THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA: REVIEW OF THE NATIONAL INNOVATION SYSTEM
In the former Yugoslav Republic of Macedonia, although several aspects of innovation policies are addressed by public institutions and strategies, no comprehensive strategy to develop the innovation performance of the national innovation system has been developed. Within the framework of the Regional Competitiveness Initiative, a project conducted with the financial support of the European Union, the government has requested the support of the OECD in drafting an innovation strategy and the related action plan. This report, which was drafted by the Private Sector Development Division of the OECD, represents the first step in this process.

The report, which draws on the experience accumulated by the Science Technology and Innovation directorate of the OECD, provides an analysis of the various components of the national innovation system. This approach relies on the idea that innovation results from a complex set of relationships between various stakeholders including enterprises, universities, public research institutions and the government. Hence, the flows of technology and information between people, enterprises and institutions are key to the innovative process (OECD, 1997).

In order to analyse all the aspects of innovation in Macedonia, including both innovation inputs and outputs, the report examines the framework conditions for innovation, the performance of research institutions, the role of the business environment, the intensity of knowledge flows and government policies relevant to innovation. The analysis of these specific policies and inputs for innovation are preceded by an executive summary of the report and a chapter on the general economic and innovation performance of the former Yugoslav Republic of Macedonia.

The assessment was conducted between February and June 2011 and was based in particular on two surveys submitted to private companies and to public research institutions. In addition, a number of interviews were conducted with representatives of the office of the Prime Minister, of the Ministry of Economy, the Ministry of Education and Science, and with a number of private companies as well as private sector associations.

The purpose of this report is to provide an analytical base on which to ground the elaboration of a National Innovation Strategy for the former Yugoslav Republic of Macedonia. In the next phase of the project, the OECD will support the Government of Macedonia in selecting the initiatives that are most relevant to help further develop the innovation capacity and meet the economic challenges that the country faces.
ACKNOWLEDGEMENTS

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It should be noted that the recommendations included in this report do not constitute a comprehensive innovation strategy. Instead, they provide a review of the various issues faced by the innovation system and provide a presentation of the main solutions that have been found by other economies in order to propose possible policy measures. In a secondary process, the preparation of the Innovation Policy and the related action plan will provide a list of priority measures and will develop the specific actions that will be implemented.
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**APPROM** Macedonian Agency for Entrepreneurship Promotion  
**AEC** Agency for Electronic Communication  
**BEEPS** Business Environment and Enterprise Performance Survey  
**BERD** Business Expenditures on Research and Development  
**CCI** Chamber of Commerce and Industry  
**CEFTA** Central European Free Trade Agreement 2006\(^1\)  
**CIRI** Chamber of Economy’s Centre for Implementation of Development Ideas  
**CIS** Community Innovation Survey  
**CMC** Network of Certified Management Consultants  
**CORDA** Community Research and Development Information Service  
**EBRD** European Bank for Reconstruction and Development  
**EC** European Commission  
**EIB** European Investment Bank  
**EPO** European Patent Office  
**EU** European Union  
**EIS** European Innovation Scoreboard  
**EIU** Economist Intelligence Unit  
**ETF** European Training Foundation  
**FME** Faculty of Mechanical Engineering  
**FDI** Foreign Direct Investment  
**GDP** Gross Domestic Product  
**GII** Global Innovation Index  
**GIZ** Gesellschaft für Internationale Zusammenarbeit

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\(^1\) CEFTA parties include Albania, Bosnia and Herzegovina, Croatia, Kosovo under UNSCR 1244/99, the former Yugoslav Republic of Macedonia, the Republic of Moldova, Montenegro and Serbia.
For the purposes of this report, South East Europe includes Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo under UNSCR 1244/99, the former Yugoslav Republic of Macedonia, Montenegro, Romania and Serbia.
EXECUTIVE SUMMARY

Economic theory and empirical studies have demonstrated that innovation is among the key drivers of economic growth (Schumpeter, 1939; OECD 2010a). Innovation can help increase productivity and the quality of goods and services, making firms more competitive. However, developing a sound innovation policy requires understanding the existing capacities of the country and identifying problems to offer solutions. The current report aims to highlight the successes of the past years in reforming the former Yugoslav Republic of Macedonia to foster innovation as well as the remaining problems and aims at finding solutions to tackle these challenges.

The government of the former Yugoslav Republic of Macedonia has already embarked the country on a path of reforms to facilitate growth and innovation. The National Development Plan and a Small and Medium-sized Enterprises (SME) policy based on the European “Small Business Act” are examples of programmes that aim to develop the country with the aims of improving living standards, long term integration in the European Union (EU), good inter-ethnic relations and investment in education to enhance the creative and productive capabilities of its citizens. Other reforms, such as the Ministry of Economy’s Industrial Policy which includes “Applied R&D and Innovation” as one of its priorities, setting aside MKD 3 millions for cluster and network development, have addressed the innovation system more specifically. However, many challenges remain to be faced in order to foster innovation in the former Yugoslav Republic of Macedonia.

The former Yugoslav Republic of Macedonia has experienced a steady pace of economic growth for almost all of the past 15 years, notwithstanding the year 2001. Despite an increase in GDP per capita (PPP) of 37% between 1995 and 2009, the corresponding 2.3% rate of annual growth from 1995 to 2009 was the lowest in the region. Furthermore, 31.1% of population still lived in relative poverty in 2010 (State Statistical Office, 2010) and 54.9% of the labour force between 15 and 24 are unemployed, which is the highest rate of youth unemployment in South East Europe (SEE)3. (World Bank, 2011a) The low level of foreign direct investment (FDI), even by regional standards, indicates that companies in the former Yugoslav Republic of Macedonia are facing challenges to export their products and that efforts need to be conducted to improve competitiveness.

There is much room for improving innovation in the former Yugoslav Republic of Macedonia. While some innovation takes place in firms, few resources are dedicated to innovation and the innovation output of the country is weak. In particular, the former Yugoslav Republic of Macedonia files fewer patents and trademarks and has a lower share of high tech exports compared to its peers in South East Europe.

Framework conditions

To support innovation, the creation of new technologies and the flow of information in both the public and the private sector, certain framework conditions need to be present in the country. Necessary

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3 This unemployment figure over represents the amount of unemployed workers because it comprises a large number of people who register as unemployed to get social security benefits (EBRD 2010) while in reality being self-employed.
framework conditions include a certain level of human capital, access to finance and legislations to regulate intellectual property, competition and trade.

The education system in the former Yugoslav Republic of Macedonia has also been significantly reformed over the past years and the country notably joined the Bologna process in 2003. Two positive developments were the expansion of the duration of primary education and the setting up of a Council for Vocational Education and Training as well as a Centre for Vocational Training to align school curricula with vocational training. This latter initiative is particularly relevant given that there are important skill gaps in the former Yugoslav Republic of Macedonia. There is also room for further developing human capital beyond the school system as companies invest little in training their employees. Access to finance is a weakness in the framework conditions for innovation in the country. Indeed, companies consider access to finance to be a barrier for their development. High levels of collaterals are required and guarantee schemes as well as public credit information services are underdeveloped. However, since innovation projects can be of long term nature and entail high risk, equity finance is often better suited than debt finance for these projects. The nascent efforts to create business angel networks and venture capital funds, few of which are recorded in other countries in SEE, are therefore a positive aspect.

The government has also worked on creating a regulatory climate favourable to businesses. According to the OECD Investment Reform Index, restrictions to foreign direct investment appear minimal in the country (OECD, 2010c). The reforms that took place, such as improving the ease to start a business, helped placing the former Yugoslav Republic of Macedonia as the country in the region with the best “Doing Business Indicator”. Even though the regulation of industrial property rights is well advanced in the country and it has ratified most of the international frameworks for Intellectual Property Rights (IPR), enforcement of the legislation on IPR needs to be improved. The former Yugoslav Republic of Macedonia is a member of the World Trade Organisation (WTO), the Central European Free Trade Area (CEFTA) and has also signed bilateral trade agreements. The government has also ratified bilateral treaties and international instruments to regulate investment disputes. However, attention should be directed towards implementing the recent legal reforms and removing remaining restrictions.

Research institutions

The policy design for matters related to innovation takes place primarily in the Ministry of Education and Science and the Ministry of Economy. The Ministry of Education and Science is in charge of issues such as education, science, technology, research and development (R&D) while the Ministry of Economy is responsible for the national strategies for SME development, FDI and industrial policy. The State Office of Industrial Property (SOIP) is the body in charge of acquiring and protecting industrial property rights.

While the bodies above are responsible for the framework and policies to encourage research and innovation, the implementation of research takes place in higher education institutions, the Academy of Science and Arts (MASA) as well as the limited research facilities of the private sector. Higher education institutions consist of five state universities, about 18 private for profit universities and one private not-for-profit university. These universities are involved both in teaching and research but tend to overlook the commercialisation of research. In principle, the key institution for the development of sciences, research, innovation and new technologies is MASA.

Innovation and R&D in both public research institutions and the private sector are constrained by a significant lack of funding. The gross expenditure dedicated to research and development (GERD) represented only 0.18% of GDP in 2007, which is very low compared to the 0.46% average share in SEE economies (UNESCO, 2011). As a consequence of the lack of funds, MASA for example suffers from outdated equipment, unattractive wages and a lack of young researchers and labour mobility in the institution. In addition, very few companies have in-house R&D capabilities.
Besides low base funding, further weaknesses of the research institutions are the lack of collaboration with businesses and the lack of labour mobility. Furthermore, policies for intellectual property rights such as patents and trademarks, determining, for example, whether the rights should belong to the university or individual academics, are lacking. Innovation in the business sector

Results from the Community Innovation Survey (CIS) and from a GfK survey show that about one third of firms introduced at least one type of innovation between 2008 and 2010 which is similar to the EU27 average. However, almost half of micro companies did not introduce any type of innovation and patenting activities were also limited. The innovative activity of firms is positively correlated with many performance indicators. Firms that innovate are more likely to export and most firms experience significant increases in turnover and profits after introducing innovations.

While firms do innovate, they dedicate few resources to R&D. Business expenditure on R&D accounted for only 23% of GERD in 2007 (Erawatch 2010) compared to 55% in the EU (Eurostat 2011a)\(^4\). Furthermore, half of the companies do not offer any form of training to their employees. Companies rely more on internal knowledge for innovation than external knowledge so that co-operation between companies and other stakeholders is limited. Half of product innovations are developed internally by firms, and only a small share of innovation arises from collaboration with other companies or with research institutions, even if a majority of companies declare having an interest in future co-operation. Links between companies and universities or research institutions are particularly rare, even though firms which have established formal links with academia tend to be more innovative.

Companies consider the high cost of innovation and limited access to funding such as bank credits or equity finance as the main constraints hindering them to innovate. Non-financial constraints include inadequate government regulation and lack of institutional support, uncertain market demand for innovative goods, the market power of incumbent companies, the low level of co-operation with academia or other stakeholders and the difficulties in identifying co-operation partners, and the lack of management skills. In line with the financial aspect of innovation being considered the main constraint, most companies are in favour of tax incentives or other types of financial contributions by the government to support innovation. A smaller share of companies indicated that support schemes to develop employee training or that foster the ex-change of know-how between companies would be most useful to further develop their innovation potential. As almost half of the companies surveyed are not aware of existing support initiatives, the raising of companies’ awareness with respect to the importance of innovation and related support measures should be a priority.

Research-industry linkages

A cost-efficient way to increase the innovation capacity of a country is to strengthen the linkages between businesses and between businesses and research institutions to facilitate knowledge flows. Even though several attempts are being made to increase those linkages in the former Yugoslav Republic of Macedonia, there is room for improvement.

An example of an existing local measure to increase linkages among businesses is the Youth Entrepreneurship Service incubator in Skopje that provides low-cost rent and/or consultancy services to 30 start-up businesses which interact closely among each other. According to interviews with companies, local innovative companies have used the services of the business incubator, in particular for IT support.

\(^4\) However, because there are no fiscal benefits for R&D expenditure in the country, firms may be under-reporting R&D spending.
Nevertheless, business incubators rely on international funds and tend to be unsustainable once external funding has ceased.

The United States Agency for International Development (USAID) initiated an effort to support business clusters. There are currently 15 clusters in the country according to the Ministry of Economy. The Ministry of Economy has also started to allocate funds for cluster promotion and development in 2011 and is further planning a new project to assist clusters and facilitate innovation. Nevertheless, the Ministry of Economy has noted that existing clusters fail to successfully develop economies of scale to increase innovation and the commercialisation of new products.

Other existing measures to foster linkages are consulting services and networks of consulting services, provided for instance by the Macedonian Agency for Entrepreneurship Promotion (APP RM). Nevertheless, the lack of wide publicising efforts has raised doubts on the effectiveness of these schemes. At present, there are no Science and Technology Parks but plans to create one are underway. Anecdotal evidence suggests that the lack of formal linkages is partially compensated by informal contacts between academics and companies.

Role of the government

The Ministry of Education and Science and Ministry of Economy are the main governmental bodies in charge of innovation-related matters. Recently, the Ministry of Education and Science has drafted an R&D Strategy, which has not yet been approved by the government, to reportedly raise R&D expenditure from 0.22% to 1.8% of GDP by 2020, which seems difficult to achieve. In contrast, Bosnia and Herzegovina, which spent 0.10% of its GDP on R&D in 2008, aimed to increase GERD to 1% of GDP by 2015. The Ministry of Economy has submitted a new programme for investment which aims to improve the general business climate and stimulate investment. It has also published an SME strategy for 2002-2013 which notably aims to develop the innovation capacity of SMEs by addressing policy areas included in the Small Business Act (SBA) developed by the European Commission (EU, 2008a).

Other programmes such as the Export Promotion Strategy for the Software and Information Technology Services Industry and the Export Promotion Strategy developed by Invest Macedonia also have the objective to increase the competitiveness of Macedonian firms. The Export Strategy seeks to create a business environment more favourable to innovation. However, the programme has not yet been approved and it remains to be seen whether it will receive sufficient funding. The SOIP has put together a Strategy for Intellectual Property 2009-2012 to improve the protection of IPR so as to encourage investment.

Only few government policies explicitly encourage innovation. These include some financial incentives, such as customs tax and partial Value Added Tax (VAT) exemption for research institutes importing scientific equipment as well as tax incentives for Technological and Industrial Development Zones (TIDZ). Public procurement requiring innovative goods and services is however limited.

There are also business associations operating at the local, national and sectoral level. One such association, the Economic Chamber of Macedonia, supports innovation through sectoral associations by raising awareness regarding innovation matters and by assisting firms to apply for domestic and international projects. It has also created a database of consultants to help companies draft applications to apply for funds.

An obstacle to the design of sound policies to promote innovation is the lack of institutional dialogue between policy making bodies. The Ministry of Education and Science and the Ministry of Economy both have few functioning internal mechanisms for dialogue. These include the Scientific Council and the yet
to-be-established Committee for Technological Development for the Ministry of Education and Science’ and the Inter Ministerial Working Group on Industrial Policy for the Ministry of Economy. An SME Forum was established to foster public private dialogue but appears to have ceased its activities. Given that business associations can informally organise ad hoc meetings with politicians or government officials there seems to be little desire on their part for a common institutional dialogue forum.

Challenges

Following this overview of the framework for innovation in the former Yugoslav Republic of Macedonia, it is possible to highlight some key challenges that the country will have to tackle in the future to increase innovation and, through it, competitiveness and growth. Four key challenges have been identified to enhance the innovation performance of the economy:

- **Weak capacities of research institutions**: The R&D capacity of research institutions in the former Yugoslav Republic of Macedonia is weak. Limited financial resources are dedicated to R&D and the number of researchers is low. As resources, in particular from the government, have been decreasing over time, research expenditures are mainly used to pay researchers salaries and almost no investment is conducted to maintain, let alone modernise, the research infrastructure.

- **Weak propensity to innovate in the business sector**: There are few incentives to back innovation-related activities in businesses and there is a limited public awareness of existing public measures to foster innovation. To be competitive on the domestic and export market, firms need to effectively engage in innovation activities. Innovation in business can occur through R&D activities, but in most cases businesses innovate by developing new products and processes, or by improving their marketing and organisation strategies. The companies that have introduced a new product and process can also face difficulties in bringing their innovations to the market. Efforts therefore need to be made to raise the awareness of companies that currently do not innovate on the need and benefits of introducing the four types of innovation (product, process, marketing and organisational).

- **Poor framework for knowledge transfer**: There is a lack of channels for knowledge flows in the economy. Increasing the absorption capacities of firms and the linkages in the economy would help the economy derive the benefits from existing knowledge and research. In particular, the most innovative companies are not well linked with the rest of the private sector and initiatives such as inter-firms networks or clusters are underdeveloped or have not been particularly successful and sustainable so far. The collaboration between businesses and research institutions is very limited and could be improved. However, since both the public and private sector carry out few R&D activities, the commercialisation of research should not be a priority for the former Yugoslav Republic of Macedonia at its current state of development. Collaboration between businesses and public research institutions may instead focus on training for skills development and on technology adaptation.

- **Lack of co-ordination of the policy-making**: Currently, the responsibility for innovation is split between several institutions, including in particular the Ministry of Education and Science and the Ministry of Economy, but there is a lack of policy co-ordination between the two ministries. Policies supporting innovation touch upon a number of policy areas, including research, education and SME support. Therefore, a continuous inter-institutional dialogue needs to be established. Furthermore, as policies in these areas ultimately aim to develop a competitive private sector, public-private consultation fora need to be developed or strengthened.
### Box 1. Policy options for the innovation strategy

**Build stronger and more market relevant research institutions**

- Increase the level of resources allocated to research and development and improve the allocation mechanisms
  - Increase the level of capital investment in research institutions
  - Revise the allocation of research funding promoting competition for funds and collaboration between research institutions and stakeholders
- Improve the connection between domestic research institutions and the international research community
  - Encourage the renewal and mobility of research personnel
  - Ensure that salaries for researchers are attractive enough to prevent brain drain and try to foster connections with the diaspora
- Ensure that the incentive structure for academics is more conducive to innovation
  - Support technology transfer and entrepreneurial activities of students and faculty members
  - Set up a regulatory environment that pays due recognition to the respective inputs of the university and the academic in relation to intellectual property rights.
  - Develop a framework to regulate and support the consultancy activities of academics.

**Enhance the business sector’s propensity to innovate**

- Raise awareness of SMEs on the benefits of innovation and on existing support measures
  - Develop a structured awareness campaign
- Set up demand-side measures to foster innovation of SMEs
- Develop measures to increase funds available for innovation
  - Create project grants
  - Develop innovation-related financial instruments
    - Assist business-angel networks or provide government-backed venture capital funds
    - Improve access to bank finance through credit guarantee schemes
- Ensure that companies have access to the needed information and services
Consider evaluating and reforming the voucher scheme system.

**Foster linkages and knowledge transfer**

- Strengthen networks and linkages between companies through means such as business clusters, business incubators or business networks
- Strengthen the linkages between multinational enterprises and local suppliers

**Foster co-operation between public research institutions and private companies**

**Co-ordinate the policy design, implementation and monitoring of innovation policies**

- Ensure the consistency of innovation policies across ministries
  - Set up an inter-institutional dialogue mechanism
  - Create an agency, a department or another equivalent institution to co-ordinate innovation-related policies
- Improve public-private consultation on innovation related-issues
- Monitor the implementation and effectiveness of support measures for innovation
CHAPTER 1: GENERAL PERFORMANCE

Innovation, according to the definition provided by the Oslo Manual (OECD; Eurostat, 2005), consists in 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. Economic theory and empirical studies have demonstrated that innovation is among the key drivers of economic growth (Schumpeter, 1939; OECD 2010a). The development of an innovation policy is considered as one of the cornerstones of the economic strategy of governments (OECD, 2010a). In the European Union this has translated in the development of the EU 2020 and the related Innovation Union strategies (Barroso, 2011).

In order to better identify the broad challenges that the innovation policy of the former Yugoslav Republic of Macedonia needs to address, it is necessary to review the recent economic developments in the country. Furthermore, at the aggregate level, reviewing the level of inputs and outputs of the National Innovation System (NIS) provides information on the broad situation of innovation in the country. Such an assessment is a preliminary step to the thorough review of the interactions between the various actors conducted in the subsequent chapters.

Economic environment

Gross Domestic Product (GDP) per capita at purchasing power parity (PPP) in the former Yugoslav Republic of Macedonia is 93% of the average of countries in the South East Europe (SEE) region (see Figure 1). After 5 years of sharp recession between 1990 and 1995, and notwithstanding the year 2001, the former Yugoslav Republic of Macedonia experienced a steady pace of economic growth for almost 15 years. GDP per capita (PPP) has increased by 37% between 1995 and 2009. Nevertheless, the corresponding 2.3% rate of annual growth from 1995 to 2009 was the lowest in the region. In 2009, due to the impact of the global economic crisis, the GDP per capita (PPP) of the former Yugoslav Republic of Macedonia contracted for the first time after 7 years of steady annual growth.

The limited absolute level of the economy has profound impacts on poverty and the social environment. With an unemployment rate of 32.2% in 2009 (World Bank, 2011a), and although participation in the informal economy may lead the Labour Force Survey (LFS) to overestimate this ratio, the former Yugoslav Republic of Macedonia is one of the SEE economies where unemployment is the highest. Only in Kosovo under UNSCR 1244/99 the unemployment rate is higher. Unemployment is particularly high among youth: 54.9% of workers between 15 and 24 were unemployed in 2009 (World Bank, 2011a). Even though the rate of youth unemployment has been steadily decreasing with an annual rate of 2.3% since 1998, still the level of youth unemployment is higher than in any other SEE economy and is more than twice as high than the level of youth unemployment in the European Union (EU) (World Bank, 2011a). Such a high level of unemployment puts a large share of citizens in a vulnerable economic situation.

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\(^5\) Data is not available for Kosovo under UNSCR 1244 and Montenegro in 1995 and 1996.
Given the high rate of unemployment, it is not surprising that, according to estimates of the State Statistical Office, 30.9% of the population lived in relative poverty\(^6\) in 2010. While relative poverty is still very high in the former Yugoslav Republic of Macedonia, severe absolute poverty is lower. In particular, the share of the population living below $2 (PPP) in 2006 was 4.3% for the former Yugoslav Republic of Macedonia, the same as in Albania, lower than in Moldova (12.5%), but higher than in Romania (1.96%) and Serbia (0.66%) (World Bank, 2011a).

**Figure 1.** GDP per capita PPP

<table>
<thead>
<tr>
<th>Country</th>
<th>2009 (Constant 2005 International $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALB</td>
<td>7,449</td>
</tr>
<tr>
<td>BIH</td>
<td>7,266</td>
</tr>
<tr>
<td>BGR</td>
<td>11,456</td>
</tr>
<tr>
<td>HRV</td>
<td>16,338</td>
</tr>
<tr>
<td>XK</td>
<td>NA</td>
</tr>
<tr>
<td>MDA</td>
<td>2,592</td>
</tr>
<tr>
<td>MKD</td>
<td>8,741</td>
</tr>
<tr>
<td>MNE</td>
<td>10,022</td>
</tr>
<tr>
<td>ROU</td>
<td>10,794</td>
</tr>
<tr>
<td>SRB</td>
<td>9,967</td>
</tr>
</tbody>
</table>

Source: World Development Indicators 2011

The former Yugoslav Republic of Macedonia suffered less from the crisis than most SEE economies and, the economy is expected to gradually return to growth. However, available data on productivity suggest that the economy in former Yugoslav Republic of Macedonia is not particularly competitive compared to other SEE economies, limiting growth prospects. In 2008, GDP per person employed in the former Yugoslav Republic of Macedonia represented 79% of the SEE average\(^7\) and only 59% of the EU average (Eurostat, 2010). This indicator of global productivity of the economy grew by 1.1% between 2005 and 2008, the lowest growth rate observed in SEE economies where data are available. This suggests that the competitiveness of the economy compared to that of its peers in the region has been declining in the recent past.

The analysis of balance of payments statistics confirms the difficulties faced by the economy of the former Yugoslav Republic of Macedonia. As shown in Figure 2, the trade deficit, which represented 15% of GDP in 2000, has progressively increased since then, reaching 23% of GDP in 2009. In 2009 and 2010, the trade deficit decreased as a consequence of the global financial crisis. However, further widening of the

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\(^6\) Households live in relative poverty if their expenditures are lower than 70% of the median equivalent consumption expenditure.

\(^7\) Data is not available for Kosovo under UNSCR 1244, Montenegro and Serbia.
gap between exports and imports is expected in the next few years as domestic demand recovers (IMF, 2011; Economist Intelligence Unit, 2011). Higher imports of oil, primarily from Russia, explain part of the surge in imports since 2005. Exports are primarily directed to markets in the EU and they have been primarily driven by exports of steel and by general manufactured products. The main exporter in the former Yugoslav Republic of Macedonia is the steel mill Makstil.

