

2017

National Study of the Business Environment



**National Study of the Business Environment
with a focus on the National Innovation Potential
in Republic of Bulgaria**

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Executive Summary

The present survey contains the basic results of the conducted National Study of the business environment for Republic of Bulgaria with focus on the national innovation potential. This potential plays a key role in increasing the competitive advantage of countries in their economies. The applied methodology is the one, developed by the EIS 2017 Framework and containing the following four specific categories of factors: environmental structure, investment climate, existing innovation activities of companies and innovation influence. The study examined important topics like macroeconomic stability, economy and growth, business enabling and socio-demographic environment and innovation potential and the derived impact.

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1 Introduction - Bulgaria

1.1 Location, Population and Political System

Bulgaria is positioned in both the northern and eastern hemispheres and is located in the southeastern region of the European Continent on the edge of the Black Sea. Bulgaria is bordered by the countries of Greece, Macedonia, Romania, Serbia, and Turkey, as well as the Black Sea.

The land that gave birth to the legendary Orpheus and Spartacus, Bulgaria is a country with a long, tumultuous and fascinating history. It has been invaded, conquered and settled by Greeks, Scythians, Romans, Byzantines and Turks, all of whom left their indelible marks on the landscape. Bulgaria's medieval 'Golden Age', when the Bulgar Khans ruled over one of the largest empires in Europe, was bright but brief, while 500 years of subsequent, Turkish domination isolated the country from the rest of Europe. More recently, Bulgaria spent four decades as a totalitarian Soviet satellite, again leaving this small Balkan nation in the shadows as far as the Western world was concerned. It's no wonder, then, that Bulgarians are so passionate about preserving their history and their culture, which has survived so often against the odds. In the last years of the 20th century Bulgaria began opening up, and is one of the newest members of the EU. short history, political system, and population, the main economic parameters of the nation along with the main challenges in the area of competitiveness and innovation.

Sofia is the capital city of Bulgaria with a population of 1,152,556, and is the political center of Bulgaria, which is considered a Republic, and home to its Ceremonial head of state.

The politics of Bulgaria take place in a framework of a parliamentary representative democratic republic whereby the Prime minister is the head of government, and of a multi-party system. Executive power is exercised by the government. Legislative power is vested in both the government and the National Assembly. The Judiciary is independent of the executive and the legislature. After 1989, after forty-five years of single party system, Bulgaria had an unstable party system, dominated by democratic parties and opposition to socialists - the Union of Democratic Forces and several personalistic parties and the post-communist Bulgarian Socialist Party or its creatures, which emerged for a short period of time in the past decade, personalistic parties could be seen as the governing Simeon II's NDSV party and GERB party. Today, the president is Rumens Radev

Bulgaria has generally good freedom of speech and human rights records as reported by the US Library of Congress Federal Research Division in 2006, while Freedom House listed it as "free" in 2011, giving it scores of 2 for political rights and 2 for civil liberties. However, in 2014, there is some concern that the proposed new Penal Code would limit freedom of the press and assembly, and as a consequence freedom of speech.

1.2 National Economy and Competitiveness

The economy of Bulgaria is still recovering from the adverse effects of the economic crisis. The process is slow and is influenced by various growth factors. There are positive trends in terms of business activity, domestic consumption, and foreign trade balance the capital structure of business and intercompany indebtedness (supported by the still cautious banking sector policies) but precise levels have not been reached yet. Over the last ten years, Bulgaria has had economic growth which was above the average EU levels (66 % and second place after Slovakia). In addition, the country's share in the European economy has increased – by 50 % between 2006 and 2015. Despite this growth, however, Bulgaria remained last in the European ranking with EUR 6,300 by the GDP per capita indicator (the average EU-28 is EUR 28 800), which is decisive for the low comparative purchasing power of households. Data about 2015 show that despite various limiting factors Bulgaria has the potential for positive shifts. The country reported GDP growth of 3 %, which– suggests that further sustainable growth can be expected.

Notable differences are a larger share of employment in Agriculture & Mining and in Manufacturing, a smaller share of employment in High and Medium high-tech manufacturing and in Knowledge-intensive services.

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 country, with an aim to provide good starting point in identification of the main strength and weakness of the country in this area with specific recommendations for their improvement in the future. The study is financed by the EU and the funds of the member countries under the EU Interreg Balkan Mediterranean Program and the project InnoPlatform.

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 strength and weakness over specific period of time (2010-2013) in order to understand whether there have been improvements or deterioration and where;'

- 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

Governments are increasingly making innovation a key issue on policy agendas today, recognizing its potential to promote economic growth and address social and environmental challenges. However, many countries face significant innovation “gaps”, resulting from a variety of binding constraints. Tracing development paths that help overcome these constraints is an important task of innovation policy.

What is innovation and why is it important?

- An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations (OECD/Eurostat, 2005).
- Innovation plays a key role in the economy and society by contributing to growth and jobs and helping address social and environmental challenges.
- Innovation is important for growth at all stages of development, specifically by creating and diffusing new technologies; different types of innovation play different roles at various developmental stages.
- Innovation may be characterized by several dimensions including (1) the degree of novelty, (2) the type of innovation (product and process innovation), (3) the impacts of radical and incremental innovation and (4) the source of innovation (technological and non-technological innovation).
- The notion of what innovation is and what role policies to encourage innovation can play has changed considerably over the past decades.

This is why the innovations are a very important element of national policies of many nations, including Bulgaria.

2.3 Basic Methodology

The core methodology used in developing the National Studies of the business environment focused on 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) **Environmental structure**, 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 activities (R&D) and innovation.
- 3) **Existing innovation activities of companies**, covers factors which determine the behavior of innovators, the existence of business connections and the protection of intellectual property and intellectual assets.
- 4) **Innovation influence** covers the determinants as the impact on employment and the impact on sales through the use of appropriate indicators.

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

Data source

(Predominantly from)

- Eurostat,
- National statistical offices (<http://www.nsi.bg>)
- Infostat (part of Bulgarian national statistic institute)
- World Bank
- Bulgarian National Bank (BNB)

3 Economy, Growth, and Macroeconomic stability

Bulgaria has undergone a significant transformation over the past three decades. It has changed from a highly centralized, planned economy to an open, market-based, upper-middle-income economy securely anchored in the EU.

In its initial transition, the country went through a decade of slow economic restructuring and growth, high indebtedness, and a loss of savings.

However, the advancement of structural reforms starting in the late 1990s, the introduction of the currency board, and the expectations of EU accession unleashed a decade of exceptionally high economic growth and improved living standards.

The economy of Bulgaria is still recovering from the adverse effects of the economic crisis. The process is slow and is influenced by various growth factors. There are positive trends in terms of business activity, domestic consumption, and foreign trade balance the capital structure of business and intercompany indebtedness (supported by the still cautious banking sector policies) but precise levels have not been reached yet. Over the last ten years, Bulgaria has had economic growth which was above the average EU levels (66 % and second place after Slovakia). In addition, the country's share in the European economy has increased – by 50 % between 2006 and 2015. Despite this growth, however, Bulgaria remained last in the European ranking with EUR 6,300 by the GDP per capita indicator (the average EU-28 is EUR 28 800), which is decisive for the low comparative purchasing power of households. Data about 2015 show that despite various limiting factors Bulgaria has the potential for positive shifts. The country reported GDP growth of 3 %, which – suggests that further sustainable growth can be expected.

Notable differences are a larger share of employment in Agriculture & Mining and in Manufacturing, a smaller share of employment in High and Medium high-tech manufacturing and in Knowledge-intensive services.

3.1 Growth, Inflation and Macroeconomic Stability

Data about 2015 show that despite various limiting factors **Bulgaria has the potential for positive shifts**. The country reported **GDP growth of 3 %**, which - although being nearly ten times lower than, for example, the growth of the Irish economy (26. %) – suggests that further sustainable growth can be expected. **Bulgaria has positioned itself as a leader in the Balkans in the ranking of the Boston Consulting Group on sustainable economic development and wellbeing** based on a set of economic indicators (income, economic stability and employment); investment in education, healthcare and infrastructure, and sustainable development (social inclusion and environment).¹

The recovery in 2014 (3%) stayed constant in 2016 (3%), in both years driven by an increase in domestic demand. Forecasts announce 2.8% growth in 2017, reflecting uncertainty

regarding the political situation and the macroeconomic fundamentals domestically and in the EU. Over the last ten years, **Bulgaria has had economic growth which was above the average EU levels** (66 % and second place after Slovakia). In addition, the country's share in the European economy has increased – by 50 % between 2006 and 2015. Together with Lithuania and Latvia, Bulgaria reported the best structural change on this indicator, against a % fall in the share of the Greek economy and the decrease in countries like Portugal, Spain, France, Italy, the Netherlands.

Figure 3-1 GDP Growth and Inflation

Indicators	Value						
	2010	2011	2012	2013	2014	2015	2016
GDP growth (%)	1.3%	1.9 %	0.0 %	0.9 %	1.3 %	3.6 %	3.9 %
Debt (millions Eur)	5,856.1	6,284.2	7,004.9	7,147.0	11,531.8	11,772.3	13,969.8
Inflation (%)	2,4%	4,2%	3,0%	0,9%	-1,4%	-0,1%	-0,8%
Interest rate (%)			0,11%	0,02%	0,03%	1.5%	

In Bulgaria –Figure 3-1. The inflation defines the macro stability of the economy. In 2011, the inflation rate was 4,2 %, in 2012 it decreased to 3.0%, and in 2013 it was 0,9 %. In 2014 it was even -1.4 %. There are negative values, also close to zero in 2015 and 2016.

In 2015, the main contribution to the growth of the Bulgarian economy in 2007 .3% have exports that have actually increased by 7.6%. For a second consecutive year, however, domestic demand also exists a positive contribution, as it is also private consumption and investment (both components are 0.5 pt. contribution) Retrospective in the years of high economic growth has been noted and the high contribution of the domestic demand due to a favorable economic environment, increasing employment and income and deepening employment financial intermediation. In recent years, however, it is not observes a clear trend towards the sources of growth. There is, however, a marked trend towards accelerating the pace GDP growth. Daily consumption is a key factor for change domestic demand due to its high share, while the contribution of gross fixed capital formation is mainly due to the high its growth. The latter is due to both high levels of absorption of European funds at the end of the last programming period period, as well as the intrinsic volatility of the investment. Consumption show two trends Procyclicality (ie its contribution is higher with high years economic growth) and dependence on the political cycle the country. Finally, we must note the change in stocks, whose dynamics does not show a strong correlation with any of the others components of end use, but have made a significant contribution to that growth in some years.

Bulgaria remains an open economy (in terms of the share of foreign trade in GDP), strongly interlinked with the rest of the world and hence subject to global market trends. A major trading partner is the European Union (mainly Germany, Italy and Romania), which means a similar economic cycle and a risk of multiplying the adverse effects of market

fluctuations. Outside the EU and in search of external markets for diversification the country maintains intensive trade with Turkey and China.

3.2 Structure of the Economy

Since 2013 there has been a gradual acceleration of economic activity in Bulgaria. Although GDP growth is still significantly lower than the rate before 2008, he reached 3% in 2015, supported mainly by the positive ones trends in the external sector. In 2016, however, one can expect some slowdown in the growth rate of GDP. Provision the positive development at the end of 2015, in 2016 we can we expect acceleration of final consumption. In the third in the fourth quarter of last year, consumption fell Focus topic: The agrarian sector as a factor for the economic development of Bulgaria 25 growth rates of respectively 1.8 and 2.4% on an annual basis after falling during the first half of the year. Improvements to the labor market can reasonably be expected in 2016. A final consumption increase of about 2%. However, investments will be lower growth rates due to the delayed start of operations programs of the current EU programming period (2014-2020).The contribution of the external sector will also decline significantly, by the growth of exports will still remain slightly higher than that of imports, and the contribution of net imports to economic growth will be low but positive.

By economic sectors in 2015 the greatest impression makes the positive contribution of the corrections that have grown by 12.7% in real terms. This increase is due to both the growth of excise and VAT revenues and the negative VAT inflation in the country. Industry and real estate have a contribution of 0.6 and 0.4 percentage points respectively. In 2015, only the agricultural, forestry and fisheries have a negative contribution to growth. Through in recent years, three sectors have been relatively stable growth rates - professional and other activities, trade, transport and hotel and information and telecommunications

Figure 3-2 Comparative employment structure in different sectors (2010-2015)

Structure of the economy	
Composition of employment, average 2010-15	
- Agriculture & Mining (NACE A-B) (%)	4.12 %
- Manufacturing (NACE C) (%)	21.0 %
of which High and Medium high-tech (%)	%
- Utilities and Construction (NACE D-F) (%)	8.5%
- Services (NACE G-N) (%)	41,5 %
of which Knowledge-intensive services (%)	%
- Public administration, etc. (NACE O-U) (%)	25.0%

3.3 Trade Balance

In 2015, Bulgaria's exports record a record as has reached € 29 billion³, forming a growth of over € 1 billion compared to 2014. Exported goods grew by 2015 its physical volume by 7.6% compared to 2014. Positive development the export in 2015 is accompanied by a slight increase investment, retention of final consumption in Bulgaria and economic revival in the euro area. Total exports of goods to EU countries grew by 7.9% and increased to third countries negligible - by 0.6%. At the heart of this increase is growth of exports to Germany, Egypt, Italy, Romania and others. Like favorable trends can be high dollar levels and long-established low oil prices. These factors create the prerequisites for the release of financial resource producers to buy more raw materials as well creates favorable conditions for exporters in euro. Here it is successful Bulgaria fits with its traditional exports of raw materials. At the same time export to Russia, Turkey, Singapore and other countries drops. The decline in exports to Russia is primarily a consequence of the international political crisis between Russia and the EU difficulties in the federation's economy. To reduce the exports to third countries matter and continue throughout 2015 trend to recover and increase exports to the EU and the Balkan region. And last but not least note that a significant contribution to the negative values of exports to third countries also has global deflation major commodity groups, such as energy resources and raw materials, food and beverages. These groups of goods have a very large share in exports and imports of Bulgaria Imports in 2015 are also characterized by an increase. It marks a growth of nearly EUR 0.5 billion or 4.4% compared to 2014 roughly constant domestic consumption, the increase in import is mainly due to the importance of the exports (the need for imported raw to export export). Imports from EU countries increased by 5.5% and imports from third countries

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. Bulgaria'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 project provides objective measures of business regulations and their enforcement across 190 economies and selected cities at the subnational and regional level. The Doing Business project, launched in 2002, looks at domestic small and medium-size companies and measures the regulations applying to them through their life cycle. Doing Business captures several important dimensions of the regulatory environment as it applies to local rms. It provides quantitative indicators on regulation for starting a business, dealing

with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency. Doing Business also measures features of labor market regulation. By gathering and analyzing comprehensive quantitative data to compare business regulation environments across economies and over time, Doing Business encourages economies to compete towards more efficient regulation; measurable benchmarks for reform; and serves as a resource for academics, journalists, private sector researchers and others interested in the business climate of each economy. It is covering 11 dimensions of the business enabling environment, through a survey of experts, the report ranks 190 economies. They 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.

