will enable a range of key stakeholders as policy makers, investors, consultants, analysts, and SMEs to make informed decisions.

2.2 Innovation – Definition and Determinants

There are many definitions on what constitutes innovations today. For the purpose of the analysis we will work according to the European Commission understanding of the term which emerges from the work of Urabe et.al. (1988). Urabe et.al. (1988, p. 134) comprehensive international comparisons of innovations and practices for managing of companies, defined innovations as "the process of generating new idea and their actual realization into a new product, process, procedure or service which results into a dynamic growth of the national economy and increase of the employment along with the creation of a clean profit from the business innovation of the enterprise". Today, innovations are the most important driver of profitability, and the capability to be innovative on continuous basis is the most important factor for competiveness of organizations and economies. It is why, innovations are a very important element of national policies of many nations, including the former Yugoslav Republic of Macedonia.

2.3 Core Methodology

The core methodology used in developing the Study of the business environment and the national innovation potential, is the methodology of the EIS 2017 Framework. The national innovation environment is assessed through four specific categories of factors:

1) **Framework conditions**, which cover conditions of utmost importance for innovations to flourish in a specific territory. They mainly cover the available resources and input systems as are the available human resources seen as agents of knowledge, the attractive research systems, which will enable them to perform, and innovation friendly environment mainly recognized by the accessibility of new technologies and the presence of opportunity driven entrepreneurship.
2) **Investment climate,** or the financing of innovative activities, covers the factors of financing and support, as well as the investments of companies in research and development (R&D) and innovation.
3) **Existing innovation activities of companies,** which covers factors which determine the behavior of innovators, the existence of business connections, and the protection of intellectual property and intellectual assets.
4) **Impact innovation,** which covers the determinants as the impact on employment and the impact on sales through the use of appropriate indicators.

The calculation and actual values of each of the indicators under the four indexes is provided in the National InnoScores, of the InnoPlatform Project.

The overall economy, the business environment, and the socio-demographic trends affect these categories of factors either supporting, or challenging the innovation of companies. The overall

economic and business environment in the former Yugoslav Republic of Macedonia is assessed through three important structural variables:

1) **Economy, Growth and Macroeconomic Stability**, through the analysis of GDP growth and macroeconomic stability (GDP, debt, inflation, interest rates), structure of employees (agriculture and mining, manufacturing, utilities and construction, services and public administration), as well trade deficit.
2) **Business enabling environment**, through the analysis of the structure of enterprises in the former Yugoslav Republic of Macedonia (micro enterprises, SMEs, large enterprises), and research and development activities of the business (birth of the enterprises, sophistication of the buyers).
3) **Socio-demographic environment**, through GDP per head of population, population size, population change, population size aged 15-64 years, population density, percentage of urbanization, active labor force movement, education, status employment.

The analysis is based on the use of secondary data coming from officially recognized institutions, predominantly from Eurostat, National statistical office, and other national and international institutions. APA style referencing format is used.

3 Economy, Growth, and Macroeconomic stability

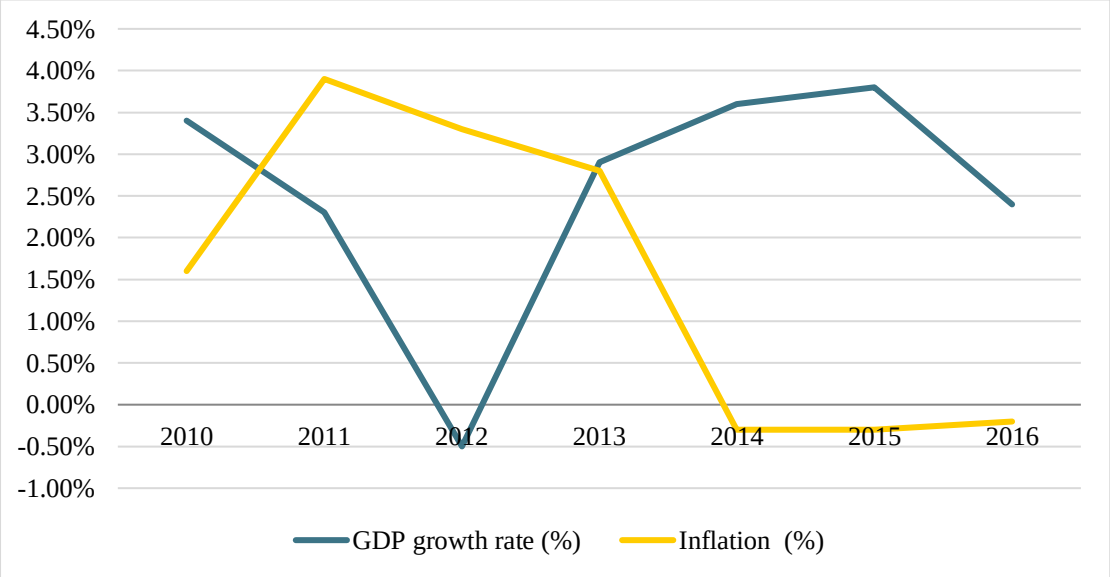
The former Yugoslav Republic of Macedonia has a small and open market economy with one of the lowest value of GDP per capita in Europe. Its current state is a legacy of the transitional period and the slow growth in national capacities for alternative directions.

In the first half of 1990s, and after its independence, the national economy of the former Yugoslav Republic of Macedonia suffered from the loss of the protected and relatively large Yugoslav market. This led to a significant drop in GDP, which caused a period of economic decline with high inflation, a large fiscal deficit, and almost no foreign investment. Towards the end of 1994, the Government initiated and successfully implemented a stabilization program, with the assistance of international donors, including the World Bank and the International Monetary Fund. As a result, at the end of 2000, the macroeconomic stability was restored, the fiscal part was balanced, and the inflation was reduced. The 2001 internal conflict disrupted the positive economic trend. GDP was reduced by more than 4%, the fiscal balance and the trade deficit deteriorated significantly, and the reforms stopped. The industrial production grew again in 2002 and after 4 years of continuous growth, in 2006 it reached the pre-conflict level. A growth of over 5% was achieved in 2007 and 2008; however, due to the global crisis, this trend could not be maintained in the coming years. As a result of the global trends, the Macedonian industrial production also suffered, with 5% and 8% reduction in the period 2009/2010.

3.1 Growth, Inflation and Macroeconomic Stability

In 2011, a new trend of industrial production growth began, starting with 3% in 2011, 4% in 2012, 3.2% in 2013 and 3.63% in 2014, 3.842 in 2015 and 2.8% in 2016. Despite this growth, the average annual value of 3% for the period 2010-2016 is relatively low for an economy of a developing nation. Average growth rates of the emerging economies should be in the range of 5-8%, due to the impact of the technology transfer from the developed nations. In simple words growth can be credit driven, while in the developed nations it is always investment driven.

Figure 3-1 GDP Growth and Inflation



Source of data: State Statistical Office (2017)

In the same period, the growth and the inflation have a negative correlation –Figure 3-1. The inflation defines the macro stability of the economy. In 2011, the inflation rate was 3.9%, in 2012 it decreased to 3.3%, and in 2013 it was 2.8%. In 2014 it was only 0.3%. There are negative values close to zero in 2015 and 2016. The direction of the causality is not important - is it the inflation which affects growth rate or vise versa. As the New Economy models defined by Barro and Sala-i- Martin (2004) argue, inflation acts as a tax on the capital and the labor, which are significant determinants of economic growth, thus, high inflation is not conductive for innovative environments. Low values of inflation and stable exchange rates positively influence the work of the business sector; however, too low or negative inflation is problematic at macroeconomic level, as it indicates that **the output i.e. the GDP is below the actual capacity of the economy,** which affects the further potential for reduction of unemployment**.**

The former Yugoslav Republic of Macedonia still has the epithet of a medium-indebted country, which can be debatable in terms of its debt-carrying capacity. Despite this situation, the banking sector has sufficient funds to finance the ongoing and development activities of SMEs, which do not always have sufficient capacity to use these funds, especially in the part of innovative activities.

At macroeconomic level, two issues raise significant concerns:

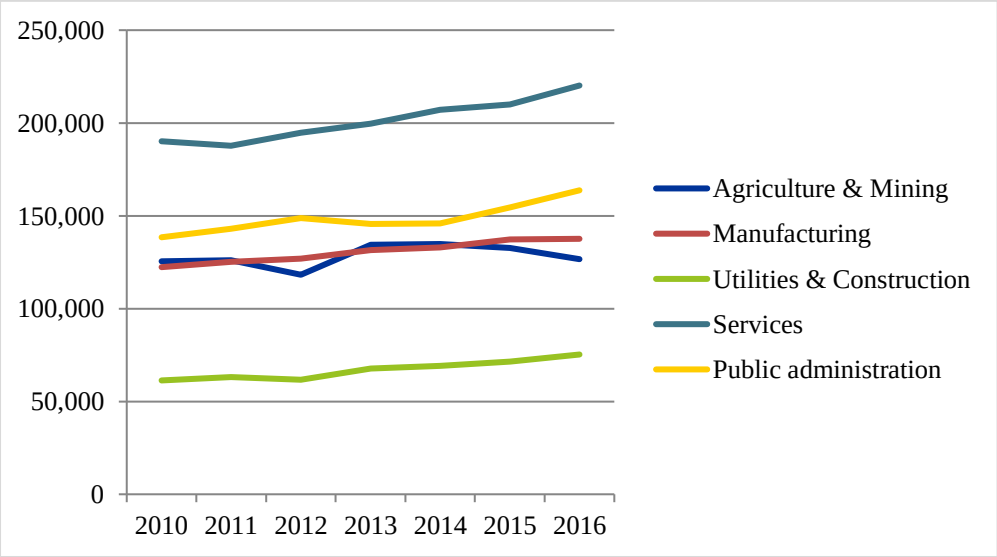
- The official unemployment rate, which historically has been the highest, slightly decreased to 26.8% in 2015. In 2014, it was 28%, and in 2017, it was 25%. However, it should be noted that the actual unemployment rate is lower due to the presence of the "gray" economy.
- Despite growth in exports mainly driven by the FDIs, the trade deficit in foreign trade steadily increased by 2014. In 2012 it was 1047 million euros, in 2013 it was 1757 million euros, and in 2016, 1777 million euros.

As a result of these developments, the current government policies are focused on improving these two specific challenges of the economy through 1) creating new jobs and (2) promoting investments, especially those that are export oriented.

3.2 Structure of the Economy

The analysis of GDP structure indicates that the GDP of the country reflects global trends, i.e. 70% of the GDP is generated by services, and 30% by the manufacturing. In terms of the structure of the employment, the composition of employment is not favorable compared to the developed economies (Figure 3-2). There is a large number of employees in agriculture and mining, compared to the services sector, which generates the highest percent of the GDP. The structure is additionally burdened by the large public sector, as the sector absorbs a higher quality of the labor (higher educated) in activities which do not generate GDP.

Figure 3-2 Comparative employment structure in different sectors (2010-2016)



Source of data: State Statistical Office (2017)

The percentage display of the indicator for the composition of employment in the former Yugoslav Republic of Macedonia, according to the NACE classification, indicates that the number of employees in different sectors changed from 2010 till 2016. In the Agriculture and mining (NACE A – B), the composition of the employees over the years registered a decline in the total number of employees. In 2010 the percentage was 19.7% of the total number of employees, and in 2016 it decreased to 17.6% of the total number of employees. As the absolute number of people employed in the sector did not change, while the unemployment rate was reduced in the same period from 37% to 25%, it can be concluded that the majority of new employment was generated by other, more valuable sectors. The number of employees in the Manufacturing sector (NACE C), the high and medium high-tech, composition of employment, grew by 10% in absolute numbers. The number of employees in services grew for 20%, accompanied with 20% growth in the employment of the public administration.

The composition of the employment is not very favorable in relation to the developed economies (Figure 3-2). There is a large number of employees in agriculture and mining,

compared to the service sector. The poor productivity and competitiveness of agriculture is solved by increasing subsidies, which do not solve the problem, but only delay it. Unfortunately, the effects of this approach are very small regarding the main weaknesses, low productivity and competitiveness of this sector, still employing relatively large portion of the population.

In recent years, the economic growth has been driven by public investments in construction (projects, Skopje 2014, road infrastruture, etc.), majority of which were political projects with poor preparation and numerous problems in realization, with consequences that will be felt in the future, adding significant costs to the economy. All of this is followed by an increased debt that becomes a problem of repayment, in addition to the fewer funds that will remain to encourage the competitiveness and innovation of enterprises, especially SMEs.

3.3 Trade Balance

The *trade deficit* of the former Yugoslav Republic of Macedonia was steadily increasing in the period before 2012, after which it shows reduction and stagnation. FDIs played an essential role here, mainly due to the presence of large global companies, which total production in the country is export oriented and constitutes a significant part of national GDP. There is a great potential behind this trend for SMEs, which is not currently visible due to the structural differences in foreign investments and the dominant part of SMEs in the country. The transformation, which is expected on the long run, can increase the competitiveness and innovation of SMEs through collaboration with the FDIs present in the country.

4 Business Enabling Environment

As it is difficult to assess the business enabling environment in one economy in absolute terms, the world uses specific methodologies that allow comparative analysis between nations. The comparison enables a relative assessment. In the concerned case the methodology used for assessing the former Yugoslav Republic of Macedonia's business enabling environment is:

- Doing Business Report of the World Bank, which provides information on the legal and regulatory environment in the country,
- The structure and type of the business sector which provides information on the profile of the businesses which successfully operate in the country;
- The nature of the demand existing at the market as the demand drives innovations – investigated through the byer sophistication index.

4.1 Ease of Doing Business

The Doing Business ranking of the World Bank is a comprehensive methodology covering 11 dimensions of the business enabling environment. Conducted through a survey of experts, the report ranks 190 economies of the world. The 11 dimensions of the business enabling environment cover: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency and labor market regulation.

The former Yugoslav Republic of Macedonia, rankings are provided in Table 4.1. In 2018, the former Yugoslav Republic of Macedonia is ranked 11th for Ease of Doing a Business. Regarding the other economies in the region the country is significantly higher compared to the ranking of other countries (Bulgaria - 39 rank, Croatia - 43 rank, Greece - 61 rank, Montenegro - 51 rank).

Table 4.1. Doing business indicators - RANK (ranking from 190 economies)		VALUE 2017	VALUE 2018
1	Starting a business	4	22
2	Dealing with construction permits	11	26
3	Getting electricity	29	53
4	Registering property	48	48
5	Getting credit	16	12
6	Protecting minority investors	13	4
7	Paying Taxes	9	29
8	Trading across borders	27	27
9	Enforcing contracts	36	35
10	Resolving insolvency	32	30
Source: Doing Business Report (2017, 2018)			

According to the *Ease of Starting a Business* indicator, former Yugoslav Republic of Macedonia is ranked 22nd. For more than 5 years the country has had a very high ranking in this compound indicator and was among the top global performers; however, in 2017 the rank fell to 22. The decline is a direct result of the newest reforms which institutionalized an

artificial middlemen in the area of registering a business – an Official Registrator. With the change, one cannot register a company at the Central registry without s certified Registrator or a digital certificate. The changes increased the number of procedures for starting a business from 2 to 4, and increased the days from 2 to 7[1]. The changes also increased the costs for starting a business. It is a strength which has worsened. In the dimension *Dealing with Construction Permits*, The former Yugoslav Republic of Macedonia is ranked 26th, and marks a fall from the 11th position in 2017. This is due to the increase of the number of procedures from 9 to 11, which has increased the required time to 96 days and the the costs to 6,1% of the warehouse value. The largest decline in the rankings the country, is in the dimension of *Getting electricity*, where the country fell from the 29th position to the 53rd position. In essence the country has reduced the costs for the dimension for 200% from 2012%; however, the ranking is relative to other countries, and the decline indicates that other countries had more substantial reforms in this area which pushed the country bellow its last year ranking. No change is registered in the dimension of *Registering property*, where the country is ranked at the 48th position similar to 2017th. It is still relatively difficult to register a property in the country, while the process is not as much burdened by the number of procedures, as it is burdened by the number of days (in 30 days). The only areas where the country experienced significant growth in 2018th rankings are: *Getting Credit* and the *Protecting Minority Rights*. The country is ranked on the 12th position in the area of *Getting Credit* compared to the 16th position in 2017. It indicates a growing clarity and structural improvements in the area of of financial resources for companies and entrepreneurs. The 2018 rankings mark an improvement in the position of the country in the dimension of *Protecting minority investors*, where the country's rank increased from 12th position to 4th, with a higher score indicating stronger protection.

Year 2018 marks a high decline in the dimension of *Paying Taxes*, where the country fell from the 9th position to the 29th, - a strength which became a weakness. There are no significant improvements in the area of *Trading across borders*, where the country is ranked 27th, *Enforcing contracts* ranked at 35th position and *Resolving insolvency*, ranked at 30th position.

Overall, and in relative terms, despite the fact that the country institutionalized certain reforms which increased procedures and subsequently days and costs for companies willing to do business, the former Yugoslav Republic of Macedonia is still among the top reformers in the business enabling environment in the larger Balkan Mediterranean Area.

4.2 Structure of the Businesses Sector

Looking at the *Ease of Business* rankings alone will not provide enough data to assess the in-country environment for business, especially having in mind that the *Ease of Business* rankings mainly measure the legal and the regulatory environment. Equally important is to understand the structure of the businesses in terms of size and type of the business sector.