Figure 2. Trade balance
% of GDP, 2000-2009

While significant effort has been made by the government to attract foreign direct investment (FDI), the performance so far has been slightly disappointing. While in flows of FDI represented 8.8% of GDP in 2007, the global economic crisis, which strongly impacted the capacity of potential investors, resulted in a strong decrease in FDI inflows. In 2009, inflows of FDI amounted to USD 248 million representing 2.8% of GDP, which is significantly below the regional average of 7.4%.

Macro-economic indicators and trade statistics indicate that companies in the former Yugoslav Republic of Macedonia are facing a significant challenge to export their products and that, for the economy to grow, significant efforts need to be conducted to improve competitiveness. The authorities in the former Yugoslav Republic of Macedonia are aware of the challenge and, accordingly they have engaged in the last few years in a programme of reforms to improve the business environment and facilitate investment.

8. Excluding Montenegro as an outlier. The Montenegrin economy has a strong tourism industry, which was ranked as the top growing tourism destination in the world, as calculated in terms of visitor export earnings as a percent of annual real growth from 2010 until 2020 (WTTC, 2011).
Main lessons from innovation indices in the former Yugoslav Republic of Macedonia

A large number of indices have been developed to assess and compare the innovation capacity of economies. These indices follow a variety of methodologies that use quantitative and qualitative indicators. Some conclusions on the innovation system of the former Yugoslav Republic of Macedonia stand out from these indices. For instance, both the Global Competitiveness Index (World Economic Forum, 2011) and the Innovation Union Scoreboard (IUS) (European Commission, 2011a) highlight the low expenditure on research and development (R&D) by businesses. It can be seen on Table 1, which shows the rankings of the former Yugoslav Republic of Macedonia for eight innovation indicators of the Global Competitiveness Index, that the country ranks 111 out of 132 countries for company spending on R&D.

Table 1. Rank of MKD based on the indicators from the 12th pillar of the Global Competitiveness Index—Innovation

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity for innovation</td>
<td>87</td>
</tr>
<tr>
<td>The quality of scientific and research institutions</td>
<td>71</td>
</tr>
<tr>
<td>Company spending on R&amp;D</td>
<td>111</td>
</tr>
<tr>
<td>University collaboration in R&amp;D</td>
<td>74</td>
</tr>
<tr>
<td>Government procurement of advanced technology</td>
<td>110</td>
</tr>
<tr>
<td>products</td>
<td></td>
</tr>
<tr>
<td>Availability of scientists and engineers</td>
<td>95</td>
</tr>
<tr>
<td>Utility patents</td>
<td>90</td>
</tr>
<tr>
<td>Intellectual property protection</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

Source: World Economic Forum

The Global Innovation Index (INSEAD, 2011) and the IUS also assign relatively low scores to the quality of linkages and technology transfer in the country. These weaknesses are reflected in the poor...
performance of the former Yugoslav Republic of Macedonia in patents and trademarks applications as shown by the Knowledge Economy Index (World Bank, 2011b) and the IUS. In addition, the latter index points out to a paradox (that will be analysed further in Chapter 4): while there are relatively few trademark and patent applications in the country, firms do introduce innovations. Finally, the country performs well on education indicators in the GII and the IUS and the IUS ranks the quality of research institutions in the country relatively high.

**Inputs to the innovation system**

Innovation inputs are tools and resources, such as human capital, access finance and Intellectual Property Rights (IPR) which enable companies to innovate. The following paragraphs will review innovation inputs in the former Yugoslav Republic of Macedonia in order to assess the effectiveness of the national innovation strategy. At the aggregate level, these resources are mainly composed of expenditures.

**Expenditure on research and development**

The former Yugoslav Republic of Macedonia is among the economies that dedicate the smallest share of national resources to R&D, only 0.22% in 2008. In 2007, the Gross Expenditure dedicated to Research and Development (GERD) represented 0.18% of GDP compared with an average of 0.50% in SEE economies (UNESCO, 2011). Figure 4 shows that Albania and Bosnia and Herzegovina are the only SEE economy that dedicated relatively fewer resources to R&D than the former Yugoslav Republic of Macedonia in 2007.

![Figure 4. Gross domestic expenditure on research and development](image)

2007, in % of GDP

Source: Unesco Institute for Statistics, Ministry of Education of Macedonia

Besides the low level of investment in research and development, the composition of expenditures shows a research framework very much dominated by public research institutions with limited resources to invest in modern equipment. In 2007, Business Expenditures on Research and Development (BERD) represented 23% of GERD in the former Yugoslav Republic of Macedonia (Erawatch, 2010). Compared to

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countries in the EU where, in 2008, BERD represented on average 54.7% of GERD (Eurostat 2008), the contribution of the private sector in the former Yugoslav Republic of Macedonia to the research effort is very low. However, given that there are no tax benefits for R&D expenditure, companies in the former Yugoslav Republic of Macedonia may under-report R&D spending. Nevertheless, the low investment of businesses in R&D suggests that innovation is driven to a large extent by public institutions.

The resources dedicated to R&D seem to fund mainly salaries and other current costs. This is particularly the case in public institutions, including both research institutions and universities. Salaries represented 44% of expenditures by public institutions and universities while capital expenditures represented only 5% of the total. Such limitations on the capital investment of public research institutions restrain their ability to update their equipment and may constrain their capacity to catch up with the latest developments in world research.

**Number of researchers**

In 2007, 2,394 people, including 1,486 researchers, were involved in research and development. The share of researchers in the former Yugoslav Republic of Macedonia has been on a downward trend over the last few years. Indeed, the number of full-time equivalent working in research and development decreased by 6% from 1,435 in 2005 to 1,350 in 2007. Furthermore, the share of researchers in the country is lower than in most neighbouring economies. In 2007, there were 1.6 researchers, in full time equivalent per 1,000 employees in the country which is significantly below the 2009 ratios for Bulgaria (3.4) Croatia (3.6) and Romania (1.9) and the EU-27 average (6.6). In the former Yugoslav Republic of Macedonia, 69% of employees in research and development work in higher education institutions and, in many cases, research activities represent only a part time occupation. In higher education institutions, researchers spend on average 43% of their time on research.

**Measures enabling the diffusion of innovation**

While the production of new knowledge is essential to sustain growth in economies and industries that are competing close to the knowledge frontier, for the majority of companies, the adoption of existing technologies and business practices is equally important as the development of new-to-the-world innovations. The efforts conducted by businesses to obtain information from outside sources are reviewed in detail in the section on private sector contribution to innovation. At the aggregate level, the number of users for internet and broadband access are usually used as proxies for the ability of companies to keep track of recent development abroad. These metrics are therefore included in several innovation indexes. In the former Yugoslav Republic of Macedonia, the use of internet is quite widespread. With 52% of the population using internet, the country is ahead of all SEE economies except Serbia. Subscription of fixed broadband services is also high in the former Yugoslav Republic of Macedonia with 11% of the population subscribing, compared to an average of 10% in SEE.

**Output from the innovation system**

In order to assess the effectiveness of the innovation system, and before reviewing the underlying processes, the output of the innovation system in the former Yugoslav Republic of Macedonia needs to be qualified. These outputs are twofold. On one hand, the production of new knowledge will be assessed based on available data on publications and on patents. On the other hand, the ability of firms to transform new knowledge into new products, process or into new forms of organisation will be assessed.

Patents and trademarks are direct indicators of innovation activities. By filing a patent, research institutions and companies protect their discovery from being copied. Similarly, trademarks are used to signal to customers some form of novelty in the product, be it a new design or a new form of marketing.
Patents are more an indication of products and process innovation while trademarks tend to be more related to marketing innovation. Patents and trademarks are subject to a strong home bias as incentives to file for intellectual property protection in a specific country may depend on the particular circumstances of that country. The framework of IPR protection in the former Yugoslav Republic of Macedonia will be analysed in Chapter 2. In order to allow for international comparison and to assess the position of the knowledge generated against the world knowledge frontier, Figure 5 shows the number of patents filed by innovators in the former Yugoslav Republic of Macedonia in the EU and in the US. Economies in SEE tend to fall in two categories. In Bulgaria, Croatia, Romania and Serbia, some innovation is conducted although the level is very low compared to most economies in the EU. The former Yugoslav Republic of Macedonia appears to fall within the second category of economies whose innovation activities are, at best, marginal.

Figure 5. Patent Applications between 2006-2008 (in patents per million inhabitants)

![Patent Applications Graph]

Source: World Intellectual Property Organisation

Figure 6 shows that the former Yugoslav Republic of Macedonia also lags behind regarding the filing of trademarks. Macedonia filed 4.5 trademarks on average per million inhabitants between 2006 and 2008. This is less than the SEE average of 7 trademarks per million inhabitants but more than 3.9 trademarks per million inhabitants, the SEE average excluding Bulgaria. This difference may be a sign that despite limited capacity for technological innovation, companies in the former Yugoslav Republic of Macedonia do compete to design new products and news ways to market them.

10. In the European union, in the period 2006-2008, 375.69 EPO patents and 364 USPTO patents were filed by million inhabitants
Low high technology exports confirm the limited innovative content in the former Yugoslav Republic of Macedonia. Figure 7 shows that with only 3.1% of high technology exports as a percentage of manufactured exports in 2009, Macedonia lags behind most other countries both in SEE. However, even though companies in the former Yugoslav Republic of Macedonia file few patents and do not export a large share of high technology products, survey results suggest that firms do innovate. Notably, Table 4 in Chapter 4 reveals that firms in the former Yugoslav Republic of Macedonia innovate about as much as firms in the European Union.
Figure 7. Share of high technology exports in manufacturing exports in 2009 (%)

Source: World Bank 2011a
CHAPTER 2: FRAMEWORK CONDITIONS

Certain environments are more conducive to innovation. An economy that fosters an entrepreneurship culture and provides means to finance investment is more likely to be innovative. This chapter evaluates the framework conditions in the former Yugoslav Republic of Macedonia, considering human capital, access to finance, intellectual property rights, competition regulation and barriers to trade and investment. While the former Yugoslav Republic Macedonia has made improvements in the field of human capital and has an open trade and investment regime, high unemployment, limited access to debt as well as equity finance, and enforcement of intellectual property remain weaknesses in the country’s framework conditions.

Human capital

Developing a sufficiently skilled labour force is a pre-requisite to reach a sufficient level of innovation and of competitiveness. Human capital development is particularly challenging in the former Yugoslav Republic of Macedonia. Indeed, despite significant efforts and reforms in the last few years, the workforce is still generally poorly educated and the labour market is characterised by a very high rate of unemployment by regional standards, in particular among youth.

Education system

The education system in the former Yugoslav Republic of Macedonia has undergone significant reforms in the last few years. The duration of primary education was extended to 9 years in 2007 and secondary education was made compulsory for all students. In the field of tertiary education, universities in the former Yugoslav Republic of Macedonia participate in the Bologna process since 2003 and studies are conducted according to the Bachelor-Master-PhD cycle. Despite these reforms, challenges to increase skills are immense, in particular when the current performance is compared to the objectives set by the strategic framework for European cooperation in education and training (“ET 2020”, see Table 2). For instance, in the former Yugoslav Republic of Macedonia tertiary attainment for 30-34 year olds is only 17% compared to an average of 34% in EU27 countries, 28% in Bulgaria, 23% in Croatia, and 18% in Romania. While the completion rate of secondary education is in line with European standards, the performance of the former Yugoslav Republic of Macedonia regarding pre-school participation and adult participation in lifelong learning is clearly below EU average, a point also highlight by the European Commission’s (EC) Progress report (EC, 2010b).

Table 2. EU benchmark for education and training

<table>
<thead>
<tr>
<th>EU Benchmarks for Education and Training</th>
<th>ET 2020 benchmark</th>
<th>EU 27 (2010)</th>
<th>FYR Macedonia</th>
<th>Other SEE countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-school participation: % of children between the age of four and the age for starting compulsory primary education participating in early childhood education (2009)</td>
<td>2005</td>
<td>90.5</td>
<td>22.9</td>
<td>BGR:78.4 HRV: 68.0 ROU:82.8</td>
</tr>
</tbody>
</table>
The former Yugoslav Republic of Macedonia spends 4.1% of its GDP on education, a smaller proportion than the OECD members, which spend on average 4.9% of their GDP on education. Results of the OECD Programme for International Student Assessment (PISA), in which the former Yugoslav Republic of Macedonia participated in 2000 show that the mean performance for literacy in the former Yugoslav Republic of Macedonia, 373, was the 4th lowest amongst the 14 non-OECD participants whose results for the 2000 study are listed\(^{11}\) and well below the OECD average of 500 (OECD and UNESCO, 2003).

Vocational education and training (VET) is very wide-spread in the former Yugoslav Republic of Macedonia with approximately 60% of secondary education students in VET (ETF, 2009). A Council for Vocational Education and Training and a Centre for Vocational Education and Training, which aim respectively to increase the links between the VET system and social partners in the field of education policy and in the development of the curriculum, have been set up. However, these institutions are quite recent and further efforts are needed to ensure that programmes reflect the needs of the labour market and that students can develop work experience within the course of the studies (ETF, 2009).

Tertiary education plays an important role in the development of innovation. Employees with tertiary education level, in particular in technical fields, contribute to develop the innovative capacity of firms. With 3,227 students per 100,000 inhabitants, the former Yugoslav Republic of Macedonia has relatively more students than Bosnia and Herzegovina (2,827) and Croatia (3,181), but relatively fewer than Romania (5,213), Moldova (3,836), Bulgaria (3,671) and Serbia (3,260). However, the number of students in tertiary education is increasing rapidly, with total enrolment up by 35% between 2006 and 2009 (UNESCO, 2011). While this is a positive development, this rapid increase in the capacity of the tertiary education system raises questions on the quality of the education provided. Furthermore, although an improvement has been reported over the last few years, a study by MASIT shows that employers report that students need to better develop soft and business related skills (MASIT, 2009). Initiatives have been conducted to further integrate studies and work experience. In particular, the Law on Higher Education enacted in 2008, made internships compulsory for tertiary education students. However, as universities are, to a large extent, autonomous, the actual level of co-operation with the private sector tends to vary significantly from university to university.

\(^{11}\) Only Indonesia, Albania and Peru had lower scores.
Labour market outcome

The labour market in the former Yugoslav Republic of Macedonia is characterised by a very low rate of labour force participation and by a high rate of unemployment, *i.e.* 32.2% of the labour force in 2009 (World Bank, 2011a). The high rate of long-term unemployment is particularly worrying: more than 80% of unemployed people have been so for at least one year (World Bank, 2011a). Long term unemployment often translates into the obsolescence of skills acquired by the workers. Youth is particularly penalised by high levels of unemployment as they often lack the practical experience that employers seek. Furthermore, minorities, women and people with lower levels of education are particularly likely to be unemployed (ETF, 2009).

However, these figures should be taken with caution given that some people register themselves as unemployed to get health benefits (EBRD, 2010). Moreover, these unemployment figures fail to capture the high proportion of workers, and particularly young workers, employed in the informal economy. The European Training Foundation (ETF) estimates that the informal economy amounts to 20% of GDP and an even higher share of employment. It is especially young workers who work in the informal economy. The International Labour Organization estimates that the share of informal workers is 42.8% for the 15 to 19 years old, 22.2% for the 20-24 years old and 6.5% for workers older than 25 years (International Labour Organization, 2008a). Measures, such as increased sanctions on informal work, have been introduced to reduce the size of informal employment.

The reasons for this high level of unemployment are manifolds and include the low level of investment and fact that privatisations created few jobs in the country. There is also a mismatch between skills required by employers and skills of unemployed workers (ETF 2006; ETF 2009). The Employment Services the Agency of Macedonia conducts skill gaps analysis on an annual basis to monitor labour market needs and document potential skill gaps. Evidence from the skill gaps analysis in 2008 shows that employers mostly seek employees with significant work experience. In particular, 70% of employers intending to recruit employees with tertiary education where expecting work experience. Such a high share contributes to the difficulties students face when transitioning from school to work and may also be an indication of the limited market-relevance of university education. The skills that are most needed by employers include the ability to speak foreign languages and information technology literacy.

In order to help employees increase their level of skills and to help unemployed people find a job, life-long learning needs to be developed. The Law on Adult Education from 2008 has established an institutional framework to promote the development of adult learning. However, funds are lacking to further develop the training offered (ETF, 2009). ETF estimates that, in 2009, 17% of registered unemployed people participated in training programmes and emphasises the need to assess the efficiency and the effectiveness of these programmes. Although active labour market policies contribute to increase the employability of unemployed people, trainings organised by companies for their staff are more likely to develop the innovative capacity in the economy.

Unfortunately, companies invest very limited amounts in further developing the skills of employees. Data collected by the World Bank in 2009 show that only 18% of companies offer some form of formal training to their permanent employees in 2008 (World Bank, 2011d), less than the SEE average of 32% . Among small firms, only 14% offer formal training while 43% of large firms do. Results of a survey conducted on 500 Macedonian firms as part of the research process of this report (see the GfK survey, Chapter 4) further confirm the lack of training in companies – only about 50% of companies reported offering training to their employees. Therefore, important efforts need to be made to further develop employee training, in particular among smaller firms. Such schemes can include both demand side policies, for example through subsidies or by imposing a minimum expenditure on continuous education and
training as is the case in France, and measures to improve the quality of the training offered and the diversity of services providers available for companies.

The limited job prospect for workers, and in particular for young workers fuels an important level of emigration. The government estimates that between 433,000 and 465,000 nationals live abroad. This represents more than 20% of the total population. Emigrants provide an important contribution to the activity of the country through remittances which represented 4.5% of GDP in 2009 (World Bank, 2011c). Although the stock of migrant population is high, companies and research institutions do not face particularly high constraints linked to the “brain drain”. This is consistent with the idea that the lack of employment opportunities, in particular among people with limited educational attainment, is a prime motivation factor for migrants to leave the country. Answers to a survey designed by the OECD and distributed by the Ministry of Education and Science on research institutions in the former Yugoslav Republic of Macedonia in 2011 suggest indeed that brain drain is not a very severe issue for most research institutions. Out of the seven respondents, only three considered it a serious issue. The problem appears to be more acute in research institutions focusing on more technical subjects such as the Faculty of Technology and Metallurgy in Skopje. Besides remittances, migrants can also invest in the country, bring back skills and develop business linkages with companies in the host country. Developing links with the diaspora and promoting brain circulation rather than brain drain should be a priority for policy makers.

**Business climate**

The business climate in the former Yugoslav Republic of Macedonia is ranked 38 out of 183 economies in the 2011 Doing Business Index (World Bank, 2011e), which places the former Yugoslav Republic of Macedonia far ahead as the country with the most favourable business climate in SEE. The country’s main strength according to this indicator is the ease of starting a business and the regulatory framework more generally. A one-stop-shop has been created to simplify business registration and the fees involved in the process have also been reduced (European Commission, 2010b). These successful reforms now place the former Yugoslav Republic of Macedonia as the 5th country where it is easiest to start a business according to the Doing Business Index. On the other hand, some reforms remain necessary such as strengthening the rule of law and facilitating the procedures to close businesses. For instance the recovery rate for closing a business in the former Yugoslav Republic of Macedonia is 20.7 cents per dollar which is less than the regional average of 31.3 cents per dollar for Eastern Europe and Central Asia.

**Table 3. Doing Business 2011 scores**

<table>
<thead>
<tr>
<th>Topic Rankings</th>
<th>DB 2011 Rank</th>
<th>DB 2010 Rank</th>
<th>Average SEE 2011 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting a Business</td>
<td>5</td>
<td>7</td>
<td>74.4</td>
</tr>
<tr>
<td>Dealing with Construction Permits</td>
<td>136</td>
<td>136</td>
<td>144.9</td>
</tr>
<tr>
<td>Registering Property</td>
<td>69</td>
<td>63</td>
<td>80.7</td>
</tr>
<tr>
<td>Getting Credit</td>
<td>46</td>
<td>44</td>
<td>38.0</td>
</tr>
<tr>
<td>Protecting Investors</td>
<td>20</td>
<td>20</td>
<td>73.2</td>
</tr>
<tr>
<td>Paying Taxes</td>
<td>33</td>
<td>47</td>
<td>101.1</td>
</tr>
<tr>
<td>Trading Across Borders</td>
<td>66</td>
<td>65</td>
<td>84.4</td>
</tr>
</tbody>
</table>
The OECD Investment Reform Index (IRI) 2010 nuances the picture by situating the investment climate in the former Yugoslav Republic of Macedonia just slightly above the SEE average, as Figure 8 illustrates. In particular, the quality of the country’s export promotion and loan guarantee schemes is below the SEE average.

Recent policies aimed also at improving the flexibility of the labour market. For instance, labour laws have been reformed in January 2009 to facilitate hiring (EBRD, 2010) and minimum social contributions were decreased.

A reform to make businesses pay corporate taxes only on distributed profits (World Bank, 2011e) has also decreased the tax burden on businesses. The total corporate tax rate now amounts to 16.4% of companies’ profits on average, compared to 44.5% in OECD countries (OECD, 2010c). This change has significantly increased the country’s ranking in “paying taxes” of the Doing Business Index but should also be monitored in the light of their wider impact on the economy.
There is room for further improving the business environment. The high cost of getting a construction permit, about 1601% of GDP per capita, remains another significant obstacle to business (World Bank, 2011e). In addition, even though the time required for property registration has declined from 98 days in 2008 to 66 days in 2009, it has stagnated at 58 days in 2010 and 2011 and should be further decreased. And finally, some credit constraints for businesses, particularly SMEs, also restrains firms’ investment and growth (European Commission, 2010b).

Additional steps should also be taken to reduce the size of the informal economy which represents about 20% of GDP (ETF, 2009). 30% of firms reported that the competitors from the informal sector were a constraint and the BEEPS survey (2009) singled out the informal sector as the main obstacle to firm investment (OECD, 2010c).

In the judicial system, legal procedures and widespread corruption continue to hamper contract enforcement. Moreover, the amendments to the law on contract enforcements, which aim to speed up legal procedure, have been postponed to July 2011. Nonetheless, improvements have been made such as the clarification of ownership rights.

**Access to finance**

In order to innovate, companies need to be able to finance research and invest in new equipment. Access to finance is therefore a critical component of the ability of private companies to innovate. Because innovative projects have more uncertain outcomes and tend to have longer payback periods, the forms of finance that are usually used by companies, in particular bank loans, may not be adapted to the particular situation of innovating companies, in particular the smallest ones. Innovation related forms of finance include in particular equity finance.

Access to finance in general is an issue for companies in the former Yugoslav Republic of Macedonia. According to the Business Environment and Enterprise Performance Survey (BEEPS, World Bank, 2011d) conducted by the EBRD and the World Bank in 2008, 72% of companies considered access to finance as an obstacle to their development, with 29% considering access to finance a major or a very severe barrier. The BEEP survey further reports that in the SEE region, excluding Romania and Bulgaria, 66% of companies consider access to finance to be an obstacle to their development. The same survey indicated that the rate of collateral required for new loans amounts to 176% of the loan amount, the second highest in SEE after Kosovo under UNSCR 1244. This is likely to be a consequence of the difficult court procedures that banks have to go through in order to enforce collaterals (EBRD, 2010). As a consequence, credit penetration in the former Yugoslav Republic of Macedonia is still limited, with domestic credit representing only 44% of GDP. Despite a strong credit growth in the last few years, this ratio puts the former Yugoslav Republic of Macedonia among the countries where credit penetration is the lowest in SEE (Figure 9). Interest rates on loans on the other hand have been decreasing gradually from 19% in 2001 to 9.7% in 2009 before a slight increase to 10.1% in 2010, one of the lowest rates in the region. According to the World Bank’s World Development Indicators (WDI) (World Bank, 2011a), interest rate spreads charged by banking institutions are the lowest in SEE, suggesting a significant level of competition on the banking market.
To help companies access bank loans, credit guarantee schemes and a public credit information services have been set up. However, the resources dedicated to these initiatives have been limited, constraining their scope and their effectiveness. The Macedonian Bank for Development Promotion Credit manages credit guarantee schemes. However, only about a third of the loan capital can be covered, which results in a low take up by entrepreneurs. A public credit bureau exists which collects data from banks and cover, according to the World Bank Doing Business (2011e), 39% of loans. A law on private credit bureau has been drafted but not adopted yet. As a result, no private credit information service exists at the moment.

Besides bank finance, innovative companies are in a critical need to have access to equity finance. In OECD countries, innovative entrepreneurs can rely specifically on venture capital funds and on business angels to finance long-term investments. The former Yugoslav Republic of Macedonia is among the few economies in SEE where some venture capital activity is recorded. Two venture capital funds operating in the former Yugoslav Republic of Macedonia have invested together in about 20 companies. These funds have not benefited from any type of support from the government so far. While venture capital is starting to develop, no business angel activity is recorded in the country. Although some individual business angels may be active, no business angel association has been set up.