Bulgaria ranked 39th out of 190 countries in the World Bank’s Doing Business 2017 report, which assesses countries business regulations and their impact. This is a drop of two places in the rankings compared with 2016. In the “starting a business” category, Bulgaria dropped four places from 2016, from 78th to 82nd place.

Ranking on doing business topics		VALUE
Doing business indicators - RANK (ranking from 190 economies)		2017
1	Starting a business	82
2	Dealing with construction permits	48
3	Getting electricity	104
4	Registering property	60
5	Getting credit	32
6	Protecting minority investors	13
7	Paying Taxes	83
8	Trading across borders	21
9	Enforcing contracts	49
10	Resolving insolvency	48

Other categories in which Bulgaria dropped compared with last year included dealing with construction permits, registering property, getting credit, protecting minority investors, and resolving insolvency. Its rankings for trading across borders and enforcing contracts remained unchanged. However, Bulgaria saw improvements in the ranking for paying taxes, up two places, and getting electricity, up six places. The World Bank report, based on experience in Bulgarian capital city Sofia, said that, in starting a business, executing the minutes of the constituent meeting of the shareholders in a limited company; obtaining a notary certified statement of consent and signature specimen of the manager, and a certified copy of the articles of incorporation of the firm took a day and cost five leva – about 2.50 euro. Depositing the paid-up capital in a bank took a further day, costing about 10 to 30 leva depending on the bank. Registering with the Commercial Register took two days, costing 55 leva for electronic registration and 110 leva for a hard copy application. Registering for VAT at the National Revenue Agency took 12 days. Registering a fiscal device (cash register) at

the revenue agency took seven day, and meant spending about 50 to 200 leva. Registering the commercial purpose of the company at Sofia Municipal Council to seven days. There was no charge, the report said.

According to the *Ease of Starting a Business*, Bulgaria is ranked 82nd. But despite that fact, Bulgaria offers a number of advantages to foreign investors: shorter administrative deadlines and individual administrative service; eased rules on acquisition of right of ownership or limited real rights over state and municipal property; financial support (state aid); tax relief; •institutional support

In the dimension *Dealing with Construction Permits*, for 2017 Bulgaria is ranked 48th.

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 business sector.

Data indicate that the dominant part of enterprises in Bulgaria is micro enterprises with number of employees from 0-9. Their participation in the overall pool of companies is 92%, SMEs participate with 7,4%, while large enterprises represent only 0.2% of all companies in the country.

Table 4.2. Structure of the Business Sector (percentages)							
Percentage %	2010	2011	2012	2013	2014	2015	2016
Micro enterprises (0-9 employees)	93%	92,0%	92,2%	92,3%	92,5%	92,4%	NA
SMEs (10-249 employees)	8,6%	7,9%	7,6%	7,4%	7,4%	7,4%	NA
Large enterprises (250+ employees)	0,2%	0,2%	0,2%	0,3%	0,1%	0,2%	NA
Share of foreign controlled enterprises	NA						

Source of data: National statistical institute (2017)

SMEs play a particularly important role in the ‘non-financial business economy’ in Bulgaria. They account for 66 % of value added and more than three quarters of employment, compared with an EU average of 57 % and two thirds respectively. For micro companies, SME value added and employment shares are roughly comparable with those in the EU as a whole, but in the case of small and medium-sized companies they are above the EU average. The manufacturing, wholesale and retail trade sectors generate half of SME value added. Their combined share is almost 10 percentage points higher than on average in the EU. These two sectors also account for 58 % of SME employment. SME value added in the ‘non-financial business economy’ rose by 12 % in 2008-2015. This stemmed mainly from very strong growth in micro firms, the value added of which exceeded its pre-crisis level by 37 %

in 2015. 2 The value added of small firms grew more moderately, by 9 %. The value added of medium-sized firms remained slightly below pre-crisis levels. Furthermore, SME employment fell by 5 % in 2008-2015 and has not yet recovered from the crisis.

4.3 Buyer Sophistication

- Buyer sophistication (1, worst - 7, best), Trend analysis 2010-2016

Buyer Sophistication (1, worst - 7, best)	2010	2011	2012	2013	2014	2015	2016
The degree of Buyer sophistication measures on a scale from 1 (low) to 7 (high)	3,21	3,16	3,16	2,93	2,94	3,22	3,26

Bulgaria moved one place up – to 38 the place among 128 countries. However, such an advance was only due to a higher number of countries included in the survey, while there was no substantive improvement of the indicators of innovation entry and innovation exit, which are underlying for the calculation of the innovation index. In the period for which the survey was conducted, there were only minor changes in the two sub-indices for entry and exit of the innovation process, and a drop in the last year. This inevitably leads to lack of improvement in the efficiency of the innovation activity for 2016 (a ratio of 0.8), and even a deterioration against the base year 2013 when this ratio was 0.9. According to the Global Innovation Index, the comparative strengths of Bulgaria are mainly in the results of innovations with low technological intensity, which also is a finding of the Innovation Union Scoreboard protected trademarks and industrial designs; use of information and communication technologies to improve and change the business model; implemented international standards; export of services of cultural and creative industries; registered new companies. The comparative weaknesses are associated with the environment enabling research and innovation – competitive and business environment; e-government; micro and venture finance; development of clusters and interaction between universities and businesses. Of the 7 groups of indicators captured by the Index (5 for innovation entry and 2 for innovation exit), the poorest results and worst positions for Bulgaria are reported in terms of human resources and research group indicators, including:

- spending on education;
- number of graduates in scientific and engineering majors;
- ratio of students to teachers in the high education system;
- place of Bulgarian universities in global rankings

5 Socio - demographic environment

In the period 1990 – 2016, Bulgaria’s population numbers have been continuously declining to reach a total fall of some 19 %. Though with some fluctuations over the past 26 years, the gap between birth rate and mortality rate has been widening and in 2016 the natural growth rate reached – 6.2‰ against a birth rate of 9.2‰ (average EU-28 for 2014 – 10.1‰), and a mortality rate of 15.3 ‰ (average EU-28 for 2014 – 9.7). Within the EU, Ireland has the highest birth rate – 14.6‰, followed by France – 12.4‰ and the United Kingdom – 12.0‰, while Portugal has the lowest birth rate – 7.9‰. Bulgaria has the highest level of general mortality in the EU and increasing population ageing (including as a result of diseases curable by proper and timely prevention). After the start of the economic crisis in 2008, the labour market contraction in West European countries resulted in a lower migration flow from Bulgaria. At the beginning of 2016, the general age dependency ratio was 52.4 %, or to any person in dependency ages (under 15 and over 65) corresponded fewer than two economically active age persons, marking a serious deterioration for the past ten-year period (44.5 % in 2005).

5.1 GDP per capita and Population trends

The economy of Bulgaria is still recovering from the adverse effects of the economic **crisis**. The process is slow and is influenced by various growth factors. There are positive trends in terms of business activity, domestic consumption, foreign trade balance, the capital structure of business and intercompany indebtedness (supported by the still cautious banking sector policies) but precrisis levels have not been reached yet. Over the last ten years, Bulgaria has had economic growth which was above the average EU levels (66 % and second place after Slovakia). In addition, the country’s share in the European economy has increased – by 50 % between 2006 and 2015. Together with Lithuania and Latvia, Bulgaria reported the best structural change on this indicator, against a % fall in the share of the Greek economy and the decrease in countries like Portugal, Spain, France, Italy, the Netherlands. Despite this growth, however, Bulgaria remained last in the European ranking with EUR **6,300** by the GDP per capita indicator (the average EU-28 is EUR 28 800), which is decisive for the low comparative purchasing power of households.

Table 5.1. Socio-demographic indicators

Indicators	Value						
	2010	2011	2012	2013	2014	2015	2016
1 GDP per capita PPS (EUR)		6 033,24	6 237,76	6 237,76	6 544,53	6 953,57	
2 GDP growth (%)	1,3%	1,9%	0,0%	0,9%	1,3%	3,6%	3,4%
3 Population size (millions)	7 504 868	7 327 224	7 284 552	7 245 677	7 202 198	7 153 784	7 101 859
4 Change in population (%)	-4,6	-5,1%	-5,5%	-5,2%	-5,7%	-6,2%	-6,0%
5 Population aged	5 141 057	4 966 189	4 899 092	4 831 866	4 763 673	4 693 792	4 628 724

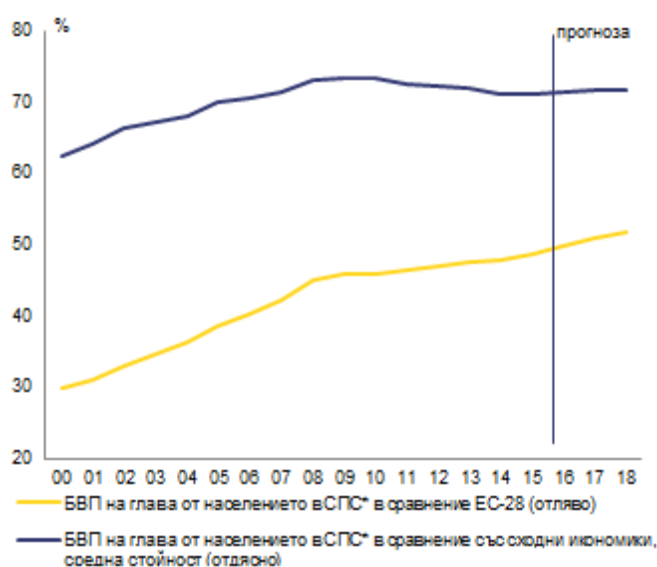
	15 - 64 (number)							
6	Population density (persons per km2)	67,62	66,01	65,63	65,28	64,89	64,45	63,98
7	Degree of urbanisation (%)	71,62%	72,67%	72,86%	73,03%	73,13%	73,06%	73,28%

The latest economic results were solid. With the growth rate of 3.6% good in 2015, the forecast is for the economy to grow by 3.3% in 2016. Growth is expected to decline slightly in 2017 and 2018, respectively to 2, 9% and 2.8%. Household consumption was a key driver of growth in 2016, although net exports contributed well. In 2017, a slightly more diversified domestic demand would only partially offset the rapid decline in net exports due to the expected increase in imports. Labor market conditions improved significantly during the economic recovery, with unemployment rate at 7.7% in 2016 and projected at 7.1% in 2017.

3.2% thanks to the acceleration of projects for EU funds under the new programming period 2014-2020.

Income convergence continues with the EU, but at the same time the relative position vis-à-vis similar countries is unchanged. Earnings convergence with the EU is projected to accelerate in the coming years, but relatively weak potential growth limits further catching-up. Structural reforms, greater private investment and improvements in the business environment could, inter alia, stimulate faster convergence.

Figure 4-2. GDP per capita relative to peers and EU28



— GDP per capita in PPS* relative to EU28 (lhs)
— GDP per capita in PPS* relative to peers average (rhs)

* Purchasing power standards

Source: European Commission

Note: The graph shows the percentage of GDP per capita, adjusted for differences in price levels (PPS), vis-a-vis peer countries: CZ,EE,LV,LT,HU,PL,RO,SI,SK.

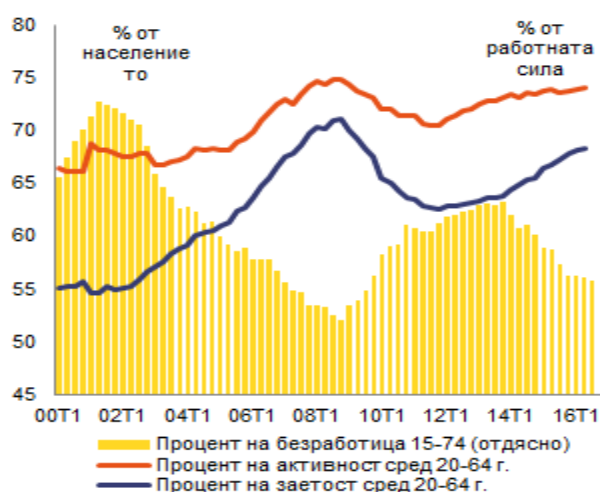
5.2 Working Population: Employment status and Education

One of the main features of the development of the Bulgarian economy in 2015 was the observed improvement in the market labor. For the second consecutive year the employment in the country increased by 0.3% (according to the National Accounts System (SNA) data). The level the unemployment rate dropped significantly to 9.2% (according to the data of Labor Force Survey (LFS), age group 15-64 years). The number of people employed in the economy in 2015 is 3 446 200 and increased by 12,000 (0.3%) compared to the previous one year. Employment, as well as the physical volume of BDS, are increasing in all major economic sectors (industry, construction and services), decreasing only in the agrarian sector. As a result of the substantial reduction in unemployment in Bulgaria in 2015 is already leveling itself with the average of EU-28. The coefficient of economic activity of the population continued to grow, reaching 69.3% (15-64 years) in 2015. A key factor for the good development of the labor market is achieved economic growth, which accelerated through the observed one year and is the highest since 2009.