Data indicate that the dominant part of enterprises in the former Yugoslav Republic of Macedonia are micro enterprises with number of employees from 0-9. Their participation in the overall pool of companies is 90%, SMEs participate with 9,2%, while large enterprises

[1] Data are taken from the printed editions of Doing Business Report 2017 and 2018.

represent only 0.3% of all companies in the country. In 2011 and 2012, there is an overall decrease in the number of micro enterprises due to the fact that the State Registry implemented a new regulation which eased the procedures for dissolving a company. Many microenterprises, which had no activity for a decade were dissolved. In the same period there is an increase in the number of small and medium enterprises (SMEs). It indicates the presence of a relatively stable economy and the existence of conditions for SMEs birth and survival – Table 4.2. Their number however, in absolute numbers, is still low and has limited potential for increasing the employment in the economy. The trend in the number of newly created enterprises in the last years also indicates saturation in the business environment.

Table 4.2. Structure of the Business Sector (percentages)

Percentage %	2010	2011	2012	2013	2014	2015	2016
Micro enterprises (0-9 employees)	92.7%	92.1%	91.6%	91.2%	90.8%	90.6%	90.5%
SMEs (10-249 employees)	7%	8%	8%	9%	9%	9%	9%
Large enterprises (250+ employees)	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%
Share of foreign controlled enterprises	NA						

Source of data: State Statistical Office (2017)

Considering the small number of large enterprises in the country (0.2-0.3%, 233 in 2016), as well as the fact that these are mainly firms that survived the transition period of the 1990s, these companies cannot be the main driving factor in strengthening the SME segment through vertical spillovers. SMEs increasingly need to open up to external markets, strengthen their cooperation with FDIs, which are present in the country, and undergo some structural transformation towards better sustainability. In this part, there is a need for subsidies for assisting the linkages of FDIs with the large enterprises and their more intensive export orientation. Some existing mechanisms and instruments can be found in the mechanisms of the State Fund for Innovations. Unfortunately, the low number of SMEs covered with the instruments of the Fund, so far indicate a possible mismatch of its services with the needs of the target companies.

4.3 Buyer Sophistication

Demand is an important driver of innovation. It affects the development of new products, as firms modify and differentiate products to increase sales and market share. Furthermore, it affects the improvement of the production and supply processes in order to reduce costs and lower prices. Demand however is not just a demand for quantity of products and services, it is also a demand for a certain level of quality and standards. In order to understand how demand affects innovation in companies in the national economy, we look at the buyer sophistication index. If the index is high, it indicates a more sophisticated market capable of driving innovations in SMEs and vice versa.

The buyer sophistication index for the former Yugoslav Republic of Macedonia measured through the Executive Opinion Survey of the World Economic Forum (2017), indicates that in

the past period i.e. from 2010- till 2016 the value of the indicator was below 3. On a scale of 1(low) to 7 (high), it indicates unsatisfactory buyer sophistication. Buyers are mainly driven by price, which limits the innovation activities of national micro and SMEs that target only the national and in rare cases limited international markets. The presence of many cheap, imported products with poor quality, negatively affects the work of domestic enterprises, often in the direction of even greater quality reduction, in order to achieve lower prices. This battle is mainly lost because imported products come from companies that have achieved economies of scale covering much larger markets.

5 Socio - demographic environment

The analysis of the socio-demographic environment investigates the social and population trends in the country, how they affect its overall business attractiveness, and whether they serve as potential drivers of innovation in enterprises. The analysis is focused on several factors of interest: GDP per capita and population trends, active population size, its employment status and education.

5.1 GDP per capita and Population trends

Despite low absolute values, the Macedonian real GDP growth per capita is among the highest in Southeast Europe. This growth allows the former Yugoslav Republic of Macedonia to reduce the difference with the new EU member states. It is mainly driven through the increased number of enterprises established with FDIs, as well as due to the growth of domestic consumption, especially in public investments. Despite the low absolute value of this indicator in relation to EU member states, the average growth of 1.8% since 2009 is above the regional growth, which is 1.3%.

As the GDP per capita in absolute numbers is still very low (3,735 eur), it affects the nature of the demand and the low buyer sophistication index. It is accompanied with increase in the inequality and income poverty. Latest data from the World Bank (2017) imply that more than one third of the population of county lives below the income poverty line, while the income inequality has increased in the past 6 years. The GDP per capita in absolute numbers might also be misleading due to the speculative data on the size of the national population. The last population census in the country was held in 2001. The 2011 census was postponed due to political challenges. Since then, the National Office of Statistics prepares annual population estimates and projections based on the number of new born, number of deaths, and officially registered (e)migrants. The data are given in Table 5.1. These data however cover a negligible number of people who emigrated and officially reported their leave. In absence of official data on this segment of the population, the World Bank (2016) estimates that in the past decade more than 400 000 people left the country.

Table 5.1. Socio-demographic indicators								
		2010	2011	2012	2013	2014	2015	2016
1	GDP per capita PPS (EUR)	3,250	3,376	3,409	3,532	3,610	3,735	
2	GDP growth (%)	3.4	2.3	-0.5	2.9	3.6	3.8[p]	2.4[e]
3	Population size (millions)	2.053	2.057	2.060	2.062	2.066	2.069	2.071
4	Change in population (%)	2.2%	1.2%	1.2%	1.7%	1.6%	1.0%	1.2%
5	Population aged 15 - 64 (million)	1.454	1.458	1.463	1.463	1.460	1.459	1.455
6	Population density (persons per km2)	82,5	82,6	82,7	82,8	83,0	83,1	
7	Degree of urbanisation (%)	2011 - 2015 average 57%						
p- projections* *e*-estimates* *Source of data: State Statistical Office (2017)*								

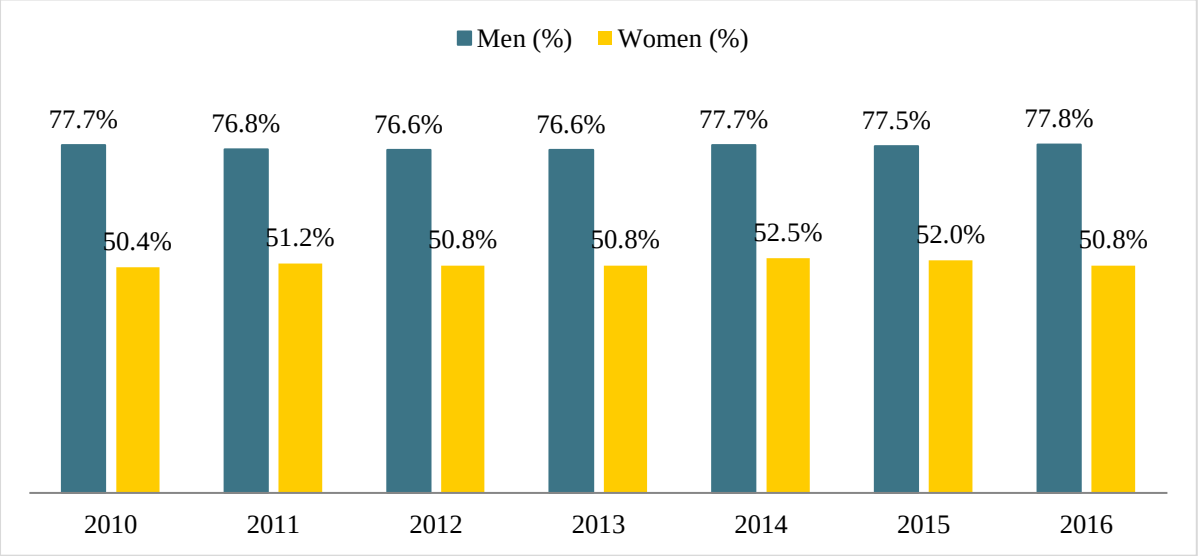
5.2 Working Population: Employment status and Education

The working population (aged 15-64), after the growth in the period 2010 -2012, experienced a steady decline. The decline indicates a trend of aging of the population, but also it emphasizes the insufficiently studied situation with the emigration of a significant part of the population abroad. The population is fairly evenly distributed in the densely populated urban areas. The trend in the density of the population indicates a small but steady growth and a concentration in the urban areas. Data from the State Statistical Office (2017) indicate that more than half of the population (57.3%) lives in the urban areas, which in terms of innovative capacity is a positive indicator, but in terms of the economic decline of rural regions - a concerning process.

The former Yugoslav Republic of Macedonia has made a serious step in reducing the unemployment rate from 37% in 2004, to 25% in 2017. Although it is the only SEE country in which the unemployment rate has not increased since 2009, the country still has an unemployment rate significantly higher than the new EU countries (Croatia 16.6%, Bulgaria 9.4%, Romania 6.8%). The youth unemployment rate fell from 53.9% in 2014 to 45.3% in 2017, aided by expensive youth employment programs. These trends favor the engagement of a growing active workforce in increasing the potential for innovations at national level. Changes in the active workforce indicate some fluctuations that could result from the emigration, as well as due to changes in the statistical methodology. Unfortunately, still a large percentage of the population faces unemployment, which generates poverty and intensifies the need for significant social policies and interventions.

The labor market is characterized by low activity, low employment rate, high unemployment rate, and a quantitative and qualitative imbalance between the offered workforce and the required skills. The low labor activity is supported by the high net inflow of money from abroad and the free health insurance for registered unemployed persons, among which there are also people who are not looking for work at all. There is also a relatively high gender gap in the rate of active labor force mainly due to: the tradition and the country's cultural values, low education and skills, ethnicity, high cost of child care services, care for older members of the family, discrimination on the labor market, etc.

Figure 5-1 Gender Trends in the Active Labor Force 2010-2016



Source of data: State Statistical Office (2017)

The trend in the educational structure of the working population indicates that around 40% of the population are people with incomplete, or complete primary education, 46% are people with incomplete secondary, secondary or vocational education, and only around 12% are higher educated people with a Bachelor degree and higher (State Statistical Office 2017). Less than 3% are illiterate. In a world where secondary education is no longer an investment for the growth of the economy, rather a cost, the current educational structure of the workable population is not favorable for supporting innovations (Bogdanovska 2012). Having in mind the trend in the ageing of the population, along with the unfavorable educational structure, the country has shifted the weight of training and educating the workforce, to the SMEs.

While efforts are being made to increase the level of education, especially with the secondary education becoming mandatory, as well as the efforts to improve the conditions in primary education, there is a perception that the quality in primary and secondary education is declining. The knowledge and skills of Macedonian students significantly lag behind those in comparable countries. For example, in the Progress in International Reading Literacy Study (PIRLS) 2016, which assesses children from the fourth grade of elementary education, in terms of literacy (reading), much fewer students achieved the lowest comparison value in the former Yugoslav Republic of Macedonia (55%), in relation to all the neighboring countries and EU members

that participated in the program (the next lowest was Slovenia with 83%). In the Trends in International Mathematics and Science Study (TIMSS), which tested 8th grade students, FYROM had the lowest, declining result in the period 1999 -2011 (drop from 447 to 426 points). The percentage of students who reached the minimum standard has fallen from 70% to 61%, in mathematics, and from 73% to 53% in physics.

Incidental engagements in higher education (translation of literature, equipping laboratories, etc.) are followed by poor implementation, which questions their impact on the higher education (large expenditures, poor practical effect, poor sustainability etc.) . In many parts of higher education, the incidents of incidents, insufficiently thought out, including those in the legislation, are yet to come. And in this segment of education, the declining quality is noticeable, although in continuity we are talking about years of some quality assurance system in the higher education of the country. In terms of entrepreneurial and innovative education, it has been formally introduced to all levels of education, but still as a very formal process within the classroom teaching, without practical approach, and with modest results.

Due to the spontaneity in the development, the education system in the former Yugoslav Republic of Macedonia has expanded its capacities in the social sciences, and in the secondary education, especially in the classical gymnasiums, with the applied sciences and professional education being on the margins of the youth's interest. All this led to an absurd situation, despite the large number of educated people, there are not enough qualified workers and engineers to satisfy the needs of the new economy and the needs of FDIs. It will need numerous thorough reforms and a lot of time to overcome the current, unfavorable situation in the educational output of the country.

6 Innovation Potential

The status of the innovation activities in the national innovation environment cover analysis of the behavior of the innovators, the existence of business linkages, and the IPR and intellectual assets. It is a trend analysis, which takes into account the developments in the general environment in the country. The innovative environment is assessed through the following sections:

- National Innovation System;
- Framework conditions;
- Investments;
- Innovative activities; and
- Impacts from the innovative activities.

The data used in this section of the study derive from the European Innovations Scorebord (2017), and provide a comparative analysis of the innovative performance of EU countries, and other European countries (including former Yugoslav Republic of Macedonia). The EIS assesses the relative strengths and weaknesses of the national innovation systems and helps countries identify areas for improvement.

6.1 Description of the National Innovation system

The national innovation ecosystem covers involvement of national and / or regional authorities, stakeholders such as universities and other higher education institutions, industry partners (the business sector), and the society involved in the entrepreneurial process, and its eco-system. The National Eco-system and the Governance Structure which supports this system for the former Yugoslav Republic of Macedonia are provided in Appendix 2. The government, public supported institutions (Universities, R&D), agencies and organizations, are among the main stakeholders which appear in both figures. There are two very specific Government documents which aim at creating a more sustainable innovation eco-system. These are: the Strategy for Innovations 2012-2020, and the Strategy for Competitiveness 2016-2020. Both documents place significant attention on the collaboration between the Universities and the R&D centers (Knowledge generators) and the SMEs (knowledge recipients), along with measures for improving the access to finances.

In general, the overall sector strategy for supporting the competitiveness and innovations is based on objectives which clearly identify the intervention area. Current measures reflect the micro-determinants of innovation: (1) a combination of measures for knowledge and technology transfer from Universities to SMEs, R&D centers, FDIs, other SMEs, clusters) and (2) measures for supporting a more favorable regulatory environment and improving the access to capital. The existing focus of the national eco-system for supporting innovations is placed on knowledge acquisition supported by improved access to capital. The drawback of this approach is that it will make SMEs more productive; however, it will not improve their innovation capacity.

To compensate for the lack of adequate funding, the government launched a Fund for Innovation and Technology Development – FITD, in November, 2013. The Fund aims at supporting innovation and R&D activities in small and medium-sized enterprises. It is financed by a loan from the World Bank in a value of €8 million, The Fund operates through four instruments for fostering development and innovation in The former Yugoslav Republic of Macedonia (FITD 2017):

1. Co-financing Grants for Start-up, Spin-off Companies and Innovations;
2. Co-financing Grants and Conditional Loans for Commercialization of Innovations;
3. Co-financing grants for Technology Transfer; and
4. Technical Assistance through Business-Technology Accelerators.

Despite introducing significant mechanisms for improving the innovation eco-system in the country, the government itself is not enough. In general SMEs in the country have low absorptive capacity when it comes to introducing innovations as they lack adequate network i.e. infrastructure of business support organizations, knowledge and available human capital. Global competitiveness report ranked the former Yugoslav Republic of Macedonia at the 91 position in 2016 according to the innovation capacity of its enterprises. The access to capital is just one side of the coin, as there is a poor infrastructure for supporting innovations. The Fund for Innovations is not enough. There are no Centers for Technology Transfer, Technological Parks, and Centers of Excellence in any area of scientific research.

According to the State Statistical Office (2017), there are 77 research organizations in the country which employ in total 7842 researchers – majority are in the state funded institutions.

Although there are different definitions presented by different scholars, a wide agreed definition of clusters defines them as " geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standard agencies, and trade associations) in particular fields that compete but also cooperate" (Porter 1998, p. 197-198). When it comes to Macedonia, the Ministry of Economy supports the development of clusters at a national level, while the Ministry of Local Self Government at regional and local level. There are around 20 clusters in the country today as MASIT, Tikvesh Wine Route, and TTA-TC.

Other important stakeholders in the national eco-system are Incubators, Accelerators and BSOs. There is only one operational Incubator in the country and its reach is questionable. There are several private Accelerators, one Association of Business Angels and 8 Business support centers for SMEs, each in every of the 8 regions in the country.

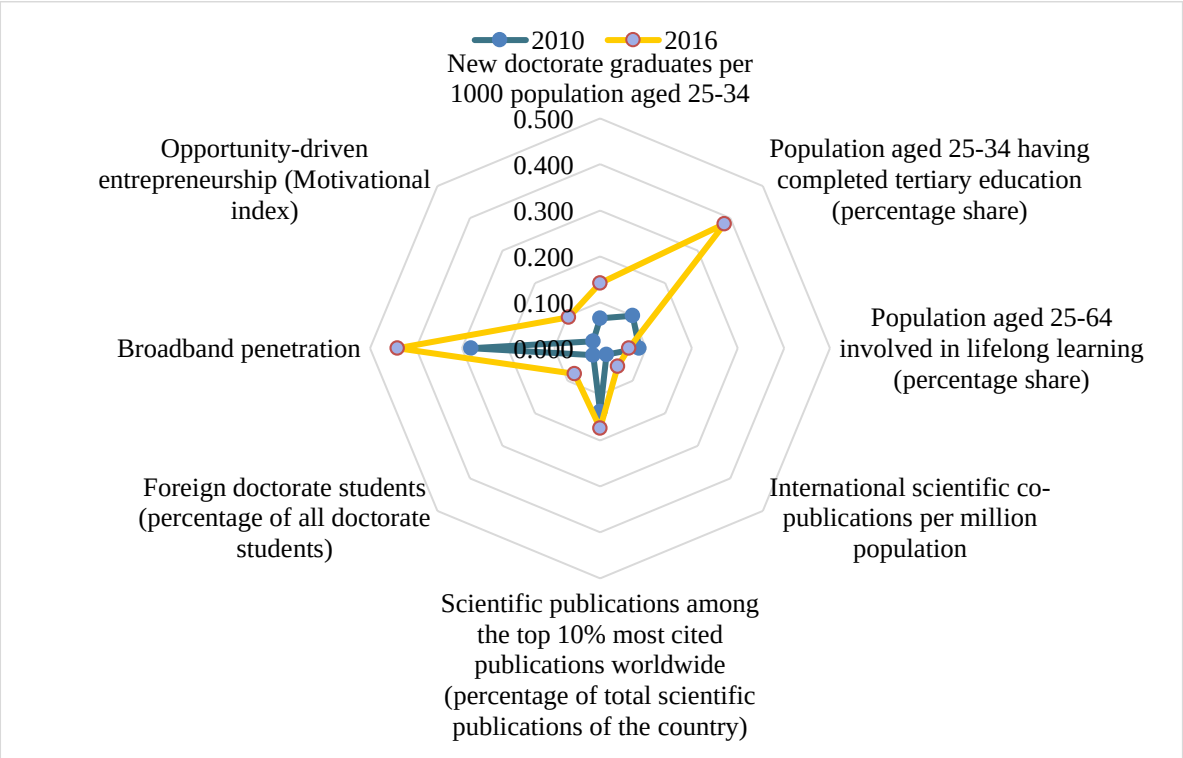
6.2 Framework conditions

The framework conditions of the national innovation environment cover analysis of the:

- *Available human resources*, by analyzing the number of doctors of science, the population aged 25-34 years with tertiary education and the analysis of lifelong education.