Experience in OECD countries has led governments to increasingly take into account the role of business angels as providers of early-stage finance to innovative companies. The benefit of informal capital over formal venture capital is three-fold (Mason, 2009). While venture capital funds tend to focus on developed companies, business angels have the ability to finance companies at the early stages of development. Furthermore, while venture capital activities tend to be concentrated geographically, business angels have the ability to finance local development. Finally, business angels usually provide
support to entrepreneurs to help them develop their businesses. Although the volume of business angel activities remains limited from an aggregate point of view, its focus on early-stage finance makes it an important contributor to innovative capacity. Accordingly, governments in the OECD have developed a number of support schemes. For instance, governments have developed fiscal incentives for individual business angels, they have contributed to the development of business angels networks, they have adapted the security legislation to the particular constraints of business angels, they have set up investment readiness services and they have developed co-investment schemes. Currently, although some investment readiness programmes exist in the former Yugoslav Republic of Macedonia, no other measure is in place to support business angels.

**Intellectual property rights**

The protection of intellectual property rights (IPR) provides an incentive for companies to innovate more as they have some guarantee that they will be able to reap the benefit of their innovation. The framework of industrial property rights is relatively well advanced in the former Yugoslav Republic of Macedonia by regional standards. The World Bank attributes a score of 2.80 (out of 7) for intellectual property protection for the former Yugoslav Republic of Macedonia while Bosnia and Herzegovina has a score of 2.30 and Serbia has a score of 2.8. The former Yugoslav Republic of Macedonia has ratified most of the international framework for IPR enforcement (OECD, 2010d). In particular, the country has ratified the WTO agreement on Trade Related Aspects of Intellectual Property (TRIPS). Despite this positive regulatory framework, the effectiveness of the IPR regime suffers from the limited capacity of the State Office for Industrial Property.

The IPRs in Macedonia are largely dominated with soft intellectual property, i.e., with issues related to trademarks, copyrights, industrial design rights, and passing off. In contrast, inventions for which the State Office for Industrial Property issues patents are few. Furthermore, substantive examination of patent applications is not carried out at the State Office for Industrial Property. Instead, the validity of invention registrations is assessed only at the stage of infringement examinations creating legal uncertainty with respect to patent rights.

The enforcement of IPR has been improved according to the progress report of the EC (EC, 2010b). A national strategy is being implemented and a coordination body for intellectual property is in charge of seizing counterfeit goods. Public officials receive specific training to identify counterfeit goods. The report recommends that further efforts could be made to develop enforcement record and to collect statistical data on IPR infringement. The capacity of courts to handle IPR cases should also be increased. In 2009, out of 98 pending cases, only 23 were completed (EC, 2010b). Furthermore, the level of awareness of the general public on IPR protection should be increased.

**Competition regulation**

One of the main purposes of innovation for a company is to differentiate itself from its competitors and gain market shares. The intensity of competition on a product market is one of the key determinants of the level of innovation (OECD, 2005a). If significant barriers to entry exist in a market, innovative entrepreneurs will not be able to introduce new products or services. Conversely, incumbents will have little incentive to improve their products and processes, leading to poor innovation outcome.

Competition policy in the former Yugoslav Republic of Macedonia is governed by the Law on Protection of Competition, enacted in 2004. The Commission for the Protection of Competition, an independent state body, is responsible for the implementation of the law. Although the legislative framework for competition policy has been adapted to better comply with the European acquis communautaire, the capacity of implementation is still weak. The former Yugoslav Republic of Macedonia needs increase efforts to reach
implementation levels of Bulgaria, Croatia and Romania, which are the leading SEE economies in this field. In 2010, only two cases were initiated for cartels and only one for abuse of dominant position. On the other hand, 22 decisions were taken in the field of concentration, a sharp increase compared to 2009. Some obstacles to a sound competition policy remain. For instance, the Commission for Protection of Competition has insufficient resources dedicated to anti-trust and mergers, and the enforcement record in the fields of cartels and state aid is weak (European Commission, 2010b).

In the information communication technologies sector, where it is particularly important for companies to have access to information on new technologies, products and business practices, several efforts have been made to develop a more competitive market. In 2004, the Law on Electronic Regulation established the Agency for Electronic Communication (AEC), which is in charge of monitoring competition in the telecommunication market and controlling that prices accurately reflect costs.

**Barriers to trade and investment**

Exports and imports of goods and services in the former Yugoslav Republic of Macedonia represent respectively 44% and 67% of GDP. Among SEE economies, this makes the former Yugoslav Republic of Macedonia the economy with the highest import share and the second highest export share in GDP. In such an open economy, the removal of barriers to trade and investment are critical elements of economic policy.

According to the OECD Investment Reform Index, the restrictions to foreign direct investment in the former Yugoslav Republic of Macedonia appear minimal (OECD, 2010c). The principle of national treatment is included in the legal framework and is well implemented. The government has ratified bilateral treaties and international instruments to regulate investment disputes. The investment promotion agency InvestMacedonia plays an active role in promoting the former Yugoslav Republic of Macedonia as an investment destination. On the other hand, the OECD Investment Reform Index highlights that while the former Yugoslav Republic of Macedonia is not behind the region when it comes to promoting foreign investment, reforms could facilitate FDI by increasing linkages between local and foreign companies or creating a one-stop-shop for foreign investors (OECD, 2010c). Further, some restrictions remain on the possibility for foreign citizens to purchase agricultural land and on the amounts that can be transferred by non-residents. Additionally, strong restrictions exist on the ability of nationals to invest abroad as they cannot buy real estate abroad, purchase shares in non-domestic companies and open up bank accounts in foreign banks (EU, 2010b). Further liberalisation of capital movements have been planned in the framework of the Stabilisation and Association Agreement (SAA) with the European Union.

The former Yugoslav Republic of Macedonia is well integrated in multilateral trading systems. The country has been a member of the World Trade Organisation (WTO) since 2003, it has signed a SAA with the European Union and is a member of the Central European Free Trade Area (CEFTA). In addition, it has signed a number of bilateral trade agreements (e.g. with Ukraine and Turkey). Besides the participation in the trade liberalisation process, significant efforts have been conducted to eliminate non-tariffs barriers to trade. The framework for regulation, standardization, accreditation and conformity assessment has been reformed to transpose the *acquis communautaire*. Attention needs to be put on the actual implementation of the legal reforms that have been enacted. In particular, administrative bodies in charge of market surveillance would need to be reinforced (EC, 2010b).

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12 CEFTA parties include Albania, Bosnia and Herzegovina, Kosovo under UNSCR 1244/99, the former Yugoslav Republic of Macedonia, Montenegro and Serbia.
Although innovation is a process which goes beyond research, the quality of research institutions is an important element of innovation systems. This chapter describes the main institutions relevant to innovation, the available research funding and the commercialisation of research outcome. While the research institutions in the country have potential, problems such as a lack of funds, little labour mobility and insufficient links with the private sector prevent them from realising this potential.

Main institutions relevant to innovation

When it comes to the organisations governing research and innovation policy design and implementation, it is appropriate to distinguish between policy and implementation. The analysis below describes the current situation in the former Yugoslav Republic of Macedonia based on meetings with a selected number of key institutions\(^\text{13}\).

Policy design

Ministry of Education and Science

Ministry of Education and Science is the key governmental institution as far as issues such as education, science, technology, research and innovation are concerned. The Ministry of Education and Science’ remit covers higher education, vocational education and international scientific-technical cooperation. Furthermore, feedback from individual universities and faculties suggests that the Ministry plays a significant role in identifying the research priorities of public research institutions, even though international projects and the academic community also appear to be of importance. The evolution of resources allocated shows that R&D has not been the primary objective of the government. Consequently, it is not entirely surprising that innovation policy per se has hitherto not attracted much policy emphasis. However, there are signs that this may be changing as policy makers become increasingly aware of the importance of innovation to the long-term economic development and future competitiveness of the country. In 2011, the Ministry of Education and Science prepared a new draft R&D Strategy, which is in line with the EU 2020 Strategy (see Chapter 8, Box 7) and does indeed place greater emphasis on innovation. The new draft R&D Strategy is expected to be approved by the new Government following in the second half of 2011.

Within the Ministry of Education and Science, two governance arrangements are worth highlighting:

- A Scientific Council, comprising a President and six other academics who are appointed by the Minister for a period of four years, advises the ministry on its annual programme of R&D priorities, scientific / R&D policy and helps in the selection of applications for research funding. The Scientific Council was actively in the preparation of the draft R&D Strategy.

\(^{13}\) Interviews were conducted in May and the chapter was drafted between the end of May and the first half of June. Therefore, the chapter does not take into account changes in the government organisation and programme that occurred after the parliamentary elections in June 2011.
A Committee for Technological Development, composed of several members (the Deputy Minister of Economic Affairs, the Minister of Finance, the Minister of Economy, the Minister of Education and Sciences, the Minister of Information Society and Administration, the Minister of Agriculture and Forestry and the Minister of Environment and Physical Planning) is to be established as a result of the Law to Encourage and Facilitate Technological Development (2011a). It is expected to monitor trends and make proposals for the technological development among other duties; however, at the time of writing, this body had not yet been established.

Ministry of Economy

The Ministry of Economy is responsible for the national strategies for SME development, FDI and industrial policy. As such, it is an active policy maker in relation to innovation matters; the three mentioned policy areas have their own strategies and annual programmes, all of which touch upon aspects of competitiveness and innovation, albeit with a strong emphasis on enterprise development. The implementation of the innovation aspects of the above strategies requires not only the active involvement of the respective departments, but also the active involvement of other institutions, not least the Deputy Prime Minister’s Department (see below), the Ministry of Education and Science (as discussed above), as well as other state bodies such as the State Office for Industrial Property (SOIP).

The Ministry of Economy used to have a National Entrepreneurship and Competitiveness Council (NECC), an inter-ministerial body designed to better coordinate economic policy, but this has been inactive for some time; the same applies to the SME Forum. The main active governance arrangement worth highlighting is the Inter Ministerial Working Group for Industrial Policy, which is broad-ranging and expected to grow in influence, once the anticipated USAID/ EC technical assistance is provided to enhance its role and functionality.

The Deputy Prime Minister for Economic Policy

The Deputy Prime Minister for Economic Policy has overall responsibility for economic policy reform (including business environment, SMEs, FDI and regulatory reform), coordination and implementation. Since innovation policy is cross-cutting or horizontal in nature, he has a strong interest in any future innovation policy which may evolve. The cabinet of the Deputy Prime Minister acknowledged the existence of a policy gap as far as innovation is concerned. In recognition of its potential value, efforts have been made to resurrect the NECC. However, a proposal circulated in 2010 for discussion to business associations has generated limited feedback so far. Interest by the institutions representing the private sector is low and, as a consequence, a reconstitution of the NECC appears unlikely in the near future.

The State Office of Industrial Property

SOIP is responsible for acquiring and protecting industrial property rights. This entails a variety of tasks such as establishing the procedures for national and international recognition of property rights, keeping registers (patents and trademarks), and harmonising national legislation, providing access to information and promoting industrial property protection. It is responsible for coordinating the implementation of the Strategy for Intellectual Property 2009-2012 but it does not have a role in relation to innovation policy per se.

Policy implementation

There are numerous bodies responsible for implementation of innovation policy, in the wide sense of the word. Below, we highlight the main relevant institutions.
Universities

There are three types of higher education institutions in the former Yugoslav Republic of Macedonia:

- Five state universities (Ss. Cyril and Methodius in Skopje, St. Clement of Ohrid in Bitola, Goce Delchev in Stip, State University of Tetovo and Information Science and Technology St. Paul the Apostle in Ohrid).

- About 18 private for-profit universities (e.g. FON, International, European, University American College Skopje).

- 1 private not-for-profit university (South East European University in Tetovo).

As a general rule, universities in the former Yugoslav Republic of Macedonia and their research institutions focus principally on teaching. However, there is some evidence to suggest that universities also consider research to be part of their activities. Through a questionnaire distributed by the Ministry of Education and Science to seven research institutions, all respondents claimed that, besides teaching, they participated in many other activities including primarily basic research and applied research as well as sole consulting and training. Nevertheless, by international standards, there is relatively little emphasis on research, development and innovation in the former Yugoslav Republic of Macedonia, primarily because of severe financial constraints (see Chapter 1). It is mainly but not exclusively the state universities that connect with R&D and innovation via their faculties, research centres and other institutes. For example, the University of Ss. Cyril and Methodius in Skopje has 23 Faculties, all of which are engaged in some form of research, though not necessarily innovation. Academics form part of the Scientific Council of the Ministry of Education and Science (see discussion above). However, it is hard to avoid the conclusion that, with some notable exceptions, there is currently a limited focus on issues such as innovation partly because of limited state funding, variable quality of human capital and outdated equipment.

Macedonian Academy of Sciences and Art (MASA)

The Macedonian Academy of Sciences and Arts (MASA) was established in 1967 as the highest scientific, scholarly and artistic institution in the country. MASA is in principle the key institution for the development of science, research, innovation and new technologies in the country through its five departments (i.e. Linguistic and Literary Sciences, Social Sciences, Mathematical and Technical Sciences, Biological and Medical Sciences, and Arts), as well as its five research centres (i.e. Research Centre for Genetic Engineering and Biotechnology, Research Centre for Energy, Informatics and Materials, Centre for Strategic Research, Centre for Linguistics, and the Lexicographical Centre). MASA has about 40 academicians and 15 assistants. However, despite the status of the Academy, an explicit focus on research and a budget which comes directly from the government (it also has the capacity to complement such funds with finance for international projects and grants); MASA suffers from similar constraints as the universities.

Research funding and capacities of research institutions

The level of Gross Domestic Expenditure or GERD has declined from 2000 to 2007; reaching a nadir in 2007 (0.18% of GDP). Chapter 1 has a full discussion of the current situation in the former Yugoslav Republic of Macedonia compared to various other EU and Balkan countries. The Ministry of Education and Science’s draft R&D Strategy aims to raise the level of GERD to 1.8% by 2020, but it remains to be seen if this target is adopted and whether it proves realistic to achieve.
While there are various sources of funding for R&D, very few focus specifically on innovation. In what follows, the main sources of funds, particularly for R&D, are analysed, with a focus on public resources such as the Ministry of Education and Science, the Ministry of Economy, MASA and Universities. Furthermore, the capacities of the various types of research institution in the country are assessed to identify some common issues but without making a detailed analysis of individual research institutions, which would require an exercise beyond the scope of this report.

**Ministries**

The Ministry of Education and Science is the main ministry in charge of R&D funds. However, its resources are limited. Whereas MKD 85 million were allocated to the Ministry of Education and Science for R&D purposes in 2010, this declined even further to MKD 65 millions (just over EUR 1 million) in 2011\(^\text{14}\). The funding covers the whole palette of activities of the ministry, focusing mainly on universities, such as domestic and international technical cooperation, provision of equipment, travelling to conferences, young researchers’ mobility, scholarships and research projects. The Ministry of Education and Science funds two main types of project: “scientific” ones geared towards the needs of research institutions and “development” ones geared to strengthen the linkages between research institutions and enterprises through cooperative research and application.

The Ministry of Economy supports activities related to R&D, investment, competitiveness and/or innovation, focusing on the business world. The FDI strategy does not have funding as such; the SME / Competitiveness annual budget amounts to MKD 6 millions (ca. EUR 100,000); and Industrial Policy had no funding in 2009 and 2010, but in 2011 MKD 11 millions (ca. EUR 180,000) were allocated to activities including innovation and cluster development\(^\text{15}\). The Ministry of Agriculture funds a few activities which intersect with research and development or innovation; however, this is smaller in scale than the Ministry of Economy funds.

**MASA**

MASA receives funding directly from the state budget and thus, independently from ministries. However MASA only has a small budget available for research: each of its 40 academicians received an annual research budget of EUR 2,000 in 2011. It is up to each academician to top-up the research funding from other national and international R&D funds, which they are able to do with varying degrees of success. MASA is an independent institution which achieves its objectives through basic, developmental and applied research, inter-disciplinary research projects, organisation of scientific and scholarly conferences and symposia, and public and dissemination of its research. Some of its research centres have gained international recognition, such as the Research Centre for Genetic Engineering and Biotechnology and Research Centre for Energy, Informatics and Materials. However, it suffers from weaknesses such as out-dated equipment and unattractive wages. Under these conditions, and despite the prestige attached to this institution, MASA may experience difficulties attracting the brightest researchers in the country.

**Universities**

It was not possible to assess all universities in terms of their research budgets. However, the analysis illustrates the general situation with reference to the University of Ss. Cyril and Methodius (USCM), the leading institution in the former Yugoslav Republic of Macedonia. According to discussions held with the Rectory staff for this report, USCM’s annual budget, which covers mainly salary and utility costs, is about MKD 60 millions (ca. EUR 972,000), 33% of which comes from the state budget, 60% of which is income.

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\(^{14}\) source: discussions with MoES staff

\(^{15}\) source: discussions with MoE staff)
from tuition fees and domestic projects funded by the Ministry of Education and Science, and about 7% is income from international project (e.g. Tempus, FP7).

The tight overall budget leaves limited scope for research funding. Within the university, each of the 23 faculties is allocated EUR 4,000 per annum for R&D purposes. It is up to each faculty to apply for additional research funding from domestic and international sources. Domestic sources of funding are mainly the Ministry of Education and Science and the Ministry of Economy, but also the Ministry of Agriculture, bilateral donors and the private sector, while international sources are mostly EU funds. This is an entirely decentralised process; within each faculty a Scientific and Education Council makes the key decisions on all research matters, including the Euro 4,000 fund and possible applications for additional funds. Where successful with these competitive applications, the contracts are signed with the university, but the faculty manages and implements the resulting research projects.

It is reported that some faculties are much more successful (e.g. Mechanical Engineering, Information and Computer Engineering, Civil Engineering) than others (e.g. Arts and Humanities) at obtaining national and international research funds. For example, the Faculty of Mechanical Engineering has been very successful in exploiting the high degree of freedom and generating significant additional grant and/or commercial income through successful applications for EU and other international funds, through testing and certification facilities, for example imported cars and trucks, and through contracts with the private sector. This success has enabled the faculty to refurbish its facilities, buy new equipment and create institutions such as CIRKO and the Business Start-up Centre (see Box 4 in Chapter 5).

The budgets for R&D purposes are even more limited in the private universities, where R&D is generally accorded lower priority than in state universities. According to discussions held with public and private universities, R&D is an expensive public good so private universities in the former Yugoslav Republic of Macedonia tend to focus almost exclusively on teaching. Indeed, the necessity to fund activities from student fees and to operate profitable precludes intense R&D efforts, especially if expensive laboratories and equipment are required. There are exceptions, however, such as the University of South East Europe (SEEU), which developed a Research Strategy in 2005. For instance, SEEU promotes the research and publication activity of its academics by making the renewal of annual contracts partly depending upon the academics’ research progress and publication records. Likewise, the University of Ss. Cyril and Methodius (USCM) covers the development of R&D activities as well as relevant support mechanisms in its 2020 development plan and the University American College Skopje has recently started emphasising its research activities and is developing research policies and requirements.

To raise the levels of R&D expenditure in the country, the Law on Higher Education requires 40% of income generated from student fees to be allocated for R&D purposes. The poor state of university finances means that the policy aim will be difficult to realise. For its part, the Ministry of Education and Science insists that the target will be met, since universities will be audited to assess compliance with the law.

Lack of funds affect negatively the capacities of universities: laboratories and equipment are becoming obsolete; status and pay are relatively low compared to the ex-Yugoslav period; a notable but decelerating degree of brain drain (internal and external) can still be observed. Typically, state universities are the research institutions with the greatest capacities, but these capacities vary significantly between faculties of a particular university (see Polenakovik and Pinto 2010).

**Business sector**

The situation is dire as far as enterprises are concerned. Only a few companies have in-house R&D capabilities. Business expenditure on R&D (BERD) contributed a mere 0.04 percentage points to the
0.18% overall R&D expenditure share in GDP in 2007 (Erawatch, 2010). By contrast, the EU target is a 66% contribution by the private sector. In 2008, the business and enterprise sector accounted for 54.7% of R&D expenditures in the EU-27 countries and 33.9% by the government (Eurostat 2011a).

To realise the aim of the draft R&D strategy of increasing R&D expenditure to 1.8% of GDP by 2020, the mobilisation of significant additional private sector funds is required. It is highly unlikely that state funding alone can bridge the existing gap to achieve this target. Significant public efforts are therefore needed to raise the awareness of companies regarding the critical importance and benefits of innovation and to help them invest more in R&D. Low R&D budgets as such do not represent an obstacle to innovation. Rather, it is important to encourage the private sector’s efforts to absorb existing knowledge and invest to fill the gap that exists between R&D and innovation.

**Commercialisation of research outcome**

The commercialisation of research appears to be one of the main weaknesses of the innovation system in the former Yugoslav Republic of Macedonia. There are no specific institutions or measures to ensure that the outcome of research leads to innovation. Furthermore, none of the key research players (Universities and MASA) consider this to be a priority.

Generally, academic and research institutions have no policy, formal or informal, in respect to the commercialisation of research outcome. Typically, each faculty decides what to focus its research on and which grants or projects to apply for. In addition, the survey conducted amongst research institutions rate “commercialisation of research” on average as the least important activity of their institution. Only in a few cases, for example the Goce Delcev University and the Faculty of Information and Communication Technologies, both of which conduct more scientific and technical research than average, reported some successful commercialisation of research outcome. The only measure which exists touching upon the issue of commercialisation is that 15% of the revenues from contracts generated by staff should flow to the faculty and 5% to the overall university. Whilst the University may gain some element of funding through this mechanism, the fact that individual researchers are able to take on external contracts and keep 80% of the contract value amounts to a very strong incentive for them to contract as individuals, rather than through the university. In other countries, universities have set up a formalised process to monitor the time that academics spend on consultancy work and to control the use of university equipment. In addition, schemes have been developed to find the right balance between generating an incentive for the academics, whilst also ensuring that the university gains from the process (see Box 2).

**Box 2. Consultancy activities of academics**

In order to regulate the consultancy activities of academics and to ensure that no conflict of interest arises over the use of their time, many universities have developed specific rules. Many universities, in particular in the USA and in the UK, have drafted guidebooks to consultancy services to inform their members of staff about the rules. These guidebooks regulate the time that academics can spend on consultancy work, the financial arrangements associated to this type of work as well as the use of university’s facilities.

Time restrictions imposed by universities can vary but tend to limit members of faculties to 30 days of consultancy work per year. This is for example the case at the Royal Holloway College of the University of London and at Glasgow University. At the University College of Los Angeles faculty members can do consultancy work up to 39 days per year for 9 months appointees and up to 48 days for 11 months appointees. At Bath University, no formal restrictions exist but the dean has to approve consultancy work prior to its undertaking. In most cases, university

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16 The remaining sources of expenditure are higher education (0.9%), not-for-profit private expenditure (1.7%) and funds from abroad (8.7%)
regulations explicitly mention that consultancy work should not infringe on work duties.

Financial arrangements also vary across universities and faculties. Some universities consider consultancy work as purely "external activities" that the academic pursue for their own benefit. For example, UCLA’s guidebook, which discusses private consultancy work, simply states that “except for faculty in the health sciences who are members of the University of California Health Science Compensation Plan, academic appointees may retain all outside income, including income from consulting earned during their allowable number of outside activity days.” Conversely, some universities, such as the Royal Holloway College or Bath University, distinguish between consultancy services carried out via the universities and those undertaken privately. Financial arrangements usually concern only university based consultancy work. In Royal Holloway, the consultant keeps 70% of the income while 20% is used to cover costs for the university. In Bath, the percentage retained by the academic varies across faculties; most departments keep 20% but the department of education, for instance, keeps 50%.

Universities which consider consultancy as a purely private activity limit the possibility to use university facilities and equipment for this purpose. For instance, UCLA excludes the use of all university equipment with the exception of the library and personal offices. On the other hand, academics are generally allowed to use facilities for university-based consultancy.

There is currently no policy in relation to patents, trademarks and other intellectual property, such as whether the rights should belong to the university or to the individual academics, which may impact on the commercialisation potential of inventions and innovations. According to the State Office for Industrial Property, not a single invention has been patented by a university since independence. In this context, it is worth highlighting the Bayh-Dole Legislation in the U.S. for illustrative purposes (see Box 3).

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**Box 3. Bayh-Dole Legislation (1980) and Innovation in the U.S.**

The Bayh-Dole Act otherwise known as the Patent and Trademark Law Amendments Act deals with intellectual property (IP). Bayh-Dole basically permits a university, small business or non-profit institution to pursue ownership of an invention in preference to the government.

The Bayh-Dole Act has enjoyed widespread recognition for its role in enabling breakthroughs in leading-edge electronics, engineering and environmental technologies, and promoting a biotechnology revolution. It has been estimated that the Act resulted in the dramatic growth in the commercialisation of federally funded research: between 1991 and 2003, more than 25,000 patents have been issued; since 1980, 4081 companies have been created by universities (The Bayh-Dole Act at 25, Bayh-Dole25., 2006, p.17). The same research suggests that the success of the Bayh-Dole framework basically rests on three factors: (i) sustained U.S. government funding for basic science education and research, (ii) support for market-based incentives and (iii) strong intellectual property protection.