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

Movements in the active labour force	2010	2011	2012	2013	2014	2015	2016
Age (15-64) (%)	47,9	46,6	46,6	46,9	48,0%	49,1%	49,3%
Gender (%)							
Total (%)	47,9%	46,6%	46,6%	46,9%	48,0%	49,1%	49,3%
Men (%)	59,4	51,1	50,8	51,4	52,7	54,1	54,6
Women (%)	47,8	42,4	42,6	42,8	43,6	44,5	44,3

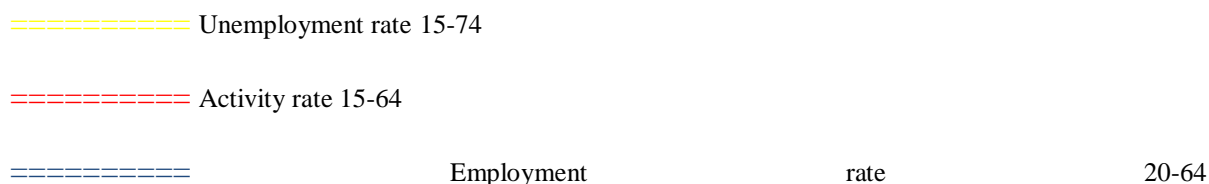
Data from the NIS show that in 2015 employment growth is rising is due entirely to the



increase in the number of employees in the private sector sector. According to them, private sector employees have increased by 3.4%, while those in the public sector decreased by 0.9%. The others categories of employed persons (employers, self-employed and unpaid family) workers) also declined compared to 2014 (by 2%). This means that the growth of employment is entirely due to the dynamics of the private sector sector, and the government sector

seeks to reduce its employment with optimization of labor costs and, in particular, limitation of labor costs the deficit of government finances.

Activity, employment and unemployment rates (quarterly, seasonally adjusted)



The dynamics of the number of people employed by education once again shows that people with a low level of education in the best- to a lesser extent, benefit from improving business conditions in the country. According to the NIS data, the number of people employed is increasing for those with higher and secondary education, while those with basic and lower-low education are diminishing. The difference in levels of employment by degrees. In 2015, faculty with higher education education have an employment rate of 84% (15-64 years); he increases by 2.3 pp. compared to the previous year. Persons with secondary education also have a relatively high employment rate (67.2 at 65.2% in 2014), with those with professional qualifications qualifications have an employment rate of 70.3%. It's quite different the situation in the two groups of low-educated people. On first, in both groups the number of employees and respectively the employment rate is decreasing in 2015 despite the overall an increase in employment in 2015. Secondly, in both groups the employment rate is extremely low. For people with basic education this coefficient in 2015 is 32.1% (at 32.2% in 2014) and for those with primary and lower education it is 18.6% (against 19.2% in 2014). Among those with primary education one in three people has a job, primary and lower education employment - just one in five. These data actually show that one of the preliminary conditions for the status of a busy person is at least on average education.

6 Innovation Potential

The Gross Innovation Product or the innovativeness of an economy is assessed by the new products and services introduced, the new technologies created and the new scientific outputs produced. It involves and results from the interaction of the innovation, technological and scientific products of a country. It is a major benchmark for innovation policy because it allows decision-makers to compare the outcome of the innovation system in temporal and geographical terms, as well as to estimate the need for changes in the organisation and resources of the innovation process

The innovative environment in Bulgaria analyses the status and potential for growth of the national innovation system based on five groups of indicators

- human capital for innovation;

- investment and financing for innovations;
- aggregate innovation product;
- entrepreneurship and innovation networks;
- information and communication technologies.

But the analysis is based on following structure

- National Innovation System of Bulgaria
- Framework conditions
- Investments
- Innovative activities
- Impacts from the innovative activities
- Analysis of the strengths and weaknesses

6.1 Description of the National Innovation system

One of the main strategic goals Bulgaria has set in the process of her accession to the European Union is enhancing the competitiveness of Bulgarian industry and improving its ability to withstand the competitive pressure of the European and world markets.

The Innovation Strategy provides the exact measures to achieve these goals based on the understanding that the industry's competitive advantage could be achieved by developing, implementing and disseminating innovation, providing leading competitive position in the international markets, meeting in advance new needs of national and international consumers.

The draft Innovation Strategy of the Republic of Bulgaria and its implementing measures has been developed with the support of the Government of the Netherlands under the PSO Pre-accession Programme.

Last version of the Innovation Strategy for smart specialization of the Republic of Bulgaria 2014-2020 (IS3) approved with CoM Decision №857/03.11.2015

Six years after the launch of the Europe 2020 Strategy of the European Commission in June 2010 and in the middle of its implementation, contradictory results have been achieved both at European and national levels: faster developments against climate change, tentative progress in education and a pronounced slowdown in employment and investment in research.(1)

The 2016 National Reform Programme² for Bulgaria provides for the following measures to overcome the delay in achieving the national target for R&D:

- preparation of amendments to the Promotion of Research Act, aiming to improve the functionalities of the **Register of Scientific Activities**;

- implementation of a **policy of open access to scientific results**;
- improving the management and **funding of research** based on scientific results;
- establishing an **Agency for Research Promotion**;
- use of **financial engineering** and ethical rules.

Although the planned measures were adopted at the end of 2015, neither of them has been included in the 2016 agenda of Bulgarian institutions, including MES:

- the policy of open access to scientific results **fully closed the access of the research community in the country to the results of the global research community**;
- improving the funding of research led to **what is expected to be a de facto reduction of public support** for public institutions in this field;
- the ethical rules in science **are still compromised by financial engineering and benefit corruption practices** and patronage.

In addition, the above-mentioned Agency for Research Promotion,⁴ together with the declared intentions of the Ministry of the Economy for combining BSMEPA (which administers the National Innovation Fund) and the Invest Bulgaria Agency into a brand new structure titled Economic Growth Agency,⁵ are evidence of an even further **disconnect of the centres of responsibility and design of policies in the otherwise connected and converging fields of science, education, technology and innovation**.

The lack of substantiated and consistently implemented policies in these fields, which should equally engage the public and private sectors, causes pronounced imbalances and fluctuations of the indicators of innovation potential, thereby leading to the unenviable positions of the country in the comparative analysis of European countries.

According to the methodology of the Global Innovation Index, **Bulgaria's advantages are mainly associated with results from low technological intensity innovation**, which is also a finding of the Innovation Union Scoreboard ranking:

- **patent activity**

Patent activity of Bulgarian patent holders remains at very low levels. The highest drop (4 %) occurred in 2015, when the Patent Office registered merely 4 patents of Bulgarian patent holders.⁶ Over the last 15 years, the higher education sector has had 24 patents. There are eight (out of 51) higher schools with patent activity.

- **publication activity**

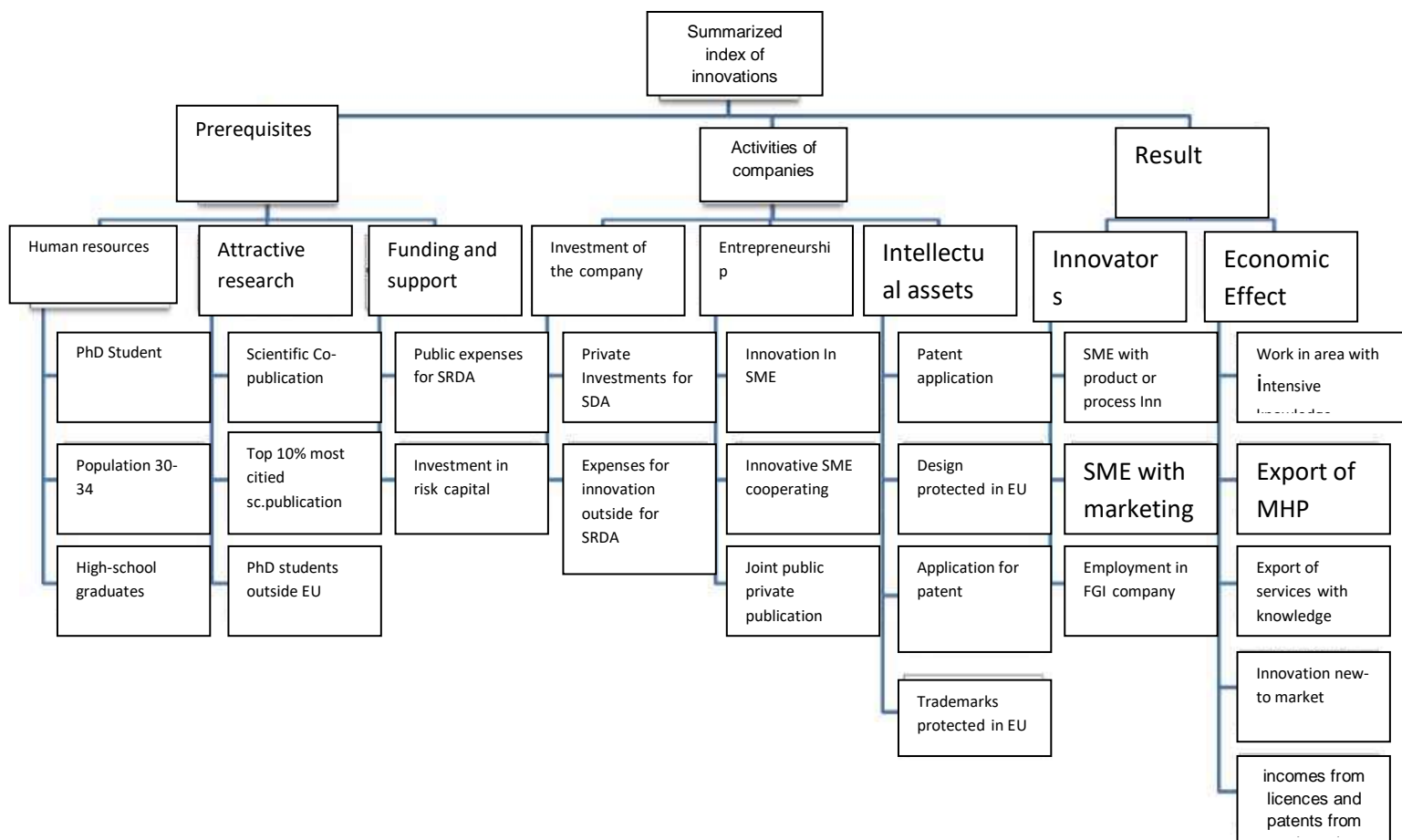
Bulgarian scientists are performing best in the fields of physics and astronomy, medicine, materials science, chemistry, biochemistry, genetics and biology. However, the analysis of the dynamics shows that **in the recent years the performance is weaker in terms of number of articles and share in publication activity for each of the thematic areas** within EU-28 and the region of Eastern Europe.

3

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6.2 Framework conditions

Figure 6-1 Framework Conditions,



6.2.1 Available Human Resources

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.
- Talent in the 21st century economy - It has become abundantly evident by now that any future growth and prosperity could only come from innovation, and that applies to developed and developing economies alike. While this has been almost universally acknowledged, how to steer the shift to economies driven by knowledge and innovation is

less clear. One factor for that transition that is being increasingly appreciated is talent. The current understanding of the concept of *talent* – including the one adopted by this report – breaks with its traditional meaning which referred to exceptional individuals of extraordinary aptitude, mostly in the sciences and the arts. Rather, by wide acknowledgement its current use in political and economic discourse has been mostly influenced by a seminal study by McKinsey & Company in the 1990s, resulting in their 2001 book "The War for Talent."¹⁰ Although not a strictly defined term, it covers mostly the segment of the workforce of a company or a country with highly developed managerial, scientific, technical, entrepreneurial skills. It thus relates to the notions of educational achievement, knowledge economy and knowledge worker, innovation and technology development.

The staff engaged in R&D together with those engaged in scientific and technological activities measure the human resources directly responsible for the creation, application and dissemination of new knowledge in the field of technologies. The indicator of employment in high-tech sectors reveals the country's specialisation in high innovation activity sectors.

Overview of the Bulgarian Higher Education System as a resource in research and innovation

Since Bulgaria joined the EU in 2007, its tertiary education system has helped to accelerate its social and economic convergence with the rest of Europe. Despite the achievements over the past two decades, higher education in Bulgaria continues to face challenges with regard to quality, efficiency, and accountability for results. In addition, Bulgaria has one of the most challenging demographic profiles in the EU and the world, with its population expected to decline by 27 percent between 2010 and 2060, ultimately decreasing to almost half of its level at the early days of transition. Bulgarian society is aging rapidly, with the population above working age expected to almost double as a share of total population to 33 percent by 2060 compared to 2010. Most importantly, the population of age 15-24 years is also projected to decline by 41 percent between 2010 and 2060, which will have a direct impact on the tertiary education sector

Reducing the convergence gap between Bulgaria and the rest of the EU will require sustained and marked improvements in productivity and a shift to economic activities with higher value-added potential, generated by employees with higher and better skills. Bulgaria's Europe 2020 agenda and the related strategic documents adopted by the Bulgarian government (the National Reform Program and the Convergence Program) set the ambitious target of increasing the share of the people aged 30–34 with higher education to 36 percent by 2020. With the emerging negative growth in enrollments, however, the achievement of this objective will require: (i) greater effort to enroll those left behind in the age range of 24–34; (ii) improved participation and completion rates for secondary education, (iii) consolidation of the sector to optimize the intake capacity of tertiary institutions; and (iv) improvement in the quality and international reputation of Bulgarian higher education, and pursuit of a higher number of international students enrollments.