- *Attractive research systems*, through international scientific publications, top-ranked publications and foreign students at doctoral studies.
- *Innovation-friendly environment*, through broadband penetration and entrepreneurship driven by opportunities.

Figure 6-1 Framework Conditions, EU FYROM normalized values, 2010-2016



Source of data EIUS (2017)

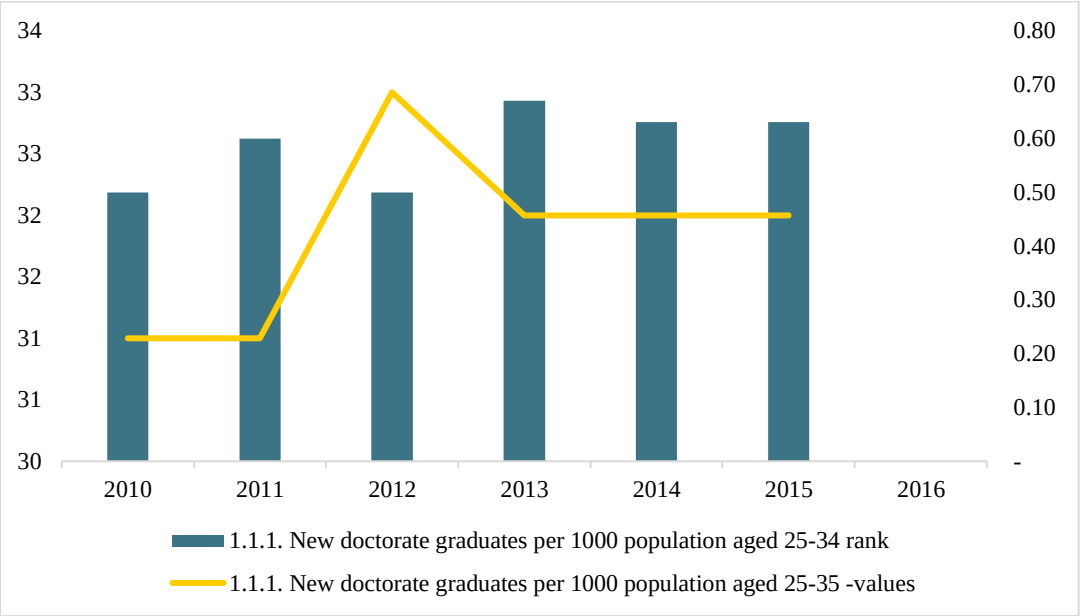
6.2.1 Available human resources

The former Yugoslav Republic of Macedonia's composite indicator on available human resources has a value of 49.3. In this area the country is ranked at the last place in EU for 2017 (EUIS 2017). All neighboring countries except Albania for which there is no data, perform better. As one part of the framework conditions, the indicator covers the quantity and quality of the available and educated human resources in the country. These results are supported by the data from the Global Competitiveness Report (2017), where Macedonia, FYR, is ranked at the 89th position from 130 economies in 2016, according to the availability of scientists and engineers. Despite being a low rank, it is the best rank of the economy in the past ten years. In general, it is very difficult for one economy to improve its competitiveness and innovation on short run without the engagement of sufficient number of researchers and engineers as this factor is not elastic, i.e. it takes time and investment to make it (OECD, 2005: 33).

The main weaknesses of the country within the composite indicator on available human resources are the number of new doctors of sciences and the life-long learning. Despite certain

improvement in value, the former Yugoslav Republic of Macedonia rank has decreased in the observed period indicating a weakness which has deteriorated.

Figure 6-2 New doctorate graduates, FYROM, EUIS 2010-2016



Source of data EIUS (2017)

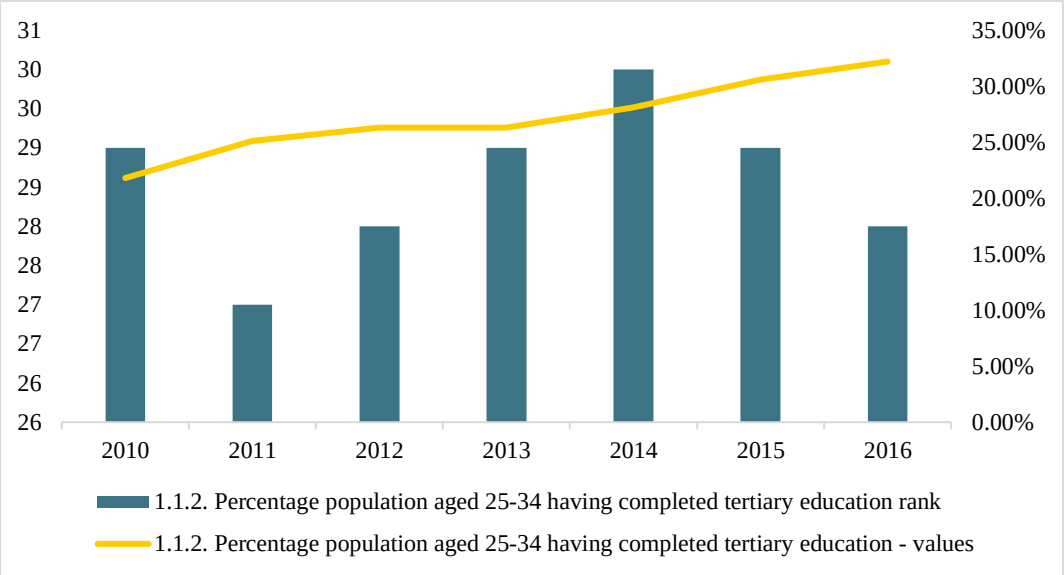
The indicator for new doctors of sciences in all areas of education, aged 25-34 years, shows slight growth in the past years, although the ranking on the 32nd place, out of a total of 36 nations, with a value of 0.63 (2015), is a rank among the lowest-ranking countries. In the EU, the median value is 1.8, with the leadership of Slovenia, Switzerland, Denmark, the United Kingdom (UK), which have 3 doctors per 1000 inhabitants, and Turkey, Malta, Cyprus, Poland and the former Yugoslav Republic of Macedonia with a 0.6 doctors per 1000 inhabitants at the bottom of the list.

Despite very low absolute values i.e. circa 230 PhDs per annum, there is a 40% growth in absolute numbers of new PhDs in all areas of education, aged 25-34 years, for the period 2010-2016. The growth is not a natural growth, rather a result of the transition from the old system of education to the new system based on the Bologna Process. The next five years will mark a stabilization period. Serious structural changes in higher education and science in the country are needed in order to achieve better performance on this indicator.

The *percentage of the population that has completed tertiary education* aged 25-34 focuses on a relatively small segment of the population, so even significant changes in the educational policy have no potential to affect the number of graduated students. This indicator is not limited only to natural-scientific and technical disciplines, since innovation, in many areas, specifically in the service sector, depends on an interdisciplinary knowledge. At Figure 6-1, it can be seen that since 2010, there is a steady growth in the value of the indicator for the former Yugoslav Republic of Macedonia. It is a result of the intensified liberalization of the higher education which resulted with the opening of many new private and state universities along with the

introduction of dispersed studies for the existing state universities. There are strong indicators that the trend will continue to grow in the next years due to two specific pre-conditions: the compulsory secondary education and the expanding higher education network in the country.

Figure 6-3 Population with Tertiary Education, FYROM, EUIS 2010-2016

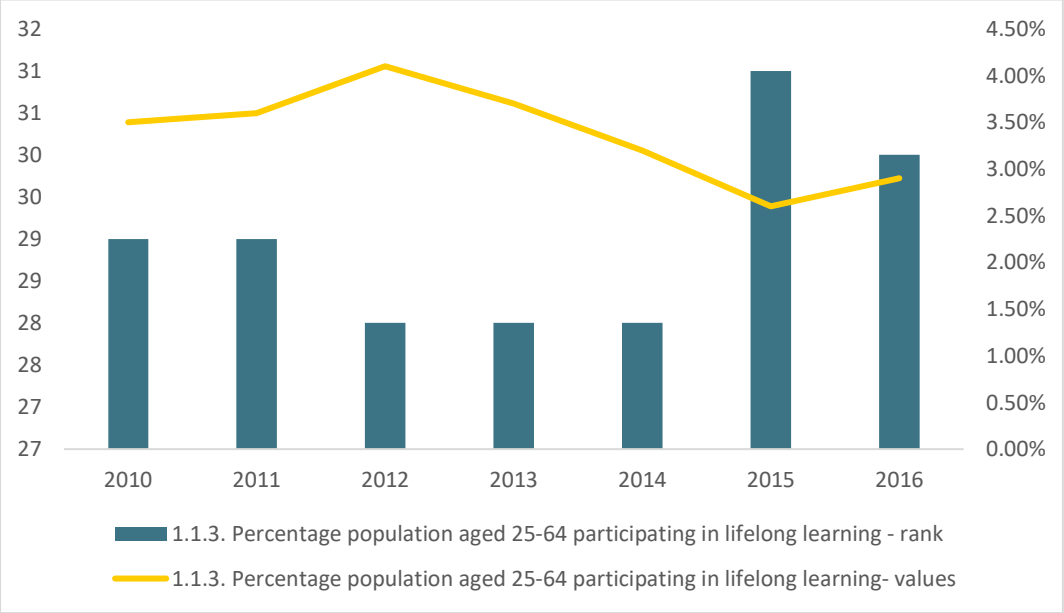


Source of data EIUS (2017)

In 2017, the EU average percentage is 38.2%, but there are countries like Cyprus, Ireland, Lithuania, Luxembourg and Switzerland, with a 50% value of this indicator. The former Yugoslav Republic of Macedonia in 2016 with a value of 32.2% and is ranked 28th, which places the country among the top 5 countries with the highest growth from 2010. The indicator and the trend show a weakness which is improving.

The *percentage of the population participating in lifelong learning* in the former Yugoslav Republic of Macedonia marks a downward trend despite its low value (3% - 4%). The lifelong learning covered by this indicator includes all forms of activities, formal and informal, which aim to improve knowledge, skills and competence. The average value in the EU is about 11% (2017), with the leadership of Switzerland, Sweden, Denmark, Finland, which have nearly twice higher percentage (about 25%), while The former Yugoslav Republic of Macedonia is in the group of countries (Romania, Bulgaria, Croatia, Poland) with under 5% of the population taking part in life-long learning activities. This type of education has no tradition in the former Yugoslav Republic of Macedonia, but it has great potential in the battle for solving the unemployment problem, as well as for improving the capacity for innovation.

Figure 6-4 Lifelong learning, FYR Macedonia, EUIS 2010-2016



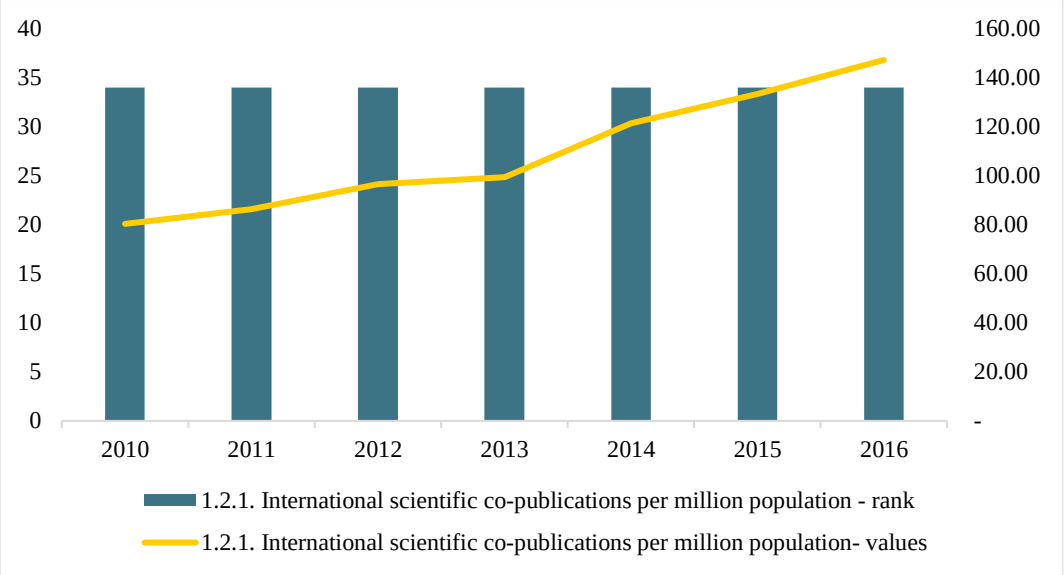
Source of data EIUS (2017)

6.2.2 Attractive research systems

The former Yugoslav Republic of Macedonia composite indicator on attractive research systems has a value of 25.3. It is ranked at the last place in EU in 2017. All neighboring countries except Albania for which there is no data, perform better.

The indicator of *international scientific co-publications* (Figure 6-5) is an assessment of the quality of scientific research, since the co-operation increases scientific productivity. In The former Yugoslav Republic of Macedonia there is a certain growth of this indicator, from 80 in 2010, to 250 in 2016, which is certainly a good trend of growth, but in absolute terms it is a small number. Although in absolute numbers the growth is insignificant, in relative terms i.e. per 1 million population, the indicator shows a 50% growth since 2010. The same increases The former Yugoslav Republic of Macedonia's position relative to the other Balkan and EU countries. In the EU, the average value is around 500 publications, in Switzerland and Iceland there are more than 2500, while five countries are with a figure of less than 250, including the former Yugoslav Republic of Macedonia, which is ranked 34th.

Figure 6-5 Scientific co-publications, FYR Macedonia, 2010-2016



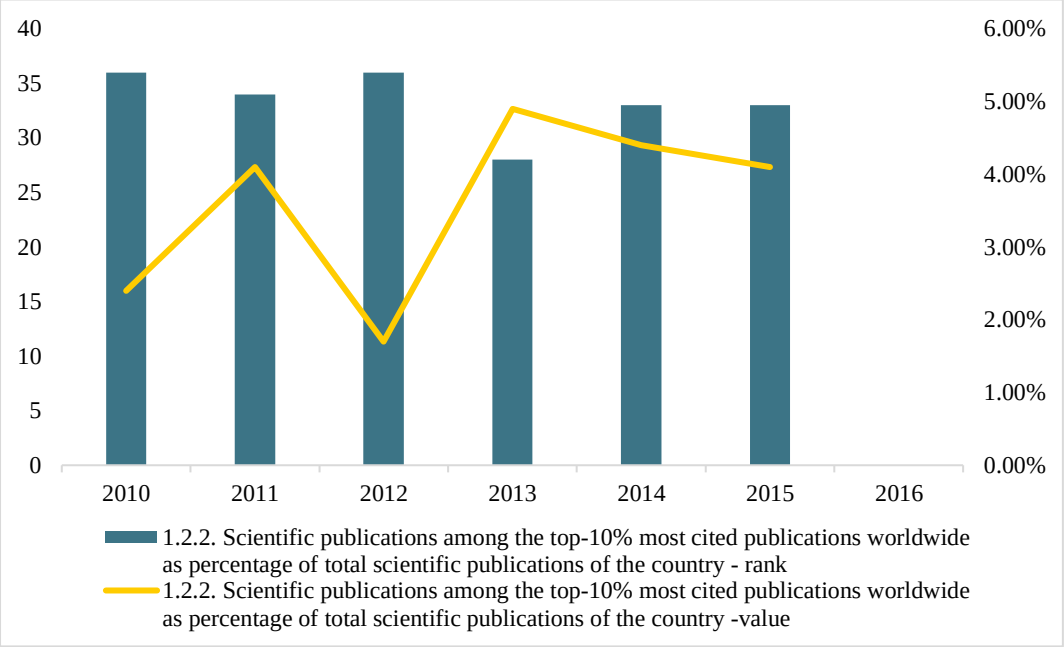
Source of data EIUS (2017)

The indicator for the *percentage of scientific publications which are among the 10% most cited in the world* of the total number of scientific publications (Figure 6-6) is growing, although is in the lowest value area. The growth has tripled in the period 2010-2016. However, having in mind the dynamic of the growth, the absolute value of a 4% rate of published scientific research in the top 10 most cited journals is too low for the size of the academic and research community in the country, along with the radically improved public investment in research infrastructure (investments in laboratories and equipment) in the period 2010-2015.