The Bayh-Dole Act is no panacea. It has been criticised, for example, for offering an exclusively market-based framework. Nevertheless the Bayh-Dole framework have been taken-up and adapted to specific needs by numerous policy-makers, both in developed and transition economies.

Furthermore, the University of Ss. Cyril and Methodius (USCM) does not have a policy or incentives in relation to creating, supporting and assisting spin-offs and spin-outs. While the Rectory does recognise the potential importance of commercialisation, intellectual property rights, spin-offs, etc. there are no activities underway to generate university-wide policies, incentives and initiatives in this respect. For instance, faculty tenure is not linked to patents or research performance. This appears to be a significant gap in the national innovation system.

At the same time, certain faculties, such as Mechanical Engineering, are very keen to pursue issues such as commercialisation, income generation, start-ups, etc. For example, plans are underway to create a Science and Technology Park within the faculty using the Public Private Partnerships Law, which could
conceivably result in the first such park in the former Yugoslav Republic of Macedonia. However, this
degree of entrepreneurialism appears the exception, rather than the rule, as far as the faculties in USCM are
concerned.
CHAPTER 4: INNOVATION IN THE BUSINESS SECTOR

Most research will not yield profit unless it is used or commercialised by the private sector. It is therefore important to evaluate the capacity of the private sector to use both existing and new knowledge to increase productivity and wealth in the country. This chapter analyses the innovation activity of the business sector in the former Yugoslav Republic of Macedonia building on results from the Community Innovation Survey (CIS) and from a GfK survey. Despite problems such as insufficient linkages amongst businesses and with the academic community, about one third of firms introduced at least one type of innovation between 2008 and 2010 which is similar to the EU27 average.

Structure of the business enterprise sector

In 2010, micro, small and medium sized enterprises (SMEs) in the former Yugoslav Republic of Macedonia represent 99.8% of the total number of active enterprises and 82% of the total employment in the private sector. Within the SME sector, micro-enterprises, which have less than 10 people, are the largest group. They represent 71.4% of all companies although they only represent 20% of the total employment in the private sector. In the European Union, micro companies in the non-financial business economy represented 92% of SMEs and 21.8% of the countries’ labour force (Eurostat, 2011b). Between 2008 and 2010, medium and large companies in the former Yugoslav Republic of Macedonia, the main driver of innovation activities, lost 5% of their employees while employment in small and micro companies increased by 8%.

Figure 10. Employment in the business sector, 2008-2010
by size of companies, in ‘000 employees

Source: Central Registry
Data on the profitability of the various types of companies show that on average companies in the micro-enterprise segment incurred a loss in 2008 and 2009. In contrast, profits per employees were the highest in small and in large companies representing respectively MKD 193 000 and MKD 173 000. As a consequence, those segments are the ones in which companies are the most likely to be willing to invest in modernizing their equipments and methods of production. Although the rate of company creation, close to 13% in 2010, suggests a dynamic micro-company segment, the low profitability suggests that the potential for investment is extremely limited.

Manufacturing and ‘wholesale and retail services trade; repair services’ are the two largest contributors to GDP. In 2009, they represented respectively 14% and 13% of GDP (State Statistical Office). Manufacturing represents 19% of the total employment and it is also the sector where the number of medium and large size companies is the highest, representing 30% of the active medium-sized and large companies in 2009. The main source of employment is agriculture and forestry, representing 19.8% of total employment. However, productivity in the agricultural sector is limited. Agriculture only contributes to 9.8% of GDP. Although no statistics are available at the sub-sector level to assess the dynamics of these sectors in more details, the data available on economic sectors suggest that, given its impact on GDP and employment, innovation policy should focus in particular on developing innovation in the manufacturing sector.

Innovation activity in the business sector

Several surveys have been conducted on innovation in the private sector. The European Innovation Scoreboard assesses the innovation activities of the private sector building on the Community Innovation Survey (CIS) conducted by NCDIEL and Contesti from May 2010 to September 2010 on a sample of 2000 companies. The CIS allows for a comparison of innovative activities in EU countries and other candidate economies. In addition, in the months of May and June 2011, GfK has conducted for the purpose of this report a survey of 500 companies focusing on various aspects of innovative capabilities.17

Table 4 illustrates that the number of Macedonian SMEs that have introduced different types of innovations between 2008 and 2010 is very close to the EU27 average. In the GfK survey, 35% of companies indicated to have introduced at least one type of innovation between 2008 and 2010. However, a larger share of companies perceives themselves as at least somewhat innovative. In particular, the majority of surveyed companies, i.e. 56%, consider themselves as somewhat innovative, 19% as very innovative, 2% as extremely innovative and only 23% as not at all innovative.

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<th>Type of innovation that companies introduced in previous 3 years</th>
<th>EU27</th>
<th>Macedonia</th>
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<tr>
<td>Product or service innovations</td>
<td>34%</td>
<td>39.2%</td>
</tr>
<tr>
<td>Process innovations</td>
<td>17%</td>
<td>19%</td>
</tr>
<tr>
<td>Marketing innovations</td>
<td>32%</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Table 4.  Type of innovation introduced by companies

---

17. “OECD Questionnaire on innovation activities of private companies” – internal document for the purposes of the Regional Competitiveness Initiative, a three year project funded by the European Union with focus on Development of Macedonian Innovation Policy 2012-2020
Organisational innovations

Patents are a direct measure of the innovation output of companies. In the GfK sample of 492 companies, only 12 companies have stated that they have patents registered with the State Office for Industrial Property, two companies registered patents with the United States Patent and Trademark Office and only one company registered a patent at the European Patent Office. In addition, nine patents were registered with other national patent offices. Figure 1 shows the relation between the innovative self-perception of firms and innovation output as measured by patents. Out of the 10 companies that consider themselves as being extremely innovative, 30% have been granted at least one patent by the State Office, while among the group of 94 very innovative companies, 10% had been granted patents.

Figure 11. Share of companies in the GfK survey that was granted patents

Table 5 provides an overview of innovative activity by industry according to the GfK survey. About one third of both manufacturing and services companies introduced product or service innovation. Besides product and service innovation, manufacturing companies engage primarily in process innovation (33%) and services companies in marketing innovation (39%).

Table 5. Companies introducing different types of innovation by industry (GfK survey)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Number of firms</th>
<th>Product or service innovations</th>
<th>Process innovations</th>
<th>Marketing innovations</th>
<th>Organisational innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing and processing industries</td>
<td>294</td>
<td>79 32%</td>
<td>81 33%</td>
<td>46 18%</td>
<td>43 17%</td>
</tr>
<tr>
<td>Construction</td>
<td>28</td>
<td>7 26%</td>
<td>7 26%</td>
<td>7 26%</td>
<td>6 22%</td>
</tr>
<tr>
<td>Services</td>
<td>133</td>
<td>45 34%</td>
<td>14 11%</td>
<td>52 39%</td>
<td>22 17%</td>
</tr>
<tr>
<td>Trade</td>
<td>142</td>
<td>35 25%</td>
<td>8 6%</td>
<td>58 41%</td>
<td>41 29%</td>
</tr>
<tr>
<td>Other sectors</td>
<td>10</td>
<td>4 28.5%</td>
<td>4 28.5%</td>
<td>1 7%</td>
<td>5 35.7%</td>
</tr>
</tbody>
</table>

Note: Some of the companies mentioned are active in two or more sectors. Also, single companies may have introduced more than one innovation.
The analysis of surveyed companies shows that micro companies (1-9 employees) have a relatively limited attitude towards innovation activities. Almost half of them did not introduce any type of innovation. From 224 micro firms included in the GfK survey, only 22 mentioned having employees working on R&D activities and 39% of them incurred certain R&D related costs. This could potentially be explained by the firms’ limited exposure to export markets given that only 6% of surveyed micro companies have export related activities.

Exporting companies innovate more than companies producing only for the domestic market. Figure 12 shows that 85% of exporting companies have introduced at least one type of innovation between 2008 and 2010, while only 58% of non-exporting firms did innovate during this period. This higher export propensity of innovating firms is in line with trade theory (Melitz, 2003) and empirical findings (Bernard et al., 2007 for US firms; Mayer and Ottaviano, 2007, for European firms) that suggest that only the most productive firms export. Innovation is crucial for firms to increase their productivity and this increased productivity allows firms to cover the fixed costs associated to exporting. However, causality can also run from exporting to innovation. Exporting may help firms to innovate more, either as a reaction to stronger competition in foreign markets or through learning effects from exporting.

Figure 12. Export orientation and innovative activities

It is interesting to note that, in the past three years, more than half of the companies identified some type of innovation which could have improved the company’s market position but which could not be introduced. This shows that, although companies are aware of the need to innovate, there may be a need for better support that would come within the company itself, as well as from external sources: state or other innovation support institutions.

**Resources dedicated to innovation**

Absorptive capacity, which is defined by Cohen and Levinthal (1990) as the “ability to recognize the value of new information, assimilate it, and apply it to commercial ends” is an important aspect of the ability to innovate. Studies show that having staff dedicated to research, investment and the development of human capital are key aspects of innovation capacity (OECD, 2008). However, these aspects are very much underdeveloped in the former Yugoslav Republic of Macedonia. Only 19% of surveyed companies reported that they have staff devoted to R&D activities within the company. Furthermore, investment in
R&D is likely to directly impact absorptive capacity since the more a firm invests in research and development activities, the more it will be able to fully appreciate the value of new external information.

Investment in R&D is very low. Less than 40% of the companies surveyed estimated having some type of expenditure related to innovation activities. These were mainly expenditure for the acquisition of machinery, equipment and software. Furthermore, companies in the former Yugoslav Republic of Macedonia rarely use external R&D services. Only 7% of companies reported using external R&D services. The reported expenditure for external R&D is minor and amounts to a total of only about MKD 20 000 000 for all companies.

Another important dimension of the absorptive capacity of companies is their willingness to acquire new knowledge. Almost half of the companies surveyed by GfK have never offered any form of training to their employees. The 50% of companies which do offer training generally rely on in-house training focusing on technical training (37%) and on management related training (17%). Table 6 shows that these companies are generally more innovative than companies that do not offer training. 80% of companies that do offer training have introduced an innovation between 2008 and 2010 and 5% have been granted at least one patent. In contrast, only 44% of companies that do not offer training have introduced innovations and only 0.5% have been granted a patent.

**Table 6. Share of companies that innovate in relation to training offered by companies**

<table>
<thead>
<tr>
<th></th>
<th>Patents</th>
<th>Innovation activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Companies that offer training</td>
<td>5%</td>
<td>80%</td>
</tr>
<tr>
<td>Companies that do not offer any training</td>
<td>0.5%</td>
<td>44%</td>
</tr>
</tbody>
</table>

Companies in transition economies which try to develop human capital can be confronted with the issue of brain drain. In the former Yugoslav Republic of Macedonia, 20% of companies consider that the emigration of skilled employees causes a major (9%) or significant (11%) disruption to the activities of the company. More than 25% of companies reported that at least one technical/scientific person emigrated from the company in the last 3 years.

**Impact of innovation on companies**

Although it is difficult to fully assess the impact of innovative activities on the profitability of companies, the GfK survey asked private companies what impact innovation had on the companies’ finances. There is evidence that companies that introduced at least one of the four types of innovation (product/service, process, marketing or organisational innovations) in the period 2008-2010 have experienced a positive impact on the companies’ turnover and profit. Table 7 shows that, for a majority of companies, innovation increased turnover and profitability by more than 10%.

31% of CIS surveyed companies\(^\text{18}\) mentioned that market changes are the main motivation for innovation. Similarly, the GfK study reveals that companies introduce innovations to answer customers’ needs and preferences (42%), and competitors pressure (31%). These two findings suggest that companies react to their environment but fail to proactively take initiatives.

\(^{18}\) CIS Survey. EIS Macedonia Final Report – page.34, line 5.
Table 7. Innovation and development of company turnover and profits

<table>
<thead>
<tr>
<th>Approximate impact of any innovation between 2008-2010</th>
<th>Company turnover</th>
<th>Company profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>over 30%</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>20-30%</td>
<td>9%</td>
<td>10%</td>
</tr>
<tr>
<td>10-20%</td>
<td>19%</td>
<td>10%</td>
</tr>
<tr>
<td>5-10%</td>
<td>24%</td>
<td>26%</td>
</tr>
<tr>
<td>Less than 5%</td>
<td>17%</td>
<td>22%</td>
</tr>
<tr>
<td>Not introduced any innovation</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Do not know / Not available</td>
<td>24%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Note: The shares indicate the number of companies which experienced the respective increases in either turnover or profits. Data are for 243 companies that introduced at least one type of innovation out of the 492 companies in the GfK survey.

Sources of innovation

Firms with a good access to information are in a better position to identify and develop innovation opportunities. In that respect, developing linkages with other stakeholders is an important step in developing innovation. Landry and Amra (2002), based on Canadian experiences, confirmed that radical innovations benefited from policies promoting stronger linkages between firms and governmental laboratories and universities, while incremental innovation might be more efficiently supported through stronger linkages between companies and other market sources of information such as suppliers, customers, and competitors.

According to the CIS survey, internal knowledge is the most important source of information for companies, with 43.5% of companies regarding it as very important. While suppliers (34.6%) and customers (32.5%) and consultants, commercial labs or private R&D institutes (23.4%) still represent important sources of information for a significant share of companies, other sources such as competitors, universities, government or public research institutes, conferences, trade fairs, exhibitions, scientific journals, trade/technical publications are mentioned as being less significant. Not only is the use of external providers of knowledge by firms limited but, in general, companies rely on external knowledge to introduce only minor changes to their operations. Companies consider possibilities to receive external innovation related assistance mainly for minor modification of technologies already used in-house (almost 50%), followed by major modification of technologies already used in-house (29%). The fact that only 12% of companies would like to adopt new “turn-key” technologies or to make radical changes in technology (5%) shows that most companies in the former Yugoslav Republic of Macedonia have a relatively conservative attitude towards change.

When they use external sources of knowledge, companies in the GfK survey rely mainly on the internet (25%), customers’ advices (17%) and suppliers (16%) to identify technological and non-technological innovation opportunities. However, firms which describe themselves as “extremely innovative” in the GfK survey, do not use internet as the main source of information, but rely predominantly on linkages. To identify innovation opportunities, 80% of “extremely innovative” companies gather information from customers, 70% from industry associations and 60% from suppliers.

The CIS survey covered in depth the usage of different types of internet, and it shows that there is positive correlation of innovations in firms with employees’ access to the Internet and also with the frequency of internet usage of those employees. 96% of companies that increased speed of the internet service reported some type of innovation (Nestorovski et al., 2011). Also this study showed that the diffusion of innovation is greater in firms that have better internet access. Although e-mail services, which

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19. CIS Survey. EIS Macedonia Final Report – (tab. 4.4.d. page 43)
are used by 85% of internet users, are the most widely used application, the survey clearly shows the importance of internet to seek new business opportunities (66% of respondents), perform daily work (66%) and to find news and information regarding their business (30%). Companies using the internet have access to more information and obviously use them to implement some type of innovation in their daily business.

Given the increasing importance of integrating the private sector within the European Union market and the focus of economic policy on attracting FDI, foreign sources of knowledge may have an important role in the innovation system. However, foreign companies operating in the former Yugoslav Republic of Macedonia generally report that they have few relationships with domestic companies. They mainly use foreign suppliers and have foreign customers. The flows of knowledge from these companies to the domestic economy are limited.

One of the main channels for knowledge transfers from foreign companies in the former Yugoslav Republic of Macedonia seems to be the mobility of employees. According to the results of the GFK survey close to 8% of companies have employed people with experience working in a major foreign or multinational firm. Most of them (86%) confirm that those employees are bringing significant benefits from their “foreign company” experience. For instance, 93% of companies with employees with “foreign company” experience have introduced at least one type of innovation in the last three years compared to an overall average of 35%, and 17% of such firms have been granted a patent compared to 3% of companies in the entire sample. Besides employing people with “foreign company” experience, a few companies indicated that they purchase intellectual services from foreign private sector consultants (25 companies) or from foreign researchers (11 companies).

The importance of co-operation with other stakeholders

The frequent use of external sources of knowledge by innovative companies shows the importance of establishing linkages to develop innovative ideas. However, in the former Yugoslav Republic of Macedonia, this type of co-operation is limited. The CIS survey showed that 51% of product innovations are developed internally by a company or the enterprise group. A smaller proportion of product innovations (14.5%) arises from collaboration with other companies and to a smaller extent from collaboration with institutions (universities, research centres, etc.), while only 9.9% of introduced innovations have been developed mainly by other institutions.

Companies included in the GFK survey conduct innovation activities mainly by cooperating with suppliers (59%) and customers (55%), while joint activities with other enterprises are rather low among companies in the same sector (31%) to almost not existing with other business (3%). Another indicator for very low cooperation in the area of R&D is the fact that only 18 companies out of 1980 surveyed by CIS joined the 7th Framework Program.

The GfK survey reported that less than 9% of companies have set up links with universities, and only 5% with research institutions. Universities mainly provide consultancy (43%) and training (26%) services to companies. Companies that have established formal links with specific universities appear more successful in terms of innovation and export (Table 8). For instance, 94% of the companies that have stated to have formal links with Universities have introduced at least one type of innovation in at least three years, and 12% of them have been granted a patent in the same period. In comparison, only 63% of the companies that did not use this mechanism have developed some innovation and only 2% have been granted a patent.

20. CIS Survey, EIS Macedonia Final Report – Page 37. The other 24% of the companies did not answer this question.
Table 8. Company links with universities and innovation activities

<table>
<thead>
<tr>
<th>Links with Universities</th>
<th>Share of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patents</td>
</tr>
<tr>
<td>Established formal links with specific universities</td>
<td>12%</td>
</tr>
<tr>
<td>Did not have links with universities</td>
<td>2%</td>
</tr>
</tbody>
</table>

In order to increase the collaboration between academia and industry, the government dedicated EUR 60 million for 2010 and 2011 to investment in new research and scientific equipment for all public Universities, research institutions and laboratories. This is the highest state direct intervention in R&D area in the last 20 years.

The lack of cooperation both among companies and with universities and research centres is partially the result of the companies’ low level of networking activities. Namely, more than 2 out of 3 companies (68%) have reported not being part of any network, only 1 out of 4 companies (24%) reported being part of a domestic network or association and only 2% reported participating in international networks or associations. GfK data showed that 60% of companies which consider themselves as extremely innovative are members of formal domestic or international network/association of companies, while 87% of companies that mentioned that they are not innovative at all are not part of any network. Hence, cooperation between firms and participation in formal business networks is very important for the stimulation of innovation related activities.

The aspirations of companies showed that, as far as co-operation with other stakeholders is concerned, limited changes are to be expected in the short term. Customers and suppliers remain on top of the cooperation wish list, representing 68% and 61% of future co-operation initiatives respectively. The main evolution regards the increased willingness to further co-operate with competitors (31%) and foreign research institutions (11%).

Main constraints for private firms

Reviews show that a number of constraints can limit innovation activities in the private sector. An extensive study, conducted by Saatçioğlu and Özmen (2010) on companies in Turkey reviewed the various barriers. This review identified more than 30 internal barriers such as financial problems, lack of information on technology, lack on information on markets, inadequate R&D, bureaucracy and resistance to change and 24 external barriers such as lack of access to finance, norms and standards, problems with inputs, macroeconomic condition and government policies. Evidence from the GfK survey shows that in the former Yugoslav Republic of Macedonia more than half of the companies perceive the following factors as the most important obstacles for innovation: high cost of innovation (60%), lack of funds within the company or within the group (57%) and lack of access to external financial resources (52%). Non-financial constraints appear to have a secondary importance. Besides access to funding and the cost of innovation, the main constraints include inadequate government regulation (37%), uncertain market demand for innovative goods or services (36%), market domination by established enterprises (35%), difficulties in identifying co-operation partners for innovation (31%), the lack of information on technology (28%) and the lack of qualified personal (27%).
As part of work conducted for the Innovation center, an international project identified the main constraints to the innovative capacity of SMEs in the former Yugoslav Republic of Macedonia. The constraints that were identified are very similar to the one highlighted as part of the GFK survey:

- **Lack of financing instruments for innovation support**: Few financial instruments for innovation exist and the existing loans from the commercial banks are hardly accessibly and very expensive. The Ministry for Education and Science has a yearly programme for technological development and supports 20-30 innovative project submitted by SMEs. Banks are very restrictive regarding innovation projects and are offering just classical loans. Business angel support is in its embryonic phase, while participation in EU (FP7, CIP, etc.) and other donor related projects is very rare among SMEs.

- **Lack of institutional support**: There is a lack of support instruments for innovation development. The most serious problem is the shared and overlapping responsibilities for innovation support amongst institutions. The Ministry of Education and Science and the Ministry of Economy, both have programs to support innovation projects, while the Agency for Entrepreneurship Promotion deals with innovation vouchers. Innovators and innovative SMEs suggested having a centralised institution in charge of innovation support.

- **Low level of collaboration between SMEs and academia**: Direct collaboration between industry and academia, especially the use of research centers and laboratories is very weak. Universities tend to focus on teaching, with few exceptions. There are positive examples of professors getting involved in innovation activities but these are not systematically organised and are usually driven by individuals. Moreover, there are only a few research centers and they are not available for SMEs.

- **Lack of awareness and innovation culture**: Innovative SMEs mentioned that company culture could be an obstacle to innovation. Furthermore, there is evidence that, although many companies state that they do not innovate at all, they do have some innovative activities in practice. In particular, accountants within companies often do not register R&D investments. More generally, there is a limited recognition of innovative activities.

- **Lack of management skills**: There are only few innovators which take in consideration the commercialisation of the product or developing line production. A significant problem is the lack of management skills and business knowledge of innovators.

**Effectiveness of existing schemes**

A number of public policies have been developed to help companies to become more innovative. These initiatives are developed in Chapter 6 on the role of public policies. As part of the survey on innovation practices, GfK collected the opinion of companies regarding their perception of the role of public policies and their input on the type of policies that could be adopted to further support innovation.

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21 On-site analysis was conducted in the period July 2010 – June 2011 for the needs of the Innovation Center and multinational project: INTER VALUE - Inter-Regional cooperation for valorisation of R&D

22 According to the Ministry of Education and Science in the period 2006-2009, almost 250 project applications submitted by SMEs were evaluated, while 68 projects was granted with total amount of 1 000 000 EUR.

23 These are SME’s and individuals (in total 20) that were interviewed during the INTERVALUE project and Innovation centre activities
Almost half of the companies surveyed are not aware of the various forms of governmental support measures for innovation. Only 5-6% of companies were involved directly in some of the mentioned programmes. This suggests that, in order to have a significant impact on the actual practices of the private sector, the scale of these programmes, and the awareness campaign surrounding them, would need to be expanded. In addition, the results of the survey show that the government does little to promote innovation related practices through public procurement. Out of the 135 companies interviewed by GfK which had participated in public procurement, only seven mentioned that a specific innovation was required to answer the tender. In most cases, the tender was primarily driven by price with limited innovation content (76 firms). Although public procurement procedures do not represent a significant constraint to innovation, these findings show that there may be a missed opportunity to develop innovation. A number of international and national projects have been implemented or launched in order to create an open and favourable business environment with a focus on improving public procurement processes.

Besides their opinion on current schemes, companies were consulted on which measures would be most relevant to support their innovative effort. Not surprisingly, given the relative consensus on the difficulties to finance innovation, companies mainly suggested measures related to access to finance. 54% of the companies ask for governmental intervention to introduce tax incentives that would support innovation, while 43% ask for other types of financial contributions to reduce the costs of innovation. Besides a better access to finance, companies are asking for measures to develop skills. Support schemes to develop employee training were mentioned by 21% of companies while measures to foster exchange of know-how between companies were called for by 20% of them.

Companies that consider themselves to be extremely innovative asked for support in the following domains: customized consultancy / research support, tax incentives and networking opportunities between companies and with universities and research centres. Companies that have identified at least one innovation which would improve their market position, but have been unable to introduce it, regard tax incentives supporting innovation (81%), other types of financial contributions to reduce the cost of innovation (79%), and measures to foster exchange of know-how between companies (51%) as very useful to extremely useful.
CHAPTER 5: RESEARCH-INDUSTRY LINKAGES

This chapter examines linkages and existing schemes to encourage interaction between different actors in the country. Based on the discussions held and materials consulted (see also Polenakovic and Pinto, 2010), the conclusion must be that the linkages between universities / research institutions and the private sector are weak and underdeveloped in the former Yugoslav Republic of Macedonia. The discussions with the business association and the results of the focus group discussions especially held for the purpose of this analysis with enterprises all reinforce this conclusion. The research institutions perform research and development as best as they can, given the limits of their highly constrained budgets. However, this is rarely geared towards co-operation and commercialisation involving the private sector. All interviewees stressed that a future innovation policy must develop mechanisms for closer linkages between enterprises and the research institutes. However, some measures are being taken to strengthen linkages, not least by the Ministry of Education and Science through research funding for “development” projects designed specifically to strengthen linkages between research institutions and enterprises through cooperative research and application. It is expected that this type of research-industry cooperation will generate gains for the researchers, firms, economy and society as a whole.