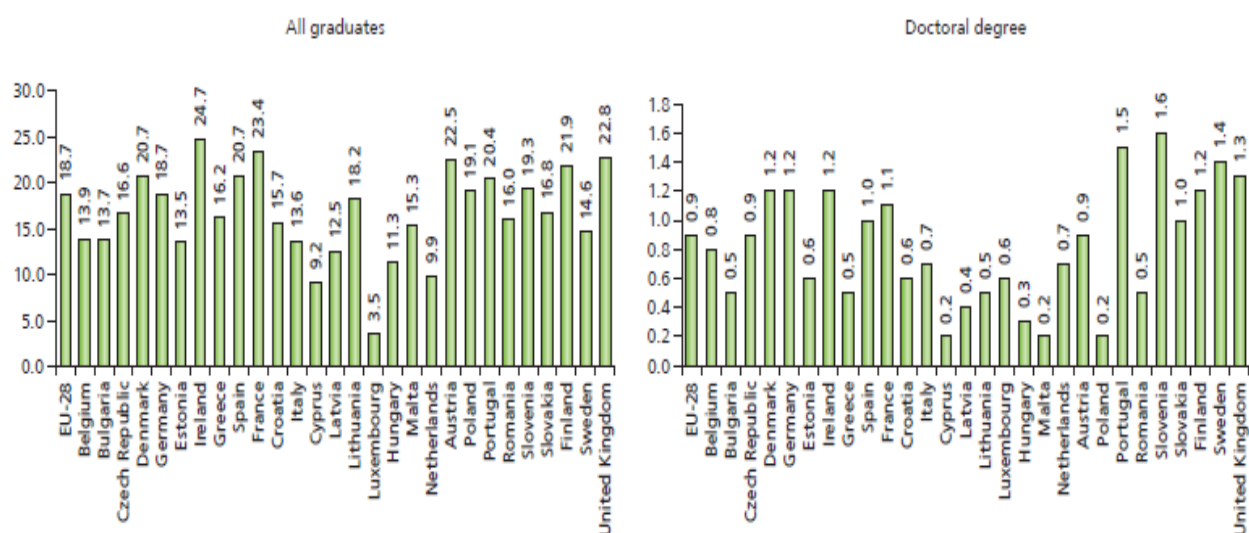
Recent reform initiatives have begun to address some of these issues:

- Amendments to the Academic Staff Development Act in 2010 replaced the ineffective, centralized system for career development with a system providing significant autonomy to HEIs and research institutions to adopt and implement their own staffing policies.
- The Higher Education Act was amended in 2010 and 2011 to allow HEIs to perform research activities on a contractual basis for state and private users as well as for other HEIs; and to partner with other HEIs (local or international) and organizations. These amendments also created the legal basis for the delivery of joint graduate or PhD programs, including through franchise arrangements.
- The funding model has been gradually reoriented toward a stronger focus on HEI performance, starting with a small performance awards envelope in 2011, and further enlarged and refined in 2012. This funding reform followed a major undertaking to collect information on educational outcomes and graduate employment in 2010 and 2011, as part of the Bulgarian Universities Ranking System (BURS)⁸⁶ initiative.
- Legislative amendments were passed in the second half of 2011 to establish the foundation for competition in the quality assurance market by allowing ENQA and EQAR member agencies to conduct program evaluations of Bulgarian HEIs, as part of a broader set of revisions of the quality assurance framework in the country.

According to Eurostat data for 2014, **the share of graduates from scientific and technological fields of education in Bulgaria amounted to 13.9% of the population aged 20-29 versus the EU-28 average of 18.7% and is far below the levels of the innovation leaders.** In addition, the country's position with respect to doctoral degree graduates needs improvement. Given NSI longer-term data (since 2010) it can be safely assumed that there are signs of such improvement. The average increase in the share of doctoral graduates in scientific and technological fields is 1.44 (ranging from 1.2 for the physical and chemical sciences to 2.5 in architecture and building). Given, however, that the average increase for all fields of education is 1.65, this suggests that the interest of students is still directed outside

science. **Bulgaria seems to be an educational hub of neighbouring countries and countries in the region.** This refers mainly to our southern neighbours whose students study mainly in the fields of medicine and technical sciences, the countries from the former Yugoslavia and countries with a strong Bulgarian diaspora. In addition, there is another group of students with completed previous level education in another country, including: United Kingdom (861 students), Germany (659 students), Italy (278 students) and others. These include mainly Bulgarian citizens who have completed secondary education or obtained a bachelor's degree and have decided to return to Bulgaria for the next educational degree. **Over the last 5 years, the admission of mobile students in Bulgaria rose by 15 %** (or 1,558 students). At the same time, after 2010 the number of all students studying for tertiary degrees in the country has decreased – by 9 % for the last academic year, and by 12 % for the whole five-year period (or 2,8 2 fewer students). The adverse effects of the demographic crisis and the continuous brain drain of students studying abroad persisted in higher education, and hence in the labour market. For students, participating in **Erasmus+**, which is effective from the beginning of this programming period, is of key importance for building professional competences and successful career development. The objectives of the programme go beyond education by linking it with the needs of businesses so as to ensure higher competitiveness through the channels of vocational education, lifelong learning and involvement of businesses in sustainable partnerships with educational institutions. Such interaction and mobility have an impact on the personal, social and nation-wide levels.⁴⁶ In the period 2007 – 2014, **11,645 students from 37 higher schools in Bulgaria took part in student exchange programmes and had part of their studies abroad**

Figure 6- Population with Tertiary Education and New doctorate graduates



* Science, mathematics, computing, engineering, manufacturing, construction.

Source: Eurostat, 2016.

Labor Market of R&D staff

In 2015, the staff engaged in R&D in Bulgaria numbered 29,519 persons. Of these, 19,26 – a little over 65 % – were researchers. After 2000, the number of researchers has been constantly increasing, but **the country still holds one of the last places in EU-28 by the share of researchers in the working age population** – only 0.48 % in 2015, which is sufficient to exceed the rate of Romania, but is far from the average level of 1.12 % for EU-28. Innovation leaders in Europe have much more human resources (around and over 2 % of the working age population) engaged in basic and applied research, hence their results constitute a sound basis for further application in practice in the form of product or process innovations.

Approximately 40 % of the R&D staff is in companies. In 2015, **the business sector almost doubled the number of the staff engaged in research and development compared with the previous year**, in contrast to the public and the higher education sectors where the trend reversed. **After 2000, the public sector has been the only sector that has been constantly reducing its R&D staff**, which represents a drop of 2 % over the entire period. The diverging trends between academic institutions focused on fundamental research and academic staff of tertiary education schools engaged mainly in teaching result in a comparative balance of the positions of the two sectors in the institutional structure by this indicator. In practice this means that in quantitative terms there is a drop in the number of personnel engaged in fundamental science in favour of applied research.

Over the last ten years, the reduction of R&D staff in the public sector applied to all age groups, except for those under 25 (for whom the growth in 2015 was almost triple compared with 2005) – an age that is suitable for obtaining doctoral degree and commencing research. The difference in the age group from 25 to 4 is drastic: the drop there is by 45 % and it is most serious in terms of age structure. Outflows are most often related to searching for career opportunities abroad or in the private sector, and more rarely in the higher education sector. In the higher education sector the upward trend in the number of academic staff applies to all age groups and is most pronounced again with regard to researchers aged under 25 (over five-fold increase in 2015 versus 2005) and gradually decreases with age.

The greatest share (40 %) of R&D staff is in the technical sciences – a lead which is clearly visible after the 40 % increase over the last two years. The main supporting factor in this case is the higher investment of businesses, which is mainly directed to that field. Natural sciences attract half as many researchers (19 %), followed by medicine (15 %). In the last year, **the only drop was in the field of agricultural sciences** by about 20 %. The greater share (59 %) of the R&D staff in 2015 was concentrated in the Yugozapaden planning region, remaining nearly unchanged at the previous year's level. Despite the faster growth in research staff against the base year 2000 in all Severozapaden Yugoiztochen Severen tsentralen Yugozapaden Severoiztochen Yuzhen tsentralen

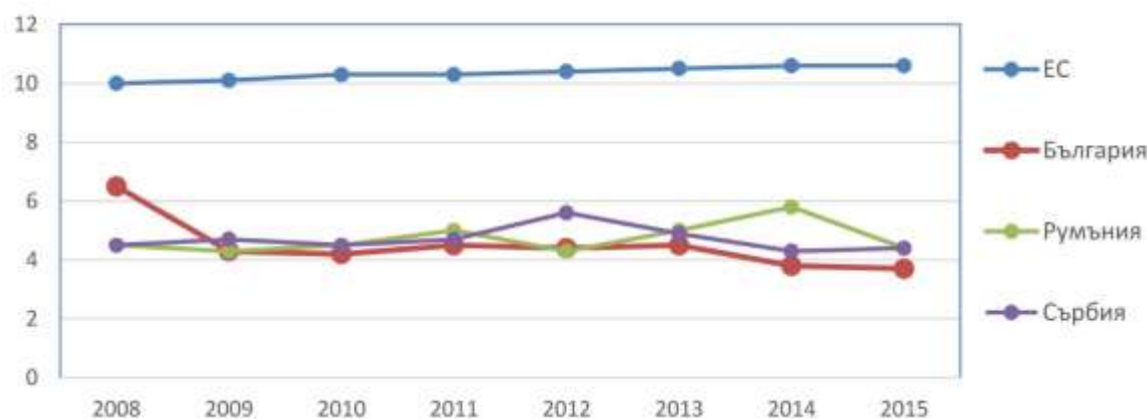
Enterprises Public sector other regions (from 1.92 times for Severozapaden region to .87 times for Yuzhen tsentralen region), **the Yugozapaden region** (mainly the capital Sofia) **retained its positions of a research hub of Bulgaria.** The regional structure of the research staff in the enterprises sector almost fully matches the average for the country. Outside the

nonprofit organisations sector, whose potential is mainly concentrated in Yugozapaden region, the regional distortions are most drastic in the public sector, with over 80 % of all R&D staff being concentrated in the capital. **Most balanced is the territorial distribution of academic staff in higher schools.**

Within the enterprises sector, **size is decisive both in terms of investments made⁴⁵ and in terms of the number of research staff:**

- **The highest innovation activity driven by own applied research and development is in large businesses** (over 250 employees), followed by the group of medium-sized enterprises (10 to 49 employees).
- The dynamics of research staff recruitment are similar. In 2015, **the enterprises with over 500 employees tripled their R&D staff on an annual basis.** The growth in the number of research staff is also high in small and medium enterprises (1.79 and 1.75 times respectively).
- **Large enterprises have the highest level of applied research measured by the higher share (over 75 %) of researchers** within total R&D staff, unlike the other groups of enterprises whose efforts are focused mainly on development and demonstration projects in which technical and support specialists have a more significant share (about and over 50 % of the R&D staff).

Figure 6-4 Scientific publications, Bulgaria



Percentage of the scientific publications in top 10% of the most cited publications out of the total number of publications

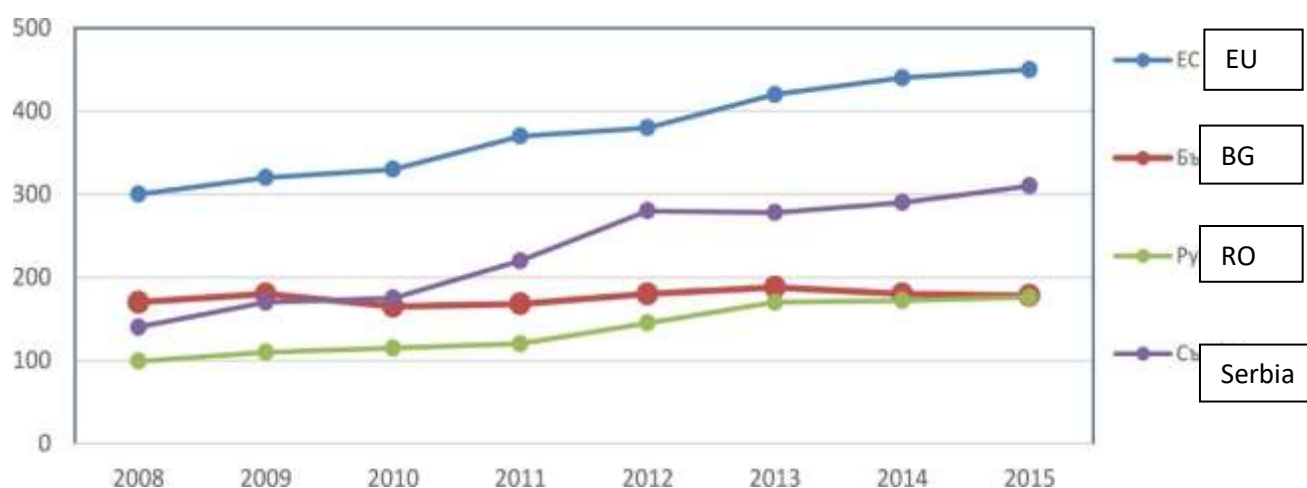
6.2.2 Attractive research systems

Bulgaria is ranked at 32nd place in EU in 2016 for the indicator international scientific co-publications. Assessment of the participation of Bulgarian scientists in international scientific

cooperation can be done, based on internationally visible scientific publications with foreign co-authors (Fig. 4b). For Bulgaria, this number, referred to 1 mil. residents is almost constant for the period 2008-2015 – 160-180 per year with increase below 10%¹. For EU countries and for neighboring countries, like Romania and Serbia, this number increases, respectively by 55%, 81% and 126%, where for Serbia the absolute value goes above 300. These results show that the Bulgarian scientists gradually lose positions in the International scientific community.