There are very few independent scientific institutes in the country, i.e. independent from Universities. The small number of affirmed scientific publications and journals reflects a declining investment in research publications. At the same time, the in-country scientists do not show significant capacity, or interest, for participation in international R&D projects. The same can be due to a large bureaucracy in the functioning of the state universities. The intensive and rapid increase of the higher education infrastructure which happened in the analyzed period negatively affected the focus on the scientific work, especially in the engineering areas.

The former Yugoslav Republic of Macedonia is ranked very low, on the 33rd place, with 4.1%, while the average EU value is about 10.6% with the leadership of Switzerland, the UK, and the Netherlands, which have more than 14% of such publications.

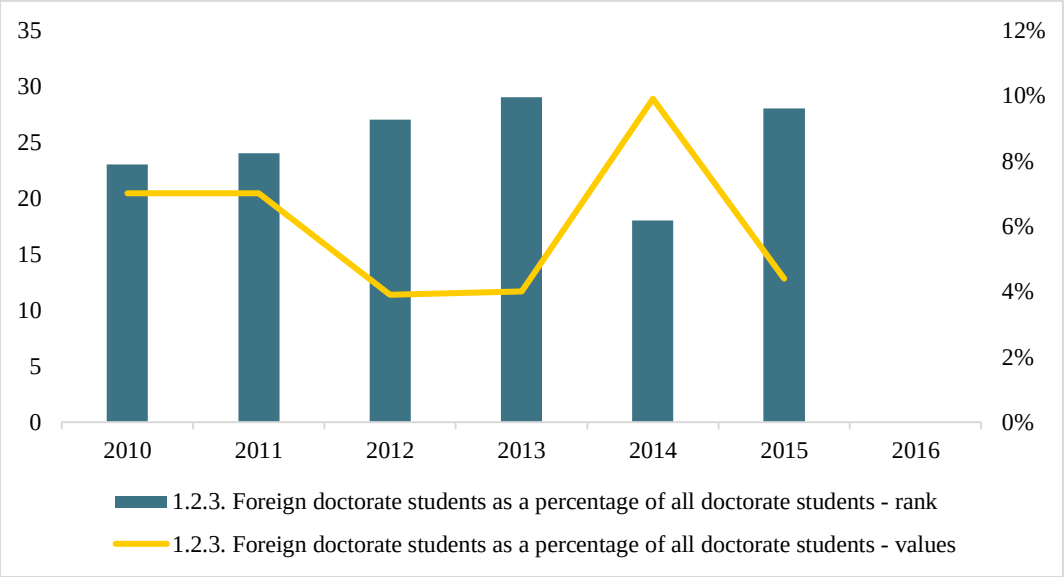
Figure 6-6 Scientific publications, FYR Macedonia, 2010-2016



Source of data EIUS (2017)

The *share of foreign students at doctoral studies* (Figure 6-7) reflects the mobility of students and process of attracting quality researchers. The stagnation of this indicator in the former Yugoslav Republic of Macedonia, with values below 5% (very small number of 9-13 students), is evident, while in the EU this percentage is 25.6%, with Luxembourg being the leader with 90%, and the other leading countries (Switzerland , UK, Belgium, France) have a value of 40%. The former Yugoslav Republic of Macedonia is in the group with Poland, Romania, Croatia, with a value below 5% and ranks 28th.

Figure 6-7 Foreign students at doctoral studies, FYROM, 2010-2016



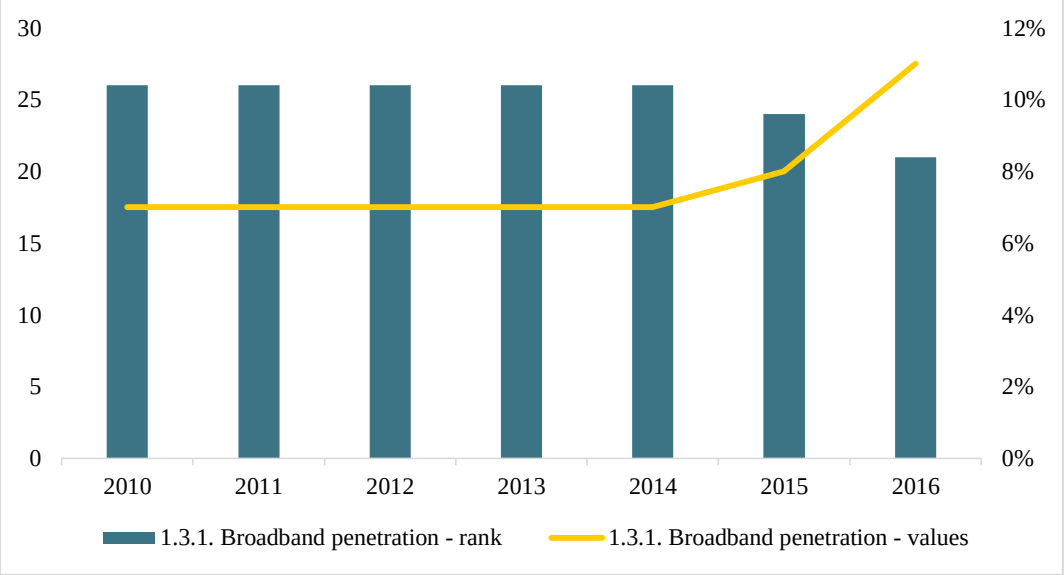
Source of data EIUS (2017)

6.2.3 Innovation-friendly environment

The former Yugoslav Republic of Macedonia composite indicator on innovation-friendly environment has a value of 61.7. The country is ranked at the sixth place from the end in EU in 2017, with Greece and Cyprus performing worse. In this area of the innovation potential, the main weakness of the country is the poor indicator of opportunity entrepreneurship as measured by the Global Entrepreneurship Monitor (2017). In the area of the other indicator under this index i.e. the broadband penetration the country's performance is in line with EU averages – rank 21st.

The total e-potential depends on the creation of e-commerce conditions and the use of the Internet. The *broadband penetration* indicator assesses the relative use of this e-potential, indicating the proportion of enterprises that have access to high-speed broadband. In the former Yugoslav Republic of Macedonia, in recent years, there has been a growth of broadband penetration that ranges from 6% to 11%, which ranks the country at the 21st place in EU. The average value of this indicator in the EU is around 13%, while Greece, Cyprus, Serbia, Italy and Croatia are between 2% and 6%. The relative growth in the former Yugoslav Republic of Macedonia in the past years is about 30%, which counts the country in countries with above average growth in the EU.

Figure 6-8 Broadband penetration, FYR Macedonia, 2010-2016

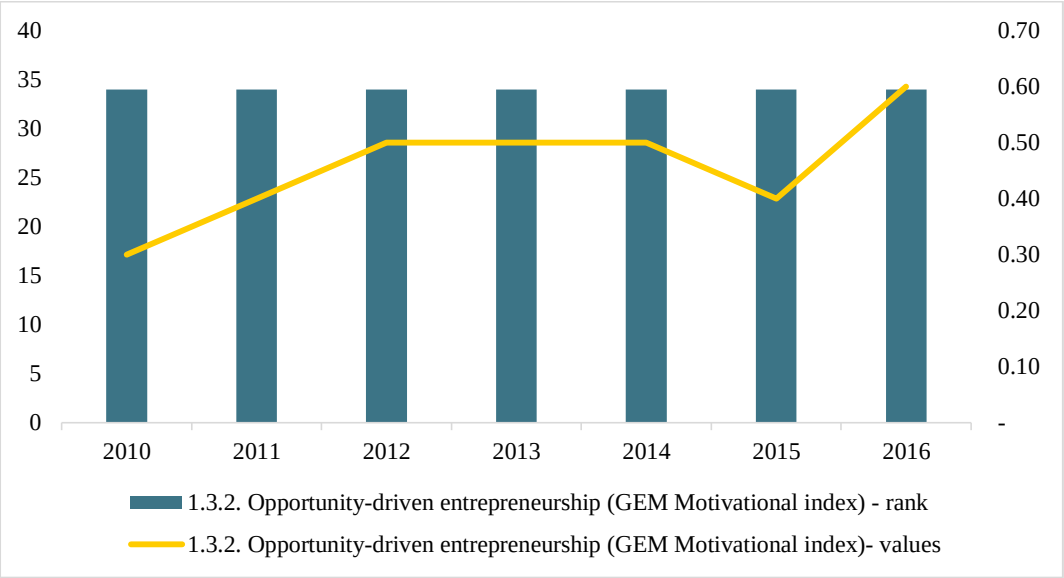


Source of data EIUS (2017)

The *motivational index* measures the relative degree of opportunity, or in other words it represents entrepreneurship driven by opportunities. Data from Global Entrepreneurship Monitor is used (GEM 2017). The index covers people, who are involved in entrepreneurial activities and claim to be driven by opportunities, rather than some other measure of

employment, and who claim that the main driving force to use the opportunities is the search for independence or an increase in their income.

Figure 6-9 Opportunity Entrepreneurship, FYR Macedonia, 2010-2016



Source of data EIUS (2017)

There is a growing trend of the indicator, which reaches a value from 0.3 to 0.6, ranking the country at the 34th place in the EU. The average value in the EU is around 3 with Norway, Denmark, Iceland and Sweden reaching values from 8-13, while on the other side are Former Yugoslav Republic of Macedonia, last in the group, with Croatia, Bulgaria, Serbia and Turkey.

6.3 Investments

The investment environment, or the financing of innovative activities, covers the analysis of financing and support, as well as the investments of companies in research and development activities (R&D) and innovation.

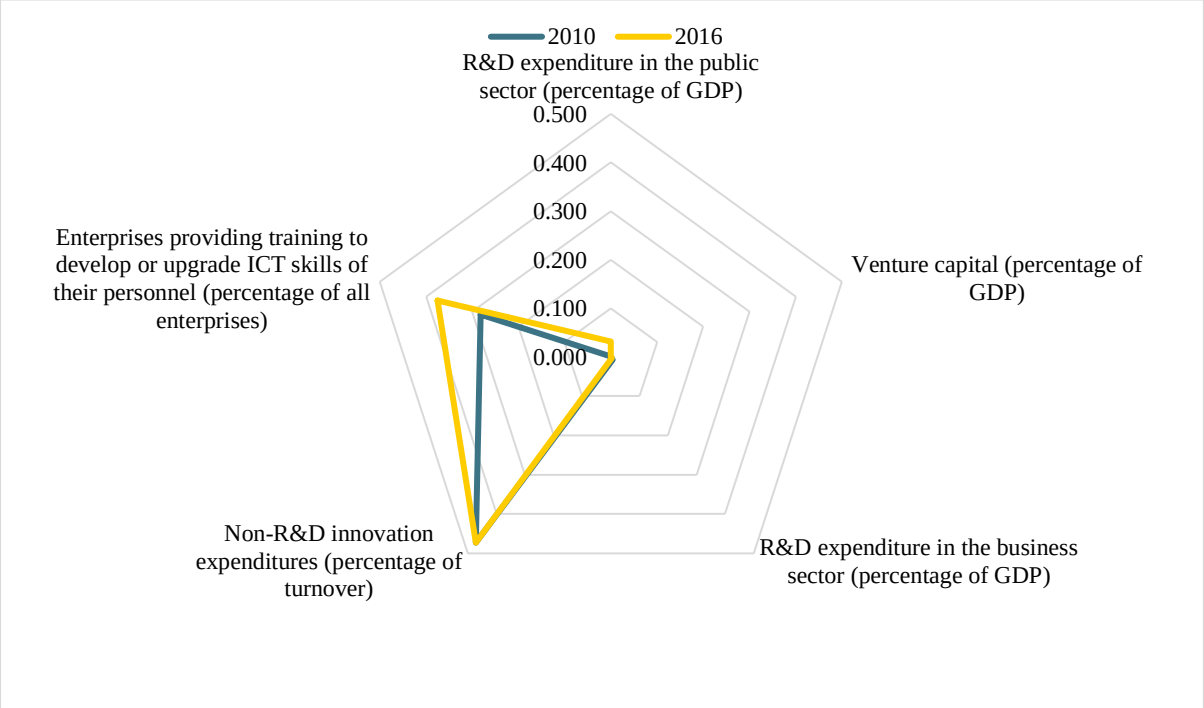
In the area of *financing and support*, the following indicators are listed:

- R&D expenditures in the public sector; and
- Investments in venture capital.

In the area of *firm investments*, the indicators are:

- R&D expenditures in the business sector;
- Non-R&D innovation expenditures; and
- Enterprises providing training to develop or upgrade ICT skills of their personnel.

Figure 6-10 Investments, FYROM EU normalized values, 2010-2016

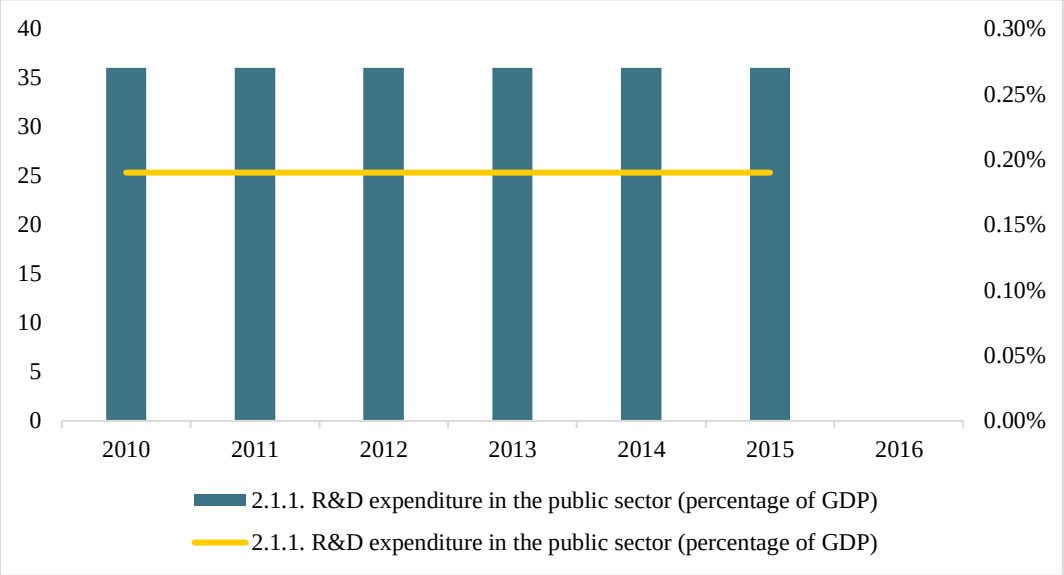


Source of data EIUS (2017)

6.3.1 Finance and support

The former Yugoslav Republic of Macedonia composite indicator on finance and support has a value of 2.8. The country is ranked at the last place in EU in 2017. All neighboring countries except Albania for which there is no data, perform better. In the area of the *R&D investments in the public sector* (as a percentage of GDP), the amount is 0.19%, a result that ranks the country at the 36th place in EU. This indicator is one of the main driving forces of the economic growth of the knowledge-based economy. The average EU value of this indicator is 0.71%, with Denmark, Sweden and Finland close to 1%, while in The former Yugoslav Republic of Macedonia, Bulgaria, and Romania is below 0.3%. Unfortunately, The former Yugoslav Republic of Macedonia takes the last place.

Figure 6-11 R&D investments in the public sector FYROM, 2010-2016



Source of data EIUS (2017)

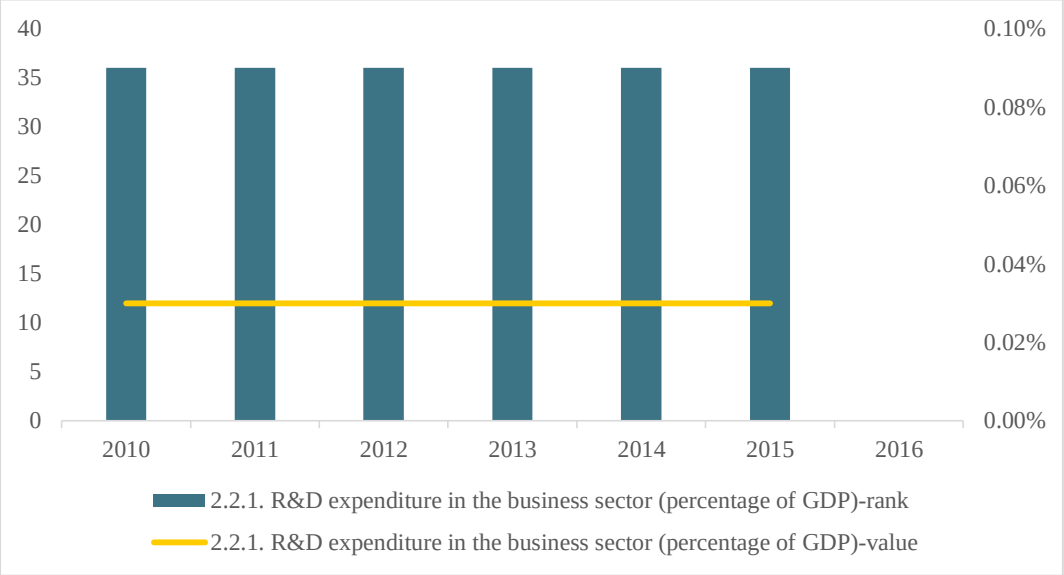
The amount of *venture capital* is an indicator for the dynamics of the creation of new businesses. The former Yugoslav Republic of Macedonia is ranked on the penultimate place, with a value close to zero, alongside Malta, Serbia, Greece and Ukraine.