Collaborative research initiatives

Although limited links exist between public and private research activities, there are some exceptions to the rule. For example, the Ministry of Education and Science programme seeks to fund “scientific” as well as “development” projects. “Development projects” are projects co-financed by the SME leading the project and the Ministry of Education and Science. According to information provided by the Ministry of Education and Science, 25 such development projects were funded (54 applications were made) in 2010 and the same number is anticipated in 2011. These projects are theoretically co-financed on the following basis: 50% by the Ministry of Education and Science and 50% by enterprises. However, in 2010 the contribution of the Ministry of Education and Science averaged only 30% of the costs. In 2011, there have been only 45 applications for development projects, and the same trend is evident in the case of scientific projects, which do not involve linkages. The steep decline in applications is attributed by the Ministry of Education and Science to the more demanding application process, the necessity for applications to be submitted on-line and the requirement for applications to be made in Macedonian and English, in order to make use of domestic and international experts in the selection panel. This is expected to raise the quality of funded development (and scientific projects) over time, but in the short term there may be a detrimental effect.

Moreover, regardless of the Ministry of Education and Science programme, certain faculties are better disposed than others to the idea of seeking close and long term linkages with the private sector. Faculties such as the ones for mechanical engineering, computer science or civil engineering lend themselves more readily to private sector collaboration. For example, the TEMPUS Programme and support from the Gesellschaft für Internationale Zusammenarbeit (GIZ) resulted in the establishment of technology transfer initiatives with the Faculty of Electrical Engineering, the Faculty of Technology and Metallurgy and at the Faculty of Agriculture at USCM. The objective of the project was to upgrade knowledge, skills, establishment of modern laboratories, as well as R&D projects. An example illustrating what is possible to achieve, despite limited state funding, is the Faculty of Mechanical Engineering (FME), as illustrated in the Box 4. In several cases, research institutions indicate that they offer services such as consulting or training to private companies. However, only in a few cases do the linkages go beyond these types of services to
include co-operation in research. Out of the seven institutions (FME was not included) that answered the questionnaire submitted by the Ministry of Education and Science, only the Goce Delcev University states it has established links with the private sector to commercialise research outcomes and only one says it collaborated with the private sector for the use of research facilities.

**Box 4. The Faculty of Mechanical Engineering (FME) at USCM**

In 2002, FME established a private company called the centre for research, development and continuous education (Cirko). As implied by the name, Cirko focuses on technology and know-how transfer in mechanical, industrial and production engineering, automotive industry, energy sector, welding and new materials, hydraulics, automation, thermodynamics, mechatronics, transport and logistics, etc.

Cirko has actively engaged with various international partners, including USAID, GIZ and UNIDO. It was successful in obtaining EU/international funding and is constantly seeking new opportunities. In 2006, with the support of the Austrian Development Agency, it created the business start-up centre to assist students and graduates to improve their business skills and to establish and run their own businesses. The centre serves as an incubator of innovative technology for students, recent graduates and staff through the provision of entrepreneurial training, support and networking.

The FME is currently actively pursuing the possibility of creating the first science and technology park using the Public Private Partnership (PPP) principle; discussions with senior staff indicate that negotiations are underway and that agreement is imminent. The FME offers a domestic model of best practice which highlights what can be achieved in the former Yugoslav Republic of Macedonia.

On a more upbeat note, one of the business associations suggested that the level of university-private sector linkages and general collaboration may be understated by the official statistics. In many situations, firms may know a particular academic and contact him/her directly for support in relation to their technology transfer or commercialisation needs. These informal contacts then result in a direct contract between the academic (using resources such as know-how and research teams, often paid for by the University / other research grants), and the firms in question. This is advantageous for the companies since they build upon their existing networks of trust. It is also relatively cheap for the companies, since the contracts are directly with the academics. The academics and their research teams also benefit from this process, but the university itself may or may not. In other words, it is possible that a higher degree of linkage may exist than might be assumed and that such activities, whether formal or otherwise, contribute to technology transfer, commercialisation and innovation.

**Strengthening linkages between companies and providers of knowledge**

The Macedonian Agency for Entrepreneurship Promotion (APPRM) is promoting the so-called “innovation voucher” involving competitive applications in the following areas: Total Quality Management; Just in Time; new product development; R&D; and IPR. The maximum amount subsidised by APPRM through the innovation vouchers is MKD 90,000 (EUR 1,500) per year and company, with the expectation that the participating companies will contribute 50% of the costs for the consulting services in the field of innovation. However, the highly restricted funds mean that demand from SMEs vastly exceeds supply: only two or three innovative vouchers are expected to be issued in 2011. It is not possible to assess how effective these measures have been since it is either too soon to make an assessment or no evaluations have been performed thus far. Although the general SME voucher schemes have been active for several years, it is not considered to be a very effective initiative by the business associations.
Although it is recognised that the lack of well-development linkages and absence of a focus on commercialisation are fundamental weaknesses in the Macedonian system, no institution is tasked with improving the system, such as the Fraunhofer Institute in Germany.

**Mobility of researchers and engineers**

There is no official policy or programme of support to foster the mobility of researchers and engineers between firms / institutions internationally, other than the general support provided by the Ministry of Education and Science (albeit with very limited funding) and the existing EC (e.g. Erasmus Mundus) and other programmes which Macedonian institutions can apply for a competitive basis.

Faculties, such as the ones for mechanical engineering or chemical engineering do actively engage with enterprises and even negotiate Memorandums of Understanding with private sector firms to enable their students to participate in internships and work placements. There is often a work experience requirement as part of the academic course, which forces faculties to be proactive in seeking cooperation (work placement) with the private sector on behalf of their students. Some companies are reportedly very good at providing mentoring and support, including participation in the official examination process. In return, the participating firms gain the prospect of recruiting high quality human capital.

**Infrastructure for linkage and innovation**

**Clusters**

The initiative to support clusters came originally from United States Agency for International Development (USAID)-supported projects. Subsequently, other donors have supported them, such as GIZ. However, the overall responsibility for cluster development now rests entirely with the Ministry of Economy. According to the information provided by the Ministry of Economy, there are currently 15 clusters in existence, such as IT, automotive, textile, fashion design, wine, agricultural mechanisation, wood processing or food processing. More recently, new clusters have arisen, such as snails and confectionery. However, some are also known to have stopped operating, such as lamb and cheese and the national tourism cluster.

The main source of finance for clusters is now the Ministry of Economy. There was no public funding to support clusters or any other form of industrial policy support during 2009 - 2010, but in 2011 MKD 3 million were allocated specifically for cluster development. Through competitive Calls for Proposals, successful applicants are selected by the Ministry of Economy for funding. This year, the Call for Proposals is targeting cluster manager training, seminars, conference and cluster support worth Euro 5,000 for up to five clusters. Three have already been selected (textiles, automotive and wine clusters) and two grants remain to be allocated.

Since no study has been carried out to evaluate impact, it is neither possible to say which of the 15 clusters are functioning effectively nor whether they are conducive to innovation. However, it is instructive that the Ministry of Economy Industrial Policy strategy states:

“The key weakness that all existing Macedonian clusters share is a lack of potential for innovation, new products and services development to better compete in the global market. Existing clusters have ... done much less in the area of sharing and creating economies of scale in purchasing, applicable research and development and innovation... Analysis of clusters around the world shows that successful clusters gather, apply and expand knowledge and create innovative solutions to business challenges. These qualities of clustering are still need to evolve in the former Yugoslav Republic of Macedonia.” (2009, p.70)
The Ministry of Economy is planning a new project funded by the EC’s Instruments for Pre-Accession (IPA) programme that, in part, is designed to assist clusters to get to the next level of development and thus meet some of the challenges highlighted in this analysis, including being more conducive to innovation. It should be noted that the OECD focus group discussion with enterprises did suggest that some entrepreneurs consider clusters, such as the automotive one, to be of use in stimulating innovation, as far as their firms are concerned.

**Incubators**

Three business incubators are currently operating: the SPARK incubator in Bitola (Dutch/USAID support), the Youth Entrepreneurship Service incubator in Skopje (originally set up with the support of the Ministry of Foreign Affairs of Norway) and the World Bank incubator in Strumica. In addition, two start-up centres (embryonic incubators) are operating in Tetovo (SINTEF) and Skopje (Austrian Development Agency). However, it should be noted that the Strumica incubator is the last survivor of the nine incubators originally created by the World Bank. This illustrates the important challenges that these initiatives face once donor funding comes to an end. Business incubator managers receive no funds from the public authorities or from universities and rely on donor funding.

Besides the issue of sustainability, these initiatives are generally regarded as positive development. However, even for companies located within business incubators, the difficulties to establish innovative firms, in particular in technical fields, mean that few of them have a strong innovative dimension. In particular, despite the low cost of business incubation services, companies have difficulties accessing funds. In order to further promote the development of spin-offs for students and academics, these business incubators could establish stronger links with education and research institutions. In particular, they could provide trainings to faculty on entrepreneurship related issues.

**Science and technology parks**

The establishment of science and technology parks is a key feature of R&D / science and technology strategies of other countries being recognised as important mechanisms for fostering entrepreneurship generally and competitiveness and innovation specifically. Although a feasibility study was carried out for the establishment of the Bitola Technology Park, with the support of GIZ, it is not yet in operation. According to the Ministry of Education and Science, no science and technology parks currently exist, but discussions with the Faculty of Mechanical Engineering (FME) of USCM indicate that FME is quite advanced in its plans to create a science and technology park using the Public Private Partnership law. The faculty anticipates the contract for the park to be signed during 2011. In addition, a USCM university-wide research park should foster interdisciplinary collaboration across different disciplines such as life science and engineering.

**Inter-firm networks**

The Industrial Policy has a focus on clusters (see earlier discussions) and networks (Industrial Policy for the former Yugoslav Republic of Macedonia 2009-2020, pp.69-73). It defines both networks (“A network is a mutually beneficial business relationship of a number of companies and institutions which operates as an exchange of business information, ideas, and support on technology, R&D, skills development, markets and business models and many other areas of joint interest.” 2009, p.69) However, due to limited state funds, any form of support for networks by the Ministry of Economy is planned for 2013 at the earliest.
While no networks are currently supported by public policies, some networking is taking place independently of the existence or otherwise of state policies and initiatives. For example, the data collected by the European Innovation Scoreboard in the former Yugoslav Republic of Macedonia provide evidence of the role that informal networks have for the innovation of companies. Indeed, suppliers and customers are the two main external sources of information used by companies to innovate. Respectively 35% and 33% of companies considered that suppliers and customers were of high importance in their innovation process. This is significantly higher than other companies in the same sector. Incidentally, institutional sources, such as Universities and public research institutes are considered as very modest contributors to the innovation process.

There are also other forms of cooperation, as illustrated by the Economic Chamber of Macedonia, which has 19 associations, all of which represent a form of inter-firm networking, usually at the sectoral level. The other business associations also have various initiatives that bring together networks of companies on a regular basis. However, there is further scope to stimulate networking among firms in the former Yugoslav Republic of Macedonia.

**Consulting services**

The former Yugoslav Republic of Macedonia has a relatively long history of establishing consulting services. A number of initiatives may be highlighted:

- **APPRM network of business centres**: a network of 12 business centres has evolved from various forms of donor support, including the DFID Enterprise Support Agencies (Tetovo, Gostivar and Ohrid) and the EC’s Regional Business Support Centres (Skopje, Veles, Bitola, Strumica and Kumanovo). This network is supplemented by others such as the Roma Business Information Centre, the Crafts Chamber and the Economic Chamber of Macedonia (all three located in Skopje) and the EVRO Centre in Sveti Nikole. These have qualified and experienced, albeit generalist, business consultants.

- **APPRM network of consultants**: a database of business consultants exists that is regularly updated to reflect the priorities that are being funded through APPRM’s Calls for Proposals. There are 283 consultants registered in the database and it is open to new applications.

- **Network of Certified Management Consultants (CMC)**: with EBRD support, a network of 52 Certified Management Consultants has been created, whose certification process is consistent with internationals standards. The CMCs are members of the ICMCI-accredited Macedonian Consultants’ Association (MCA2000).

- **Chamber of Economy’s Centre for Implementation of Development Ideas (CIRI)**: CIRI has recently developed a database of consultants with technical skills required to support applications to EU programmes. The CIRI network has ca. 35 technology/innovation/generalist independent consultants.

- **Innovation Centre**: the centre is in the process of developing an ecosystem of consultants (ca. 20 experts) able to support entrepreneurs in various aspects of innovation-adoption and/or commercialisation of research. The centre has further created the first Business Angel Network.

There is no public policy to develop consulting services, other than through APPRM. APPRM seeks to deliver services to start-ups and SMEs through its network of business centres. Moreover, it maintains a
database of consultants and it seeks to build their capacities, for example through the provision of training and certification. The system requires regular re-certification, which in turn requires members to raise their knowledge and standards over time.

**Business associations**

There are about 20 national, local, sectoral and bilateral business associations covering numerous sectors of activity, including four with national coverage, namely the Economic Chamber of Macedonia, Macedonian Chambers of Commerce, Economic Chamber of North West Macedonia and the Chamber of Crafts.

The Macedonian Chambers of Commerce recognises the importance of innovation and supports the creation of an Innovation Policy for the former Yugoslav Republic of Macedonia. However, it does not have a policy position per se and does not advocate/lobby for innovation matters. It does recognise the importance of adding innovation to its palette of training activities but has not yet done so. It also has an R&D Committee which meets on an ad hoc basis to discuss R&D and innovation matters.

The Economic Chamber of Macedonia recognises the importance of innovation and strongly supports the process of creating an innovation policy. Through its 19 sectoral associations, it is keen to support the process of raising awareness on innovation matters among its member firms. A new initiative is its Centre for Implementation of Development Ideas (CIRI), which fills an important market gap in assisting firms to apply for various domestic/international projects on a commercial basis. As discussed earlier, it has recently developed a database of consultants with technical skills required to support applications to EU (such as Eco-Innovation and Intelligent Energy Europe, as well as FP7 and IPA funds). Through CIRI the Chamber expects to assist its members to access funds and support for innovation but no applications have been successfully submitted so far.

To conclude, based on discussions with the Macedonian Chambers of Commerce, MASIT and the Economic Chamber of Macedonia, all recognise the importance of R&D generally and innovation policy specifically. Although the degree of active involvement in innovation policy and implementation varies from association to association, all agree on its critical importance to the future competitiveness of enterprises and the economy. Furthermore, all acknowledge that their members require awareness raising, training and support in order to ensure that they play a fuller role in innovation matters in the future.

**Obstacles to infrastructure development**

The initiatives discussed above are diverse in nature (clusters, networks, incubators, consultant networks, etc.) so it is hard to abstract and generalise. The various forms of infrastructure appear to have some common characteristics in terms of their various phases of development:

1. **Strong development:** consistent with significant donor funding and technical assistance.
2. **Stagnation and/or stabilisation:** programmes go through a process of adjustment to the economic realities of operating without sustained donor support. Often initiatives “wither on the vine” and seek state and/or donor support, which is often irregular and insufficient to assist them to the next stage of development.
3. **Closure:** in certain cases, the initiatives, whether clusters (e.g. lamb and cheese), business centres, incubators (e.g. eight of the nine World Bank funded incubators have stopped operating) or parks (e.g. Bitola Technology Park) simply stop operating due to lack of sustainability.
4. Take-off: a subset of the initiatives, especially those that are truly demand-driven and private sector-oriented, achieve financial sustainability and positively thrive the post-donor / state support phase. There appear to be few such initiatives, such as possibly the CIRKO centre.

In a nutshell, the main obstacles faced are connected with markets, finance, expertise and sustainability. Once donor funding is terminated, the programmes must survive independently, mainly by providing demand-driven services to the private sector. Since these have tended to be predominantly supply-driven initiatives, they either fail or just about survive (still reliant primarily on state, EU and other funds) and either deliver minimalistic services or reorient their services away from the target groups that they were originally formed to serve (such as start-ups and SMEs) due to the financial imperatives.
CHAPTER 6: ROLE OF THE GOVERNMENT

Innovation in the economic programme of the government\textsuperscript{24}

Several documents have been adopted by the government over the last few years that seek to improve innovation and research outcome. Those include the National Development Plan (NDP) for 2008-2013, the Strategy on Industrial Policy, the Strategy for Intellectual Property, the Export Promotion Strategy as well as documents related to small and medium-sized enterprise (SME) policy. In addition to these documents related to economic development, some reforms have been conducted in the research areas, in particular through the Law for the Development of Research and Scientific Activity, the Law to Encourage and Facilitate Technological Development, the Act to Encourage and Facilitate Technical Education and the Law on Encouragement and Support of Technical Culture.

Although all of these texts entail some aspects of innovation policy, they only consider it within the limited scope of enterprise development. No document that would take into account both the research and development aspects of innovation as well as its economic implication, as does the EU 2020 strategy (see Box 5), has been developed in former Yugoslav Republic of Macedonia yet.

\begin{footnotesize}\begin{tabular}{p{1\textwidth}}
\textbf{Box 5. European Union 2020 Strategy} \\
Europe 2020 is the growth strategy of the European Union (EU). It builds upon the by the Lisbon strategy for growth and jobs, launched in 2000. The strategy sets clear and measurable targets (both at EU and national level) and robust surveillance. It aims to foster new models of growth, promotes stronger governance and tighter economic co-ordination.

Europe 2020 aims to foster smart, sustainable and inclusive growth within the Union. Smart growth means bridging the European productivity gap through improving education, research/innovation, and the digital society. Sustainable growth means promoting a more resource efficient, greener and more competitive economy though building a more competitive low-carbon economy, protecting the environment, developing new green technologies, introducing efficient smart electricity grids, harnessing EU-scale networks, improving the business environment, and helping consumers make well-informed choices. Inclusive growth means fostering a high-employment economy delivering economic, social and territorial cohesion through creating more and better jobs, investing in skills and training, modernizing labour markets and welfare systems, ensuring an equal dispersion of the benefits of growth. These three mutually reinforcing priorities are to deliver high levels of employment, productivity and social cohesion.

The EU has strategic objectives in five target areas: employment, innovation, climate/energy, education and poverty/social exclusion. The primary strategic goals set by Europe 2020 are to increase employment of the 20-64 year-olds to 75%; to invest 3% of the EU’s GDP (public and private combined) in R&D/innovation; to reduce greenhouse gas emissions to 20% (or potentially 30%) lower than 1990 levels; to use 20% of energy from renewable resources; to increase energy efficiency with 20%; to reduce school drop-out rates below 10%; to ensure that at least 40% of 30-34-year-olds complete third level education; and reduce the number of people in or at risk of poverty and social exclusion with at least 20 million.

Each individual Member State will adopt its own national targets in order to achieve the objectives of the Union by 2020. Concrete actions will be undertaken both at EU and national level. The strategy has introduced 7 flagship
\end{tabular}\end{footnotesize}\textsuperscript{24}.

This chapter was drafted between the end of May and the first half of June. Therefore, it does not take into account changes in the government organisation and programme that occurred after the parliamentary elections in June 2011.
The strategy emphasizes on the need to use more effectively existing cross-cutting policies and tools, such as the single market, the EU budget and the external policy tools.

The Monitoring process will review macroeconomic factors, growth-enhancing reports and public finances. Progress will be assessed through an annual growth survey, the Spring meeting of the European Council, the National Reform Programmes and Stability / Convergence Programmes. The Commission will propose country-specific recommendations every June and, where recommendations are not acted on within the given time-frame, there will be policy warnings with enforcement through incentives and sanctions in the case of excessive imbalances. Ministerial Meetings in the Council of the EU will peer review and monitor progress towards EU headline targets, and advance Europe 2020 flagship initiatives. Every stage of the process will be accompanied by the European Parliament.

Source: EC, 2010a

**General orientation of the government**

The general programme of the government for the period 2006-2010 defined the objectives to be followed by the government. The full scope of government intervention is covered, from economic reform to education and healthcare. Increasing the competitiveness of business in the former Yugoslav Republic of Macedonia is among the key objectives mentioned. In the area of economic reform, the improvement of the various aspects of business climate and support to FDI development were identified as key priorities for the government. Besides these general priorities, a number of measures are dealing directly with innovation. Developing linkages between universities and the private sector and improving the participation of the private sector to the research effort were recognised in the general programme as essential measures to develop competitiveness.

In 2007, the government adopted its NDP for 2008-2013. Four main objectives were defined for the country:

- integration of the former Yugoslav Republic of Macedonia into the EU;
- sustainable economic growth and competitiveness, employment, and raising living standards and the quality of life;
- good inter-ethnic relations and coexistence based on the principles of mutual tolerance and respect;
- investment in education to enhance individual creative and productive capabilities, as the basis of a modern, competitive society.

The industrial strategy for 2009-2020 aims at defining the broad objectives for the economy of the former Yugoslav Republic of Macedonia in the long term. It defines 5 pillars on which the economic policy of the government will focus. The 5 pillars are: the development of applied research, development and innovation, FDI stimulation, sustainable development and ecology, support of SMEs and entrepreneurship, and development of clusters and networks. In each pillar, the strategy includes some objectives that should be reached by the government and suggest potential policy measures that could be adopted.
Institutions and policies

Ministry of Education and Science

There are two main institutions in charge of innovation policy and programmes, though other organisations’ activities also impinge on the issue. The first is the Ministry of Education and Science, whose focus is on R&D generally (with a budget of MKD 65 millions in 2011) rather than innovation per se. However, the draft R&D Strategy, which has been prepared but not yet received governmental approval, reportedly seeks to raise the levels of investment in R&D from the current 0.22% to 1.8% by 2020. It is framed around the EU’s 2020 strategy and the Ministry of Education and Science considers it to be completed. The Ministry of Education and Science intends to prepare a related four year R&D Programme in the coming six months so it would be of importance for the future Innovation Policy to be developed with OECD support to feed into the new R&D Programme.

The Ministry of Education and Science is the main body regulating scientific activities in the former Yugoslav Republic of Macedonia. A number of legal texts regulating these activities have been drafted. In particular, the Law to Encourage and Facilitate Technological Development (2011a) and the Law for Scientific-Research Activities (2011b) aim to structure the research effort in the country. These laws mainly seek to regulate the activities of public bodies involved in research activities. They have limited focus on innovation and they do not explicitly support innovation activities and linkages between research performing institutions and private companies.

Ministry of Economy

The second key institution is the Ministry of Economy. Innovation is a prominent feature of the current Programme for the Development of Entrepreneurship, Competitiveness and Innovation of Small and Medium Enterprises (2007 – 2010); and is gaining in prominence, as illustrated for example, by the emphasis on improving linkages between SMEs and research institutions and the publication of the first European Innovation Scoreboard (EIS) report for the former Yugoslav Republic of Macedonia (Contesti, 2011).

The ministry has developed a number of initiatives to enhance the competitiveness of SMEs. The general orientation of SME policy in the former Yugoslav Republic Macedonia was defined in 2002 when the Ministry of Economy published its SME strategy for 2002-2013. This strategy, which was updated in 2007, included among others the objective to develop the innovation capacity of SMEs. Several programmes have been developed that aim to translate the orientation provided by the strategy into concrete policy measures. The latest programme was adopted in April 2011 and covers the period from 2011 to 2013.

The SME programme aims at addressing the policy areas included in the Small Business Act (SBA) developed by the European Commission (EU, 2008a). The main focus of the programme are (i) to set up an adapted institutional architecture, (ii) to improve the business environment, (iii) to facilitate access to finance (iv) and to better develop innovation and competitiveness of SMEs. Measures that explicitly target the innovative capacity of the private sector include support to the creation of an “innovation voucher”, the development of the Innovation Union Scoreboard and the support of commercial application of knowledge developed in the universities.
The Ministry of Economy’s industrial policy focuses on a series of priorities, one of the most prominent of which is “Applied R&D and Innovation.” The Ministry of Economy sets aside MKD 3 millions for cluster and network development, as well as ca. 11 millions for a variety of industrial policy initiatives in 2011, such as support of business costs for technological development, support of business costs for employment of young researchers, support for commercialisation of patented innovations and building institutional capacity for participation in international projects and programmes.

Thirdly, the new Programme for Stimulating Investment 2011-2014 (Ministry of Economy, 2011a) has been submitted to Government for approval and focuses on the following reform themes: Investment Policy and Promotion; Trade Policy; Tax Policy; Business Environment; Human Capital; Infrastructure for Investment; Access to Finance; and Economic Reform. Although it does not focus on innovation per se, the new Investment Programme amounts to a wide-ranging reform agenda designed to improve the general business climate, as well as stimulate investment in the country, thus contributing directly to raising the competitiveness of Macedonian firms. It also contributes to the goal of increasing of profitability, growth and employment generation, thus impacting on innovation in general. However, it does not have specific resources allocated for its implementation.

Other state institutions

The SOIP has developed a Strategy for Intellectual Property 2009 – 2012, which aims to develop the capacity of IP right holders and the business community in protection and enforcement of intellectual property rights, thus spurring investment in R&D.