The reduction in the field of scientific research is clearly seen also in the participation of Bulgaria in the EU framework programs. Bulgaria has received 12.8 Euro per person of the population from the 7th Framework program, while the average value for EU is six times higher - 78.9 Euro². The success of the projects with Bulgarian participation is also lower, compared to the average success for EU, respectively 15.4% and 20.4%. The tendency during the first two years of the “Horizon 2020” framework program is even more negative. The funds received by the Bulgarian participants are 1.55 Euro per person of the population, while

Figure 6-1 Scientific co-publications

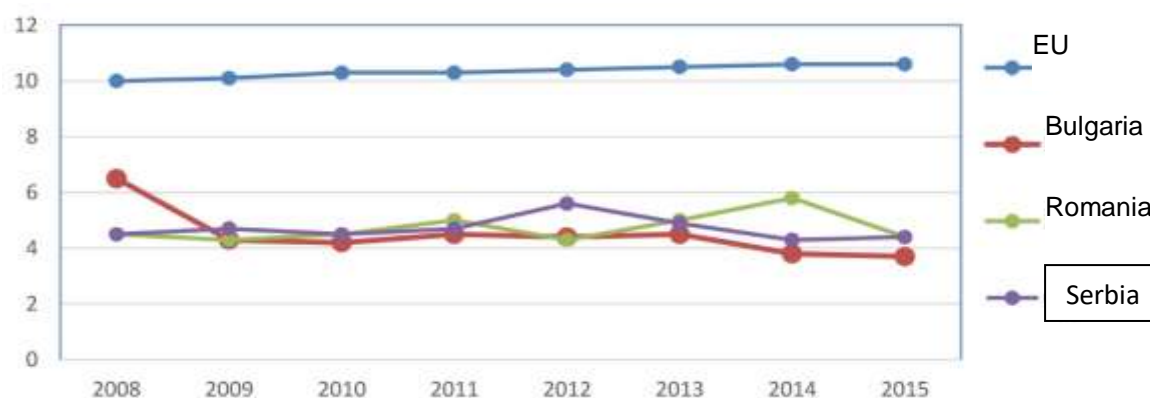


the average value for EU is almost ten times higher - 14.60 Euro. For 2015, the success of the projects with Bulgarian participation is 5.6%, and the average value for the program is 11.6%

According to the report "Science, Research and Innovation of EU, 2016", the percentage of scientific publications in top 10% of the total number of publications for most of the EU countries grows from year 2000 towards year 2010 and the intensity of research and development funding is also rising. Contrary to them, the direction for Bulgaria is the opposite – towards reduction of the intensity of funding. Based on data of the European Innovation Scoreboard, 2016, the share of scientific publications from Bulgaria, included in the top 10% of the most cited works has dropped by more than one-third from year 2008 to

year 2015, respectively from 6.5% to 3.5%. As per this indicator, which is one of the main indicators used for the evaluation of the quality of the scientific production, Bulgaria is behind Romania and Serbia, while in 2008 Bulgaria was before these countries (Fig. 4).

Figure 6-2 Percentage of the scientific publications in top 10% of the most cited publications out of the total number of publications



Although Bulgaria is economically lagging behind within EU, it is showing significant growth in some high-technology sectors, thanks to the accompanying traditions and competitive labor prices, as, for example, the IT sector. The development of high-tech companies, combined with the relatively low investments, required for research is an additional prerequisite for the development of science in the sectors, included in the Innovation strategy for smart specialization.

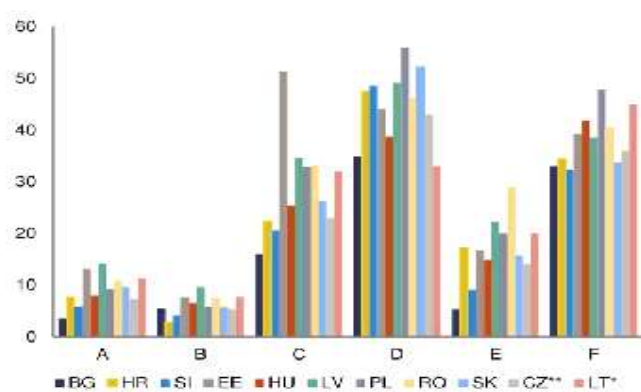
The agency will also coordinate the activities for popularization of the science and the results from the scientific researches.

6.2.3 Innovation Friendly Environment

In this area of the innovation potential of the country the indicator of opportunity entrepreneurship is ranking 32th place. 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 23st..

Bulgaria continues to underperform in the field of entrepreneurship. The Global Entrepreneurship Monitor Report for Bulgaria (GEM, 2016) highlighted the many challenges faced by entrepreneurs. To tackle the gaps in the business ecosystem, the government adopted the 'Entrepreneurship Bulgaria 2020' plan at the end of 2015. In 2016, it introduced an entrepreneurship module in all levels of education, though the quality remains to be seen. In addition, the ongoing reform of the insolvency framework is crucial for enabling a restructuring and fresh start of bankrupt entrepreneurs.

Graph 4.4.9: Global Entrepreneurship Monitor



A: total early-stage entrepreneurial activity
 B: established business ownership rate
 C: perceived opportunities
 D: perceived capabilities
 E: Entrepreneurial intention
 F: fear of failure

Source: GEM (2016), GEM Country profiles
 Note: The data for LT* is for 2014 and for CZ** for 2013.

The EU SME initiative and the Investment Plan for Europe will increase funding for SMEs. Access to finance continues to be a challenge for SMEs. The EU SME initiative, operational since 2016, is expected to mobilise about EUR 600 mn for Bulgaria’s SMEs through commercial banks. The instrument is managed by the European Investment Fund and co-financed by the European Structural and Investment Funds, the European Commission (through its Horizon 2020 funds), and the European Investment Bank Group. Adding to this, ten agreements with intermediaries have been approved under the SME window of the European Fund for Strategic Investments, the first pillar the Investment Plan for Europe, which should mobilise financing of EUR 575m. A further EUR 408m of financing for SMEs can be mobilised by an agreement approved by the EIB under the Infrastructure and Innovation window.

The very nascent business start-up system is still largely dependent on public support. Venture capital and business angel financing for new and growing firms are well below the EU average. In July 2015, the government set up a fund manager responsible for all financial instruments co-financed by European Structural and Investment Funds (so-called Fund of Funds). However, progress was slow in 2016 with no operational results so far. The insufficient public information on the fund manager’s investment strategy and uncertainty over the planned financial product pipeline in 2016 further added to the risks surrounding the project. The slow uptake of digital technology, mainly due to low digital skills, is a further challenge. Bulgaria ranks among the EU’s lowest countries in the 2016, with a very weak rate in digital public services, e-government usage and integration of digital technology by businesses (European Commission, 2016f). Further investment in fixed and mobile broadband infrastructure is still hindered despite some progress for mobile broadband (see also European Commission, 2015c). Despite recent improvements, consumers’ confidence in online commerce is one of the lowest in the EU (European Commission, 2017b). The share of the population who ordered goods or services over the internet in the last 12 months is less

than one third of the EU28 average (17 % vs 55 % EU28). Only 5 % of Bulgarian SMEs sold online in 2016 (17 % for EU28) (European Commission, 2016f Bulgarian financial

6.3 Investments

Spending on research and innovation is a measure of the investment in the creation, use and dissemination of new knowledge in the public and business sectors. It is considered an indirect indicator of the innovation capacity of the national economies. A high ratio of R&D financing to GDP is a factor fostering dynamic economic growth and competitiveness.

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

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

In the area of *firm investments* are

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

6.3.1 Finance Support

- R&D expenditure in public sector indicator 35th place
- Venture capital indicator ranking at 24th place

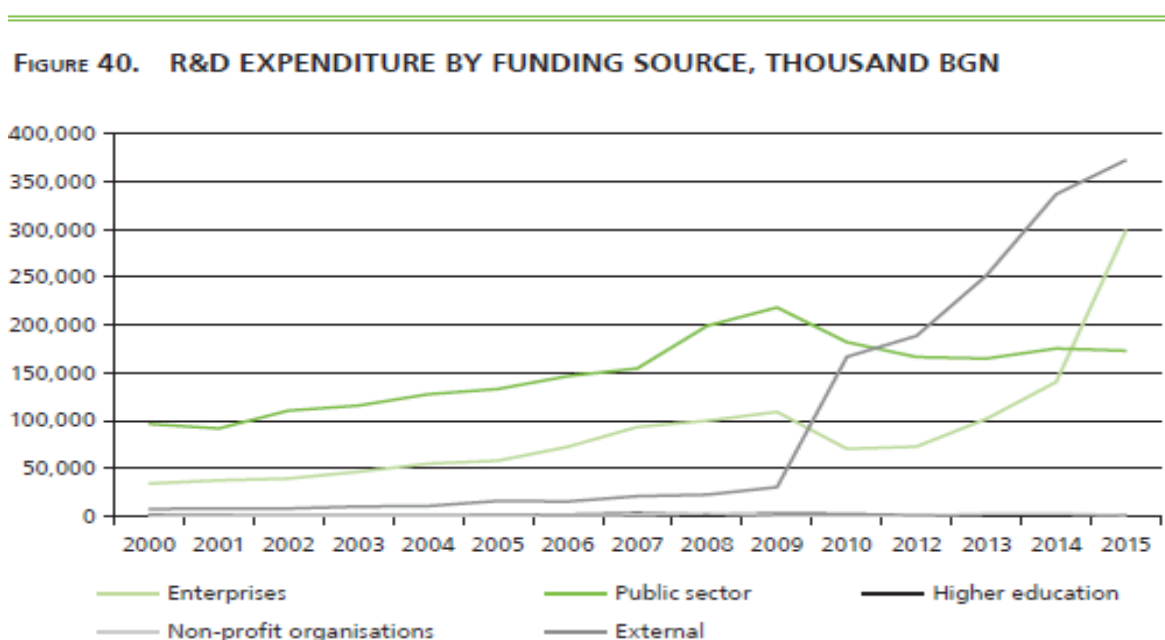
R&D spending In 2015, **the upward trend in R&D expenditure** continued in absolute terms and as a percentage of GDP (by some 0 % from the previous year). There are two enabling factors:

- a steady high level (ranging from 40 % to 50 % for the period after 2010, 44 % for 2015) of foreign investment in innovation projects, including European structured finance allocated directly through the European framework programmes for applied research and development, and indirectly, through the national operational programmes, as well as foreign direct investment in research projects and subsidiaries of foreign companies based in the country's territory;
- more than doubling from the previous year of the funds allocated by enterprises for research and development (own and externally commissioned) and their share in the structure of total R&D financing in the country reaching peak levels of 35 % in 2015.

The higher education sector also doubled its own funds for scientific research compared with the previous year. Nevertheless, its share in total R&D finance in the country stood negligibly low – 0.08 % in 2015, ranking the country at the last place in structural terms. **The total budget for the higher schools in Bulgaria for fundamental and applied research amounted to some BGN 46 million in 2015.** The sector offset the lack of own funds for R&D with funds received from the government, which accounted for 42 % of its budget, external project finance of 4 %, and funds for projects commissioned by the business sector

approximating 2 %. For a sixth year in a row **the share of public expenses for R&D decreased**. This is a period when external finance played a leading role in the country. **The decline on 2009 is almost triple, reaching the present level of 20.43 %**. The public research units (BAS, the Agricultural Academy, and other research centres at ministries) spent almost fully the public funds for their fundamental and applied research (82.4 % in regards to sources of finance), including purely institutional finance, direct public procurement, and through the National Science Fund. Only 15 % of their budgets originated from external sources (research institutes in the country are not eligible beneficiaries under operational programmes and the National Innovation Fund; they may implement only projects commissioned by business and financing from European and other research projects is still not decisive for them).

Figure 6-11 R&D Expenditure



Source: NSI, 2016.

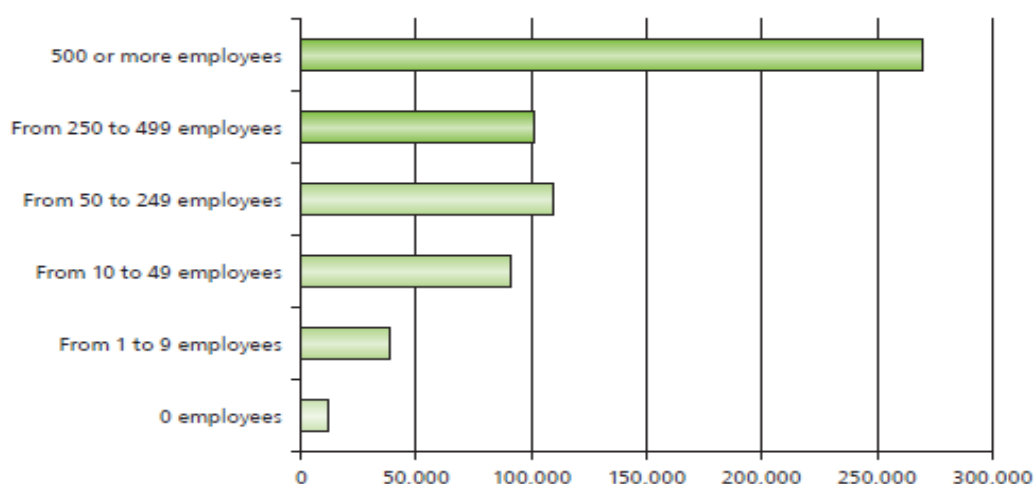
6.3.2 Firm Investment

Business in Bulgaria invested approximately BGN 621 million in research and innovation projects in 2015 – an increase by 45 % from the previous year, and 10 times more than the pre-accession 2006. Foreign finance (5 % share in the last year of the review period) plays the biggest role in the raising of internal private investment (46 % co-financing from companies). **Approximately 15 % of R&D costs of the business sector in 2015 include investments in fixed assets**. As regards the public sector, this "allocation for the future" amounts to slightly above 7 %, being a direct effect of the dominant institutional finance, which is allocated mainly for wages and to cover current expenses. **The intensity of the**

research and innovation of companies depends on their size. Although the number of large companies in Bulgaria employing over 500 persons is only 555, their budget for R&D almost equals the budget of the other groups of companies. Also, they have the highest growth in investment – for 2015 the increase is nearly 8 times compared with the previous year. **The major part of business sector expenditure for R&D is focused in two main fields of science: technical sciences (54 %) and medical sciences (41 %).** There is a logical mismatch between these and the priorities of public spending, as the latter is focused on fundamental science and covers all scientific areas.