6.3.2 Firm investments

The former Yugoslav Republic of Macedonia composite indicator on firm investments has a value of 67.9. The country is ranked in the last ten countries in EU in 2017, with Greece, Bulgaria and Cyprus performing worse. There is no data for Albania. The main weakness is the indicator for R&D expenditures in the business sector, while the indicator non-R&D expenditure is the main strength.

The indicator of *the R&D expenditures in the business sector* measures the rank The former Yugoslav Republic of Macedonia on the last, 36th place, with a value of 0.03% of GDP. The mean value in the European Scoreboard is above 1.3% of GDP, and in the leading countries, Israel, Sweden, Austria and Switzerland, the indicator is over 2%. Alongside The former Yugoslav Republic of Macedonia, Cyprus and Latvia are also with value under 0.5%.

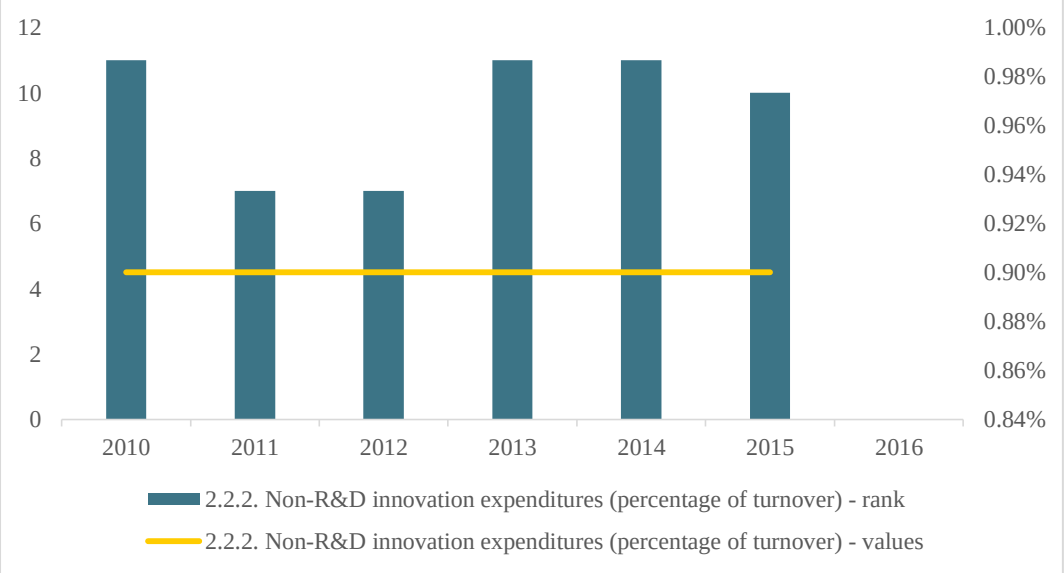
Figure 6-12 R&D investments in the business sector FYROM, 2010-2016



Source of data EIUS (2017)

The *indicator for non-R&D innovation expenditures*, as a percentage of the total turnover (measures indicators such as investment in equipment and machinery, the purchase of patents and licenses), actually measures the diffusion of new production technologies and ideas. For the former Yugoslav Republic of Macedonia, the value of this indicator is 0.9%, which ranks the country at the high 10th place. In the EU, this indicator has a mean value of 0.76%, while in Turkey, Switzerland and Lithuania is above 2%. Taking into account the intensity of FDIs, as well as the rebuilding of the industry, after not very successful privatization, this trend is understandable for the country.

Figure 6-13 Non-R&D innovation expenditures FYROM, 2010-2016



Source of data EIUS (2017)

ICTs are particularly important for the innovations in an increasingly growing digital economy. Having that in mind, the share of *companies providing training* is an assessment for the evolving skills of employees. In the former Yugoslav Republic of Macedonia, on average, about 14% to 17% of companies provide training, which ranks the country at 23-24 place. The EU average value is 22%, while in Norway, Austria, Finland and Belgium this percentage is above 34%. In Romania, Bulgaria and Lithuania these values are between 5% and 10%. The percentage in the former Yugoslav Republic of Macedonia comes as a result to the presence of the FDIs and the strong emphasis on digitization.

6.4 Innovation activities

The status of innovation activities in the national innovation environment covers the analysis of the behavior of innovators, the existence of business connections, and the protection of intellectual property and intellectual assets.

In the *Innovators* section, the indicators that are considered are indicators from the Community Innovations Survey of the EU from 2010-2014:

- SMEs introducing products or processes innovations;
- SMEs introducing marketing or organizational innovations; and
- SMEs innovating in-house

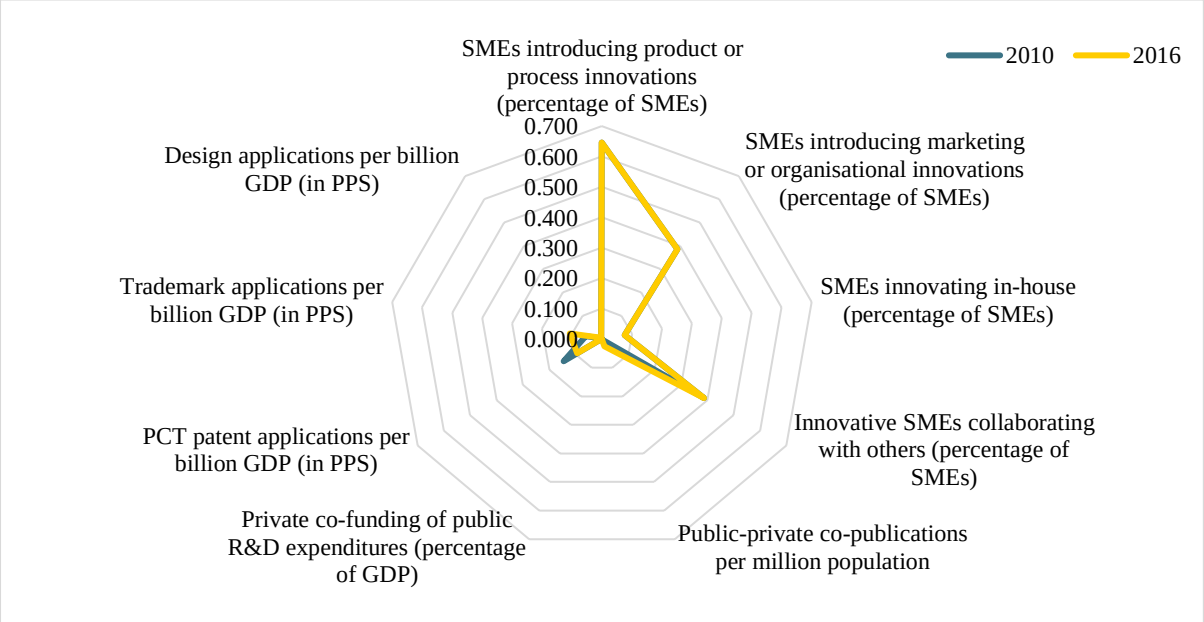
In the section *Linkages*, the following indicators are analyzed:

- Innovative SMEs collaborating with others;
- Public-private co-publications;
- Private co-funding of public R&D expenditures.

In the *Intellectual Assets* section, the indicators that are considered are:

- PCT patent applications;
- Trademark applications;
- Design applications.

Figure 6-14 Innovation Activity, FYROM EU normalized values, 2010-2016



Source of data EIUS (2017)

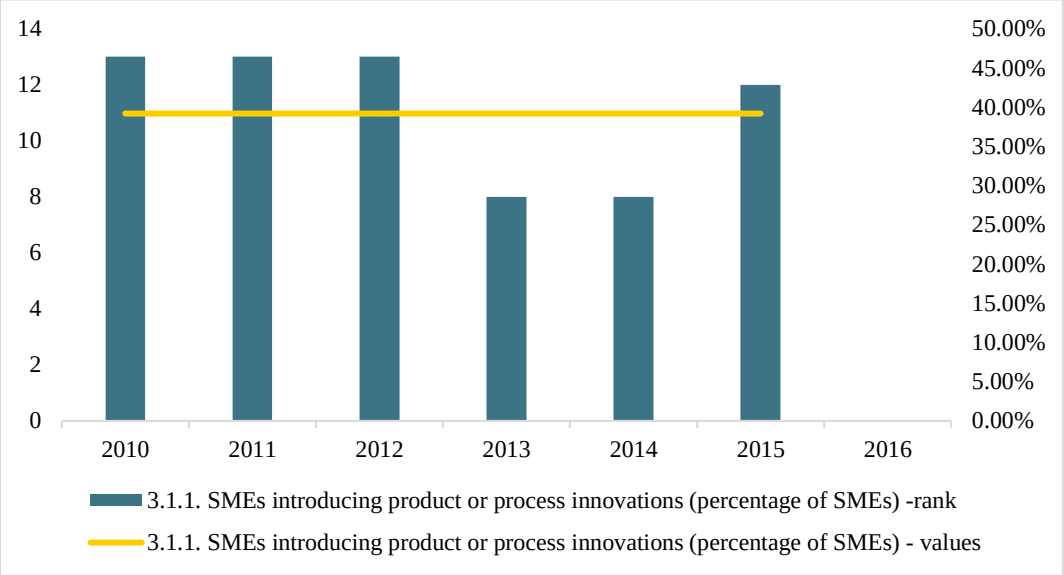
6.4.1 Innovators

The former Yugoslav Republic of Macedonia composite indicator on innovators has a value of 66.2. Only Bulgaria from the BalkanMed countries has a worse composite indicator than the former Yugoslav Republic of Macedonia. There is no data for Albania. The main weakness in this area comes from the indicator *SMEs innovating in-house*. The main strength is the indicator representing the SMEs *introducing products or processes innovations*, where the country is ranked at the 12th position in the EU.

The part of SMEs that are *introducing products, or processes innovations* in terms of the total number of SMEs is traditionally accepted as the most important type of innovation in the industry. The former Yugoslav Republic of Macedonia with a value of 39.2% for this indicator is ranked 12th, while the EU average is 31%. In Belgium, Switzerland and Ireland this value is above 45%, while in Romania it is only 5%, and in Ukraine, Latvia, Poland and Bulgaria are under 15%.

The indicator covers the activity of SMEs, which have a number of employees between 10 and 249, and belong to the NACE sectors of innovators as identified by CIS. There are 6540 SMEs in all NACE sectors in the former Yugoslav Republic of Macedonia which have between 10-249 employees. More than half of them or 3943 belong to the NACE sectors of innovators in 2016.

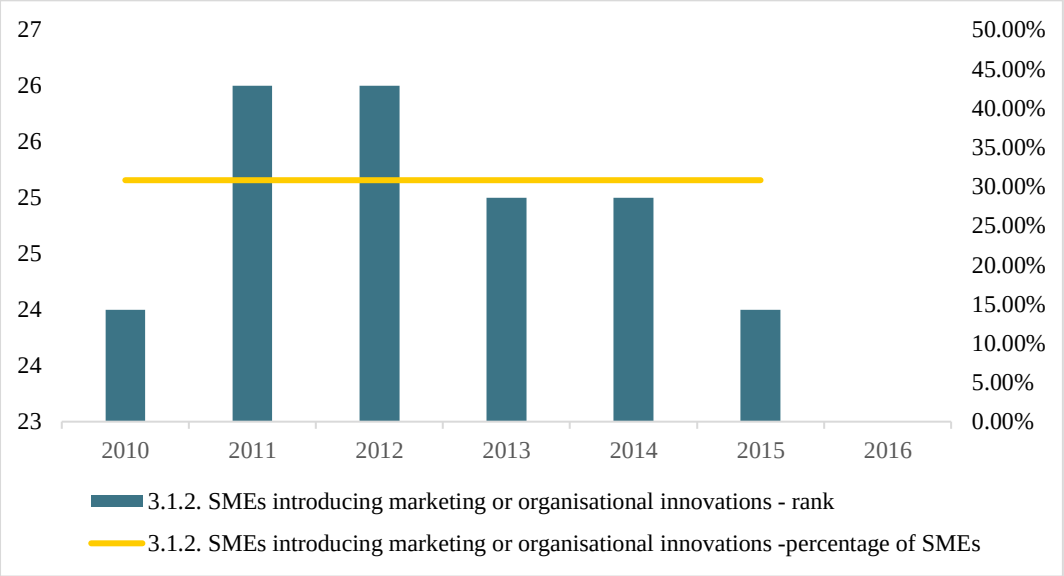
Figure 6-15 SMEs introducing products or processes innovations FYROM, 2010-2016



Source of data EIUS (2017)

Many companies, especially in the service sector, innovate through *marketing* (significant changes in product design or packaging, product placement, product promotion, or product prices) and *organizational innovation* (new organizational methods in business practice, job organization or external relations). In this segment the former Yugoslav Republic of Macedonia has a value of 30.8%, which ranks the country at the 24th position in the EU, where the average value is about 35%. In Switzerland, Luxembourg and Ireland the value is over 50%, while Romania, Ukraine and Poland have a value below 12%.

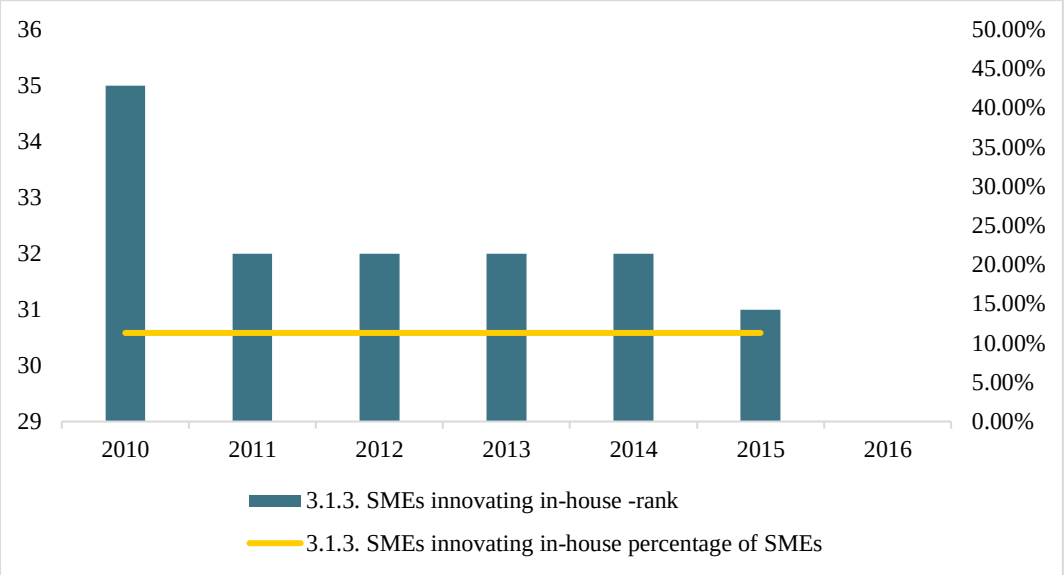
Figure 6-16 SMEs introducing marketing or organizational innovations FYROM, 2010-2016



Source of data EIUS (2017)

The percentage of SMEs innovating in-house in the former Yugoslav Republic of Macedonia is 11.3%, which ranks it on the 31st place. The average value for EU is 28.8%, Switzerland and Ireland have a value of over 40%, while Romania, Poland, Latvia, Bulgaria and The former Yugoslav Republic of Macedonia are with value under 12%.

Figure 6-17 SMEs innovating in-house FYROM, 2010-2016



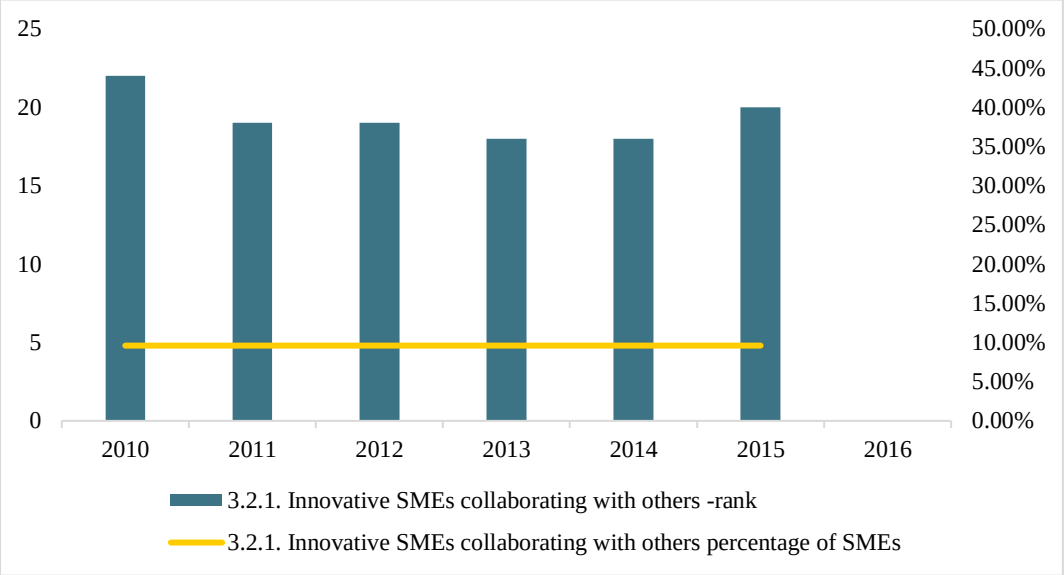
Source of data EIUS (2017)

6.4.2 Linkages

The former Yugoslav Republic of Macedonia composite indicator on linkages has a value of 41.2. Only Bulgaria from the BalkanMed countries has a worse composite indicator on linkages. There is no data for Albania. The main weakness in the area are the indicators on the *public-private co-publications* and *private co-funding of public R&D*, while in the indicator *SMEs collaborating with others*, the country reflects the EU averages.