The software industry has emerged as dynamic sector of the Macedonian economy, with potential to act as a motor of competitiveness and innovation. The Export Promotion Strategy for the Software and IT Services Industry proposes a series of measures to assist the software sector to be branded as a software specialist, providing high quality outsourcing services and delivering superior software products in Europe.

Finally, a draft Export Promotion Strategy has been prepared by the investment and export promotion agency Invest Macedonia but not yet been approved by the government. It aims to increase the value of exports generated by Macedonian companies by 30% over a three year period. The strategy mentions that improving the competitiveness and the innovation is a pre-requisite for companies to improve their presence in international market.

It proposes to assist companies to commercialise by improving linkages between businesses and the research base and between enterprises and the European innovation network; it seeks to support enterprise-based processes which can underpin innovation; to develop infrastructure and connections enabling more effective collaboration between companies within priority sectors and to help create a business environment conducive to innovation; to create and sustain an innovation system representing the focal point through which activities of stakeholders and specialists can be concentrated on supporting enterprises in the former Yugoslav Republic of Macedonia; to bridge gaps and establish robust and logical linkages between broader business / SME promotion policy and the Science and Technology development-related policies; to encourage companies to invest in innovation, beyond the focus on science and technology, in order to develop new products, services and ways of working; and to focus on enabling technologies to develop new solutions that meet the needs of European markets. These are significant proposals which would further promote the importance of innovation in the country. But it remains to be seen whether the draft Export Strategy will be approved and whether it will have the necessary funds for implementation.
European Commission (EC)

Since the former Yugoslav Republic of Macedonia is a Candidate Country, it is important to assess the EC’s perspective on the progress being made in relation to the relevant chapter of the acquis. This is illustrated in the Box 6.

Box 6. EC progress report 2010 - excerpts from chapter 25: Science and Research

Little progress can be reported in the area of research policy. The 2010 programmes for scientific research activities, technological development and technical culture were adopted. The 2010 budget for the programme for research and technological development maintained at the 2009 level. Financial resources are still limited and the capacities of the research facilities remain weak. Preparations in this area are moderately advanced. Good progress is being made as regards the country’s participation in the framework programmes. The number of applications and the projects selected and funded under the seventh EU research framework programme (FP7) increased. However, participation needs to be strengthened in a number of key areas, including mobility of researchers and SMEs. Moreover, the administrative capacity needs to be strengthened in order to ensure effective and sustainable participation in EU research cooperation... However, the investment in research, from both the public and the private sector, remains low (estimated at 0.5% of GDP in 2009). The lack of reliable statistics makes implementation and monitoring difficult. A strategy on research and innovation is still missing. Preparations in this area are moderately advanced (EC, 2010, p.68, emphasis added).

Local government

In common with most countries of the Western Balkans, the local government system in the former Yugoslav Republic of Macedonia is cash-strapped. Local authorities’ activities are largely restricted to local economic development work, with focus on entrepreneurship, competitiveness and investment. The key players at the local level are the Local Economic Development Offices (LEDOs) which are operating in each of the 84 municipalities. In addition, the network of Business Centres (part-financed by APPRM) is also active in supporting the local economic development agenda, including a general focus on start-ups, competitiveness and innovation. With some exceptions, such as the largest cities and the current and designated Technological and Industrial Development Zones (TIDZs - see below), innovation-related instruments are not a policy priority for local government in the former Yugoslav Republic of Macedonia.

Incentives

The innovation-related funds and instruments operate almost exclusively at the national level. The incentives are primarily financial in nature (see Ministry of Education and Science and Ministry of Economy funds), with a few tax incentives, such as customs tax and partial Value Added Tax (VAT) exemption for public research institutes importing scientific equipment.

The main tax incentives available are for the development of the TIDZs (Ministry of Economy, 2011a):

1. 10 year tax holiday: Investors in TIDZs are entitled to 10-year Corporate Income Tax exemption (10% thereafter) and to 0% reduction Personal Income Tax for a period of 5 years (10% thereafter). Investors are exempt of VAT and customs duties for export production.
2. Land: Investors in the TIDZs can negotiate long-term leases for a period of up to 99 years at concessionary rates.
3. Infrastructure: Investors are exempt from utility taxes on natural gas, water, sewage and electricity.
4. Fees and registration: Investors are exempt from paying fees for land building permits. Rapid business registration is provided by the DTIDZ to further reduce start-up costs.

5. Subsidies: the government contributes to the construction costs of TIDZ investors up to Euro 500,000, depending on the number of new jobs and volume of investment.

However, Invest Macedonia and others stress that the companies that have located in the TIDZs so far (e.g. Johnson Controls and Johnson Mathey) have limited or no linkage with domestic enterprises.

Role of public procurement

The Government appears to regularly experience major delays and other difficulties in relation to public procurement (see Box 7). The overall procedures need to be streamlined and harmonized with EU directives and other requirements as a top priority. Overall, the public procurement process in the former Yugoslav Republic of Macedonia has no role in relation to development of innovation capacity at present.

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<th>Box 7. EC progress report 2010 - excerpts from Chapter 5: public procurement</th>
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<td>Little progress has been made as regards general principles. ... With regard to administrative capacity, the staff of the Public Procurement Bureau (PPB) was increased to 17 people. The PPB adopted a strategy for the development of the public procurement system for 2010-2012 which confirms the maturity of that institution in developing, piloting and monitoring the country's public procurement policy. ... The trend in tender cancellations and failures continued. There is still insufficient awareness regarding conflicts of interest, ethics and anti-corruption in procurement procedures. ... Furthermore, works have often started and even been completed before the respective tender has been launched. The State Audit Office detected serious irregularities in procurement procedures, but the Public Prosecutor's Office in most cases established only minor omissions. This resulted in few charges being pressed against the contracting authorities. As regards award of public contracts, the country is moderately advanced. (emphasis added, EC, 2010, p.35-36).</td>
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Institutional dialogue

The level of institutional dialogue in the former Yugoslav Republic of Macedonia is underdeveloped at all levels. The main arrangements are highlighted below.

Ministry of Education and Science

The Ministry of Education and Science’ main mechanism for dialogue is through the Scientific Council. The Scientific Council consists of seven experts in various technical fields, all of whom are appointed by the Minister of Education and Science. The Scientific Council is involved in the process of drafting the new R&D Strategy; selection of winning scientific and development projects and provides advice to the Minister. Further, a National Committee was established to develop scientific research and is in the process of forming a board of ethics. Another body, the Committee for Technological Development, which is expected to eventually comprise seven Ministry members, has not yet been established.

Ministry of Economy

The Ministry of Economy has a variety of mechanisms for dialogue, though they are not all in active use:

- Inter Ministerial Working Group on Industrial Policy (IMWGIP): as part of the Industrial Policy, an IMWGIP was created comprising some 30 civil servants from various relevant ministries. The
IMWGIP is expected to receive USAID support in order to enhance its operation so as to produce an effective forum for dialogue on various issues, including innovation.

- **NECC**: was initiated with USAID support to act as an inter-institutional forum for dialogue on various aspects on economic policy, including clusters and competitiveness, but it proved to be unsustainable. The Deputy Prime Minister’s Office has sought to resurrect the NECC with core Government funding in order to ensure sustainability. A proposal for the new NECC was circulated in October 2010 to all business associations, inviting feedback but only one responded, recommending an alternative model. The opinion of some associations is that NECC had failed to deliver in the past and is unlikely to do so in future. The assumption is that the NECC is unlikely to be re-established.

- **SME Forum**: the Ministry of Economy has established a mechanism for public private dialogue specifically for the SME sector with a focus on business associations active in the former Yugoslav Republic of Macedonia. Despite initial interest and activity, once EC project support came to an end, the SME Forum failed to maintain its activities. Since business associations appear to have ready access to ministers (see below), there appears to be little desire on their part to participate in a common institutional dialogue forum.

*Business associations*

There is no longer a general mechanism for dialogue between the government and business associations. Instead, the general approach is for ad hoc meetings to be convened between individual business associations and government representatives such as ministers. Some, such as the Macedonian Chambers of Commerce and the Economic Chamber of Macedonia, appear to have regular access to the Deputy Prime Minister responsible for economic issues and to specific Ministers of interest to them, such as the Ministry of Economy. However, since these meetings are not institutionalised or mandated by law, the degree of access may change at any point in time.

*Donor coordination*

The Paris Declaration on Aid Effectiveness calls for a higher degree of coordination between the activities of the government and the donor community. The EU Financial Framework, such as IPA, is increasing over time (Euro 82 millions in 2009 increasing to Euro 117 millions in 2013); USA, Norway, Germany and other bilateral donors expect to maintain an economic development focus, as do International Financial Institutions (IFIs) such as the World Bank, EBRD and European Investment Bank (EIB). However, coordination in the area of economic development has been fragmented hitherto.

The Deputy Prime Minister for EU Affairs is the National Aid Coordinator and the Secretariat for European Affairs is mandated to coordinate the donor assistance in the country. Efforts are being made to improve the mechanisms for donor coordination, as illustrated by the following (High Level Donor Coordination Meeting, Tirana, 01 April 2010):

- Introduction of the Programme Based Approach (PBA) in 2009.
- Strengthening of the National System for Coordination of Foreign Assistance.

The PBA has been introduced for various programme areas, including Business Environment, Competitiveness and Innovation. The Working Group for Business environment, Competitiveness and
Innovation has 20 members (e.g. Ministries of Economy, Finance, Transport and Communication, Information Society, Secretariat for European Affairs, United Nations Development Programme, EU, GIZ, USAID and World Bank) and meets regularly. It has prepared:

- A questionnaire on Business Environment, Competitiveness and Innovation.
- A report assessing the Business Environment, Competitiveness and Innovation.
The innovation system in the former Yugoslav Republic of Macedonia faces a number of very significant challenges. The innovation performance of the economy is low, both compared to EU member countries and to neighbouring economies. These issues derive from the limited policy focus and decreasing resources dedicated to innovation over the last few years. The low innovativeness of the economy may reduce the ability of companies in the former Yugoslav Republic of Macedonia to remain competitive and export.

An innovation strategy would benefit the common interest by providing an inclusive action plan to promote innovation and increase competitiveness. Over the last few years, a number of economic programmes enacted by the government referred to the need to foster innovation. In particular, the Industrial Strategy and the SME strategy developed by the Ministry of Economy explicitly include the objective to increase innovation. However, these documents include few concrete measures targeting innovation specifically and a comprehensive framework for innovation policy is still lacking.

In order to fill this gap, under the guidance of the Ministry of Economy a project team consisting of different Ministries, and various private and public stakeholders have decided to develop an innovation strategy for the former Yugoslav Republic of Macedonia. This chapter aims to provide a list of the various objectives that such a policy should address and to provide a menu of measures, taken from national and international best practices, which could be adapted in the former Yugoslav Republic of Macedonia.

Objectives of the innovation strategy

In order to define the priority measures to be included in the strategy, the former Yugoslav Republic of Macedonia needs to define the long-term objectives for the innovation system. As a candidate country to join the EU, these objectives need to be compatible with the EU 2020 objective to promote “smart, sustainable and inclusive growth”. However, the particularities of the country call for a number of specific objectives.

In the innovation field, the EU 2020 strategy includes the guideline to “optimise support for R&D and innovation, strengthen the knowledge triangle and unleash the potential of the digital economy”. This translates into the target of 3% of GDP dedicated to Research and Development by 2020. Moreover, Member states have agreed on an action plan to achieve an “Innovation Union” (EC, 2010c). This action plan includes over 30 resolutions to (i) strengthen the knowledge base, (ii) get ideas to market, (iii) maximise social and territorial cohesion, (iv) pool forces throughout the EU, (v) leverage policies externally and (vi) implement reforms of innovation system (see Box 8).

While some of these objectives of EU member states are relevant for the former Yugoslav Republic of Macedonia, not all of them are. In addition, the performance of the innovation system in the former Yugoslav Republic of Macedonia is significantly lagging that of EU member states. As a consequence, policy makers may need to define a different set of objectives reflecting the current level of development of the national innovation system. Based on the assessment conducted by the OECD, the following objectives could be focused on in the Innovation strategy:
• **Build stronger research and more market-relevant institutions**: The innovation capacity of research institutions in the former Yugoslav Republic of Macedonia is weak. Very limited financial resources are dedicated to research and development and the number of researchers is also low. As resources, in particular from the government, have been decreasing over time, research expenditures are mainly used to pay researchers’ salaries and almost no investment is conducted to maintain, let alone modernise, the research infrastructure. Investments to develop research capacities are required, but, given the constrained funding possibilities, a targeted approach is needed. Support might be prioritised towards the most successful existing research areas and to new areas that are closely linked to the needs of users. Furthermore, there is a strong disconnection between research institutions and the private sector. Despite a few examples of successful collaboration, the innovation outcome of research is extremely limited. In the long run, increasing the resources for research and development is likely to have limited impact on innovation unless an institutional dialogue between researchers and the private sector is established.

• **Enhance the business sector’s propensity to innovate**: The participation of the private sector in innovation is currently low. In order to be competitive in the domestic and export market, firms need to effectively engage in innovation activities. Efforts therefore need to be made to raise the awareness of companies that currently do not innovate on the advantages of doing so. The companies that are indeed innovating should also be supported and mechanisms should be developed to help them to bring their innovations to the market.

• **Foster linkages and knowledge transfer**: To facilitate innovation, knowledge flows between producers and users of knowledge need to be strengthened. Policies that target inter-firm networks such as the promotion of clusters enable collaboration between customers and suppliers and can help improve knowledge flows. Moreover, efforts should be made to create links between innovative companies, including multinational enterprises, with the rest of the private sector. This would ensure that innovative companies are not operating as “islands of knowledge” but contribute to the development of the economy. Collaboration between research institutions and businesses is weak. However, since both the public and private sector carry out few R&D activities, the commercialisation of research should not be a priority for the former Yugoslav Republic at its current state of development. Collaboration with public research institutions may therefore focus on training for skills development and on technology adaptation.

• **Co-ordinate the policy design, implementation and monitoring of innovation policies**: Policies supporting innovation touch upon a number of policy areas, including among others research, education and SME support. Therefore, a continuous inter-institutional dialogue needs to occur. Furthermore, as policies in these areas ultimately aim to develop a competitive private sector, a public-private consultation forum needs to be developed. Currently, the responsibility for innovation is split between several institutions, including in particular the Ministry of Education and Science and the Ministry of Economy. The institutional setting should be adapted, and possibly specific institutions could be set up, to ensure that a consistent approach is adopted throughout the design and the implementation of innovation related measures.

In the reminder of this chapter, each of these policy objectives will be detailed and instruments developed in OECD countries will be presented in order to provide guidance for potential measures that could be introduced in the former Yugoslav Republic of Macedonia

**Box 8. Action Points of the “Innovation Union” strategy**
As part of the EU 2020 strategy, the European Union has developed a specific document outlining measures to be taken both by Member States and by European institutions to increase the innovativeness of the economy. The various actions are grouped in six objectives.

1. **Strengthening the knowledge base and reducing fragmentation:** To strengthen the knowledge base in the EU, member states will increase the number of researchers trained and promote attractive employment conditions in public research. The EC will also support business academia collaborations and propose an integrated framework for the development and promotion of e-skills. In 2012, the Commission will propose a European Research Area framework and supporting measures to remove obstacles to mobility and cross-border co-operation. The role of the European Research Council (ERC) in promoting excellence will be strengthened and industry driven priorities reinforced in the research Framework Programme. Finally, future EU research and innovation programmes will further involve SMEs.

2. **Getting good ideas to market:** To ensure that innovative ideas are commercialised, the EC will work on enhancing access to finance for innovative companies and creating a common innovation market. By 2014, the EU should put in place financial instruments to attract an increase in private finance. The EC will ensure it favours cross border investments and improve access to finance for SMEs. The European parliament and the European Council will vote on a proposal to implement an EU patent and the regulatory framework in the EU will be streamlined so as to speed up the process of standardization.

3. **Maximising social and territorial cohesion:** The EU will attempt to increase social benefits of innovation across the EU as well as work on a more efficient and spread out distribution of these benefits. This will involve, amongst other things, improving the use of the existing Structural Funds for research and innovation projects as well as the preparation of post 2013 Structural Fund programmes with an increased focus on innovation.

4. **Pooling forces to achieve breakthroughs:** The EC will launch European Innovation Partnerships to better coordinate research instruments to focus on social problems with the aim of finding solutions. In early 2011, the EC will start a pilot European Innovation Partnership on active and healthy ageing.

5. **Leveraging our policies externally:** The EU will take measures to ensure through integrated policies that leading academics and researchers live and work in Europe, to counteract a small brain drain. More thought will also be given to creating a common approach towards co-operation with third countries as well as partnerships for research infrastructures.

6. **Making it happen:** Finally, member states will be invited to carry out self assessments of their national innovation and research systems based on a list of features and to identify challenges. The Commission will support the process through peer reviews and reviews of best practice. The EC will also begin work for the development of a new indicator to measure the share of fast growing innovative companies in the economy.

**Source:** EC, 2010c

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**Build stronger and more market relevant research institutions**

Research institutions in the former Yugoslav Republic of Macedonia are very weak. In order to increase their innovation performance, the quality of research institute laboratories and equipment needs to be improved. In order to do so, the resources of research institutions will need to be raised. Moreover, the current mechanisms to allocate funds may need to be reviewed. Finally, measures could be developed to ensure that the work conducted by research institutions is relevant to the needs of the economy.

**Increase the level of resources allocated to research and development and improve allocation mechanisms**

The first cause of the low performance of research institutions in the former Yugoslav Republic of Macedonia is the lack of financial resources. Funds dedicated to research and development have decreased over the years. The government needs to increase funds dedicated to R&D and to improve allocation mechanisms.
mechanisms for these funds. Following the trend set by the EU 2020 strategy, several SEE economies have defined target level of R&D expenses. Similarly, the draft R&D strategy prepared by the Ministry of Education and Science reportedly includes the target of increasing R&D investment as a percentage of GDP from 0.22% to 1.8% by 2020, which seems very difficult to achieve. It would be more realistic to lower the R&D spending target and to detail a plan to achieve this target.

The way research institutions are financed should also be revised. Research funding is currently allocated as a lump sum contribution to research institutions and is not based on specific research projects. No specific research priorities are defined by the government. Furthermore, as the method for allocating funds does not correspond to defined priorities, there are no incentives to increase the relevance of the research process or encourage a multi-disciplinary approach. The main contribution in that area comes from FP7 projects which are allocated on a competitive basis and require some level of collaboration between research institutions and stakeholders.

Besides these general recommendations, specific aspects of funding for research activities of universities need to be reviewed. The Law on Higher Education requires 40% of income generated from student fee to be allocated for R&D purposes. However, the poor state of university financing means that the policy aim will be difficult or impossible to realise. The development of a realistic target, gradually increasing over time, would enable universities to comply with the law.

**Improve the connection between domestic research institutions and the international research community**

Participation in international projects has positive impacts on research institutions in the former Yugoslav Republic of Macedonia. Indeed, the Faculty of Mechanical Engineering provides an example of the benefit that individual faculties can draw from the participation in international projects. The resources available from international sources of funding for research, such as the FP7 programmes, can provide essential support to the activities of research institutions. Moreover, the exchange of knowledge between foreign research centres and domestic institutions can only have positive impact on the quality of the research conducted. While CIRI provides a scheme to help companies access international grants, no similar initiative seems to exist for public research institutions. Efforts could be made to increase the participation of research institutions in international projects, building for example on the experience of CIRI.

Besides participating in international projects, policies and programmes to foster the mobility of researchers and engineers between institutions and between countries can be developed. By making it possible for academics to spend a period of time in the private sector or in another institution, domestic or international, the government could increase the diversity of profiles and experience of researchers. This would contribute to increase their exposure to different ideas and foster innovation.

Brain drain is another problem in the country. Salaries for researchers should be high enough to prevent brain drain. Further, the diaspora abroad should also be seen as an opportunity to strengthen linkages with the international academic community.

**Ensure that the incentive structure for academics is more conducive to innovation**

Both universities and the Ministry of Education and Science recognise the importance of technology transfer, commercialisation and intellectual property rights. However, in practice, efforts have been insufficient to ensure that the incentives of academics are consistent with the need to increase innovation.

In general, the innovative activities of academics are not rewarded. This translates into a low entrepreneurial activity of academics in research institutions. In particular, there are no spin-offs from
universities and few examples of technology transfer. Further efforts are needed to foster this type of activities and to develop the recognition of entrepreneurial activities of academics. For instance, the Austrian AplusB programme raises awareness on business creation amongst students and faculty and helps with the development of start-ups.

In specific cases, this lack of recognition results in net losses for the university. For example, academics can and do choose to register inventions and innovations as their individual intellectual property, rather than that of the university that pays their salaries and funds their research. Furthermore, the USCM’s “policy” that 20% of academic’s private contracts to be paid to the university (15% to faculty and 5% to the university) and individual researchers keep 80% of the contract value is a very strong incentive not to contract through the university. Similar policies (or no policies) may exist in other universities. A framework should be defined to better regulate intellectual property rights of academics and their consultancy work. International practice such as the examples described in Box 2 in Chapter 4 could provide guidance on the right balance between generating an incentive for the academics, whilst also ensuring that the university gains from these activities, perhaps requiring that a certain share of such income flows into research activities.

Enhance the business sector’s propensity to innovate

In the former Yugoslav Republic of Macedonia, resources that companies dedicate to R&D are extremely low, constituting only 23% of GERD in 2007 (Erawatch 2010). Furthermore, the capacity of the country to increase significantly the resources dedicated to innovation is currently limited. Therefore, the new Strategy and Programme for innovation will need to focus on mechanisms for mobilising significant additional private sector funds. These mechanisms will need to be adapted to the situation of the various classes of companies. Efforts will be needed to raise the awareness of SMEs, whose innovative activity is currently limited, of the critical importance of innovation. Additional measures should support companies which do invest in innovation.

Raise awareness of SMEs on the benefits of innovation and on existing support measures

If the former Yugoslav Republic of Macedonia is to respond to the innovation agenda, it is essential for the private sector to become aware of the need to innovate and of existing support measures. This in turn calls for a well structured medium-term awareness campaign, in which the ca. 20 business associations active in the country should take a central role. In most countries, innovation programmes include some elements of awareness as part of a wider framework to promote innovation. Seminars, conferences and media campaigns are used to inform companies about the benefits of innovation and also include details about measures to facilitate and finance innovation.

An example of such a programme is the Estonian InnoAwareness Measure. The programme is carried out through studies, education seminars and workshops, roundtables, television and radio programmes and competitions. The programme has not been formally evaluated and there are no quantitative results to assess its success, however, it has received attention in reports and articles. Furthermore, innovation has become more central in Estonia although it is unclear to what extent this can be attributed to the InnoAwareness Measure. Programmes developed in Brazil (Barboza, 2009), or the VIS programme in Flanders, Belgium (OECD, 2010b; European Commission, 2009) also provide examples of a structured approach to awareness campaign on innovation.
**Set up demand-side measures to foster innovation of SMEs**

Demand side policies for innovation aim at increasing demand for innovative goods through policies such as technology-oriented government procurement, technology mandates and innovation specific regulations and standards (OECD, 2010a).

**Public procurement**

The Small Business Innovation Research Programme (SBIR), established in the USA, and various similar programmes developed in countries such as Australia, the United Kingdom and the Netherlands show how public procurement can be used to foster innovation. The US SBIR programme, introduced in 1982, provides for government agencies to use 2.5% of their funds for competition based awards to small innovative firms (OECD, 2010f). Evaluations suggest that the SBIR programme has led to increased growth and employment as well as greater likelihood to attract venture financing (Lernet, 1999; NRC 2000). On the other hand, critics of the programme have questioned whether it simply crowds out private investment (Wallsten, 2000) and pointed out that SBIR-like programmes do not provide sufficient funds for the successful commercialisation of innovations (NRC, 2008).

**Standards for innovation**

Standards have also been used as a demand side measure to encourage innovation. The results from a consultation by the European Commission suggest that standardisation can foster innovation in various ways that include facilitating competition between new and older market actors, ensuring that consumers trust products, allowing for product differentiation and contributing to diffusing knowledge (European Commission 2008). For example, a standard for biometric recognition in the United Kingdom has been found to deliver positive results by increasing competition, accelerating biometric programmes and ensuring an open market (Karou, 2010). However, the standardisation programme in the UK requires an increasing amount of work from standardisation bodies and the costs of financing this work suggest that funds may be a challenge to using standardisation as a way to promote innovation in the former Yugoslav Republic of Macedonia. Nevertheless, the implementation of international and in particular EU standards can help domestic firms to integrate into international supply chains and access export markets.

**Develop measures to increase funds available for innovation**

**Tax incentives and project grants**

The tax incentives for R&D and innovation are extremely limited at the present time in the former Yugoslav Republic of Macedonia. More precisely, the only scheme is a customs tax and partial VAT exemption for public research institutions. The development of further financial incentives for R&D and innovation should be considered taking into account the fiscal reality of the former Yugoslav Republic of Macedonia. Two main forms of financial incentive exist: direct subsidies to particular projects and tax rebates on research expenditures.