Figure 6-11 R&D Expenditure in the business

FIGURE 41. R&D EXPENDITURE IN THE BUSINESS SECTOR BY COMPANY SIZE, 2015, THOUSAND BGN



Source: NSI, 2016.

6.4 Innovation activities

In the *Innovators* section, the indicators that are considered are:

- SMEs introducing products or processes innovations
- SMEs introducing marketing or organizational innovations
- 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

6.4.1 Innovators

Performance in the Innovators dimension reflects to some extent the overall classification into four performance groups. Innovation Leaders and Strong Innovators, except for Slovenia, are the best performing countries. Ireland is the overall leader, and Belgium ranks second; both countries are Strong Innovators. Germany, an Innovation Leader, ranks third. There are four Moderate Innovators that perform above the EU average on this indicator: Greece, Portugal, Italy, and Cyprus. The highest rate of performance increase between 2010 and 2016 is observed in Lithuania (36.4%), followed by the Netherlands (34.0%) and the UK (24.8%). For 19 EU Member States, performance decreased, most notably in Estonia (-87.6%), Cyprus (-49.2%), Germany (-44.6%), and Romania (-38.5%). Other strong decreases are observed in the Czech Republic, Spain, Portugal, Denmark, and Poland. The EU average decreased by 14.5% between 2010 and 2016. Despite the small improvement by individual indicators, Bulgaria sustains its position at the bottom of European and global rankings of innovation and entrepreneurship:

- The share of innovative SMEs in all SMEs in Bulgaria is among the lowest in Europe – 11.6 % in 2015 compared to 28.7 % on average for EU-28 and about 40 % for innovation leader countries; furthermore, Bulgaria declined by about one third in the past five years;
- low innovation activity is simultaneously the cause of and effect of the weak interaction within the national innovation ecosystem – only 2.3 % of all SMEs consider their partners as an asset in the implementation of joint innovation projects (ahead of Romania only and remaining far behind Serbia and Macedonia);
- only 13.6 % of SMEs register product and process innovations (the second lowest place ahead of Romania) compared to 0.6 % on average for EU-28;
- clearly the weakest performance by marketing and organisation innovation – 17.6 % compared to 6.2 % on average for EU-28;

Bulgaria's first inclusion in the global survey of entrepreneurship likewise reveals a picture of the indicators covered in it – small number of entrepreneurs who are active mainly in low-tech activities and without a major contribution to the country's economy in terms of job creation, launch of new products and sales on international markets

6.4.2 Linkages

Performance in the dimension Linkages reflects to some extent the overall classification into four performance groups. The Innovation Leaders are represented amongst the top group of countries, together with Strong Innovator countries such as Belgium, which is the overall leader in this dimension, Austria and Slovenia. On the other hand, Luxembourg, also a Strong Innovator, performs well below the EU average. Ireland and France also perform below the EU average. Moderate Innovator Lithuania shows a strong performance above the EU

average. The highest rate of performance increase between 2010 and 2016 is observed in Austria (16.0%), followed by Slovakia (11.3%), and Lithuania (8.7%). For 20 EU Member States, performance decreased, most notably in Estonia (-51.3%), Cyprus (-40.9%), Denmark (-37.9%), and Finland (-37.4%). Other strong decreases are observed in Croatia, Hungary, and Luxembourg. The EU average decreased by 4.7% between 2010 and 2016

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 Bulgaria the value is 3,11 %, which ranks the country at the 33th place, while the EU average is around 11%.

Although the innovation capacity of the Bulgarian companies has been improved after the accession of Bulgaria to the European Union and the start of OP “Competitiveness”, the whole picture in this field nowadays shows achievements, which are significantly below the capacity. The Bulgarian companies are spending 0.39 % of GDP for R&D, compared with 1.31% in EU – i.e. the percentage is about 3 times lower. The ratio is analogical for the public expenditures. The Bulgarian companies occupy 105 and 106 place in the world with regard to innovation and business complexity¹⁷.

The studies show that the aptitude for innovations of the Bulgarian companies is positive and considerably correlates to their R&D costs and the connected with that investments in technological infrastructure, as well as that their production is increasing together with their innovation efforts, no matter whether the company is new on the market or not. 18

As has been mentioned, Bulgaria is one of the countries, which are modest innovators. It occupies the last place in the ranking of the member states.

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 (**Error! Reference source not found.**). Bulgaria is with a value of about 1,11 (2015) and ranked at the 33th place, and value 2,35 and ranked 31th place for 2014 while the EU average is 28.7. For Switzerland, Ireland and Denmark this indicator is 100.

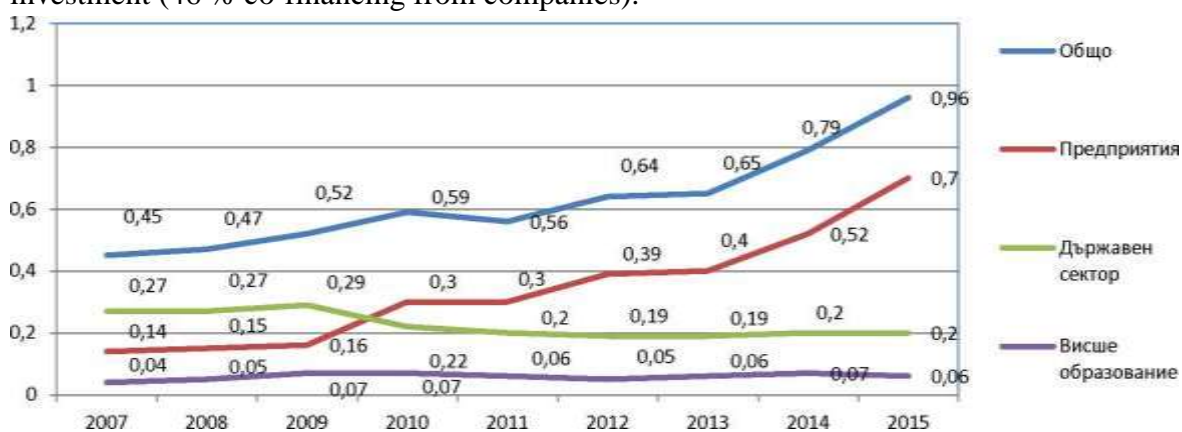
Assessment of the participation of Bulgarian scientists in international scientific cooperation can be done, based on internationally visible scientific publications with foreign co-authors (Fig. 4b). For Bulgaria, this number, referred to 1 mil. residents is almost constant for the period 2008-2015 – 160-180 per year with increase below 10%³. For EU countries and for neighboring countries, like Romania and Serbia, this number increases, respectively by 55%, 81% and 126%, where for Serbia the absolute value goes above 300. These results show that the Bulgarian scientists gradually lose positions in the International scientific community.

The reduction in the field of scientific research is clearly seen also in the participation of Bulgaria in the EU framework programs. Bulgaria has received 12.8 Euro per person of

³ European Innovation Scoreboard 2016, data from Web of Science

the population from the 7th Framework program, while the average value for EU is six times higher - 78.9 Euro⁴. The success of the projects with Bulgarian participation is also lower, compared to the average success for EU, respectively 15.4% and 20.4%. The tendency during the first two years of the “Horizon 2020” framework program is even more negative. The funds received by the Bulgarian participants are 1.55 Euro per person of the population, while the average value for EU is almost ten times higher - 14.60 Euro⁵. For 2015, the success of the projects with Bulgarian participation is 5.6%, and the average value for the program is 11.6%

The indicator of *private co-funding of public R&D expenditures* measures the co-operation between the public and the private sector. Business in Bulgaria invested approximately BGN 621 million in research and innovation projects in 2015 – an increase by 45 % from the previous year, and 10 times more than the pre-accession 2006. Foreign finance (5 % share in the last year of the review period) plays the biggest role in the raising of internal private investment (46 % co-financing from companies).



After a quick drop in the intensity of the funding of scientific research and development activities in Bulgaria (combined public and private investments as a percentage of the GDP) from 2,16% in 1990 to 0,56% in 1995, the share of funding had a slight increase up to 0,79% in 2014. In this way Bulgaria leaves on the bottom of the chart in terms of investments of EU members states in scientific research and development activities (24th place out of 28 EU member states) and significantly below the average value for EU for intensity of funding of such activities of 2.03% for 2014. Especially troubling is the reduction of the public share of investments in scientific research and development activities (combined state sector and sector of the higher education), which has dropped from 0.35% in 2007 to 0.25-0.27% for the last four years. According to that indicator, Bulgaria is not only occupying the penultimate place in EU (Table 1), but is falling behind neighboring countries, which are not EU members, like Serbia and Turkey, with share of the public investments for scientific research and development of, respectively, about 0.60% and 0.50% for the last four years.

Table 1. Public expenses for scientific research and development as per 2015 of the EU member states

⁴ European Commission, JRC-IPTS (2015), Stairway to Excellence Facts and Figures: Bulgaria

⁵ Report Horizon 2020 Two years on, 2016

COUNTRY	Public expenses for scientific research and development per 2015 (% of GDP)	COUNTRY	Public expenses for scientific research and development per 2015 (% of GDP)
Austria	0.86	Latvia	0.45
Belgium	0.70	Luxembourg	0.59
Bulgaria	0.27	Malta	0.33
United	0.57	Poland	0.50
Germany	0.92	Portugal	0.66
Greece	0.54	Romania	0.22
Denmark	1.08	Slovakia	0.56
EU	0.72	Slovenia	0.54
Estonia	0.80	Hungary	0.38
Ireland	0.40	Finland	1.00
Spain	0.58	France	0.76
Italy	0.54	Czech	0.87
Cyprus	0.32	Sweden	1.04

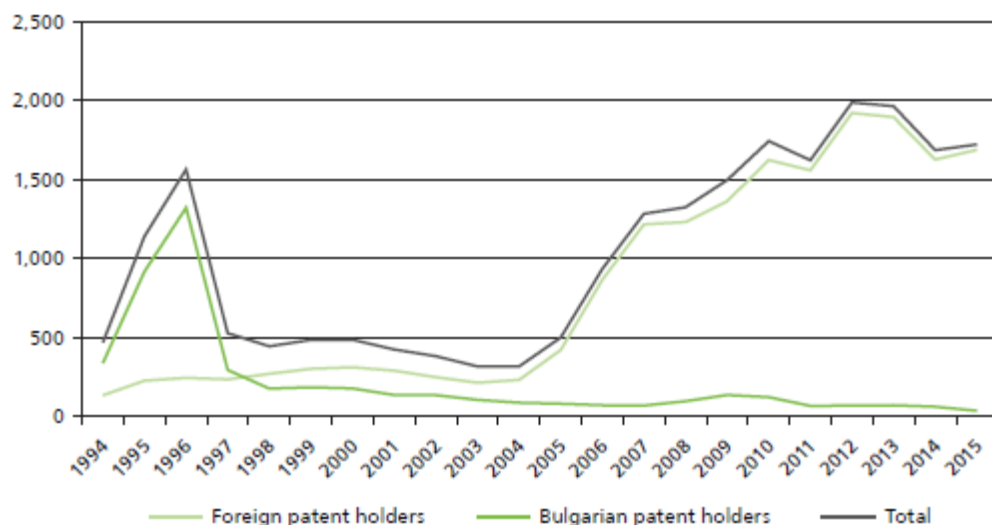
6.4.3. Intellectual Assets

The structure of the **patents** of the Bulgarian patent holders shows the highest activity of the group of the physical persons, who own 765 patents (68.3 %), followed by the business sector with 276 patents (23.3 %), state sector - 89 patents (6.8%) and “Tertiary Education” sector - 18 patents (1.6 %). The share of the Bulgarian Academy of Science (BAS) in the total number of Bulgarian patents amounts to 5.2 % and is 3.5 times higher than the share of the “Tertiary Education” sector. BAS owns almost 81 % of the patents in the state sector. The analysis of the structure during the last decade shows increase in the shares of the business and the state, which shapes a trend towards overcoming the low degree of institutionalization of the patent activity in Bulgaria.

The analysis of the Bulgarian patent activity in front of the European Patent Office (EPO) shows that during the last decade the yearly average has been equal to the issuance of 4-5 patents to Bulgarian applicants. Approximately 40% of the issued patents are concentrated in 5 technological areas – mechanics, lighting, heating, motors and pumps (10 patents), special machines (4 patents), pharmacy (4 patents) and medical equipment (3 patents)

The Bulgarian patent activity in front of the US Patent and Trade Mark Office is significantly higher due to the big interest on the part of the Bulgarian companies to enter the American market and the facilitated administrative procedures. During the period 2000 – 2012, 208 American patents were issued (compared with submitted 744 applications). This is an evidence for the increased interest of Bulgarian applicants towards patenting and economic realization of their technological products on USA territory – computer systems for data transfer and processing (19%), management of data bases or data structures (18%), software development, installation and management (14%), etc.