The percentage of *innovative SMEs that cooperate with others* in terms of the total number of SMEs measures the flow of knowledge between public research institutions and private firms, as well as between firms themselves, but limited only to SMEs. In the former Yugoslav Republic of Macedonia the value is 9.6%, which ranks the country at the 20th place, while the EU average is around 11%. In Belgium, the UK, Iceland and Austria the value is over 20%, while Ukraine, Romania, Latvia, Bulgaria, Poland and Malta are below 5%.

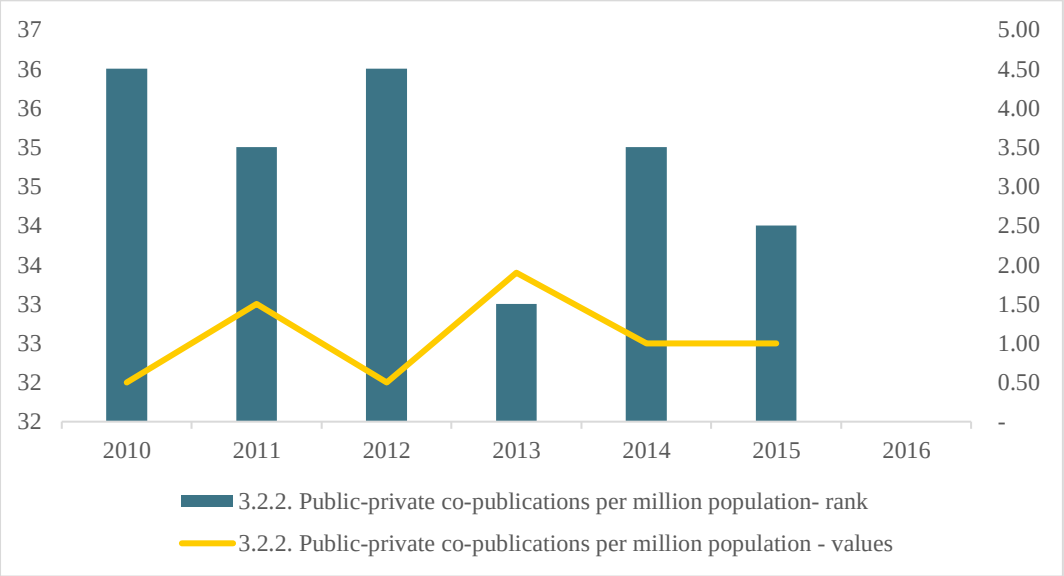
Figure 6-18 Innovative SMEs collaborating with others FYROM, 2010-2016



Source of data EIUS (2017)

The indicator for *public-private co-publications* per million population defines the public-private connections and active co-operation between the business sector and the public sector which resulted with publication (Figure 6-19). The former Yugoslav Republic of Macedonia is with a value of about 0.08 (2015) and ranked at the 35th place in the EU, while the EU average is 28.7. For Switzerland, Ireland and Denmark this indicator is 100, and 11 countries have an index below 5. The low level of scientific-research work in the former Yugoslav Republic of Macedonia is confirmed here as well.

Figure 6-19 Public-private co-publications FYROM, 2010-2016



Source of data EIUS (2017)

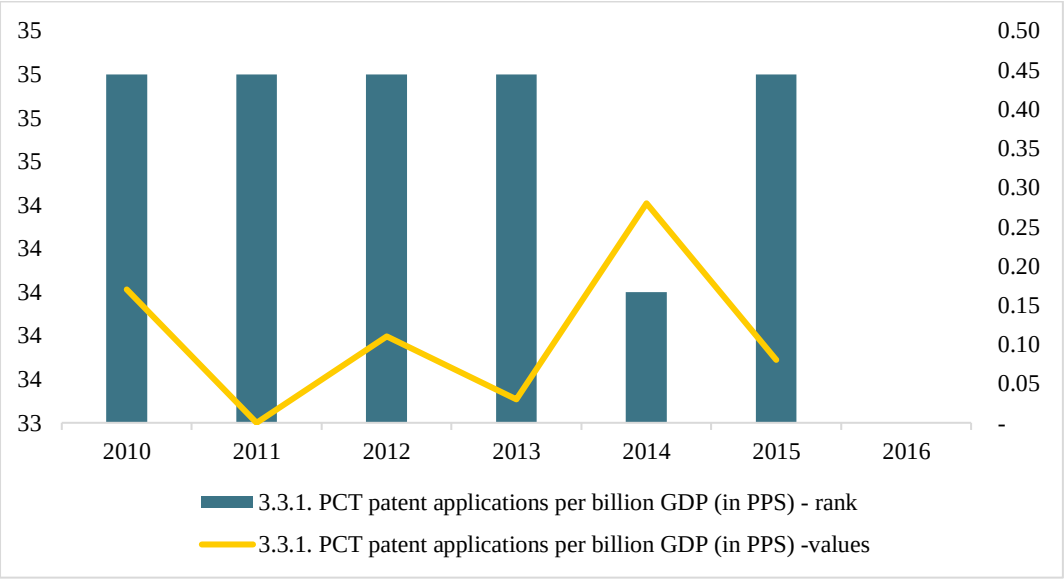
The indicator of *private co-funding of public R&D expenditures* measures the co-operation between the public and the private sector. There is no data for the former Yugoslav Republic of Macedonia, while the EU average is 0.05% of the EU GDP. In Germany this value is above 0.12%, and above the EU average value are Switzerland, Lithuania, the Netherlands, Belgium and Turkey. Close to 0% are Cyprus and Malta.

6.4.3 Intellectual Assets

The former Yugoslav Republic of Macedonia composite indicator on intellectual assets has a value of 13.9. The country is ranked at the last place in EU in 2017. All neighboring countries except Albania for which there is no data perform better.

The capacity of companies to develop new products strongly affects their competitive advantage. One of the estimates of this feature is the *number of patent applications*. In the EU, this figure is 3.7 PCT patents per billion GDP, but in Israel, Switzerland and Finland this figure is over 8. Values of less than 1 have 13 countries, including the former Yugoslav Republic of Macedonia which is ranked last.

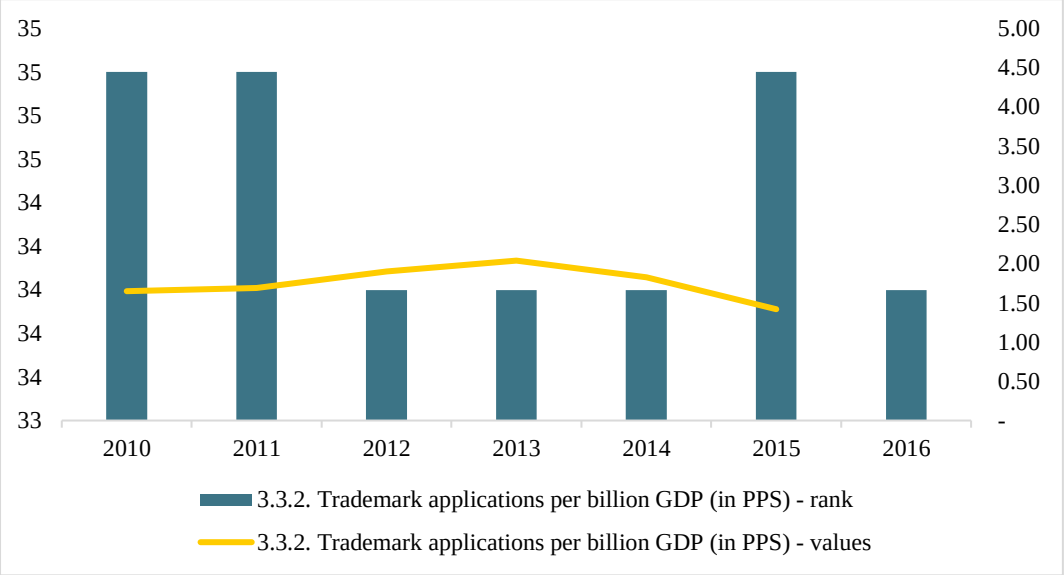
Figure 6-20 Patent Applications, FYR Macedonia, 2010-2016



Source of data EIUS (2017)

In the service sector, the *trademark* has a strong significance. It provides the origin of the manufactured service, guarantees the consistency of the quality based on the commitment of the company's buyers, and it is a certain form of communication i.e. is the basis for publicity and advertising. For the former Yugoslav Republic of Macedonia (Figure 6.21), this indicator is below 2.0, which ranks it at 34/35 place in Europe. With over 30 applications are Cyprus, Malta, and Luxembourg, while countries with the lowest numbers of applications are Turkey, Ukraine, The former Yugoslav Republic of Macedonia, and Romania, with a value below 2.5.

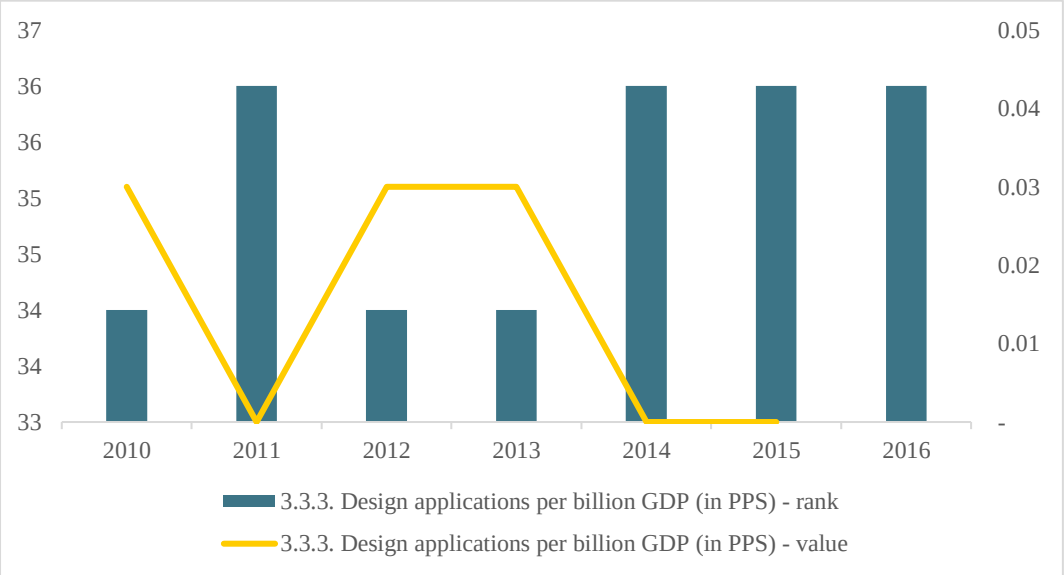
Figure 6-21 Trademark applications FYR Macedonia, 2010-2016



Source of data EIUS (2017)

The *design* is the outer appearance of the product. In the EU, Malta and Luxembourg hold the higher positions with values above 20, while the former Yugoslav Republic of Macedonia is ranked last with a close to zero value (Figure 6-22).

Figure 6-22 Design applications FYR Macedonia, 2010-2016



Source of data EIUS (2017)

6.5 Impact from the innovation activities

The influence of the innovative activities covers the analysis of the impact on employment and the impact on sales through appropriate indicators.

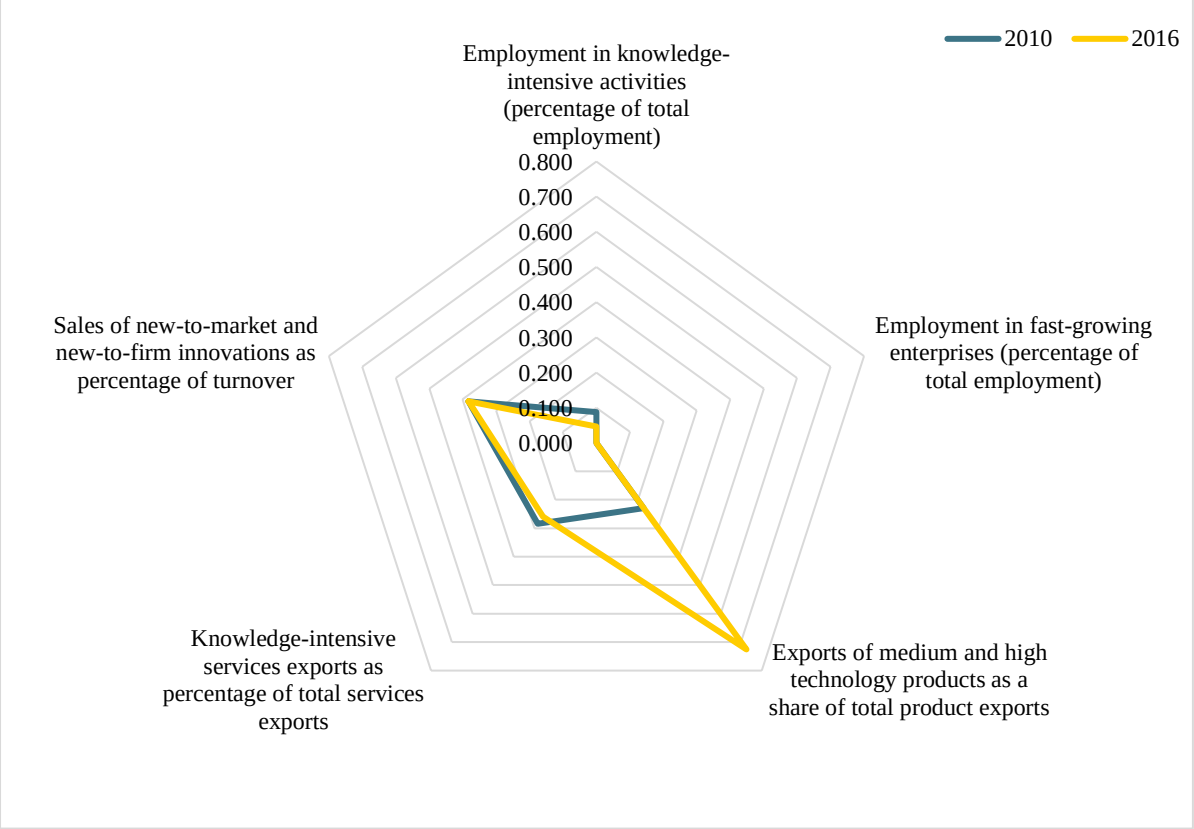
In the *Employment impact* section, the following indicators are considered:

- Employment in knowledge-intensive activities
- Employment in fast-growing enterprises

In the *Sales Impact* section, the following indicators are considered:

- Exports of medium and high technology products
- Knowledge-intensive services exports
- Sales of new-to-market and new-to-firm innovations

Figure 6-23 Innovation Impact, FYROM EU normalized values, 2010-2016



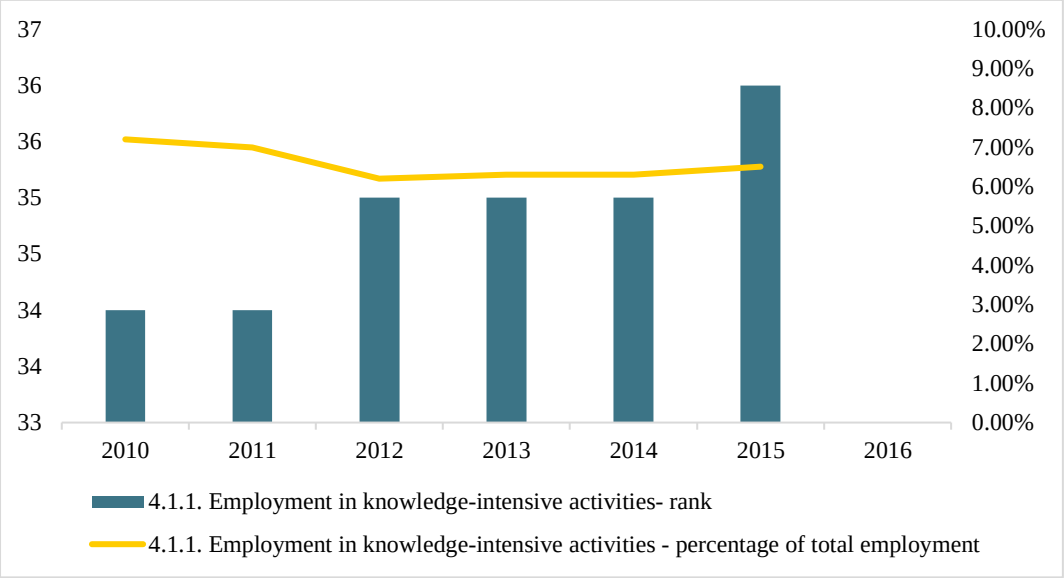
Source of data EIUS (2017)

6.5.1 Employment impact

The former Yugoslav Republic of Macedonia composite indicator on the impact of innovation activities on the employment in the country has a value of 8.7. The former Yugoslav Republic of Macedonia is ranked at the last place in EU in 2017. All neighboring countries except Albania for which there is no data, perform better.

In the group of services based on knowledge-intensive activities, the services are directly delivered to the users (telecommunications for example), which are the inputs of innovative activities of other companies in all sectors of the economy. The indicator for employment in knowledge-intensive activities for the country is shown in Figure 6-24.

Figure 6-24 Employment in knowledge-intensive activities FYROM, 2010-2016



Source of data EIUS (2017)

The average value of this EU indicator is 14.1%, and high-value countries, with over 20%, are Israel, Luxembourg, Switzerland, Iceland and Ireland. The former Yugoslav Republic of Macedonia, with a value of 6.5% is ranked last, followed by Turkey and Romania.