While tax rebates can be powerful incentives for companies to invest in R&D and were introduced in many OECD countries, they may not be particularly appropriate in the case of the former Yugoslav Republic of Macedonia. Indeed, the country already has low tax rates on business profits and special incentives exist in Technological and Industrial Development Zones so that additional tax incentives may create little additionality. Furthermore, in order for fiscal incentives to be effective, authorities need to have a well-developed fiscal system that can allow them to discriminate between R&D costs and other types of expenditures. Otherwise, tax incentives on R&D could result in a pure relabeling of standard expenditures and not in increased R&D activities.
Direct subsidies, under the form of grants, allow public authorities to carefully select the recipient of public funds and help monitor more closely the project. The certainty that subsidies indeed result in additional research activities may make them a more suitable choice for the former Yugoslav Republic of Macedonia compared to tax rebates which may create little added value and for which the current tax system may not yet be developed enough. While subsidies are generally distortive if they are targeted towards certain sectors or activities, such prioritisation might be actually necessary to form critical masses given the limited resources.

**Develop innovation-related financial instruments**

As was discussed in Chapter 2, innovative companies have specific financing needs. The risk and time horizon of innovation projects mean that bank loans may not be the best instrument to fund the related investment. Equity finance, and in particular venture capital and business angels, have attracted much attention from academics and policy makers. The large number of venture capitalists was considered as one of the factors underpinning the success of start-ups in the Silicon Valley. In an effort to replicate this success, policymakers have developed instruments to foster the emergence of a venture capital sector. Successful examples such as Yozma in Israel demonstrate that public policy can indeed provide support to the venture capital industry.

On the other hand, in Croatia, public authorities had to abandon their innovation fund initiative because of the limited interest of private investors. Indeed, the example in Croatia shows that actively introducing an otherwise undeveloped venture capital industry is a complicated task. Hall and Lerner (2009) insist that the emergence of a venture capital sector requires “investors, experienced venture fund managers, and a market for initial public offerings”. These three prerequisites are not met by the former Yugoslav Republic of Macedonia.

Some investment readiness programmes exist in the former Yugoslav Republic of Macedonia. However, no other measure is currently in place to support business angels. Such measures could contribute to a broader policy mix to help develop business finance but cannot be the core element of this policy mix for the reasons mentioned above.

Other measures to target the development of access to finance could be developed and tailored to the needs of innovative companies in certain cases. In particular, the OECD Investment Reform Index (OECD, 2010c) points out that the coverage of the credit guarantee schemes should be increased in order to effectively provide an incentive for banking institutions to provide more credit to risky companies. In addition, credit information services, export guarantee schemes and the development of factoring are also initiatives that would benefit access to finance in general, and thereby develop potential to finance innovative projects.

**Ensure that companies have access to the needed information and services**

Ensuring that firms develop an adequate absorptive capacity is crucial in order to build a successful innovation framework. The analysis of the GfK firm survey in Chapter 4 reveals that in the former Yugoslav Republic of Macedonia firms have rather weak absorptive capacities. Policies aimed at increasing the absorptive capacities of firms can be categorised into those that increase the knowledge flows and policies to ensure that companies have the capacity to use that knowledge.

Although some companies are aware of the need to innovate and are indeed taking steps to introduce innovative products or processes, they often lack know-how to effectively do so. Skills that companies miss to be innovative are not necessarily technical skills. In many cases, and in particular for SMEs, the
lack of basic business skills is the prime constraint to the development of the company (EBRD, 2009). In this respect, the development of entrepreneurship training, one of the key measures included in the SME development strategy, should be sustained. Indeed, human capital is among the main components of the absorptive capacity of companies. Besides increasing human capital, through initial education and life-long learning, some governments have also developed measures to make it easier for companies to find external consultants with the required skills. While some specific initiatives have been taken in the former Yugoslav Republic of Macedonia, more efforts are needed to develop a consistent framework supporting the development of high-quality consulting services.

To support their development, SMEs may require skills they do not necessarily possess internally. Innovative SMEs are particularly in need of consulting services as innovation precisely consists in changing the usual activities of the company. Be it because they are unsure about the quality of the service providers or because they do not have sufficient financial resources to do so, SMEs rarely make use of consultancy services. Several institutions in the former Yugoslav Republic of Macedonia have developed databases of consultants. In particular, the EBRD, through its TAM/BAS programme has developed a network of certified management consultants. However, further efforts are needed to allow firms to better navigate the consulting market.

The list of consultants maintained by the Macedonian Agency for Entrepreneurship Promotion (APPRM) was developed in the context of the implementation of the voucher scheme. Although the idea of the voucher scheme has been successfully developed in several countries, its implementation in the former Yugoslav Republic of Macedonia has yielded criticism. Indeed, the limited resources provided to the voucher programme drastically constrain the effectiveness of this scheme. Although the introduction of “innovation-specific” vouchers is a positive step, if only a few vouchers are awarded, this can only have a peripheral impact on actual innovation. An impact assessment of the voucher scheme should be conducted in order to draw the lessons from this experience and adjust the programme to increase its impact.

**Foster linkages and knowledge transfer**

The innovative activities of most businesses in the former Yugoslav Republic of Macedonia consist in adapting imported technologies or in innovating processes and products. Most firms do not have the capacities to engage in collaborative research projects or to absorb findings from research institutions. Hence, at its present state of development, the former Yugoslav Republic of Macedonia may focus its innovation policy not on the commercialisation of research but rather on building up research capacities and on supporting business-oriented networks and knowledge flows.

**Develop networks and linkages between companies**

Knowledge transfer should take place both locally and at the global level as well as between different sectors of the economy (OECD 2010). While linkages between research institutions and the private sector are an important driver of innovation, linkages with other firms (customers, suppliers, and partners) constitute the main source of innovation in the private sector.

One way to encourage the flow and use of knowledge is through the promotion of business and knowledge networks. The role of the government should be to support private initiatives rather than to create networking platforms. Business clusters, incubators and science parks are examples of policies to develop networks. In the former Yugoslav Republic of Macedonia, significant initiatives have been developed, in particular with the support of international donors. However, these programmes, which are generally under the responsibility of the Ministry of Economy, would need to be reviewed and in some cases reformed:
• **Business clusters**: Given the limited capacities for R&D in the former Yugoslav Republic of Macedonia, a cluster-oriented policy could be a priority for the country’s innovation policy. Business clusters include, but go far beyond, research collaborations. In particular, cluster policies may help firms increase their competitiveness by fostering the co-operation between customers and suppliers, tying in FDI, creating supporting institutions and providing training. Nevertheless, the time is ripe for the Ministry of Economy to undertake an independent evaluation of the performance of existing clusters. It may also be necessary to focus the limited funds on the clusters offering greatest potential for development, export and innovation.

• **Incubators**: Eight of the nine business incubators implemented by the World Bank have failed to be sustainable. Other incubators are in the process of being established. Evaluating why incubators have failed, what can be done better and how innovation can become an integral part of the process would be an important step to effectively support these initiatives.

• **Business networks**: A number of private companies associations operate in the former Yugoslav Republic of Macedonia. These associations do not particularly focus on innovation. The government could develop measures to support inter-firm networks and to increase the contribution of these association to innovation.

*Strengthen the linkages between multinational enterprises and local suppliers*

FDI is generally acknowledged to be a potentially powerful source of technology transfer. However, international comparisons show that not all countries benefited equally from FDI. For example, Gallagher and Shaffaedin (2010) have compared how Mexico and China approached FDI to evaluate how successful their policies were in promoting capacity building and knowledge absorption by local firms. They find that while in Mexico, domestic firms failed to develop absorptive capacity and did not benefit from large transfer of knowledge from FDIs, China’s pro-active approach contributed to the rapid creation of local R&D capacities. International evidence suggests that linkages can be fostered through the development of training initiatives and through networks.

In an effort to attract more innovative companies, in the 80’s Singapore implemented the Skills Development Fund (SDF) to facilitate the appropriate training of the work force. The fund, which is financed by a tax on low-wage labour, can be used to train employees. All companies with more than 10 workers used the fund and 33% of firms with less than 10 employees used it (Britchie 2002). In addition to this initiative to develop formal training, informal knowledge transfers have been promoted. In Singapore, a scheme was developed to transfer skilled managers from international companies to local companies to help them develop the technologies and knowledge necessary to supply the mentoring multinational enterprise (MNE; Britchie, 2002). Similarly, in Wales, Japanese investors provided training to local SMEs in their supply chain networks. Other steps were taken to increase knowledge spillovers from FDI such as placing local engineers in the foreign customers’ plant, disseminating best-practice and joint problem solving.

Measures can also be taken to integrate foreign firms into regional networks. Local linkages with foreign affiliates can be increased by encouraging foreign firms to meet local suppliers or research institutions and policies can also help local firms and institutions achieve standards required by foreign affiliates (Potter 2002). Based on a study of Irish companies, Görg, Hanley and Strobl (2010) show that while financial incentives may help MNEs build linkages with local suppliers, policies to encourage networks and matching companies are needed.

A comprehensive programme including both training and networking aspects was developed in the Czech Republic in 1999. In an effort to establish linkages between MNEs and local suppliers, CzechInvest,
the FDI promotion agency, launched a Supplier Development Programme. This programme was composed of three pillars (Potter, 2002):

- Making available information on Czech component suppliers’ capacities and products to enable MNEs to contact potential future suppliers;
- Matching potential suppliers to MNEs through “Meet the Buyer” events between foreign investors and local suppliers, seminars and exhibitions and concrete proposals to encourage MNEs to work with local suppliers;
- Improving Czech suppliers through consultancy, training support and management operations.

Foster the co-operation between public research institutions and private companies

Research institutions are rarely geared towards cooperation with the private sector, technology transfer, commercialisation, start-ups or spin-offs. While the actual level of university-private sector linkages may be understated because informal contacts result in a direct contract between academics and firms, there is common agreement that a future innovation policy must develop mechanisms for closer linkages between enterprises and research institutions. However, given the lack of research and development capacity both in research institutions and in businesses, targeting expenditures to developing this basic capacity is a necessary first step before focusing on linkages. Nonetheless, this should not preclude introducing some measures to foster linkages with research institutions if these do not form the core of the strategy’s expenditure.

Foster the development of collaborative innovative projects

Currently, the research activities of private companies are very limited. In addition, innovative companies rarely have any connection with research institutions. Anecdotal evidence suggests that the most innovative companies in the former Yugoslav Republic of Macedonia have research capabilities that exceed those of public research institutions. While these companies may not need the support of research institutions, the majority of companies have limited resources and would benefit from collaborative research.

As part of its support to research institutions, the Ministry of Education and Science is funding both basic research and development-oriented projects. The “development” projects aim to improve the collaboration between public research institutes and the private sector. This represents a very positive initiative. On the other hand, the public contribution to joint research efforts represents on average 30% of the total cost of the project which may still leave an excessive cost burden for certain companies to carry. In addition, the eligibility criteria for this type of public funding need to be monitored to ensure that they do not fund research that would have occurred anyway.

Science and technology parks represent a type of infrastructure where collaborative research is routinely conducted. Although some initiatives exist to set up such parks in the former Yugoslav Republic of Macedonia, they have had no success so far. The success and the sustainability of science and technology parks are very much determined by the willingness of the private sector to participate in the initiatives. Only a few industrial sectors have the capacity to develop such an infrastructure domestically. Public authorities should support existing initiatives while carefully assessing the sustainability and the innovativeness of the project conducted. The Public Private Partnership (PPP) law offers potential for the development of science and technology parks and other innovation infrastructure. For companies that do not need or do not have the capacity to engage in collaborative research, research institutions can provide support by giving access to specific skills and equipment. For example the University of Oxford, has
developed a system to allow private partners to benefit from the expertise of its various departments. In the former Yugoslav Republic of Macedonia, such services are only offered on an informal basis by individual academics. Measures to allow institutions to provide consultancy services to companies need to be established. In specific cases, the regulation of research institutions may need to be reformed for that purpose.

**Co-ordinate the policy design, implementation and monitoring of innovation policies**

There is a consensus in the former Yugoslav Republic of Macedonia on the importance of developing the innovative capacity of the economy. On the other hand, the co-operation between public institutions and the private sector and between public institutions themselves appears extremely limited. Because innovation policy is of a transversal nature, no significant progress will be made unless a consistent approach is adopted. Furthermore, innovation-related policies need to be tailored to the needs of the private sector and monitoring schemes need to be defined to assess the efficiency of the measures and refine the various instruments.

**Ensure the consistency of innovation policies across ministries**

The Ministry of Economy and the Ministry of Education and Science both play a central role in the design of policy to promote an efficient national innovation system. The Ministry of Education and Science is currently developing its Research and Development Strategy. On the other hand, the Ministry of Economy has developed a number of strategies that aim to support the innovative capacity of companies. Although the need to strengthen linkages between research institutions and the private sector is acknowledged by both institutions, limited institutional dialogue occurs.

In the short term, the Ministry of Economy and the Ministry of Education and Science should make sure that they have a consistent approach in developing their current strategy. In particular, the Ministry of Economy should make sure that the Innovation Policy that it is currently developing feeds into the Ministry of Education and Science R&D four year Programme to be prepared during the second half of 2011.

In the longer term, an institutional structure should be adopted to ensure that sufficient consultation occurs on innovation-related issues. Experiences in SEE (see Annex 1) and in OECD economies (OECD, 2005b) show the importance of setting-up a whole-of-government approach to innovation policy, for example through specific institutions and advisory councils. Such an institution could for example build on the Inter Ministerial Working Group on Industrial Policy (IMWGIP) that was proposed as part of the Industrial Strategy.

**Box 9. Innovation Agencies and Departments**

Some OECD countries, such as Sweden and Finland, have set up agencies which focus on designing and/or implementing pro-innovation policies. Similarly to an Innovation Fund (see Annex 1), these agencies also link businesses and science through a variety of co-funding initiatives; however, they have a stronger policy-making role. In Finland, the innovation agency Finish Funding Agency for Technology and Cooperation (Tekes) was created to help Finland through an economic recession in the 1970’s (Tekes 2011). Most of the agency’s funds are dedicated to SMEs and less than 3% of the agency’s R&D funds go to companies with more than 500 employees (OECD, 2010e). In Sweden, Vinnova is a governmental agency under the Ministry of Enterprise, Energy and Communication. It facilitates research and innovation, creates networks and fosters stronger linkages between the business sector and research institutions. It co-finances all projects with a budget of about 220 million euro, about 10% of which dedicated to SMEs (OECD, 2010e).

Alternatively to an agency attached to a lead ministry, a separate government institution can be created to ensure an efficient inter-institutional dialogue. In Australia, for example, the national innovation system is currently managed
on a ministerial level. The Department of Innovation, Industry, Science and Research co-ordinates projects and administers funds in order to link industry, science and research. The Department was created after a federal election in 2007, replacing the former Department of Industry, Tourism and Resources and taking over some of the areas of the departments of Education, Science and Training Department, Employment and Workplace Relations and Communications, Information Technology and the Arts. This governmental restructuring occurred in order to strengthen the industrial sector, enhance economic and social benefits and maintain the knowledge-based economy. This highest level of administrative restructuring seems to have been efficient given that the annual evaluations of the programmes under the auspices of the Department show that in some cases the achieved results exceeded annual targets. (Australian government, 2009)

Improve public-private consultation on innovation related-issues

Besides ensuring that the perspectives from the various institutions in charge of aspects of innovation policy are taken into account, policy makers need to ensure that some degree of public-private consultation is conducted. Currently, in the former Yugoslav Republic of Macedonia, very limited dialogue occurs, be it at the phase of policy design or of implementation.

In OECD countries, the level of formalisation of public-private consultation varies. In countries where public-private dialogue is very developed, contacts occur informally through consultative committees that influence policy making. In other cases, a formal consultation process has been developed (OECD, 2003) and specific institutions, for example the Finnish Science and Technology Policy Council, the German Science Council and the Italian National Assembly for Science and Technology, have been set up. These councils ensure that policies in the innovation area are adopted with a sufficient level of consultation. In the former Yugoslav Republic of Macedonia, the National Entrepreneurship and Competitiveness Council (NECC) was originally designed as a forum where public and private stakeholders could discuss policies on competitiveness. The interest of private companies in resurrecting this initiative has been limited. Nevertheless, further efforts are needed to increase the public-private dialogue on innovation policy. The Committee for Technological Development, as anticipated by the Law to Encourage and Facilitate Technological Development (2011), should be established.

Responsibility for the implementation of measures to foster private companies’ innovation is currently split between various bodies. The Ministry of Economy, the Ministry of Education and Science and APPRM have some programmes to target innovation and InvestMacedonia touches on innovation with its export strategy. Although all these institutions are ultimately dependent from the Ministry of Economy, which ensures co-ordination, this structure may create potential frictions between the various programmes and may make it difficult for companies to engage in a dialogue on these policies. Clarifying the responsibilities of public institutions for innovation-related policies would facilitate the design and implementation of policies and programmes.

One way to ensure a clear allocation of responsibilities is to review the allocation of ministries and organisation’s mandates to ensure that they do not overlap. Another option is to develop an institution to centralise innovation measures and improve public-private consultation. Such an agency could act as a focal point to ensure that the various projects implemented by international organisations in the former Yugoslav Republic of Macedonia are consistent with the orientations of the innovation policy. In several countries in SEE and in the OECD, independent agencies responsible for the implementation and the monitoring of the various measures to support innovation have been set up (OECD, 2005b). For example, the Finnish agency TEKES (see Box 9), which distributes funding for R&D, provides support for SMEs and develops linkages between academics and companies. By including private sector representatives in the governance structure of these agencies, policy-makers have introduced a way to ensure that programmes are adequately answering the needs of the private companies and that, if needed, measures would be quickly adapted. Developing such an institution or modifying the status of an existing body to
centralise innovation measures and improve public-private consultation would help develop a responsive institutional framework.

Monitor the implementation and effectiveness of support measures for innovation

A number of measures have been developed to support innovation in the former Yugoslav Republic of Macedonia, in many cases with the support of donor organisations. However, while in principle laws regulate public support measures, the selection basis for some individual measures appears unclear. While some level of experimentation is necessary, no monitoring of the various measures and of their contribution to innovation has been conducted. For example, regarding the development of clusters and industrial zones, it has been decided to expand the scope of pilot measures without conducting a thorough assessment. Besides monitoring the implementation of policies, impact evaluations of programmes should be conducted, highlighting the benefits or potentially missing benefits of programmes. Hence, monitoring and impact evaluations would help the government to draw the right lessons from existing initiatives and to allocate government funds more efficiently.
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APPENDIX 1: MAPPING OF INNOVATION STRATEGIES IN SOUTH EAST EUROPE

The former Yugoslav Republic of Macedonia is among the few countries in South East Europe (SEE) which do not have an innovation policy yet. In order to provide background information to stakeholders in the former Yugoslav Republic of Macedonia on the type of policy settings and objectives that similar economies have adopted, this paper summarizes the policy documents related to innovation that have been developed in Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo under UNSCR 1244, Montenegro, Romania and Serbia.

The purpose of this section is solely to provide an overview of the currently existing policy documents in the region. The examples given should not serve as models for best practices. Furthermore, although a critical point of view is adopted on some particular aspects of these policies, it is not the scope of this appendix to provide a critical assessment of the validity and of the results of the innovation policies adopted in SEE.

Development of innovation strategies in SEE

The first examples of policies to facilitate innovation in SEE were developed in the late 1990s. For example, Croatia drafted a National Science and Research programme for 1996-2000 and Bulgaria developed its National Strategy of Technological Development in 1999. However, these strategies tend to have a narrow focus and only recently have SEE countries started to adopt comprehensive innovation strategies. Bulgaria and Romania developed their innovation strategies in 2004 and 2006 respectively, in the path toward their accession to the European Union (EU) in 2007. In the Western Balkan countries, most innovation-related strategies were adopted between 2008 and 2010.

In most SEE countries, international co-operation agencies participated in the preparatory work for the set up of the innovation strategy. For example, in Albania, the Strategy of Science, Technology and Innovation was prepared with the assistance of the United Nations Educational, Scientific and Culture Organisation (UNESCO) while the Business Innovation and Technology Strategy and Action Plan were sponsored by the EU and prepared by a consultancy. In Bulgaria, the preparation of the innovation policy was initiated in 2002 with the co-operation of the Dutch government. In Croatia, the first efforts to develop an innovation policy, in 1993, were conducted with the co-operation of the German Federal Ministry for Education, Science, Research and Technology. Kosovo²⁵ partnered with Austria in the field of Higher Education and Research, which provided funding, consultation and planning. In other economies, for example in Bosnia and Herzegovina, although prior analyses by international organisations were available, the strategy was prepared by local experts and by the relevant ministry.

Structure of the innovation strategies in SEE

All the SEE economies have drafted a strategy to support institutions related to science and technology. However, only few of them have developed an integrated innovation strategy to foster innovative activities in the business sector. In Albania and Montenegro, business innovation is addressed in a separate strategy. In Bosnia and Herzegovina and in Kosovo, although strategies to support companies in

²⁵ Under UNSCR 1244/99
general have been developed, no specific measure to target innovative companies. Bulgaria and Croatia, and to a lesser extent Serbia and Romania have included both support to research innovation and to innovative companies within one single policy framework. Serbia has also developed an SME strategy which includes measures explicitly targeting innovative firms.

The innovation strategies in SEE economies, whether they include innovation by companies or not, follow broadly similar structures:

- Review of the innovation system: Generally, an introductory part includes a review of the performance of the innovation system and highlights the challenges to be met. This part is particularly detailed for Serbia, where a review of funding, human capital, participation in regional research and research outcome is included. In Bosnia and Herzegovina, this assessment actually represents the largest part of the Strategy for the Development of Science. In other economies, the level of detail is much more limited.

- Vision / strategic objectives: Based on the assessment, a set of general objectives and challenges for the implementation period are highlighted. Objectives include both the improvement of research capacity and the strengthening of companies’ innovation capacity.

- Specific objectives: Within each of the policy domains defined as part of the vision, specific objectives are set. In Bulgaria, Croatia, Romania and Serbia, the main instruments to be developed to reach each objective are listed. Where relevant, quantitative targets are defined. In Croatia, a general policy matrix including for each objective the challenges, the target group, the proposed measures as well as the responsible authorities is included.

- Action plan: All strategies, except for Serbia, include an action plan detailing for each measures, the timeline and the responsible entity. In Bosnia and Herzegovina, Croatia and Romania, the action plan is a separate document from the strategy. In Croatia two action plans have been developed: one for research and technology and one for innovation in a more general sense (2007-2010). In Albania, Bulgaria, Kosovo and Montenegro, the action plan is included in the strategy, either in the body of the text or in an annex. In Serbia, although no specific action plan is attached to the strategy, the main measures have been included in the laws on innovation activity and the law on scientific activity, which were updated after the publication of the innovation strategy.

**Objectives of the innovation strategies**

Innovation strategies in SEE economies generally pursue the same general objective of developing research capabilities and fostering economic development. However, although some elements are common to all strategies, such as the need to increase resources dedicated to R&D and human capital, the instruments and measures applied to do so are diverse.

**Gross expenditure for R&D**

All the innovation strategies in SEE, except in Kosovo, include a quantitative commitment to increase gross expenditures for research and development (GERD). In most economies the objectives are relatively modest (see Table 9). Whereas all SEE countries refer to the EU Lisbon Strategy objective of increasing R&D expenditure to 3% of GDP, only Croatia actually aims to achieve this goal. Montenegro sets a target of 2% of GDP. In Bosnia and Herzegovina, Bulgaria, and Serbia, the goal is to reach close to 1% of GDP. Albania, where current funding for R&D represented less than 0.2% of GDP in 2009, is the country with
the lowest objective. The Albanian government, which only targets public expenditures for R&D, seeks to increase its expenditure to reach 0.6% of GDP.