Figure 6-3 Number of Patents granted for Innovation, Bulgaria

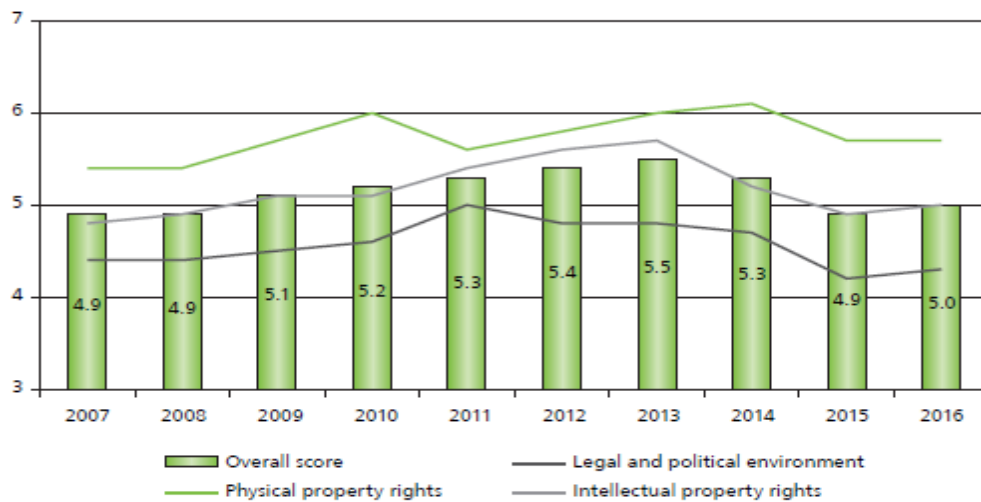


Source: Based on data from the Official Gazette of PORB.

Bulgaria is ranking 27th place for registered *trademarks*

According to the conducted SME surveys in the beginning of 2013, 30% of the entrepreneurs in the industry have declared availability of sufficient financial resources for intellectual property registration. The share of the industrial SMEs with own registered **trademarks** in Bulgaria or abroad is 42%. The share of the micro enterprises with such registration is 27%, of the small — 47%, and of the medium — 61%. The enterprises which own national patents are 20%. Registered patent have 12% of the micro enterprises, this share for the small companies being 21% and for the medium ones — 32%. The share of the micro enterprises, which have declared that they have financial resources to register intellectual property, is 20%. This share of the small companies is 31%, and of the medium — 43%.

Figure 6-4 Trademark applications



Source: International Property Rights Index.

Bulgaria is proud of ranking 5th place for *Design*

Bulgaria is well known as an ICT oriented country. Some of the activities and facts that characterize the past of the industry in the country are: the first electronic digital device Atanasoff - Berry; the largest production of personal computers (Pravets, IMCO) in Eastern Europe; the production of IBM compatible mainframe computers; design and prototype of the first digital watch and the first digital calculator; highly educated and qualified human resources and others. Until 1990, Bulgaria has specialized in manufacturing computer hardware and software development and production within the Council for Mutual Economic Assistance.

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:

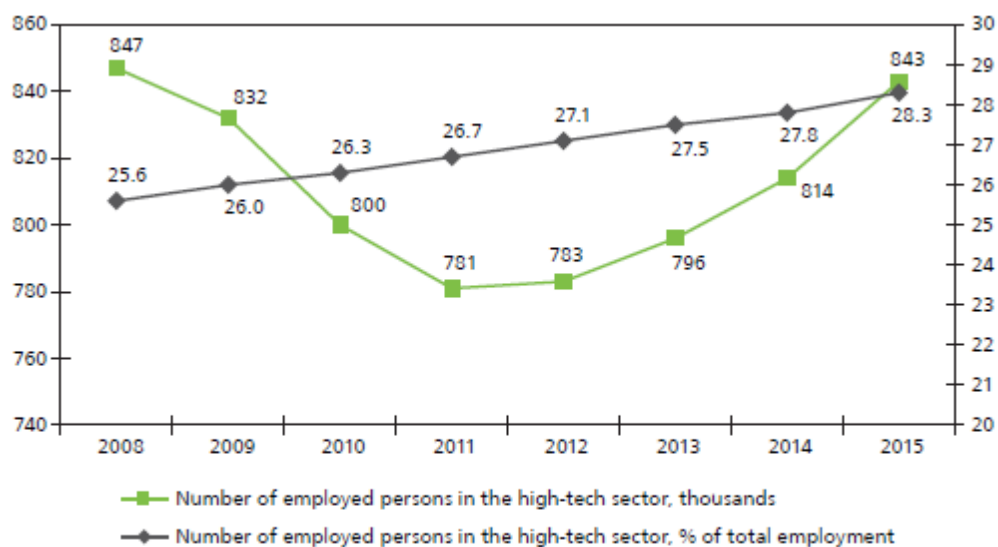
- Exports of medium and high technology products
- Knowledge-intensive services exports
- Sales of new-to-market and new-to-firm innovations

6.5.1 Employment impact

Performance in Employment impacts reflects the overall classification into four performance groups less well with only two Innovation Leaders in the top-5 positions. Ireland, a Strong Innovator, is the best performing country in the Employment impacts dimension, followed by Malta, a Moderate Innovator, and the United Kingdom ranks third. Most of the Innovation Leaders, except Finland, are amongst the leading countries in this dimension and perform above the EU average. Bulgaria, a Modest Innovator, shows a strong performance just below the EU average. Innovation Leader Finland and Strong Innovators Slovenia, Belgium, Austria, and France all perform below the EU average. The highest rate of performance increase between 2010 and 2016 is observed in Malta (31.6%), followed by Latvia (29.1%), and Croatia (27.3%). Other strong increases over time are observed for Estonia, Portugal, Ireland, and Romania. For 18 EU Member States, performance increased between 2010 and 2016. The EU average has increased by 0.1%. Strong decreases are observed in Denmark (-29.0%), Germany (-20.8%), and the Czech Republic (-20.3%)

The positive impact of the "employment in the high-tech sector" factor on the innovation activity in the country could be further undermined, given the fact that in the period 2008 – 2015 the absolute values of the indicator decreased, although minimally, after the growth in the second half of the period failed to offset the drastic decline of 2011. Within the European Union, the most serious regional imbalances as regards high-tech workers as a percentage of total regional employment are found in Romania with a gap between the regions with highest and least developed high-tech sectors of some 8.5 times, followed by Spain (7.91), United Kingdom (6.5), Greece (5.88), and Poland (5.64). The result for Bulgaria is 5.50 times higher employment in the high-tech field in the South West Planning Region against the North East Planning Region. However, as the data from the Regional Innovation Scoreboard for 2016 2 show, regional differences in 7 countries, including Bulgaria, allow all regions in the country to fall within the same category. And if for Austria, Belgium and Ireland this is the category of strong innovators, and for the Czech Republic and Hungary this involves moderate innovators, the regions of Bulgaria and Romania generally fall in the group of modest innovators. While Belgium, the Netherlands, Ireland, Greece and Romania report a fall in the regional innovation index in all their regions in the last three-year period (2014 – 2016), Bulgaria is the only country in the EU-28 in which all regions report growth in their innovation index (at NUTS 1 level this concerns the two regions North and East Bulgaria and South West and South Central Bulgaria).

Figure 6-5 Employment in knowledge-intensive activities Bulgaria, 2010-2016



Source: Eurostat.³⁰

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%, and Bulgaria is ranking 6th place .

6.5.2 Sales impact

The indicator for *exports of medium and high technology products* measures the technological competitiveness i.e. the ability of companies to commercialize the results of the R&D and innovations on the international markets. This indicators also points towards the specialization for certain products in the country. the share of export of medium high-tech and high-tech products in total export of products rose by over 28 % for the period (despite this, 27th place for 2015); the share of knowledge-intensive services in total export of services rose by over 24 % for the period (despite this, 25th place for 2015);

7 Strengths and Weaknesses



8 Conclusions and Recommendations

Ten years after the accession of Bulgaria as a full member of the EU and on the eve of the Bulgarian Presidency of the Council of Europe The EU benefits to Bulgarian society and in particular to the innovative businesses in the country are visible. Among the most significant of them should note the harmonization of the Bulgarian with the European and related higher standards in the field business and lifestyle; the right of Bulgarian citizens to travel and work in the EU and in a number of cases also outside its borders; the free movement of goods and capital within the single Euro-market. Through many initiatives, Europe has proven that, alongside border, she values the diversity and the different fundamentals which are the unique language, traditions and culture of each country Member State. Under such conditions it is a matter of national effort to create the desired image of the country and to work for higher positions in the eu-the European competitive area. The main achievements for Bulgaria in the field of innovation policy and tools to promote entrepreneurship and the innovation activity of business that is direct the outcome and continuation of European policy on national level .include:

- Innovative strategy for intelligent specialization for the 2014-2020 period, which was accepted as a condition for allocating of the European Structural Funds through the national operational programs and which replaced the first in the the democratic history of the country National innovation strategy of 2004 - an extremely obsolete document in the the second programming period for Bulgaria as an EU member, which did not reflect European membership and its consequences of the financial and economic crisis and whose monitoring and reporting was discontinued only three years after the start of its application.
- Improved administrative capacity of the state and local administration in the work with European programs and in providing business services.
- Real payments under OP "Competitiveness of the Bulgarian-
- At the end of 2015 to the amount of BGN 2 160 415 879, of which BGN 340 964 407 national funding, in its large part aimed at promoting innovation
- .
- Real payments under OP "Innovation and Competitiveness" at the end of 2017 amounted to BGN 535 484 663,92 of which 80 302 917,12 BGN national funding. In response to this free enterprise enterprises responded with rapid growth of co-financing for innovative projects and under this indicator have reached leading positions in the European Innovation Scoreboard.
- Through the Jeremy initiative, BGN 1.40 billion was invested 7990 small and medium-sized enterprises, of which more than 1300 newly-(for all Jeremy tools, including Portfolio Guarantee credit losses; Low Interest Loans (with Sharing) risk); Accelerators (startup funds) . Against this background, Sofia is became the third entrepreneurial destination after London and Dublin, by the end of 2015, with 146 start-ups (with 2004), backed by accelerators.
- Real payments under OP "Science and education for smart growth by the end of 2017 to the amount of BGN 121 261 871,21, BGN 18 189 280,8 national funding And more: Absorbed funding directly through the European framework programs; foreign direct investments in the

field of high-sectors and R & D; implementation of a number of sustainability social, open innovation - possible only because of Bulgaria's EU membership.

Recommendations

1. Further institutional reforms are critical to improve policy design and implementation. Despite recent institutional changes, Bulgaria's OPC management structure needs further reform: the institutional setup is not in line with international good practices, which suggests that the development of an independent, stand-alone specialized agency can be an effective way to manage public resources targeting innovation; the OPC Managing Authority (MA) lacks human capital with the right mix of experience, as well as the long-term perspective needed to develop the capacity for effective implementation; MEET would need to play a stronger role at the policy level and lead the dialogue among stakeholders on the country's innovation policies and programs.
2. Better and more competitive financing of the research it is necessary to re-structure the National Science Fund into one agency for financing of scientific researches, which is politically and operatively independent. It must significantly increase the multiannual programmes for provision of gratuitous funds for scientific researches assisted by a transparent, responsible, quality-based competition, the criteria for that must be envisioned based on the international standards and practices. This recommendation will be realized within the framework of the horizontal activity.
3. The new OP Innovation and Entrepreneurship to be developed for the 2014-2020 cycle (OPIE) is an opportunity to introduce new innovation instruments targeting various stages of the innovation value chain. The OPIE will mostly likely be the primary public source of innovation finance in the 2014-2020 perspective. In order to complement already existing innovation instruments and address existing gaps in supporting all stages of the innovation value chain, there is a menu of new instruments that would complete and boost Bulgaria's national innovation system: Business incubators that include early stage investment funds Proof of Concept Labs which will support prototyping and piloting for product innovation; Mobile Industry Applications Labs that would provide the necessary infrastructure for the deployment and scaling up of mobile applications; A Network of Technology Transfer Offices with an off-campus office providing specialized services in research commercialization; Programs promoting collaboration with Bulgaria's highly skilled Diaspora that would result in connection to the global knowledge networks and innovation experts; Innovation Vouchers for SMEs that would encourage behavioral change in SMEs in traditional sectors towards innovation
4. Adoption of an effective procedure for release of an academic position in case there is an unsatisfactory attestation result.

5. Adoption of an order for limiting or discontinuing of the financing of science units or organizations in case of unsatisfactory results from their scientific evaluation.
6. Increasing qualification of the scientists in the scientific organizations and higher schools. The successful scientific activity is related with constantly increasing of qualification. Although this measure is related to all scientists and specialists, a special attention has to be paid to the qualification increase for young scientists and for scientists from institutions in areas with weak economic development.
7. Introduction of a system for differentiated payment to scientists, including two components: (1) main work salary – with fixed amount for the individual scientific positions, doctors and post-doctors in budget science organizations and higher schools and (2) additional material stimulation bound to particular scientific results.
8. Strengthening monitoring and evaluation in the OP. A consolidation of mechanisms already introduced under OPC and new innovation instruments could boost Bulgaria's innovation-based competitiveness. In parallel, it is important to strengthen the monitoring and evaluation in the OP IE. Options that exist include having a richer set of indicators that balance outputs and outcomes, introducing rigorous impact evaluation to measure the additionality of different instruments and improving the coordination with other ministries so that the results achieved are visible.
9. Early stage investment funds in Bulgaria could assist in the identification of high potential start-ups and increase the pipeline for Venture Capital. New enterprises, particularly those backed by venture capital, have proven to be a key engine for innovation. Whereas large firms often focus on existing clients and markets, new companies will often focus on exploiting new market opportunities. To attract venture capital, a company must have successfully developed the innovation, proved its technical capability, and identified probable commercial applications and markets. At that stage, venture capital provides the funds to expand production and develop those markets, and plays a critical role in supporting the later and most visible stages of commercialization.
10. The fact that innovation policy in Bulgaria is designed and implemented by multiple ministries and agencies limits horizontal coherence in policy making and implementation and has negatively impacted the quality and rate of public expenditures on research and innovation. The Ministry of Education, Youth and Science (MES) and the Ministry of Economy, Energy and Tourism (MEET) are the main policymaking and executive bodies in the areas of science and technology and innovation policy, respectively. Their functions are complemented by several executive agencies and advisory bodies. Other ministries (primarily Agriculture, Health, and Defense) are formally responsible for research activities within their respective areas. The National Council on Innovation which is supposed to play an advisory role has not played a significant role in influencing Innovation Policy in Bulgaria as is typically the case with Advisory Councils without a clear legal mandate.