The indicator for *employment in fast-growing enterprises* in the innovation sector identifies the country's capacity for fast transformation of its economy to meet the new needs and gain advantage while meeting the newly announced demand. The value of this indicator in the EU is 4.8%, however, in Ireland, Hungary, Slovakia, Malta and the UK the values are close and over 7%. For many countries (Greece, Iceland, Israel, Serbia, The former Yugoslav Republic of Macedonia and others) there is no data.

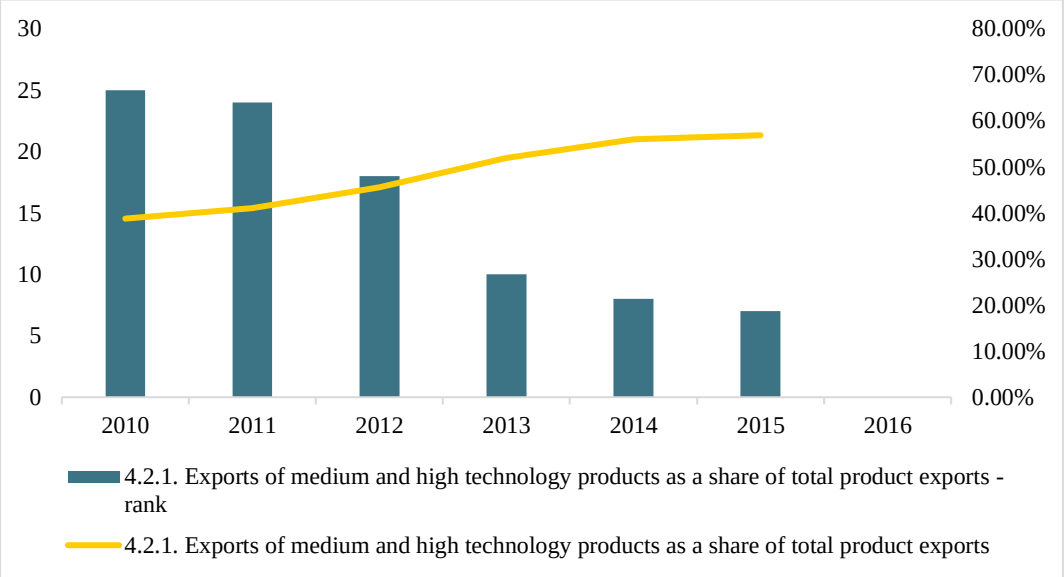
6.5.2 Sales impact

The former Yugoslav Republic of Macedonia composite indicator on the impact of innovation activities on sales has a value of 70.6. Cyprus, Greece and Bulgaria are all ranked worse than in 2017, while there is no data for Albania.

The indicator for *exports of medium and high technology products* (

Figure 6-25) measures the technological competitiveness i.e. the ability of companies to commercialize the results of the R&D and innovations at the international markets. This indicators also points towards the specialization for certain products in the country.

Figure 6-25 Exports of medium and high technology products FYROM, 2010-2016

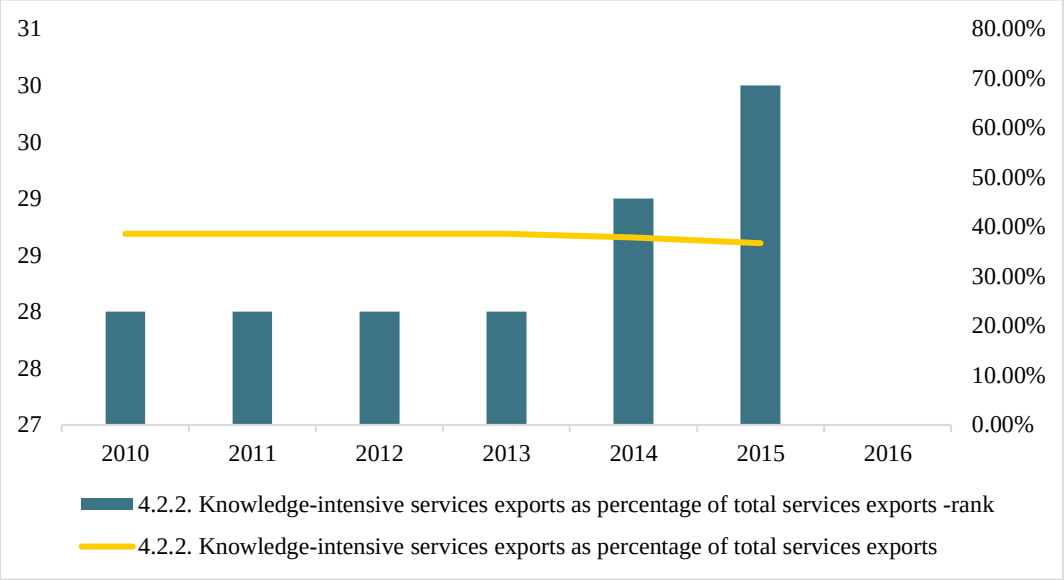


The export of medium and high technology products in the EU covers 56% of the total export of products. For Hungary, Germany, Slovakia and the Czech Republic this percentage is above 60%. The former Yugoslav Republic of Macedonia is with a value of about 60%, which is above the EU average (

Figure 6-25), while Iceland, Norway and Greece are at the bottom of the list with an average of below 25%. This high rank of the former Yugoslav Republic of Macedonia in recent years, is attributed to the high-tech FDIs and this trend is expected to continue.

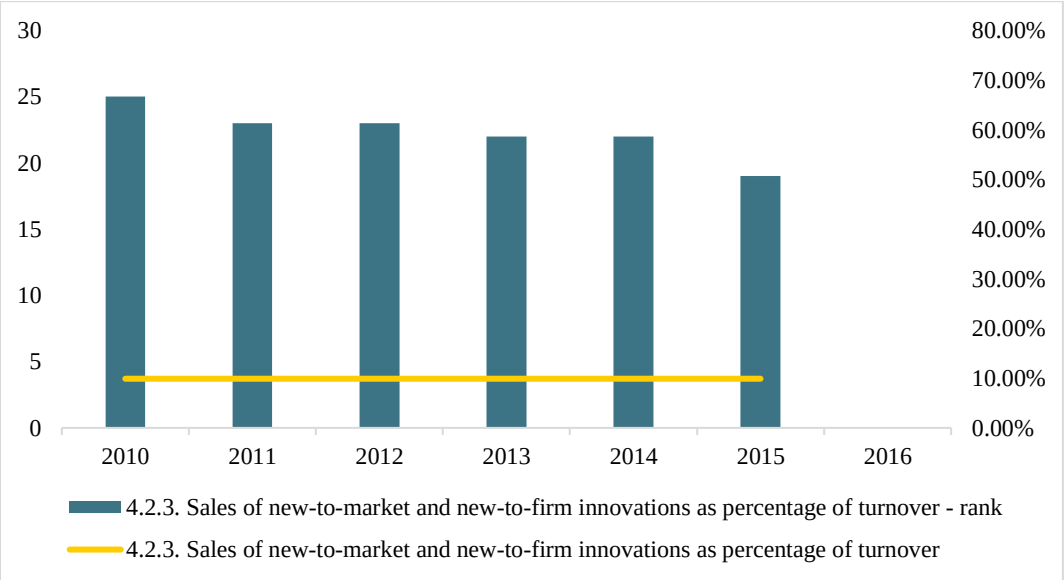
The export of knowledge-intensive services measures the competitiveness of the service sector. The indicator reflects the ability of the economy, as a result of innovation, to export high value-added services and successfully engage part of the global value chain in knowledge-based industries. In the EU, the average value is 69%, while in Ireland, Luxembourg, the UK, the Netherlands, Norway and Sweden, the value is over 75%. The former Yugoslav Republic of Macedonia, with a value of 28-30% (Figure 6-26) occupies the 28-30 place, while Croatia and Lithuania, with less than 25%, are at the last and penultimate place.

Figure 6-26 Exports of knowledge-intensive services FYROM, 2010-2016



The *sales of new-to-market and new-to-firm innovations* measure the turnover of new or significantly improved products. This indicator measures the creation of new state-of-the-art technologies (new for market products) and diffusion of these technologies (new for the firm products). The EU average value is 13.4%, while in the UK, Switzerland and Slovakia the value is close to 20%. In Ukraine, Malta, Cyprus, Bulgaria and Croatia, this value is below 5%. The former Yugoslav Republic of Macedonia, with a value of 9.9%, is ranked 19th.

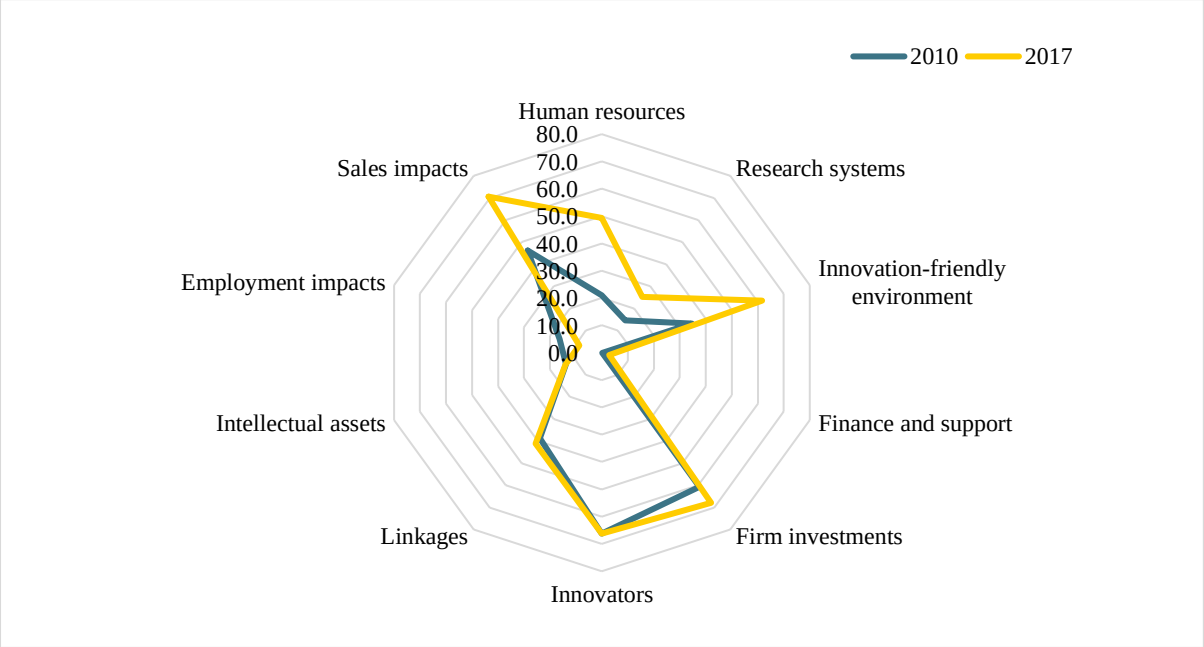
Figure 6-27 Sales of new-to-market and new-to-firm innovations FYROM, 2010-2016



6.6 The former Yugoslav Republic of Macedonia - a Moderate Innovator

The difference in the normalized EU IS values for each of the composite indicators of the Innovation Potential from 2010 to 2017 for The former Yugoslav Republic of Macedonia, indicate the the country is constantly **a moderate innovator** and at the bottom group of EU countries when it comes to innovation. ***However, in values relative to the EU performance, the country has made a remarkable progress on majority of the composite indicators.***

Figure 6-28 Innovation Potential relative to EU, former Yugoslav Republic of Macedonia, 2010-2017



7 Strengths and Weaknesses

Findings indicate that in the researched period, the country has been a remarkable innovator in governance. The many innovations in governance, however, had small impact on the macro and micro determinants of innovations.

In the period 2010-2017, the country made a progress in two areas which are considered its strengths: (1) Exports of medium and high technology products; and (2) Introduction of a low taxation system. At the same period, there has been a remarkable improvement in the following areas which emerged as weaknesses:

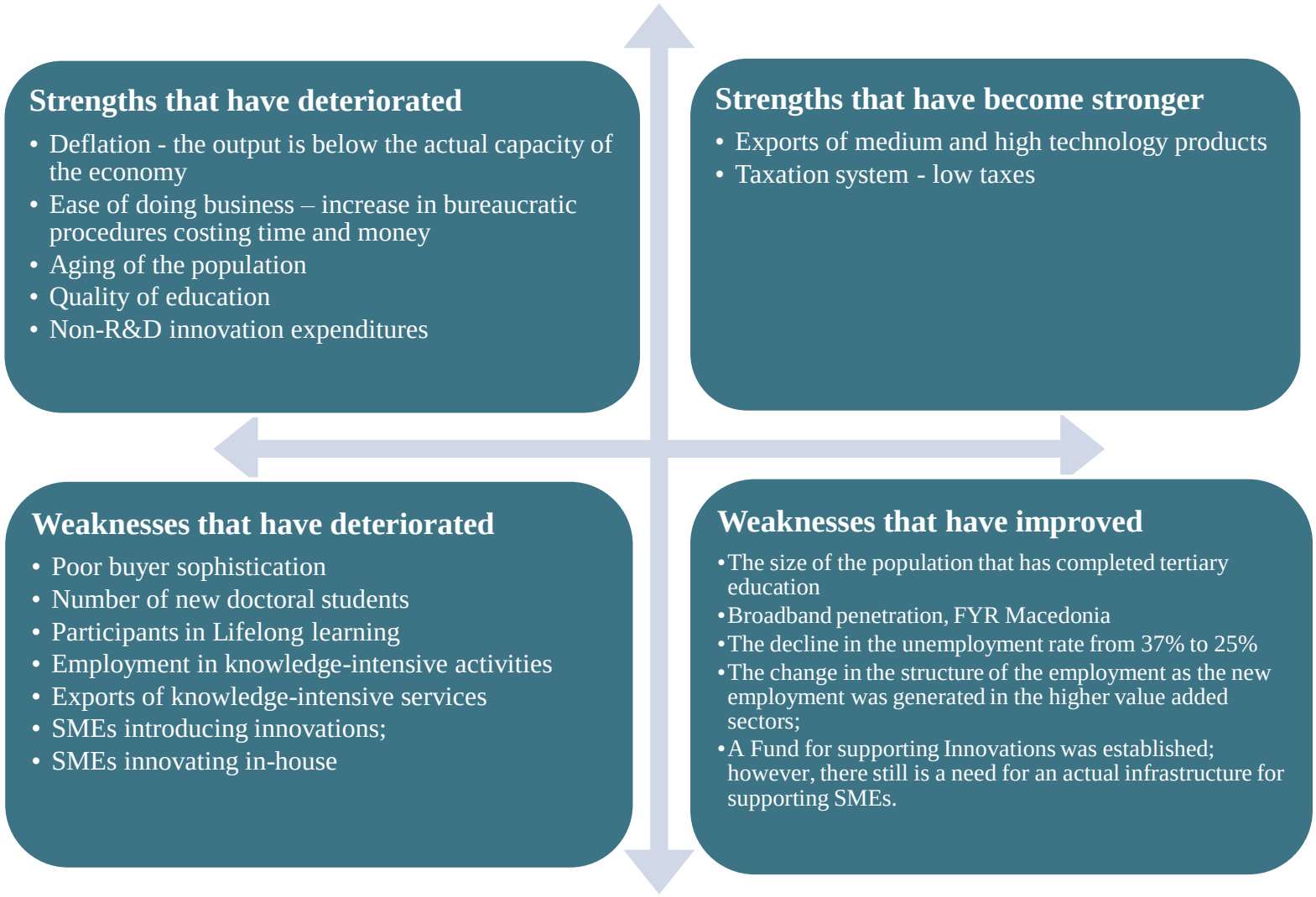
- An increase in the size of the population (25-34 years) with completed tertiary education;
- An increase in the rate of broadband penetration;
- A decline in the unemployment rate from 37% to 25%;
- A change in the structure of the employment as the new employment was generated in the higher value added sectors;
- A Fund for supporting Innovations was established; however, there still is a need for an actual infrastructure of BSOs, Centres for TT and similar for supporting SMEs.

Unfortunately, the period marks a deterioration in country's previous strengths, mainly:

- The low inflation in 2015 became a deflation, and indicates that the output is below the actual capacity of the economy;
- The strong ranking on the Doing Business Report deteriorated in 2017 due to increase in bureaucratic procedures;
- The trend of ageing of the population accompanied with a decrease in the quality of education among the active workforce negatively affects the available human capital;
- There is a decline in the non-R&D expenditures of the businesses due to the poor investment activities in the past couple years.

The period also marks deterioration in the following weaknesses:

- Poor buyer sophistication which decreases the demand for innovative and quality products and locks SMEs in price wars with cheaper and low quality imported products;
- Declining trend of new doctoral students which despite growth in absolute numbers is declining in relative numbers and indicates that the nation is not generating researchers at the required pace. The low number of doctorates in the area of natural sciences and engineering is an additional burden;
- Declining trend of SMEs investing in Lifelong learning for their employees;
- Declining employment in knowledge-intensive activities;
- Declining exports of knowledge-intensive services;
- Decrease in absolute numbers of SMEs working in the innovative sectors of the economy and which have introduced product, process, marketing or organizational innovations along with SMEs innovating in-house..