Table 9. Current and targeted levels of GERD in SEE economies

<table>
<thead>
<tr>
<th>Country</th>
<th>Level of GERD at the time when the innovation strategy was drafted</th>
<th>Target level of GERD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>N/A</td>
<td>Public: 0.6% of GDP by 2015</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>0.10% of GDP (2008)</td>
<td>1% of GDP by 2015</td>
</tr>
<tr>
<td></td>
<td>Public: 0.85-0.9% of GDP (2008)</td>
<td>Public: 0.67% of GDP by 2015</td>
</tr>
<tr>
<td></td>
<td>Private: 0.1-0.15% of GDP (2008)</td>
<td>Private: 0.33% of GDP by 2015</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.52% of GDP (2000) and 0.53% of GDP (2009)</td>
<td>1.15% of GDP by 2013 and 1.5% of GDP by 2020</td>
</tr>
<tr>
<td></td>
<td>Croatia</td>
<td>1.01% of GDP (2005)</td>
</tr>
<tr>
<td>Kosovo under UNSCR 1244/99</td>
<td>0.1% of GDP (2010)</td>
<td>Public expenditure for R&amp;D can represent up to 0.7% of the Budget</td>
</tr>
<tr>
<td>Montenegro</td>
<td>0.04% of GDP (2006)</td>
<td>1.4% of GDP by 2013</td>
</tr>
<tr>
<td></td>
<td>Public: 0.03% of GDP (2006)</td>
<td>Public: 0.8% of GDP by 2013</td>
</tr>
<tr>
<td></td>
<td>Private: 0.01% of GDP (2006)</td>
<td>Private: 0.6% of GDP by 2013</td>
</tr>
<tr>
<td>Romania</td>
<td>0.48% of GDP (2009)</td>
<td>0.85% of GDP by 2013 and 2% of GDP by 2020</td>
</tr>
<tr>
<td></td>
<td>Public: 0.31% of GDP (2009)</td>
<td>Public: 0.6% of GDP by 2013 and 1% of GDP by 2020</td>
</tr>
<tr>
<td></td>
<td>Private: 0.17% of GDP (2009)</td>
<td>Private: 0.25% of GDP by 2013 and 1% of GDP by 2020</td>
</tr>
<tr>
<td>Serbia</td>
<td>Public: 0.3% of GDP (2009)</td>
<td>1.05% of GDP by 2015 and 2% of GDP by 2020</td>
</tr>
<tr>
<td></td>
<td>Public: 1% of GDP by 2020</td>
<td>Private: 1% of GDP by 2020</td>
</tr>
</tbody>
</table>

Although economies adopt specific objectives regarding the total level of expenditures, this does not suffice to ensure their effectiveness. In particular, the increase in R&D expenditure may have failed to

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26 The drafting of the Innovation Strategy of the Republic of Bulgaria begun in 2002 and the most recent data that was available was for 2000. The target figure for public and private expenditure on R&D by 2013 in the Bulgarian National Innovation Strategy excludes the funds allocated by the National Innovation Fund (estimated at 0.16% of GDP by 2013) and other sources.
address specific demands for innovation. Besides increasing GERD, mechanisms need to be put in place to ensure that funds are distributed to sectors which will benefit most from these resources.

**Research priorities**

The innovation strategies in the SEE countries generally list within their key objectives a set of national research priorities. These aim at focusing the research effort on a limited number of fields where skills are already well-developed. In general, SEE economies have identified 5 to 7 priorities (see Table 10). In some cases, in Bosnia and Herzegovina, Kosovo, Serbia and Romania, the strategy goes one step further. The rationale behind each priority area is set out and a list of sub-areas is included.

**Table 10. Key research priorities in SEE economies**

<table>
<thead>
<tr>
<th>Country</th>
<th>ICT</th>
<th>Environment</th>
<th>Agriculture</th>
<th>Cultural identity</th>
<th>Energy</th>
<th>Medical Research</th>
<th>Nanotechnologies</th>
<th>Tourism</th>
<th>Biotechnology</th>
<th>New Materials</th>
<th>Microtechnologies</th>
<th>Transportation</th>
<th>Space and Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Croatia</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kosovo</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montenegro</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serbia</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: National innovation strategies

**Linkages**

Besides the need to strengthen research institutions and to focus research efforts, most innovation strategies include the need to improve connections between research institutions and society as a whole. In particular, in all SEE economies, except Albania and Montenegro, establishing linkages between research institutions and the private sector is defined as a key objective. Furthermore, in some economies, for example in Bosnia and Herzegovina, the development of further institutional dialogue within the government is also mentioned as a key priority. Finally, the innovation strategies in Croatia, Kosovo and Montenegro stress the need to further integrate research institutions within international. Although the need to increase connections between research institutions is well-understood, due to the “science and technology” bias of the various innovation strategies, this objective relates generally to the commercialisation of research instead of focusing on supporting the innovation capacity of the private sector.

**Other objectives**

Besides these three building blocks, the various strategies also include other objectives which are more specific to the situation of the economy. In the economies where the innovation system is least
developed, the need to strengthen the policy framework is among the key objectives. This is for example the case in Albania, in Bosnia and Herzegovina and in Montenegro. Kosovo is the only economy where the improvement of human capacity for research and development is also among the key objectives of the strategy. However, the measures included in this objective are not horizontal but focusing on the priority research areas.

**Measures included within the innovation strategies**

Measures adopted by governments in SEE include horizontal measures to improve the framework conditions, reforms of the research system, measures to support innovativeness of private companies and to create linkages between the public and the private sector, as well as within the private sector.

**Horizontal Measures**

Most innovation strategies introduce horizontal measures to improve the framework conditions. The most common horizontal policy area included within the innovation policy is developing human capital. Indeed, all SEE countries have included measures to develop human capital within their innovation or science strategy. Strengthening intellectual property laws, facilitating access to finance and improving infrastructure are also listed among the main horizontal reforms to promote innovation in SEE.

Because a large number of talents have emigrated from the region in the last few years, brain gain programmes have attracted a lot of attention. All SEE economies include some measures to develop links with scientists who have emigrated. In Serbia, the strategy mentions that a database of Serbian scientists working abroad will be developed in order to set up partnerships, although the exact mechanisms are not developed in the strategy. In Croatia, two projects- “Brain Gain” and “Unity through Knowledge”- aim to attract Croatian scientists who have emigrated and to integrate young Croatian scientists into the workforce by facilitating short-term placements of expatriate scientists within research institutions/industry and long-term placements at scientific institutions. In spite of their ambitions and of anecdotal success stories, no comprehensive impact assessment of brain gain programmes has been conducted so far that would establish the human capital gain.

Besides efforts to encourage emigrated scientists to relocate in the economy, a number of measures are also developed to increase human capital domestically. These measures can be segmented into measures to promote higher education and research and actions that aim to improve the connection between skills and labour market needs. Concrete measures to develop higher education and research include offering scholarships to researchers and doctoral students (in Albania, Romania and Serbia), implementing higher education reforms (in Albania, Bosnia and Herzegovina, Kosovo, Montenegro and Serbia) and supporting young researchers (Bulgaria and Croatia). To promote the integration of skills into the labour market, career development facilities have been set up, for example in Romania, and entrepreneurial training programme have been developed, for example in Bulgaria.

Although human capital is clearly the main framework condition mentioned in the innovation framework, various other areas are also touched upon. In general, in these areas, the innovation strategies mainly refer to the work conducted or to other strategies and rarely include specific measures. Evolution of the legal framework and of the institutional setting for the implementation of IPR is often described. The facilitating of the access to finance is another important framework condition.

**Measures for companies**

Although most innovation strategies in SEE mention the need to develop linkages between research institutions and the private sector, few include a comprehensive set of measures to increase the level of innovation in the private sector. Two broad types of policies have been designed in the region to foster
competitiveness. In order to promote private investment in innovation, governments provide various types of financial support measures to companies. Furthermore, to promote the creation and growth of innovative companies, specific infrastructure has been put in place.

The main supports to innovative companies provided by governments in SEE are schemes to help them finance innovation projects. Two types of support exist: funding to develop specific research projects and more horizontal forms of support through tax incentives. Co-financing of innovation projects has been set up in Bulgaria, Croatia and in Romania. In Croatia, co-funding is also provided for consultancy services. Other measures to foster innovation among companies are financial support for start-ups (Bulgaria, Croatia), favourable loans (Bulgaria, Croatia), voucher schemes (Albania, Bulgaria) and grants offered through competitive contests (Croatia, Serbia). To be effective, these schemes need to be sufficiently advertised. Furthermore, in order to ensure that political factors do not interfere with fund distribution, some SEE economies have set up independent innovation funds (see Box 10).

In most SEE economies, innovation measures are financed directly from the budget of the relevant ministries. However, in Bulgaria and in Montenegro, specific funds have been set up that are in charge of administering some of the resources dedicated to innovation. This set up, which increases the independence of the institution responsible for the distribution of funds, allows for greater transparency of funds attribution (see Box 10).

Box 10. The Bulgarian Innovation Fund

The innovation fund in Bulgaria was set up in 2005 in order to help companies improve their competitiveness, in particular within the perspective of the adhesion of Bulgaria to the European Union. Through the funds, the government of Bulgaria seeks to provide support to companies that are innovating and to foster co-operation between companies and research institutions.

The fund subsidises a percentage of the total R&D investments in companies. Projects are selected through tenders that are organised twice a year based on their innovativeness and on their potential economic impact. The fund covers projects during between eight months and three years. The subsidies amount to 50% of the costs for Research projects and 25% for development projects. In order to provide an incentive for companies to set up linkages with universities, the fund covers an additional 10% of the costs of the project if a partnership is established. The maximum subsidy offered by the fund amounts to BGN 500 000 (approximately EUR250 000).

In addition to these grants, the innovation fund also provides subsidies for feasibility studies for innovative projects. These subsidies cover 50% of the wage expenditures and subcontracting costs incurred by the feasibility studies.

In 2007, a total of BGN 13 million (approximately EUR 6.6 million were allocated through the fund. In its review of measures to be implemented to support the development of skills and innovation in SMEs, the European Commission presented the fund as a particularly successful initiative. (European Commission, 2008)

Besides financial support, most innovation strategies explicitly emphasise the need to support technology centres, business incubators and clusters. Concrete measures are rarely included within the innovation strategy. More concrete policies addressing these issues have been adopted following the introduction of the strategy in Bulgaria, in Croatia and in Serbia. In Romania, even though no specific legislation for clusters exists, there are certain measures to support clusters. In the other economies, cluster programmes are very limited. Two clusters have been set up with international donors’ support in Bosnia and Herzegovina while none seem to operate in Albania and Montenegro. Besides clusters, governments have set up schemes to create and promote business incubators, often with international assistance. Bulgaria, Croatia, Romania and Serbia seem to have developed business incubators better than the other SEE economies. In Bosnia Herzegovina, twelve incubators operate, although most of them are supported
by donor initiatives. In the other SEE economies, although some initiatives have been launched, they have been relatively unsuccessful and incubators are still in a nascent phase.

In addition, trainings are provided to strengthen the innovative capacities of firms and foster entrepreneurship. In Bulgaria and in Serbia, trainings are offered to businesses in specialised services such as innovation diagnostic and scanning. In Croatia and in Albania, training programmes focus on improving technical and managerial skills. In Romania no specific measure is included within the strategy.

**Reform of research activities**

Research activities are generally governed by the Ministry of Science or, as is the case in Albania, by an academy of science. The institutions responsible for research activities are financed either directly by the Ministry or through a specific fund administered independently from the Ministry, as is the case in Bulgaria and Croatia. The draft innovation strategy of Albania includes a proposal to set up such a research funding agency.

These funds are based on the state budget and can be complemented by foreign funds from international organisations (such as the World Bank or European Structural Funds), international programmes (such as EUREKA) and bilateral donors. These funds generally distribute project-based funding to research institutes, academic institutions, university hospitals, other R&D units and SMEs. In Croatia, for example, the Science and Innovation Investment Fund had a grant scheme in 2009, targeting universities and research organisations, and financing technology transfers within the European Commission’s Instrument for Pre-Accession Assistance programme. From 2010 until 2012, it is providing technical assistance and advisory assistance to the grantees.

**Linkages**

Linkages between institutions and the private sectors are weak in most SEE countries. Initiatives, such as the creation of science and technology parks and technology transfer centres, have been conducted in most SEE economies. Nevertheless, only Bulgaria and Croatia have taken certain measures to improve linkages between the private sector and businesses.

In Croatia, BICRO created a programme to promote linkages initiatives called TEHCRO. This initiative helps knowledge-based start-ups use universities’ and research institutes resources for technology transfer. The programme supports the existing network of Technology Business Centres, R&D centres, and specialized Technology Incubators. The total value of funded projects exceeds 21.99 million Euros, but each public budget Euro invested through the TEHCRO programme attracts 1.34 Euros from other funding sources. In 2010, the six TEHCRO centres reported a significant workflow that included: 781 applications for services; 196 feasibility studies, business plans and various funding applications completed for client companies; 38 start-up companies being accepted into the incubation programmes; 51 entrepreneurship promoting events organised, 41 training events organised for SMEs and academic community, with a total of 1677 registered participants.

Albania and Kosovo are currently considering reforms that would improve linkages. The Albanian SME strategy proposes a plan to launch a National Technology Programme which would create linkages between academic research institutes and the private sector; one programme is to be launched in the period 2010-2015 and two or three more by 2020. The research strategy of Kosovo also proposes a plan to establish a programme to support science-industry relations, which will be launched in 2013. This programme for applied research and technological development is to be drafted in 2012 by a working group with science and business representatives and implemented in 2014, targeting SMEs, the large industry and the services sector.
Design and implementation of the innovation strategies

The institutional framework in SEE economies generally follows a similar model. Innovation related policies and programmes are defined and implemented by a single ministry, in general the ministry for education and science. This is the case in Albania, Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, Romania and Serbia. In Bulgaria, the strategy was initiated both by the Ministry of Science and the Ministry of Economy, but the Ministry of Economy is actually the main beneficiary of the strategy. In order to collect inputs from various stakeholders, SEE countries, with the exception of Bosnia and Herzegovina and Montenegro, have set up institutions that provide guidance on innovation matters (see Box 11).

**Box 11. Agencies for innovation policy design**

In order to increase the inclusiveness of innovation policies, SEE economies have set up specific agencies to help define the general direction of innovation policies, revise the action plans annually and eventually monitor their implementation. In general, these institutions are directly attached to the lead ministry (Albania, Bulgaria, Croatia, Kosovo, Romania and Serbia).

These agencies allow in particular for inter-institutional dialogue. In Croatia, a specific body, the Government Body for Science and Technology Policy, gives directions, approves policies, co-ordinates and provides government support. It is headed by the Prime Minister and includes the Minister of Science; the Minister of Economy; the Minister of Finance; the Minister of Sea, Tourism, Transport and Development; the Minister of Environmental Protection, Physical Planning and Construction and two members representing the R&D community.

In Bulgaria, Croatia, and Romania, the agency responsible for innovation policy design is also responsible for consulting with the private sector. For example, in Romania, the National Authority for Scientific Research composed the innovation policy through consultations with more than 800 representatives from research institutes, universities, enterprises, professional and employer’s associations, NGOs and public administrations, using in particular electronic surveys.

**Monitoring the innovation policies**

In most SEE economies, assessments of the impact of the innovation strategies have been conducted, either by external auditors or by academia. Usually, these assessments involve a SWOT analysis and a comparative analysis of the inputs and outputs of the innovation systems. Besides these external monitoring, governments in SEE generally do not monitor consistently the implementation of the innovation policies. Only Bulgaria, Croatia and Romania have had some follow-up procedures after the adoption of the strategy and the implementation of the action plan.

The main external reports that have assessed the propensity of some SEE countries to innovate are PRO INNO Europe, and the World Economic Forum.

- **PRO INNO Europe** is an initiative of Directorate General Enterprise and Industry and produces reports, such as the Inno-Policy Trendchart, the European Innovation Scoreboard, and the Innobarometer. PRO INNO Europe assesses the innovation performance within the EU and a few non-member states, such as Croatia. UNESCO’s Regional Bureau for Science and Culture in Europe has reviewed the Science, Technology and Innovation policies in the throughout SEE in order to make recommendations for the definition and implementation for a science and technology policy of Bosnia and Herzegovina.
The World Economic Forum ranks all countries by their competitiveness in its Global Competitiveness Index, and includes innovation as part of the components of measuring competitiveness. These assessments highlight the general challenges met by SEE national innovation systems.

Croatia updated its innovation policies in 2008 with an action plan drafted by the National Commission for Framework Programmes. The action plan includes financial, fiscal and structural measures to strengthen the absorption capacity of Croatian scientific organisations for the European Commission’s Seventh Framework Programme. As Bulgaria and Romania are both EU members, they have to monitor the progress made in reaching the objectives set by the EU 2020 initiative. In Bulgaria, prior to EU adoption, the innovation strategy was monitored and updated annually for three years from 2005 to 2007. However, no assessment has been conducted since then. In 2011, the Romanian National Agency for Scientific Research initiated an interim evaluation of the national innovation strategy and its action plan.

Key documents

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2. **Bosnia and Herzegovina**


Ministry of Civil Affairs (2009), *Strategy for the Development of Science in Bosnia and Herzegovina (2010 – 2015).*

3. **Bulgaria**


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4. Croatia


Ministry of Science, Education and Sports (2001b), *HITRA: Croatian Program for Innovative Technological Development (HITRA)*.


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5. Kosovo


6. Montenegro


7. Romania


8. Serbia


Ministry of Science and Technological Development (2009), *Strategy of Scientific and Technological Development 2010-2015*.

APPENDIX 2: METHODOLOGY

The methodology for the background research for the report involves both a quantitative and a qualitative analysis.

Quantitative analysis

The main sources of the quantitative analysis of this report were two surveys, one by the OECD and one by the EU, data provided by the Central Registry, the State Statistical Office of the republic of Macedonia and a variety of indicators from international sources.

OECD Innovation Survey, 2011

This survey was developed with the purpose to address the problems that the private sector faces when dealing with innovation issues. The survey was conducted via face-to-face interviews by GfK, Skopje from May to June, 2011.

The OECD survey on the innovative activities of business enterprises stratified companies in three clusters according to their number of employees: small (less than 9 employees), medium (10-49 employees) and large companies (50+ employees). It should be noted that the standard EU definition is micro (less than 9 employees), small (10-49 employees), medium (50-249 employees), and large (more than 250 employees).

From the targeted 500 companies, 492 were successfully surveyed (224 small, 162 medium and 106 large). Companies were almost equally represented among the four sectors trade (28%), services (20%), manufacturing (20%), and construction (28%). 439 companies had private ownership, 15 companies had dominant (>50%) foreign investors, only 7 were owned by foreigners and 8 firms were still in state ownership, and 23 in mixed ownership.

A modified version of this survey was submitted to research institutions. The survey was distributed to universities by the Ministry of Education and Science. Since the number of responses that were collected is only 8, the survey was not used for a quantitative analysis; rather it provided more substance to the one-to-one interviews at universities, conducted for the analysis of the part for innovation in research institutions.

Community Innovation Survey (CIS), 2010

In 2010, the innovation capacities within the former Yugoslav Republic of Macedonia were evaluated by a survey conducted annually in the EU by the European Innovation Scoreboard (Ministry of Economy, 2010a). In Europe, the questionnaire is carried out within EU member states under Commission Regulation (EC) No. 1450/2004, implementing Decision No. 1608/2003/EC. NCDIEL and Contesti, Srl. conducted CIS in the former Yugoslav Republic of Macedonia between May 2010 and September 2010, using version 4 of the Community Innovation Statistics (CIS 4) a sample of 2000 companies were surveyed.

It was focused on all companies that had economic activities in the period 2006-2009 and the sample was extracted equally from all 8 statistical regions in Macedonia. In order to have comparable data with the
GfK Skopje’s study, CIS sample consists of 1980 companies in total, grouped in: 1394 small (1-9), 428 medium (10-49) and 158 large (50+) companies.

**Qualitative Analysis**

The quantitative analysis includes on-site interviews with government institutions and business sector and a focus group discussion with business representatives.

**On-site interviews**

The OECD conducted on-site interviews within the Ministry of Economy, the Ministry of Education and Science, a variety of government institutions and businesses. The full list of the institutions is provided in appendix 3.

NCDIEL conducted on-site interviews with more than 20 innovators – individuals and innovative SMEs were conducted by NCDIEL staff in the period July 2010 – June 2011 for the needs of the Macedonia Innovation Center – Innovation to Business (sponsored by USAID) and the multinational project: INTER VALUE) - Inter-Regional cooperation for valorisation of R&D (funded under the SEE Transnational Cooperation Programme – 1st call). The target group of those two projects are innovators – individuals and innovative SMEs. During interviews and an evaluation process, more than 20 innovations were selected for an analysis of the possibilities for market commercialisation and potential investments by investment bodies.

**Focus group**

GfK, Skopje conducted a focus group in the premises of the Best Western Hotel, Skopje on 12th May, 2011. The basic research method was a group discussion with 7 companies. The discussion was facilitated by a trained moderator (psychologist), in accordance with the structured discussion guide, developed by the OECD and approved by the participants in the discussion. In addition to the written report, an audio recording of the focus group discussion was made and is available upon request (in Macedonian). The sample included both innovative and non-innovative companies from a variety of sectors.
# APPENDIX 3: KEY INSTITUTIONS MET DURING THE PREPARATION OF THE REPORT

<table>
<thead>
<tr>
<th>Project Team</th>
<th>Position/Title</th>
<th>Ministry/Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imerali</td>
<td>Head of Department</td>
<td>Ministry of Economy, Department for Entrepreneurship and Competitiveness of SME</td>
</tr>
<tr>
<td>Baftijari</td>
<td>Deputy Head</td>
<td>Ministry of Economy, Department for Entrepreneurship and Competitiveness of SME</td>
</tr>
<tr>
<td>Suzana</td>
<td>Head of Unit</td>
<td>Ministry of Economy, Department for Entrepreneurship and Competitiveness of SME</td>
</tr>
<tr>
<td>Arsova-Kostadinova</td>
<td>Advisor</td>
<td>Industrial Policy Department</td>
</tr>
<tr>
<td>Elizabeta</td>
<td>Advisor</td>
<td>Ministry for Education and Science</td>
</tr>
<tr>
<td>Todorova</td>
<td>Professor</td>
<td>Faculty of Mechanical Engineering and National Center for Development of Innovations and Entrepreneurial Training</td>
</tr>
<tr>
<td>Jasmina</td>
<td>Project Coordinator</td>
<td>MASIT, ICT Chamber of Commerce</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Institutions</th>
<th>Role/Title</th>
<th>Ministry/Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metodij Hadzivaskov</td>
<td>Vice Minister</td>
<td>Ministry of Economy</td>
</tr>
<tr>
<td>Majstoroska Suzana</td>
<td>Head of Unit</td>
<td>Ministry of Economy, Industrial policy department</td>
</tr>
<tr>
<td>Ignatovik-Aleksova Mrs.</td>
<td>Economic Policies Advisor</td>
<td>Cabinet of the Vice Prime Minister in charge of Economic Affairs, Economic Policy Unit</td>
</tr>
<tr>
<td>Romanela Jelena</td>
<td></td>
<td>Cabinet of the Vice Prime Minister in charge of Economic Affairs, Economic Policy Unit</td>
</tr>
<tr>
<td>Dimitrijevic Mitko Aleksov Jasna</td>
<td></td>
<td>Ministry of Education and Science</td>
</tr>
<tr>
<td>Petkovska Natasha</td>
<td>Coordinator/ Assistant</td>
<td>Association of Chambers of Commerce</td>
</tr>
<tr>
<td>Petkova Danco Petrov</td>
<td>Project Coordinator</td>
<td>YES Incubator</td>
</tr>
<tr>
<td>Vahida Igor Velevski Jadranka</td>
<td>Assistant Director</td>
<td>Technological Industrial Development Zone Invest Macedonia</td>
</tr>
<tr>
<td>Arizankovska Frosina</td>
<td>Director</td>
<td>Macedonian Chambers of Commerce</td>
</tr>
<tr>
<td>Jovanovska Vahida</td>
<td>Coordinator</td>
<td>Macedonian Chambers of Commerce</td>
</tr>
<tr>
<td>Mrs. Gabriela Kostovska</td>
<td>Managing Director</td>
<td>Agency for promotion of entrepreneurship - APPRM Management and Industrial Research Foundation- SINTEF</td>
</tr>
</tbody>
</table>
Universities
Pece
Nedanovski  Vice-Chancellor  University of Saints Cyril and Methodius
Dragi  General Manager  Scientific Council - Centre for Research, Development
Dimitrijevski  Dean  and Continuing Research (CIRKO)
Ljupco Pejov  Assistant Professor  Faculty of Agriculture
Centre for Research, Development
Lumni Ajvazi  Professor  Centre for business Development - University of
Pop-Jordanov  Professor  Southeast Europe
Macedonian academy for science and art

Business
Kliker Marketing, Skopje
Verica Verica
Petar  Managing Director  Lihnida, Ohrid
Golaboski  Managing Partner  Microtel, Skopje
Bozo Lazetic  Sonja
Todorova  Head of Marketing  Pivara Skopje
Vladimir  Parleev  General Manager  REMA Computers, Skopje
Joze  General Manager  Ruen, Kocani
Anakievski  Vasil  Seavus, Skopje
Gocevski  Rados  Head of Marketing  Tikves Winery, Kavadarci
Vukicevic  Martin  Kochmanovski  Elena
Mladenovska-  Mladenovska-
Jelenkovic  Head of Marketing and  Tinex, Skopje
Todor  Department Manager  Product Development
Georgievski  Department  TTK Bank, Skopje
Marta  Elena
Naumovska  Head of Marketing and
Gmrarova  Product Development
Daniela  Department
Aleksandar  Todor
Mazni  Executive Director  World Wide Bakery, Skopje
Managing Partner  Zoki Rol, Skopje
General Manager  Zavar Company, Skopje
Managing Partner  Zoom Consultancy, Skopje