11. Effective policy making in innovation is complex given the long term impact and systemic nature of innovation with significant risk of capture by stakeholders and therefore institutional development plays a key role in improving the quality of policies. The major challenge is to prevent two great dangers that typically weaken institutional governance: the natural tendency of governments to focus on policies with short-term benefits; and the equally natural propensity of the multiple agencies responsible for implementing policies to establish their own

12. Promoting the integration of science policy and technology development requires policies that respond to market signals and complement private sector willingness to invest in public goods, R&D, and human capital. Countries use different models to organize state policymaking and coordination among different aspects of innovation (science and advanced education, research and technological development, economic and business innovation).

13. Bulgaria's inadequate research and knowledge infrastructure has led to a decline in scientific productivity and reversing this decline is a major policy challenge. The benchmarking of Bulgaria's research system and review of its key institutional and funding aspects point to five interconnected objectives that need to be integrated into the RIS3 priorities and be the focus of regular monitoring and evaluation: - Addressing institutional imbalances in the research system - Establishing incentive systems that promote excellence - Making scientific specialization responsive to the need for economic specialization - Making research careers more attractive and retaining talent - Stepping up R&D, commercialization, and public-private cooperation.

14. Increasing the effectiveness and impact of the research system requires new policies that address the imbalances in how the system is organized.

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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 (%)	1.3%	1.9 %	0.0 %	0.9 %	1.3 %	3.6 %	3.9 %
2	Debt (millions EUR)	5,856.1	6,284.2	7,004.9	7,147.0	11,531.8	11,772.3	13,969.8
3	Inflation (%)	2,4%	4,2%	3,0%	0,9%	-1,4%	-0,1%	-0,8%
4	Interest rate (%)			0,11%	0,02%	0,03%	1.5%	
Composition of employment - Numbers		2010	2011	2012	2013	2014	2015	2016
1	Agriculture & Mining	101 746	104 981	107 383	109 509	108 844	110 850	125 163
2	Manufacturing	537 415	537 119	524 723	523 400	535 780	544 805	549 555
3	Utilities & Construction	250483	228735	217664	212126	212155	212181	208 120
4	Services	1 059 904	1 057 583	1 054 348	1 055 314	1 066 802	1 078 351	
5	Public administration	648 100	635 100	642 100	644 300	646 300	645 500	649 700
Composition of employment (%)		2010	2011	2012	2013	2014	2015	2016
1	Agriculture & Mining	3,91%	4,09%	4,21%	4,30%	4,23%	4%	
2	Manufacturing	21%	21%	20,6%	21%	21%	21%	
3	Utilities & Construction	10%	9%	8,5%	8%	8%	8%	
4	Services	41%	41%	41,4%	41%	41%	42%	
5	Public administration	25%	25%	25%	25%	25%	25%	

Trade balance (millions Eur, exports and imports)		2010	2011	2012	2013	2014	2015	2016
1	Trade balance (millions EUR, exports and imports)	-3 683,60	-3 141,84	-4 688,96	-3 556,65	-4 020,75	-3 469,20	-2 600,40

Source: NSI Bulgaria.

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)	337147	336631	342934	348372	354988	363905	337147
2	SMEs (10-249 employees)	29030	28853	28365	28265	28165	28816	29030
3	Large enterprises (250+ employees)	752	756	737	746	752	739	752
4	Share of foreign controlled enterprises							
Percentage %		2010	2011	2012	2013	2014	2015	2016
1	Micro enterprises (0-9 employees)	93%	92,0%	92,2%	92,3%	92,5%	92,4%	93%
2	SMEs (10-249 employees)	8,6%	7,9%	7,6%	7,4%	7,4%	7,4%	8,6%
3	Large enterprises (250+ employees)	0,2%	0,2%	0,2%	0,3%	0,1%	0,2%	0,2%
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)	32109	42136	39055	39333	40358	32109	42136
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)	3,21	3,16	3,16	2,93	2,94	3,22	3,26

Source: NSI Bulgaria (2017)

Table 1.3. Socio-Demographic Environment

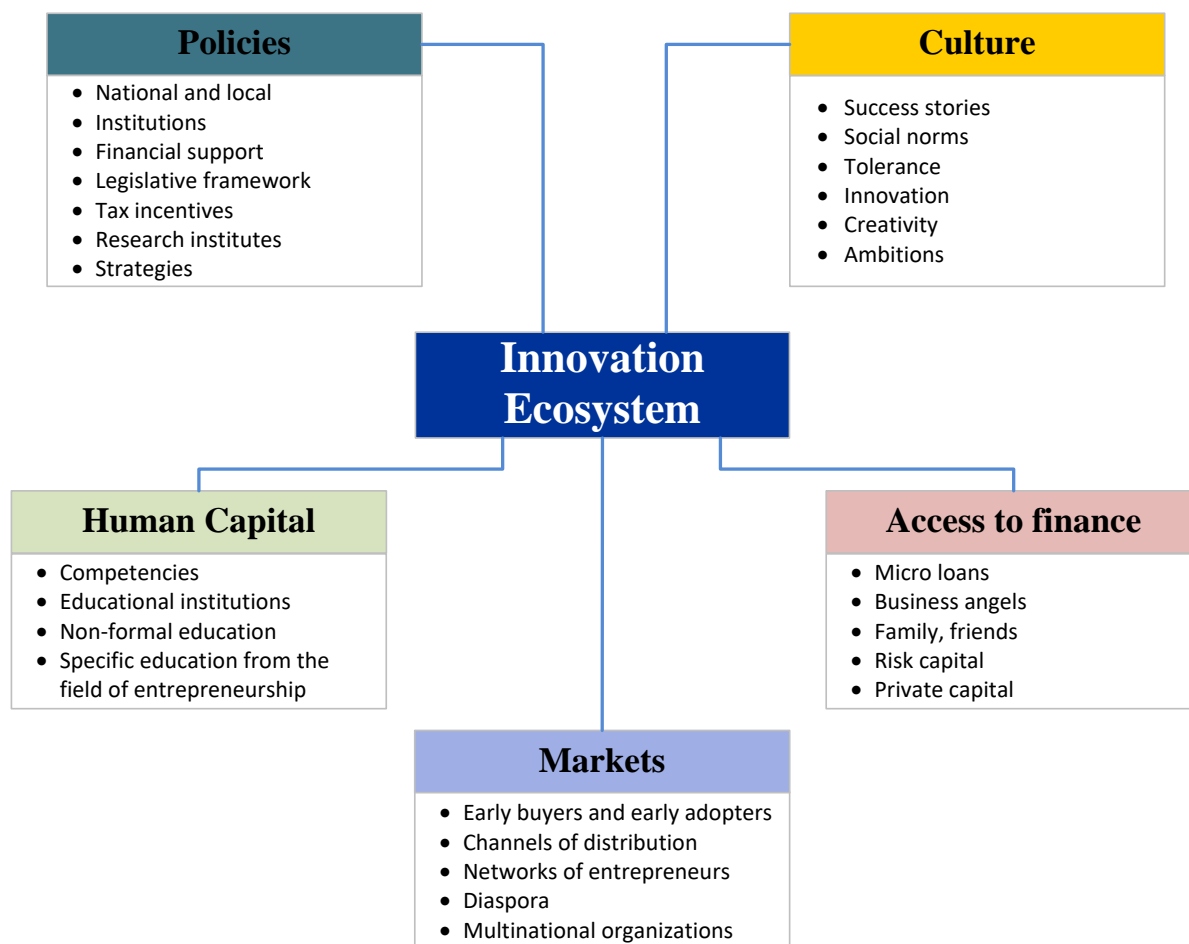
Indicators		Value						
		2010	2011	2012	2013	2014	2015	2016
1	GDP per capita PPS (EUR)		6 033,24	6 237,76	6 237,76	6 544,53	6 953,57	
2	GDP growth (%)	1,3%	1,9%	0.0%	0,9%	1,3%	3,6%	3,4%
3	Population size (millions)	7 504 868	7 327 224	7 284 552	7 245 677	7 202 198	7 153 784	7 101 859
4	Change in population (%)	-4,6	-5,1%	-5,5%	-5,2%	-5,7%	-6,2%	-6,0%
5	Population aged 15 - 64 (number)	5 141 057	4 966 189	4 899 092	4 831 866	4 763 673	4 693 792	4 628 724
6	Population density (persons per km2)	67,62	66,01	65,63	65,28	64,89	64,45	63,98
7	Degree of urbanisation (%)	71,62%	72,67%	72,86%	73,03%	73,13%	71,62%	72,67%

Movements in the active labour force		2010	2011	2012	2013	2014	2015	2016
1	Age (15-64) (%)	47,9	46,6	46,6	46,9	48,0%	49,1%	49,3%
2	Gender (%)							
3	Total (%)	47,9%	46,6%	46,6%	46,9%	48,0%	49,1%	49,3%

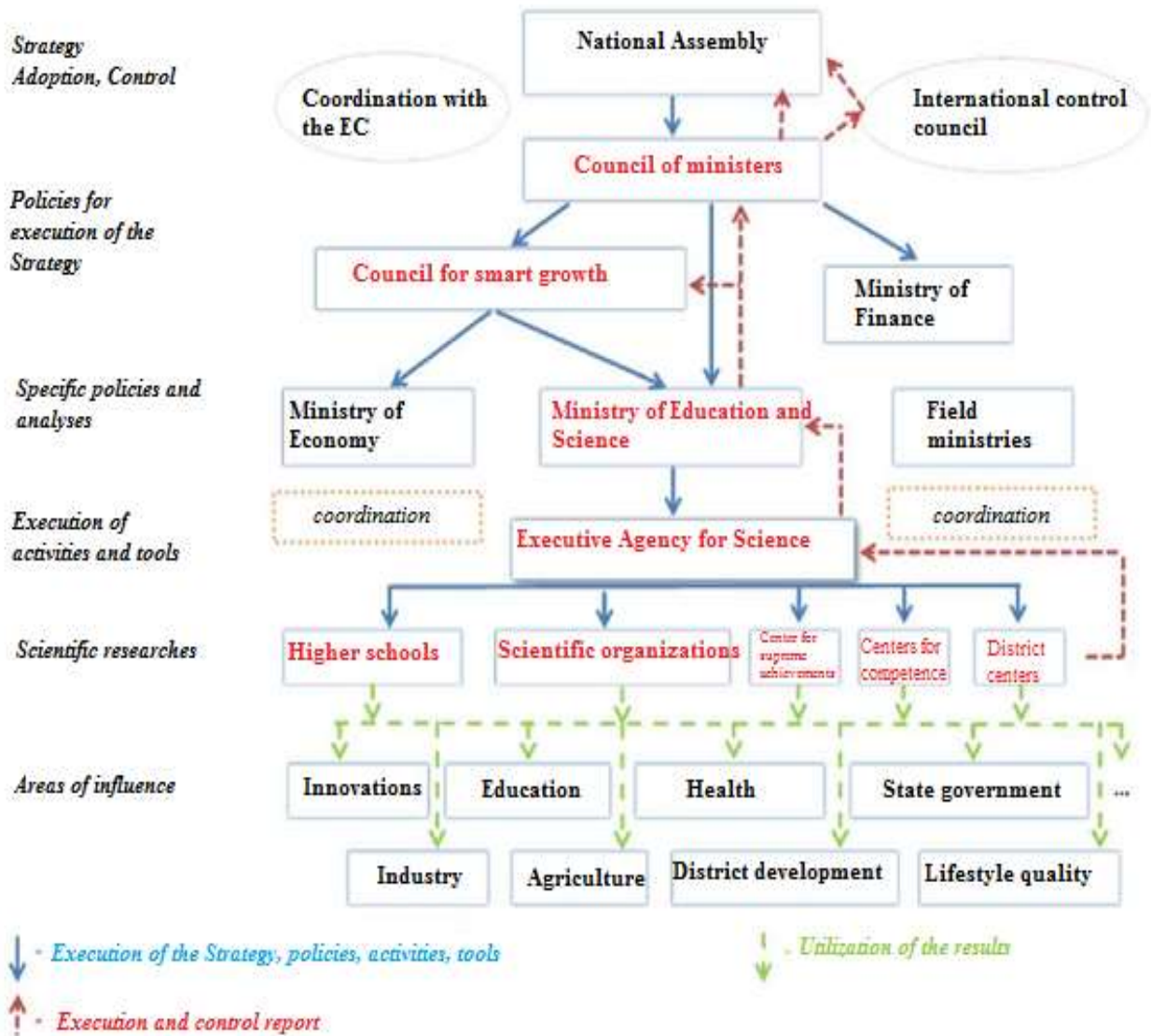
	Men (%)	59,4	51,1	50,8	51,4	52,7	54,1	54,6
	Women (%)	47,8	42,4	42,6	42,8	43,6	44,5	44,3

4	Employment status (numbers)	2010	2011	2012	2013	2014	2015	2016
	- employed	3 075 300	2 965 200	2 934 000	2 934 900	2 981 400	3 031 900	3 016 800
	- unemployed	352 350	376 300	410 400	436 275	384 500	305 100	247 300

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

InnoPlatform project is co-funded by the European Union
and National Funds of the participating countries