Strengths that have deteriorated
• Deflation - the output is below the actual capacity of the economy
• Ease of doing business – increase in bureaucratic procedures costing time and money
• Aging of the population
• Quality of education
• Non-R&D innovation expenditures
Strengths that have become stronger
• Exports of medium and high technology products
• Taxation system - low taxes
Weaknesses that have deteriorated
• Poor buyer sophistication
• Number of new doctoral students
• Participants in Lifelong learning
• Employment in knowledge-intensive activities
• Exports of knowledge-intensive services
• SMEs introducing innovations;
• SMEs innovating in-house
Weaknesses that have improved
• The size of the population that has completed tertiary education
• Broadband penetration, FYR Macedonia
• The decline in the unemployment rate from 37% to 25%
• The change in the structure of the employment as the new employment was generated in the higher value added sectors;
• A Fund for supporting Innovations was established; however, there still is a need for an actual infrastructure for supporting SMEs.

8 Conclusions and Recommendations

There are several ways a country can positively affect the innovative potential of its economy, i.e. innovation capacities of the business sector. The macro determinants of innovation cover the strength of the economy, the macro stability, the favorable taxation and regulation, along with the focus of the society on improving the quantity and quality of education and the increase of the public investments in R&D. The micro determinants of the innovation are recognized at the level of the organizations, i.e. companies, the investments in the human capital, the private investments in innovation activities and technology transfer and collaboration with the R&D community.

The analysis indicates that the former Yugoslav Republic of Macedonia has been a remarkable innovator in governance in the period 2010-2016. The many innovations in governance, however, had small impact on the macro determinants. In general, the reduction of the unemployment rate, the changes in the structure of the employment along with the increase in the exports of the high technology products driven by FDIs, hold the potential for further spillovers and improvements in the innovation capacities of the economy. The changes in the micro determinants had more immediate impacts.

Intermediate recommendations for the forthcoming period cover the following actions:

1. Immediate actions have already been taken by the new Government to counter fight the effects of recent deflation, as it can limit the growth of the economy. The Government increased the minimal wage which subsequently affected the flow of money in the economy; at the same time the additional tariffs placed on the diesel fuel are expected to increase the prices of commodities.

2. The continuation of the active measures for supporting self-employment indicate a commitment of the new Government to continue on the course of supporting the entrepreneurship as a viable option for career especially among the young people. However, these measures mainly support the necessity driven entrepreneurship. According to GEM (2010-201), the former Yugoslav Republic of Macedonia is a leader in the area of necessity driven entrepreneurship, which is not very supportive for innovations. This is why the current measures for supporting start-ups and want to-be entrepreneurs need to increase in scope and cover the employed persons along with the unemployed, in order to stimulate the opportunity entrepreneurship.

3. The 2017 trend of increased bureaucracy in the regulative environment for doing business needs to stop. As the majority of businesses in the country are SMEs, the legal and regulatory environment of doing business should reflect their needs. There are already significant government initiatives in this area which main objective is to create an SME favorable regulatory environment i.e. the new Strategy for SMEs.

4. National markets need to be better regulated in terms of the quality of products and services, or the regulation needs to be enforced in the proper manner in order to increase the buyer sophistication and positively affect the demand for innovations in the products and services.

5. The current Government measures as outlined in the Strategy of Innovations 2012-2010 are focused on improving the collaboration between research institutions and business. The main question is whether this is enough. As indicated by EUIS (2017), the former Yugoslav Republic of Macedonia researchers have low participation in research projects, fail to publish research findings, and have poor collaboration on international research projects. There needs to be a strategic approach in the area of higher education, research and development and in the area of innovation activity. Measures are required in order to increase and keep the available human capital as doctorate holders specifically in the area of sciences and engineering where the country lags behind EU and many other countries in the world. The lack of available human resources as researchers and engineers affects the absorptive capacity of businesses and also negatively affects the generation of new knowledge in Universities.

6. The National Innovation-eco system is relatively weak in terms of actual infrastructure for supporting SMEs in the area of innovations. The establishment of the Fund for supporting Innovations in 2013 is a large accomplishment; however, it is not an infrastructure. There is a need for establishment of Centers for technology transfer, Technological Parks and Centers of excellence for supporting innovations.

7. There is a growing need for continuous reforms in the adult education along with the increase of the offer of education opportunities for all categories of people (employed and unemployed) in order to increase the capacity of SMEs to absorb new technologies, generate innovations and grow. There is a need for systematic support of SMEs in this regard, and it is important that the civic sector along with the research and education providers are proactively engaged in the process.

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Appendix 1. Structural variables – Statistics

Table A1.1. Economy, Growth and Macro economy								
Indicator name		**Value**						
GDP & Macroeconomic stability		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	GDP growth rate (%)	3.40%	2.30%	-0.50%	2.90%	3.60%	3.8% p*	2.4% p
2	Debt (millions EUR)	4,105.70	4,846.60	5,171.70	5,219.70	5,992.30	6,290.50	7,216.60
3	Inflation (%)	1.6%	3.9%	3.3%	2.8%	-0.3%	-0.3%	-0.2%
4	Interest rate (%)	3.8%	2.2%	2.1%	1.9%	1.8%	1.0%	
Composition of employment - Numbers		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Agriculture & Mining	125,561	126,209	118,259	134,271	134,816	132,807	126,719
2	Manufacturing	122,355	125,206	126,892	131 542	132,937	137,151	137,615
3	Utilities & Construction	61,320	63,031	61,784	67,633	69,215	71,486	75,295
4	Services	190,172	187,748	194,788	199,687	207,060	210,045	220,191
5	Public administration	138,446	142,888	148,831	145,707	146,008	154,502	163,730
Composition of employment (%)		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Agriculture & Mining	19,7%	19,6%	18,1%	19,8%	19,5%	18,8%	17,6%
2	Manufacturing	19,2%	19,4%	19,6%	19,4%	19,3%	19,4%	19%
3	Utilities & Construction	9,6%	9,8%	9,5%	10%	10%	10,1%	10,4%
4	Services	29,9%	29,1%	30%	29,5%	30%	29,8%	30,5%
5	Public administration	21,7%	22,2%	22,9%	21,5%	21,2%***	21,9%	22,6%
Trade balance (millions Eur, exports and imports)		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Trade balance (millions EUR, exports and imports)	-1,602.20	-1,838.00	-1,946.70	-1,748.10	-1,757.90	-1,713.60	-1,777.40

Source: Statistical Office of RM (2017) *estimation.

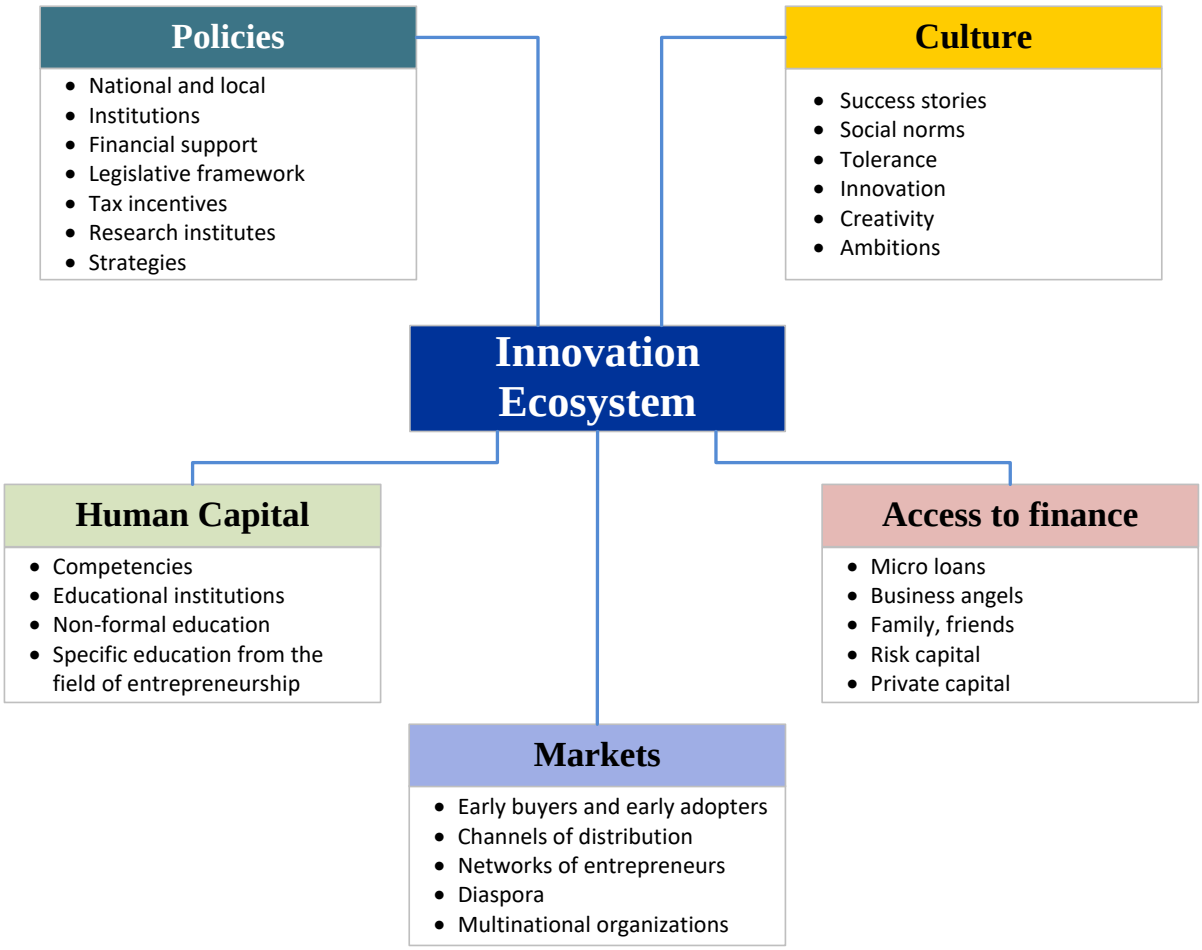
Table A1.2. Business Environment - Structure of the private sector (trend analysis)								
		VALUE						
Number of SMEs		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Micro enterprises (0-9 employees)	70032	67294	68211	65014	64187	63590	64782
2	SMEs (10-249 employees)	5262	5639	6012	6067	6266	6318	6504
3	Large enterprises (250+ employees)	203	185	201	209	206	231	233
4	Share of foreign controlled enterprises							
Percentage %		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Micro enterprises (0-9 employees)	93%	92%	91,6%	91,2%	90,8%	90,6%	90,5%
2	SMEs (10-249 employees)	6,9%	7,7%	8,1%	8,5%	8,8%	9%	9,2%
3	Large enterprises (250+ employees)	0,2%	0,2%	0,2%	0,3%	0,3%	0,3%	0,3%
4	Share of foreign controlled enterprises							
R&D activities of the business focused on top R&D spending enterprises		**VALUE**						
		2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Average number per 10mln population	none	none	none	none	none	none	none
2	Average R&D spending (mln EUR)	none	none	none	none	none	none	none
3	Enterprise births (10+ employees)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	Enterprise births (number)	11595	9150	8329	6805	7161	6877	
Buyer Sophistication (1, worst - 7, best)		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	The degree of Buyer sophistication measures on a scale from 1 (low) to 7 (high)	2,89	2,69	2,34	2,51	2,82	2,59	2,92
Source: Statistical Office of RM (2017)								

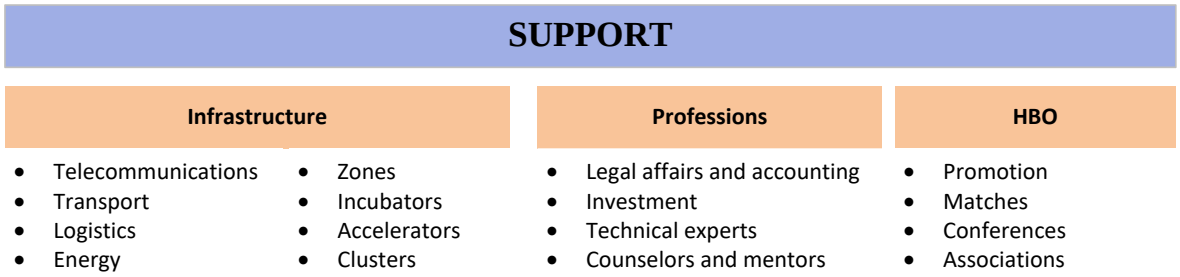
Table 1.3. Socio-Demographic Environment								
Indicators		**Value**						
		2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	GDP per capita PPS (EUR)	3,250.30	3,376.30	3,409.30	3,532.00	3,610.00	3,735.00	
2	GDP growth (%)	3.4	2.3	-0.5	2.9	3.6	3.8[p]	2.4[e]
3	Population size (millions)	2,052,722	2,057,284	2,059,794	2,062,294	2,065,769	2,069,172	2,071,278
4	Change in population (%)	2.2%	1.2%	1.2%	1.7%	1.6%	1.0%	1.2%
5	Population aged 15 - 64 (number)	1,453,499	1,459,766	1,462,995	1,462,445	1,460,355	1,458,089	1,455,198
6	Population density (persons per km2)	82,5	82,6	82,7	82,8	83,0	83,1	
7	Degree of urbanisation (%)	2011 - 2015 average 57%						

	Movements in the active labour force	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
1	Age (15-64) (%)	64.2%	64.2%	63.9%	63.9%	65.3%	64.9%	64.5%
2	Gender (%)							
3	Total (%)	64.2%	64.2%	63.9%	63.9%	65.3%	64.9%	64.5%
	Men (%)	77.7%	76.8%	76.6%	76.6%	77.7%	77.5%	77.8%
	Women (%)	50.4%	51.2%	50.8%	50.8%	52.5%	52.0%	50.8%

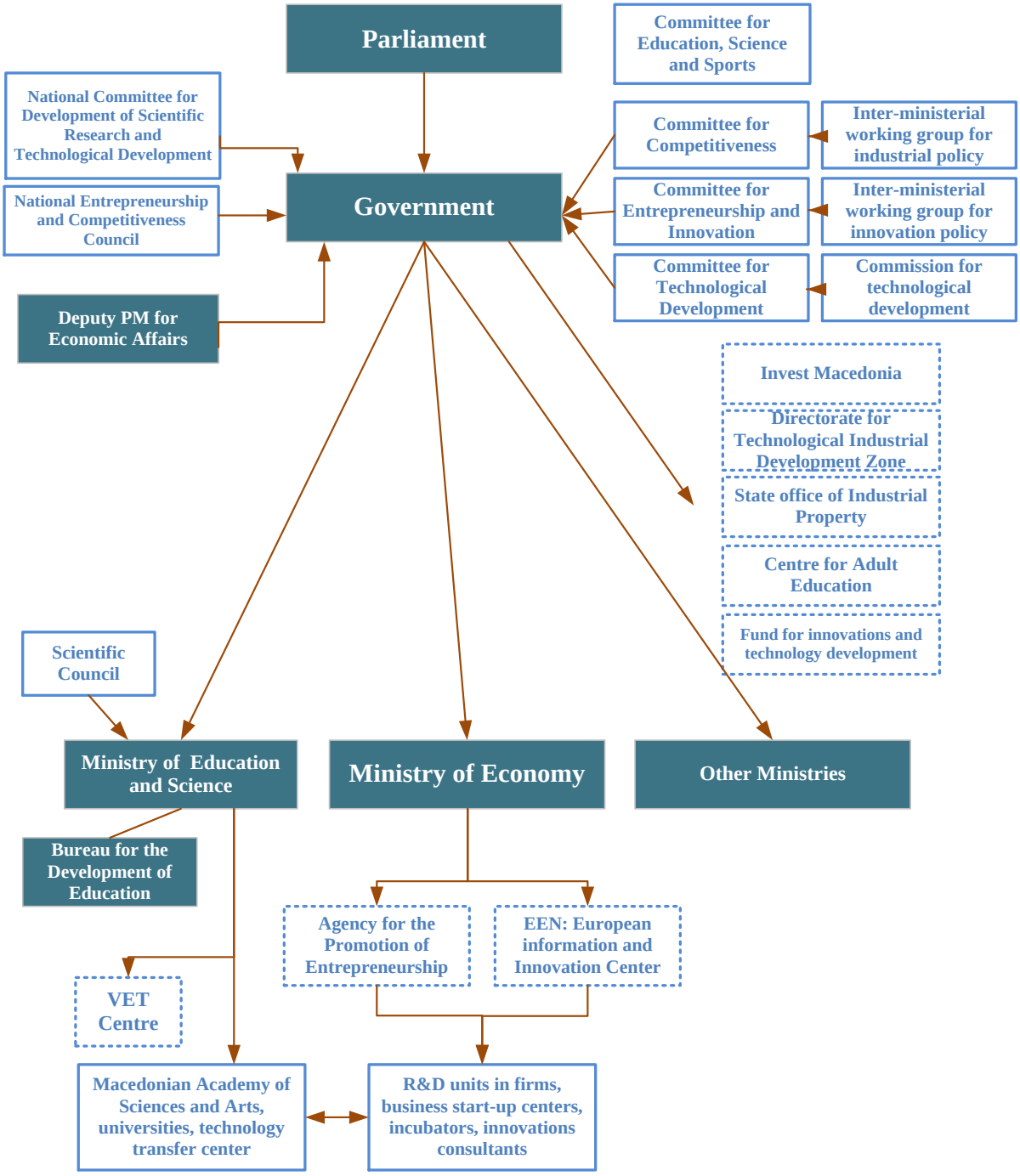
4	**Employment status (numbers)**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
	- employed	637,855	645,085	650,554	678,838	690,188	705,991	723,550
	- unemployed	300,439	294,963	292,502	277,219	268,809	248,933	225,049

Appendix 2. Stakeholders in the Eco-system that supports the development of the Innovations





Governance structure of the national innovation system



National Study

Interreg
Balkan-Mediterranean
INNOPLATFORM

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